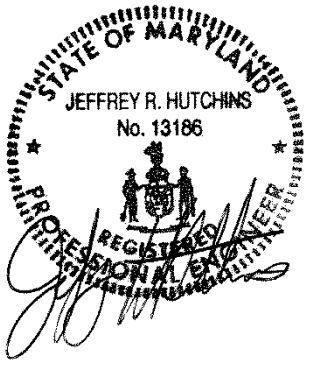
Certification Statement 40 CFR § 257.64(c) – Location of an Existing CCR Landfill in an Unstable Area

CCR Unit: GenOn Westland Ash Management Site

I, Jeffrey Hutchins, being a Registered Professional Engineer in good standing in the State of Maryland, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the demonstration regarding the location of the CCR Unit is not in an unstable area as included in Attachment 1, dated September 28, 2018 meets the requirements of 40 CFR § 257.64(a).

Jeffrey Hutchins
Printed Name

October 2, 2018
Date



October 2, 2018

I certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Maryland.

License No. 13186 Expiration Date: 10/17/2020

ATTACHMENT 1

GENON WESTLAND ASH MANAGEMENT SITE

EXISTING ASH LANDFILL STABLE AREA EVALUATION

AECOM
12420 Milestone Center Drive
Suite 150
Germantown, MD 20876
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301 820 3000 tel
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Memorandum

To	GenOn MD Ash Management LLC	Page	1
CC			
Subject	NRG Westland Stability Analysis		
From	AECOM		
Date	September 28, 2018		

The purpose of this memorandum is to present the results of a desktop evaluation of the NRG Westland Ash Storage Site. The Environmental Protection Agency (EPA) regulation 40 CFR 257.64 states that new or existing Coal Combustion Residual (CCR) landfills and/or surface impoundments must not be located in unstable areas without certain criteria being met. The scope of the desktop study was to evaluate the stability of the Westland Ash Storage Site and the surrounding areas.

EPA Regulation 40 CFR 257.64 (Unstable Areas)

(a) *An existing or new CCR landfill, existing or new CCR surface impoundment, or any lateral expansion of a CCR unit must not be located in an unstable area unless the owner or operator demonstrates by the dates specified in paragraph (d) of this section that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted.*

(b) *The owner or operator must consider all of the following factors, at a minimum, when determining whether an area is unstable:*

(1) On-site or local soil conditions that may result in significant differential settling;
(2) On-site or local geologic or geomorphologic features; and
(3) On-site or local human-made features or events (both surface and subsurface).

(c) *The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.*

(d) *The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (d)(1) or (2) of this section.*

(1) For an existing CCR landfill or existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.
(2) For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.
(3) The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by §257.105(e).

(4) An owner or operator of an existing CCR surface impoundment or existing CCR landfill who fails to demonstrate compliance with the requirements of paragraph (a) of this section by the date specified in paragraph (d)(1) of this section is subject to the requirements of §257.101(b)(1) or (d)(1), respectively.
(5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstration showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.

(e) *The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(e), the notification requirements specified in §257.106(e), and the Internet requirements specified in §257.107(e).*

RESULTS

The results of the desktop study are presented below. AECOM evaluated criteria including the potential presence of karst, faults, seismic impact zones, local soils, local geology and potential human made features or events.

Karst Areas

Areas underlain by soluble rock have the potential for karst development. Karst can cause ground subsidence (e.g., sinkholes) when rock is eroded by natural processes. The United States Geological Survey (USGS) has compiled a database which depicts areas that have a potential for the development of karst. The database indicates that no carbonate bedrock formations underlay the Westland Ash Storage Site. An exhibit which depicts the distribution of potential karst bearing rock is presented in **Figure 1**.

Fault Areas

The USGS has compiled a database of faults and associated folds in the United States that are believed to be sources of magnitude greater than 6 earthquakes during the Quaternary Period (the past 1,600,000 years). No Quaternary faults or folds either intersect or are immediately adjacent to the Westland ash storage site. The seismic source closest to the site is the Central Virginia Seismic Zone which is located approximately 93 miles to the southwest of the site. The geologic evidence for faulting in this seismic zone is based on liquefaction features of the early Holocene Epoch or younger (the past 12,000 years). While these features are evidence of moderately strong shaking, they do not identify the specific fault that caused the earthquake. An exhibit which depicts the distribution of faults is presented in **Figure 2**.

Seismic Impact Zone

40CFR 257.53 defines a seismic impact zone as: “an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a percentage of the earth's gravitational pull (g), will exceed 0.10 g in 50 years”. Ground motion data was obtained from the USGS Seismic-hazard maps for the conterminous United States, dated 2014 which indicates that the Westland site lies between the 0.06g and 0.08g contour lines. Thus, the site is not located within a Seismic Impact Zone as defined 40CFR 257.53. Exhibits which depict the local seismic impact zones are presented in **Figures 3** and **3A**. **Figure 3A** shows the detailed seismic zone delineation for the Westland site.

AECOM

Local Soils

The United States Department of Agriculture (USDA) has compiled a database of soils collected by the National Soil Survey over the course of the last century. A review of this database indicates that the soils underlying the site are primarily composed of the Penn Silt Loam which is not deemed to be prone to uneven settlement. An exhibit which depicts the local distribution of soils is presented in **Figure 4** and information about the soils which underlie the site is included in **Attachment 1**.

Local Geology

The USGS geological database indicates that the rock type which underlies the site is part of the New-Oxford formation, a rock composed of shale, sandstone and siltstone. This formation is not associated with any known geological hazards and does not pose an immediate or long-term threat to the existing CCR landfill. An exhibit which depicts the distribution of rock around the site is presented in **Figure 5**.

Human Made Features or Events

After reviewing multiple sources of publically available data and literature, no human made features or events have been identified that could negatively affect the stability of the existing Westland ash storage site.

Conclusion

A review of the criteria listed above indicates that no existing surface or subsurface features have been identified that are indicative of conditions which may present stability hazards to the Westland ash storage site.

LIMITATIONS

This desktop study was conducted in accordance with reasonable and accepted engineering practices, and the interpretations and conclusions are rendered in a manner consistent with other consultants in our profession. No other representation to the client is expressed or implied, and no warranty or guarantee is included or intended.

