

FIFA Soccer Field Hydrology Report

Prepared for USVI Soccer Federation

By Island Designs LLC

Hydrology Study Report

Pre-development versus post-development analysis for the 5-acre site located at N-1 Estate Nazareth, St. Thomas, VI.

Introduction

The FIFA soccer field is a proposed soccer field including tiered seating areas and potential concession stands. The project will also include the construction of driveways and parking areas. The plan is to construct a regulation sized soccer field along the west side of the property with tiered seating for spectators immediately surrounding the field. Potential to add concession and/or locker room buildings will be included in the northeast corner of the parcel, with parking and driveways in the already graded and cleared southeastern corner of the lot. The stormwater management BMP's will be designed and constructed with the assumption that buildings are being constructed, although there is no definitive design regarding the size or placement at this time. As such, when the concessions stands are constructed, the stormwater management BMP's will have already been designed and constructed.

Existing (Pre-Development) and Proposed (Post-Development) Conditions

The drainage for the property slopes from north to south and mainly discharges into an existing swale that traverses also west to east across the south border of the property. The ground cover for the existing conditions for the property is a mixture of woods/grass combination and newly graded area. The post development conditions considered that both the field and buildings were being constructed, including all the parking and driveway areas for all areas. The post development conditions considered the soccer field and parking lot as permeable surfaces, as discussed in previous meetings with the Soccer Federation, and driveway and building areas as impervious surfaces. The other disturbed surfaces will be covered with grass beyond the buildings, parking and driveways. The design point for the pre-and-post development conditions was taken at the southeast corner of the site where the exiting swale leaves the property.

Stormwater Management BMP

The project area's land cover was digitized into categories including grass cover, newly graded area, impervious area, and woods/grass combination. Since there is not an official design of the site available at this time, it was estimated that an approximate area of 1 acre was to be impervious due to driveway or building structures. Stormwater runoff

for the site was delineated from the interpretation of topographic data, including elevation contours, derived from topographical survey datasets. Time of Concentration lines, the longest hydrological flow path, was estimated. A Hydrologic & Hydraulic model was developed in WinTR-55 version 1.00.10, to estimate peak flows for the site, size proposed best management practices (BMPs) and to assess the peak flow reduction benefits of the current conditions (pre-development) compared to utilizing BMPs in the proposed condition (post development). The models were prepared using several spatial input layers, including the manually digitized land cover, Natural Resource Conservation Service (NRCS) soils data, and National Oceanic and Atmospheric Administration (NOAA) rainfall data. Rainfall data was obtained from the NOAA Atlas 14 Point Precipitation Frequency Estimates.

The proposed BMP, a permeable soccer field and parking area with overflows into the existing swale, was sized to maximize peak discharge reduction benefits during the 1-year storm event and to provide water quality treatment for the 1.1" rainfall event, the 90th percentile rainfall event. A peak flow comparison can be seen in Table 1 below. The modeling results support that the proposed BMP is adequately sized to reduce stormwater flows associated with 1-year 24hour storm event (2.82 inches). The stormwater flow is controlled by the permeable field and parking area with gravels bases and potential underground graywater storage capabilities, with overflows piped directly into the existing drainage swale along the road.

Table 1. The peak flows for various sized storm events have been modeled using WinTR-55. In Each storm event, the post development flow is lower, as the BMP has been appropriately sized to attenuate flow.

STORM EVENT	PEAK FLOW (PRE-DEVELOPED)	PEAK FLOW (POST-DEVELOPED)
1-YEAR	6.22 cfs	2.17 cfs
5-YEAR	19.32 cfs	12.47 cfs
10-YEAR	24.64 cfs	17.24 cfs
100-YEAR	44.71 cfs	36.48 cfs

Conclusion

The hydrologic analysis performed using WinTR-55 demonstrates that the proposed FIFA Soccer Field development results in a net reduction of peak discharge for the 1, 5, 10, and 100-year storm events. These results reflect high initial abstraction from a storage layer (gravel base) under the field and parking area that acts like a detention basin. Consequently, the project as designed meets DPNR requirements for stormwater attenuation, as it will not increase downstream runoff rates.

WinTR-55 Current Data Description

--- Identification Data ---

User: CSIDES Date: 3/23/2026
 Project: FIFA Soccer Field Units: English
 SubTitle: Existing Condition Areal Units: Acres
 State: Virgin Islands
 County: St. Thomas-E
 Filename: C:\Users\cside\AppData\Roaming\WinTR-55\Fifa N-1.w55

--- Sub-Area Data ---

Name	Description	Reach	Area (ac)	RCN	Tc
N-1	Existing Condition	Outlet	5.03	78	0.1

Total area: 5.03 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
4.3	6.2	7.4	9.0	10.4	11.9	3.1

Storm Data Source: User-provided custom storm data
 Rainfall Distribution Type: Type III
 Dimensionless Unit Hydrograph: <standard>

CSIDES

FIFA Soccer Field
Existing Condition
St. Thomas-E County, Virgin Islands

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
4.3	6.2	7.4	9.0	10.4	11.9	3.1

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type III
Dimensionless Unit Hydrograph: <standard>

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FIFA Soccer Field
Existing Condition
St. Thomas-E County, Virgin Islands

