



Economic Impact Analysis Virginia Department of Planning and Budget

12 VAC 5-610– Department of Health (State Board of) Sewage Handling and Disposal Regulations February 4, 2002

The Department of Planning and Budget (DPB) has analyzed the economic impact of this proposed regulation in accordance with Section 9-6.14:7.1.G of the Administrative Process Act and Executive Order Number 25 (98). Section 9-6.14:7.1.G requires that such economic impact analyses include, but need not be limited to, the projected number of businesses or other entities to whom the regulation would apply, the identity of any localities and types of businesses or other entities particularly affected, the projected number of persons and employment positions to be affected, the projected costs to affected businesses or entities to implement or comply with the regulation, and the impact on the use and value of private property. The analysis presented below represents DPB's best estimate of these economic impacts.

Summary of the Proposed Regulation

The proposed regulations will establish new requirements for mass sewage disposal systems. The substantive changes include making proposed subdivisions with massed drainfields subject to mass sewage system requirements, modifying the footprint area calculation method, adopting new vertical distance requirements for mounding below the absorption area, establishing geotechnical evaluation requirements for flows exceeding 5,000 gallons per day (gpd), and establishing a requirement for filing a dedication document.

In addition to mass sewage system requirements, new criteria for the percentage of rock allowed in the soils below a soil absorption system will be established. All of the onsite systems regardless of size will be subject to this last requirement.

Estimated Economic Impact

Collection, conveyance, treatment, and disposal of sewage are subject to regulations because they affect public health. The proposed regulations will expand the definition of mass sewage systems to include massed individual systems and establish new rules for mass systems and for the allowable rock content of all onsite sewage systems. Currently, there are no regulatory requirements for mass sewage disposal systems and for the quantity of rock allowed in soils. Instead, the Department of Health (the department) has an informal policy to enforce permitting and design procedures in these areas. The policy has been administered under the general provisions of the Sewage Handling and Disposal Regulations since 1984.

Mass Sewage Disposal Systems:

The proposed changes will add new regulatory requirements for mass sewage disposal systems. These systems have average flows over 750 gpd. Mass systems serve a cluster of sources or large individual sources. The types of onsite wastewater mass systems include multi-family housings such as condominiums, shopping centers, commercial enterprises such as restaurants, and combined systems such as subdivisions. Single-family dwelling lots will be subject to the proposed mass sewage disposal system requirements if developed as a part of a subdivision. These mass systems have a greater potential for failure than small commercial onsite systems and pose a higher risk of surface and ground water contamination than do smaller ones.¹

a. Massed Single Family Sewage Systems: The proposed regulations will add new evaluation requirements for drainfield layouts of subdivisions with single-family residences to determine if they have the potential for groundwater mounding or nitrate contamination. These residences are not subject to evaluation requirements under the current department policy. The department indicates, however, that some developers are massing as many as a dozen or more single-family drainfields together. The department believes that massing individual systems may cause premature failure from groundwater mounding and the contamination of wells around and downgradient from massed drainfields.

With the proposed changes, a massed system applicant will be required to analyze the potential for water mounding below the absorption area, collect and analyze background samples

from the groundwater, and submit the evaluation to the department along with the application for a construction permit. Water mounding evaluation must demonstrate that there is appropriate distance between the sewage trench bottom and the top of water mounding over the water table to treat the discharged effluent. The required distance decreases as the treatment level increases. This new requirement creates the possibility that some massed system owners may be required to treat the effluent to be able to continue with the development project. In some other cases, the project may no longer be feasible even with the highest treatment level. Thus, if the water mounding is a limiting factor, of the five massed system applications expected annually, some owners will likely incur significant treatment costs and some others may choose to abandon the development project.

Additionally, massed individual systems will be subject to the groundwater standards established under 9 VAC 25-260-190, which require less than 5 mg/l nitrate-nitrogen concentration in groundwater. The massed system owners will be required to comply with the nitrate standard. Since this is a new requirement for massed individual systems, there is likely to be additional costs on the owner. The magnitude of additional costs will depend on the compliance method chosen. There will be several options available to the owners to comply with the nitrate standard. First, the owner may choose to decrease the amount of effluent discharge to meet the nitrate standard. For a given area, this could be achieved by reducing the number of dwellings or the size of such dwellings. Second, the applicant may treat the sewage to comply with the nitrate standard. This may require redesigning the system and/or installing new treatment equipment. Third, the applicant may be able to proceed with the current project by increasing the land area available for dilution. This may require purchase of additional land area. Finally, the applicant may want to reevaluate the validity of the other assumptions used in the site evaluation. For example, the actual nitrogen concentration in the rain may be lower in some areas than the assumed level. If the owner is not able to comply with the nitrate standard through any of these means, then the development project will require substantial modification or may even be abandoned.

The department expects about five massed system applications a year that may be subject to mass drainfield requirements. In most of these cases, compliance with water mounding and

¹ Source: The Department of Health.

nitrate standards are likely to introduce significant compliance costs on massed individual sewage system permit applicants.² Some development projects may have to be modified at significant costs and some may no longer be feasible. However, there is no data available to determine potential additional costs on massed individual system owners.

On the other hand, the proposed regulations are likely to improve the quality of groundwater in the proximity of these massed individual systems.

b. Minimum foot print area: The proposed regulations will establish a new method to calculate the required minimum footprint area. The footprint area is an area where sewage is licensed to be disposed. It includes the absorption area and a reserve area that can be used as the absorption area if needed. The size of the required absorption area is determined by the degree of treatment provided, site and soil conditions, and the method of dispersal. Currently, the department uses the percolation rate to determine the required footprint area. The percolation rate is a measure of soil's hydraulic conductivity in terms of the rate of absorption. It is stated in terms of the movement of effluent toward the center of gravity in terms of inches per day and calculated based on observations made at static time intervals. For soils that are conductive, no reserve area is currently required. For soils that are not conductive the agency requires designation of 50% reserve area in the sewage system footprint. The proposed regulations will modify the footprint area calculation method and provide a table for the required minimum footprint area. The proposed methodology differs from the current practice in three ways.

First, the hydraulic conductivity will be stated in terms of Ksat rate, a metric measure of absorption rate stated in terms of centimeter per day, instead of the percolation rate, which is a standard American measure of absorption rate stated in terms of inches per day. The sewage system permit applicants will be required to use the proposed new measure of rate of absorption. The agency will provide a conversion chart for approximate Ksat rates corresponding to the percolation rates during six month to one year transition period when the regulated industry become familiar with the proposed measure. However, the industry will eventually start calculating and using the Ksat rates.

² Source: Representatives of Virginia Society of Professional Engineers and Virginia branch of National Onsite Wastewater Recycling Association.

The agency indicates that the Ksat test is scientifically more appropriate, more reliable, accepted world wide, easier, faster, and cheaper to conduct. Ksat rate is calculated based on observations made in continuous time as opposed to observations made in static time intervals. It can be performed within 3 to 4 hours as opposed to two days for the percolation test. The cost of equipment to estimate Ksat rate is in \$500 to \$1,500 range whereas the percolation test equipment is relatively cheap requiring a bucket or drum for water, an auger, a tape measure and a few nails.³ Mass sewage system applicants or their consultants will have to purchase new equipment due to proposed use of Ksat rate. This will introduce one time costs on the industry. However, ongoing cost savings due to faster testing may exceed the additional one time equipment costs at a reasonable discount rate. Additionally, Ksat test may provide additional environmental and health benefits because it is a scientifically more appropriate conductivity measure.

Second, the proposed footprint area, which includes the reserve area, will vary for each of the eight categories of Ksat rates. Currently, there are only two categories. For above average absorption rates, no reserve area is required while for below average absorption rates, 50% reserve area is required.⁴ The proposed regulations will establish 10 different categories where the footprint area increases linearly as the conductivity decreases. The establishment of ten categories is likely to better meet the footprint requirements of sewage systems varying in size than is the current two categories. The required reserve area will be 100% of the absorption area for all ten categories. This means that applicants who are currently required no reserve area will be required to have a 100% reserve area. These changes will double the required footprint area for some of these applicants. The applicants who are currently required 50% reserve are will be required 100% reserve area. This will increase the required footprint area by 1/3 for some of the applicants. Thus, all property owners will be required a larger footprint area.

Any change in the footprint size will likely have a direct impact on the profitability of a real estate development project. The additional costs may come from reduced area for development or an increase in treatment costs. On the other hand, larger footprint area is likely to be insurance for failing systems. This may prevent exorbitant costs in cases when a system

³ Source: The department.

⁴ Above average Ksat rates are greater than 10 cm/day while below average rates are less than or equal to 10 cm/day.

fails and there is no sufficient reserve area to discharge the effluent. The potential risks to ground and surface water contamination from such large systems may also be reduced if the owner purposefully avoids acknowledging a failing system due to high costs of compliance.

Third and more importantly, the proposed footprint area will take into account different sewage treatment levels. Required footprint area decreases as the treatment level for the sewage increases. The treatment level of the effluent is another dimension that will be taken into account when issuing permits. According to the agency, the proposed footprint sizes will be higher for less treated effluent and lower for better-treated effluent. Thus, the proposed change is likely to provide cost savings to some applicants and introduce additional costs to some others. However, the establishment of six categories for varying treatment levels is likely to better meet the footprint requirements of sewage systems varying in pollution potential than the current practice. In addition, unlike the soil conductivity rate, the treatment level is under direct control of the property owner. This feature provides a valuable option to the permit applicants. The idea is that if the owner better manages or treats the effluent then a smaller footprint area will be allowed. Applicants who wish to reduce the footprint area will likely choose to increase the treatment level. This optional feature is likely to be used if it is beneficial to do so. If the treatment costs do not justify the savings in footprint area, the owner will likely simply choose not to increase the treatment level. Also, if the treatment costs do not vary between different locations, then developers in valuable land areas would especially be eager to take advantage of the proposed rules.

Furthermore, for soils with very low hydraulic conductivity (K_{sat} is between 0.001 cm/day to 0.8 cm/day) the department does not propose any footprint requirement, but will evaluate each application on a case-by-case basis. Currently, no permits are issued for soils with these characteristics. About one or two applications per year are expected to apply for special consideration under this category. Slowly moving soil characteristics are especially prevalent in Loudon County, Prince William County, and Fairfax County. The proposed changes may benefit some applicants if the department allows new sewage systems in these localities. Some landowners might be allowed to develop new areas for residential purposes.

c. Water Mounding: Another requirement will be for the water mounding below the absorption area. Currently the distance between the sewage trench bottom and the top of water

mounding over the water table must be at least 18 inches for all types of discharges. The intent of the proposed distance is to ensure that there is enough soil to treat the effluent discharged before reaching the water table. The proposed regulations will adopt different distance requirements depending on the type of sewage discharged. The distance will be required to be 24 inches for primary effluent which is untreated discharge directly coming from the septic tank, 18 inches for secondary effluent which is treated somewhat (BOD and TSS less than 30 mg/L), 12 inches for advanced secondary effluent (BOD and TSS less than 30 mg/L), 6 inches for enhanced secondary treatment and disinfected effluents (chlorinated effluent). The proposed amendments recognize that different distances may be more appropriate for different levels of treatment for soil to perform its filter function.

These proposed standards have the potential to be more or less stringent than the current standard depending on the type of effluent discharged. For the discharges of untreated effluent, the proposed standard will be more stringent as an additional 6-inch distance will be required in addition to current generic 18-inch distance. The proposed additional 6-inch may not be available for some primary effluent discharges. Owners of these systems may have to install some treatment equipment to convert the primary effluent to secondary effluent to be able to obtain a permit. Thus, the proposed standard may reduce the areas that would be constructed as new dwellings or may require installation of new equipment to obtain a permit. According to the agency, dense areas (2-4 bedroom houses per acre) are most likely to be affected by the more stringent distance requirement, as it is relatively difficult to expand the drainfield area to obtain a permit. On the other hand, for the discharges of advanced secondary effluent and better treated other types of effluent, the proposed standard will be less stringent. Owners of these types of potential systems will be able to obtain a permit. Thus, the proposed standard may also increase the areas that would be constructed as new dwellings. However, no data exists to determine how many systems will fall under each category.

d. Sampling requirements: The proposed amendments will also establish sampling requirements for mass sewage disposal systems that discharge septic tank effluent. Currently, sampling is required for all mass drainfields with secondary or better treatment. The owners of systems that discharge septic tank effluent will be required to conduct tests for eight variables: effluent flow, BOD, total suspended solids, total residual chlorine, fecal coliform, pH, dissolved oxygen, nitrogen. The frequency of proposed number of sampling increases as the plant size

increases. For example, BOD and total suspended solids will have to be sampled twice a year for mass flows less than 5,000 gpd whereas total residual chlorine will be required to be sampled three times a day for flows over 100,000 gpd. The department does not expect any septic tank effluent system greater 40,000 gpd to come online. Thus, the main effect is expected to be on septic tanks systems less than 40,000 gpd.

