House Joint Resolution 641 Report: Evaluation of Additional Issues Related to the Use of Rainwater as Part of the Rulemaking Process

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Virginia Department of Health
Office of Environmental Health Services
Division of Onsite Sewage and Water Services,
Environmental Engineering, and Marina Programs

VDH VIRGINIA DEPARTMENT OF HEALTH

To protect the health and promote the well-being of all people in Virginia.

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EXECUTIVE SUMMARY

In response to Chapter 817 of the 2018 Acts of the Assembly House Bill 192 (HB 192), codified as §32.1-248.2 of the Code of Virginia (the Code), the Virginia Department of Health (Department) assembled a group of stakeholders and sought feedback from local health departments to assist in developing necessary regulations for rainwater harvesting. Thus far the stakeholder group has met four times to discuss these issues. Based on the efforts of the workgroup and responses from local health departments, the Department's Office of Environmental Health Services (OEHS) prepared a Notice of Intended Regulatory Action (NOIRA) to be submitted by the end of 2019.

The development process included reviewing systems that collect rainwater for use by commercial enterprises but do not provide water for human consumption, as defined in §32.1-167 of the Code. The Department and the stakeholder group, as requested by House Joint Resolution 641 (HJ641) of the General Assembly 2019 Session, also evaluated additional issues related to the use of rainwater as part of the rulemaking process. The issues reviewed by the Department and stakeholder group included:

- The conditions under which rainwater may be appropriately used and for what purposes.
- Standards for the use of rainwater for human consumption.
- Standards for rainwater harvesting systems, including systems that collect rainwater for human consumption and systems that collect rainwater for use by commercial enterprises but not human consumption, as those systems are defined in §32.1-167 of the Code.
- A requirement that buildings that withdraw water from both rainwater harvesting systems and public water supplies maintain appropriate cross-connection safeguards.

- Training and certification requirements for installers of rainwater harvesting systems installed in buildings that draw water from both rainwater harvesting systems and public water supplies.
- Addressing water supply and water resource demand.
- Addressing impacts of drought on facilities reliant upon rainwater harvesting systems.
- Local ordinance requirements for connection to public water when rainwater harvesting is an available water supply solution.
- Lack of Department funding for program implementation.

The Department, in conjunction with the stakeholder group, identified the following key considerations for development of rainwater harvesting regulations:

- The use of harvested rainwater not intended for human consumption currently occurs safely and effectively under the Virginia Uniform Statewide Building Code (VUSBC), the International Plumbing Code, and the Department's Rainwater Harvesting & Use Guidance.
- Provision of harvested rainwater for human consumption is permitted under the Waterworks regulations for those systems that, on the basis of capacity and distribution, are classified as waterworks.
- Provision of harvested rainwater for human consumption for systems that, on the basis of capacity and distribution, would not be classified as waterworks, will require development of regulations pursuant to §32.1-248.2 of the Code.

The Department shares the stakeholder group's conclusion that it is appropriate to develop regulations pertaining to the use of harvested rainwater for human consumption by private systems (non-waterworks). Based on these considerations and conclusions,

the Department submits four recommendations for consideration by the General Assembly:

Recommendation 1 – Funding for a Rainwater Harvesting Permit Program

The General Assembly may wish to consider amending §32.1-248.2 of the Code and the Appropriation Act to establish fees for rainwater harvesting system for permitting and ongoing operation and maintenance review by the Department, based on system capacity and use.

Recommendation 2 – Local Ordinances

The General Assembly may wish to consider exploring options under Title 15.2, Subtitle II, Chapter 21 of the Code to address opportunities for users of permitted rainwater harvesting systems for human consumption to obtain relief from mandatory connection to public water supplies.

Recommendation 3 – Training and Certification

The General Assembly may wish to consider requiring certifications for persons involved in the design, installation, testing, and operation of rainwater harvesting systems.

Recommendation 4 – Private Well Water Quality

The General Assembly may wish to consider amendments to §32.1-176.2 of the Code to authorize the Board of Health (the Board) to ensure water quality of private wells conforms to reasonable requirements. Alternately, the General Assembly may wish to consider amendments to the Code to allow the Board to include in its regulations water quality standards applicable to the transfer of real estate served by one or more private wells providing water for human

consumption, or water quality standards applicable to commercial facilities serving sensitive populations (e.g. day care) relying on private well water for human consumption.

1.0 INTRODUCTION

In 2018, the General Assembly approved Chapter 817 of the Acts of the Assembly, including House Bill 192 (HB 192)[1] (see Attachment A). HB 192 directs the Board to include in its Regulations standards for the use of rainwater harvesting systems, including systems that collect rainwater for use by commercial enterprises but do not provide water for human consumption. HB 192 further directs the Department, in conjunction with the Department of Environmental Quality (DEQ), to promote the use of rainwater as means to reduce fresh water consumption, ease demands on public treatment works and water supply systems, and promote conservation. In addition, HB 192 directs the Department, in conjunction with DEQ, to consider recognizing rainwater as an independent source of fresh water available for use by the residents of the Commonwealth. HB 192 has been codified as §32.1-248.2 of the Code of Virginia.

During the 2019 Session, the General Assembly issued House Joint Resolution 641 (HJ 641) (see Attachment B), requesting the Department to evaluate additional issues related to the use of rainwater as part of the rulemaking process. HJ 641 required the Department to submit an update on the status of the rulemaking process to the General Assembly by November 1, 2019, and an executive summary and report of its progress in meeting the request of this resolution no later than the first day of the 2020 Regular Session of the General Assembly.

[1] HB192 states that the Board shall adopt regulations regarding the use of gray water and rainwater. This report to the General Assembly addresses rainwater. The Department will address the gray water aspect of HB192 by means of revision of the Sewage Handling and Disposal Regulations.

This report summarizes the Department's progress in meeting the request of HJ 641, and addresses issues related to the development of regulations addressing the harvesting and use of rainwater; specifically:

1. The conditions under which rainwater may be appropriately used and for what purposes;
2. Standards for the use of rainwater for human consumption;
3. Standards for rainwater harvesting systems, including systems that collect rainwater for human consumption and systems that collect rainwater for use by commercial enterprises but not human consumption, as those systems are defined in §32.1-167;
4. A requirement that buildings that withdraw water from both rainwater harvesting systems and public water supplies maintain appropriate cross-connection safeguards;
5. Training and certification requirements for installers of rainwater harvesting systems installed in buildings that draw water from both rainwater harvesting systems and public water supplies;
6. Addressing water supply and water resource demand;
7. Addressing impacts of drought on facilities reliant upon rainwater harvesting systems;
8. Local ordinance requirements for connection to public water when rainwater harvesting is an available water supply solution; and
9. Lack of Department funding for program implementation.

In response to HB 192, the Department assembled a Rainwater Harvesting Workgroup (see Attachment C) to explore the demand, needs, challenges, and obstacles pertaining to developing regulations governing rainwater harvesting. Stakeholders include Department representatives from: OEHS, the Department's Office of Drinking Water (ODW), the DEQ, the Virginia Coastal Policy Center, the Chesapeake Bay Foundation, Mission H_2O, the

Homebuilders Association of Virginia, the Virginia Municipal Stormwater Association, the Department of Housing and Community Development, the City of Newport News, academia (i.e. Virginia Tech, Longwood University), industry (Rainwater Management Solutions, Otto Sales, Lindl Corporation), and members of the general public that currently use rainwater harvesting systems not for human consumption (Tyrone Jarvis, Go Green Auto Care). Thus far the workgroup has met four times: December 17, 2018; March 25, 2019; May 6, 2019; and September 4, 2019. OEHS also reached out to local health departments for their thoughts in the development of regulations for rainwater harvesting. Based on the efforts of the workgroup and responses from local health departments, OEHS prepared a Notice of Intended Regulatory Action (NOIRA) to be submitted by the end of 2019.

2.0 BACKGROUND

Historically in the Commonwealth, the following regulations and guidance documents include reference to rainwater harvesting, or to issues that pertain to rainwater harvesting.

Virginia Uniform Statewide Building Code

The *Virginia Uniform Statewide Building Code* (VUSBC), administered by the Department of Housing and Community Development (DHCD), addresses requirements for plumbing, including provision for special application piping for non-potable water service and distribution. Non-potable water pipe is always purple in color to ensure that water lines fit for human consumption are not crossed with non-potable water lines. Purple pipe is generally dedicated to reclaimed water, a category which includes harvested rainwater. A common application is to harvest rainwater for use to flush toilets and urinals in structures such as schools.

Virginia Stormwater Management Program Regulations

The *Virginia Stormwater Management Program Regulations* (4VAC50-60) were developed by the Department of Conservation and Recreation (DCR) to address administration, implementation and enforcement of a permit program authorized by the federal Clean Water Act and the Virginia Stormwater Management Act. Associated with these regulations, DCR developed the Virginia DCR Stormwater Design Specification No. 6, Rainwater Harvesting, which contains design information for non-potable use and on-site stormwater disposal and infiltration, including components, configurations, and a cistern design spreadsheet. In 2013, the Virginia Stormwater Management Act was transferred from Soil and Water Conservation Laws to State Water Control Laws, and the Storm Water Management Regulations were transferred from DCR to DEQ.

DEQs *Virginia Stormwater Management Program Regulations (9VAC25-870)* provide a framework for the administration, implementation and enforcement of the Virginia Stormwater Management Act. They delineate the procedures and requirements to be followed in connection with state permits issued by the State Water Control Board (SWCB) pursuant to the Clean Water Act (CWA) and the Virginia Stormwater Management Act, and local permits issued by a Stormwater Management Program authority, while at the same time providing flexibility for innovative solutions to stormwater management issues. Under 9VAC25-870-74, stormwater harvesting is encouraged for the purposes of landscape irrigation systems, fire protection systems, flushing water closets and urinals, and other water handling systems to the extent such systems are consistent with federal, state, and local regulations.

Water Reclamation and Reuse Regulations

The *Water Reclamation and Reuse Regulations (9VAC25-740)* prohibit direct potable reuse of reclaimed water, the use of reclaimed water for food preparation or in beverage products, swimming pools, hot tubs or wading pools, or distribution to one- or two-family dwellings. Use of gray water, harvested rainwater and stormwater are excluded from the requirements of this regulation.

Waterworks Regulations

The *Waterworks Regulations (12VAC5-590)*, administered by ODW, address the location, construction and operation of public water systems. These regulations provide a regulatory framework for the use of surface water sources and groundwater sources under the direct influence of surface water sources, including harvested rainwater, as water sources for waterworks. These regulations also require every waterworks to establish and enforce a program of cross connection control and backflow prevention. The *Private Well Regulations (12VAC5-630)* address the location and construction of private wells. Subsequent operation of private wells and their water delivery systems, including water quality, is not covered by this regulation, nor is cross connection and backflow prevention.

Sewage Handling and Disposal Regulations

The *Sewage Handling and Disposal Regulations (12VAC5-610)* include construction requirements for nonpublic water supplies, other than a private well, that may be used in conjunction with an onsite sewage disposal for new construction (i.e. springs and cisterns) when there is no other feasible source of potable water. Section 1140 specifies that the system must be capable of supplying an adequate quantity of water at all times. Section 1170 specifies location, protection, and construction standards for cisterns. Adequate treatment and continuous

disinfection are required to insure potability. Generally, cisterns have been used to store potable water hauled from off-site.

Rainwater Harvesting Guidelines

In 2011, the Department issued the Rainwater Harvesting and Use Guidelines that provided guidance for the use of rainwater harvesting in the Commonwealth. The guidelines covered water quality requirements, cross connection control, component materials and sizing, among other factors. The guidelines recommended that harvested rainwater be restricted to non-potable uses.

The referenced regulations and guidance have provided residents of the Commonwealth information by which harvested rainwater systems may be installed in a variety of situations. These situations may be grouped by:

(1) Available water supply:

- Private water supply (for example, for a spray irrigation system).
- Dual water supplies (public and private; for example, use of harvested rainwater harvesting for toilets and urinals in public buildings served by a waterworks).

(2) Water use and delivery:

- Single interior plumbing systems.
- Separate plumbing system for non-potable reuse.

3.0 FINDINGS AND RECOMMENDATIONS

3.1 Findings

Per the directives to the Department articulated in HJ 641, the stakeholder group evaluated the following:

3.1.1 The conditions under which rainwater may be appropriately used and for what purposes.

The stakeholder group identified three conditions under which rainwater may be used: (i) not for human consumption with unlikely human contact, (ii) not for human consumption with potential for direct human contact, and (iii) for human consumption. Some of these conditions are covered under current regulations and guidance, while others are not covered under current regulations or guidance or regulations and guidance are incomplete.

Conditions addressed under current regulations and guidance.

- Not for Human Consumption with Unlikely Human Contact.

Example Use	Likelihood of Exposure			
	Ingestion	**Inhalation**	**Skin contact**	**Overall**
HVAC[1]	Rare	Rare	Rare	Rare
Rooftop thermal cooling	Rare	Rare	Rare	Rare

[1]Cooling tower, evaporative condenser, spray cooler, direct and indirect evaporative cooling

- Not for Human Consumption with Potential for Direct Human Contact.

Example Use	Likelihood of Exposure			
	Ingestion	**Inhalation**	**Skin contact**	**Overall**
Toilet and urinal flushing	Rare	Possible	Possible	Possible
Clothes laundering	Rare	Possible	Possible	Possible
Pressure washing	Possible	Likely	Likely	Likely
Decorative fountains	Possible	Likely	Likely	Likely
Vehicle washing	Possible	Likely	Likely	Likely

Example Use	Likelihood of Exposure			
	Ingestion	**Inhalation**	**Skin contact**	**Overall**
Spray irrigation	Possible	Likely	Likely	Likely

- For Human Consumption.

Use	Likelihood of Exposure			
	Ingestion	**Inhalation**	**Skin contact**	**Overall**
Waterworks (e.g. public water suppy)	Will occur	Will occur	Will Occur	Will Occur

Condition not addressed or incompletely addressed by current regulations and guidance.

- Human Consumption.

  Use of harvested rainwater for human consumption – including drinking, food preparation dishwashing, oral hygiene, bathing, showering, hand washing, and via pools, hot tubs, spas, splash pads, misting stations, and swamp coolers – has certainty of human exposure. The use of harvested rainwater for human consumption is currently allowed for under the requirements of the Virginia Waterworks Regulations. However, there is no regulation or guidance addressing use of harvested rainwater for human consumption in a private system.

3.1.2. Standards for the use of rainwater for human consumption.

Section 32.1-167 of the Code defines "human consumption" as *drinking, food preparation, dishwashing, bathing, showering, hand washing, teeth brushing, and maintaining oral hygiene*. The Code further defines "pure water" as *water fit for human consumption that is (i) sanitary*

and normally free of minerals, organic substances, and toxic agents in excess of reasonable amounts and (ii) adequate in quantity and quality for the minimum health requirements of the persons served. These standards apply to all waters provided via a waterworks, as regulated by the Waterworks Regulations. The Department does not regulate the quality of water withdrawn from private wells beyond a bacteriological sample to confirm proper construction. However, when a question arises regarding private well water quality, the Department references the water quality standards applicable to waterworks. Stakeholders agreed that similar standards for human consumption should be incorporated into rainwater harvesting regulations for human consumption in a private system (e.g., single family residential homes).

3.1.3. Standards for rainwater harvesting systems, including systems that collect rainwater for human consumption and systems that collect rainwater for use by commercial enterprises but not human consumption.

Considerable literature exists regarding standards for rainwater harvesting systems, including: the Rainwater Harvesting Manual, developed by the American Rainwater Catchment Systems Association (ARCSA), 2015; ARCSA/American Society of Plumbing Engineers (ASPE)/American National Standards Institute (ANSI) 63-2013: Rainwater Catchment Systems; and the International Code Council (ICC) 805-2018, Rainwater Harvesting Systems (National Standard of Canada). Additionally, language in current editions of the International Plumbing Code and the VUSBC address rainwater harvesting systems for non-potable use.

Standards for Systems that Collect Water for Human Consumption

ARCSA/ASPE/ANSI 63-2013, Rainwater Catchment Systems, includes sections addressing potable water applications (collection surfaces, cistern requirements, filtration, and disinfection). This standard requires rainwater catchment surfaces to be certified to National

Sanitation Foundation (NSF) NSF Protocol P151. NSF Protocol P151, Certification of Rainwater Catchment System Components, is a protocol created by a team of NSF scientists and water quality experts that confirms that rainwater catchment products do not impart contaminants into the water at levels that exceed USEPA drinking water regulations or advisories.

ICC 805-2018 includes sections addressing potable water applications (water safety plan, potable system protection, materials, and collection surfaces) and addresses potable usage within sections addressing design and installation, water quality, and tests and inspections. The standards presented in both ARCSA/ASPE/ANSI 63-2013 and ICC 805-2018 relate generally to building code considerations. As such, they appear to have direct applicability to the VUSBC, but less applicability to the Department's development of regulations for rainwater harvesting for private systems, other than as standards to be referenced.

Standards for Systems that Collect Rainwater for Use by Commercial Enterprises but not Human Consumption

The use of collected rainwater for use by commercial enterprises but not human consumption occurs presently per the VUSBC, the International Plumbing Code, and the Virginia Rainwater Harvesting & Use Guidelines. This has been an effective and safe system for providing rainwater not for human consumption. Under these requirements, for example, harvested rainwater has been used for purposes including industrial and commercial process water, and water supplied to toilets and urinals in structures such as schools. The requirements of §32.1-248.2 could be achieved by means of changing the status of the Guidelines to regulation, to include a general permit provision for systems not for human consumption, if deemed necessary.