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period			
	5-Yr (cfs)	10-Yr (cfs)	100-Yr (cfs)	1-Yr (cfs)

SUBAREAS				
N-1	19.32	24.64	44.71	6.22
REACHES				
OUTLET	19.32	24.64	44.71	6.22

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FIFA Soccer Field
Existing Condition
St. Thomas-E County, Virgin Islands

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow 5-Yr (cfs) (hr)	and Peak Time (hr) 10-Yr (cfs) (hr)	by Rainfall Return Period 100-Yr (cfs) (hr)	1-Yr (cfs) (hr)
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SUBAREAS

N-1	19.32	24.64	44.71	6.22
	12.11	12.11	12.11	12.12

REACHES

OUTLET	19.32	24.64	44.71	6.22
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FIFA Soccer Field
Existing Condition
St. Thomas-E County, Virgin Islands

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
N-1	5.03	0.100	78	Outlet	Existing Condition
Total Area: 5.03 (ac)					

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FIFA Soccer Field
Existing Condition
St. Thomas-E County, Virgin Islands

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)

N-1							
SHEET	100	0.0600	0.130				0.081
SHALLOW	100	0.0600	4.3				0.007
CHANNEL	100	0.0175					
Time of Concentration							0.1
							=====

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FIFA Soccer Field
Existing Condition
St. Thomas-E County, Virgin Islands

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number

N-1	Newly graded area (pervious only)	C	1.53	91
	Woods - grass combination	(fair) B	1.3	65
	Woods - grass combination	(fair) C	2.2	76
	Total Area / Weighted Curve Number		5.03	78
			====	==

WinTR-55 Current Data Description

--- Identification Data ---

User: CSIDES Date: 3/23/2026
 Project: FIFA Soccer Field Units: English
 SubTitle: Post-Developed Condition Areal Units: Acres
 State: Virgin Islands
 County: St. Thomas-E
 Filename: C:\Users\cside\Documents\Island Designs\Soccer Field\Fifa N-1 Post.w55

--- Sub-Area Data ---

Name	Description	Reach	Area (ac)	RCN	Tc
N-1	Developed Land Use	Outlet	5.03	64	0.1

Total area: 5.03 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
4.3	6.2	7.4	9.0	10.4	11.9	3.1

Storm Data Source: User-provided custom storm data
 Rainfall Distribution Type: Type III
 Dimensionless Unit Hydrograph: <standard>

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FIFA Soccer Field
Post-Developed Condition
St. Thomas-E County, Virgin Islands

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
4.3	6.2	7.4	9.0	10.4	11.9	3.1

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type III
Dimensionless Unit Hydrograph: <standard>

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FIFA Soccer Field
Post-Developed Condition
St. Thomas-E County, Virgin Islands

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period			
	5-Yr (cfs)	10-Yr (cfs)	100-Yr (cfs)	1-Yr (cfs)

SUBAREAS				
N-1	12.47	17.24	36.48	2.17
REACHES				
OUTLET	12.47	17.24	36.48	2.17

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FIFA Soccer Field
Post-Developed Condition
St. Thomas-E County, Virgin Islands

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow 5-Yr (cfs) (hr)	Peak Flow 10-Yr (cfs) (hr)	Peak Flow 100-Yr (cfs) (hr)	Peak Time (hr) by Rainfall Return Period 1-Yr (cfs) (hr)
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SUBAREAS

N-1	12.47	17.24	36.48	2.17
	12.12	12.12	12.11	12.13

REACHES

OUTLET	12.47	17.24	36.48	2.17
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CSIDES

FIFA Soccer Field
Post-Developed Condition
St. Thomas-E County, Virgin Islands

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
N-1	5.03	0.100	64	Outlet	Developed Land Use

Total Area:	5.03 (ac)				

CSIDES

FIFA Soccer Field
Post-Developed Condition
St. Thomas-E County, Virgin Islands

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)

N-1							
SHEET	100	0.0600	0.150				0.091
SHALLOW	100	0.0600	0.025				0.006
CHANNEL	100	0.0175					
Time of Concentration							0.1
							=====

CSIDES

FIFA Soccer Field
Post-Developed Condition
St. Thomas-E County, Virgin Islands

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
N-1	Open space; grass cover 50% to 75% (fair)	B	.84	69
	Open space; grass cover > 75% (good)	A	1.78	39
	Paved parking lots, roofs, driveways	C	1	98
	Newly graded area (pervious only)	A	.41	77
	Woods - grass combination (fair)	B	1	65
	Total Area / Weighted Curve Number		5.03 ====	64 ==



Designed by Dave Zimmerman
Professional Landscape Designer
CCPI, CSRWI, PDCC



7200 Regatta Pt
Unit 8D
St. Thomas VI 00802



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LANDSCAPE PROFESSIONALS



March 24, 2026		
REV	DATE	DESCRIPTION

DRAWN BY: CS
REVIEWED BY: DZ
PROJECT:

FIFA Soccer Field
St. Thomas, VI

Pre-Development
Conditions

SHEET NUMBER:

1.1



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Unit 8D
St. Thomas VI 00802



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March 24, 2026		
REV	DATE	DESCRIPTION

DRAWN BY: CS

REVIEWED BY: DZ

PROJECT:
FIFA Soccer Field
St. Thomas, VI

Post-Development
Conditions

SHEET NUMBER: