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## APPENDIX A: MINIMUM LEACHING SYSTEM SPREAD

New systems, and repairs of existing systems where feasible, shall provide a leaching system spread that equals or surpasses the minimum leaching system spread (MLSS) calculated in accordance with the following formula that utilizes factors reflective of the building's design flow, and the site's hydraulic conditions. MLSS is not applicable on sites that have a receiving soil depth exceeding 60 inches, or on sites where a licensed professional engineer has satisfactorily demonstrated through hydraulic analysis that the receiving soil can disperse the building's wastewater without overflow or breakout.

Leaching systems with shared receiving soil shall be evaluated collectively as a single system. Therefore, leaching systems on sloped lots that are in the same hydraulic window (i.e., down gradient of one another) would need to be kept at least 50 feet apart to avoid a MLSS assessment as a single system. Leaching systems located within 25 feet of one another on lots with flat groundwater tables shall be evaluated as a single system. Septic tank effluent shall be applied fairly uniformly over the entire length of leaching system. If MLSS is applicable, single leaching system rows should contain leaching systems of uniform effective leaching area rating in order to avoid possible hydraulic overload of any portion of the leaching system row. Whenever effluent is not uniformly distributed, a stacking analysis (See DPH Design Manual Chapter 25) shall be performed to ensure no portion of the receiving soil is overloaded.

### MLSS Formula

$$\text{MLSS (in feet)} = \text{HF} \times \text{FF} \times \text{PF}$$

HYDRAULIC FACTOR (HF) = Factor based on the hydraulic gradient and receiving soil depth.

FLOW FACTOR (FF) = Factor based on the design flow of the building served.

PERCOLATION FACTOR (PF) = Factor based on the percolation rate of the receiving soil.

### Definitions & Factor Information

**Hydraulic Gradient:** Shall be deemed the percent of slope of the restrictive layer or naturally occurring grade. The slope of the naturally occurring grade can be utilized as the hydraulic gradient except on sites with a flat groundwater table or a restrictive layer slope that has been determined to be less than the natural ground slope. On lots with purported flat groundwater tables, the gradient shall be confirmed to be level (essentially zero) by evaluating groundwater elevations in the leaching system area and at least 25 to 50 feet around the perimeter of the leaching system. On all other lots, the hydraulic gradient shall be the average gradient in the leaching system area and down gradient (25 to 50 feet) of the leaching system.

**Leaching System Spread:** Shall be deemed the leaching system length in feet of effluent application to the receiving soil. On lots with flat groundwater tables, the leaching system spread shall be deemed to be the length in feet of the perimeter of the leaching system. On all other lots, the leaching system spread shall be measured perpendicular to the hydraulic gradient and shall take into account converging and diverging conditions 25 to 50 feet down gradient of the leaching system.

**Restrictive Layer:** Shall be deemed the first layer beneath the receiving soil that impedes downward movement of septic tank effluent. Restrictive layers include ledge rock, maximum groundwater, and severely restrictive hardpan (percolation rate slower than 30 minutes/inch) that is beneath a more permeable soil. In the event groundwater monitoring is required, the restrictive layer shall be deemed the average of at least five (5) consecutive weekly readings taken in the most restrictive 30-day period of the wet season.

**Receiving Soil:** Shall be deemed the soil in the immediate vicinity of the leaching system that is available to disperse the septic tank, and includes the soil above the restrictive layer, and within 25 feet around the perimeter of the leaching system on lots with flat groundwater tables, or within 50 feet down gradient of the leaching system on all other lots.

**Receiving Soil Depth (RS Depth):** Shall be deemed the depth in inches from the top of the receiving soil to the restrictive layer. On lots with flat groundwater tables, the restrictive layer depth shall be the average of the depth in the leaching system area and the minimum depth 25 feet around the perimeter of the leaching system. On all other lots, the restrictive layer depth shall be the average depth in the leaching system area and down gradient (25 to 50 feet) of the leaching system. Large systems (Greater than 2,000 gallons per day) warrant evaluation of receiving soil depths at least 50 feet down gradient of the leaching system.

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## **USE OF MLSS FORMULA**

**New Systems and Code-Complying Areas:** New subsurface sewage disposal systems approved pursuant to Public Health Code (PHC) Section 19-13-B103, and code-complying areas identified pursuant to PHC Section 19-13-B100a shall provide leaching system spreads that equal or surpass the calculated MLSS. PHC regulations require that these systems have sufficient naturally occurring soil that can adequately absorb or disperse the expected volume of sewage effluent without overflow, breakout or detrimental effect on ground or surface water. Therefore, new systems and code-complying areas must have naturally occurring receiving soil. Such soil formed from natural processes, and does not include fill placed by humans or fill deposited as a result of human actions. For new systems, MLSS applies only to the primary leaching system, and ideally the reserve leaching area should provide additional spread and hydraulic capacity.

### **New System MLSS is based on Naturally Occurring Receiving Soil Only**

New systems and code-complying areas on sites that have less than 18 inches of naturally occurring soil (< 18" of RS Depth in HF Chart) cannot be approved unless a licensed professional engineer conducts a hydraulic analysis to demonstrate compliance with PHC Section 19-13-B103e (a)(4), which pertains to the above noted ability of the natural soil to satisfactorily handle the wastewater. New systems and code-complying areas on sites with no unsaturated naturally occurring soil are not candidates for hydraulic analysis since the naturally occurring soil is already in an "overflowed" condition.