The Department is aware that some commercial enterprise owners desire to utilize rainwater harvesting as a sole source of water supply, with the goal of disconnection from a public water supply for both economic and environmentally protective reasons. However, the Guidelines do not address all uses that meet the definition of human consumption (primarily hand washing, and, frequently, food preparation). The Department does not recommend providing an exception from human consumptions standards for commercial facilities that wish to limit use rainwater for hand-washing or other listed human consumption uses other than "drinking." In order to protect human health and promote the well-being of all people in Virginia, it is critical that the same definition of human consumption and pure water apply for all water sources used as a potable source. Further, the definitions for human consumption and pure water originate in the Safe Drinking Water Act. The General Assembly may wish to consider exploring options under Title 15.2, Subtitle II, Chapter 21 of the Code to address opportunities for users of permitted rainwater harvesting systems for human consumption to obtain relief from mandatory connection to public water supplies.

Feasibility of Regulating Harvested Rainwater for Human Consumption

In order for a local building official to approve a certificate of occupancy for a plumbed structure, the Department must approve the water source. Historically, the Department regulates the provision of potable water to structures in two ways, either by the Waterworks Regulations or by the Private Well Regulations. The number of users dictates the regulatory framework. Section 32.1-167 of the Code defines a waterworks as a "*system that serves piped water for human consumption to at least 15 service connections or 25 or more individuals for at least 60 days out of the year. "Waterworks" includes all structures, equipment, and appurtenances used in the storage, collection, purification, treatment, and distribution of pure water except the*

piping and fixtures inside the building where such water is delivered." Any rainwater harvesting system that serves piped water for human consumption to at least 15 service connections or 25 or more individuals for at least 60 days a year must comply with the standards for waterworks articulated in the Waterworks Regulations. The standards for waterworks include, but are not limited to: water quality sampling (parameters and frequency); compliance with Safe Drinking Water Act Maximum Contaminant Levels (88 distinct organic and inorganic chemicals); treatment process selection; disinfection; raw water monitoring; analytical laboratory control; Emergency Management Plans for extended power outages; cross connection and backflow prevention; recordkeeping; metering; standby power capability; Operation and Maintenance; fluoridation (or fluoride removal); stabilization; taste and odor control; and removal of volatile synthetic organic compounds (VOCs).

Harvested rainwater represents a previously untapped and undefined "source" of water for human consumption. A waterworks typically obtains water from groundwater or a surface water source, and private wells use groundwater as the sole water source. Generally, groundwater is a reliable source of pure water unless subjected to anthropogenic contamination or saltwater intrusion. Surface water requires treatment in order to meet pure water standards, which is why in Virginia it has been utilized by waterworks only, and not as a private source. Section 32.1-248.2 of the Code in part directs the Department, in conjunction with DEQ, to consider recognizing rainwater as an independent source of fresh water available for use by the residents of the Commonwealth. As is the case with surface water, treatment of harvested rainwater is necessary for it to be considered a source of pure water suitable for human consumption.

As previously noted, harvested rainwater can be used as a source for a waterworks. At the time of the preparation of this report, there is one permitted waterworks in Virginia using a harvested rainwater source, and another undergoing the permitting process. Rainwater harvesting systems that would not be regulated as a waterworks and for which the water would be classified as for "human consumption" will require the development of regulations that should address, at a minimum: performance objectives; collection parameters; drought protection; conveyance system requirements; pre-filtration requirements; storage parameters; pump and filtration parameters; disinfection and other treatment technique parameters; water quality parameters; and inspection, operation, and maintenance requirements. In order to be protective of human health, such regulations should also incorporate a permitting strategy. The Department has determined that such regulations would appropriately be administered by the OEHS.

3.1.4. A requirement that buildings that withdraw water from both rainwater harvesting systems and public water supplies maintain appropriate cross-connection safeguards.

The International Plumbing Code (§608.6.1.) prohibits cross connections between private and public water supplies. Section 12VAC5-590-590 of the Waterworks Regulations prohibits any connection whereby water from an auxiliary system may enter a waterworks. Waterworks customers having an auxiliary water system, such as a rainwater harvesting reuse system, may be classified as a high hazard. The waterworks will require these customers to install and maintain backflow protection to prevent backflow of water into the waterworks. The Waterworks Regulations require waterworks to establish a cross connection control program to prevent backflow of water of unknown quality into the waterworks. This program includes the inspection and testing of all backflow prevention devices annually, at a minimum.

The Private Well Regulations do not contemplate cross connection safeguards. None of the safeguards addressed above can be considered to apply in the case of a structure served by a private well and a rainwater harvesting system. In such circumstance, it is appropriate to consider cross connection and backflow prevention safeguards, primarily as a groundwater protection measure. The promulgation of rainwater harvesting regulations should include required cross connection controls between rainwater systems and private wells, and may necessitate revision of the Private Well Regulations to address cross connection safeguards.

3.1.5. Training and certification requirements for installers of rainwater harvesting systems installed in buildings that draw water from both rainwater harvesting systems and public water supplies.

Given that the Waterworks regulations and Virginia's plumbing code already incorporate strict backflow protection and cross-connection safeguards and that a rainwater harvesting system is an auxiliary water system (potential high risk), it is not anticipated that additional training and certification requirements would be necessary for buildings served by rainwater harvesting systems and public water supplies. Training to ensure the same level of backflow protection and cross-connection safeguards with respect to rainwater harvesting systems installed in buildings that also connect to private wells may need to be considered. Training and certification generally occurs under the authority of the Department of Professional and Occupational Regulation (DPOR). Accordingly, the Department will coordinate with DPOR during the development of a regulation addressing rainwater harvesting for human consumption.

