November 25, 2025

Department of Planning and Natural Resources
Charles W. Turnbull Regional Library - 4607 Tutu Park Mall
St. Thomas, VI 00802

Re: Stormwater Management Calculations Cover Letter
US VIDE St. Thomas Emanuel Benjamin Oliver PREK-8 School
325 Palmetto Road, Anna's Retreat, St. Thomas 00802, U.S. Virgin Islands

SITE DESCRIPTION

The proposed development for the US Virgin Islands Department of Education (VIDE) St. Thomas Emanuel Benjamin Oliver PREK-8 School is located along Palmetto Road St. Thomas, US Virgin Islands. The existing site is occupied by an existing non-operational school, a central courtyard area and two asphalt parking lots. The site is bounded on the north by Palmetto Road and west, south, and east by hills that slope down away from the development area. The site has an approximate area of 7.99 acres out of which only 4.95 acres will be disturbed. See image below for the project Location Figure.

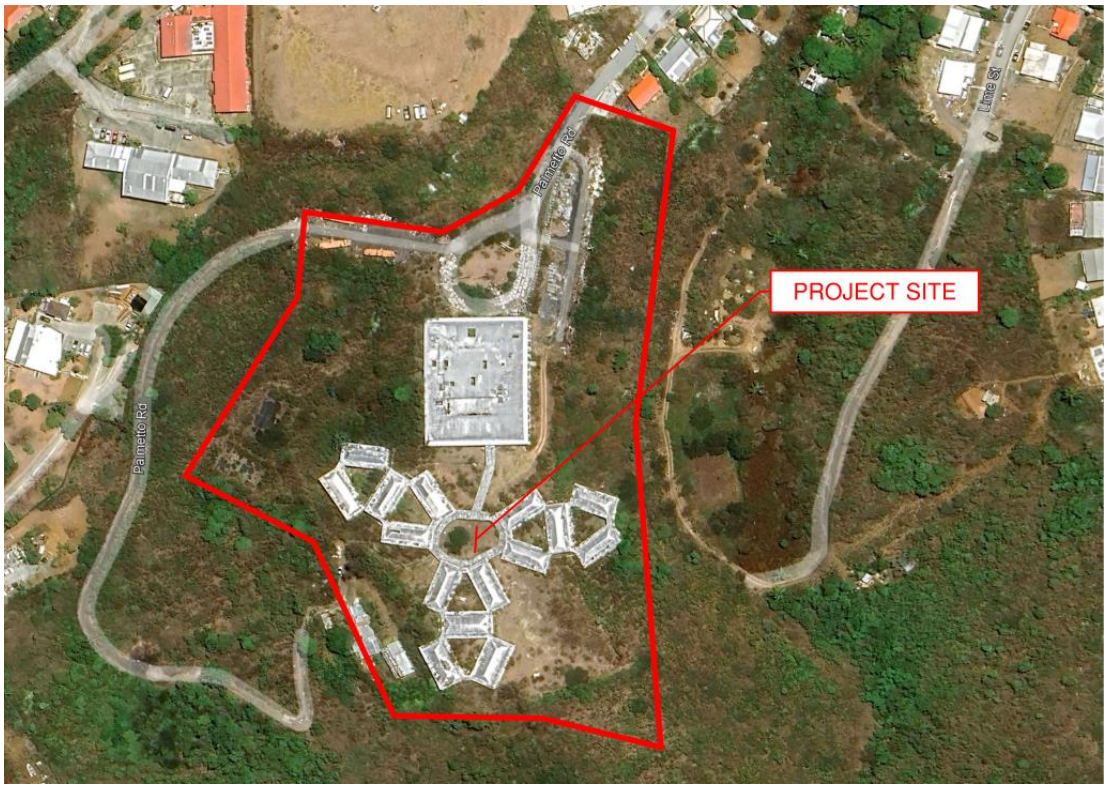


Figure 1 – Site Location Figure

EXISTING SITE CONDITIONS

The topography of the project site varies between approximately elevations 205.0-ft to 250.00-ft however, the existing site is located at the top of a hill that is about 100-feet above the surrounding landscape. The existing grades on the center of the cluster buildings are relatively flat but rapidly slopes down away in the east, south and west direction. The existing site slopes up from the center of the building cluster towards the north. The elevations referenced are based on Army Corp Aerial Topography, per the topographic survey prepared by Marvin Berning & Associates (refer to **Attachment A**). Stormwater runoff currently drains offsite throughout the perimeter of the site, downhill. Tabulated below is a breakdown of the existing land use of the site.

Surface Type	**Area (acres)**
Existing Buildings	1.15
Pervious	2.44
Impervious	1.36
Total	**4.95**

PROJECT DESCRIPTION

The proposed project will consist of demolishing all the existing buildings and constructing a completely new PK-8 educational school, an admin center building, a gymnasium (FEMA safe room) facility, a dining and media-center building, and new driveways with drop-off areas and parking stalls.

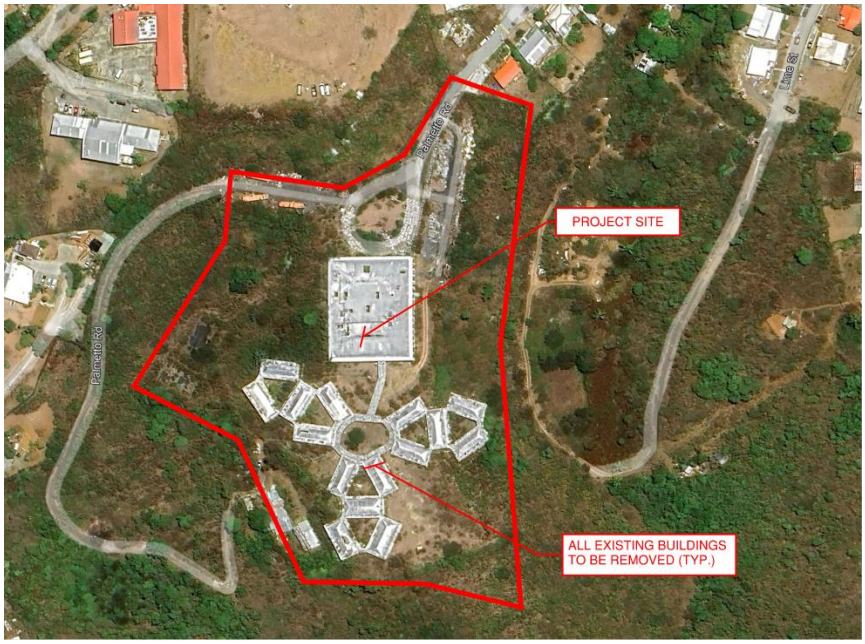


Figure 2 – Existing Buildings to be Removed

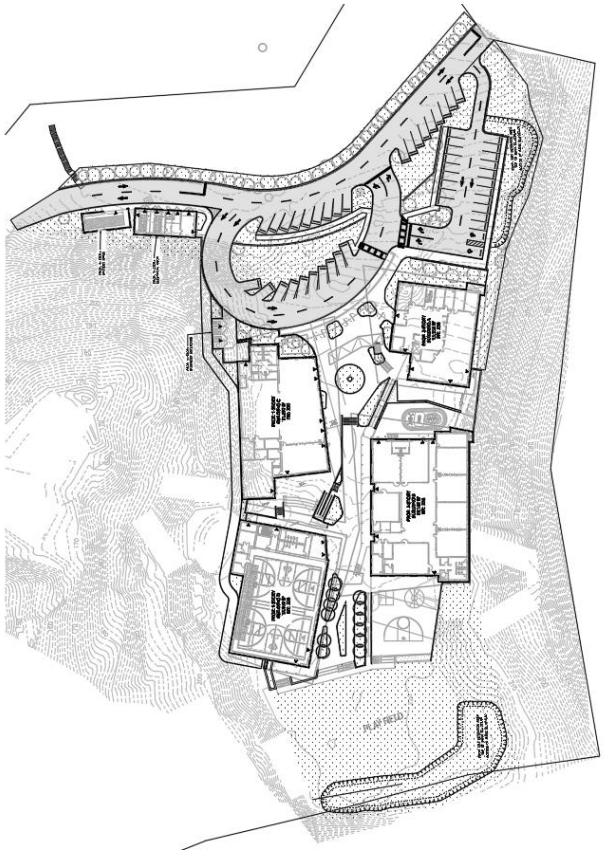


Figure 3 – Proposed Site Plan

Below is the breakdown for the post-development land use condition:

Surface Type	**Area (acres)**
Proposed Buildings	1.09
Pervious	1.95
Impervious	1.91
Total	4.95

PROPOSED ON-SITE STORMWATER MANAGEMENT IMPROVEMENTS

The proposed stormwater management system includes two separate systems. One of these includes catch basins and drainage pipes along the proposed northern driveway and discharges into the proposed dry detention area to the east of the proposed parking lot. This dry detention area overflows downhill along its full perimeter. This system also collects and discharges the upland runoff that comes from the hill to the north of the site. The second system consists of interconnected catch basins, drainage pipes, and a dry detention area located along the southern perimeter of the site. The runoff collected from the site discharges into the dry detention area

and the runoff from the building roofs are conveyed to the proposed cistern under the new gym building to be treated and reused. The cistern has an overflow into the proposed dry detention area. This dry detention area also overflows downhill along its full perimeter. The top of bank elevation of the two dry detention areas has been set to provide sufficient volume to ensure that discharge occurs once the required stormwater quantity and quality requirements have been met.

We have conducted a pre-development to post-development analysis for the 10-year and 100-year 24-hour storm events (type II distribution) per the VI Department of Planning and Natural Resources (DPNR), section 2.2 – Post-Construction Standards for Permanent Stormwater Control.

The post-development and pre-development total runoff volumes will be calculated using the following design parameters and criteria:

1. Groundwater Table Elevation for the site is approximately elevation 211-ft per the Geotechnical Engineering Study prepared by Langan. The bottom elevation of the proposed dry detention areas will be designed to be at least 1 foot above the groundwater table elevation.

2. Using Table 3-6 Typical Curve Number Values for Urban Areas (SCS 1986) a weighted curve number value was calculated for the pre-development conditions and a uniform curve number was used for the post-development conditions based on land use type. The values used are tabulated below:

	CN (pervious)	**CN (impervious)**	**CN (weighted)**
Pre-Development	80	95	88
Post-Development	-	95	95

3. Precipitation (P) data will be obtained from NOAA (National Oceanic and Atmospheric Administration) Atlas 14. Refer to **Attachment B**. The rainfall amount used for the calculations is equivalent to 90% of the highest rainfall amount within the range provided in Atlas 14 for each of the 10-year 24-hour and 100-year 25-hour storm events, as per the requirements of the DPNR Environmental Protection Handbook.

The pre-development and post-development will be calculated using the NRCS (Natural Resources Conservation Service) method. See below for formulas.

$$S = \frac{1000}{CN} - 10$$

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)} \ (A)$$

Q = total runoff volume (ac-ft)
P = precipitation data (ft)
A = area (acres)
The table below summarizes the results of the pre-development and post-development runoff volume calculations.

Storm Events	Pre-Development Q (ac-ft)	Post-Development Q (ac-ft)
10-year, 24-hour	3.13	3.50
100-year, 24-hour	6.51	6.91

As shown in the table below, the post-development condition generates more runoff volume than the pre-development conditions. To address this condition, we are proposing dry retention areas that will be providing additional storage volume on site of approximately 0.83 ac-ft. This volume is larger than the additional runoff volume generated in the post-development condition for the 10-year 24-hour event and the 100-year 24-hour event. Therefore, the post-development condition will discharge less total runoff volume offsite, compared to the pre-development condition for the 10-year 24-hour and 100-year 24-hour storm events.

WATER QUALITY

Based on the available information for the existing site, it does not appear that there are currently any water quality treatment practices in place. The proposed stormwater management system will provide the required water quality volume within the proposed dry detention areas. The required water quality treatment volume is being calculated using the following formula per the DPNR Environmental Protection Handbook, section 2.2 – Post-Construction Standards for Permanent Stormwater Control.

$$WQ = \frac{(1") \ (I)}{12},$$

WQ = required water quality volume (ac-ft)
I = Impervious area for proposed development (acres)

$$WQ = \frac{(1") \ (1.91 \ acres)}{12}$$

$$WQ = 0.16ac - ft$$

W	WQ (ac-ft)
Required	0.16
*Provided	0.83

* The total water quality volume provided includes the volume in the proposed dry retention areas.

SWPPP (STORMWATER POLLUTION PREVENTION PLAN)

The following Best Management Practices (BMPs) are being implemented as part of the stormwater pollution prevention plan:

- Silt fences and berms around the perimeter of the site
- Stabilized construction entrances,
- Inlet protection for existing and proposed drainage inlets
- Sedimentation basins. The sedimentation basins are sized to hold the volume equivalent to 1" of runoff from the contributing area (on-site area disturbed during construction), as per the DPNR Environmental Protection Handbook, section 2.1 – Standards for Temporary Erosion and Sediment Control.

FINISHED FLOOR ELEVATION

Per FEMA panel 7800000028G the project site is located within FEMA flood zone X which means the project is not located in a flood zone area. Refer to **Attachment C**. The proposed finished floor elevations for the proposed buildings are 226.0-ft and 230.0-ft.

