ATTACHMENTS

ATTACHMENT HH&C-1: WAVE OVERTOPPING RATES: ACES OUTPUTS & EUROTOP SPREADSHEETS

ATTACHMENT HH&C-2: OTHER DATA –

ATTACHMENT HH&C-1: WAVE OVERTOPPING RATES: ACES OUTPUTS & EUROTOP SPREADSHEETS

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE NORTH WALL 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.4000	ft	Wave Height
T_p =	2.9600	s	Wave Period
h =	2.4300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4	x_2, e_2
Seaward End of Crest	13.5	4	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.6909	s	Spectral Wave Period
L_o =	37.1086	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0377		Spectral Wave Steepness
ξ_o =	5.1484		Iribarren Parameter
R_c =	1.5700	ft	Freeboard
Det q =	0.1426	ft^3/s/ft	Overtopping
max q =	0.1426	ft^3/s/ft	Maximum Overtopping

0.0132 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.1426	ft^3/s/ft	Overtopping
	0.1018	ft^3/s/ft	Maximum Overtopping

0.0132 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE NORTH WALL 2% AEP (50-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.4000	ft	Wave Height
T_p =	2.9600	s	Wave Period
h =	3.3900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4	x_2, e_2
Seaward End of Crest	13.5	4	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.6909	s	Spectral Wave Period
L_o =	37.1086	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0377		Spectral Wave Steepness
ξ_o =	5.1484		Iribarren Parameter
R_c =	0.6100	ft	Freeboard
Det q =	0.6901	ft^3/s/ft	Overtopping
max q =	0.6901	ft^3/s/ft	Maximum Overtopping

0.0641 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6901	ft^3/s/ft	Overtopping
	0.6056	ft^3/s/ft	Maximum Overtopping

0.0641 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE NORTH WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.8000	ft	Wave Height
T_p =	3.1800	s	Wave Period
h =	3.3800	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	5.5	x_2, e_2
Seaward End of Crest	13.5	5.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.8909	s	Spectral Wave Period
L_o =	42.8297	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0420		Spectral Wave Steepness
ξ_o =	4.8779		Iribarren Parameter
R_c =	2.1200	ft	Freeboard
Det q =	0.1826	ft^3/s/ft	Overtopping
max q =	0.1826	ft^3/s/ft	Maximum Overtopping

0.0170 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.1826	ft^3/s/ft	Overtopping
	0.1282	ft^3/s/ft	Maximum Overtopping

0.0170 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE NORTH WALL 1% AEP (100-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.8000	ft	Wave Height
T_p =	3.1800	s	Wave Period
h =	4.3400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	5.5	x_2, e_2
Seaward End of Crest	13.5	5.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.8909	s	Spectral Wave Period
L_o =	42.8297	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0420		Spectral Wave Steepness
ξ_o =	4.8779		Iribarren Parameter
R_c =	1.1600	ft	Freeboard
Det q =	0.6225	ft^3/s/ft	Overtopping
max q =	0.6225	ft^3/s/ft	Maximum Overtopping

0.0578 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6225	ft^3/s/ft	Overtopping
	0.5131	ft^3/s/ft	Maximum Overtopping

0.0578 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE NORTH WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.2000	ft	Wave Height
T_p =	3.3600	s	Wave Period
h =	4.3100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	7	x_2, e_2
Seaward End of Crest	13.5	7	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.0545	s	Spectral Wave Period
L_o =	47.8156	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0460		Spectral Wave Steepness
ξ_o =	4.6620		Iribarren Parameter
R_c =	2.6900	ft	Freeboard
Det q =	0.2225	ft^3/s/ft	Overtopping
max q =	0.2225	ft^3/s/ft	Maximum Overtopping

0.0207 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.2225	ft^3/s/ft	Overtopping
	0.1541	ft^3/s/ft	Maximum Overtopping

0.0207 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE NORTH WALL 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.2000	ft	Wave Height
T_p =	3.3600	s	Wave Period
h =	5.2700	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	7	x_2, e_2
Seaward End of Crest	13.5	7	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.0545	s	Spectral Wave Period
L_o =	47.8156	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0460		Spectral Wave Steepness
ξ_o =	4.6620		Iribarren Parameter
R_c =	1.7300	ft	Freeboard
Det q =	0.6069	ft^3/s/ft	Overtopping
max q =	0.6069	ft^3/s/ft	Maximum Overtopping

0.0564 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6069	ft^3/s/ft	Overtopping
	0.4794	ft^3/s/ft	Maximum Overtopping

0.0564 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.9400	ft	Wave Height
T_p =	3.1300	s	Wave Period
h =	8.5300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	10.5	x_2, e_2
Seaward End of Crest	13.5	10.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.8455	s	Spectral Wave Period
L_o =	41.4934	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0468		Spectral Wave Steepness
ξ_o =	4.6248		Iribarren Parameter
R_c =	1.9700	ft	Freeboard
Det q =	0.2967	ft^3/s/ft	Overtopping
max q =	0.2967	ft^3/s/ft	Maximum Overtopping

0.0276 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.2967	ft^3/s/ft	Overtopping
	0.2188	ft^3/s/ft	Maximum Overtopping

0.0276 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 5% AEP (20-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.9400	ft	Wave Height
T_p =	3.1300	s	Wave Period
h =	9.4900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	10.5	x_2, e_2
Seaward End of Crest	13.5	10.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.8455	s	Spectral Wave Period
L_o =	41.4934	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0468		Spectral Wave Steepness
ξ_o =	4.6248		Iribarren Parameter
R_c =	1.0100	ft	Freeboard
Det q =	0.9260	ft^3/s/ft	Overtopping
max q =	0.9260	ft^3/s/ft	Maximum Overtopping

0.0860 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9260	ft^3/s/ft	Overtopping
	0.7921	ft^3/s/ft	Maximum Overtopping

0.0860 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.7700	ft	Wave Height
T_p =	3.5900	s	Wave Period
h =	9.8800	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	13.5	x_2, e_2
Seaward End of Crest	13.5	13.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.2636	s	Spectral Wave Period
L_o =	54.5858	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0507		Spectral Wave Steepness
ξ_o =	4.4392		Iribarren Parameter
R_c =	3.6200	ft	Freeboard
Det q =	0.2590	ft^3/s/ft	Overtopping
max q =	0.2590	ft^3/s/ft	Maximum Overtopping

0.0241 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.2590	ft^3/s/ft	Overtopping
	0.1750	ft^3/s/ft	Maximum Overtopping

0.0241 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 2% AEP (50-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.7700	ft	Wave Height
T_p =	3.5900	s	Wave Period
h =	10.8400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	13.5	x_2, e_2
Seaward End of Crest	13.5	13.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.2636	s	Spectral Wave Period
L_o =	54.5858	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0507		Spectral Wave Steepness
ξ_o =	4.4392		Iribarren Parameter
R_c =	2.6600	ft	Freeboard
Det q =	0.5747	ft^3/s/ft	Overtopping
max q =	0.5747	ft^3/s/ft	Maximum Overtopping

0.0534 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.5747	ft^3/s/ft	Overtopping
	0.4309	ft^3/s/ft	Maximum Overtopping

0.0534 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.1100	ft	Wave Height
T_p =	3.9200	s	Wave Period
h =	10.8300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	14.5	x_2, e_2
Seaward End of Crest	13.5	14.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5636	s	Spectral Wave Period
L_o =	65.0823	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0478		Spectral Wave Steepness
ξ_o =	4.5746		Iribarren Parameter
R_c =	3.6700	ft	Freeboard
Det q =	0.4124	ft^3/s/ft	Overtopping
max q =	0.4124	ft^3/s/ft	Maximum Overtopping

0.0383 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.4124	ft^3/s/ft	Overtopping
	0.2895	ft^3/s/ft	Maximum Overtopping

0.0383 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 1% AEP (100-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.1100	ft	Wave Height
T_p =	3.9200	s	Wave Period
h =	11.7900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	14.5	x_2, e_2
Seaward End of Crest	13.5	14.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5636	s	Spectral Wave Period
L_o =	65.0823	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0478		Spectral Wave Steepness
ξ_o =	4.5746		Iribarren Parameter
R_c =	2.7100	ft	Freeboard
Det q =	0.8389	ft^3/s/ft	Overtopping
max q =	0.8389	ft^3/s/ft	Maximum Overtopping

0.0779 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8389	ft^3/s/ft	Overtopping
	0.6459	ft^3/s/ft	Maximum Overtopping

0.0779 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.3900	ft	Wave Height
T_p =	4.1700	s	Wave Period
h =	11.7600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	16	x_2, e_2
Seaward End of Crest	13.5	16	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7909	s	Spectral Wave Period
L_o =	73.6483	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0460		Spectral Wave Steepness
ξ_o =	4.6610		Iribarren Parameter
R_c =	4.2400	ft	Freeboard
Det q =	0.3990	ft^3/s/ft	Overtopping
max q =	0.3990	ft^3/s/ft	Maximum Overtopping

0.0371 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.3990	ft^3/s/ft	Overtopping
	0.2741	ft^3/s/ft	Maximum Overtopping

0.0371 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SURGE BARRIER 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.3900	ft	Wave Height
T_p =	4.1700	s	Wave Period
h =	12.7200	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	16	x_2, e_2
Seaward End of Crest	13.5	16	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7909	s	Spectral Wave Period
L_o =	73.6483	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0460		Spectral Wave Steepness
ξ_o =	4.6610		Iribarren Parameter
R_c =	3.2800	ft	Freeboard
Det q =	0.7652	ft^3/s/ft	Overtopping
max q =	0.7652	ft^3/s/ft	Maximum Overtopping

0.0711 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.7652	ft^3/s/ft	Overtopping
	0.5724	ft^3/s/ft	Maximum Overtopping

0.0711 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SOUTH WALL 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	0.2900	ft	Wave Height
T_p =	2.5200	s	Wave Period
h =	0.4300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	1	x_2, e_2
Seaward End of Crest	13.5	1	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.2909	s	Spectral Wave Period
L_o =	26.8962	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0108		Spectral Wave Steepness
ξ_o =	9.6305		Iribarren Parameter
R_c =	0.5700	ft	Freeboard
Det q =	0.0019	ft^3/s/ft	Overtopping
max q =	0.0019	ft^3/s/ft	Maximum Overtopping

0.0002 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0019	ft^3/s/ft	Overtopping
	0.0011	ft^3/s/ft	Maximum Overtopping

0.0002 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SOUTH WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	0.9200	ft	Wave Height
T_p =	2.8700	s	Wave Period
h =	1.3800	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	2.5	x_2, e_2
Seaward End of Crest	13.5	2.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.6091	s	Spectral Wave Period
L_o =	34.8863	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0264		Spectral Wave Steepness
ξ_o =	6.1579		Iribarren Parameter
R_c =	1.1200	ft	Freeboard
Det q =	0.0609	ft^3/s/ft	Overtopping
max q =	0.0609	ft^3/s/ft	Maximum Overtopping

0.0057 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0609	ft^3/s/ft	Overtopping
	0.0423	ft^3/s/ft	Maximum Overtopping

0.0057 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SOUTH WALL 1% AEP (100-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.5600	ft	Wave Height
T_p =	2.8700	s	Wave Period
h =	2.3400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	2.5	x_2, e_2
Seaward End of Crest	13.5	2.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.6091	s	Spectral Wave Period
L_o =	34.8863	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0447		Spectral Wave Steepness
ξ_o =	4.7290		Iribarren Parameter
R_c =	0.1600	ft	Freeboard
Det q =	1.7466	ft^3/s/ft	Overtopping
max q =	1.7466	ft^3/s/ft	Maximum Overtopping

0.1623 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.7466	ft^3/s/ft	Overtopping
	1.6937	ft^3/s/ft	Maximum Overtopping

0.1623 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SOUTH WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.5400	ft	Wave Height
T_p =	3.2200	s	Wave Period
h =	2.3100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4.5	x_2, e_2
Seaward End of Crest	13.5	4.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.9273	s	Spectral Wave Period
L_o =	43.9139	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0351		Spectral Wave Steepness
ξ_o =	5.3400		Iribarren Parameter
R_c =	2.1900	ft	Freeboard
Det q =	0.0824	ft^3/s/ft	Overtopping
max q =	0.0824	ft^3/s/ft	Maximum Overtopping

0.0077 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0824	ft^3/s/ft	Overtopping
	0.0538	ft^3/s/ft	Maximum Overtopping

0.0077 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

BISCAYNE SOUTH WALL 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.1800	ft	Wave Height
T_p =	3.2200	s	Wave Period
h =	3.2700	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4.5	x_2, e_2
Seaward End of Crest	13.5	4.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.9273	s	Spectral Wave Period
L_o =	43.9139	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0496		Spectral Wave Steepness
ξ_o =	4.4882		Iribarren Parameter
R_c =	1.2300	ft	Freeboard
Det q =	0.9978	ft^3/s/ft	Overtopping
max q =	0.9978	ft^3/s/ft	Maximum Overtopping

0.0927 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9978	ft^3/s/ft	Overtopping
	0.8425	ft^3/s/ft	Maximum Overtopping

0.0927 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.3700	ft	Wave Height
T_p =	3.4800	s	Wave Period
h =	2.0500	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4	x_2, e_2
Seaward End of Crest	13.5	4	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1636	s	Spectral Wave Period
L_o =	51.2919	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0267		Spectral Wave Steepness
ξ_o =	6.1188		Iribarren Parameter
R_c =	1.9500	ft	Freeboard
Det q =	0.0689	ft^3/s/ft	Overtopping
max q =	0.0689	ft^3/s/ft	Maximum Overtopping

0.0064 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0689	ft^3/s/ft	Overtopping
	0.0450	ft^3/s/ft	Maximum Overtopping

0.0064 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 5% AEP (20-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.0100	ft	Wave Height
T_p =	3.4800	s	Wave Period
h =	3.0100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4	x_2, e_2
Seaward End of Crest	13.5	4	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1636	s	Spectral Wave Period
L_o =	51.2919	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0392		Spectral Wave Steepness
ξ_o =	5.0516		Iribarren Parameter
R_c =	0.9900	ft	Freeboard
Det q =	1.0418	ft^3/s/ft	Overtopping
max q =	1.0418	ft^3/s/ft	Maximum Overtopping

0.0968 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.0418	ft^3/s/ft	Overtopping
	0.8987	ft^3/s/ft	Maximum Overtopping

0.0968 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.2200	ft	Wave Height
T_p =	3.7600	s	Wave Period
h =	3.3300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	6.5	x_2, e_2
Seaward End of Crest	13.5	6.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.4182	s	Spectral Wave Period
L_o =	59.8779	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0371		Spectral Wave Steepness
ξ_o =	5.1935		Iribarren Parameter
R_c =	3.1700	ft	Freeboard
Det q =	0.1407	ft^3/s/ft	Overtopping
max q =	0.1407	ft^3/s/ft	Maximum Overtopping

0.0131 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.1407	ft^3/s/ft	Overtopping
	0.0916	ft^3/s/ft	Maximum Overtopping

0.0131 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 2% AEP (50-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.8600	ft	Wave Height
T_p =	3.7600	s	Wave Period
h =	4.2900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	6.5	x_2, e_2
Seaward End of Crest	13.5	6.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.4182	s	Spectral Wave Period
L_o =	59.8779	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0478		Spectral Wave Steepness
ξ_o =	4.5756		Iribarren Parameter
R_c =	2.2100	ft	Freeboard
Det q =	0.9282	ft^3/s/ft	Overtopping
max q =	0.9282	ft^3/s/ft	Maximum Overtopping

0.0862 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9282	ft^3/s/ft	Overtopping
	0.7362	ft^3/s/ft	Maximum Overtopping

0.0862 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.8900	ft	Wave Height
T_p =	3.9300	s	Wave Period
h =	4.3400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	8.5	x_2, e_2
Seaward End of Crest	13.5	8.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5727	s	Spectral Wave Period
L_o =	65.4148	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0442		Spectral Wave Steepness
ξ_o =	4.7576		Iribarren Parameter
R_c =	4.1600	ft	Freeboard
Det q =	0.2035	ft^3/s/ft	Overtopping
max q =	0.2035	ft^3/s/ft	Maximum Overtopping

0.0189 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.2035	ft^3/s/ft	Overtopping
	0.1321	ft^3/s/ft	Maximum Overtopping

0.0189 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 1% AEP (100-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.5300	ft	Wave Height
T_p =	3.9300	s	Wave Period
h =	5.3000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	8.5	x_2, e_2
Seaward End of Crest	13.5	8.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5727	s	Spectral Wave Period
L_o =	65.4148	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0540		Spectral Wave Steepness
ξ_o =	4.3048		Iribarren Parameter
R_c =	3.2000	ft	Freeboard
Det q =	0.9357	ft^3/s/ft	Overtopping
max q =	0.9357	ft^3/s/ft	Maximum Overtopping

0.0869 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9357	ft^3/s/ft	Overtopping
	0.7129	ft^3/s/ft	Maximum Overtopping

0.0869 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.7500	ft	Wave Height
T_p =	4.0800	s	Wave Period
h =	5.6300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	11	x_2, e_2
Seaward End of Crest	13.5	11	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7091	s	Spectral Wave Period
L_o =	70.5035	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0532		Spectral Wave Steepness
ξ_o =	4.3360		Iribarren Parameter
R_c =	5.3700	ft	Freeboard
Det q =	0.3059	ft^3/s/ft	Overtopping
max q =	0.3059	ft^3/s/ft	Maximum Overtopping

0.0284 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.3059	ft^3/s/ft	Overtopping
	0.1991	ft^3/s/ft	Maximum Overtopping

0.0284 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.3900	ft	Wave Height
T_p =	4.0800	s	Wave Period
h =	6.5900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	11	x_2, e_2
Seaward End of Crest	13.5	11	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7091	s	Spectral Wave Period
L_o =	70.5035	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0623		Spectral Wave Steepness
ξ_o =	4.0075		Iribarren Parameter
R_c =	4.4100	ft	Freeboard
Det q =	1.0357	ft^3/s/ft	Overtopping
max q =	1.0357	ft^3/s/ft	Maximum Overtopping

0.0962 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.0357	ft^3/s/ft	Overtopping
	0.7662	ft^3/s/ft	Maximum Overtopping

0.0962 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.3200	ft	Wave Height
T_p =	3.4800	s	Wave Period
h =	10.7500	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	15	x_2, e_2
Seaward End of Crest	13.5	15	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1636	s	Spectral Wave Period
L_o =	51.2919	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0647		Spectral Wave Steepness
ξ_o =	3.9306		Iribarren Parameter
R_c =	4.2500	ft	Freeboard
Det q =	0.3614	ft^3/s/ft	Overtopping
max q =	0.3614	ft^3/s/ft	Maximum Overtopping

0.0336 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.3614	ft^3/s/ft	Overtopping
	0.2461	ft^3/s/ft	Maximum Overtopping

0.0336 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 5% AEP (20-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.3200	ft	Wave Height
T_p =	3.4800	s	Wave Period
h =	11.7100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	15	x_2, e_2
Seaward End of Crest	13.5	15	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1636	s	Spectral Wave Period
L_o =	51.2919	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0647		Spectral Wave Steepness
ξ_o =	3.9306		Iribarren Parameter
R_c =	3.2900	ft	Freeboard
Det q =	0.7028	ft^3/s/ft	Overtopping
max q =	0.7028	ft^3/s/ft	Maximum Overtopping

0.0653 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.7028	ft^3/s/ft	Overtopping
	0.5220	ft^3/s/ft	Maximum Overtopping

0.0653 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.0400	ft	Wave Height
T_p =	3.7600	s	Wave Period
h =	12.0300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	17.5	x_2, e_2
Seaward End of Crest	13.5	17.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.4182	s	Spectral Wave Period
L_o =	59.8779	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0675		Spectral Wave Steepness
ξ_o =	3.8498		Iribarren Parameter
R_c =	5.4700	ft	Freeboard
Det q =	0.4093	ft^3/s/ft	Overtopping
max q =	0.4093	ft^3/s/ft	Maximum Overtopping

0.0380 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.4093	ft^3/s/ft	Overtopping
	0.2727	ft^3/s/ft	Maximum Overtopping

0.0380 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 2% AEP (50-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.0400	ft	Wave Height
T_p =	3.7600	s	Wave Period
h =	12.9900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	17.5	x_2, e_2
Seaward End of Crest	13.5	17.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.4182	s	Spectral Wave Period
L_o =	59.8779	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0675		Spectral Wave Steepness
ξ_o =	3.8498		Iribarren Parameter
R_c =	4.5100	ft	Freeboard
Det q =	0.7070	ft^3/s/ft	Overtopping
max q =	0.7070	ft^3/s/ft	Maximum Overtopping

0.0657 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.7070	ft^3/s/ft	Overtopping
	0.5058	ft^3/s/ft	Maximum Overtopping

0.0657 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.5100	ft	Wave Height
T_p =	3.9300	s	Wave Period
h =	13.0400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	19	x_2, e_2
Seaward End of Crest	13.5	19	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5727	s	Spectral Wave Period
L_o =	65.4148	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0689		Spectral Wave Steepness
ξ_o =	3.8085		Iribarren Parameter
R_c =	5.9600	ft	Freeboard
Det q =	0.5202	ft^3/s/ft	Overtopping
max q =	0.5202	ft^3/s/ft	Maximum Overtopping

0.0483 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.5202	ft^3/s/ft	Overtopping
	0.3500	ft^3/s/ft	Maximum Overtopping

0.0483 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 1% AEP (100-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.5100	ft	Wave Height
T_p =	3.9300	s	Wave Period
h =	14.0000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	19	x_2, e_2
Seaward End of Crest	13.5	19	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5727	s	Spectral Wave Period
L_o =	65.4148	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0689		Spectral Wave Steepness
ξ_o =	3.8085		Iribarren Parameter
R_c =	5.0000	ft	Freeboard
Det q =	0.8488	ft^3/s/ft	Overtopping
max q =	0.8488	ft^3/s/ft	Maximum Overtopping

0.0789 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8488	ft^3/s/ft	Overtopping
	0.6087	ft^3/s/ft	Maximum Overtopping

0.0789 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.9600	ft	Wave Height
T_p =	4.0800	s	Wave Period
h =	14.3300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	21	x_2, e_2
Seaward End of Crest	13.5	21	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7091	s	Spectral Wave Period
L_o =	70.5035	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0704		Spectral Wave Steepness
ξ_o =	3.7702		Iribarren Parameter
R_c =	6.6700	ft	Freeboard
Det q =	0.5688	ft^3/s/ft	Overtopping
max q =	0.5688	ft^3/s/ft	Maximum Overtopping

0.0528 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.5688	ft^3/s/ft	Overtopping
	0.3799	ft^3/s/ft	Maximum Overtopping

0.0528 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 0.5% AEP (200-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.9600	ft	Wave Height
T_p =	4.0800	s	Wave Period
h =	15.2900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	21	x_2, e_2
Seaward End of Crest	13.5	21	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7091	s	Spectral Wave Period
L_o =	70.5035	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0704		Spectral Wave Steepness
ξ_o =	3.7702		Iribarren Parameter
R_c =	5.7100	ft	Freeboard
Det q =	0.8877	ft^3/s/ft	Overtopping
max q =	0.8877	ft^3/s/ft	Maximum Overtopping

0.0825 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8877	ft^3/s/ft	Overtopping
	0.6285	ft^3/s/ft	Maximum Overtopping

0.0825 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	0.6200	ft	Wave Height
T_p =	3.9400	s	Wave Period
h =	0.9300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	2	x_2, e_2
Seaward End of Crest	13.5	2	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5818	s	Spectral Wave Period
L_o =	65.7481	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0094		Spectral Wave Steepness
ξ_o =	10.2978		Iribarren Parameter
R_c =	1.0700	ft	Freeboard
Det q =	0.0105	ft^3/s/ft	Overtopping
max q =	0.0105	ft^3/s/ft	Maximum Overtopping

0.0010 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0105	ft^3/s/ft	Overtopping
	0.0062	ft^3/s/ft	Maximum Overtopping

0.0010 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 2% AEP (50-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.2600	ft	Wave Height
T_p =	3.9400	s	Wave Period
h =	1.8900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	2	x_2, e_2
Seaward End of Crest	13.5	2	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5818	s	Spectral Wave Period
L_o =	65.7481	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0192		Spectral Wave Steepness
ξ_o =	7.2236		Iribarren Parameter
R_c =	0.1100	ft	Freeboard
Det q =	1.3131	ft^3/s/ft	Overtopping
max q =	1.3131	ft^3/s/ft	Maximum Overtopping

0.1220 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.3131	ft^3/s/ft	Overtopping
	1.2792	ft^3/s/ft	Maximum Overtopping

0.1220 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.2300	ft	Wave Height
T_p =	4.1100	s	Wave Period
h =	1.8400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7364	s	Spectral Wave Period
L_o =	71.5442	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0172		Spectral Wave Steepness
ξ_o =	7.6267		Iribarren Parameter
R_c =	1.6600	ft	Freeboard
Det q =	0.0695	ft^3/s/ft	Overtopping
max q =	0.0695	ft^3/s/ft	Maximum Overtopping

0.0065 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0695	ft^3/s/ft	Overtopping
	0.0463	ft^3/s/ft	Maximum Overtopping

0.0065 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 1% AEP (100-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.8700	ft	Wave Height
T_p =	4.1100	s	Wave Period
h =	2.8000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7364	s	Spectral Wave Period
L_o =	71.5442	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0261		Spectral Wave Steepness
ξ_o =	6.1854		Iribarren Parameter
R_c =	0.7000	ft	Freeboard
Det q =	1.2269	ft^3/s/ft	Overtopping
max q =	1.2269	ft^3/s/ft	Maximum Overtopping

0.1140 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.2269	ft^3/s/ft	Overtopping
	1.0966	ft^3/s/ft	Maximum Overtopping

0.1140 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.8500	ft	Wave Height
T_p =	4.2700	s	Wave Period
h =	2.7700	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	5.5	x_2, e_2
Seaward End of Crest	13.5	5.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.8818	s	Spectral Wave Period
L_o =	77.2229	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0240		Spectral Wave Steepness
ξ_o =	6.4608		Iribarren Parameter
R_c =	2.7300	ft	Freeboard
Det q =	0.0959	ft^3/s/ft	Overtopping
max q =	0.0959	ft^3/s/ft	Maximum Overtopping

0.0089 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0959	ft^3/s/ft	Overtopping
	0.0616	ft^3/s/ft	Maximum Overtopping

0.0089 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 0.5% AEP (200-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.4900	ft	Wave Height
T_p =	4.2700	s	Wave Period
h =	3.7300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	5.5	x_2, e_2
Seaward End of Crest	13.5	5.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.8818	s	Spectral Wave Period
L_o =	77.2229	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0322		Spectral Wave Steepness
ξ_o =	5.5690		Iribarren Parameter
R_c =	1.7700	ft	Freeboard
Det q =	0.8694	ft^3/s/ft	Overtopping
max q =	0.8694	ft^3/s/ft	Maximum Overtopping

0.0808 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8694	ft^3/s/ft	Overtopping
	0.7024	ft^3/s/ft	Maximum Overtopping

0.0808 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 2% AEP (50-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.0400	ft	Wave Height
T_p =	3.7600	s	Wave Period
h =	12.9900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	17.5	x_2, e_2
Seaward End of Crest	13.5	17.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.4182	s	Spectral Wave Period
L_o =	59.8779	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0675		Spectral Wave Steepness
ξ_o =	3.8498		Iribarren Parameter
R_c =	4.5100	ft	Freeboard
Det q =	0.7070	ft^3/s/ft	Overtopping
max q =	0.7070	ft^3/s/ft	Maximum Overtopping

0.0657 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.7070	ft^3/s/ft	Overtopping
	0.5058	ft^3/s/ft	Maximum Overtopping

0.0657 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.5100	ft	Wave Height
T_p =	3.9300	s	Wave Period
h =	13.0400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	19	x_2, e_2
Seaward End of Crest	13.5	19	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5727	s	Spectral Wave Period
L_o =	65.4148	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0689		Spectral Wave Steepness
ξ_o =	3.8085		Iribarren Parameter
R_c =	5.9600	ft	Freeboard
Det q =	0.5202	ft^3/s/ft	Overtopping
max q =	0.5202	ft^3/s/ft	Maximum Overtopping

0.0483 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.5202	ft^3/s/ft	Overtopping
	0.3500	ft^3/s/ft	Maximum Overtopping

0.0483 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 1% AEP (100-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.5100	ft	Wave Height
T_p =	3.9300	s	Wave Period
h =	14.0000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	19	x_2, e_2
Seaward End of Crest	13.5	19	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5727	s	Spectral Wave Period
L_o =	65.4148	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0689		Spectral Wave Steepness
ξ_o =	3.8085		Iribarren Parameter
R_c =	5.0000	ft	Freeboard
Det q =	0.8488	ft^3/s/ft	Overtopping
max q =	0.8488	ft^3/s/ft	Maximum Overtopping

0.0789 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8488	ft^3/s/ft	Overtopping
	0.6087	ft^3/s/ft	Maximum Overtopping

0.0789 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.9600	ft	Wave Height
T_p =	4.0800	s	Wave Period
h =	14.3300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	21	x_2, e_2
Seaward End of Crest	13.5	21	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7091	s	Spectral Wave Period
L_o =	70.5035	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0704		Spectral Wave Steepness
ξ_o =	3.7702		Iribarren Parameter
R_c =	6.6700	ft	Freeboard
Det q =	0.5688	ft^3/s/ft	Overtopping
max q =	0.5688	ft^3/s/ft	Maximum Overtopping

0.0528 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.5688	ft^3/s/ft	Overtopping
	0.3799	ft^3/s/ft	Maximum Overtopping

0.0528 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

EDGEWATER WALL IN WATER 0.5% AEP (200-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.9600	ft	Wave Height
T_p =	4.0800	s	Wave Period
h =	15.2900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	21	x_2, e_2
Seaward End of Crest	13.5	21	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7091	s	Spectral Wave Period
L_o =	70.5035	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0704		Spectral Wave Steepness
ξ_o =	3.7702		Iribarren Parameter
R_c =	5.7100	ft	Freeboard
Det q =	0.8877	ft^3/s/ft	Overtopping
max q =	0.8877	ft^3/s/ft	Maximum Overtopping

0.0825 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8877	ft^3/s/ft	Overtopping
	0.6285	ft^3/s/ft	Maximum Overtopping

0.0825 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	0.6200	ft	Wave Height
T_p =	3.9400	s	Wave Period
h =	0.9300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	2	x_2, e_2
Seaward End of Crest	13.5	2	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5818	s	Spectral Wave Period
L_o =	65.7481	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0094		Spectral Wave Steepness
ξ_o =	10.2978		Iribarren Parameter
R_c =	1.0700	ft	Freeboard
Det q =	0.0105	ft^3/s/ft	Overtopping
max q =	0.0105	ft^3/s/ft	Maximum Overtopping

0.0010 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0105	ft^3/s/ft	Overtopping
	0.0062	ft^3/s/ft	Maximum Overtopping

0.0010 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 2% AEP (50-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.2600	ft	Wave Height
T_p =	3.9400	s	Wave Period
h =	1.8900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	2	x_2, e_2
Seaward End of Crest	13.5	2	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5818	s	Spectral Wave Period
L_o =	65.7481	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0192		Spectral Wave Steepness
ξ_o =	7.2236		Iribarren Parameter
R_c =	0.1100	ft	Freeboard
Det q =	1.3131	ft^3/s/ft	Overtopping
max q =	1.3131	ft^3/s/ft	Maximum Overtopping

0.1220 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.3131	ft^3/s/ft	Overtopping
	1.2792	ft^3/s/ft	Maximum Overtopping

0.1220 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.2300	ft	Wave Height
T_p =	4.1100	s	Wave Period
h =	1.8400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7364	s	Spectral Wave Period
L_o =	71.5442	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0172		Spectral Wave Steepness
ξ_o =	7.6267		Iribarren Parameter
R_c =	1.6600	ft	Freeboard
Det q =	0.0695	ft^3/s/ft	Overtopping
max q =	0.0695	ft^3/s/ft	Maximum Overtopping

0.0065 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0695	ft^3/s/ft	Overtopping
	0.0463	ft^3/s/ft	Maximum Overtopping

0.0065 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 1% AEP (100-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.8700	ft	Wave Height
T_p =	4.1100	s	Wave Period
h =	2.8000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7364	s	Spectral Wave Period
L_o =	71.5442	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0261		Spectral Wave Steepness
ξ_o =	6.1854		Iribarren Parameter
R_c =	0.7000	ft	Freeboard
Det q =	1.2269	ft^3/s/ft	Overtopping
max q =	1.2269	ft^3/s/ft	Maximum Overtopping

0.1140 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.2269	ft^3/s/ft	Overtopping
	1.0966	ft^3/s/ft	Maximum Overtopping

0.1140 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.8500	ft	Wave Height
T_p =	4.2700	s	Wave Period
h =	2.7700	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	5.5	x_2, e_2
Seaward End of Crest	13.5	5.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.8818	s	Spectral Wave Period
L_o =	77.2229	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0240		Spectral Wave Steepness
ξ_o =	6.4608		Iribarren Parameter
R_c =	2.7300	ft	Freeboard
Det q =	0.0959	ft^3/s/ft	Overtopping
max q =	0.0959	ft^3/s/ft	Maximum Overtopping

0.0089 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0959	ft^3/s/ft	Overtopping
	0.0616	ft^3/s/ft	Maximum Overtopping

0.0089 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER NORTH WALL 0.5% AEP (200-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.4900	ft	Wave Height
T_p =	4.2700	s	Wave Period
h =	3.7300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	5.5	x_2, e_2
Seaward End of Crest	13.5	5.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.8818	s	Spectral Wave Period
L_o =	77.2229	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0322		Spectral Wave Steepness
ξ_o =	5.5690		Iribarren Parameter
R_c =	1.7700	ft	Freeboard
Det q =	0.8694	ft^3/s/ft	Overtopping
max q =	0.8694	ft^3/s/ft	Maximum Overtopping

0.0808 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8694	ft^3/s/ft	Overtopping
	0.7024	ft^3/s/ft	Maximum Overtopping

0.0808 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.7000	ft	Wave Height
T_p =	3.4600	s	Wave Period
h =	7.3900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	11	x_2, e_2
Seaward End of Crest	13.5	11	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1455	s	Spectral Wave Period
L_o =	50.7041	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0533		Spectral Wave Steepness
ξ_o =	4.3335		Iribarren Parameter
R_c =	3.6100	ft	Freeboard
Det q =	0.2325	ft^3/s/ft	Overtopping
max q =	0.2325	ft^3/s/ft	Maximum Overtopping

0.0216 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.2325	ft^3/s/ft	Overtopping
	0.1557	ft^3/s/ft	Maximum Overtopping

0.0216 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 5% AEP (20-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.7000	ft	Wave Height
T_p =	3.4600	s	Wave Period
h =	8.3500	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	11	x_2, e_2
Seaward End of Crest	13.5	11	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1455	s	Spectral Wave Period
L_o =	50.7041	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0533		Spectral Wave Steepness
ξ_o =	4.3335		Iribarren Parameter
R_c =	2.6500	ft	Freeboard
Det q =	0.5268	ft^3/s/ft	Overtopping
max q =	0.5268	ft^3/s/ft	Maximum Overtopping

0.0489 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.5268	ft^3/s/ft	Overtopping
	0.3924	ft^3/s/ft	Maximum Overtopping

0.0489 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.5000	ft	Wave Height
T_p =	3.9100	s	Wave Period
h =	8.6300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	13.5	x_2, e_2
Seaward End of Crest	13.5	13.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5545	s	Spectral Wave Period
L_o =	64.7507	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0541		Spectral Wave Steepness
ξ_o =	4.3012		Iribarren Parameter
R_c =	4.8700	ft	Freeboard
Det q =	0.3028	ft^3/s/ft	Overtopping
max q =	0.3028	ft^3/s/ft	Maximum Overtopping

0.0281 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.3028	ft^3/s/ft	Overtopping
	0.1995	ft^3/s/ft	Maximum Overtopping

0.0281 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 2% AEP (50-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.5000	ft	Wave Height
T_p =	3.9100	s	Wave Period
h =	9.5900	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	13.5	x_2, e_2
Seaward End of Crest	13.5	13.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5545	s	Spectral Wave Period
L_o =	64.7507	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0541		Spectral Wave Steepness
ξ_o =	4.3012		Iribarren Parameter
R_c =	3.9100	ft	Freeboard
Det q =	0.5691	ft^3/s/ft	Overtopping
max q =	0.5691	ft^3/s/ft	Maximum Overtopping

0.0529 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.5691	ft^3/s/ft	Overtopping
	0.4070	ft^3/s/ft	Maximum Overtopping

0.0529 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.2000	ft	Wave Height
T_p =	4.1600	s	Wave Period
h =	9.5400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	15.5	x_2, e_2
Seaward End of Crest	13.5	15.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7818	s	Spectral Wave Period
L_o =	73.2955	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0573		Spectral Wave Steepness
ξ_o =	4.1775		Iribarren Parameter
R_c =	5.9600	ft	Freeboard
Det q =	0.3736	ft^3/s/ft	Overtopping
max q =	0.3736	ft^3/s/ft	Maximum Overtopping

0.0347 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.3736	ft^3/s/ft	Overtopping
	0.2441	ft^3/s/ft	Maximum Overtopping

0.0347 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 1% AEP (100-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.2000	ft	Wave Height
T_p =	4.1600	s	Wave Period
h =	10.5000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	15.5	x_2, e_2
Seaward End of Crest	13.5	15.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7818	s	Spectral Wave Period
L_o =	73.2955	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0573		Spectral Wave Steepness
ξ_o =	4.1775		Iribarren Parameter
R_c =	5.0000	ft	Freeboard
Det q =	0.6320	ft^3/s/ft	Overtopping
max q =	0.6320	ft^3/s/ft	Maximum Overtopping

0.0587 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6320	ft^3/s/ft	Overtopping
	0.4422	ft^3/s/ft	Maximum Overtopping

0.0587 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.0000	ft	Wave Height
T_p =	4.3900	s	Wave Period
h =	10.4700	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	18	x_2, e_2
Seaward End of Crest	13.5	18	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.9909	s	Spectral Wave Period
L_o =	81.6243	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0613		Spectral Wave Steepness
ξ_o =	4.0404		Iribarren Parameter
R_c =	7.5300	ft	Freeboard
Det q =	0.3973	ft^3/s/ft	Overtopping
max q =	0.3973	ft^3/s/ft	Maximum Overtopping

0.0369 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.3973	ft^3/s/ft	Overtopping
	0.2529	ft^3/s/ft	Maximum Overtopping

0.0369 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SURGE BARRIER 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.0000	ft	Wave Height
T_p =	4.3900	s	Wave Period
h =	11.4300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	18	x_2, e_2
Seaward End of Crest	13.5	18	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.9909	s	Spectral Wave Period
L_o =	81.6243	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0613		Spectral Wave Steepness
ξ_o =	4.0404		Iribarren Parameter
R_c =	6.5700	ft	Freeboard
Det q =	0.6179	ft^3/s/ft	Overtopping
max q =	0.6179	ft^3/s/ft	Maximum Overtopping

0.0574 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6179	ft^3/s/ft	Overtopping
	0.4166	ft^3/s/ft	Maximum Overtopping

0.0574 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SOUTH WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	0.4900	ft	Wave Height
T_p =	4.1600	s	Wave Period
h =	0.7400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	1.5	x_2, e_2
Seaward End of Crest	13.5	1.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7818	s	Spectral Wave Period
L_o =	73.2955	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0067		Spectral Wave Steepness
ξ_o =	12.2304		Iribarren Parameter
R_c =	0.7600	ft	Freeboard
Det q =	0.0110	ft^3/s/ft	Overtopping
max q =	0.0110	ft^3/s/ft	Maximum Overtopping

0.0010 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0110	ft^3/s/ft	Overtopping
	0.0069	ft^3/s/ft	Maximum Overtopping

0.0010 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SOUTH WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.1100	ft	Wave Height
T_p =	4.3900	s	Wave Period
h =	1.6700	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.9909	s	Spectral Wave Period
L_o =	81.6243	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0136		Spectral Wave Steepness
ξ_o =	8.5753		Iribarren Parameter
R_c =	1.8300	ft	Freeboard
Det q =	0.0299	ft^3/s/ft	Overtopping
max q =	0.0299	ft^3/s/ft	Maximum Overtopping

0.0028 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0299	ft^3/s/ft	Overtopping
	0.0183	ft^3/s/ft	Maximum Overtopping

0.0028 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

LITTLE RIVER SOUTH WALL 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.7500	ft	Wave Height
T_p =	4.3900	s	Wave Period
h =	2.6300	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.9909	s	Spectral Wave Period
L_o =	81.6243	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0214		Spectral Wave Steepness
ξ_o =	6.8295		Iribarren Parameter
R_c =	0.8700	ft	Freeboard
Det q =	0.8374	ft^3/s/ft	Overtopping
max q =	0.8374	ft^3/s/ft	Maximum Overtopping

0.0778 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8374	ft^3/s/ft	Overtopping
	0.7214	ft^3/s/ft	Maximum Overtopping

0.0778 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.4400	ft	Wave Height
T_p =	2.6400	s	Wave Period
h =	2.1600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4	x_2, e_2
Seaward End of Crest	13.5	4	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.4000	s	Spectral Wave Period
L_o =	29.5188	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0488		Spectral Wave Steepness
ξ_o =	4.5276		Iribarren Parameter
R_c =	1.8400	ft	Freeboard
Det q =	0.1038	ft^3/s/ft	Overtopping
max q =	0.1038	ft^3/s/ft	Maximum Overtopping

0.0096 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.1038	ft^3/s/ft	Overtopping
	0.0707	ft^3/s/ft	Maximum Overtopping

0.0096 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 5% AEP (20-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.0800	ft	Wave Height
T_p =	2.6400	s	Wave Period
h =	3.1200	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	4	x_2, e_2
Seaward End of Crest	13.5	4	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.4000	s	Spectral Wave Period
L_o =	29.5188	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0705		Spectral Wave Steepness
ξ_o =	3.7672		Iribarren Parameter
R_c =	0.8800	ft	Freeboard
Det q =	1.2866	ft^3/s/ft	Overtopping
max q =	1.2866	ft^3/s/ft	Maximum Overtopping

0.1195 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.2866	ft^3/s/ft	Overtopping
	1.1333	ft^3/s/ft	Maximum Overtopping

0.1195 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.5900	ft	Wave Height
T_p =	3.2700	s	Wave Period
h =	3.8800	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	7.5	x_2, e_2
Seaward End of Crest	13.5	7.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.9727	s	Spectral Wave Period
L_o =	45.2883	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0572		Spectral Wave Steepness
ξ_o =	4.1816		Iribarren Parameter
R_c =	3.6200	ft	Freeboard
Det q =	0.1900	ft^3/s/ft	Overtopping
max q =	0.1900	ft^3/s/ft	Maximum Overtopping

0.0177 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.1900	ft^3/s/ft	Overtopping
	0.1249	ft^3/s/ft	Maximum Overtopping

0.0177 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 2% AEP (50-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.2300	ft	Wave Height
T_p =	3.2700	s	Wave Period
h =	4.8400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	7.5	x_2, e_2
Seaward End of Crest	13.5	7.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.9727	s	Spectral Wave Period
L_o =	45.2883	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0713		Spectral Wave Steepness
ξ_o =	3.7445		Iribarren Parameter
R_c =	2.6600	ft	Freeboard
Det q =	0.9912	ft^3/s/ft	Overtopping
max q =	0.9912	ft^3/s/ft	Maximum Overtopping

0.0921 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9912	ft^3/s/ft	Overtopping
	0.7742	ft^3/s/ft	Maximum Overtopping

0.0921 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.4000	ft	Wave Height
T_p =	3.4900	s	Wave Period
h =	5.1000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	10	x_2, e_2
Seaward End of Crest	13.5	10	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1727	s	Spectral Wave Period
L_o =	51.5871	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0659		Spectral Wave Steepness
ξ_o =	3.8952		Iribarren Parameter
R_c =	4.9000	ft	Freeboard
Det q =	0.2586	ft^3/s/ft	Overtopping
max q =	0.2586	ft^3/s/ft	Maximum Overtopping

0.0240 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.2586	ft^3/s/ft	Overtopping
	0.1678	ft^3/s/ft	Maximum Overtopping

0.0240 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 1% AEP (100-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.0400	ft	Wave Height
T_p =	3.4900	s	Wave Period
h =	6.0600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	10	x_2, e_2
Seaward End of Crest	13.5	10	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1727	s	Spectral Wave Period
L_o =	51.5871	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0783		Spectral Wave Steepness
ξ_o =	3.5734		Iribarren Parameter
R_c =	3.9400	ft	Freeboard
Det q =	0.9781	ft^3/s/ft	Overtopping
max q =	0.9781	ft^3/s/ft	Maximum Overtopping

0.0909 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9781	ft^3/s/ft	Overtopping
	0.7300	ft^3/s/ft	Maximum Overtopping

0.0909 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.3000	ft	Wave Height
T_p =	3.6500	s	Wave Period
h =	6.4500	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	13	x_2, e_2
Seaward End of Crest	13.5	13	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.3182	s	Spectral Wave Period
L_o =	56.4256	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0762		Spectral Wave Steepness
ξ_o =	3.6225		Iribarren Parameter
R_c =	6.5500	ft	Freeboard
Det q =	0.3045	ft^3/s/ft	Overtopping
max q =	0.3045	ft^3/s/ft	Maximum Overtopping

0.0283 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.3045	ft^3/s/ft	Overtopping
	0.1928	ft^3/s/ft	Maximum Overtopping

0.0283 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER NORTH WALL 0.5% AEP (200-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.9400	ft	Wave Height
T_p =	3.6500	s	Wave Period
h =	7.4100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	13	x_2, e_2
Seaward End of Crest	13.5	13	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.3182	s	Spectral Wave Period
L_o =	56.4256	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0875		Spectral Wave Steepness
ξ_o =	3.3797		Iribarren Parameter
R_c =	5.5900	ft	Freeboard
Det q =	0.9231	ft^3/s/ft	Overtopping
max q =	0.9231	ft^3/s/ft	Maximum Overtopping

0.0858 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9231	ft^3/s/ft	Overtopping
	0.6574	ft^3/s/ft	Maximum Overtopping

0.0858 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.9500	ft	Wave Height
T_p =	3.9400	s	Wave Period
h =	20.2600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	28.5	x_2, e_2
Seaward End of Crest	28.5	28.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5818	s	Spectral Wave Period
L_o =	65.7481	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0905		Spectral Wave Steepness
ξ_o =	3.3242		Iribarren Parameter
R_c =	8.2400	ft	Freeboard
Det q =	0.6814	ft^3/s/ft	Overtopping
max q =	0.6814	ft^3/s/ft	Maximum Overtopping

0.0633 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6814	ft^3/s/ft	Overtopping
	0.4498	ft^3/s/ft	Maximum Overtopping

0.0633 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

$\mu = 4.75$, $\sigma = 0.5$

$\mu = 2.6$, $\sigma = 0.35$

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 5% AEP (20-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.9500	ft	Wave Height
T_p =	3.9400	s	Wave Period
h =	21.2200	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	28.5	x_2, e_2
Seaward End of Crest	28.5	28.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.5818	s	Spectral Wave Period
L_o =	65.7481	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0905		Spectral Wave Steepness
ξ_o =	3.3242		Iribarren Parameter
R_c =	7.2800	ft	Freeboard
Det q =	0.9876	ft^3/s/ft	Overtopping
max q =	0.9876	ft^3/s/ft	Maximum Overtopping

0.0918 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9876	ft^3/s/ft	Overtopping
	0.6842	ft^3/s/ft	Maximum Overtopping

0.0918 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

$\mu = 4.75$, $\sigma = 0.5$

$\mu = 2.6$, $\sigma = 0.35$

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	6.7300	ft	Wave Height
T_p =	4.4000	s	Wave Period
h =	21.9800	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	31.5	x_2, e_2
Seaward End of Crest	13.5	31.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	4.0000	s	Spectral Wave Period
L_o =	81.9966	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0821		Spectral Wave Steepness
ξ_o =	3.4905		Iribarren Parameter
R_c =	9.5200	ft	Freeboard
Det q =	0.7656	ft^3/s/ft	Overtopping
max q =	0.7656	ft^3/s/ft	Maximum Overtopping

0.0711 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.7656	ft^3/s/ft	Overtopping
	0.5008	ft^3/s/ft	Maximum Overtopping

0.0711 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 2% AEP (50-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	6.7300	ft	Wave Height
T_p =	4.4000	s	Wave Period
h =	22.9400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	31.5	x_2, e_2
Seaward End of Crest	13.5	31.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	4.0000	s	Spectral Wave Period
L_o =	81.9966	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0821		Spectral Wave Steepness
ξ_o =	3.4905		Iribarren Parameter
R_c =	8.5600	ft	Freeboard
Det q =	1.0629	ft^3/s/ft	Overtopping
max q =	1.0629	ft^3/s/ft	Maximum Overtopping

0.0987 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.0629	ft^3/s/ft	Overtopping
	0.7257	ft^3/s/ft	Maximum Overtopping

0.0987 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

$\mu = 4.75$, $\sigma = 0.5$

$\mu = 2.6$, $\sigma = 0.35$

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	7.2500	ft	Wave Height
T_p =	4.6100	s	Wave Period
h =	23.2000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	33.5	x_2, e_2
Seaward End of Crest	13.5	33.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	4.1909	s	Spectral Wave Period
L_o =	90.0104	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0805		Spectral Wave Steepness
ξ_o =	3.5235		Iribarren Parameter
R_c =	10.3000	ft	Freeboard
Det q =	0.8441	ft^3/s/ft	Overtopping
max q =	0.8441	ft^3/s/ft	Maximum Overtopping

0.0784 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8441	ft^3/s/ft	Overtopping
	0.5512	ft^3/s/ft	Maximum Overtopping

0.0784 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 1% AEP (100-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	7.2500	ft	Wave Height
T_p =	4.6100	s	Wave Period
h =	24.1600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	33.5	x_2, e_2
Seaward End of Crest	13.5	33.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	4.1909	s	Spectral Wave Period
L_o =	90.0104	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0805		Spectral Wave Steepness
ξ_o =	3.5235		Iribarren Parameter
R_c =	9.3400	ft	Freeboard
Det q =	1.1446	ft^3/s/ft	Overtopping
max q =	1.1446	ft^3/s/ft	Maximum Overtopping

0.1063 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.1446	ft^3/s/ft	Overtopping
	0.7777	ft^3/s/ft	Maximum Overtopping

0.1063 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	7.7300	ft	Wave Height
T_p =	4.7700	s	Wave Period
h =	24.5500	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	36	x_2, e_2
Seaward End of Crest	13.5	36	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	4.3364	s	Spectral Wave Period
L_o =	96.3668	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0802		Spectral Wave Steepness
ξ_o =	3.5308		Iribarren Parameter
R_c =	11.4500	ft	Freeboard
Det q =	0.8084	ft^3/s/ft	Overtopping
max q =	0.8084	ft^3/s/ft	Maximum Overtopping

0.0751 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8084	ft^3/s/ft	Overtopping
	0.5184	ft^3/s/ft	Maximum Overtopping

0.0751 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SURGE BARRIER 0.5% AEP (200-YR)

NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	7.7300	ft	Wave Height
T_p =	4.7700	s	Wave Period
h =	25.5100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	36	x_2, e_2
Seaward End of Crest	13.5	36	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	4.3364	s	Spectral Wave Period
L_o =	96.3668	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0802		Spectral Wave Steepness
ξ_o =	3.5308		Iribarren Parameter
R_c =	10.4900	ft	Freeboard
Det q =	1.0757	ft^3/s/ft	Overtopping
max q =	1.0757	ft^3/s/ft	Maximum Overtopping

0.0999 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.0757	ft^3/s/ft	Overtopping
	0.7160	ft^3/s/ft	Maximum Overtopping

0.0999 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	0.1700	ft	Wave Height
T_p =	2.8400	s	Wave Period
h =	0.2600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	0.5	x_2, e_2
Seaward End of Crest	13.5	0.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.5818	s	Spectral Wave Period
L_o =	34.1607	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0050		Spectral Wave Steepness
ξ_o =	14.1755		Iribarren Parameter
R_c =	0.2400	ft	Freeboard
Det q =	0.0031	ft^3/s/ft	Overtopping
max q =	0.0031	ft^3/s/ft	Maximum Overtopping

0.0003 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.0031	ft^3/s/ft	Overtopping
	0.0020	ft^3/s/ft	Maximum Overtopping

0.0003 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.3200	ft	Wave Height
T_p =	3.1500	s	Wave Period
h =	1.9800	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.8636	s	Spectral Wave Period
L_o =	42.0254	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0314		Spectral Wave Steepness
ξ_o =	5.6425		Iribarren Parameter
R_c =	1.5200	ft	Freeboard
Det q =	0.1218	ft^3/s/ft	Overtopping
max q =	0.1218	ft^3/s/ft	Maximum Overtopping

0.0113 m^3/s/m

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.1218	ft^3/s/ft	Overtopping
	0.0862	ft^3/s/ft	Maximum Overtopping

0.0113 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL 2% AEP (50-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	1.9600	ft	Wave Height
T_p =	3.1500	s	Wave Period
h =	2.9400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	3.5	x_2, e_2
Seaward End of Crest	13.5	3.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	2.8636	s	Spectral Wave Period
L_o =	42.0254	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0466		Spectral Wave Steepness
ξ_o =	4.6305		Iribarren Parameter
R_c =	0.5600	ft	Freeboard
Det q =	1.6142	ft^3/s/ft	Overtopping
max q =	1.6142	ft^3/s/ft	Maximum Overtopping

0.1500 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.6142	ft^3/s/ft	Overtopping
	1.4816	ft^3/s/ft	Maximum Overtopping

0.1500 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.1300	ft	Wave Height
T_p =	3.3200	s	Wave Period
h =	3.2000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	6	x_2, e_2
Seaward End of Crest	13.5	6	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.0182	s	Spectral Wave Period
L_o =	46.6839	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0456		Spectral Wave Steepness
ξ_o =	4.6816		Iribarren Parameter
R_c =	2.8000	ft	Freeboard
Det q =	0.1716	ft^3/s/ft	Overtopping
max q =	0.1716	ft^3/s/ft	Maximum Overtopping

0.0159 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.1716	ft^3/s/ft	Overtopping
	0.1157	ft^3/s/ft	Maximum Overtopping

0.0159 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL 1% AEP (100-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	2.7700	ft	Wave Height
T_p =	3.3200	s	Wave Period
h =	4.1600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	6	x_2, e_2
Seaward End of Crest	13.5	6	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.0182	s	Spectral Wave Period
L_o =	46.6839	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0593		Spectral Wave Steepness
ξ_o =	4.1053		Iribarren Parameter
R_c =	1.8400	ft	Freeboard
Det q =	1.1354	ft^3/s/ft	Overtopping
max q =	1.1354	ft^3/s/ft	Maximum Overtopping

0.1055 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	1.1354	ft^3/s/ft	Overtopping
	0.9303	ft^3/s/ft	Maximum Overtopping

0.1055 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.0300	ft	Wave Height
T_p =	3.4700	s	Wave Period
h =	4.5500	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	9	x_2, e_2
Seaward End of Crest	13.5	9	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1545	s	Spectral Wave Period
L_o =	50.9976	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0594		Spectral Wave Steepness
ξ_o =	4.1025		Iribarren Parameter
R_c =	4.4500	ft	Freeboard
Det q =	0.2042	ft^3/s/ft	Overtopping
max q =	0.2042	ft^3/s/ft	Maximum Overtopping

0.0190 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.2042	ft^3/s/ft	Overtopping
	0.1315	ft^3/s/ft	Maximum Overtopping

0.0190 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	3.6700	ft	Wave Height
T_p =	3.4700	s	Wave Period
h =	5.5100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	9	x_2, e_2
Seaward End of Crest	13.5	9	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.1545	s	Spectral Wave Period
L_o =	50.9976	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0720		Spectral Wave Steepness
ξ_o =	3.7277		Iribarren Parameter
R_c =	3.4900	ft	Freeboard
Det q =	0.8955	ft^3/s/ft	Overtopping
max q =	0.8955	ft^3/s/ft	Maximum Overtopping

0.0832 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.8955	ft^3/s/ft	Overtopping
	0.6732	ft^3/s/ft	Maximum Overtopping

0.0832 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 5% AEP (20-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.2000	ft	Wave Height
T_p =	3.6200	s	Wave Period
h =	13.4600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	19	x_2, e_2
Seaward End of Crest	13.5	19	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.2909	s	Spectral Wave Period
L_o =	55.5019	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0757		Spectral Wave Steepness
ξ_o =	3.6352		Iribarren Parameter
R_c =	5.5400	ft	Freeboard
Det q =	0.4702	ft^3/s/ft	Overtopping
max q =	0.4702	ft^3/s/ft	Maximum Overtopping

0.0437 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.4702	ft^3/s/ft	Overtopping
	0.3165	ft^3/s/ft	Maximum Overtopping

0.0437 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 5% AEP (20-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	4.2000	ft	Wave Height
T_p =	3.6200	s	Wave Period
h =	14.4200	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	19	x_2, e_2
Seaward End of Crest	13.5	19	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.2909	s	Spectral Wave Period
L_o =	55.5019	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0757		Spectral Wave Steepness
ξ_o =	3.6352		Iribarren Parameter
R_c =	4.5800	ft	Freeboard
Det q =	0.7954	ft^3/s/ft	Overtopping
max q =	0.7954	ft^3/s/ft	Maximum Overtopping

0.0739 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.7954	ft^3/s/ft	Overtopping
	0.5735	ft^3/s/ft	Maximum Overtopping

0.0739 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 2% AEP (50-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.1000	ft	Wave Height
T_p =	3.8300	s	Wave Period
h =	15.1800	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	22	x_2, e_2
Seaward End of Crest	13.5	22	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.4818	s	Spectral Wave Period
L_o =	62.1281	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0821		Spectral Wave Steepness
ξ_o =	3.4903		Iribarren Parameter
R_c =	6.8200	ft	Freeboard
Det q =	0.6033	ft^3/s/ft	Overtopping
max q =	0.6033	ft^3/s/ft	Maximum Overtopping

0.0561 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6033	ft^3/s/ft	Overtopping
	0.4040	ft^3/s/ft	Maximum Overtopping

0.0561 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 2% AEP (50-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.1000	ft	Wave Height
T_p =	3.8300	s	Wave Period
h =	16.1400	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	22	x_2, e_2
Seaward End of Crest	13.5	22	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.4818	s	Spectral Wave Period
L_o =	62.1281	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0821		Spectral Wave Steepness
ξ_o =	3.4903		Iribarren Parameter
R_c =	5.8600	ft	Freeboard
Det q =	0.9302	ft^3/s/ft	Overtopping
max q =	0.9302	ft^3/s/ft	Maximum Overtopping

0.0864 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9302	ft^3/s/ft	Overtopping
	0.6590	ft^3/s/ft	Maximum Overtopping

0.0864 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 1% AEP (100-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.6000	ft	Wave Height
T_p =	3.9700	s	Wave Period
h =	16.4000	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	24	x_2, e_2
Seaward End of Crest	13.5	24	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.6091	s	Spectral Wave Period
L_o =	66.7531	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0839		Spectral Wave Steepness
ξ_o =	3.4526		Iribarren Parameter
R_c =	7.6000	ft	Freeboard
Det q =	0.6632	ft^3/s/ft	Overtopping
max q =	0.6632	ft^3/s/ft	Maximum Overtopping

0.0616 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6632	ft^3/s/ft	Overtopping
	0.4414	ft^3/s/ft	Maximum Overtopping

0.0616 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 1% AEP (100-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	5.6000	ft	Wave Height
T_p =	3.9700	s	Wave Period
h =	17.3600	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	24	x_2, e_2
Seaward End of Crest	13.5	24	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.6091	s	Spectral Wave Period
L_o =	66.7531	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0839		Spectral Wave Steepness
ξ_o =	3.4526		Iribarren Parameter
R_c =	6.6400	ft	Freeboard
Det q =	0.9837	ft^3/s/ft	Overtopping
max q =	0.9837	ft^3/s/ft	Maximum Overtopping

0.0914 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9837	ft^3/s/ft	Overtopping
	0.6892	ft^3/s/ft	Maximum Overtopping

0.0914 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 0.5% AEP (200-YR)

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	6.1000	ft	Wave Height
T_p =	4.0900	s	Wave Period
h =	17.7500	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	26.5	x_2, e_2
Seaward End of Crest	13.5	26.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7182	s	Spectral Wave Period
L_o =	70.8496	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0861		Spectral Wave Steepness
ξ_o =	3.4080		Iribarren Parameter
R_c =	8.7500	ft	Freeboard
Det q =	0.6312	ft^3/s/ft	Overtopping
max q =	0.6312	ft^3/s/ft	Maximum Overtopping

0.0586 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.6312	ft^3/s/ft	Overtopping
	0.4104	ft^3/s/ft	Maximum Overtopping

0.0586 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty

μ = 4.75, σ = 0.5

μ = 2.6, σ = 0.35

Wave Overtopping of Uniform Structure Slopes

The overtopping is computed based on the equations given in the EurOtop manual.

Legend
User inputs (Input Worksheet)
Intermediate Computations
Final Calculation

MIAMI RIVER SOUTH WALL IN WATER 0.5% AEP (200-YR)
NOAA ADAPTABILITY

Input Wave and Water Level Variables from Input Sheet			
H_{mo} =	6.1000	ft	Wave Height
T_p =	4.0900	s	Wave Period
h =	18.7100	ft	Total Depth at Levee Toe
cot a =	1.0000		Seaward Slope
γ_f =	1.0000		Roughness Influence Factor
γ_b =	1.0000		Berm
g =	32.2000	ft/s^2	Acceleration of Gravity
β =	0.0000	deg	Wave Obliquity
	1.0000		CASE
H_B/h_B =	0.7800		Breaker Ratio for Breaker Height at xB

Input Structure Geometry from Input Sheet			
Point	x	Elevation	coords
Leeward Structure Toe	16.5	0	x_1, e_1
Leeward End of Crest	16.5	26.5	x_2, e_2
Seaward End of Crest	13.5	26.5	x_3, e_3
Seaward Structure Toe	13.5	0	x_4, e_4

Computed Variables			
$T_{m-1,0}$ =	3.7182	s	Spectral Wave Period
L_o =	70.8496	ft	Spectral Wave Length
γ_f =	1.0000		Roughness Influence Coefficient
γ_β =	1.0000		Wave Obliquity Influence Coefficient

Computed Overtopping q			
tan α =	1.0000		Equivalent Slope
s_o =	0.0861		Spectral Wave Steepness
ξ_o =	3.4080		Iribarren Parameter
R_c =	7.7900	ft	Freeboard
Det q =	0.9064	ft^3/s/ft	Overtopping
max q =	0.9064	ft^3/s/ft	Maximum Overtopping

0.0842 m^3/s/m

Determinitstic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.3\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.3\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Wave overtopping for short-crested waves

$$\gamma_\beta = 1 - 0.0033\,|\beta| \qquad 0° \le |\beta| \le 80°$$

$$\gamma_\beta = 1 - 0.0033\,(80) \qquad |\beta| > 80°$$

Probabilistic Equations

Computed Mean Overtopping q			
Prob q =	0.9064	ft^3/s/ft	Overtopping
	0.6179	ft^3/s/ft	Maximum Overtopping

0.0842 m^3/s/m

Probabilistic Equations

$$\frac{q}{\sqrt{gH_{m0}^3}} = \frac{0.067}{\sqrt{\tan\alpha}}\gamma_b\xi_{m-1,0}\exp\left(-4.75\frac{R_c}{\xi_{m-1,0}H_{m0}\gamma_b\gamma_f\gamma_\beta\gamma_v}\right)$$

$$\frac{q}{\sqrt{gH_{m0}^3}} < 0.2\cdot\exp\left(-2.6\frac{R_c}{H_{m0}\gamma_f\gamma_\beta}\right)$$

Uncertainty
μ = 4.75, σ = 0.5
μ = 2.6, σ = 0.35

Case: 2079_0.5% Flood (200YR) Overtopping at North Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.200	ft	Runup for significant waves (R):	2.803	ft
Peak wave period (T):	3.360		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	200.000		Deepwater significant wave (Ho):	2.283	ft
Water depth at structure toe (ds):	4.300	ft	Relative height (ds/Ho):	1.883	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	7.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at North Wall Biscayne NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.200	ft	Runup for significant waves (R):	2.687	ft
Peak wave period (T):	3.360		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	200.000		Deepwater significant wave (Ho):	2.338	ft
Water depth at structure toe (ds):	5.270	ft	Relative height (ds/Ho):	2.254	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	7.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.099	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at North Wall LR

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.850	ft	Runup for significant waves (R):	2.920	ft
Peak wave period (T):	4.270		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	1.644	ft
Water depth at structure toe (ds):	2.800	ft	Relative height (ds/Ho):	1.703	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.003	
Structure height above toe (hs):	5.500	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.014	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at North Wall LR NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.490	ft	Runup for significant waves (R):	3.676	ft
Peak wave period (T):	4.270		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	2.339	ft
Water depth at structure toe (ds):	3.730	ft	Relative height (ds/Ho):	1.595	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.004	
Structure height above toe (hs):	5.500	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.268	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at North Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.300	ft	Runup for significant waves (R):	5.568	ft
Peak wave period (T):	3.650		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	4.590	ft
Water depth at structure toe (ds):	6.500	ft	Relative height (ds/Ho):	1.416	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	13.000	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at North Wall MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.940	ft	Runup for significant waves (R):	6.336	ft
Peak wave period (T):	3.650		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	5.332	ft
Water depth at structure toe (ds):	7.410	ft	Relative height (ds/Ho):	1.390	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	13.000	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.105	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at North Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.200	ft	Runup for significant waves (R):	2.803	ft
Peak wave period (T):	3.360		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	200.000		Deepwater significant wave (Ho):	2.283	ft
Water depth at structure toe (ds):	4.300	ft	Relative height (ds/Ho):	1.883	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	7.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at SB Biscayne use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.390	ft	Runup for significant waves (R):	3.922	ft
Peak wave period (T):	4.170		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	3.709	ft
Water depth at structure toe (ds):	12.720	ft	Relative height (ds/Ho):	3.430	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	16.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.069	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at SB LR use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	5.000	ft	Runup for significant waves (R):	6.058	ft
Peak wave period (T):	4.390		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	300.000		Deepwater significant wave (Ho):	5.421	ft
Water depth at structure toe (ds):	11.430	ft	Relative height (ds/Ho):	2.109	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.009	
Structure height above toe (hs):	18.000	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.033	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at SB MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	7.730	ft	Runup for significant waves (R):	9.008	ft
Peak wave period (T):	4.770		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	8.395	ft
Water depth at structure toe (ds):	24.600	ft	Relative height (ds/Ho):	2.930	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	36.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at SB MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	7.730	ft	Runup for significant waves (R):	8.988	ft
Peak wave period (T):	4.770		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	8.376	ft
Water depth at structure toe (ds):	25.510	ft	Relative height (ds/Ho):	3.045	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	36.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.031	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at South Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth
Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.540	ft	Runup for significant waves (R):	2.237	ft
Peak wave period (T):	3.220		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	1.468	ft
Water depth at structure toe (ds):	2.300	ft	Relative height (ds/Ho):	1.566	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.004	
Structure height above toe (hs):	4.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.007	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at South Wall Biscayne NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.180	ft	Runup for significant waves (R):	2.975	ft
Peak wave period (T):	3.220		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	2.204	ft
Water depth at structure toe (ds):	3.270	ft	Relative height (ds/Ho):	1.484	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	4.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.281	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at South Wall in water MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	6.100	ft	Runup for significant waves (R):	7.151	ft
Peak wave period (T):	4.100		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	25.000		Deepwater significant wave (Ho):	6.633	ft
Water depth at structure toe (ds):	17.800	ft	Relative height (ds/Ho):	2.684	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	26.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at South Wall in water MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	6.100	ft	Runup for significant waves (R):	7.127	ft
Peak wave period (T):	4.100		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	25.000		Deepwater significant wave (Ho):	6.613	ft
Water depth at structure toe (ds):	18.710	ft	Relative height (ds/Ho):	2.829	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	26.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.035	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at South Wall LR

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.100	ft	Runup for significant waves (R):	2.068	ft
Peak wave period (T):	4.390		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	125.000		Deepwater significant wave (Ho):	0.868	ft
Water depth at structure toe (ds):	1.700	ft	Relative height (ds/Ho):	1.958	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.001	
Structure height above toe (hs):	3.500	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.008	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at South Wall LR NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.750	ft	Runup for significant waves (R):	2.863	ft
Peak wave period (T):	4.390		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	125.000		Deepwater significant wave (Ho):	1.518	ft
Water depth at structure toe (ds):	2.630	ft	Relative height (ds/Ho):	1.733	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.002	
Structure height above toe (hs):	3.500	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.319	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at South Wall MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.670	ft	Runup for significant waves (R):	4.786	ft
Peak wave period (T):	3.470		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	110.000		Deepwater significant wave (Ho):	3.892	ft
Water depth at structure toe (ds):	5.510	ft	Relative height (ds/Ho):	1.416	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	9.000	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.156	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at Wall Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.750	ft	Runup for significant waves (R):	5.066	ft
Peak wave period (T):	4.080		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	3.830	ft
Water depth at structure toe (ds):	5.630	ft	Relative height (ds/Ho):	1.470	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	11.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.019	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at Wall Edgewater NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.390	ft	Runup for significant waves (R):	5.814	ft
Peak wave period (T):	4.080		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	4.579	ft
Water depth at structure toe (ds):	6.590	ft	Relative height (ds/Ho):	1.439	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.009	
Structure height above toe (hs):	11.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.146	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at Wall in water Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.960	ft	Runup for significant waves (R):	5.827	ft
Peak wave period (T):	4.080		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	50.000		Deepwater significant wave (Ho):	5.431	ft
Water depth at structure toe (ds):	14.300	ft	Relative height (ds/Ho):	2.633	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	21.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.018	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at SB MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	7.730	ft	Runup for significant waves (R):	9.008	ft
Peak wave period (T):	4.770		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	8.395	ft
Water depth at structure toe (ds):	24.600	ft	Relative height (ds/Ho):	2.930	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	36.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at North Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.800	ft	Runup for significant waves (R):	2.340	ft
Peak wave period (T):	3.180		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	200.000		Deepwater significant wave (Ho):	1.835	ft
Water depth at structure toe (ds):	3.380	ft	Relative height (ds/Ho):	1.842	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	5.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.016	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at SB MR2

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	6.300	ft	Runup for significant waves (R):	7.313	ft
Peak wave period (T):	3.950		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	6.676	ft
Water depth at structure toe (ds):	22.700	ft	Relative height (ds/Ho):	3.400	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.013	
Structure height above toe (hs):	31.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.017	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at North Wall LR

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.230	ft	Runup for significant waves (R):	2.167	ft
Peak wave period (T):	4.110		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	1.017	ft
Water depth at structure toe (ds):	1.840	ft	Relative height (ds/Ho):	1.809	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.002	
Structure height above toe (hs):	3.500	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.017	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at North Wall LR NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.870	ft	Runup for significant waves (R):	2.902	ft
Peak wave period (T):	4.110		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	1.687	ft
Water depth at structure toe (ds):	2.800	ft	Relative height (ds/Ho):	1.660	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.003	
Structure height above toe (hs):	3.500	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.494	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at North Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.400	ft	Runup for significant waves (R):	4.476	ft
Peak wave period (T):	3.490		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	3.570	ft
Water depth at structure toe (ds):	5.100	ft	Relative height (ds/Ho):	1.428	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.009	
Structure height above toe (hs):	10.000	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.016	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at North Wall MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.040	ft	Runup for significant waves (R):	5.229	ft
Peak wave period (T):	3.490		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	4.320	ft
Water depth at structure toe (ds):	6.060	ft	Relative height (ds/Ho):	1.403	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	10.000	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.159	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at SB Biscayne use

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.110	ft	Runup for significant waves (R):	3.619	ft
Peak wave period (T):	3.920		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	3.399	ft
Water depth at structure toe (ds):	10.800	ft	Relative height (ds/Ho):	3.178	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	14.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.020	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at SB Biscayne use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.110	ft	Runup for significant waves (R):	3.593	ft
Peak wave period (T):	3.920		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	3.405	ft
Water depth at structure toe (ds):	11.790	ft	Relative height (ds/Ho):	3.462	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	14.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.096	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at SB LR use

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.200	ft	Runup for significant waves (R):	5.110	ft
Peak wave period (T):	4.160		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	300.000		Deepwater significant wave (Ho):	4.530	ft
Water depth at structure toe (ds):	9.540	ft	Relative height (ds/Ho):	2.106	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.008	
Structure height above toe (hs):	15.500	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at SB LR use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.200	ft	Runup for significant waves (R):	5.039	ft
Peak wave period (T):	4.160		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	300.000		Deepwater significant wave (Ho):	4.560	ft
Water depth at structure toe (ds):	10.500	ft	Relative height (ds/Ho):	2.303	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.008	
Structure height above toe (hs):	15.500	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.042	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at SB MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	7.250	ft	Runup for significant waves (R):	8.445	ft
Peak wave period (T):	4.610		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	7.869	ft
Water depth at structure toe (ds):	23.200	ft	Relative height (ds/Ho):	2.948	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	33.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.019	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at SB MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	7.250	ft	Runup for significant waves (R):	8.425	ft
Peak wave period (T):	4.610		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	7.849	ft
Water depth at structure toe (ds):	24.160	ft	Relative height (ds/Ho):	3.078	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	33.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.041	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at South Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	0.920	ft	Runup for significant waves (R):	1.412	ft
Peak wave period (T):	2.870		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	0.834	ft
Water depth at structure toe (ds):	1.400	ft	Relative height (ds/Ho):	1.678	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.003	
Structure height above toe (hs):	2.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.010	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at South Wall Biscayne NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.560	ft	Runup for significant waves (R):	2.164	ft
Peak wave period (T):	2.870		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	1.552	ft
Water depth at structure toe (ds):	2.340	ft	Relative height (ds/Ho):	1.508	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	2.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.729	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at South Wall in water MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	5.600	ft	Runup for significant waves (R):	6.563	ft
Peak wave period (T):	3.970		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	25.000		Deepwater significant wave (Ho):	6.095	ft
Water depth at structure toe (ds):	16.400	ft	Relative height (ds/Ho):	2.691	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	24.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.020	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at North Wall LR

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.230	ft	Runup for significant waves (R):	2.167	ft
Peak wave period (T):	4.110		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	1.017	ft
Water depth at structure toe (ds):	1.840	ft	Relative height (ds/Ho):	1.809	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.002	
Structure height above toe (hs):	3.500	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.017	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at South Wall LR

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	0.500	ft	Runup for significant waves (R):	1.366	ft
Peak wave period (T):	4.160		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	125.000		Deepwater significant wave (Ho):	0.334	ft
Water depth at structure toe (ds):	0.740	ft	Relative height (ds/Ho):	2.216	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.001	
Structure height above toe (hs):	1.500	ft	Overtopping coef(alpha):	0.063	
			Overtopping coef(Q*o):	0.038	
			Overtopping rate (Q):	0.017	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at South Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.130	ft	Runup for significant waves (R):	2.943	ft
Peak wave period (T):	3.320		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	110.000		Deepwater significant wave (Ho):	2.126	ft
Water depth at structure toe (ds):	3.200	ft	Relative height (ds/Ho):	1.505	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	6.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at South Wall MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.770	ft	Runup for significant waves (R):	3.689	ft
Peak wave period (T):	3.320		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	110.000		Deepwater significant wave (Ho):	2.872	ft
Water depth at structure toe (ds):	4.160	ft	Relative height (ds/Ho):	1.449	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.008	
Structure height above toe (hs):	6.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.279	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at Wall Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.890	ft	Runup for significant waves (R):	4.015	ft
Peak wave period (T):	3.930		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	2.869	ft
Water depth at structure toe (ds):	4.340	ft	Relative height (ds/Ho):	1.513	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	8.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at Wall Edgewater NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.530	ft	Runup for significant waves (R):	4.760	ft
Peak wave period (T):	3.930		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	3.613	ft
Water depth at structure toe (ds):	5.300	ft	Relative height (ds/Ho):	1.467	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	8.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.164	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at Wall in water Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.500	ft	Runup for significant waves (R):	5.287	ft
Peak wave period (T):	3.930		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	50.000		Deepwater significant wave (Ho):	4.928	ft
Water depth at structure toe (ds):	13.000	ft	Relative height (ds/Ho):	2.638	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	19.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.017	ft^3/s-ft

Case: 2079_1% Flood (100YR) Overtopping at Wall in water Edgewater NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.500	ft	Runup for significant waves (R):	5.254	ft
Peak wave period (T):	3.930		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	50.000		Deepwater significant wave (Ho):	4.923	ft
Water depth at structure toe (ds):	14.000	ft	Relative height (ds/Ho):	2.844	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	19.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.052	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at North Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.400	ft	Runup for significant waves (R):	1.891	ft
Peak wave period (T):	2.960		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	200.000		Deepwater significant wave (Ho):	1.387	ft
Water depth at structure toe (ds):	2.430	ft	Relative height (ds/Ho):	1.752	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.005	
Structure height above toe (hs):	4.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.016	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at North Wall Biscayne NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.400	ft	Runup for significant waves (R):	1.731	ft
Peak wave period (T):	2.960		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	200.000		Deepwater significant wave (Ho):	1.456	ft
Water depth at structure toe (ds):	3.390	ft	Relative height (ds/Ho):	2.328	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.005	
Structure height above toe (hs):	4.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.200	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at North Wall LR

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	0.620	ft	Runup for significant waves (R):	1.306	ft
Peak wave period (T):	3.940		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	0.456	ft
Water depth at structure toe (ds):	1.000	ft	Relative height (ds/Ho):	2.194	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.001	
Structure height above toe (hs):	2.000	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.005	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at North Wall LR NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.260	ft	Runup for significant waves (R):	2.137	ft
Peak wave period (T):	3.940		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	1.067	ft
Water depth at structure toe (ds):	1.890	ft	Relative height (ds/Ho):	1.771	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.002	
Structure height above toe (hs):	2.000	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q^*o):	0.009	
			Overtopping rate (Q):	0.562	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at North Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.600	ft	Runup for significant waves (R):	3.478	ft
Peak wave period (T):	3.270		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	2.683	ft
Water depth at structure toe (ds):	3.900	ft	Relative height (ds/Ho):	1.453	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.008	
Structure height above toe (hs):	7.500	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.016	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at North Wall MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.230	ft	Runup for significant waves (R):	4.218	ft
Peak wave period (T):	3.270		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	3.422	ft
Water depth at structure toe (ds):	4.840	ft	Relative height (ds/Ho):	1.415	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	7.500	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.215	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at SB Biscayne use

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Runup

Breaking criteria:	0.780				
Incident wave ht (Hi):	2.770	ft	Wave Runup (R):	3.212	ft
Peak wave period (T):	3.590		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater wave (Ho):	3.033	ft
Water depth at structure toe (ds):	9.900	ft	Relative height (ds/Ho):	3.264	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	13.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.009	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at SB Biscayne use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Runup

Breaking criteria:	0.780				
Incident wave ht (Hi):	2.770	ft	Wave Runup (R):	3.191	ft
Peak wave period (T):	3.590		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater wave (Ho):	3.034	ft
Water depth at structure toe (ds):	10.840	ft	Relative height (ds/Ho):	3.573	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	13.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.052	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at South Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.130	ft	Runup for significant waves (R):	2.943	ft
Peak wave period (T):	3.320		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	110.000		Deepwater significant wave (Ho):	2.126	ft
Water depth at structure toe (ds):	3.200	ft	Relative height (ds/Ho):	1.505	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	6.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	ft^3/s-ft

Case: 2079_2% Flood (50YR) Overtopping at SB LR use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.500	ft	Runup for significant waves (R):	4.160	ft
Peak wave period (T):	3.910		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	300.000		Deepwater significant wave (Ho):	3.807	ft
Water depth at structure toe (ds):	9.590	ft	Relative height (ds/Ho):	2.519	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.008	
Structure height above toe (hs):	13.500	ft	Overtopping coef(alpha):	0.069	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.041	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at SB MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	6.730	ft	Runup for significant waves (R):	7.830	ft
Peak wave period (T):	4.400		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	7.286	ft
Water depth at structure toe (ds):	22.000	ft	Relative height (ds/Ho):	3.019	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	31.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.018	$ft^3/s\text{-}ft$

Case: 2079_1% Flood (100YR) Overtopping at Wall Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.890	ft	Runup for significant waves (R):	4.015	ft
Peak wave period (T):	3.930		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	2.869	ft
Water depth at structure toe (ds):	4.340	ft	Relative height (ds/Ho):	1.513	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	8.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at South Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	0.300	ft	Runup for significant waves (R):	0.655	ft
Peak wave period (T):	2.520		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	0.223	ft
Water depth at structure toe (ds):	0.430	ft	Relative height (ds/Ho):	1.928	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.001	
Structure height above toe (hs):	1.000	ft	Overtopping coef(alpha):	0.067	
			Overtopping coef(Q*o):	0.009	
			Overtopping rate (Q):	0.001	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at South Wall in water MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	5.100	ft	Runup for significant waves (R):	5.969	ft
Peak wave period (T):	3.830		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	25.000		Deepwater significant wave (Ho):	5.552	ft
Water depth at structure toe (ds):	15.200	ft	Relative height (ds/Ho):	2.738	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	22.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.020	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at South Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.320	ft	Runup for significant waves (R):	1.949	ft
Peak wave period (T):	3.150		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	110.000		Deepwater significant wave (Ho):	1.237	ft
Water depth at structure toe (ds):	2.000	ft	Relative height (ds/Ho):	1.617	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.004	
Structure height above toe (hs):	3.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.019	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at South Wall MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.960	ft	Runup for significant waves (R):	2.700	ft
Peak wave period (T):	3.150		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	110.000		Deepwater significant wave (Ho):	1.962	ft
Water depth at structure toe (ds):	2.940	ft	Relative height (ds/Ho):	1.498	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	3.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.590	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at South Wall in water MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	5.100	ft	Runup for significant waves (R):	5.946	ft
Peak wave period (T):	3.830		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	25.000		Deepwater significant wave (Ho):	5.533	ft
Water depth at structure toe (ds):	16.140	ft	Relative height (ds/Ho):	2.917	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.012	
Structure height above toe (hs):	22.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.050	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at Wall Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.220	ft	Runup for significant waves (R):	3.183	ft
Peak wave period (T):	3.760		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	2.139	ft
Water depth at structure toe (ds):	3.330	ft	Relative height (ds/Ho):	1.557	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.005	
Structure height above toe (hs):	6.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.011	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at Wall Edgewater NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.860	ft	Runup for significant waves (R):	3.926	ft
Peak wave period (T):	3.760		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	2.874	ft
Water depth at structure toe (ds):	4.290	ft	Relative height (ds/Ho):	1.493	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	6.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.204	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at Wall in water Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.040	ft	Runup for significant waves (R):	4.736	ft
Peak wave period (T):	3.760		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	50.000		Deepwater significant wave (Ho):	4.424	ft
Water depth at structure toe (ds):	12.000	ft	Relative height (ds/Ho):	2.712	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	17.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.012	$ft^3/s\text{-}ft$

Case: 2079_2% Flood (50YR) Overtopping at Wall in water Edgewater NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.040	ft	Runup for significant waves (R):	4.706	ft
Peak wave period (T):	3.760		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	50.000		Deepwater significant wave (Ho):	4.418	ft
Water depth at structure toe (ds):	12.990	ft	Relative height (ds/Ho):	2.940	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	17.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.043	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at North Wall Biscayne

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	0.630	ft	Runup for significant waves (R):	0.932	ft
Peak wave period (T):	2.500		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	200.000		Deepwater significant wave (Ho):	0.573	ft
Water depth at structure toe (ds):	1.080	ft	Relative height (ds/Ho):	1.885	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.003	
Structure height above toe (hs):	2.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.002	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at North Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.440	ft	Runup for significant waves (R):	1.958	ft
Peak wave period (T):	2.640		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	1.456	ft
Water depth at structure toe (ds):	2.200	ft	Relative height (ds/Ho):	1.511	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.006	
Structure height above toe (hs):	4.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.010	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at North Wall MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.080	ft	Runup for significant waves (R):	2.719	ft
Peak wave period (T):	2.640		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	210.000		Deepwater significant wave (Ho):	2.201	ft
Water depth at structure toe (ds):	3.120	ft	Relative height (ds/Ho):	1.418	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.010	
Structure height above toe (hs):	4.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.422	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at SB Biscayne use

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.940	ft	Runup for significant waves (R):	2.221	ft
Peak wave period (T):	3.130		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	2.124	ft
Water depth at structure toe (ds):	8.500	ft	Relative height (ds/Ho):	4.002	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	10.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.020	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at SB Biscayne use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.940	ft	Runup for significant waves (R):	2.208	ft
Peak wave period (T):	3.130		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	250.000		Deepwater significant wave (Ho):	2.118	ft
Water depth at structure toe (ds):	9.490	ft	Relative height (ds/Ho):	4.480	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.007	
Structure height above toe (hs):	10.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.215	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at SB LR use

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.700	ft	Runup for significant waves (R):	3.210	ft
Peak wave period (T):	3.460		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	300.000		Deepwater significant wave (Ho):	2.934	ft
Water depth at structure toe (ds):	7.400	ft	Relative height (ds/Ho):	2.522	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.008	
Structure height above toe (hs):	11.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.009	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at SB LR use NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	2.700	ft	Runup for significant waves (R):	3.168	ft
Peak wave period (T):	3.460		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	300.000		Deepwater significant wave (Ho):	2.950	ft
Water depth at structure toe (ds):	8.350	ft	Relative height (ds/Ho):	2.831	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.008	
Structure height above toe (hs):	11.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.049	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at SB MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	6.000	ft	Runup for significant waves (R):	6.977	ft
Peak wave period (T):	3.940		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	6.423	ft
Water depth at structure toe (ds):	20.300	ft	Relative height (ds/Ho):	3.160	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.013	
Structure height above toe (hs):	28.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.020	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at SB MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	6.000	ft	Runup for significant waves (R):	6.963	ft
Peak wave period (T):	3.940		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	100.000		Deepwater significant wave (Ho):	6.397	ft
Water depth at structure toe (ds):	21.220	ft	Relative height (ds/Ho):	3.317	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.013	
Structure height above toe (hs):	28.500	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.046	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at South Wall in water MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.200	ft	Runup for significant waves (R):	4.890	ft
Peak wave period (T):	3.620		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	25.000		Deepwater significant wave (Ho):	4.573	ft
Water depth at structure toe (ds):	13.500	ft	Relative height (ds/Ho):	2.952	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	19.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.017	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at South Wall MR1

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	0.170	ft	Runup for significant waves (R):	0.541	ft
Peak wave period (T):	2.840		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	110.000		Deepwater significant wave (Ho):	0.106	ft
Water depth at structure toe (ds):	0.260	ft	Relative height (ds/Ho):	2.449	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.000	
Structure height above toe (hs):	0.500	ft	Overtopping coef(alpha):	0.075	
			Overtopping coef(Q*o):	0.088	
			Overtopping rate (Q):	0.012	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at Wall Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	1.370	ft	Runup for significant waves (R):	2.088	ft
Peak wave period (T):	3.480		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	500.000		Deepwater significant wave (Ho):	1.247	ft
Water depth at structure toe (ds):	2.100	ft	Relative height (ds/Ho):	1.684	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.003	
Structure height above toe (hs):	4.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.009	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at Wall in water Edgewater

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	3.320	ft	Runup for significant waves (R):	3.865	ft
Peak wave period (T):	3.480		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	50.000		Deepwater significant wave (Ho):	3.633	ft
Water depth at structure toe (ds):	10.800	ft	Relative height (ds/Ho):	2.973	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.009	
Structure height above toe (hs):	15.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.015	$ft^3/s\text{-}ft$

Case: 2079_5% Flood (20YR) Overtopping at South Wall in water MR1 NOAA

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	4.200	ft	Runup for significant waves (R):	4.870	ft
Peak wave period (T):	3.620		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	25.000		Deepwater significant wave (Ho):	4.557	ft
Water depth at structure toe (ds):	14.420	ft	Relative height (ds/Ho):	3.165	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.011	
Structure height above toe (hs):	19.000	ft	Overtopping coef(alpha):	0.068	
			Overtopping coef(Q*o):	0.006	
			Overtopping rate (Q):	0.050	$ft^3/s\text{-}ft$

Case: 2079_0.5% Flood (200YR) Overtopping at SB LR use

Wave Runup and Overtopping on Impermeable Structures

Wave type: Irregular Slope type: Smooth

Rate estimate: Overtopping

Breaking criteria:	0.780				
Incident significant wave ht (Hi):	5.000	ft	Runup for significant waves (R):	6.141	ft
Peak wave period (T):	4.390		Onshore wind velocity (U):	80.000	ft/sec
COTAN of nearshore slope (cot phi):	300.000		Deepwater significant wave (Ho):	5.388	ft
Water depth at structure toe (ds):	10.500	ft	Relative height (ds/Ho):	1.949	
COTAN of structure slope (cot theta):	0.000		Wave steepness (Ho/gT^2):	0.009	
Structure height above toe (hs):	18.000	ft	Overtopping coef(alpha):	0.070	
			Overtopping coef(Q*o):	0.007	
			Overtopping rate (Q):	0.013	$ft^3/s\text{-}ft$

ATTACHMENT HH&C-2: OTHER DATA –

To: USACE Climate COP

From: SAJ / NAO SE FL Feasibility Study Teams

Date: 18 January 2019

Subject: South East Florida Sea Level Change Incorporation Strategy

This memo summarizes the selection of an appropriate sea level change record and the plan formulation strategy regarding sea level change for the Southeast Florida Supplemental Feasibility Studies (Miami-Dade Coastal, Miami-Dade Back Bay, and Monroe County).

Sea Level Change Record

A number of long period tide gauges exist in South Florida where three new feasibility studies are under way (Figure 1), two on the Gulf coast, two on the east coast, and two within the Florida Keys in Monroe County. The gauge closest in proximity to Miami-Dade County is the Miami Beach gauge. Typically this gauge and its associated record would be selected to guide the sea level change strategy for the feasibility study due to its proximity and long period of record. However the gauge was discontinued in 1981 and the published sea level trend does not reflect sea level change over the past nearly 40 years and any potential acceleration in sea level change. A new gauge within about 3 miles was subsequently established at Virginia Key in 1994; however, the large temporal gap and spatial differences in gauges makes combining these records prohibitive. Of the other five gauges, the two on the Gulf of Mexico are screened out due to their location on the Gulf of Mexico and distance from the study areas.

Of the three remaining gauges the two in closest proximity to Miami-Dade County, Lake Worth Pier and Vaca Key, have very similar periods of record and similar sea level change trends of approximately 3.7 mm / yr. The Key West gauge has a much longer period of record and much lower sea level change trend of 2.42 mm / yr. Analysis of this gauge via the NOAA "Variation of 50 year trends" tool on the NOAA Tides and Currents website shows that changing the mid-point of a 50 year averaging period (an averaging period similar to Lake Worth Pier and Vaca Key) can produce very different sea level change trends as shown in Figure 2. What is evident from the figure is that the sea level change trend has been increasing with the highest level reported utilizing the most recent averaging period. This points to an increase in the sea level change trend throughout southeast Florida. Vertical land movement data is available at both Miami and Key West from NASA JPL (https://sideshow.jpl.nasa.gov/post/series.html). The land movement at both sites were examined (Figure 3 and 4). The Miami site appears to reflect a distinct shift in horizontal location during the record which leads to a highly uncertain trend in vertical land movement of -1.402 ± -1.348 mm / yr. For Key West the vertical land movement trend is -0.272 ± -0.988 mm / yr. Due to the short record for both locations there is tremendous uncertainty in both records. Nevertheless both locations point to a slight decrease in land surface height over time. Both the Keys and Miami are subject to similar large scale oceanographic forcing. Due to their orientations the predominant wave characteristics are different at each site, but the larger scale physical oceanography is similar. Figure 5 shows a "spaghetti plot" of the trajectories of all NOAA AOML Drifting Buoy Data Assembly Center's archived near-surface buoys from 1978 to 2003. The corresponding speeds of the

trajectories are color-coded which makes the major currents visible. It is evident in the plot that the gauges located in the Keys and those off the SE FL mainland coast are both predominantly subject to the Florida Current.

Based on the increase in sea level change trend observed in Key West and the similarity in sea level change trend for both Vaca Key and Lake Worth Pier along with similar vertical land movement and physical oceanographic conditions throughout the area, it is appropriate to use the sea level change rate at Vaca Key or Lake Worth Pier for the Miami-Dade and Monroe County studies. With Vaca Key located within Monroe County and within similar proximity to the focus areas of the Miami-Dade studies as Lake Worth Pier, the Vaca Key tide gauge and associated sea level change trend will be adopted for the Monroe and (2) Miami-Dade County feasibility studies. While the Vaca Key gauge has been chosen to estimate the potential range of SLC to be evaluated, the other gauges will be useful in determining short and long-term variability of Total Water Levels via NOAA's estimates for Extreme Water Levels.

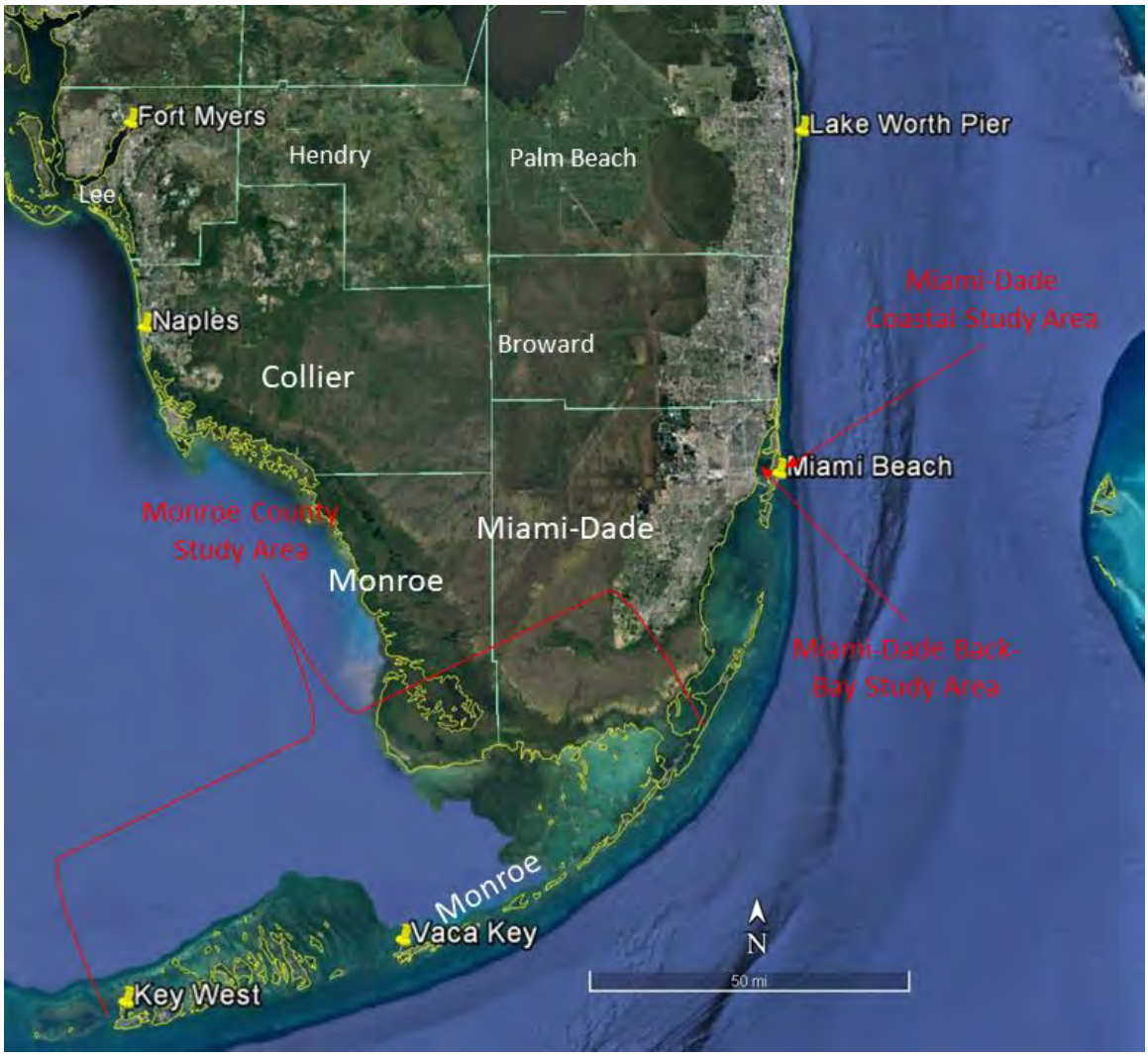


Figure 1: Locations of long period tidal records in South Florida along with county boundaries (https://tidesandcurrents.noaa.gov/sltrends/)

Table 1: South Florida Tide Gauges, Periods of Record, and Relative Sea Level Trend

Tide Gauge	Period of Record	Relative Sea Level Trend (mm / yr)
Fort Myers	1965 – Present	3.10 ± 0.49
Naples	1965 – Present	2.80 ± 0.45
Key West	1913 – Present	2.42 ± 0.15
Vaca Key	1971 – Present	3.69 ± 0.46
Miami Beach	1931 – 1981	2.39 ± 0.43
Lake Worth Pier	1970 – Present	3.70 ± 0.58

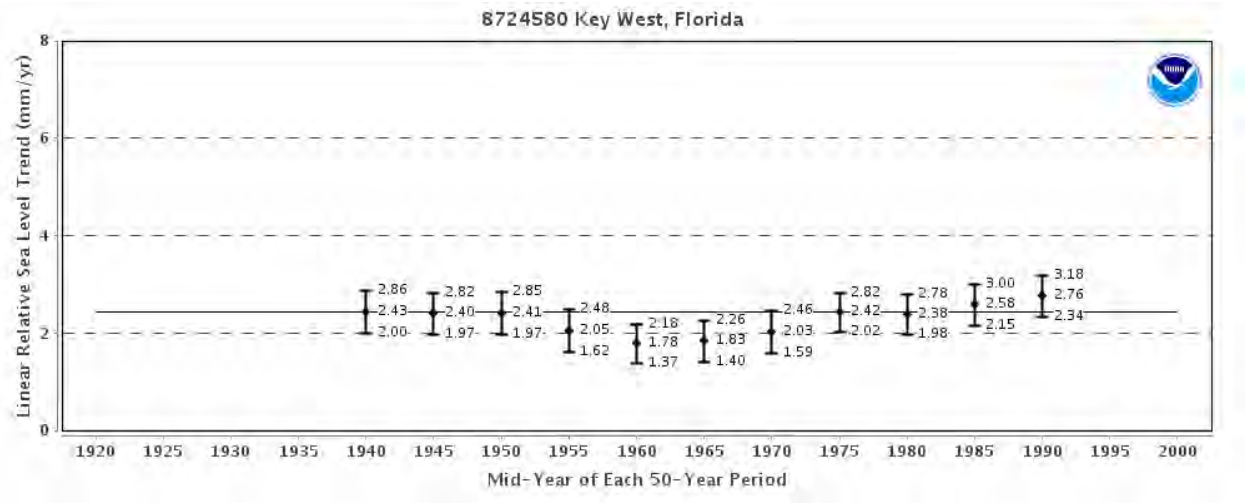


Figure 2: Variation of 50 year trends at the Key West Tide Gauge (https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?plot=50yr&id=8724580)

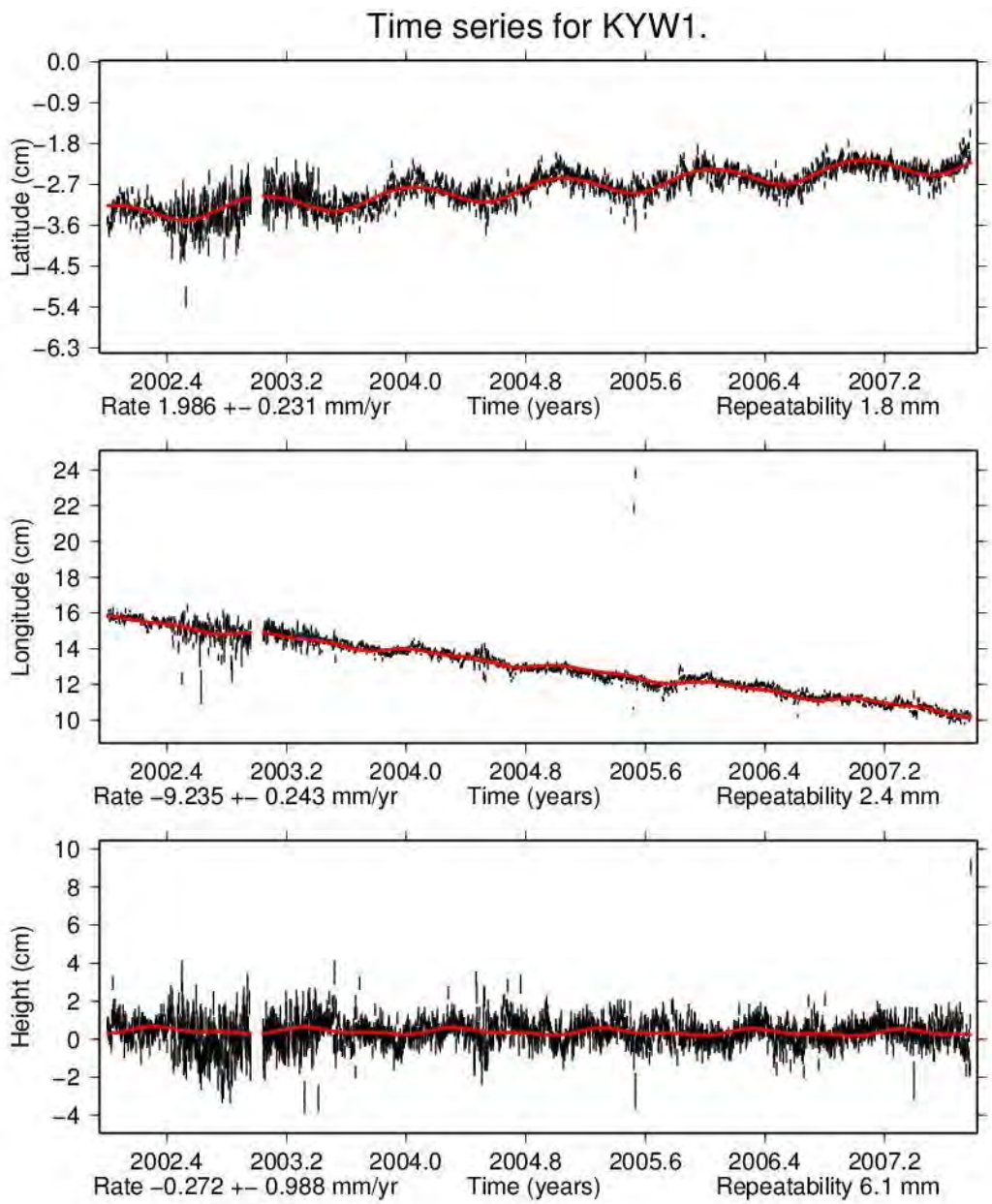


Figure 3: Land Movement at Key West (https://sideshow.jpl.nasa.gov/post/series.html)

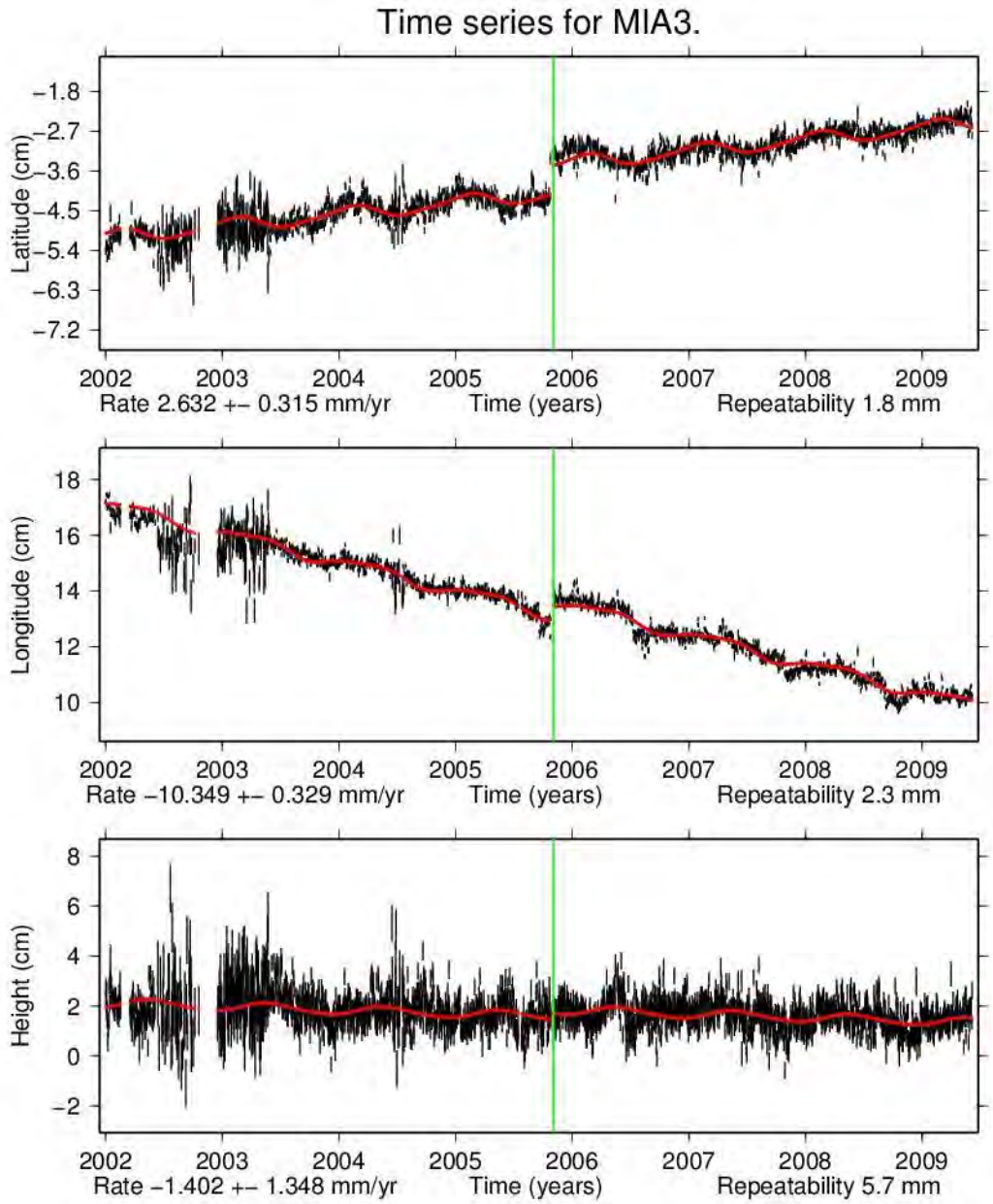


Figure 4: Land movement at Miami (https://sideshow.jpl.nasa.gov/post/series.html)

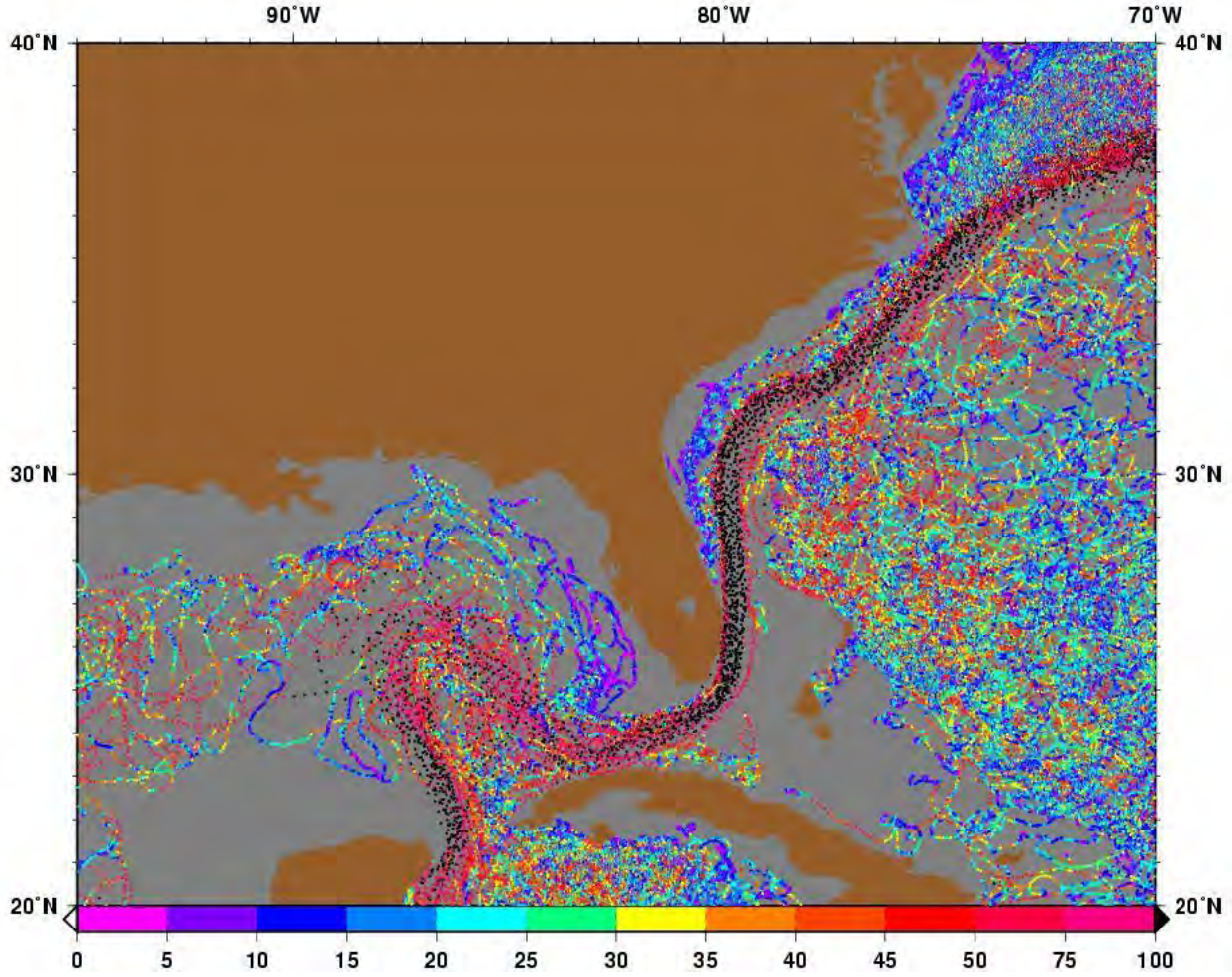


Figure 5: Spaghetti plot of the trajectories of all NOAA AOML Drifting Buoy Data Assembly Center's archived near-surface buoys from 1978 to 2003. The corresponding speeds of the trajectories are color-coded which makes the major currents visible. (https://oceancurrents.rsmas.miami.edu/caribbean/spaghetti-speed/florida.jpg)

Sea Level Change Plan Formulation Strategy

Miami-Dade and Monroe Counties are heavily involved and invested in sea level change research and searching for solutions for their counties. As such, they are members of the South East Florida Regional Climate Change Compact (SEFLRCCC). They released a unified sea level rise projection (Figure 3) in 2015 featuring three global curves adapted specifically for regional use. These curves are the median of the IPCC AR5 RCP8.5 scenario as the low boundary, the USACE High Curve as the upper boundary for short term use until 2060, and the NOAA High Curve as the uppermost boundary for medium to long term use. The USACE Intermediate/NOAA Intermediate Low Curves are shown as reference on the plot but not currently part of the SEFLRCCC guidance. Based on the SEFLRCCC guidance, the possibility of incorporating the NOAA High Curve into the plan formulation strategy has been explored.

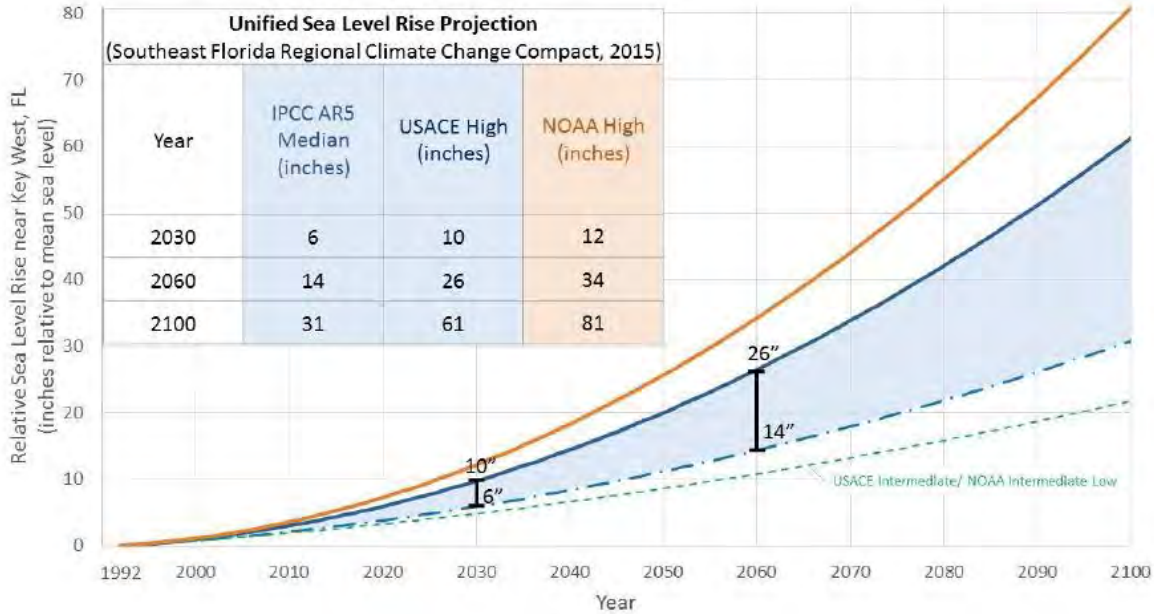


Figure 6: South East Florida Regional Climate Change Compact unified sea level rise projections

To incorporate the direct and indirect physical effects of projected future sea level change (SLC) on design, construction, operation, and maintenance of coastal projects, USACE has provided guidance in the form of Engineer Regulation, ER 1100-2-8162, and Engineer Technical Letter (ETL) 1100-2-1. Three estimates are required by the guidance; a baseline (or "low") estimate, which is based on historic sea level rise (SLR) and represents the minimum expected SLC, an intermediate estimate, and a high estimate representing the maximum expected SLC. These three curves are not only required by guidance but "hard-wired" into the Beach-fx and G2CRM models. Any rigorous assessment of additional curves within Beach-fx or G2CRM would require modifications to the software and potential re-certification prior to application. Given the scope and schedule of these feasibility studies these actions are seen as too much risk to the study schedule. As such these studies will work with the three USACE curves, formulating to one and assessing sensitivity to the other two. Additionally the study teams will work with Climate COP to develop a table-top procedure to assess sensitivity to the NOAA High Curve.

For the Vaca Key gauge the USACE Sea Level Tracker application (website) shows both the 19 year moving average and the 5 year moving average of Mean Sea Level (MSL) in Figure 4. Also shown in the figure are the USACE Low, Intermediate, and High Curves as well as the NOAA High Curve superimposed on the plot. The recent trend in both the shorter and longer term moving averages is trending above the USACE Intermediate Curve and toward the USACE High Curve. To visualize the longer planning horizon, the three USACE curves are shown in Figure 5 for Vaca Key out to 2100. In general the engineering features being considered for the back bay studies are less adaptable and must be designed considering a longer term planning horizon which includes greater uncertainty in sea level change. While soft engineering options considered for the coastal studies are more adaptable, for consistency across the region and based on sea level change trends a single unified formulation strategy is suggested. Based on all presented, the project teams recommend to formulate alternatives to the USACE High Curve and test sensitivity to the USACE Intermediate and Low Curves while working with the Climate COP to develop sensitivity tests for the NOAA High Curve.

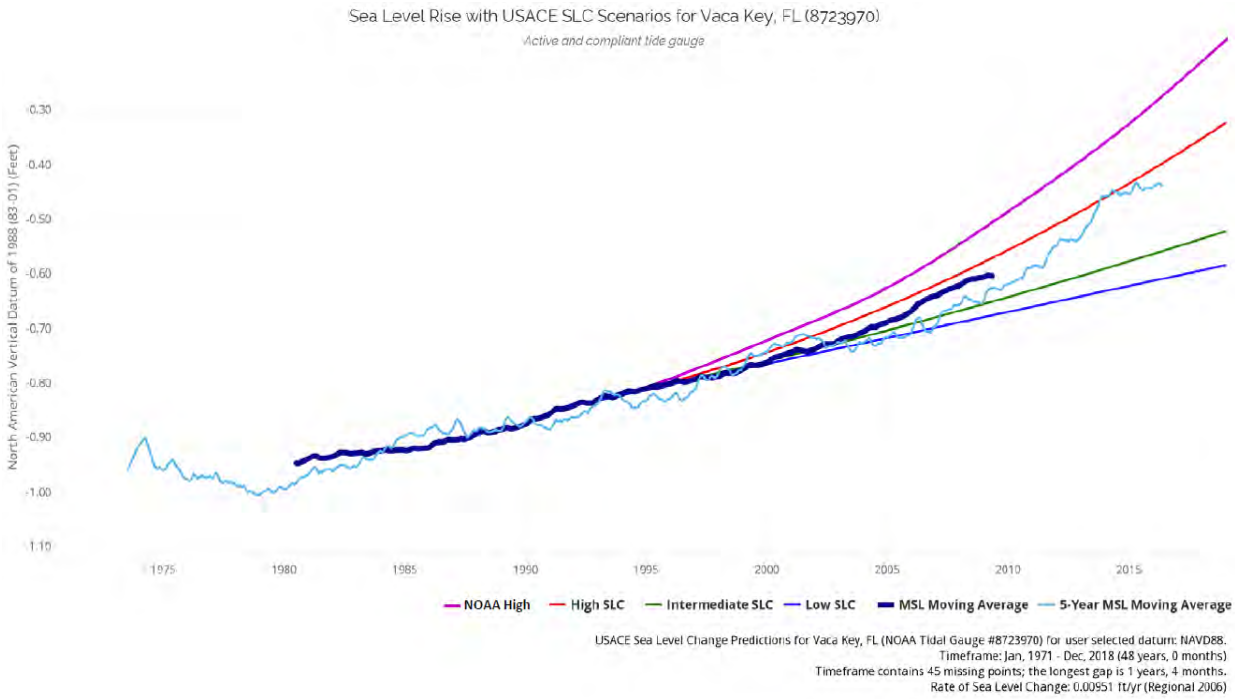


Figure 7: USACE Sea Level Tracker for Vaca Key with NOAA High Curve superimposed

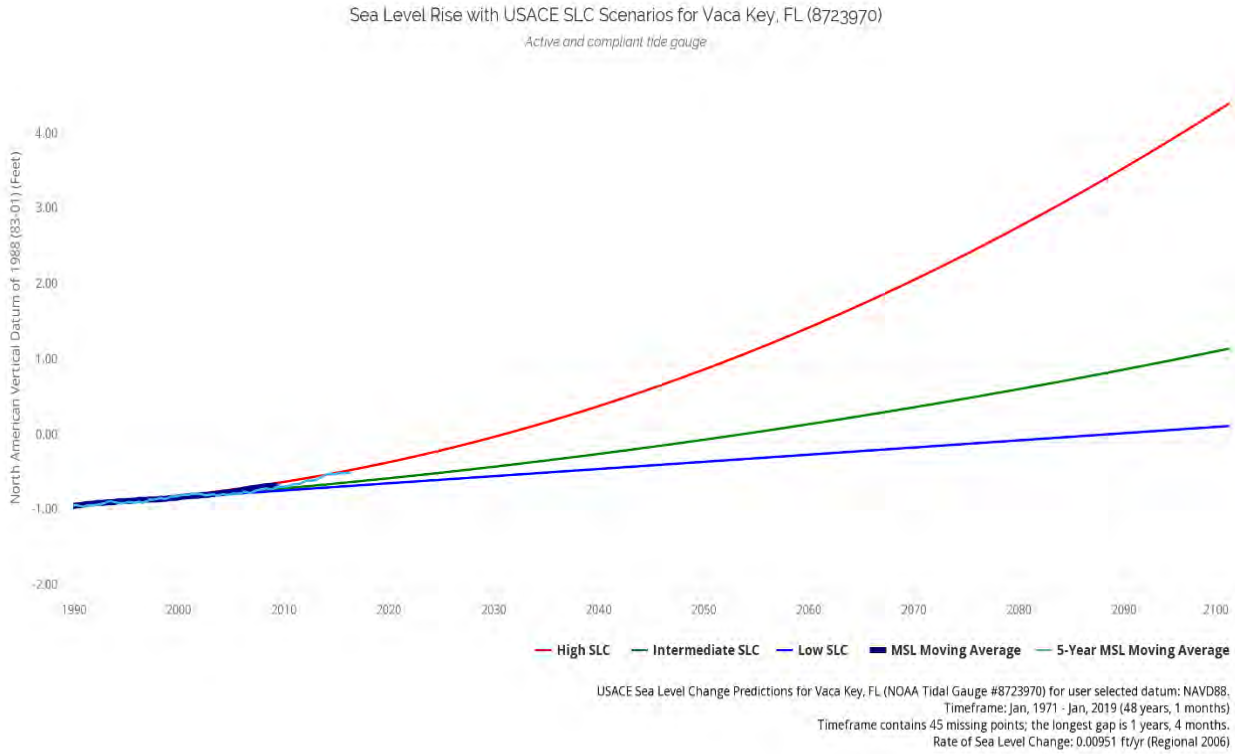


Figure 8: USACE Sea Level Tracker for Vaca Key for the long term planning horizon

Based on the conclusions described above and in accordance with ER 1100-2-8162, the plan formulation strategy in these three feasibility studies will have five broad steps:

1.) The future without project (FWOP) condition will be simulated in all three USACE SLR scenarios (low, intermediate, and high). This will allow the team to understand how future damages are likely to occur over time and space in the absence of a Federal project. The quantified FWOP will also make it possible to determine which management measures (dunes and/or nourishment, seawalls, breakwaters, etc.) could be economically viable in which planning reaches. At this stage of the formulation process, a number of measures are likely to be screened out based on the spatial and temporal distribution of damages in the three scenarios.
2.) Various management measures will be combined into project alternatives. The alternatives will be compared and evaluated based on the High USACE SLR curve.
3.) A Tentatively Selected Plan will be selected based on the alternative that maximizes net benefits in the high curve, provided it is environmentally acceptable and feasible from an engineering standpoint.
4.) The future with project (FWP) condition will be simulated, based on the TSP in all three SLR scenarios. This will provide important information about project performance and economic viability in all three scenarios. The high curve will be the basis for plan selection, but the other two will be used as important sensitivity analyses. The BCR and net benefits of the project will be reported in all three scenarios.
5.) A table top procedure will allow the team to qualitatively consider project performance and effectiveness in the NOAA High scenario. The NOAA High Curve will not be modeled.

Attachments HH&C-2 Other Data SWL 90% Confidence Limit **Miami-Dade Back Bay CSRM** March 2020

SvPt ID	Latitude (deg)	Longitude (deg)	ADCIRC node	Annual Exceedance Frequency, AEF (1/year) of Water Level (m, NAVD88)-1992									
				2	5	10	20	50	100	200	500	1,000	
443	25.7701	-80.1879	1303455	NaN	0.42	0.82	1.24	1.76	2.14	2.55	3.05	3.34	Miami River
572	25.8036	-80.1862	1526185	NaN	0.38	0.72	1.08	1.47	1.78	2.17	2.57	2.78	Edgewater
614	25.8449	-80.1734	1629089	NaN	0.40	0.73	1.06	1.44	1.72	2.00	2.33	2.53	Little River
615	25.8987	-80.1612	1629322	NaN	0.34	0.69	1.06	1.45	1.77	2.26	2.73	3.02	Arch Creek
621	25.8718	-80.1647	1637144	NaN	0.41	0.75	1.09	1.50	1.79	2.08	2.40	2.62	Biscayne

SvPt ID	Latitude (deg)	Longitude (deg)	ADCIRC node	Annual Exceedance Frequency, AEF (1/year) of Water Level (ft, NAVD88)-1992									
				2	5	10	20	50	100	200	500	1,000	
443	25.7701	-80.1879	1303455	NaN	1.39	2.70	4.06	5.78	7.00	8.35	10.01	10.95	Miami River
572	25.8036	-80.1862	1526185	NaN	1.23	2.38	3.55	4.83	5.84	7.13	8.42	9.13	Edgewater
614	25.8449	-80.1734	1629089	NaN	1.30	2.41	3.49	4.73	5.64	6.57	7.64	8.31	Little River
615	25.8987	-80.1612	1629322	NaN	1.11	2.26	3.47	4.76	5.82	7.40	8.95	9.89	Arch Creek
621	25.8718	-80.1647	1637144	NaN	1.34	2.46	3.58	4.93	5.88	6.81	7.88	8.58	Biscayne

SvPt ID	Latitude (deg)	Longitude (deg)	ADCIRC node	Annual Exceedance Frequency, AEF (1/year) of Water Level (ft, NAVD88)-2018									
				2	5	10	20	50	100	200	500	1,000	
443	25.7701	-80.1879	1303455	NaN	1.70	3.01	4.37	6.09	7.31	8.66	10.32	11.26	Miami River
572	25.8036	-80.1862	1526185	NaN	1.54	2.69	3.86	5.14	6.15	7.44	8.73	9.44	Edgewater
614	25.8449	-80.1734	1629089	NaN	1.61	2.72	3.80	5.04	5.95	6.88	7.95	8.62	Little River
615	25.8987	-80.1612	1629322	NaN	1.42	2.57	3.78	5.07	6.13	7.71	9.26	10.20	Arch Creek
621	25.8718	-80.1647	1637144	NaN	1.65	2.77	3.89	5.24	6.19	7.12	8.19	8.89	Biscayne

HH&C Section 3.6 Impacts of Sea Level Rise During Future Years Tables

Miami River Option 1 alignment Save Point 443

		USACE Low SLR Curve				USACE Intermediate SLR Curve				USACE High SLR Curve				NOAA High SLR Curve			
Annual Recurrence Interval (years)	Annual Chance of Exceedance (ACE) in %	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*
20	5	4.52	4.76	5.11	5.72	4.59	5	5.72	7.35	4.8	5.75	7.66	12.53	4.9	6.13	8.62	15.10
50	2	6.24	6.48	6.83	7.44	6.31	6.72	7.44	9.07	6.52	7.47	9.38	14.25	6.62	7.85	10.34	16.82
100	1	7.46	7.7	8.05	8.66	7.53	7.94	8.66	10.29	7.74	8.69	10.6	15.47	7.84	9.07	11.56	18.04
200	0.5	8.81	9.05	9.4	10.01	8.88	9.29	10.01	11.64	9.09	10.04	11.95	16.82	9.19	10.42	12.91	19.39

Edgewater alignment Save Point 572

		USACE Low SLR Curve				USACE Intermediate SLR Curve				USACE High SLR Curve				NOAA High SLR Curve			
Annual Recurrence Interval (years)	Annual Chance of Exceedance (ACE) in %	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*
20	5	4.01	4.25	4.6	5.21	4.08	4.49	5.21	6.84	4.29	5.24	7.15	12.02	4.39	5.62	8.11	14.59
50	2	5.29	5.53	5.88	6.49	5.36	5.77	6.49	8.12	5.57	6.52	8.43	13.30	5.67	6.9	9.39	15.87
100	1	6.3	6.54	6.89	7.50	6.37	6.78	7.5	9.13	6.58	7.53	9.44	14.31	6.68	7.91	10.4	16.88
200	0.5	7.59	7.83	8.18	8.79	7.66	8.07	8.79	10.42	7.87	8.82	10.73	15.60	7.97	9.2	11.69	18.17

Little River alignment Save Point 614

		USACE Low SLR Curve				USACE Intermediate SLR Curve				USACE High SLR Curve				NOAA High SLR Curve			
Annual Recurrence Interval (years)	Annual Chance of Exceedance (ACE) in %	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*
20	5	3.95	4.19	4.54	5.15	4.02	4.43	5.15	6.78	4.23	5.18	7.09	11.96	4.33	5.56	8.05	14.53
50	2	5.19	5.43	5.78	6.39	5.26	5.67	6.39	8.02	5.47	6.42	8.33	13.20	5.57	6.8	9.29	15.77
100	1	6.1	6.34	6.69	7.30	6.17	6.58	7.3	8.93	6.38	7.33	9.24	14.11	6.48	7.71	10.2	16.68
200	0.5	7.03	7.27	7.62	8.23	7.1	7.51	8.23	9.86	7.31	8.26	10.17	15.04	7.41	8.64	11.13	17.61

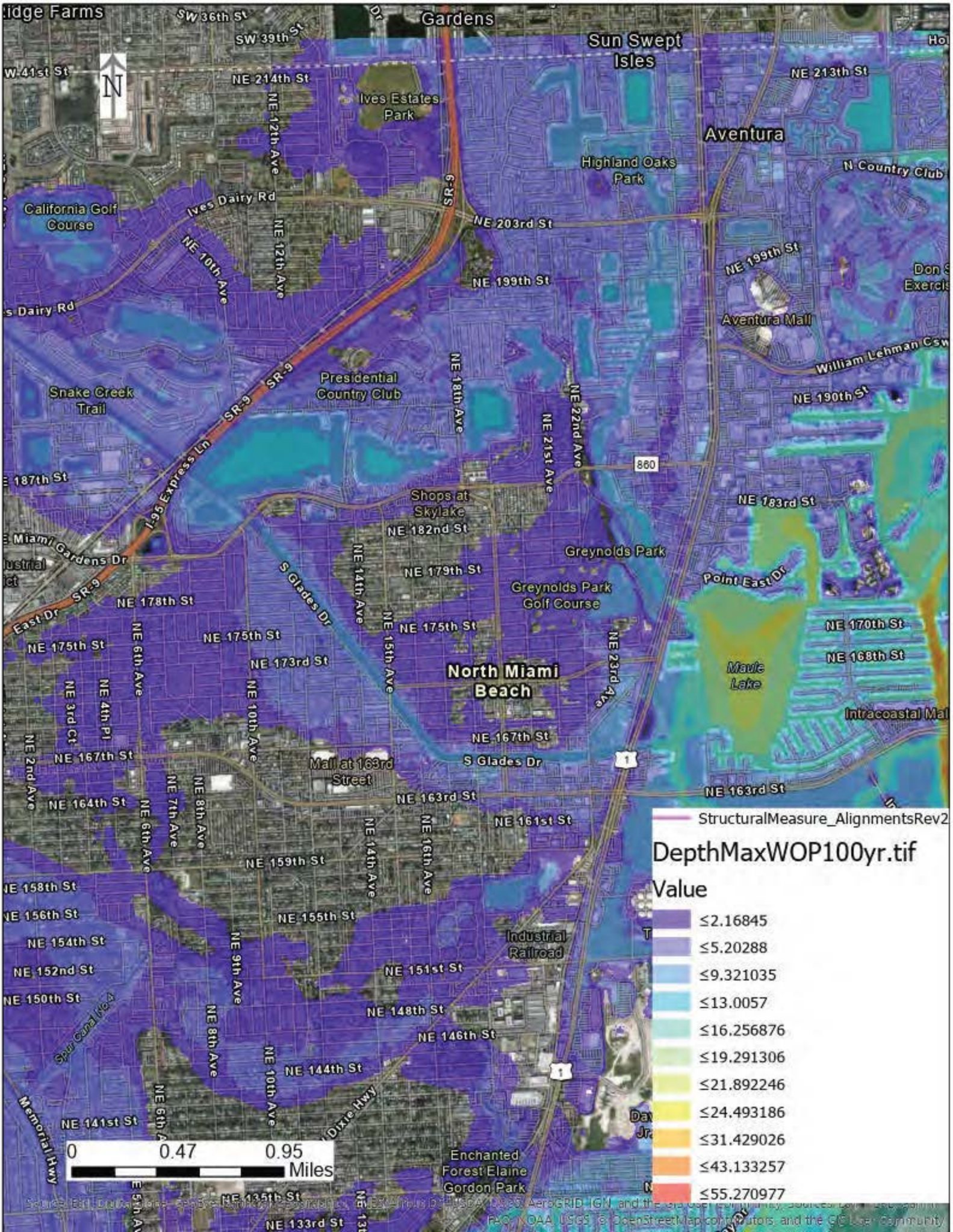
Biscayne alignment Save Point 621

		USACE Low SLR Curve				USACE Intermediate SLR Curve				USACE High SLR Curve				NOAA High SLR Curve			
Annual Recurrence Interval (years)	Annual Chance of Exceedance (ACE) in %	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*
20	5	4.04	4.28	4.63	5.24	4.11	4.52	5.24	6.87	4.32	5.27	7.18	12.05	4.42	5.65	8.14	14.62
50	2	5.39	5.63	5.98	6.59	5.46	5.87	6.59	8.22	5.67	6.62	8.53	13.40	5.77	7	9.49	15.97
100	1	6.34	6.58	6.93	7.54	6.41	6.82	7.54	9.17	6.62	7.57	9.48	14.35	6.72	7.95	10.44	16.92
200	0.5	7.27	7.51	7.86	8.47	7.34	7.75	8.47	10.10	7.55	8.50	10.41	15.28	7.65	8.88	11.37	17.85

Arch Creek alignment Save Point 615

		USACE Low SLR Curve				USACE Intermediate SLR Curve				USACE High SLR Curve				NOAA High SLR Curve			
Annual Recurrence Interval (years)	Annual Chance of Exceedance (ACE) in %	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*	**2030** 90CL Frequency SWL incl SLR in feet Navd88*	**2050** 90CL Frequency SWL incl SLR in feet Navd88*	**2079** 90CL Frequency SWL incl SLR in feet Navd88*	**2130** 90CL Frequency SWL incl SLR in feet Navd88*
20	5	3.93	4.17	4.52	5.13	4.00	4.41	5.13	6.76	4.21	5.16	7.07	11.94	4.31	5.54	8.03	14.51
50	2	5.22	5.46	5.81	6.42	5.29	5.70	6.20	8.05	5.50	6.45	8.36	13.23	5.60	6.83	9.32	15.80
100	1	6.28	6.52	6.87	7.48	6.35	6.76	7.26	9.11	6.56	7.51	9.42	14.29	6.66	7.89	10.38	16.86
200	0.5	7.86	8.10	8.45	9.06	7.93	8.34	8.84	10.69	8.14	9.09	11.00	15.87	8.24	9.47	11.96	18.44

Maximum Depth Maps for the year 2079 1% AEP SWL tailwater conditions Without Project and Without Precipitation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Gardens
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Presidential Country Club
Snake Creek Trail
Aventura Mall
Shops at Skylake
Greynolds Park
Greynolds Park Golf Course
North Miami Beach
Maule Lake
Mall at 163rd Street
Industrial Railroad
Enchanted Forest Elaine Gordon Park
NE 214th St
NE 213th St
NE 203rd St
NE 199th St
NE 190th St
NE 183rd St
NE 182nd St
NE 179th St
NE 178th St
NE 175th St
NE 173rd St
NE 170th St
NE 168th St
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NE 133rd St
SW 36th St
SW 39th St
SW 41st St
Ives Dairy Rd
NE 10th Ave
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NE 18th Ave
NE 21st Ave
NE 22nd Ave
NE 14th Ave
NE 15th Ave
NE 23rd Ave
NE 6th Ave
NE 7th Ave
NE 8th Ave
NE 9th Ave
NE 16th Ave
NE 3rd Ct
NE 4th Pl
NE 2nd Ave
S Glades Dr
Point East Dr
William Lehman Csw
Miami Gardens Dr
East Dr
Dixie Hwy
Memorial Hwy
Spur Canal No. 4
I-95 Express Ln
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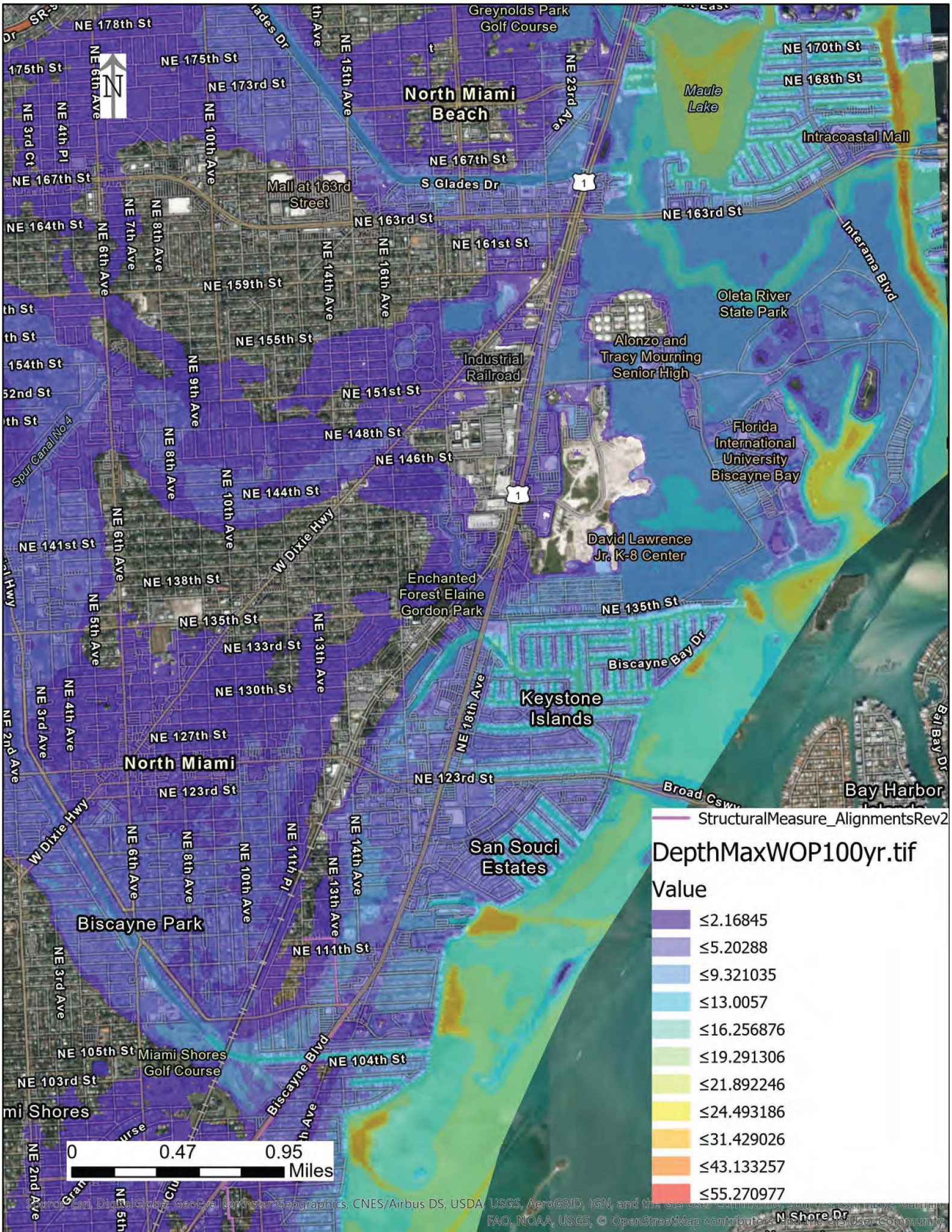
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Intracoastal Mall
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Oleta River State Park
Alonzo and Tracy Mourning Senior High
Industrial Railroad
Florida International University Biscayne Bay
David Lawrence Jr. K-8 Center
Enchanted Forest Elaine Gordon Park
Keystone Islands
North Miami
San Souci Estates
Biscayne Park
Miami Shores Golf Course
Bay Harbor
NE 178th St
NE 175th St
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NE 159th St
NE 155th St
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Biscayne Blvd
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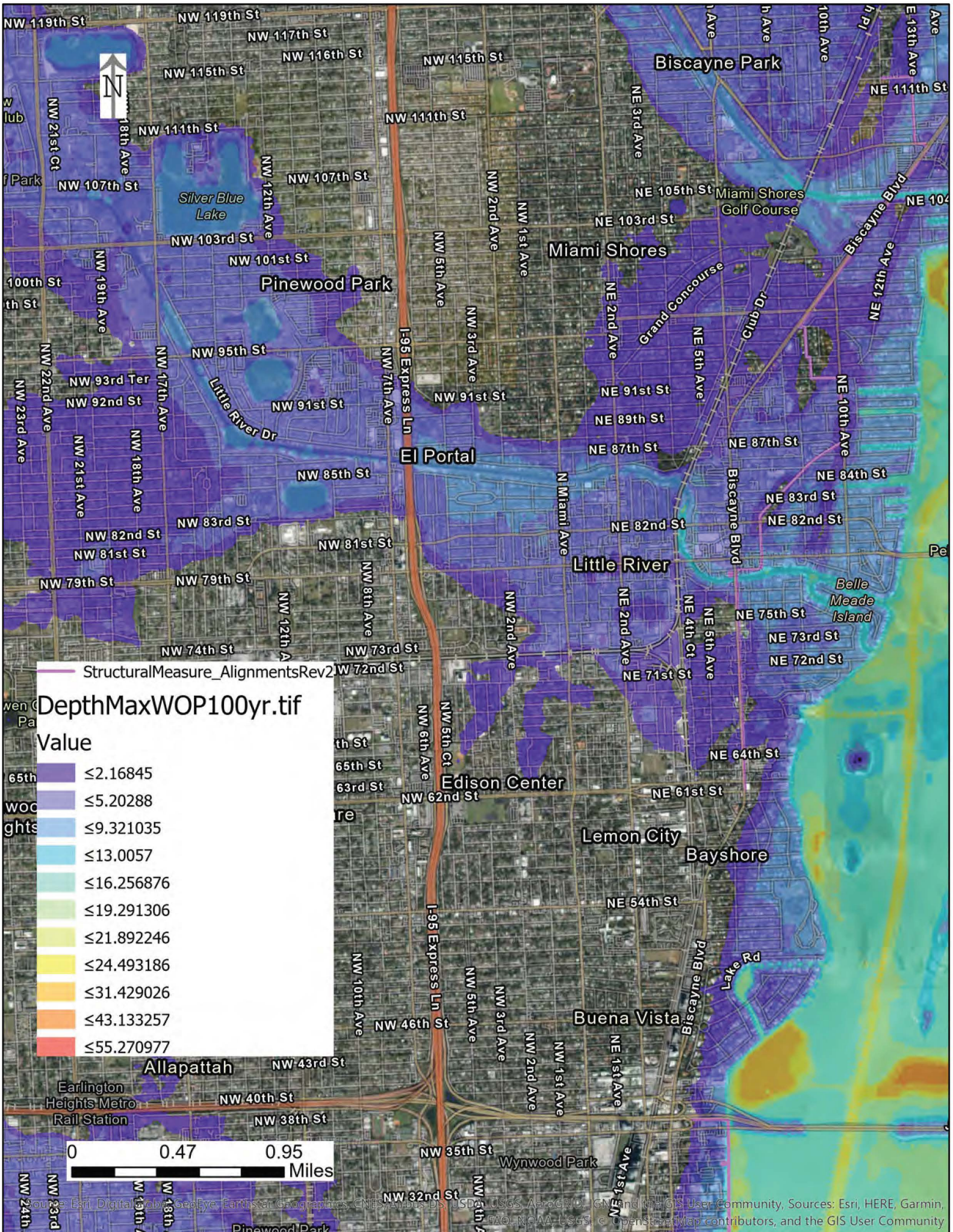
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Miles
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El Portal
Little River
Belle Meade Island
Edison Center
Lemon City
Bayshore
Buena Vista
Allapattah
Earlington Heights Metro Rail Station
Wynwood Park
I-95 Express Ln
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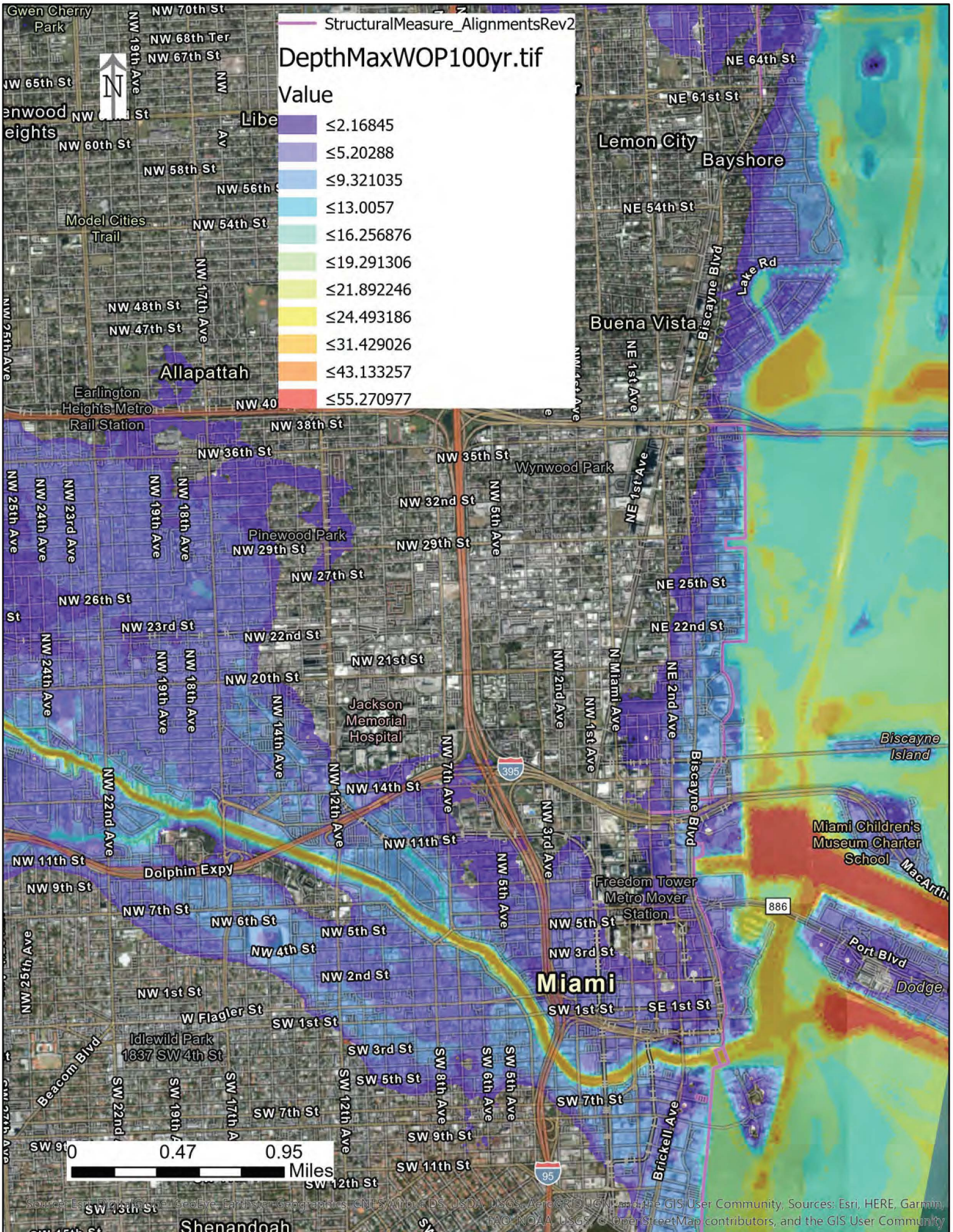
NE 5th Ave
NE 4th Ct
NE 10th Ave
NE 12th Ave
NE 13th Ave
NW 8th Ave
NW 6th Ave
NW 5th Ct
NW 10th Ave
NE 1st Ave
Little River Dr
Grand Concourse
Club Dr
Biscayne Blvd
N Miami Ave
Lake Rd
Source: Esri, Digital Globe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community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NW 17th Ave
Model Cities Trail
Allapattah
Earlington Heights Metro Rail Station
NW 38th St
NW 36th St
NW 35th St
Wynwood Park
NE 64th St
NE 61st St
Lemon City
Bayshore
NE 54th St
Biscayne Blvd
Lake Rd
Buena Vista
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NW 25th Ave
NW 24th Ave
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NW 19th Ave
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NW 32nd St
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Pinewood Park
NW 29th St
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NE 25th St
NW 26th St
NW 23rd St
NW 22nd St
NE 22nd St
NW 21st St
NW 20th St
NW 14th Ave
Jackson Memorial Hospital
NW 2nd Ave
NW 1st Ave
N Miami Ave
NE 2nd Ave
Biscayne Island
395
NW 7th Ave
NW 12th Ave
NW 14th St
NW 22nd Ave
NW 11th St
NW 3rd Ave
Miami Children's Museum Charter School
MacArthur
Dolphin Expy
NW 9th St
NW 7th St
NW 6th St
NW 5th St
NW 4th St
NW 2nd St
NW 1st St
Freedom Tower Metro Mover Station
886
Port Blvd
Dodge
Miami
SW 1st St
SE 1st St
W Flagler St
Idlewild Park 1837 SW 4th St
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Shenandoah
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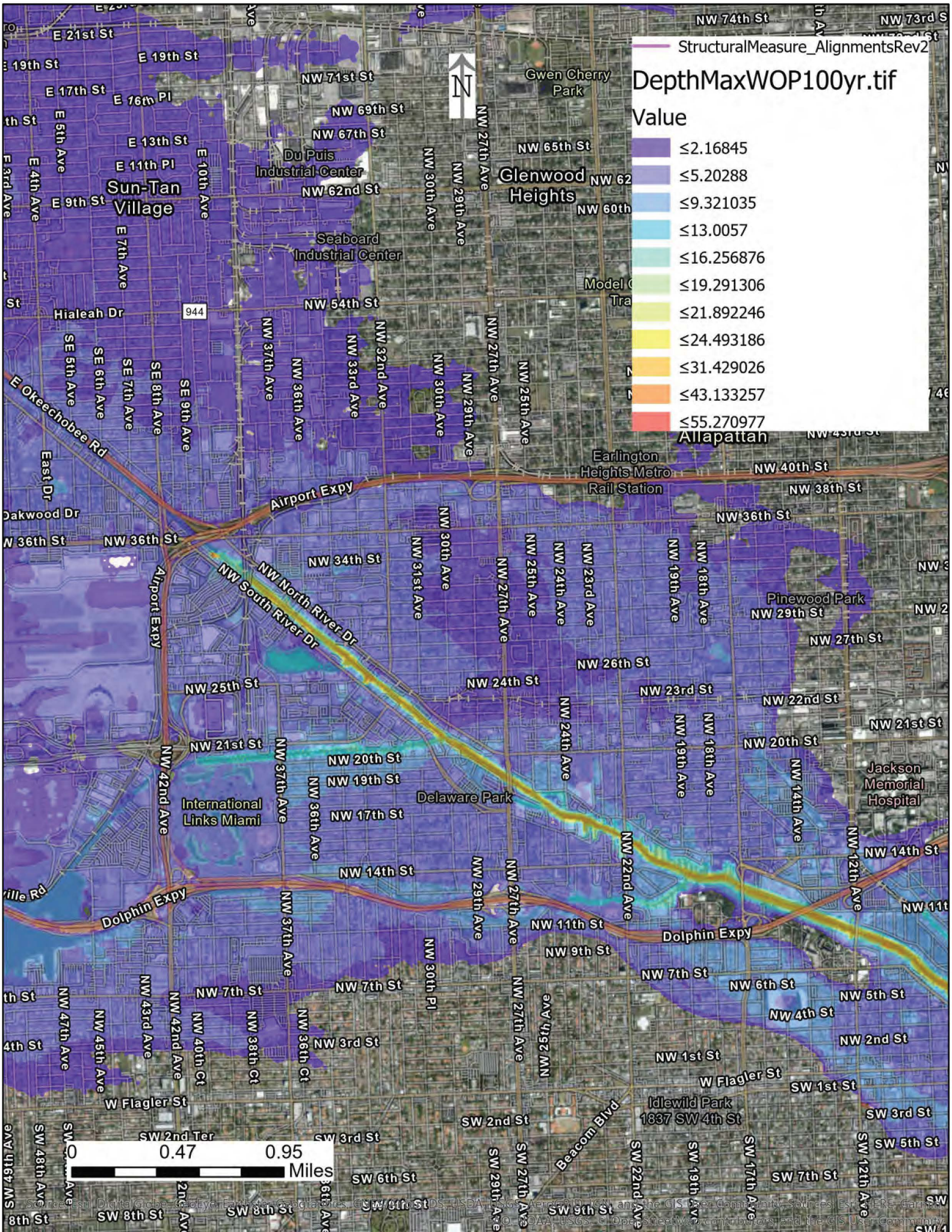
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Seaboard Industrial Center
Glenwood Heights
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Pinewood Park
Jackson Memorial Hospital
Delaware Park
International Links Miami
Idlewild Park
1837 SW 4th St
E Okeechobee Rd
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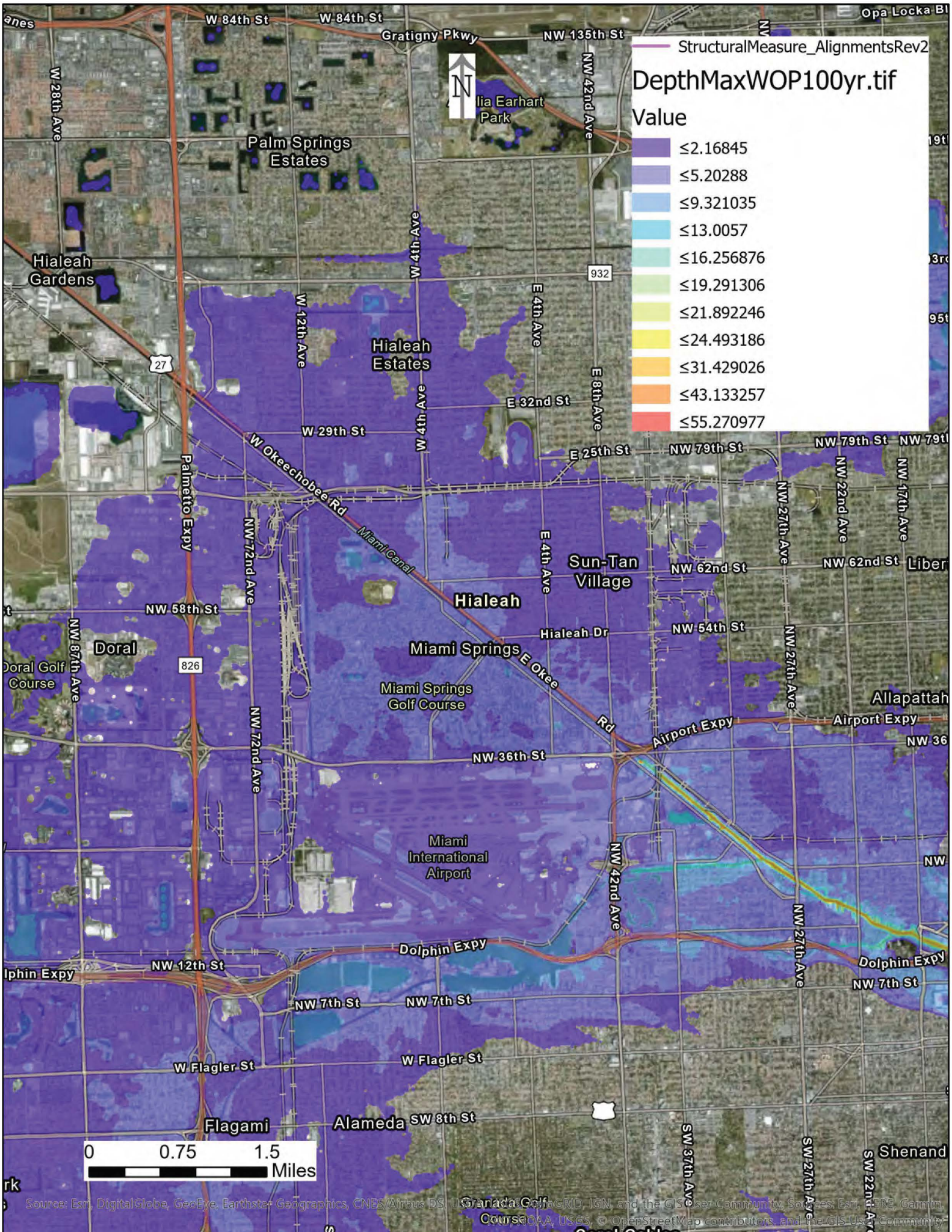
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Gratigny Pkwy
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Opa Locka Bl
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NW 42nd Ave
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W 4th Ave
932
W 12th Ave
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Hialeah Estates
27
E 8th Ave
E 32nd St
W 29th St
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Doral
826
Miami Springs
E Okee Rd
Miami Springs Golf Course
Allapattah
Airport Expy
NW 36th St
Miami International Airport
Dolphin Expy
NW 12th St
NW 7th St
W Flagler St
Flagami
Alameda
SW 8th St
SW 37th Ave
SW 27th Ave
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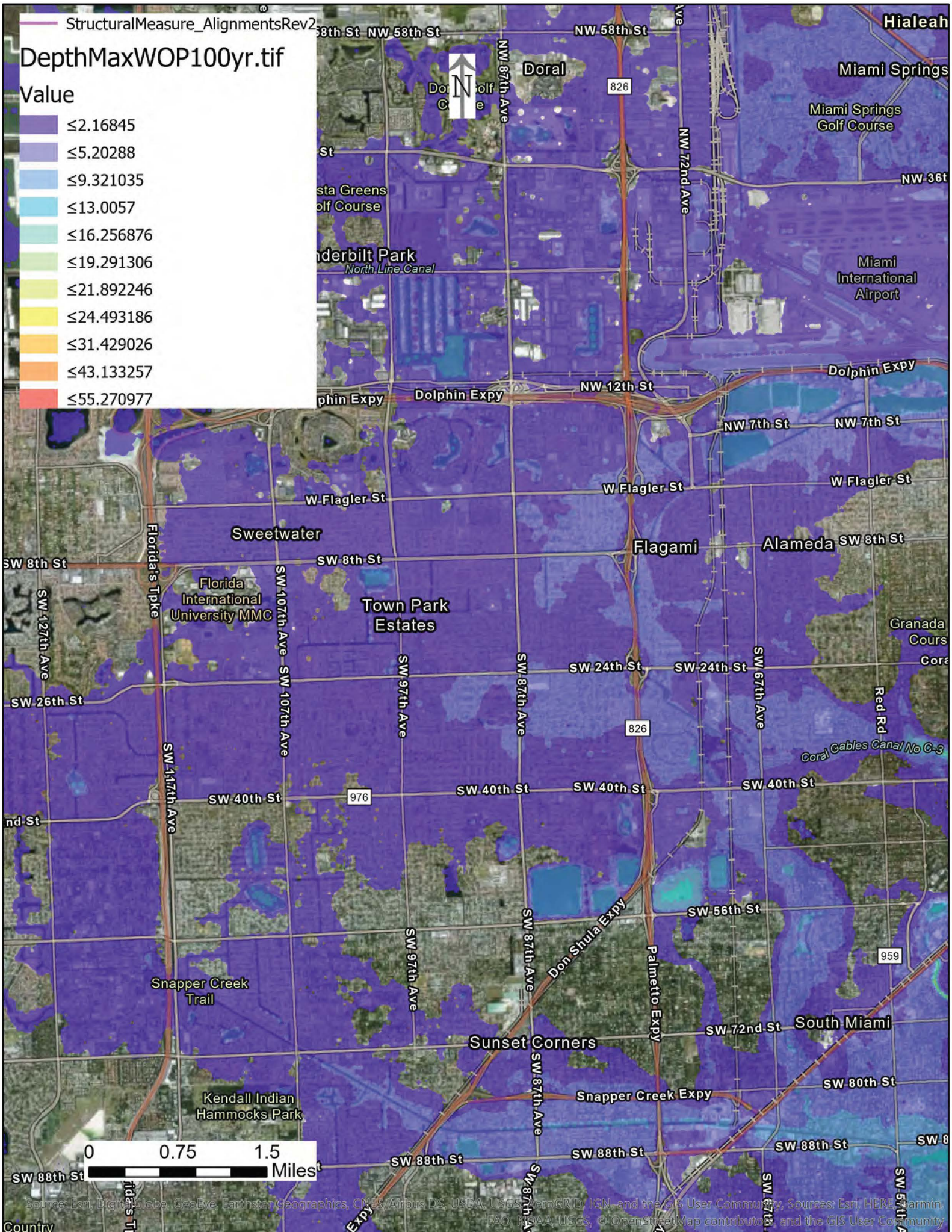
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community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Doral
Miami Springs
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NW 36t
North Line Canal
Dolphin Expy
NW 12th St
NW 7th St
W Flagler St
Sweetwater
Flagami
Alameda
SW 8th St
Florida's Tpke
Florida International University MMC
Town Park Estates
Granada Cours
SW 127th Ave
SW 107th Ave
SW 97th Ave
SW 87th Ave
SW 24th St
SW 67th Ave
Red Rd
SW 26th St
Coral Gables Canal No C-3
SW 117th Ave
SW 40th St
976
826
SW 56th St
Don Shula Expy
Palmetto Expy
959
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South Miami
Sunset Corners
SW 80th St
Snapper Creek Expy
Kendall Indian Hammocks Park
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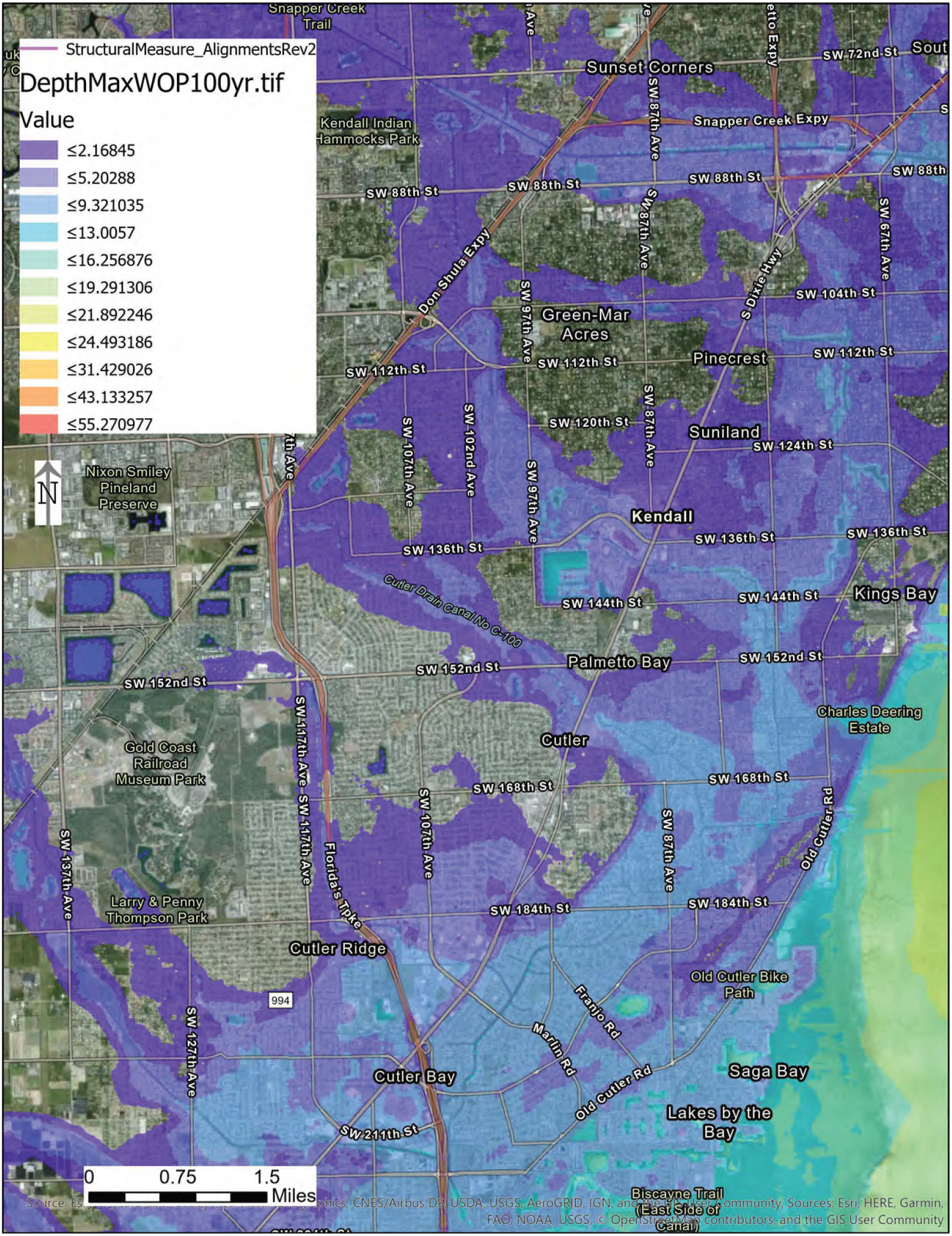
Miles
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community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Snapper Creek Trail
Sunset Corners
SW 72nd St
Kendall Indian Hammocks Park
Snapper Creek Expy
SW 87th Ave
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Don Shula Expy
SW 97th Ave
Green-Mar Acres
S Dixie Hwy
SW 104th St
SW 67th Ave
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Pinecrest
SW 120th St
Suniland
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Kendall
SW 136th St
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SW 144th St
Kings Bay
Palmetto Bay
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Charles Deering Estate
Cutler
Gold Coast Railroad Museum Park
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Larry & Penny Thompson Park
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Lakes by the Bay
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Biscayne Trail (East Side of Canal)
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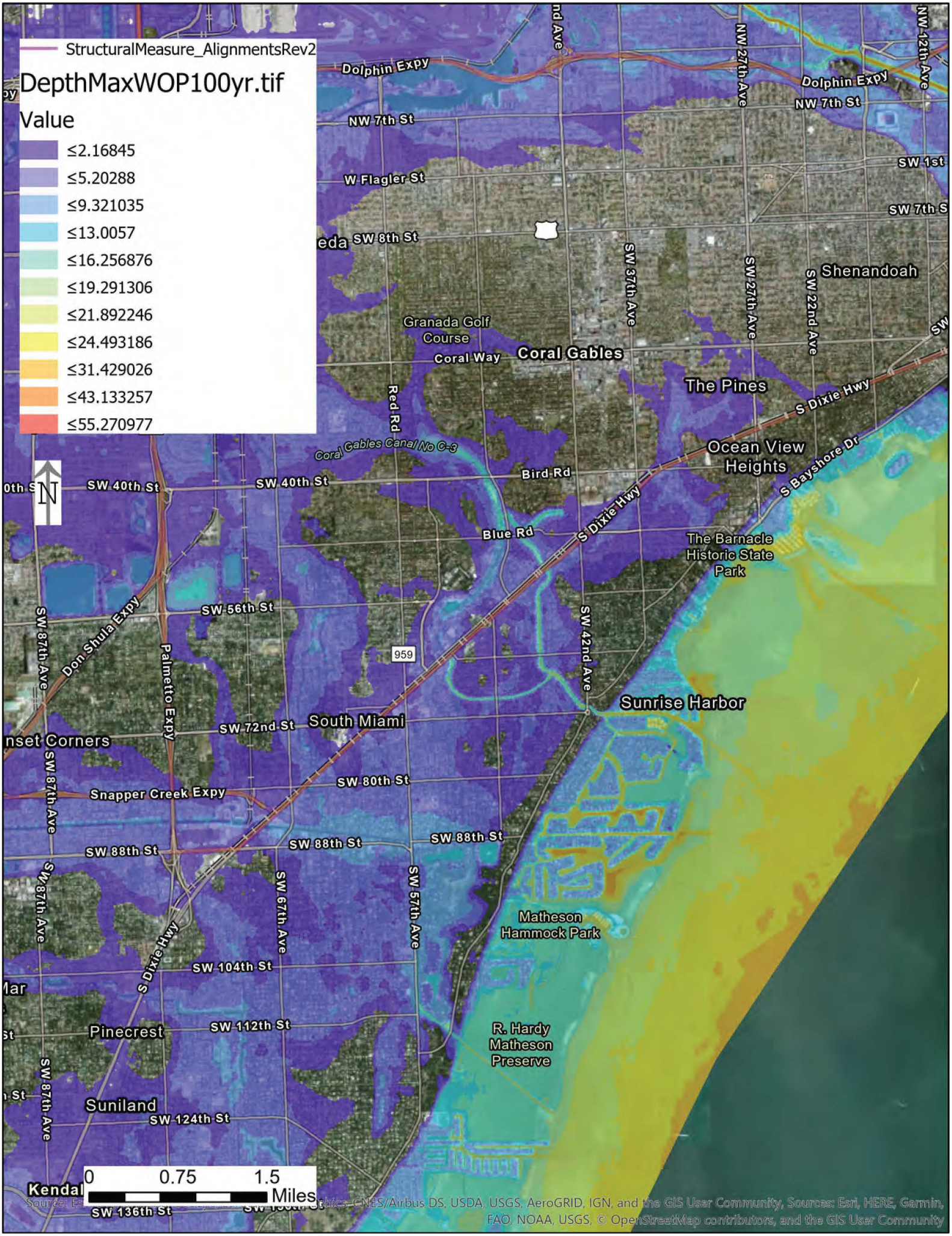
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Granada Golf Course
Coral Way
Coral Gables
The Pines
S Dixie Hwy
Red Rd
Coral Gables Canal No C-3
Ocean View Heights
S Bayshore Dr
Bird Rd
SW 40th St
Blue Rd
The Barnacle Historic State Park
SW 56th St
Don Shula Expy
Palmetto Expy
959
SW 42nd Ave
Sunrise Harbor
SW 72nd St
South Miami
SW 80th St
Snapper Creek Expy
SW 88th St
SW 87th Ave
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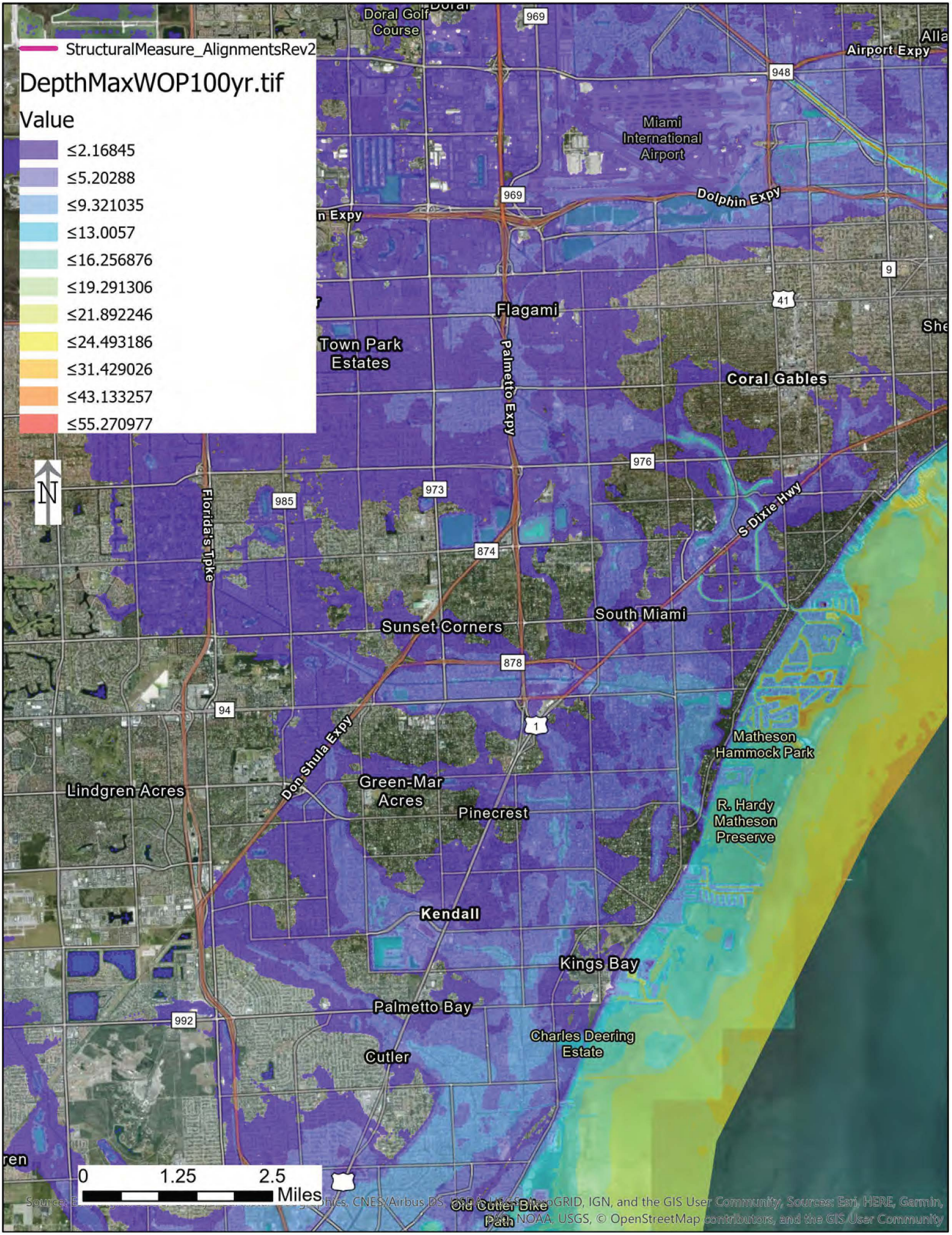
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Airport Expy
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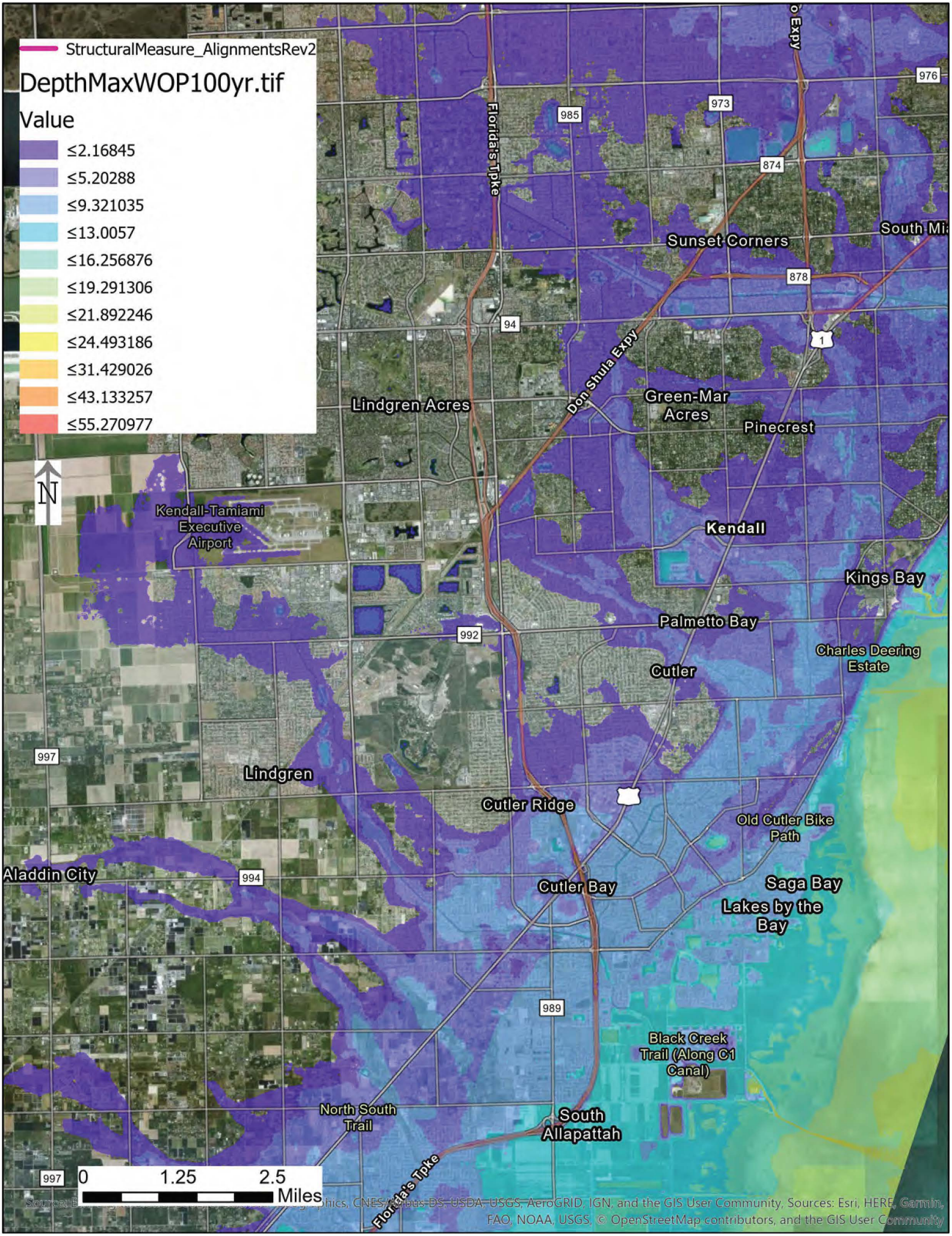
Town Park Estates
Palmetto Expy
Coral Gables
976
973
985
874
S Dixie Hwy
Florida's Tpke
South Miami
Sunset Corners
878
94
1
Don Shula Expy
Matheson Hammock Park
Lindgren Acres
Green-Mar Acres
Pinecrest
R. Hardy Matheson Preserve
Kendall
Kings Bay
Palmetto Bay
992
Charles Deering Estate
Cutler
0
1.25
2.5
Miles
Old Cutler Bike Path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N
Florida's Tpke
Don Shula Expy
976
973
985
874
878
94
1
992
997
994
989
997
Sunset Corners
South Mi
Lindgren Acres
Green-Mar Acres
Pinecrest
Kendall-Tamiami Executive Airport
Kendall
Kings Bay
Palmetto Bay
Charles Deering Estate
Cutler
Lindgren
Cutler Ridge
Old Cutler Bike Path
Aladdin City
Cutler Bay
Saga Bay
Lakes by the Bay
Black Creek Trail (Along C1 Canal)
North South Trail
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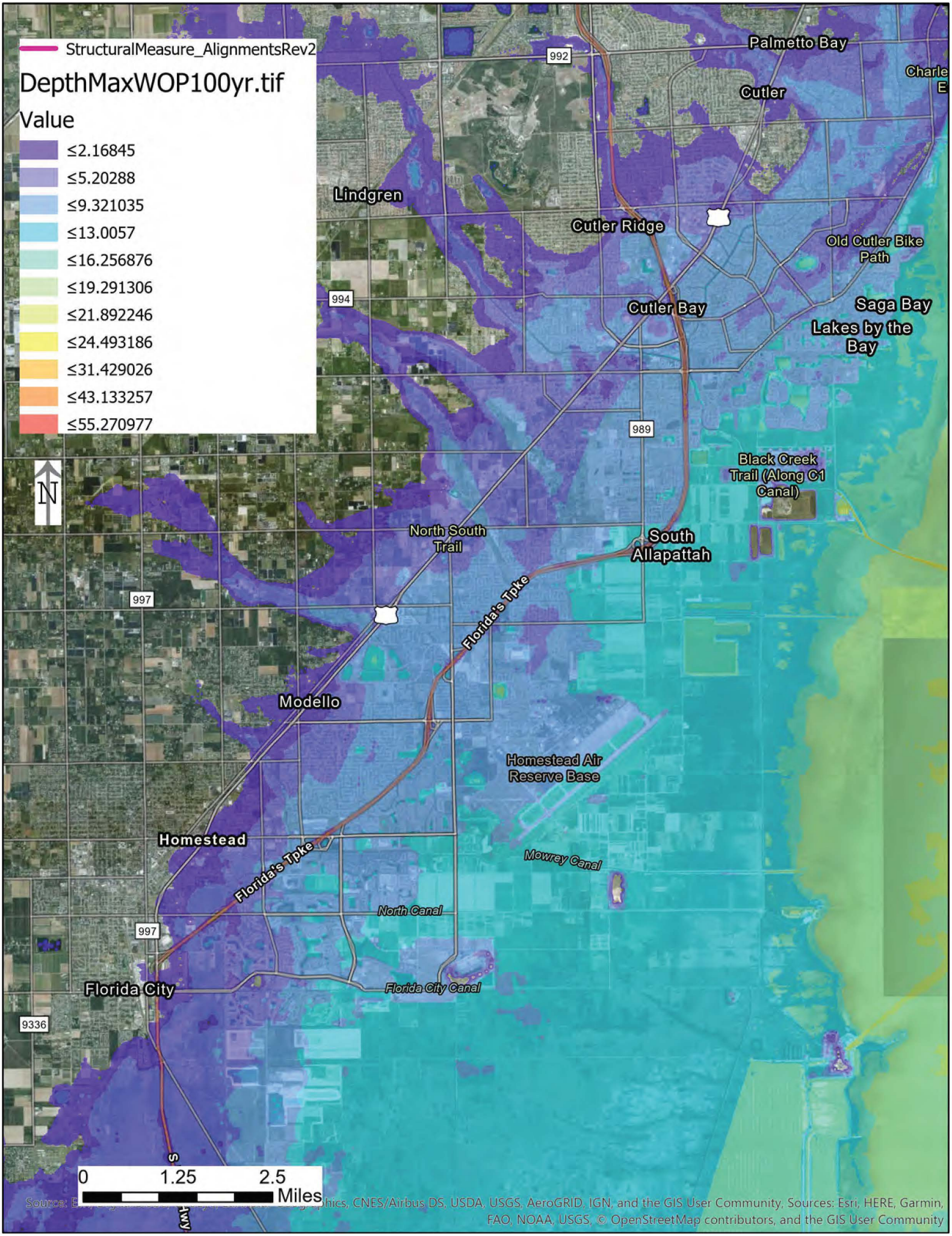
0
1.25
2.5
Miles
Source: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community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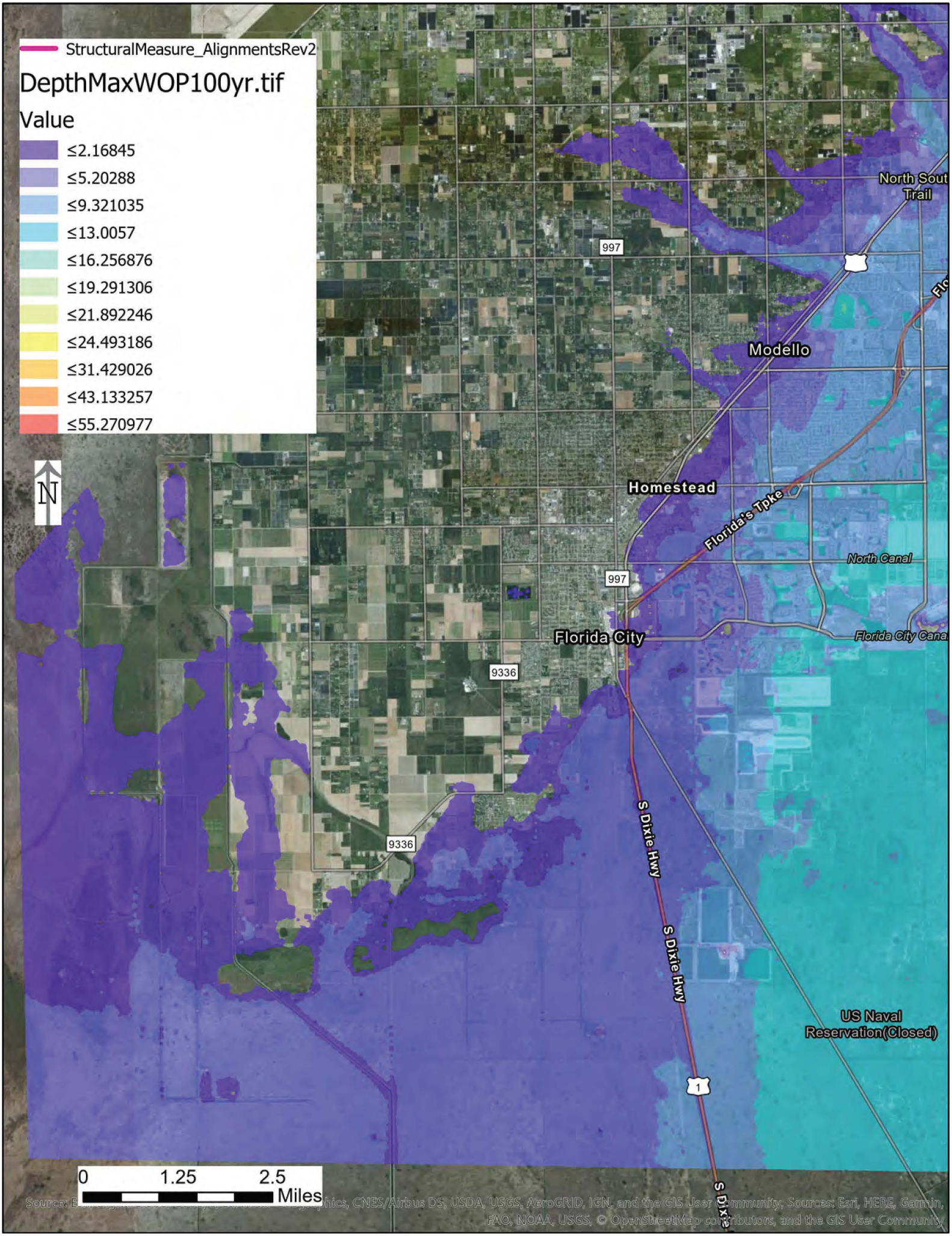
N
Palmetto Bay
Cutler
Lindgren
Cutler Ridge
Old Cutler Bike Path
Cutler Bay
Saga Bay
Lakes by the Bay
Black Creek Trail (Along C1 Canal)
North South Trail
South Allapattah
Florida's Tpke
Modello
Homestead Air Reserve Base
Homestead
Mowrey Canal
North Canal
Florida City
Florida City Canal
992
994
989
997
9336
0
1.25
2.5
Miles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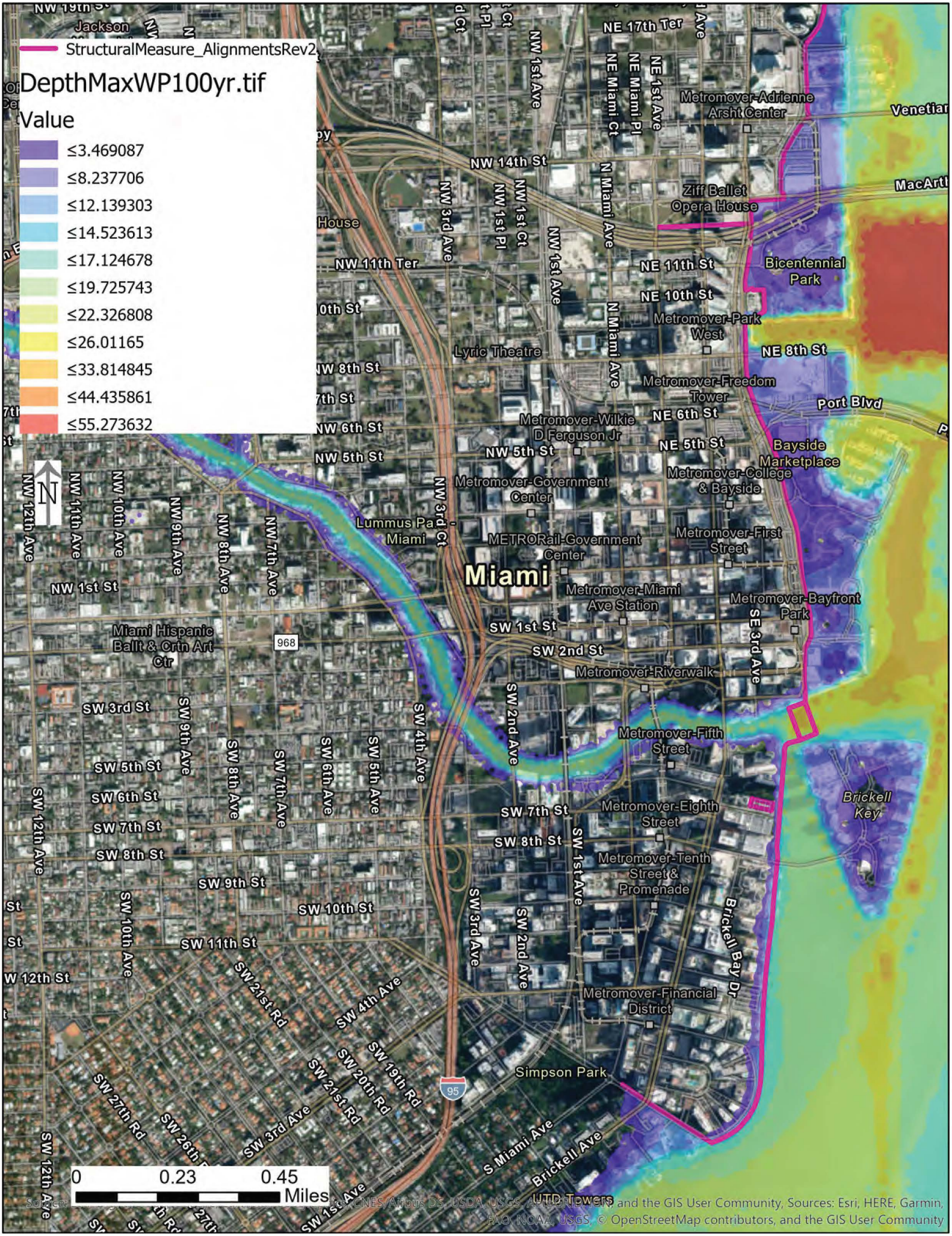
≤55.270977
N
North Sout
Trail
997
Modello
Homestead
Florida's Tpke
North Canal
997
Florida City
Florida City Cana
9336
9336
S Dixie Hwy
S Dixie Hwy
US Naval
Reservation(Closed)
1
0
1.25
2.5
Miles

Maximum Depth Maps for the year 2079 1% AEP SWL tailwater conditions With Project and Without Precipitation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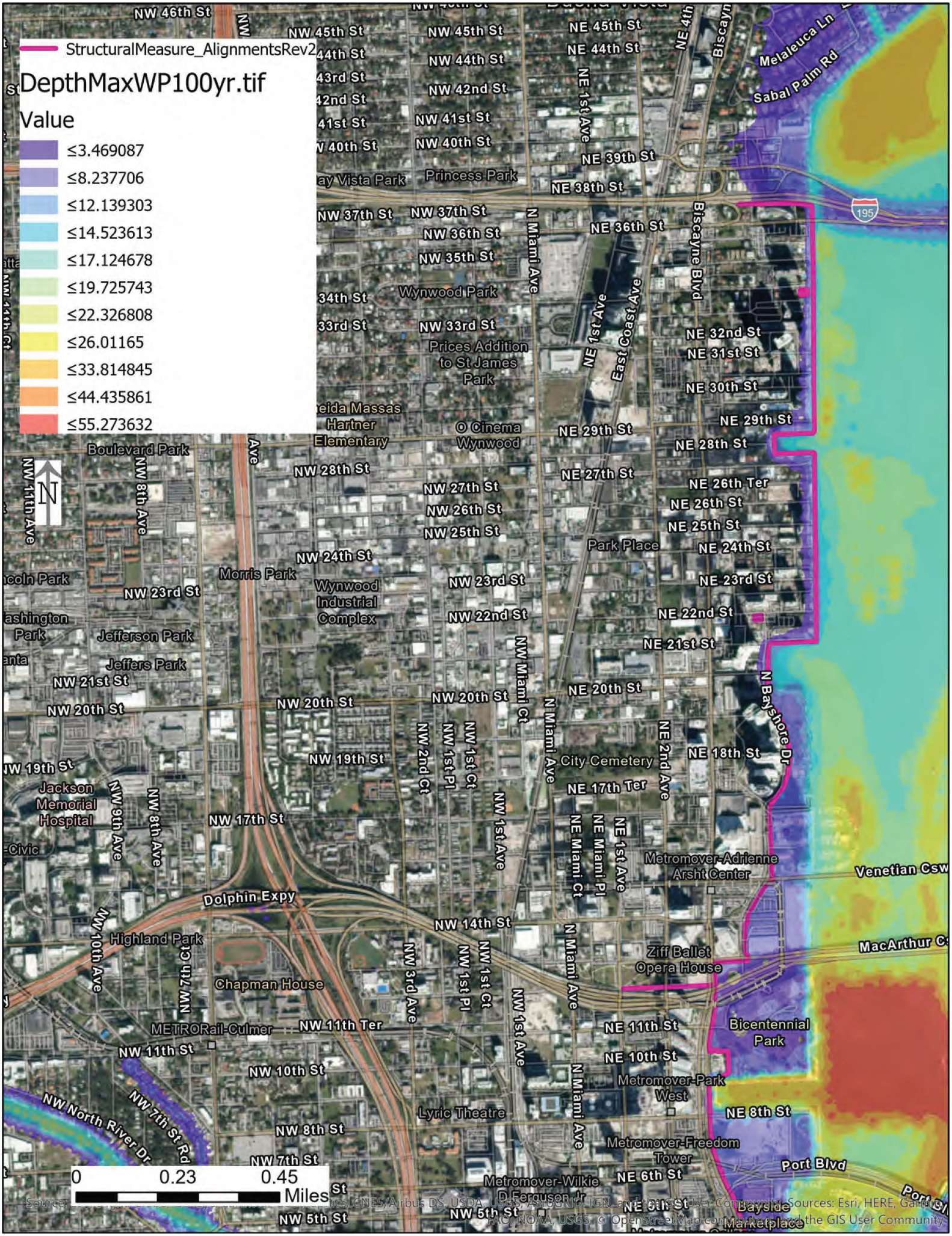
≤44.435861
≤55.273632
N
0
0.23
0.45
Miles
Miami
NW 19th St
Jackson
NE 17th Ter
NW 1st Ave
NE Miami Ct
NE Miami Pl
NE 1st Ave
Metromover-Adrienne Arsht Center
Venetian
NW 14th St
N Miami Ave
Ziff Ballet Opera House
MacArth
NW 3rd Ave
NW 1st Pl
NW 1st Ct
NW 11th Ter
NE 11th St
Bicentennial Park
NE 10th St
Metromover-Park West
Lyric Theatre
NE 8th St
NW 8th St
Metromover-Freedom Tower
Port Blvd
NW 6th St
Metromover-Wilkie D Ferguson Jr
NE 6th St
NW 5th St
NE 5th St
Bayside Marketplace
Metromover-College & Bayside
Metromover-Government Center
NW 3rd Ct
Lummus Pa - Miami
METRORail-Government Center
Metromover-First Street
NW 12th Ave
NW 11th Ave
NW 10th Ave
NW 9th Ave
NW 8th Ave
NW 7th Ave
NW 1st St
Metromover-Miami Ave Station
Metromover-Bayfront Park
SW 1st St
SE 3rd Ave
Miami Hispanic Ballt & Crtn Art Ctr
968
SW 2nd St
Metromover-Riverwalk
SW 3rd St
SW 2nd Ave
SW 9th Ave
SW 4th Ave
Metromover-Fifth Street
SW 5th St
SW 8th Ave
SW 7th Ave
SW 6th Ave
SW 5th Ave
SW 6th St
SW 7th St
Metromover-Eighth Street
Brickell Key
SW 7th St
SW 8th St
SW 1st Ave
Metromover-Tenth Street & Promenade
SW 12th Ave
SW 9th St
SW 10th St
SW 10th Ave
SW 11th St
SW 3rd Ave
SW 2nd Ave
Brickell Bay Dr
SW 12th St
SW 21st Rd
SW 4th Ave
Metromover-Financial District
SW 19th Rd
SW 20th Rd
SW 21st Rd
Simpson Park
95
SW 27th Rd
SW 26th
SW 3rd Ave
S Miami Ave
Brickell Ave
SW 12th Ave
UTD Towers
SW 1st Ave
CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community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≤44.435861
≤55.273632
N
0
0.23
0.45
Miles
NW 46th St
NW 45th St
NW 44th St
NW 43rd St
NW 42nd St
NW 41st St
NW 40th St
NE 45th St
NE 44th St
NE 39th St
NE 38th St
NW 37th St
NW 36th St
NW 35th St
NW 33rd St
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NE 32nd St
NE 31st St
NE 30th St
NE 29th St
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NW 11th St
NW 10th St
NW 8th St
NW 7th St
NW 5th St
NE 11th St
NE 10th St
NE 8th St
NE 6th St
NE 5th St
Melaleuca Ln
Sabal Palm Rd
Biscayne
Biscayne Blvd
N Miami Ave
NE 1st Ave
East Coast Ave
NW 1st Ave
NW Miami Ct
N Miami Ave
NE Miami Ct
NE Miami Pl
NE 2nd Ave
NW 2nd Ct
NW 1st Pl
NW 1st Ct
NW 3rd Ave
NW 7th Ct
NW 7th Ln
NW 9th Ave
NW 8th Ave
NW 10th Ave
NW 11th Ave
NW 7th St Rd
NW North River Dr
N Bayshore Dr
Venetian Csw
MacArthur C
Dolphin Expy
195
Princess Park
Wynwood Park
Prices Addition to St James Park
Hartner Elementary
O Cinema Wynwood
Boulevard Park
Morris Park
Wynwood Industrial Complex
Jefferson Park
Jeffers Park
Jackson Memorial Hospital
Highland Park
Chapman House
METRORail-Culmer
Lyric Theatre
City Cemetery
Park Place
Metromover-Adrienne Arsht Center
Ziff Ballet Opera House
Bicentennial Park
Metromover-Park West
Metromover-Freedom Tower
Metromover-Wilkie D Ferguson Jr
Port Blvd
Bayside Marketplace
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
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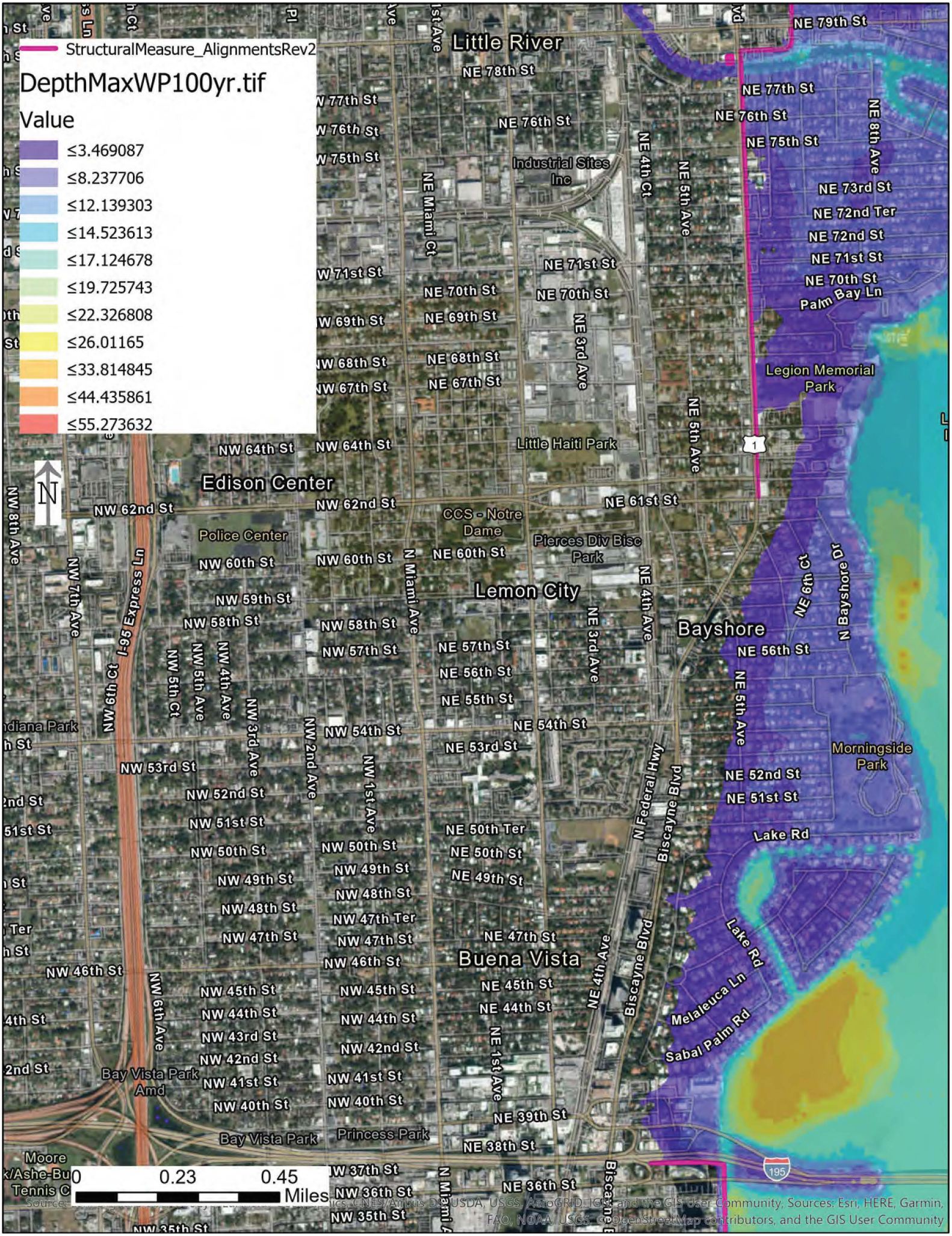
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≤26.01165
≤33.814845
≤44.435861
≤55.273632
N
Little River
Industrial Sites Inc
Legion Memorial Park
Little Haiti Park
Edison Center
Police Center
CCS - Notre Dame
Pierces Div Bisc Park
Lemon City
Bayshore
Morningside Park
Buena Vista
Bay Vista Park Amd
Bay Vista Park
Princess Park
Moore
Tennis C
NE 79th St
NE 78th St
NE 77th St
NE 76th St
NE 75th St
NE 73rd St
NE 72nd Ter
NE 72nd St
NE 71st St
NE 70th St
Palm Bay Ln
NW 77th St
NW 76th St
NW 75th St
NW 71st St
NW 69th St
NW 68th St
NW 67th St
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NE 61st St
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NW 35th St
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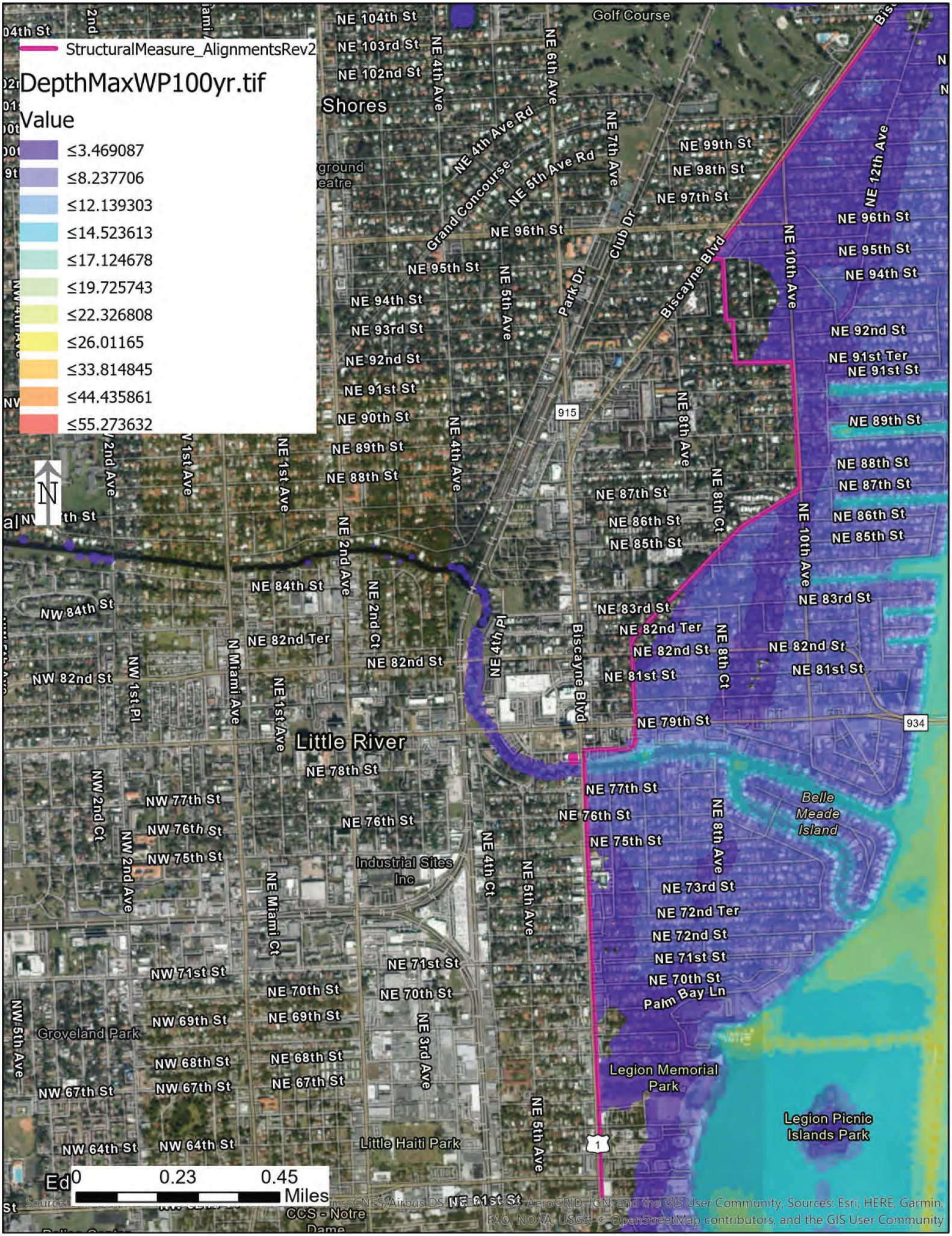
NE 4th Ct
NE 5th Ave
NE 3rd Ave
NE 4th Ave
NE 6th Ct
N Bayshore Dr
NE 1st Ave
N Miami Ct
N Miami Ave
NW 8th Ave
NW 7th Ave
I-95 Express Ln
NW 6th Ct
NW 5th Ct
NW 5th Ave
NW 4th Ave
NW 3rd Ave
NW 2nd Ave
NW 1st Ave
NW 6th Ave
N Federal Hwy
Biscayne Blvd
Lake Rd
Melaleuca Ln
Sabal Palm Rd
1
195
0 0.23 0.45 Miles
Source: ics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, OpenStreetMap contributors, and the GIS User Community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≤26.01165
≤33.814845
≤44.435861
≤55.273632
N
0 0.23 0.45 Miles
Golf Course
Shores
Little River
Industrial Sites Inc
Groveland Park
Little Haiti Park
Legion Memorial Park
Legion Picnic Islands Park
Belle Meade Island
CCS - Notre Dame
NE 104th St
NE 103rd St
NE 102nd St
NE 4th Ave
NE 6th Ave
NE 4th Ave Rd
NE 5th Ave Rd
Grand Concourse
NE 7th Ave
Club Dr
Park Dr
Biscayne Blvd
NE 99th St
NE 98th St
NE 97th St
NE 96th St
NE 95th St
NE 94th St
NE 93rd St
NE 92nd St
NE 91st St
NE 90th St
NE 89th St
NE 88th St
NE 87th St
NE 86th St
NE 85th St
NE 84th St
NE 83rd St
NE 82nd Ter
NE 82nd St
NE 81st St
NE 79th St
NE 78th St
NE 77th St
NE 76th St
NE 75th St
NE 73rd St
NE 72nd Ter
NE 72nd St
NE 71st St
NE 70th St
Palm Bay Ln
NE 69th St
NE 68th St
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NE 8th Ct
NE 5th Ave
NE 4th Ave
NE 4th Pl
NE 4th Ct
NE 3rd Ave
NE 2nd Ave
NE 2nd Ct
NE 1st Ave
N Miami Ave
NE Miami Ct
NW 84th St
NW 82nd St
NW 1st Pl
NW 2nd Ave
NW 2nd Ct
NW 77th St
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NW 64th St
NW 5th Ave
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934
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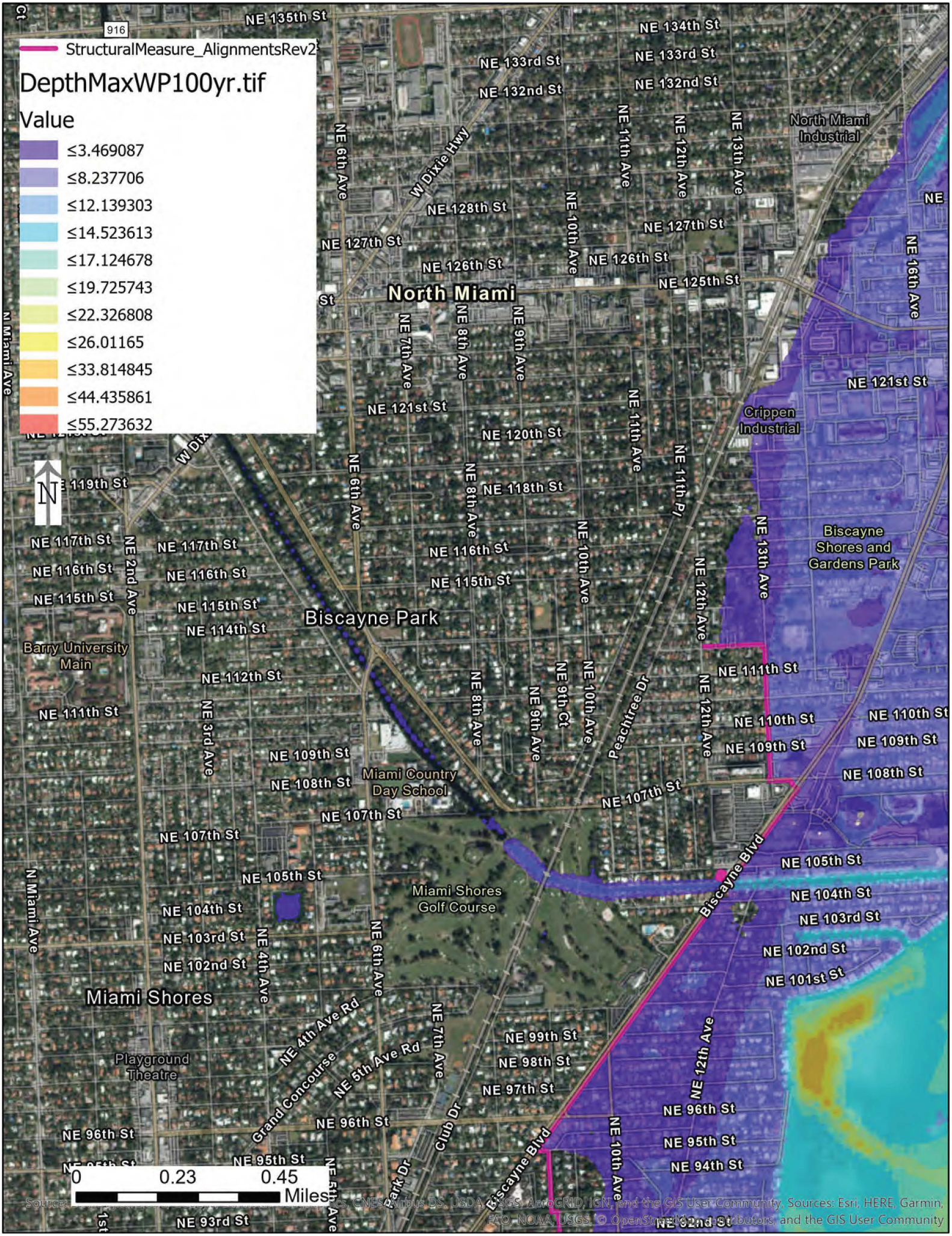
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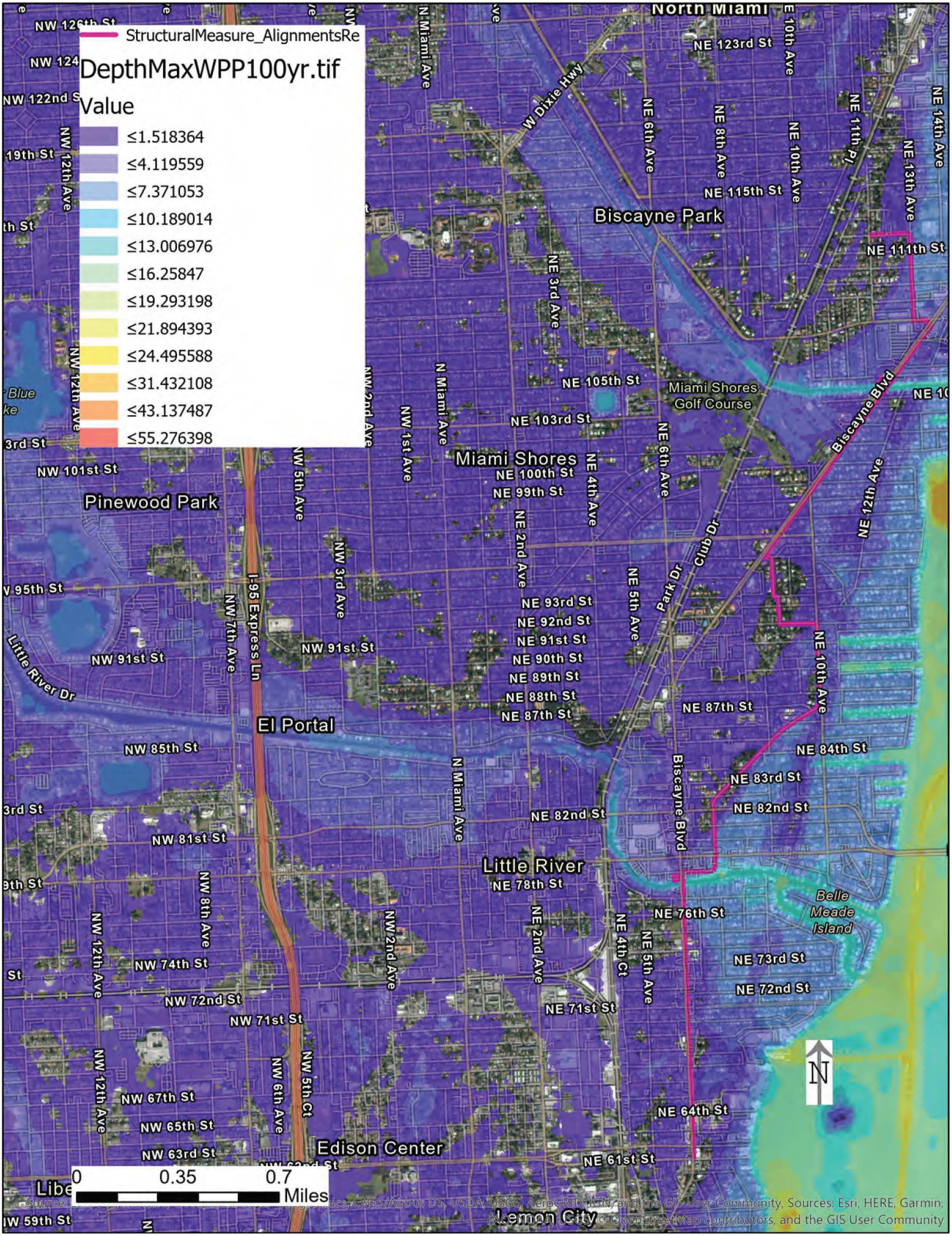
North Miami
Biscayne Park
Miami Shores
North Miami Industrial
Crippen Industrial
Biscayne Shores and Gardens Park
Barry University Main
Miami Country Day School
Miami Shores Golf Course
Playground Theatre
NE 135th St
NE 134th St
NE 133rd St
NE 132nd St
NE 128th St
NE 127th St
NE 126th St
NE 125th St
NE 121st St
NE 120th St
NE 119th St
NE 118th St
NE 117th St
NE 116th St
NE 115th St
NE 114th St
NE 112th St
NE 111th St
NE 110th St
NE 109th St
NE 108th St
NE 107th St
NE 105th St
NE 104th St
NE 103rd St
NE 102nd St
NE 101st St
NE 99th St
NE 98th St
NE 97th St
NE 96th St
NE 95th St
NE 94th St
NE 93rd St
NE 92nd St
W Dixie Hwy
Biscayne Blvd
Peachtree Dr
Grand Concourse
Club Dr
Park Dr
NE 4th Ave Rd
NE 5th Ave Rd
N Miami Ave
NE 2nd Ave
NE 3rd Ave
NE 4th Ave
NE 5th Ave
NE 6th Ave
NE 7th Ave
NE 8th Ave
NE 9th Ave
NE 9th Ct
NE 10th Ave
NE 11th Ave
NE 11th Pl
NE 12th Ave
NE 13th Ave
NE 16th Ave
0
0.23
0.45
Miles