The stakeholder group agrees that third party certification provides an appropriate level of confidence in parties involved in manufacturing, design, and installation, and should be included in the regulations for rainwater harvesting. The American Society of Sanitary Engineering

(ASSE) certification standards for installers, designers, and inspectors specifically address rainwater harvesting. The National Sanitation Foundation (NSF) maintains a certification program for materials and equipment used in water systems.

3.1.6. Additional issues.

The Department has identified the following additional issues through discussion with stakeholders.

Addressing Water Supply and Water Resources Demand

The Department's water supply programs serve the majority of Virginia's population with safe drinking water. Section 32.1-248.2 of the Code directs the Department, in conjunction with DEQ, to consider recognizing rainwater as an independent source of fresh water available for the residents of the Commonwealth. The Department has identified specific areas where rainwater harvesting could meet water demands. Those include areas that have insufficient groundwater resources, contaminated groundwater resources, saltwater intrusion and well inundation, or owner preference.

Generally, groundwater will be encountered almost anywhere a well is drilled in Virginia; however, there are locations where either groundwater is absent or where groundwater cannot be pumped at sufficient rate to support beneficial use. Such locations account for only a few potential well sites, but nonetheless is a factor for existing residences in the Commonwealth not served by a public water supply which rely on cisterns to hold hauled water. Rainwater harvesting could represent an option for such circumstances.

Pollution from leaking underground storage tanks, failing onsite sewage systems, and other sources can contaminate groundwater, affecting private wells. The typical solution is

abandonment of the contaminated well and installation of a new well at an appropriate separation distance. However, on small lots, this is not always feasible. In those cases, the alternative is typically hauled water to a cistern. Groundwater under the direct influence of surface water (GUDI) is water that is microbiologically unsafe due to rapid movement of water from the surface to a well or spring. This is frequently a problem in the karst terrain of the Valley and Ridge physiographic province. Water from coal seams and groundwater contaminated by coal mining is usually unsuitable for most uses. Rainwater harvesting could represent an option for each of these circumstances.

Well inundation is anticipated to increasingly become a factor for waterfront and nearshore properties in the Coastal Plain as a result of sea level rise. The Department cannot reliably estimate the number of existing private wells at risk due to the number of variables involved; however, tens of thousands of private wells currently exist within 500 feet of marine and estuarine shorelines in Virginia. Rainwater harvesting could represent an option for such circumstances.

Some residents desire to utilize rainwater harvesting as a sole source of water supply based on economic and environmentally protective reasons. Leadership in Energy and Environmental Design (LEED) green building certification, a globally recognized symbol of sustainability achievement, encourages rainwater harvesting and reuse. Rainwater harvesting could represent an option for parties who desire to adopt sustainability objectives.

Addressing Impacts of Drought on Facilities Reliant Upon Rainwater Harvesting Systems

Rainwater harvesting systems rely on precipitation and snowmelt for water supply. The stakeholder group has concluded that a backup water supply, such as a well, a public water supply, or contracted provision of hauled water, should be a component of regulations for

rainwater harvesting system used for human consumption because of the unpredictability of drought conditions.

In the event of a drought of sufficient severity as to necessitate local or statewide water use restrictions, the stakeholder group does not anticipate governing authorities would place restrictions on the use of harvested rainwater for irrigation, vehicle washing, or the like. A mechanism may need to be developed to ensure that water from a backup supply stored in a rainwater harvesting system is not used for restricted purposes if the backup supply is prohibited from that use. This would apply, for example, where the backup supply to a harvested rainwater system is a public water supply currently under a watering restriction due to drought. While harvested rainwater could be used under these circumstances for watering, the public water supply could not.

Local Ordinances and Similar Land Use Provisions

Many localities have promulgated ordinances requiring structures in areas served by a public water supply to be connected to that supply. For this reason, the owner of a private rainwater harvesting system for human consumption might be prevented by local ordinance from disconnecting from the public supply, and therefore to the commitment for paying a utility bill. Further, many localities base sewage disposal payments on the quantity of water obtained from the metered supply. The Department has no authority in the local governing process.

Aesthetics is another aspect outside of the Department's authority. Aboveground tanks used for water storage may be subject to local zoning considerations and Homeowner Association covenants, conditions and restrictions. Generally, rainwater harvesting for human consumptive use is anticipated to rely on below ground storage.

Funding Relative to Public Health Protection

Drinking water supply in Virginia is currently managed by the Department under three regulations: the Waterworks Regulations, the Private Well Regulations, and the Sewage Handling and Disposal Regulations for cisterns. As noted above, use of harvested rainwater for human consumption in systems that would qualify as waterworks would be addressed under the Waterworks Regulations. The Department recommends that smaller rainwater harvesting systems that would provide water for human consumption fall under a permitting system similar to that of the private well program.

Per §32.1-248.2 of the Code, the Board is obligated to develop such regulations. However, §32.1-248.2 does not provide a funding mechanism by which a permitting program can be implemented. The General Assembly may wish to consider amending §32.1-248.2 of the Code and the Appropriation Act to establish fees for rainwater harvesting system for permitting and ongoing operation and maintenance review by the Department for rainwater harvesting systems used for human consumption that do not qualify as a waterworks.

3.2 Implementation of §32.1-248.2

The stakeholder group discussed three potential approaches to achieving regulation of the use of harvested rainwater (not by a waterworks) as required by §32.1-248.2 of the Code. The approaches are:

- Option A. Update the status of current Department Rainwater Harvesting & Use Guidelines to Regulation. The use of harvested rainwater for human consumption would not be allowed.

- Option B. Draft new regulations incorporating general permitting of systems not used for human consumption and individual permitting for systems used for human consumption.

- Option C. Draft new regulations incorporating individual permitting for systems used for human consumption. Use of harvested rainwater for uses other than human consumption would be exempted.

The following table summarizes the three options in light of the requirements of §32.1-248.2 of the Code.

Table 1: Summary of Options for Implementation of §32.1-248.2 of the Code

32.1-248.2	**Option A**	**Option B**	**Option C**
A. Provide standards for use of rainwater harvesting systems including systems that collect water for use by commercial systems but do not provide water for human consumption.	Yes*	Yes	Yes
B. Promote the use of rainwater as means to reduce fresh water consumption, ease demands on public treatment works and water supply systems, and promote conservation.	Yes	Yes	Yes
C. Consider recognizing rainwater as an independent source of fresh water available for use by the residents of the Commonwealth.	Yes**	Yes	Yes

*In this case, the requirement for systems that collect water for use by commercial systems but do not provide water for human consumption are recommended to be identical to current Department rainwater harvesting guidance and existing building standards and codes. If a water source for human consumption applies, such facilities would be required to obtain water used for human consumption from a waterworks or a private well and to ensure that the water supply for human consumption is not comingled with the harvested rainwater system.

**§32.1-248.2.C requires that the Department in conjunction with DEQ *consider* recognizing rainwater as an independent source of fresh water. In Option A, the result of the consideration would be that it should not be recognized as such.

The Department concludes that while Option A conforms to requirements of §32.1-248.2, it does not fully address the goals implied by the statute. Further, Option A would not represent an avenue to address the real, and potentially growing, demand for rainwater harvesting for

human consumption where no other source is feasible. Finally, selection of Option A would not be consistent with mandates elsewhere in the Code relative to resource protection and management (e.g., groundwater management areas). For these reasons, the Department shares the Stakeholder group's conclusion that it is appropriate to develop regulations pertaining to private systems using harvested rainwater for human consumption. This can be achieved under either Option B or C.

The Department concludes that Option C is the most advantageous approach for the Commonwealth. The existing requirements administered under the VUSBC, the International Plumbing Code, and the Department's Virginia Rainwater Harvesting & Use Guidelines have been effective and safe for rainwater harvesting systems classified as "Not for Human Consumption – No Contact Possible" or "Not for Human Consumption – Direct Contact Possible". Under these requirements, harvested rainwater systems have been installed and maintained for purposes including industrial and commercial process water, residential and commercial irrigation, and water supplied to toilets and urinals in non-residential buildings including schools.

Regulatory standards for such uses of rainwater harvesting systems, could be accomplished by means of a general permit program, with an individual permit program for rainwater harvesting systems used for human consumption. However, the Department believes that establishment of a general permitting program for rainwater harvesting systems not used for human consumption would represent additional burden on the regulated community with no apparent benefit to public health or the environment. The goals of §32.1-248.2 of the Code could be accomplished by exempting rainwater harvesting not intended for human consumption

from the Department's regulations. Such systems would continue to be designed and installed per existing guidance, plumbing codes, the VUSBC, and other applicable and existing regulations.

3.3 Recommendations

Recommendation 1 – Funding for a Rainwater Harvesting Permit Program

The General Assembly may wish to consider amending §32.1-248.2 of the Code and the Appropriation Act to establish fees for rainwater harvesting system for permitting and ongoing operation and maintenance review by the Department, based on system capacity and use. Section 32.1-248.2 of the Code directs the Department, in conjunction with the DEQ, to promote the use of rainwater; and to consider recognizing rainwater as an independent source of fresh water available for use by the residents of the Commonwealth. Consistent with this language, the Department proposes to develop regulations for Rainwater Harvesting for Human Consumptive Use.

The Department anticipates that administration of such regulations will require a permitting program with features similar to that currently applicable to the private well program, as well an ongoing operation and maintenance program. The Department anticipates staff would be required to: review designs and specifications accompanying applications to permit systems; issue or denial permit applications (including construction and operation permits); perform construction site visits and inspections; provide oversight for ongoing operation and maintenance; store and managing data related to the program; and perform of duties in response to case decisions as required by the Administrative Process Act.

The Department anticipates that its efforts to permit rainwater harvesting systems under regulations developed in response to §32.1-248.2 of the Code would be consistent with that of

private wells. Authorization of a similar fee to that for private well permits ($300), as well as fees to cover the Department's cost for ongoing review of operation and maintenance and water quality, is necessary for proper implementation of a rainwater harvesting regulatory program.

Recommendation 2 – Local Ordinances

The General Assembly may wish to consider exploring options under Title 15.2, Subtitle II, Chapter 21 of the Code to address opportunities for users of permitted rainwater harvesting systems for human consumption to obtain relief from mandatory connection to public water supplies. Title 15.2, Subtitle II, Chapter 21 of the Code of Virginia addresses, among other matters, powers of local government pertaining to public utilities. Such exclusion would not apply to connection to publicly owned wastewater treatment works where mandatory connection is required by local ordinance.

Recommendation 3 – Training and Certification

The General Assembly may wish to consider requiring certifications for the design, installation, testing, and operation of rainwater harvesting systems. The Department recognizes that design, installation, inspection, testing, and operation of rainwater systems for human consumption is highly specialized. Therefore, the Department recommends that persons undertaking design, installation, inspection, testing and operation of rainwater systems for human consumption undergo specialized training. The Department anticipates incorporating a requirement for training into rainwater harvesting regulations. The General Assembly may wish to consider whether recognition of these certifications by licensing agencies and other agencies with programs covering rainwater harvesting is necessary.

Recommendation 4 – Private Well Water Quality

The General Assembly may wish to consider amendments to §32.1-176.2 of the Code to authorize the Board of Health (the Board) to ensure water quality of private wells conforms to reasonable requirements. Alternately, the General Assembly may wish to consider amendments to the Code to allow the Board to include in its regulations water quality standards applicable to the transfer of real estate served by one or more private wells providing water for human consumption, or water quality standards applicable to commercial facilities serving sensitive populations (e.g. day care) relying on private wells water for human consumption.