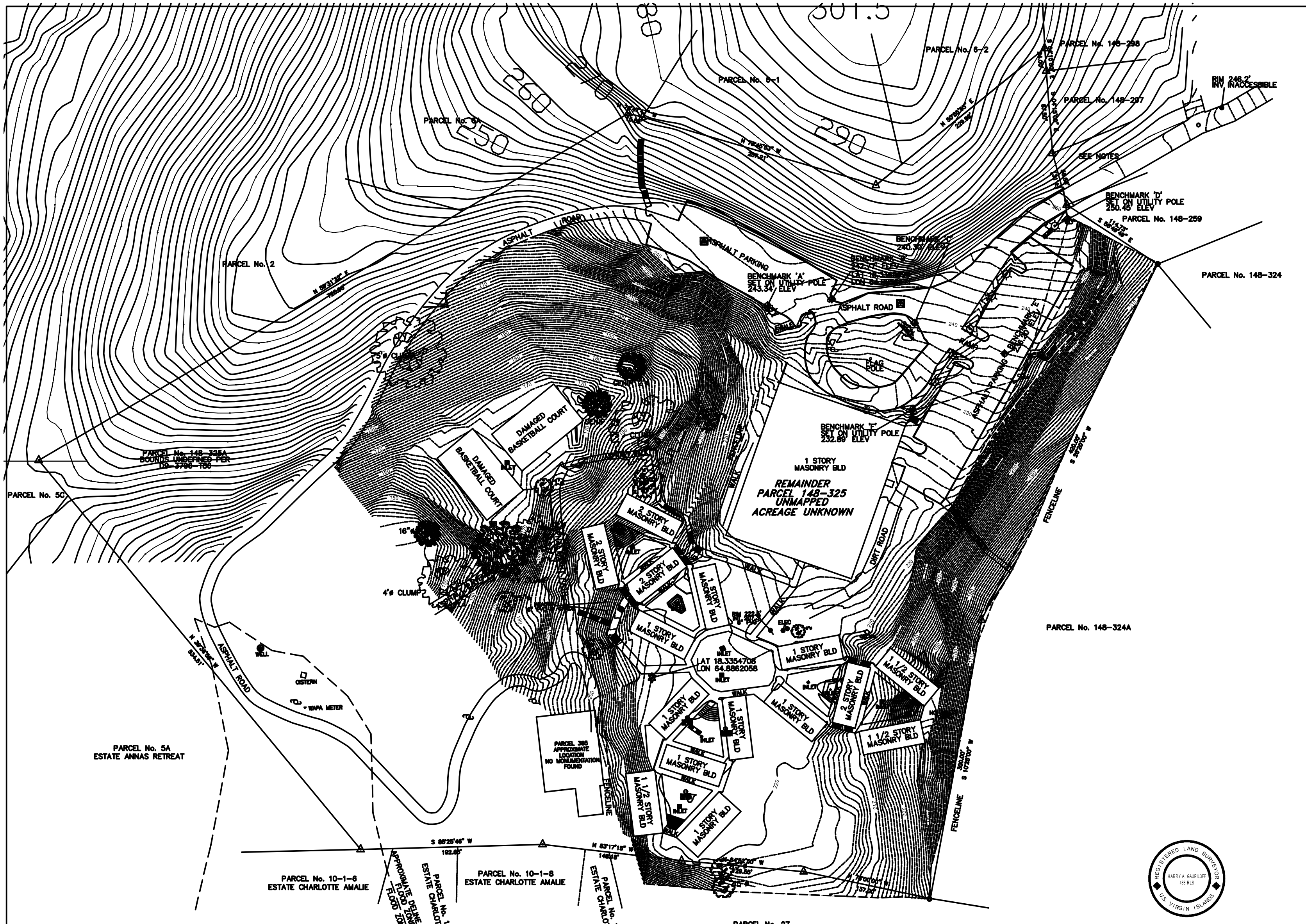
If you have any questions, please do not hesitate to contact us at 786-264-7200.

Sincerely,
Langan Engineering and Environmental Services, LLC

Eric Blaine Shwarz, PE
Senior Principal
USVI PE License No. 0-50150-3B
Registration No. 1644-e

Cc: Leonardo Rodriguez, PE, Kelvin Martinez, PE
Enclosure(s): Attachment A – Topographic survey prepared by Marvin Berning & Associates
Attachment B – NOAA Atlas 14.
Attachment C – FEMA panel 7800000028G

ATTACHMENT A
TOPOGRAPHIC SURVEY



LEGEND

- 3/4" φ PIPE FOUND
- SET PK NAIL
- MAN HOLE
- COMPUTED UNMARKED POINT
- SCAN PK POINTS
- BENCHMARKS
- LIGHT POLE
- UTILITY POLE
- TREE UNKNOWN SPECIES
- GENIP TREE

NOTES:

FEMA FLOOD ZONE CLASSIFICATION X & A
ORIGINAL FILED MAP OF PARCEL No. 148-325 HAS A 25' ± CLOSURE ERROR. THIS ERROR PRESENTS IN THE AREA WHERE THE PUBLIC ROAD ABUTS THE PARCEL.
STARTING ELEVATION EXTRAPOLATED FROM ARMY CORP AERIAL TOPOGRAPHY

MARVIN BERNING & ASSOCIATES
ENGINEERS AND LAND SURVEYORS
SUBDIVISION PLANNING
PROPERTY SURVEYS

6501 RED HOOK PLAZA
SUITE 201, SAINT THOMAS, VI 00802-1306
340 - 775-6857

TOPOGRAPHICAL AS-BUILT SURVEY OF
REM. PARCEL REM 148-325 ESTATE ANNAS RETREAT
NEW QUARTER
ST. THOMAS, U.S.V.I.

SURVEY: LOUIS
CALC.: GAURILOFF
SCALE: 1" =50'
DATE: 11/15/25
JOB NO. 5005-0

APPROVED BY:

ATTACHMENT B
NOAA ATLAS 14 RAINFALL DATA

NOAA Atlas 14, Volume 3, Version 4
Location name: Tutu, US Virgin Islands, VIR*
Latitude: 18.3358°, Longitude: -64.8859°
Elevation: 222 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.329** (0.283-0.384)	**0.423** (0.366-0.488)	**0.523** (0.454-0.600)	**0.598** (0.516-0.695)	**0.698** (0.591-0.821)	**0.774** (0.645-0.924)	**0.851** (0.701-1.03)	**0.929** (0.751-1.13)	**1.03** (0.818-1.28)	**1.12** (0.865-1.40)
10-min	**0.449** (0.387-0.524)	**0.578** (0.501-0.667)	**0.714** (0.620-0.820)	**0.818** (0.705-0.950)	**0.954** (0.807-1.12)	**1.06** (0.881-1.26)	**1.16** (0.958-1.41)	**1.27** (1.03-1.55)	**1.41** (1.12-1.75)	**1.53** (1.18-1.91)
15-min	**0.576** (0.497-0.673)	**0.741** (0.642-0.857)	**0.917** (0.796-1.05)	**1.05** (0.905-1.22)	**1.22** (1.04-1.44)	**1.36** (1.13-1.62)	**1.49** (1.23-1.80)	**1.63** (1.32-1.99)	**1.81** (1.43-2.24)	**1.96** (1.52-2.46)
30-min	**0.923** (0.795-1.08)	**1.19** (1.03-1.37)	**1.47** (1.28-1.69)	**1.68** (1.45-1.95)	**1.96** (1.66-2.30)	**2.18** (1.81-2.59)	**2.39** (1.97-2.89)	**2.61** (2.11-3.18)	**2.90** (2.30-3.59)	**3.14** (2.43-3.93)
60-min	**1.37** (1.18-1.60)	**1.76** (1.53-2.04)	**2.18** (1.89-2.50)	**2.49** (2.15-2.90)	**2.91** (2.46-3.42)	**3.23** (2.69-3.85)	**3.55** (2.92-4.29)	**3.87** (3.13-4.72)	**4.31** (3.41-5.33)	**4.65** (3.60-5.84)
2-hr	**1.72** (1.49-2.07)	**2.26** (1.94-2.67)	**2.94** (2.50-3.44)	**3.46** (2.92-4.10)	**4.17** (3.44-5.04)	**4.74** (3.81-5.84)	**5.32** (4.20-6.64)	**5.91** (4.56-7.50)	**6.74** (5.05-8.76)	**7.39** (5.38-9.78)
3-hr	**1.94** (1.63-2.30)	**2.52** (2.14-2.98)	**3.30** (2.80-3.87)	**3.90** (3.28-4.64)	**4.74** (3.88-5.73)	**5.39** (4.33-6.62)	**6.07** (4.80-7.56)	**6.78** (5.25-8.55)	**7.76** (5.83-9.98)	**8.54** (6.26-11.2)
6-hr	**2.33** (1.90-2.86)	**3.09** (2.53-3.77)	**4.29** (3.50-5.22)	**5.29** (4.26-6.50)	**6.69** (5.22-8.42)	**7.83** (5.94-10.1)	**9.05** (6.68-11.9)	**10.3** (7.43-13.8)	**12.2** (8.43-16.7)	**13.7** (9.18-19.3)
12-hr	**2.71** (2.15-3.41)	**3.67** (2.93-4.64)	**5.39** (4.26-6.76)	**6.80** (5.28-8.67)	**8.85** (6.62-11.6)	**10.5** (7.63-14.1)	**12.4** (8.66-17.0)	**14.3** (9.73-20.1)	**17.2** (11.2-24.9)	**19.5** (12.2-29.0)
24-hr	**3.12** (2.57-3.84)	**4.25** (3.51-5.22)	**6.40** (5.24-7.83)	**8.24** (6.70-10.1)	**11.0** (8.78-13.4)	**13.3** (10.5-16.2)	**15.9** (12.4-19.3)	**18.7** (14.4-22.7)	**22.8** (17.3-27.7)	**26.3** (19.6-31.9)
2-day	**4.09** (3.34-5.00)	**5.60** (4.57-6.81)	**8.39** (6.81-10.2)	**10.7** (8.62-12.9)	**14.1** (11.2-16.9)	**16.9** (13.3-20.3)	**20.0** (15.5-24.0)	**23.3** (17.8-28.0)	**28.1** (21.1-33.9)	**32.1** (23.8-38.7)
3-day	**4.28** (3.48-5.25)	**5.85** (4.77-7.16)	**8.75** (7.08-10.7)	**11.1** (8.92-13.5)	**14.6** (11.5-17.6)	**17.5** (13.6-21.1)	**20.6** (15.8-24.9)	**23.9** (18.2-29.0)	**28.8** (21.6-35.0)	**32.8** (24.3-39.9)
4-day	**4.46** (3.62-5.51)	**6.11** (4.97-7.51)	**9.11** (7.35-11.2)	**11.6** (9.23-14.1)	**15.1** (11.8-18.4)	**18.0** (14.0-22.0)	**21.2** (16.2-25.8)	**24.6** (18.7-29.9)	**29.5** (22.1-36.0)	**33.5** (24.8-41.0)
7-day	**5.08** (4.12-6.28)	**6.94** (5.63-8.56)	**10.4** (8.33-12.7)	**13.2** (10.5-16.1)	**17.3** (13.5-21.1)	**20.8** (16.1-25.3)	**24.6** (18.8-29.9)	**28.7** (21.7-34.9)	**34.6** (25.7-42.2)	**39.4** (29.0-48.4)
10-day	**5.63** (4.59-6.90)	**7.64** (6.25-9.36)	**11.2** (9.06-13.6)	**14.1** (11.3-17.1)	**18.3** (14.4-22.1)	**21.7** (17.0-26.3)	**25.4** (19.7-30.8)	**29.5** (22.6-35.8)	**35.2** (26.5-42.8)	**39.9** (29.7-48.9)
20-day	**7.50** (6.28-8.86)	**9.97** (8.37-11.8)	**13.8** (11.5-16.2)	**16.8** (13.9-19.7)	**20.9** (17.2-24.5)	**24.3** (19.8-28.5)	**27.8** (22.5-32.6)	**31.4** (25.3-37.0)	**36.6** (29.0-43.3)	**40.8** (32.0-49.3)
30-day	**9.38** (7.94-10.9)	**12.3** (10.4-14.3)	**16.2** (13.7-18.9)	**19.2** (16.1-22.3)	**23.1** (19.3-26.8)	**26.2** (21.7-30.5)	**29.3** (24.1-34.2)	**32.5** (26.7-38.1)	**37.1** (30.1-43.5)	**41.1** (33.1-49.8)
45-day	**11.8** (10.1-13.5)	**15.3** (13.2-17.5)	**19.5** (16.7-22.3)	**22.6** (19.3-25.8)	**26.6** (22.7-30.5)	**29.7** (25.2-34.0)	**32.8** (27.6-37.7)	**36.0** (30.2-41.4)	**40.2** (33.4-46.5)	**43.5** (35.9-50.5)
60-day	**13.5** (11.8-15.3)	**17.4** (15.2-19.6)	**21.9** (19.0-24.6)	**25.2** (21.9-28.4)	**29.7** (25.6-33.5)	**33.1** (28.4-37.4)	**36.5** (31.0-41.3)	**40.0** (33.7-45.4)	**44.6** (37.3-50.9)	**48.2** (40.0-55.2)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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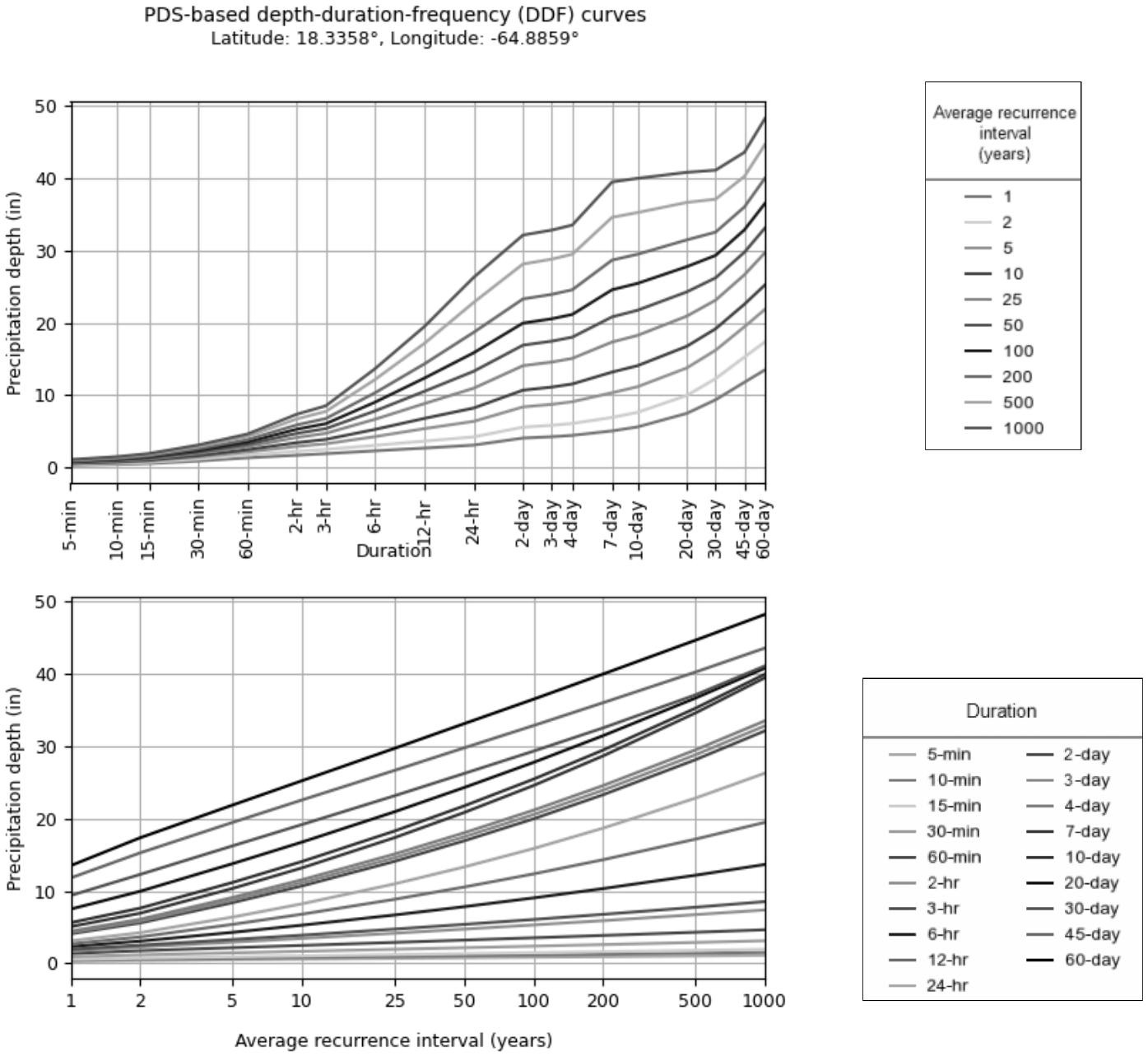
PF graphical



NOAA Atlas 14, Volume 3, Version 4

Created (GMT): Mon Sep 15 14:26:57 2025

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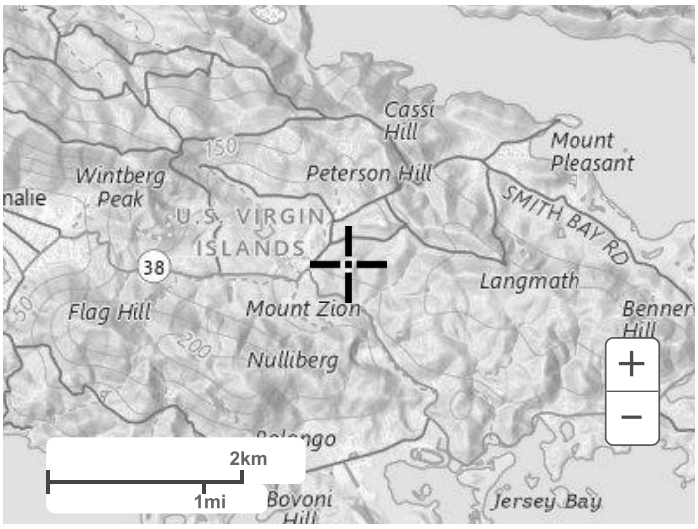
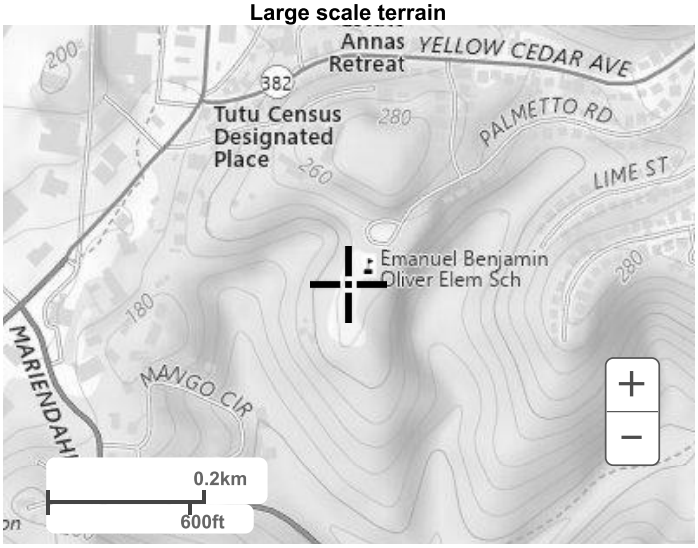
Maps & aerials

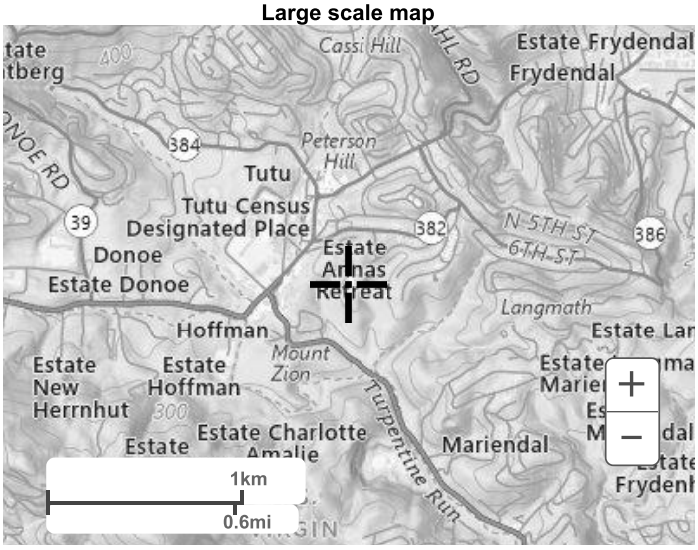
Small scale terrain



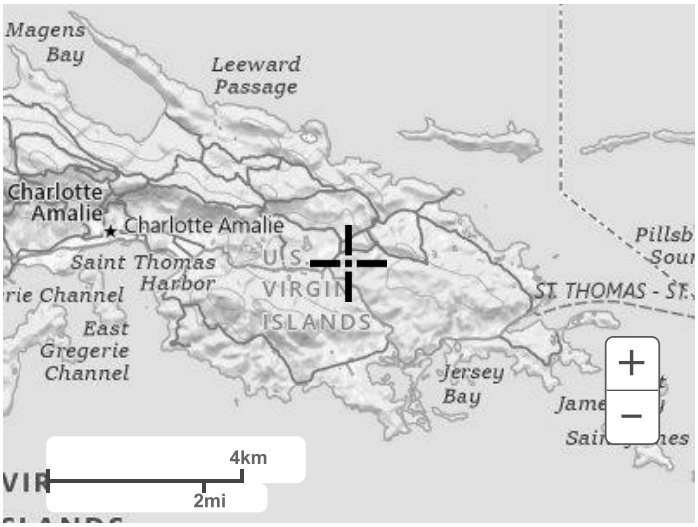
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

ATTACHMENT C
FEMA FLOOD MAP

National Flood Hazard Layer FIRMette

FEMA

64°53'27"W 18°20'27"N

64°52'50"W 18°19'53"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/13/2025 at 8:23 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.