**Repairs and Potential Repair Areas:** To the maximum extent possible, subsurface sewage disposal system repairs approved pursuant to PHC Section 19-13-B103, and potential repair areas identified pursuant to PHC Section 19-13-B100a shall provide leaching system spreads that equal or surpass the MLSS calculated for new systems. If a repair site has less than 18 inches of naturally occurring soil (< 18" of RS Depth in HF Chart), the new system MLSS shall be calculated utilizing a RS Depth of 18 to 22 inches. Leaching system spreads for repairs and potential repair areas that do not meet the MLSS calculated for new systems, require an exception that can only be granted if it is determined that the exception is unlikely to cause a nuisance or health hazard. In making a determination as to whether a MLSS exception is unlikely to result in a breakout or surfacing of effluent, and to determine the permitted flow for non-compliant repairs, the local director of health shall require an additional MLSS assessment that considers the hydraulic capacity of fill and naturally occurring receiving soil. This "non-compliant repair MLSS" utilizes a hydraulic factor that is based on a RS Depth that includes both naturally occurring soil and fill material, and takes into account actual/existing site conditions and fill placement that will be included in the system installation. Leaching systems for repairs that provide less than 50 percent of the repair MLSS are hydraulically challenged.

### **Non-compliant Repair MLSS is based on Naturally Occurring Soil & Fill Receiving Soil**

The following criterion shall be utilized in calculating the non-compliant repair MLSS:

- Receiving Soil fill must have a percolation rate of 30 minutes per inch or faster.
- The maximum receiving soil depth (RS Depth) that includes fill and natural soil shall be 60 inches.
- The RS Depth in the leaching system area shall be measured from the bottom of the leaching system to the restrictive layer.
- The minimum RS Depth measured 25 feet around the perimeter of the leaching system on flat groundwater table lots shall be 6 inches. On all other lots, the minimum receiving soil depth measured 25 feet down gradient of the leaching system shall be 12 inches. A repair with a RS Depth less than either of the above cited depths should not be approved unless a licensed professional engineer conducts a hydraulic analysis to demonstrate the receiving soil has sufficient capacity to disperse the permitted flow.
- When determining the RS Depth, the calculated average depth shall not utilize a depth in the leaching system area that exceeds by more than 6 inches the minimum depth 25 feet around the perimeter of the leaching system on flat groundwater table lots. On all other lots, the calculated average depth shall not utilize a depth in the leaching system area that exceeds by more than 1 foot the minimum depth 25 feet down gradient of the leaching system.
- For repairs and identification of potential repair areas that have a RS Depth less than 18 inches, the non-compliant repair MLSS shall be calculated based on the following: Non-compliant repair MLSS = MLSS based on a RS Depth of 18 – 22 inches times 18/X where X equals the RS Depth.
- The leaching system spread for the repair shall provide the maximum percent compliance with the MLSS calculated for a new system unless the repair spread is more, which can happen on sites with less than 18 inches of naturally occurring soil.

The repair MLSS shall constitute the required MLSS for PHC Section 19-13-B100a (c)(2) compliance purposes for non-flow increasing building additions. The permitted flow on the permit to discharge shall take into account the leaching system spread as compared to repair MLSS.

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## HYDRAULIC FACTORS (HF)

### Hydraulic Gradient (% Slope)

Receiving  
Soil (RS)  
Depth  
(Inches)

	<1.0	1.0-2.0	2.1-3.0	3.1-4.0	4.1-6.0	6.1-8.0	8.1-10.0	10.1-15.0	>15.0
0.1 - 17.9	See Comments in <u>Use of MLSS Formula</u> Section								
18.0 - 22.0	72	62	54	48	42	34	30	28	26
22.1 - 26.0	66	56	48	42	34	30	28	26	24
26.1 - 30.0	56	49	42	34	30	28	26	24	20
30.1 - 36.0	48	42	34	30	28	26	24	20	18
36.1 - 42.0	42	36	30	28	26	24	20	18	16
42.1 - 48.0	36	32	28	26	24	20	18	16	14
48.1 - 60.0	30	28	24	22	20	18	16	14	10
>60.0	MLSS Need Not be Considered								

## FLOW FACTORS (FF)

**Flow Factor = Design Flow/300**

**Residential:** Design Flow for each bedroom is 150 gallons per day (GPD) except for bedrooms beyond 4 in single-family residential buildings, which have a 75 GPD per bedroom design flow.

**Single-family homes:**

**FF**

2 Bedroom Home = 300/300	1.0
3 Bedroom Home = 450/300	1.5
4 Bedroom Home = 600/300	2.0
5 Bedroom Home = 675/300	2.25

Increase FF by 0.25 for each additional bedroom

**Multi-family buildings:**

Same as above except 5 Bedrooms = 750/300 2.5 Increase FF by 0.5 for each additional bedroom

**Non-Residential:**

Design Flow (GPD) / 300

## PERCOLATION FACTORS (PF)

Percolation Rate	Percolation Factor (PF)
Up to 5.0 Minutes/Inch	1.0
5.1 to 10.0 Minutes/Inch	1.2
10.1 to 20.0 Minutes/Inch	1.5
20.1 to 30.0 Minutes/Inch	2.0
30.1 to 45.0 Minutes/Inch	3.0
45.1 to 60.0 Minutes/Inch	5.0