Section 32.1-176.2 of the Code of Virginia states "The General Assembly finds that the improper construction of private wells can adversely affect aquifers as ground water resources in the Commonwealth. Consistent with the duty to protect these ground water resources and to safeguard the public welfare, safety and health it is declared to be the policy of this Commonwealth to require that the construction and location of private wells conform to reasonable requirements." Based on this language, the Private Well Regulations address only the location and construction of private wells; responsibility for the ongoing water quality after the well is constructed lies with the well owner. Historically, this has been the subject of concern and confusion to well owners and other parties, notably in conjunction with property transfers. The Waterworks Regulations include regular water quality monitoring requirements, and the Department anticipates inclusion of water quality requirements in rainwater harvesting regulations to be promulgated under §32.1-248.2 of the Code. As a result, private wells could become the only regulated source of water for human consumption in the Commonwealth not subject to ongoing water quality monitoring measures. The Department believes that such

inconsistency could lead to confusion within the regulated community and lead to further risk to public health.

As documented in Virginia Household Water Quality Program (Virginia Cooperative Extension) Annual Reports from 2015 through 2018, over 40% of private wells test positive for total coliform bacteria, over 30% exceed safe levels of sodium, and approximately 10% exceed safe levels of copper and lead. Moreover, exceedances of these and other contaminants over safe drinking water levels were often higher in certain counties or regions of the state. Of note, many private wells serve as a drinking water source for more than a single residence. For example, a well serving 14 or fewer connections would not be regulated as a waterworks. A residence, served by a private well, operating as a home day-care center with fewer than five children in care is also not currently subject to requirements to maintain water quality.

4.0 CONCLUSION

4.1 Summary of Issues Specified in HJ 641.

In response to Chapter 817 of the Acts of the Assembly, including HB 192, the Department assembled a group of stakeholders to evaluate the development of regulations applicable to the harvesting of rainwater. As part of its efforts, and as requested by HJ 641, the stakeholder group evaluated additional issues related to the use of rainwater as part of the rulemaking process. In summary:

HJ 641 Evaluation Topic	Summary of Evaluation
The conditions under which rainwater may be appropriately used and for what purposes.	1. Not for human consumption with unlikely human contact 2. Not for human consumption with potential for direct human contact 3. For human consumption.

HJ 641 Evaluation Topic	Summary of Evaluation
Standards for the use of rainwater for human consumption.	The definitions of "human consumption" and "pure water" articulated in Code of Virginia Section 32.1-167 of the Code is applicable to rainwater used for human consumption. These definitions originate in the Safe Drinking Water Act.
Standards for rainwater harvesting systems, including systems that collect rainwater for human consumption and systems that collect rainwater for use by commercial enterprises but not human consumption, as those systems are defined in §32.1-167 of the Code.	The standards currently applicable to rainwater harvesting systems (specifically, the Uniform Statewide Building Code, the International Plumbing Code, and the Department's Rainwater Harvesting & Use Guidelines) have proven to be safe and effective. These standards do not address all uses that meet the definition of human consumption. In order to protect human health and promote the well-being of all people in Virginia, it is critical that the same definition of human consumption and pure water apply for all water sources (i.e., from a waterworks, from a private well, and from harvested rainwater).
A requirement that buildings that withdraw water from both rainwater harvesting systems and public water supplies maintain appropriate cross-connection safeguards	This requirement is currently established in the International Plumbing Code, the Uniform Statewide Building Code, and the Waterworks Regulations. However, it is not clear that appropriate safeguards would apply in the case of buildings that withdraw water from both rainwater harvesting systems and a private well(s).
Training and certification requirements for installers of rainwater harvesting systems installed in buildings that draw water from both rainwater harvesting systems and public water supplies	Third party certification provides an appropriate level of confidence. For example, the American Society of Sanitary Engineering (ASSE) certification standards for installers, designers, and inspectors specifically address rainwater harvesting. The National Sanitation Foundation (NSF) maintains a certification program for materials and equipment used in water systems. These can be addressed in the regulations developed as contemplated by §32.1-248.2 of the Code.

In addition to the foregoing, the Department has evaluated demand, drought, local ordinances and similar land use provisions, and funding considerations related to the use of rainwater as part of the rulemaking process.

4.2 Status of the Rulemaking Process

OEHS is in the process of developing regulations governing the use of rainwater pursuant to § 32.1-248.2 of the Code of Virginia. OEHS assembled a Rainwater Harvesting Workgroup to explore the demand, needs, challenges, and obstacles pertaining to developing regulations governing rainwater harvesting. The Department shares the stakeholder group's conclusion that it is appropriate to develop regulations pertaining to the use of harvested rainwater for human consumption by private systems (non-waterworks). Based on the efforts of the stakeholder group and responses from local health departments, OEHS has prepared a Notice of Intended Regulatory Action (NOIRA) for development of regulations governing use of harvested rainwater for human consumption, to be submitted for review by the end of 2019.

4.3 Recommendations

The Department submits four recommendations for consideration by the General Assembly:

Recommendation 1 – Funding for a Rainwater Harvesting Permit Program

The General Assembly may wish to consider amending §32.1-248.2 of the Code and the Appropriation Act to establish fees for rainwater harvesting system for permitting and ongoing operation and maintenance review by the Department, based on system capacity and use.

Recommendation 2 – Local Ordinances

The General Assembly may wish to consider exploring options under Title 15.2, Subtitle II, Chapter 21 of the Code to address opportunities for users of permitted rainwater harvesting systems for human consumption to obtain relief from mandatory connection to public water supplies.

Recommendation 3 – Training and Certification

The General Assembly may wish to consider requiring certifications for the design, installation, testing, and operation of rainwater harvesting systems.

Recommendation 4 – Private Well Water Quality

The General Assembly may wish to consider amendments to §32.1-176.2 of the Code to authorize the Board of Health (the Board) to ensure water quality of private wells conforms to reasonable requirements. Alternately, the General Assembly may wish to consider amendments to the Code to allow the Board to include in its regulations water quality standards applicable to the transfer of real estate served by one or more private wells providing water for human consumption, or water quality standards applicable to commercial facilities serving sensitive populations (e.g. day care) relying on private wells water for human consumption.