REFERENCES

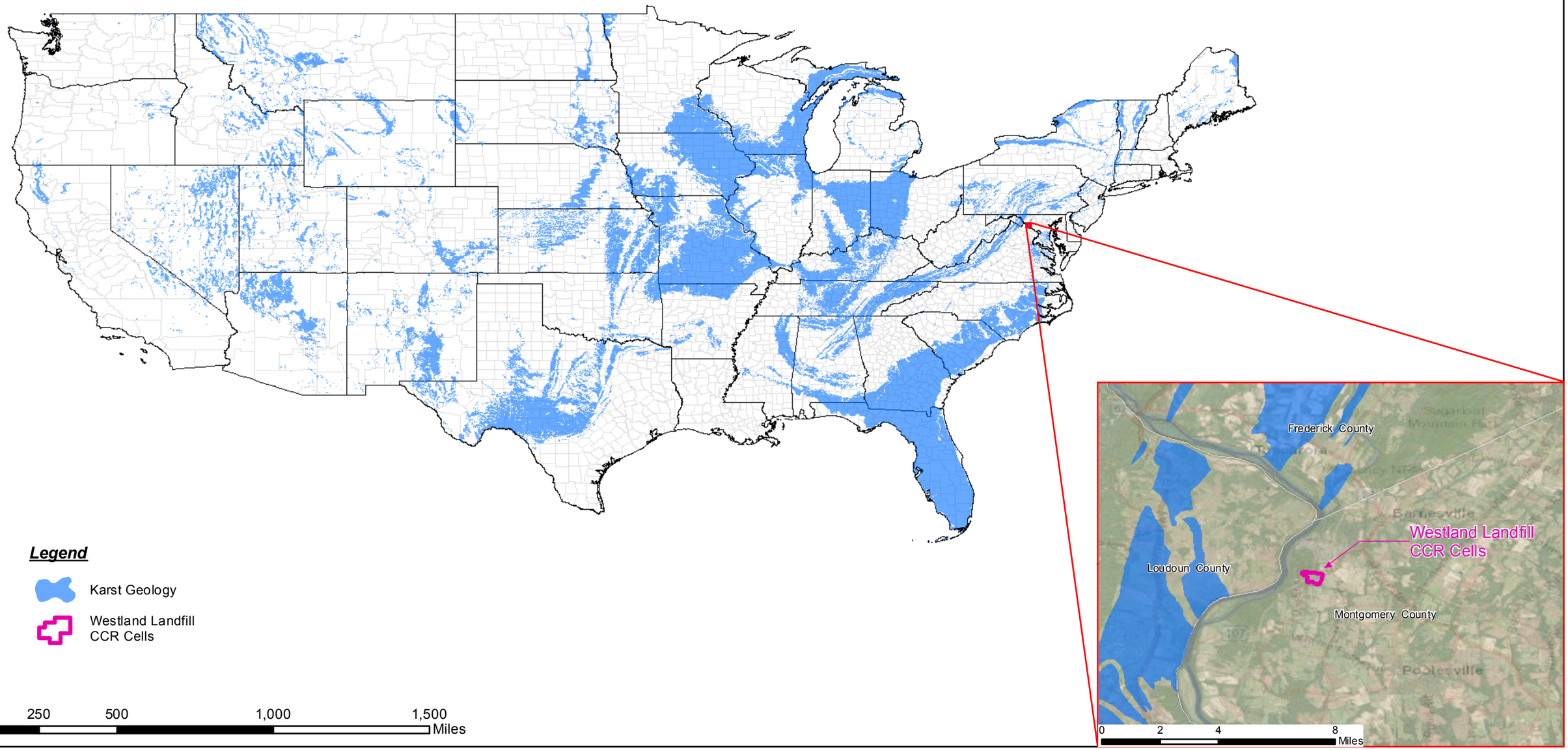
Dicken, C., Nicholson, S., Horton, J., Kinney, S., Gunther, G., Foose, M. and Mueller, J. (2008). *Preliminary integrated geologic map databases for the United States: Delaware, Maryland, New York, Pennsylvania, and Virginia*. [online] Available at: http://pubs.usgs.gov/of/2005/1325/index.htm [Accessed 23 Aug. 2018].

Petersen, M.D., Moschetti, M.P., Powers, P.M., Mueller, C.S., Haller, K.M., Frankel, A.D., Zeng, Yuehua, Rezaeian, Sanaz, Harmsen, S.C., Boyd, O.S., Field, E.H., Chen, Rui, Luco, Nicolas, Wheeler, R.L., Williams, R.A., Olsen, A.H., and Rukstales, K.S. (2015). *Seismic-hazard maps for the conterminous United States. U.S. Geological Survey*. Available at: http://pubs.usgs.gov/sim/3325/. [Accessed 23 Aug. 2018].

Soil Survey Staff. (2016) *Soil Survey Geographic (SSURGO) Database*. Natural Resources Conservation Service, United States Department of Agriculture. Available at: https://sdmdataaccess.sc.egov.usda.gov. [Accessed 23 Aug. 2018].

U.S. Geological Survey. (2006), *Quaternary fault and fold database for the United States*. Available at: https://earthquake.usgs.gov/hazards/qfaults/.[Accessed 23 Aug. 2018].

Weary, D. and Doctor, D. (2014). *Karst in the United States: A Digital Map Compilation and Database*. [online] Reston, Virginia: U.S. Geological Survey. Available at: https://pubs.usgs.gov/of/2014/1156/pdf/of2014-1156 .[Accessed 23 Aug. 2018].



Legend

Karst Geology

Westland Landfill
CCR Cells

0 250 500 1,000 1,500
Miles

NOTES:

1. Basemap courtesy of ESRI and others.

CLIENT	GenOn MD Ash Management LLC.			
PROJ	Westland Ash Storage Site Stability Analysis			
REVISION NO	0	DES BY	CSZ	08/27/2018
SCALE	See Above	DR BY	CSZ	08/27/2018
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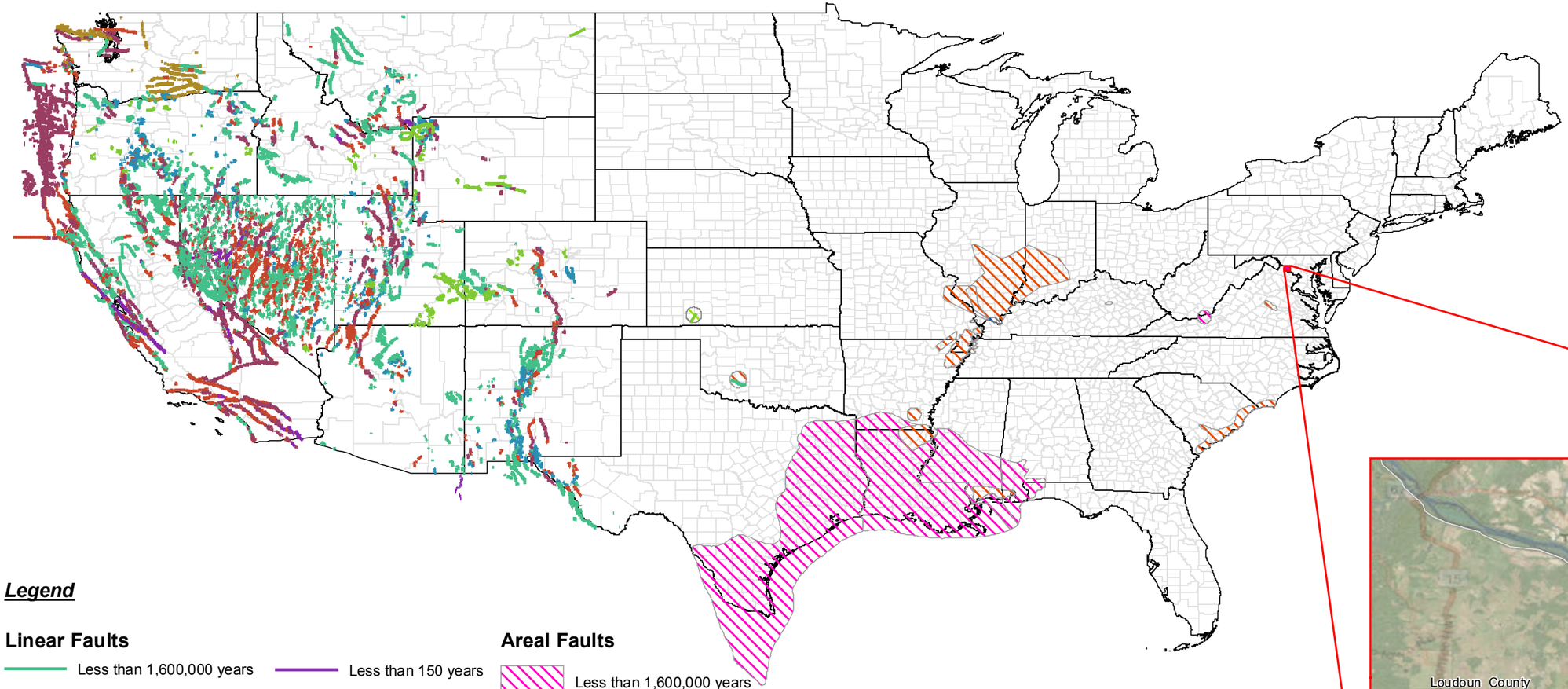
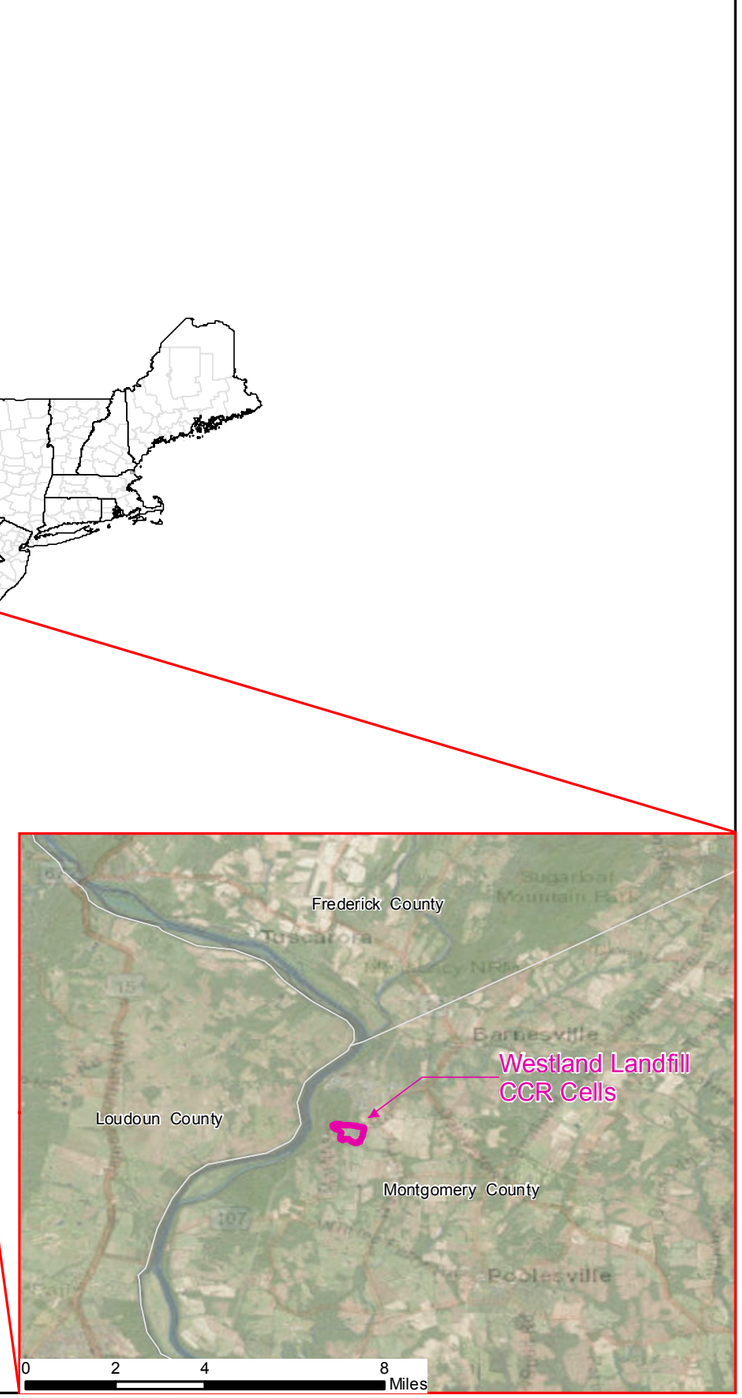
TITLE Westland Ash Storage Site-Karst Analysis

AECOM Geophysical Services
12420 Milestone Center Drive, Suite 150
Germantown, MD 20876

PROJ NO 60586425

Figure 1





NOTES:

1. Basemap courtesy of ESRI and others.

CLIENT	GenOn MD Ash Management LLC.		
PROJ	Westland Ash Storage Site Stability Analysis		
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TITLE Westland Ash Storage Site-Fault Analysis

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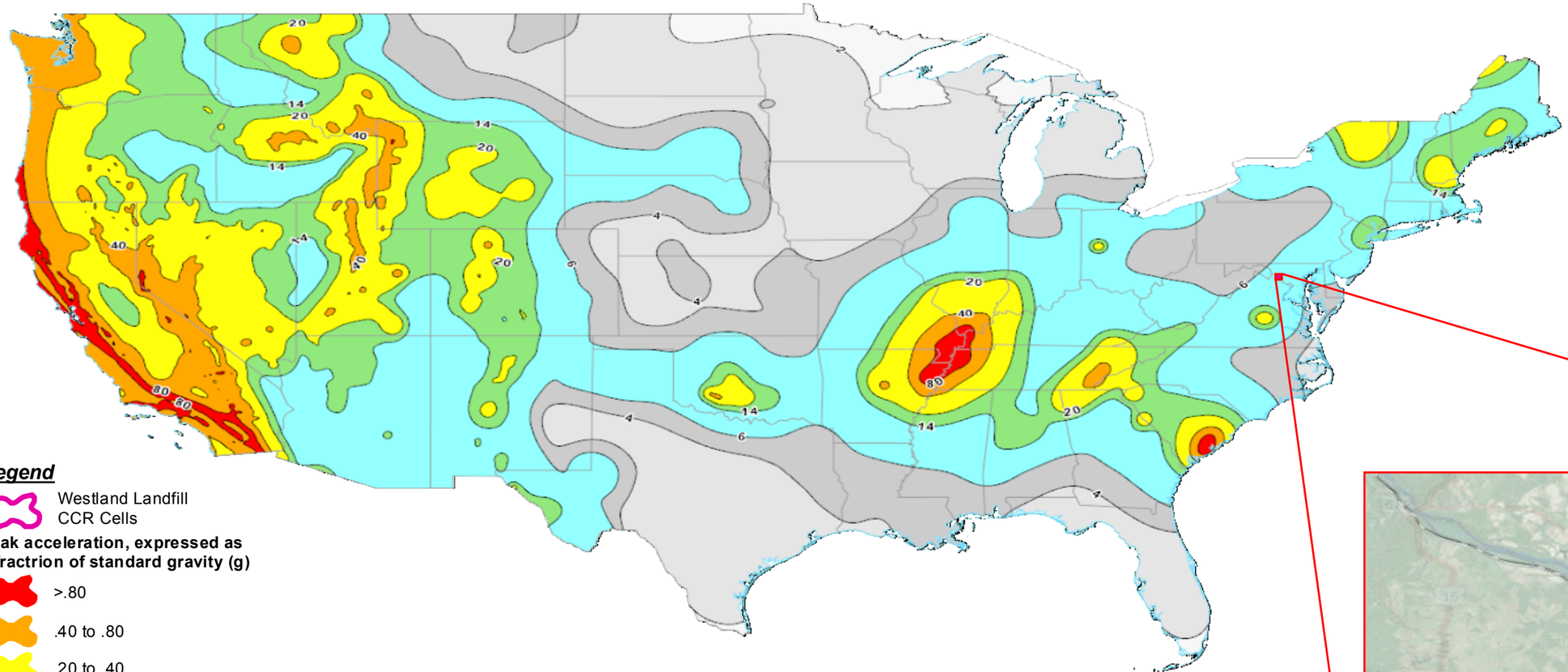
PROJ NO 60586425

Figure 2

Two-Percent Probability of Exceedance in 50 Years Map of Peak Ground Acceleration



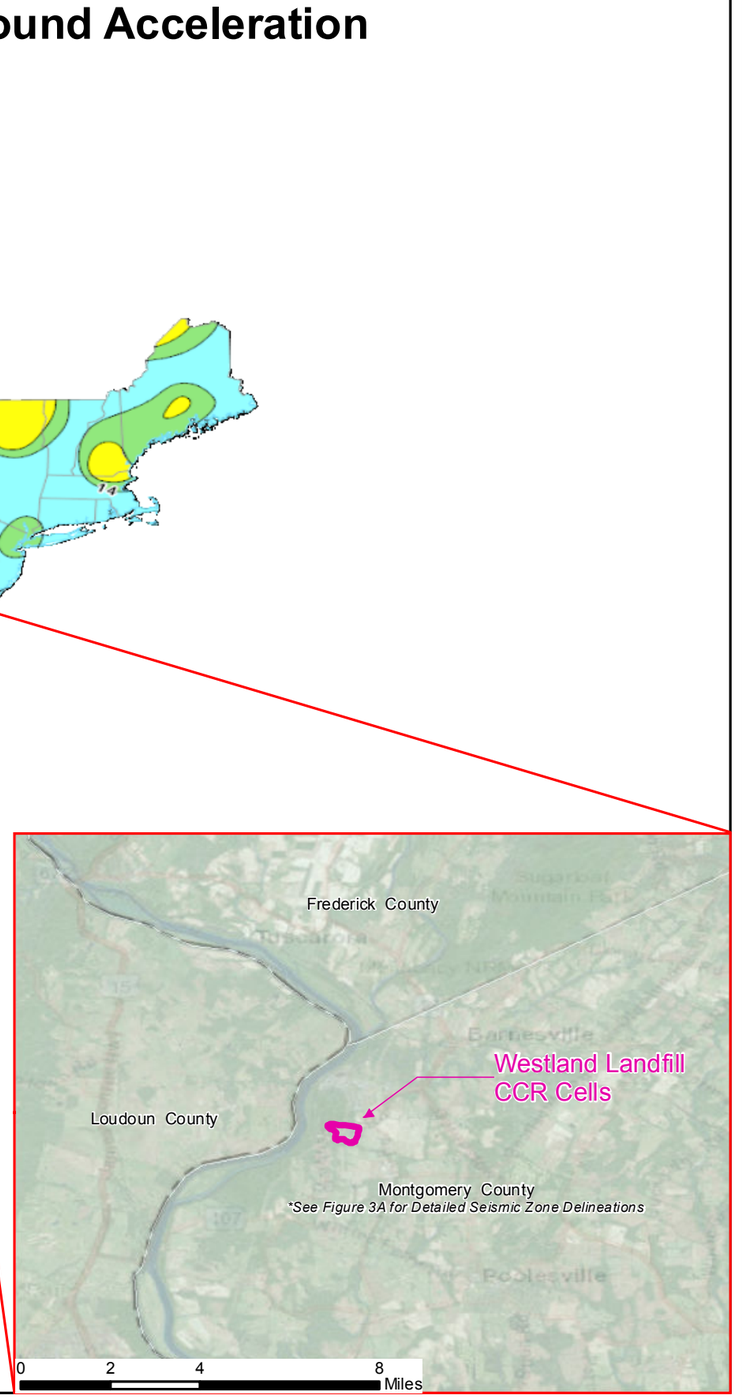
Legend

Westland Landfill
CCR Cells

Peak acceleration, expressed as a fractrion of standard gravity (g)

- >.80
- .40 to .80
- .20 to .40
- .14 to .20
- .06 to .14
- .04 to .06
- .02 to .04

0 250 500 1,000 1,500 Miles



NOTES:

1. Basemap courtesy of ESRI and others.
2. Seismic Impact Zone defined as an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a fraction of the earth's gravitational pull (g), will be exceeded in 50 years

CLIENT	GenOn MD Ash Management LLC.			
PROJ	Westland Ash Storage Site Stability Analysis			
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TITLE Westland Ash Storage Site–Seismic Zone Analysis

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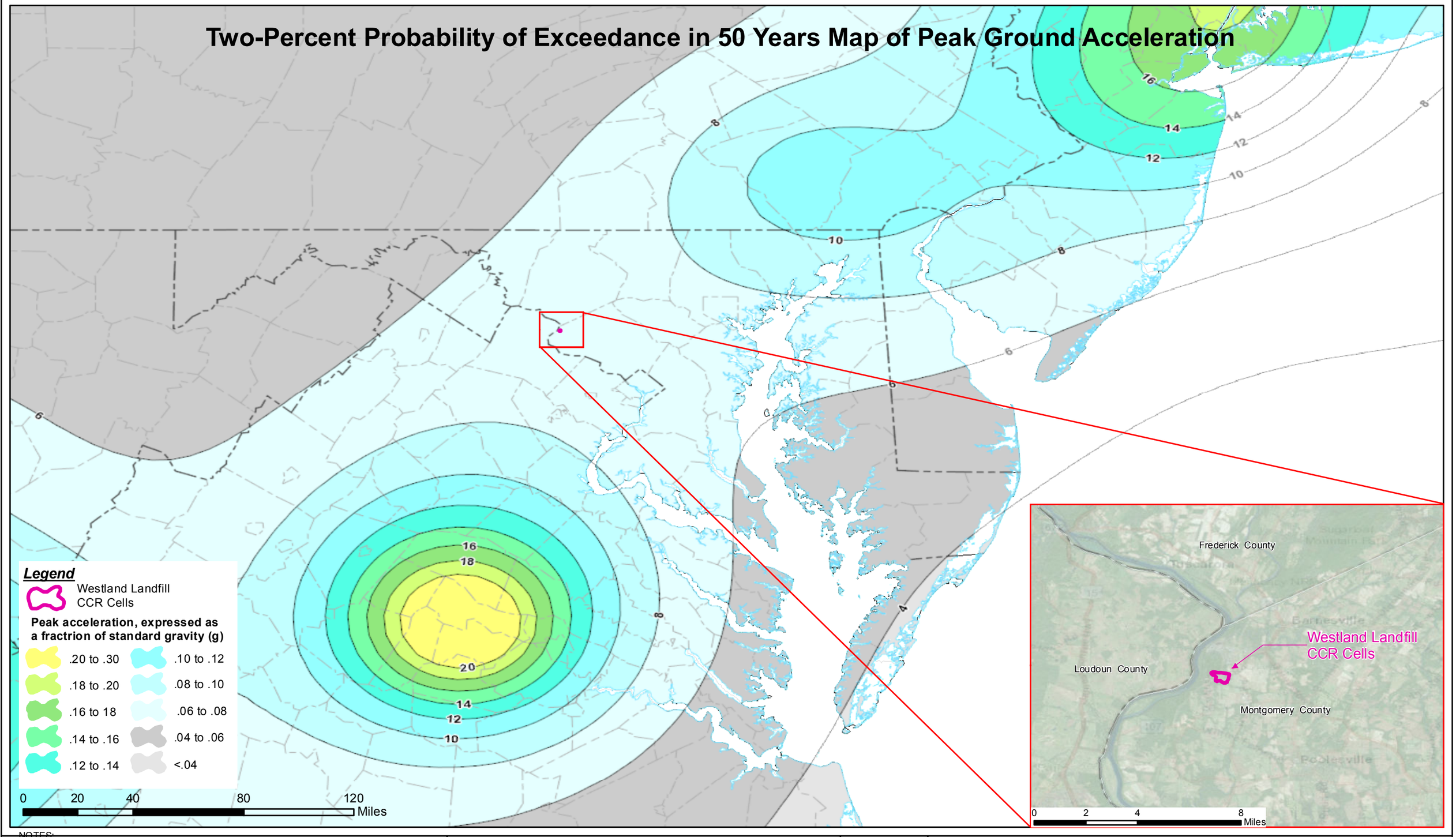
Figure 3

Two-Percent Probability of Exceedance in 50 Years Map of Peak Ground Acceleration



NOTES:

1. Basemap courtesy of ESRI and others.
2. Seismic Impact Zone defined as an area having a 2% or greater probability that the maximum expected horizontal acceleration, expressed as a fraction of the earth's gravitational pull (g), will be exceeded in 50 years

CLIENT	GenOn MD Ash Management LLC.			
PROJ	Westland Ash Storage Site Stability Analysis			
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TITLE Westland Ash Storage Site-Seismic Zone Analysis

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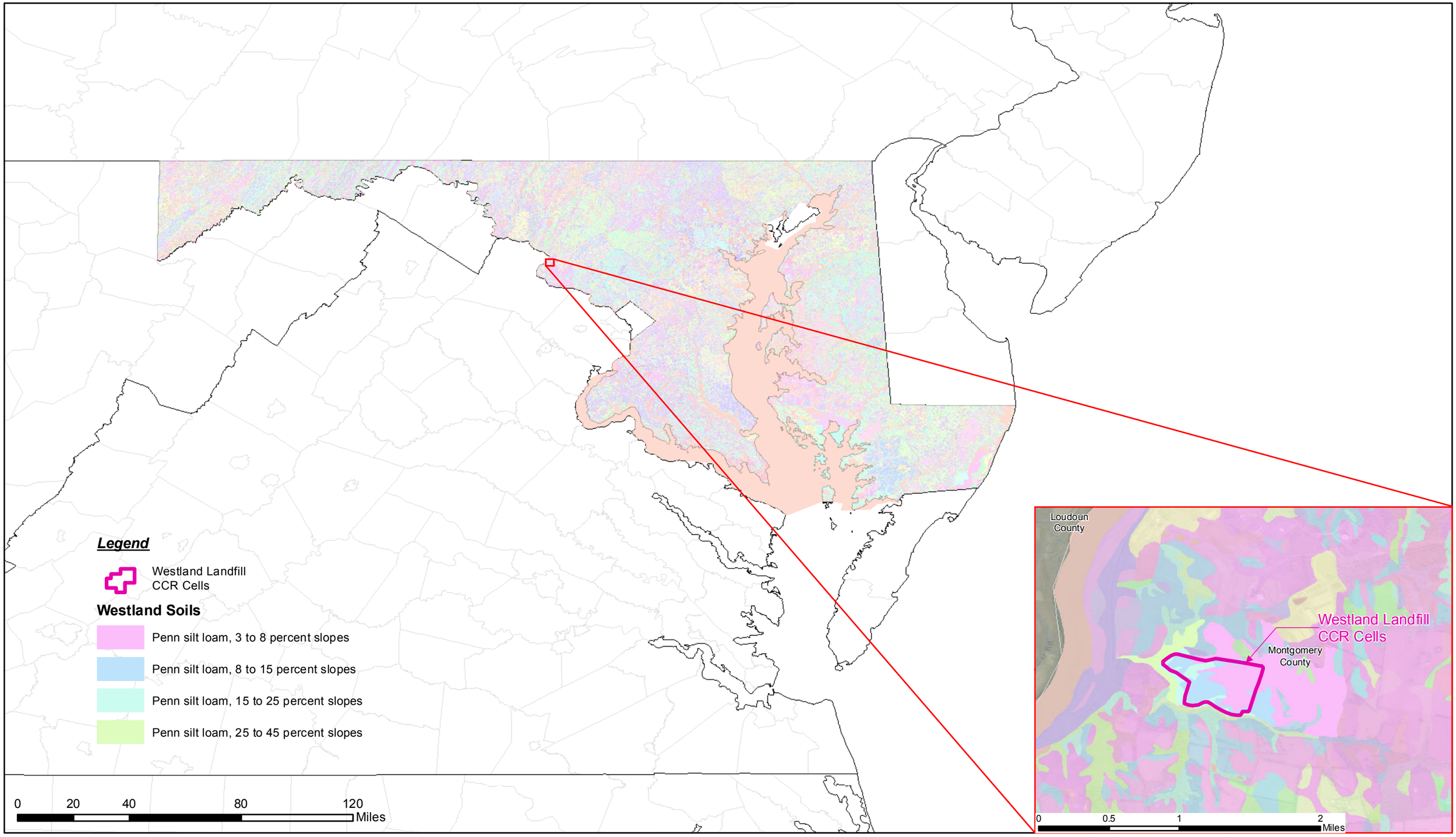
Figure 3A



NOTES:

1. Basemap courtesy of ESRI and others.
2. Soil data presented in legend only lists the soil units located on the Westland site.

CLIENT	GenOn MD Ash Management LLC.			
PROJ	Westland Ash Storage Site Stability Analysis			
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TITLE Westland Ash Storage Site-Soils Analysis

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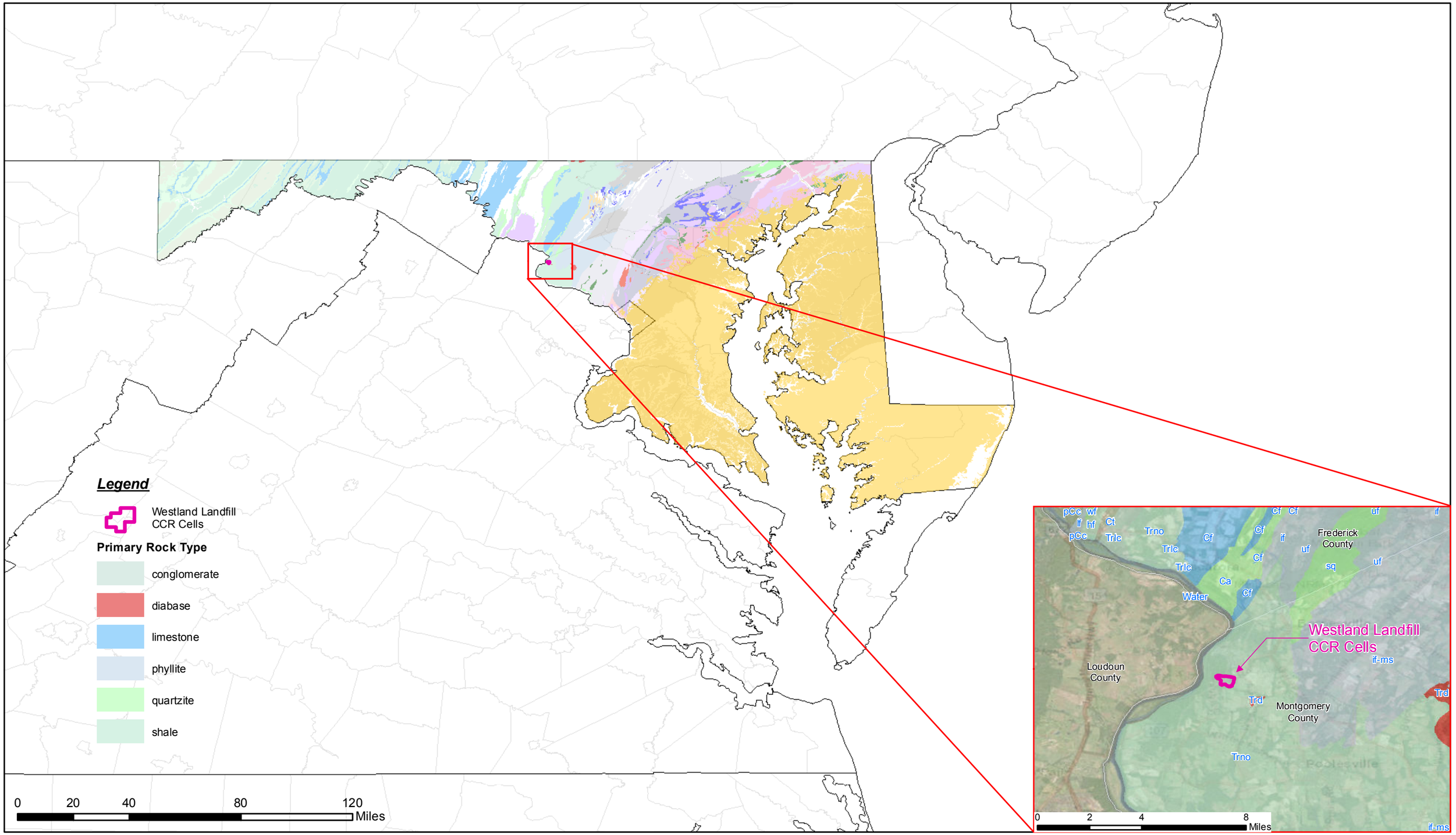
PROJ NO 60586425

Figure 4



NOTES:

1. Basemap courtesy of ESRI and others.
2. Geologic data presented in legend only lists the geologic units presented on the inset map.

CLIENT GenOn MD Ash Management LLC.			
PROJ Westland Ash Storage Site Stability Analysis			
REVISION NO 0	DES BY	CSZ	08/27/2018
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TITLE Westland Ash Storage Site-Geology Analysis

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Germantown, MD 20876

PROJ NO 60586425

Figure 5

Attachment 1

Map Unit Description (Brief, Generated)

Montgomery County, Maryland

[Minor map unit components are excluded from this report]

Map unit: 21B - Penn silt loam, 3 to 8 percent slopes

Component: Penn (85%)

The Penn component makes up 85 percent of the map unit. Slopes are 3 to 8 percent. This component is on piedmonts, hills. The parent material consists of Triassic residuum weathered from shale and siltstone and/or Triassic residuum weathered from mudstone and/or Triassic residuum weathered from sandstone. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 27 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: 21C - Penn silt loam, 8 to 15 percent slopes

Component: Penn (85%)

The Penn component makes up 85 percent of the map unit. Slopes are 8 to 15 percent. This component is on piedmonts, hills. The parent material consists of Triassic residuum weathered from shale and siltstone and/or sandstone and/or mudstone. Depth to a root restrictive layer, bedrock, lithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 3e. This soil does not meet hydric criteria.

Map unit: 21D - Penn silt loam, 15 to 25 percent slopes

Component: Penn (95%)

The Penn component makes up 95 percent of the map unit. Slopes are 15 to 25 percent. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 4e. This soil does not meet hydric criteria.

Map unit: 21E - Penn silt loam, 25 to 45 percent slopes

Component: Penn (95%)

The Penn component makes up 95 percent of the map unit. Slopes are 25 to 45 percent. Depth to a root restrictive layer, bedrock, paralithic, is 20 to 40 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria.

Soil Features

Montgomery County, Maryland

[Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
21B:									
Penn	Paralithic bedrock Lithic bedrock	20-27 27-33	0-13 8-13	Moderately cemented Strongly cemented	0	0	Moderate	Low	Moderate
Klinesville	Lithic bedrock	10-20	---	Strongly cemented	0	0	Moderate	Low	Moderate
Readington	Fragipan Lithic bedrock	20-40 40-70	--- ---	Noncemented Very strongly cemented	0	0	Moderate	High	Moderate
Reaville	Lithic bedrock	20-40	---	Very strongly cemented	0	0	Moderate	High	Moderate
21C:									
Penn	Lithic bedrock	20-40	10-52	Strongly cemented	0	0	Moderate	Low	Moderate
Klinesville	Lithic bedrock	10-20	10-70	Strongly cemented	0	0	Moderate	Low	Moderate
Readington	Fragipan Lithic bedrock	20-36 40-68	20-40 12-40	Noncemented Very strongly cemented	0	0	Moderate	High	Moderate
Reaville	Lithic bedrock	20-40	10-60	Very strongly cemented	0	0	Moderate	High	Moderate
21D:									
Penn	Paralithic bedrock	20-40	---	---	0	0	Moderate	Low	High
Unnamed soils	---	---	---	---	---	---	---	---	---

Soil Features

Montgomery County, Maryland

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	*In*		*In*	*In*			
21E:									
Penn	Paralithic bedrock	20-40	---	---	0	0	Moderate	Low	High
Unnamed soils	---	---	---	---	---	---	---	---	---

Physical Soil Properties

Montgomery County, Maryland

[Entries under "Erosion Factors--T" apply to the entire profile. Entries under "Wind Erodibility Group" and "Wind Erodibility Index" apply only to the surface layer. Absence of an entry indicates that data were not estimated]

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
21B:														
Penn	0-10	14-43	39-74	12-25	1.41-1.51	4.00-42.00	0.18-0.22	0.0-2.9	1.0-3.0	.37	.37	2	5	56
	10-15	17-41	32-66	18-34	1.36-1.56	4.00-42.00	0.12-0.22	0.0-2.9	0.1-1.1	.49	.49			
	15-19	17-43	31-65	19-35	1.36-1.66	4.00-42.00	0.12-0.22	0.0-2.9	0.1-1.1	.49	.49			
	19-22	18-43	28-64	18-30	1.54-1.61	4.00-42.00	0.10-0.19	0.0-2.9	0.1-0.2	.28	.49			
	22-28	---	---	---	---	1.00-9.00	---	---	---	---	---			
	28-38	---	---	---	---	0.00-2.00	---	---	---	---	---			
Klinesville	0-8	20-50	40-65	10-20	1.42-1.49	14.00-42.00	0.06-0.10	0.0-2.9	1.0-3.0	.17	.32	1	6	48
	8-14	20-50	35-65	15-25	1.47-1.50	14.00-42.00	0.04-0.08	0.0-2.9	0.0-0.2	.10	.43			
	14-24	---	---	---	---	1.40-14.00	0.00	---	---	---	---			
Readington	0-8	10-45	35-75	10-22	1.41-1.53	4.23-14.11	0.18-0.23	0.0-2.9	1.0-3.0	.37	.37	3	5	56
	8-29	10-45	35-72	18-35	1.52-1.63	4.23-14.11	0.08-0.14	0.0-2.9	0.0-0.5	.43	.43			
	29-58	10-45	35-75	15-35	1.54-1.75	1.41-4.23	0.06-0.10	0.0-2.9	0.0-0.5	.20	.49			
	58-68	---	---	---	---	1.41-14.11	---	---	---	---	---			
Reaville	0-10	10-40	50-75	7-25	1.41-1.49	4.23-14.11	0.16-0.20	0.0-2.9	1.0-3.0	.37	.37	2	5	56
	10-18	5-25	40-70	12-40	1.41-1.56	0.42-1.41	0.08-0.14	0.0-2.9	0.0-0.5	.49	.49			
	18-30	5-25	40-65	15-40	1.43-1.55	0.42-1.41	0.06-0.12	0.0-2.9	0.0-0.5	.28	.43			
	30-38	15-45	40-65	12-35	1.48-1.52	0.42-1.41	0.06-0.12	0.0-2.9	0.0-0.3	.24	.43			
	38-80	---	---	---	---	0.42-14.11	---	---	---	---	---			
21C:														
Penn	0-10	14-43	39-70	12-25	1.41-1.51	4.00-42.00	0.16-0.22	1.1-3.5	1.0-3.0	.37	.37	2	5	56
	10-15	17-41	32-66	18-34	1.36-1.56	4.00-42.00	0.15-0.20	1.5-5.1	0.1-1.1	.49	.49			
	15-19	17-43	31-65	19-35	1.36-1.66	4.00-42.00	0.15-0.18	1.6-5.4	0.1-1.1	.49	.49			
	19-22	18-43	28-64	18-30	1.54-1.61	4.00-42.00	0.11-0.19	1.2-4.2	0.1-0.2	.28	.49			
	22-28	19-52	29-68	13-19	1.41-1.50	4.00-42.00	0.04-0.19	0.5-1.4	0.0-0.2	.17	.43			
	28-80	---	---	---	---	0.00-2.00	---	---	---	---	---			

Physical Soil Properties

Montgomery County, Maryland

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
21C:														
Klinesville	0-5	20-50	40-73	7-25	1.47-1.50	14.00-42.00	0.05-0.14	0.2-2.1	1.0-3.0	.17	.43	1	7	38
	5-15	20-50	28-65	15-25	1.45-1.49	14.00-42.00	0.04-0.15	0.5-1.9	0.0-0.2	.17	.43			
	15-80	---	---	---	---	1.40-14.00	0.00	---	---	---	---			
Readington	0-8	6-30	55-73	13-24	1.38-1.44	4.23-14.11	0.17-0.19	0.8-2.1	1.0-3.0	.43	.43	3	5	56
	8-29	2-22	55-70	16-35	1.42-1.57	4.23-14.11	0.16-0.18	0.8-3.4	0.0-0.5	.49	.49			
	29-58	10-39	42-71	9-27	1.61-1.70	1.41-4.23	0.00	0.3-1.3	0.0-0.5	.24	.49			
	58-80	---	---	---	---	1.41-14.11	---	---	---	---	---			
Reaville	0-10	10-40	50-75	7-25	1.41-1.49	4.23-14.11	0.16-0.20	0.4-2.4	1.0-3.0	.37	.37	2	5	56
	10-18	5-25	40-70	12-40	1.41-1.56	0.42-1.41	0.14-0.20	0.7-5.3	0.0-0.5	.49	.49			
	18-30	5-25	40-65	15-40	1.43-1.55	0.42-1.41	0.12-0.16	0.8-4.2	0.0-0.5	.43	.43			
	30-38	15-45	40-65	12-27	1.48-1.54	0.42-1.41	0.11-0.15	0.6-2.4	0.0-0.3	.55	.55			
	38-80	---	---	---	---	0.42-14.11	---	---	---	---	---			
21D:														
Penn	0-9	---	---	10-20	1.20-1.40	4.00-42.00	0.16-0.20	0.0-2.9	1.0-3.0	.43	.43	3	5	56
	9-21	---	---	18-32	1.40-1.60	4.00-42.00	0.14-0.18	0.0-2.9	0.0-0.5	.20	.43			
	21-36	---	---	18-25	1.40-1.60	4.00-42.00	0.04-0.08	0.0-2.9	0.0-0.5	.15	.43			
	36-40	---	---	---	---	1.40-42.00	---	---	---	---	---			
Unnamed soils	---	---	---	---	---	---	---	---	---	---	---	---	---	---
21E:														
Penn	0-9	---	---	10-20	1.20-1.40	4.00-42.00	0.16-0.20	0.0-2.9	1.0-3.0	.43	.43	3	5	56
	9-21	---	---	18-32	1.40-1.60	4.00-42.00	0.14-0.18	0.0-2.9	0.0-0.5	.20	.43			
	21-36	---	---	18-25	1.40-1.60	4.00-42.00	0.04-0.08	0.0-2.9	0.0-0.5	.15	.43			
	36-40	---	---	---	---	1.40-42.00	---	---	---	---	---			
Unnamed soils	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Engineering Properties

Montgomery County, Maryland

[Absence of an entry indicates that the data were not estimated]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
21B:												
Penn	0-10	Loam, silt loam	CL, CL-ML	A-4, A-6, A-7-6	0	1-7	85-98	84-98	72-96	63-86	24-41	7-17
	10-15	Clay loam, loam, silty clay loam, silt loam	CL	A-6, A-7-6	0	2-7	84-94	83-94	70-94	61-84	27-44	12-23
	15-19	Clay loam, loam, silty clay loam, silt loam	CL	A-6, A-7-6	0	2-6	85-94	84-94	70-94	62-85	28-45	12-24
	19-22	Clay loam, channery loam, silty clay loam, silt loam	CL, GC	A-6	0	2-14	65-95	63-94	55-94	44-77	27-39	12-21
	22-28	Bedrock	---	---	---	---	---	---	---	---	---	---
	28-38	Bedrock	---	---	---	---	---	---	---	---	---	---
Klinesville	0-8	Channery loam, channery silt loam, silt loam	CL, GC-GM	A-2-4, A-4, A-6	0	0-8	50-81	46-80	39-75	28-57	22-37	6-13
	8-14	Channery silt loam, very channery loam, loam	CL, GC	A-2-4, A-6	0	0-13	37-77	33-75	28-72	21-57	24-35	9-17
	14-24	Bedrock	---	---	---	---	---	---	---	---	---	---
Readington	0-8	Loam, silt loam	CL, CL-ML	A-4, A-6	0-1	0-9	87-100	87-100	74-97	60-81	22-39	6-15
	8-29	Clay loam, loam, silty clay loam, silt loam	CL	A-6, A-7-6	0-2	0-10	91-100	91-100	80-100	70-94	27-44	12-25
	29-58	Clay loam, channery silty clay loam, channery silt loam, very channery loam	CL, GC	A-4, A-6, A-7-6	0-2	2-23	54-95	52-95	45-95	39-90	24-44	9-25
	58-68	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Properties

Montgomery County, Maryland

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
21B:												
Reaville	0-10	Silt loam	CL, ML	A-4, A-6, A-7-6	0	0-5	87-98	85-97	59-85	52-77	20-41	3-17
	10-18	Silty clay loam, silt loam	CL, CL-ML	A-4, A-6, A-7-6	0	2-6	84-94	83-94	62-94	57-90	22-49	7-28
	18-30	Channery silt loam, silty clay loam	CL, GC	A-4, A-6, A-7-6	0	3-12	68-92	66-92	50-92	47-88	24-49	9-28
	30-38	Channery clay loam, channery silty clay loam, channery silt loam, very channery loam	CL, GC-GM	A-2-4, A-6, A-7-6	0	9-19	48-78	45-76	33-75	31-70	22-44	7-25
	38-80	Bedrock	---	---	---	---	---	---	---	---	---	---
21C:												
Penn	0-10	Loam, silt loam	CL, CL-ML	A-4, A-6	0	1-7	85-98	84-98	72-96	63-86	25-35	7-18
	10-15	Clay loam, loam, silty clay loam, silt loam	CL	A-4, A-6, A-7-6	0	2-7	84-94	83-94	70-94	61-84	27-43	8-26
	15-19	Clay loam, loam, silty clay loam, silt loam	CL	A-4, A-6, A-7-6	0	2-6	85-94	84-94	70-94	62-85	27-44	9-26
	19-22	Clay loam, channery loam, silty clay loam, silt loam	CL, GC	A-4, A-6	0	2-14	65-95	63-94	55-94	44-77	27-39	9-20
	22-28	Channery loam, channery silt loam, very channery loam	GC	A-2-4, A-6	0	13-22	40-67	36-66	31-60	24-47	23-29	8-12
	28-80	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Properties

Montgomery County, Maryland

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
21C:												
Klinesville	0-5	Channery loam, very channery silt loam	CL, GC, GM	A-6	0	7-25	59-83	57-82	49-82	41-74	0-36	NP-15
	5-15	Channery silt loam, very channery loam	CL, GC	A-4, A-6	0	8-25	59-80	56-79	48-75	37-59	25-35	9-17
	15-80	Bedrock	---	---	---	---	---	---	---	---	---	---
Readington	0-8	Silt loam	CL	A-4, A-6	0	5	95-97	83-87	76-87	69-83	25-40	8-16
	8-29	Channery silt loam, silty clay loam, silt loam	CL	A-4, A-6, A-7-6	0	6-8	83-87	82-87	73-87	67-87	26-44	10-24
	29-58	Channery loam, channery silt loam, channery silt loam	CL, GM	A-4, A-6	0	14-16	66-71	64-69	52-69	45-61	18-36	2-16
	58-80	Bedrock	---	---	---	---	---	---	---	---	---	---
Reaville	0-10	Silt loam	CL, ML	A-4, A-6, A-7-6	0	0-4	91-100	90-100	63-87	55-79	20-41	3-17
	10-18	Channery silt loam, silty clay loam, silt loam	CL, CL-ML	A-4, A-6, A-7-6	0	2-5	86-94	85-94	64-94	58-90	23-48	6-26
	18-30	Channery silt loam, parachannery silt loam, silty clay loam	CL	A-4, A-6, A-7-6	0	3-7	83-93	82-92	63-92	58-89	25-49	9-28
	30-38	Channery loam, channery silty clay loam, channery silt loam, parachannery silt loam	CL, CL-ML	A-4, A-6	0	4-9	78-88	77-87	61-82	57-78	23-36	5-16
	38-80	Bedrock	---	---	---	---	---	---	---	---	---	---

Engineering Properties

Montgomery County, Maryland

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percent passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 Inches	3-10 Inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
21D:												
Penn	0-9	Silt loam	CL	A-4	0	0-5	95-100	80-100	80-95	60-85	0-14	6-13
	9-21	Channery loam, channery silty clay loam, channery silt loam	GM, ML, SM	A-2, A-4	0	0-10	55-100	50-100	45-95	30-75	20-37	1-10
	21-36	Very channery loam, very channery silt loam	CL, GM, ML, SM	A-1, A-2, A-4	0	0-15	35-100	20-100	15-95	15-70	20-35	3-10
	36-40	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Unnamed soils	---	---	---	---	---	---	---	---	---	---	---	---
21E:												
Penn	0-9	Silt loam	CL	A-4	0	0-5	95-100	80-100	80-95	60-85	0-14	6-13
	9-21	Channery loam, channery silty clay loam, channery silt loam	GM, ML, SM	A-2, A-4	0	0-10	55-100	50-100	45-95	30-75	20-37	1-10
	21-36	Very channery loam, very channery silt loam	CL, GM, ML, SM	A-1, A-2, A-4	0	0-15	35-100	20-100	15-95	15-70	20-35	3-10
	36-40	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Unnamed soils	---	---	---	---	---	---	---	---	---	---	---	---