The proposed sampling requirements are likely to introduce costs on the owners of these systems. Since an operator is already required under the current policy to visit the plant periodically additional compliance costs would be mainly for the testing and are expected to be about \$600 for systems greater than 5,000 gpd and \$100 for systems less than 5,000 gpd.⁵ Additionally, there may be additional costs on owners, as they will be required to fix the system to the standards when tests indicate a violation of standards.

On the other hand, the proposed monitoring is likely to help identify problems with the system and prevent discharge of effluents that may contaminate surface and ground water. This is likely to afford additional protection for the aquatic life and human health as these waters may be the drinking water sources or may be used for recreational purposes.

e. Geotechnical Evaluation: Mass drainfield flows exceeding 5,000 gpd will be required to have additional evaluation. The required additional evaluations include boring logs and geophysical data collected from the absorption area or other appropriate locations to analyze the potential impact on ground and surface water. The cost to produce the technical report is about \$6,000.⁶ The agency expects construction of about 10 to 20 systems per year with flows greater than 5,000 gpd.

The proposed evaluation requirement is to make sure that the data used in nitrate and mounding analysis is accurate, and the soil conditions beyond the system area are capable of handling the amount of discharge. Since these are very large systems, potential risks to ground and surface water contamination may be reduced by more accurate data.

f. Dedication Document: The proposed regulations will also introduce a requirement to file a dedication document with clerk of the circuit court stating that the sewage disposal areas and nutrient dilution areas will be used only for sewage disposal system and may not be excavated

⁵ Source: The department.

⁶ Ibid.

and used for permanent structures. This requirement will increase costs on permit applicants by about \$200 per case.⁷ Additionally, a survey will be required in most cases. The department indicates that survey costs vary significantly. In some cases, a survey may cost up to \$500. This requirement will help ensure that approved land area for sewage system is maintained and is not used for other purposes. In addition, it may help new owners to identify the location of the designated footprint area. The department indicates that dedication documents on most mass drainfields are currently required, but does not know how many additional systems will be required to provide the same dedication document.

g. Summary: The potential effects of some of the proposed amendments are counterbalancing each other. The two of the proposed changes discussed are likely to have significant and opposing effects on the land area available for development and on the sewage system owners. First, making massed individual systems subject to nitrate and water mounding requirements is likely to reduce the land area available for this type of real estate development, or introduce additional treatment costs on the owners. Second, allowing smaller footprint area and a shorter distance between the sewage trench bottom and the top of water mounding for treated effluents is likely to increase the land area available for real estate development and consequently benefit the land owners. Thus, some development projects will be feasible under the proposed changes and some will no longer be feasible.

Allowable Rock Content in a Drainfield:

The proposed regulations will introduce new requirements for depth of suitable soil for all systems including the mass systems if a high percentage of rock to soil content below the trench bottom is present. Soil provides treatment for septic tank effluent and high rock content between the trench bottom and the water table reduces the treatment capability of soil. Treatment capability of soil depends on its texture. For example, fine textures like clays clean the effluent in a shorter distance than coarser sandy materials. On the other hand, once sewage encounters rock it is free to travel unfettered to the water table and the only treatment that occurs is pathogen die-off due to time passed.

Currently, the department has been making decisions on permit applications for high rock content soils on a case-by-case basis without any formal guidelines. The proposed regulations

⁷ Ibid.

will establish regulatory rules for all applications. Thus, some of the systems that may be allowed under the current policy will no longer be allowed. The department estimates that about 1,500 to 1,800 dwellings may be affected by the proposed high rock content requirements.

For systems dispersing septic tank effluent, the proposed regulations will require a minimum of 18 inches of suitable soil below the trench bottom which may contain up to 60% rock fragments by volume and the soil has a texture of loamy sand or finer. If the soil materials are sand, then a minimum three-foot horizon of sand with up to 60% rock fragments must be present below the trench bottom. For systems discharging secondary or better effluent, the required distances are lower because secondary or better effluents may be treated in a shorter soil horizon below the trench bottom.

Additionally, soil horizons below the trench bottom that have greater than 60% rock fragments by volume may be considered for approval if the thickness of the high-rock content horizons is a minimum of three feet and the soil materials have a texture of loamy sand or finer.

The proposed changes are new for all systems regardless of their sizes and are likely to increase compliance costs on homes and businesses that utilize onsite systems. Some of the development projects will likely no longer be feasible due to rock content and minimum distance requirements that go together. Some permit applicants may have to increase the size of the drainage area to obtain a permit or abandon the development project. This change is likely to reduce the land area considered permeable under the current regulations.

The proposed requirements will likely affect landowners seeking permits in areas of the state characterized by hilly or mountainous terrain with relatively shallow soils underlain by bedrock. In general, most of the rocky soils are found in the western portions of the state. Two examples of these regions are the Shenandoah Valley and the mountainous regions of southwestern Virginia, particularly the counties of Wise, Dickinson, Buchanan, Scott, Lee, and Tazewell. In addition, varying horizon depths of soil with rock fragments for treated and untreated effluent is likely to provide incentives to land owners to install treatment equipment.

On the other hand, the proposed rock content and minimum distance requirements are likely to provide additional protection for groundwater quality. Soil is used to naturally clean up sewage effluent. Assuring that there is adequate soil and not too many rock fragments, will likely prevent untreated sewage from entering shallow groundwater horizons. This may benefit

public by protecting natural groundwater resources and by preventing contamination of aquifers used for drinking water supplies.

In short, though some land may be able to continue with the development projects that are currently feasible by increasing the level of treatment, the proposed rock content and minimum distance requirements are likely to reduce the land area available for real estate development. Some development projects may no longer be feasible and cancelled.

Businesses and Entities Affected

The proposed regulations are expected to affect about 1,500 to 1,800 individual home builders with onsite systems, fewer than 50 real estate developers, 25 small businesses, and up to 5 schools annually.

Localities Particularly Affected

The proposed regulations apply throughout the Commonwealth. However, localities with very low hydraulic conductivity soil characteristics may be particularly affected. The department will start considering approval for this type of soils on a case-by-case basis. Slowly moving soil characteristics are especially prevalent in Loudon County, Prince William County, and Fairfax County. More significantly, the proposed high rock content and minimum distance requirements will most likely affect land owners seeking permits in areas of the state characterized by hilly or mountainous terrain with relatively shallow soils underlain by bedrock. In general, most of the rocky soils are found in the western portions of the state. Two examples of these regions are the Shenandoah Valley and the mountainous regions of southwestern Virginia, particularly the counties of Wise, Dickinson, Buchanan, Scott, Lee, and Tazewell.

As discussed above, the proposed rock content requirements are likely to reduce the land area available for real estate development in these localities. Some development projects may no longer be feasible and cancelled. If this happens, the local government real estate tax revenues in these areas of the Commonwealth may be affected. The decline in the land area considered permeable under the current regulations is likely to reduce the developed acreage in the tax base, and consequently, the tax revenues. The increase in real estate prices due to scarcity is likely to increase the average value of developable parcels and increase tax revenues. The net effect on tax revenues will depend on the sizes of these balancing effects. Which of these effects will be greater is not known.

Projected Impact on Employment

The proposed regulations have the potential to promote demand for labor if new areas could be developed, but also have the potential to reduce the demand for labor if some development projects become no longer feasible. Thus, the net impact on employment is not known.

Effects on the Use and Value of Private Property

Some of the proposed changes are likely to have an effect on the use and value of private property. The owners of land where massed individual systems are no longer feasible are likely to experience a decline in land values. Similarly, the owners of land where development is no longer feasible due to high rock content are likely to experience a decline in land values as well. On the other hand, the owners of land where development may be possible by sewage treatment equipment are likely to see an increase in their land values. Finally, greater protection of adjacent properties will raise their value.