REFERENCES

1. Virginia Uniform Statewide Building Code
2. Virginia Stormwater Management and Program Regulations (4VAC50-60)
3. Water Reclamation and Reuse Regulations (9VAC25-740)
4. Virginia Stormwater Management Program Regulations (9VAC25-870)
5. Waterworks Regulations (12VAC5-590)
6. Private Well Regulations (12VAC5-630)
7. Sewage Handling and Disposal Regulations (12VAC5-610)
8. Virginia Rainwater Harvesting & Use Guidelines (VDH, March 31, 2011)
9. International Plumbing Code
10. Rainwater Harvesting Manual 2015 (American Rainwater Catchment Systems Association)
11. ARCSA/ASPE/ANSI 63-2013: Rainwater Catchment Systems
12. ICC 805-2018 (Rainwater Harvesting Systems – National Standard of Canada)
13. Virginia Rainwater Harvesting Manual, The Cabell Brand Center, 2009
14. Evaluation of Rooftop Rainfall Collection – Cistern Storage Systems in Southwest Virginia (Virginia Water Resources Research Center, Virginia Tech 1998)
15. Virginia Household Water Quality Program Annual Reports 2015, 2016, 2017, 2018 (Virginia Cooperative Extension)

ATTACHMENTS

Attachment A

VIRGINIA ACTS OF ASSEMBLY -- 2018 RECONVENED SESSION

CHAPTER 817

An Act to amend and reenact § 32.1-248.2 of the Code of Virginia, relating to use of rainwater and gray water; regulations.

[H 192]

Approved April 18, 2018

Be it enacted by the General Assembly of Virginia:

1. That § 32.1-248.2 of the Code of Virginia is amended and reenacted as follows:

§ 32.1-248.2. Use of rainwater and reuse of gray water; regulations.

A. The ~~Department~~ *Board* shall ~~develop by January 1, 1999, guidelines~~ *adopt regulations* regarding the use of gray water and rainwater. The ~~guidelines~~ *regulations* shall *(i)* describe the conditions under which gray water and rainwater may appropriately be used and for what purposes~~. The guidelines shall~~*; (ii)* include categories of ~~used~~ *gray* water, such as types of used household water and used water from businesses, ~~which~~ *that* are appropriate for reuse~~. The guidelines shall~~*; and (iii)* include a definition of gray water that ~~does not include~~ *excludes* used toilet water. *The regulations shall also provide standards for the use of rainwater harvesting systems, including systems that collect rainwater for use by commercial enterprises but do not provide water for human consumption, as defined in § 32.1-167.*

Such regulations shall not apply to water not for human consumption, as defined in § 32.1-167, including gray water and rainwater, that is produced and utilized by any facility that is permitted through a Virginia Pollutant Discharge Elimination System permit or General Virginia Pollution Abatement permit.

B. The Department, in conjunction with the Department of Environmental Quality, shall promote the use of rainwater and reuse of gray water as means to reduce fresh water consumption, ease demands on public treatment works and water supply systems, and promote conservation.

C. The Department, in conjunction with the Department of Environmental Quality, shall consider recognizing rainwater as an independent source of fresh water available for use by the residents of the Commonwealth.

Attachment B

2019 SESSION

ENROLLED

HOUSE JOINT RESOLUTION NO. 641

Requesting the Department of Health to evaluate additional issues related to use of rainwater as part of the rulemaking process. Report.

Agreed to by the House of Delegates, February 4, 2019
Agreed to by the Senate, February 20, 2019

WHEREAS, during the 2018 Session, the General Assembly approved Chapter 817 of the Acts of Assembly, directing the Board of Health to adopt regulations governing the use of gray water and rainwater; and

WHEREAS, Chapter 817 directed the Board of Health to include in its regulations standards for the use of rainwater harvesting systems, including systems that collect rainwater for use by commercial enterprises but do not provide water for human consumption; and

WHEREAS, during the 2018 interim, the Department of Health has worked with stakeholders to address concerns related to the promulgation of regulations pursuant to Chapter 817, and additional issues remain, including questions about (i) the conditions under which rainwater may appropriately be used and for what purposes; (ii) standards for the use of rainwater for human consumption; (iii) standards for rainwater harvesting systems, including systems that collect rainwater for human consumption and systems that collect rainwater for use by commercial enterprises but not human consumption, as those systems are defined in § 32.1-167 of the Code of Virginia; (iv) a requirement that buildings that draw water from both rainwater harvesting systems and public water supplies maintain appropriate cross-connection safeguards; and (v) training and certification requirements for installers of rainwater harvesting systems, including installers of rainwater harvesting systems installed in buildings that draw water from both rainwater harvesting systems and public water supplies; and

WHEREAS, participants in the current rulemaking process can provide extensive expertise and insight into regulatory solutions and the current rulemaking process provides an opportunity to address those remaining issues; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Department of Health be requested to evaluate additional issues related to use of rainwater as part of the rulemaking process. Specifically, the Department of Health is requested to include consideration of and allow for stakeholder input on (i) the conditions under which rainwater may appropriately be used and for what purposes; (ii) standards for the use of rainwater for human consumption; (iii) standards for rainwater harvesting systems, including systems that collect rainwater for human consumption and systems that collect rainwater for use by commercial enterprises but not human consumption, as those systems are defined in § 32.1-167; (iv) a requirement that buildings that draw water from both rainwater harvesting systems and public water supplies maintain appropriate cross-connection safeguards; and (v) training and certification requirements for installers of rainwater harvesting systems, including installers of rainwater harvesting systems installed in buildings that draw water from both rainwater harvesting systems and public water supplies. The Department is also requested to provide an update on the status of the rulemaking process to the General Assembly by November 1, 2019.

The Department of Health shall submit to the Division of Legislative Automated Systems an executive summary and report of its progress in meeting the request of this resolution no later than the first day of the 2020 Regular Session of the General Assembly. The executive summary and report shall be submitted for publication as a report document as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports and shall be posted on the General Assembly's website.

Attachment C

Rainwater Reuse Regulatory Workgroup

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