Maximum Depth Maps for the year 2079 1% AEP SWL tailwater conditions

With Project and With Precipitation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North Miami
Biscayne Park
Miami Shores
Miami Shores Golf Course
Pinewood Park
El Portal
Little River
Belle Meade Island
Edison Center
Lemon City
NE 123rd St
NE 115th St
NE 111th St
NE 105th St
NE 103rd St
NE 100th St
NE 99th St
NE 93rd St
NE 92nd St
NE 91st St
NE 90th St
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W Dixie Hwy
N Miami Ave
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NE 8th Ave
NE 10th Ave
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NE 12th Ave
NE 4th Ct
Biscayne Blvd
Park Dr
Club Dr
NW 12th Ave
NW 1st Ave
NW 2nd Ave
NW 3rd Ave
NW 5th Ave
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NW 5th Ct
I-95 Express Ln
Little River Dr
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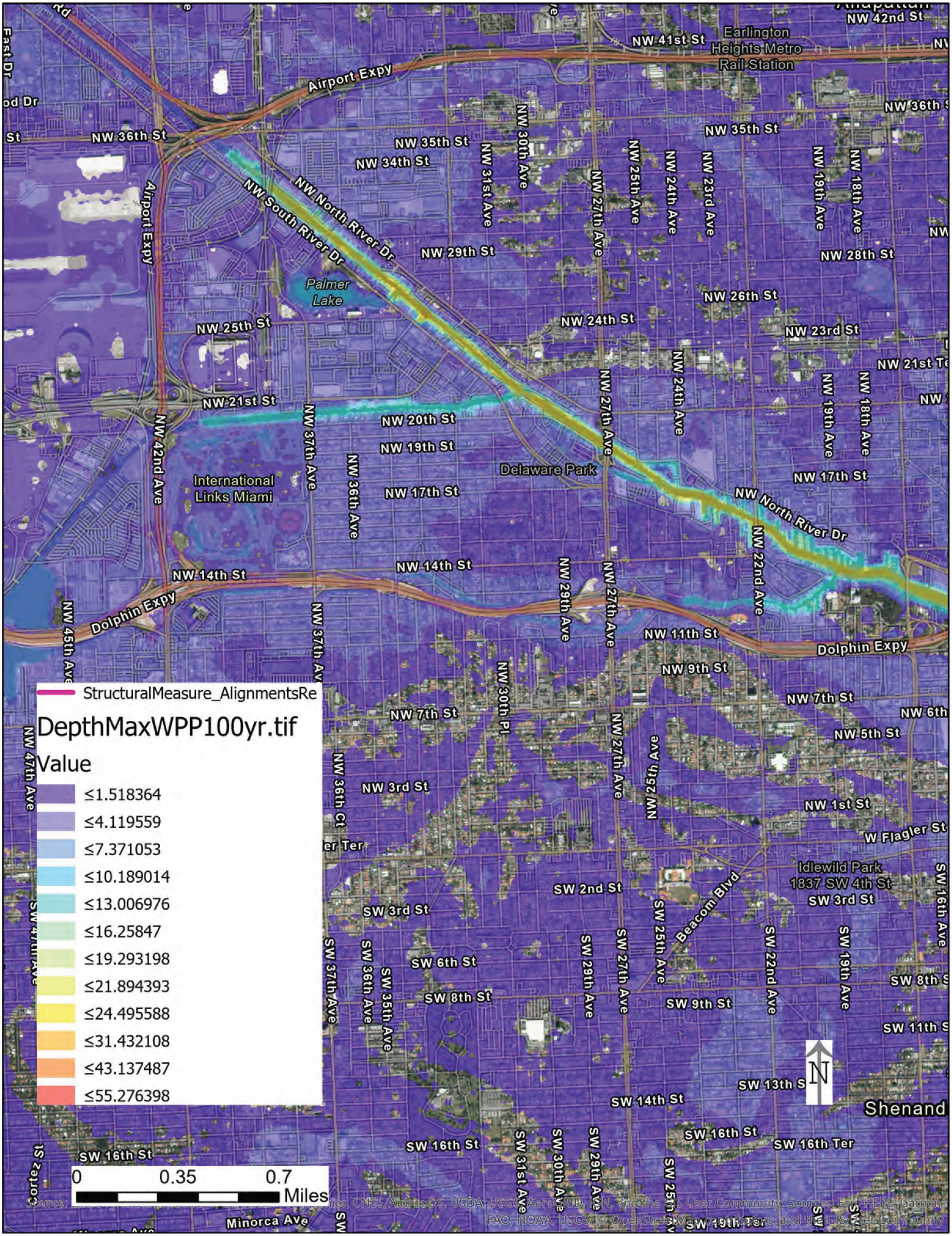
0.35
0.7
Miles
N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0
0.35
0.7
Miles
N
Airport Expy
Dolphin Expy
NW North River Dr
NW South River Dr
Palmer Lake
Delaware Park
International Links Miami
Earlington Heights Metro Rail Station
Idlewild Park
1837 SW 4th St
Beacom Blvd
Shenand
NW 42nd St
NW 41st St
NW 36th St
NW 35th St
NW 34th St
NW 29th St
NW 28th St
NW 26th St
NW 25th St
NW 24th St
NW 23rd St
NW 21st St
NW 20th St
NW 19th St
NW 17th St
NW 14th St
NW 11th St
NW 9th St
NW 7th St
NW 5th St
NW 3rd St
NW 1st St
W Flagler St
SW 2nd St
SW 3rd St
SW 6th St
SW 8th St
SW 9th St
SW 13th St
SW 14th St
SW 16th St
SW 16th Ter
NW 42nd Ave
NW 37th Ave
NW 36th Ave
NW 31st Ave
NW 30th Ave
NW 29th Ave
NW 27th Ave
NW 25th Ave
NW 24th Ave
NW 23rd Ave
NW 22nd Ave
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NW 36th Ct
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SW 37th Ave
SW 36th Ave
SW 35th Ave
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SW 19th Ave
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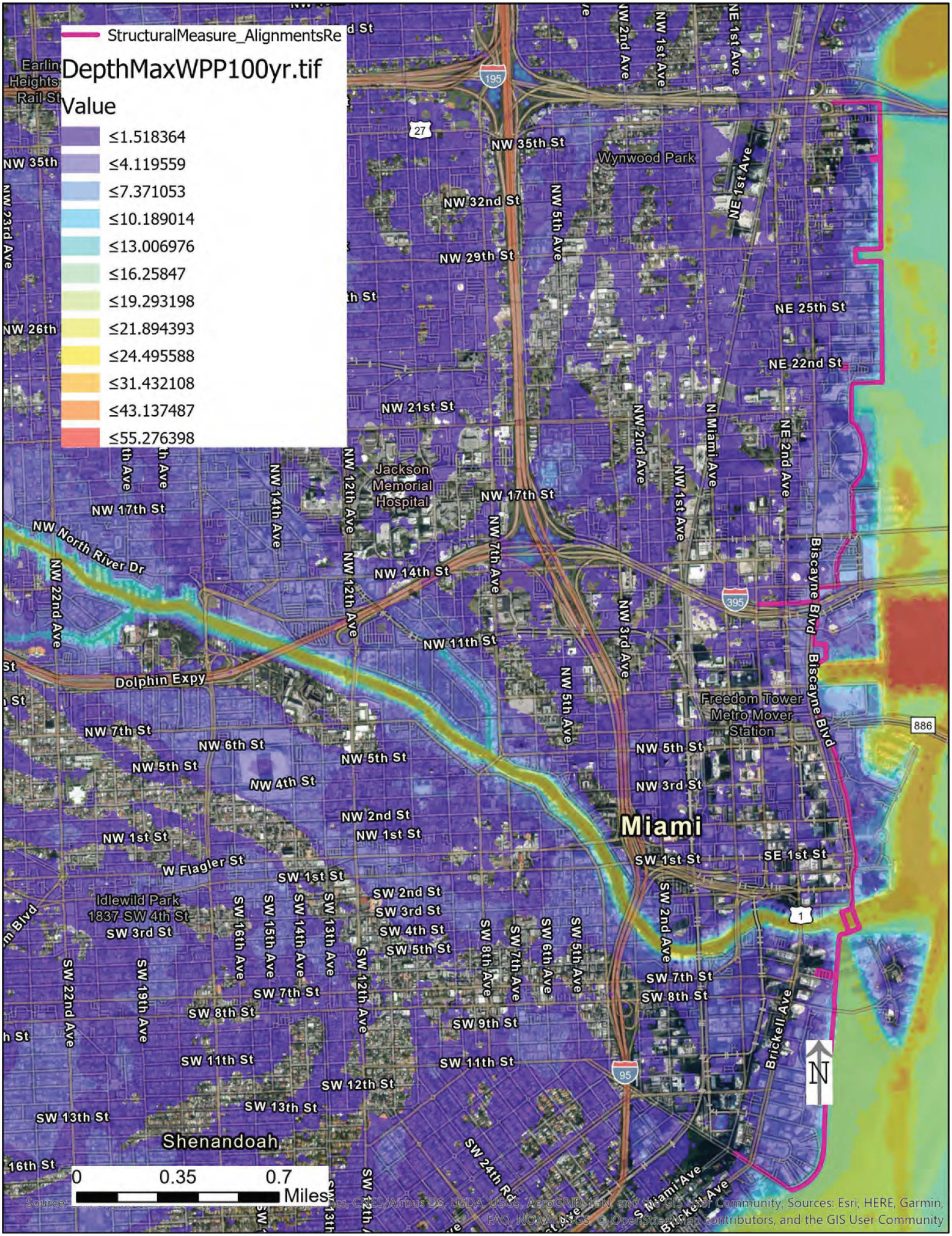
Minorca Ave
Cortez St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≤55.276398
Earlington Heights Rail Station
NW 35th St
Wynwood Park
NW 32nd St
NW 29th St
NE 25th St
NE 22nd St
NW 21st St
Jackson Memorial Hospital
NW 17th St
NW North River Dr
NW 14th St
NW 11th St
Dolphin Expy
Freedom Tower Metro Mover Station
NW 7th St
NW 6th St
NW 5th St
NW 4th St
NW 3rd St
NW 2nd St
NW 1st St
Miami
SW 1st St
SE 1st St
W Flagler St
Idlewild Park 1837 SW 4th St
SW 2nd St
SW 3rd St
SW 4th St
SW 5th St
SW 7th St
SW 8th St
SW 9th St
SW 11th St
SW 12th St
SW 13th St
Shenandoah
SW 24th Rd
S Miami Ave
Biscayne Blvd
Brickell Ave
NW 2nd Ave
NW 1st Ave
NE 1st Ave
NW 5th Ave
NW 7th Ave
NW 12th Ave
NW 14th Ave
NW 22nd Ave
NW 23rd Ave
NW 26th
N Miami Ave
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SW 14th Ave
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SW 22nd Ave
195
27
395
886
1
95
N
0
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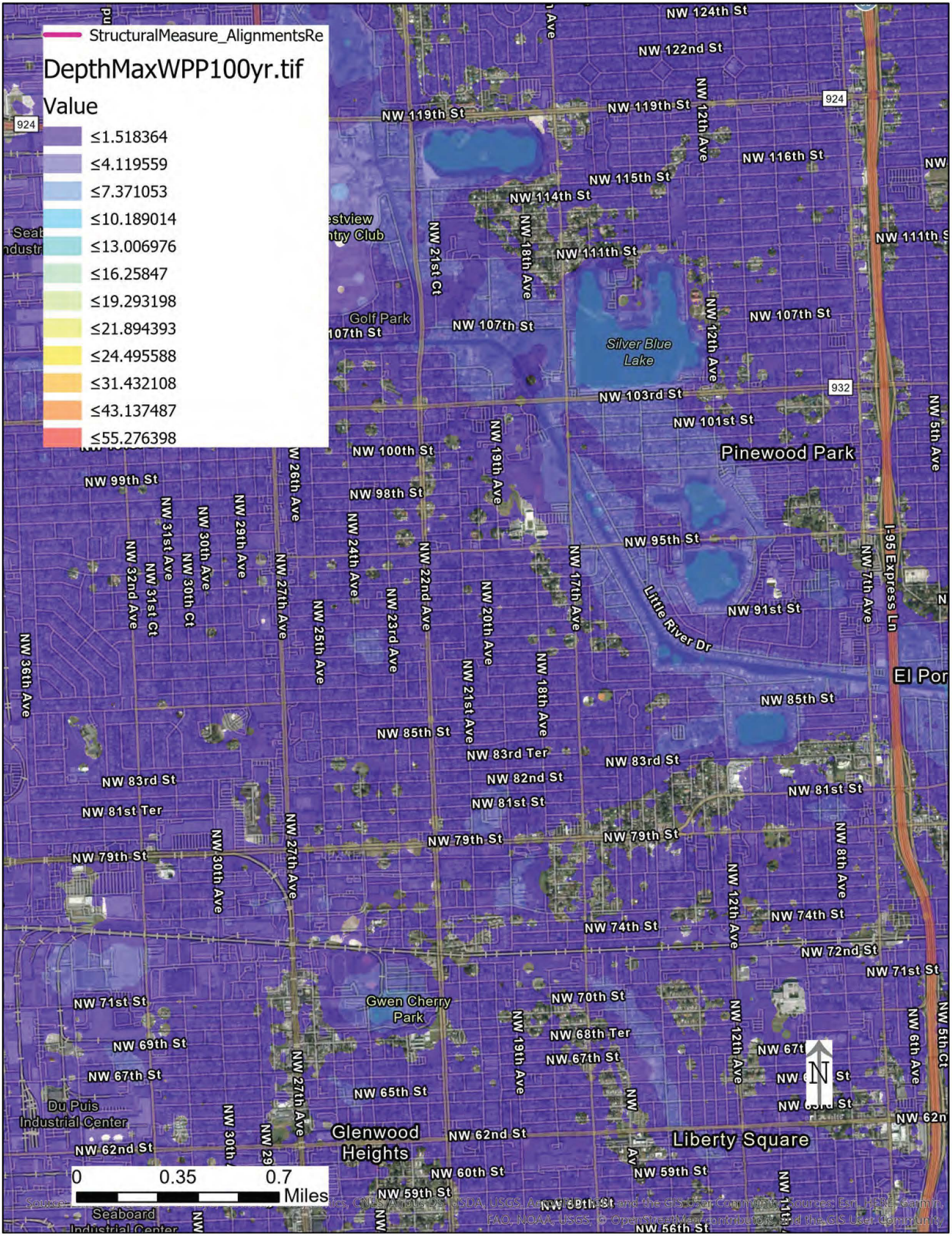
0.7
Miles
Source: Esri, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community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NW 119th St
NW 116th St
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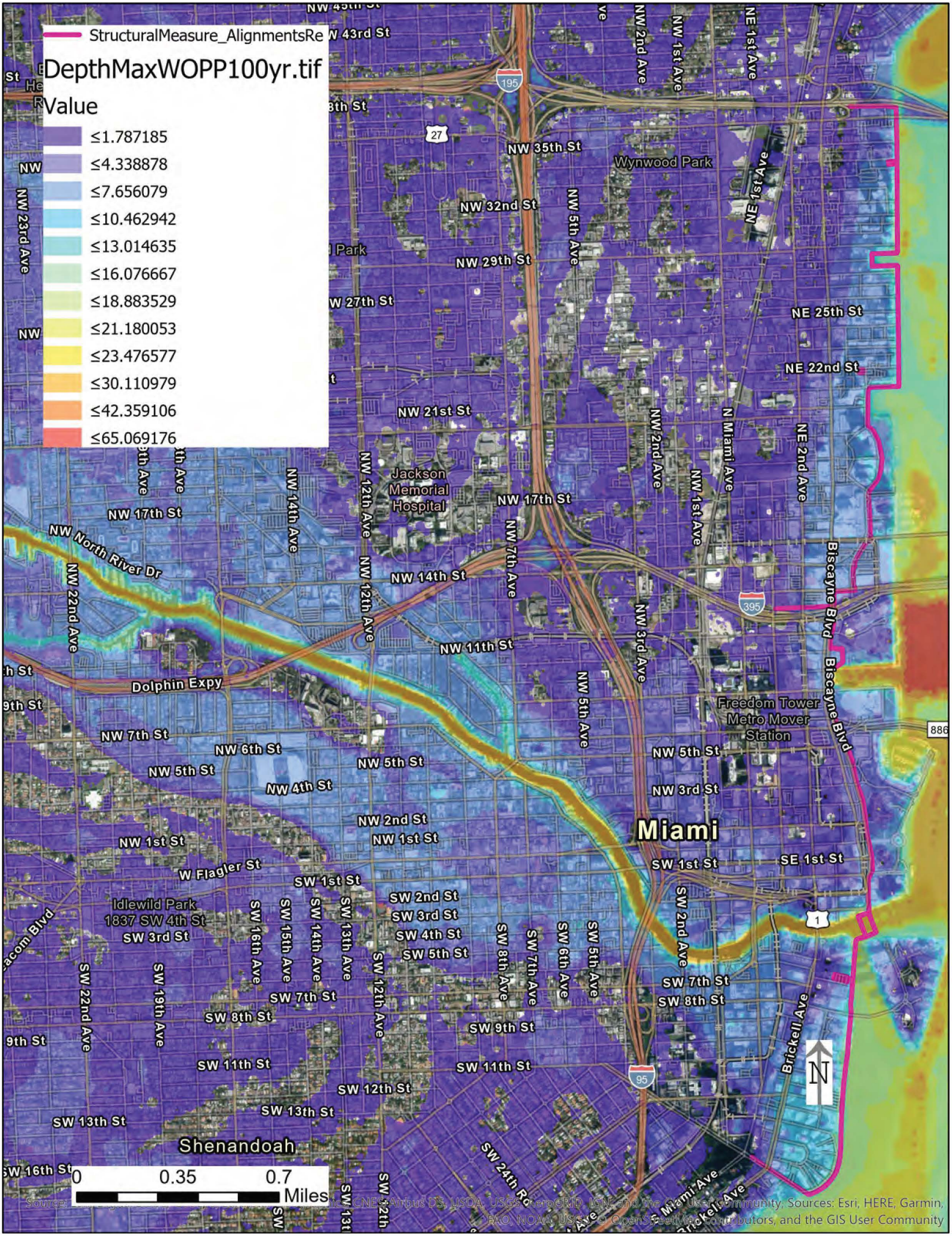
NW 5th Ave
NW 5th Ct
NW 36th Ave
I-95 Express Ln
Little River Dr
Silver Blue Lake
Golf Park
Pinewood Park
Gwen Cherry Park
Glenwood Heights
Liberty Square
Du Puis Industrial Center
Seaboard Industrial Center
El Por
924
932
N
0 0.35 0.7 Miles

Maximum Depth Maps for the year 2079 1% AEP SWL tailwater conditions Without Project and With Precipitation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≤16.076667
≤18.883529
≤21.180053
≤23.476577
≤30.110979
≤42.359106
≤65.069176
Miami
Wynwood Park
Jackson Memorial Hospital
Freedom Tower Metro Mover Station
Idlewild Park 1837 SW 4th St
Shenandoah
NW 35th St
NW 32nd St
NW 29th St
NW 27th St
NE 25th St
NE 22nd St
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NW 14th St
NW 11th St
NW North River Dr
Dolphin Expy
NW 7th St
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NW 4th St
NW 3rd St
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W Flagler St
SW 1st St
SW 2nd St
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SW 7th St
SW 8th St
SW 9th St
SW 11th St
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SW 13th St
SE 1st St
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NW 23rd Ave
NW 22nd Ave
Biscayne Blvd
Brickell Ave
SW 24th Rd
0 0.35 0.7 Miles
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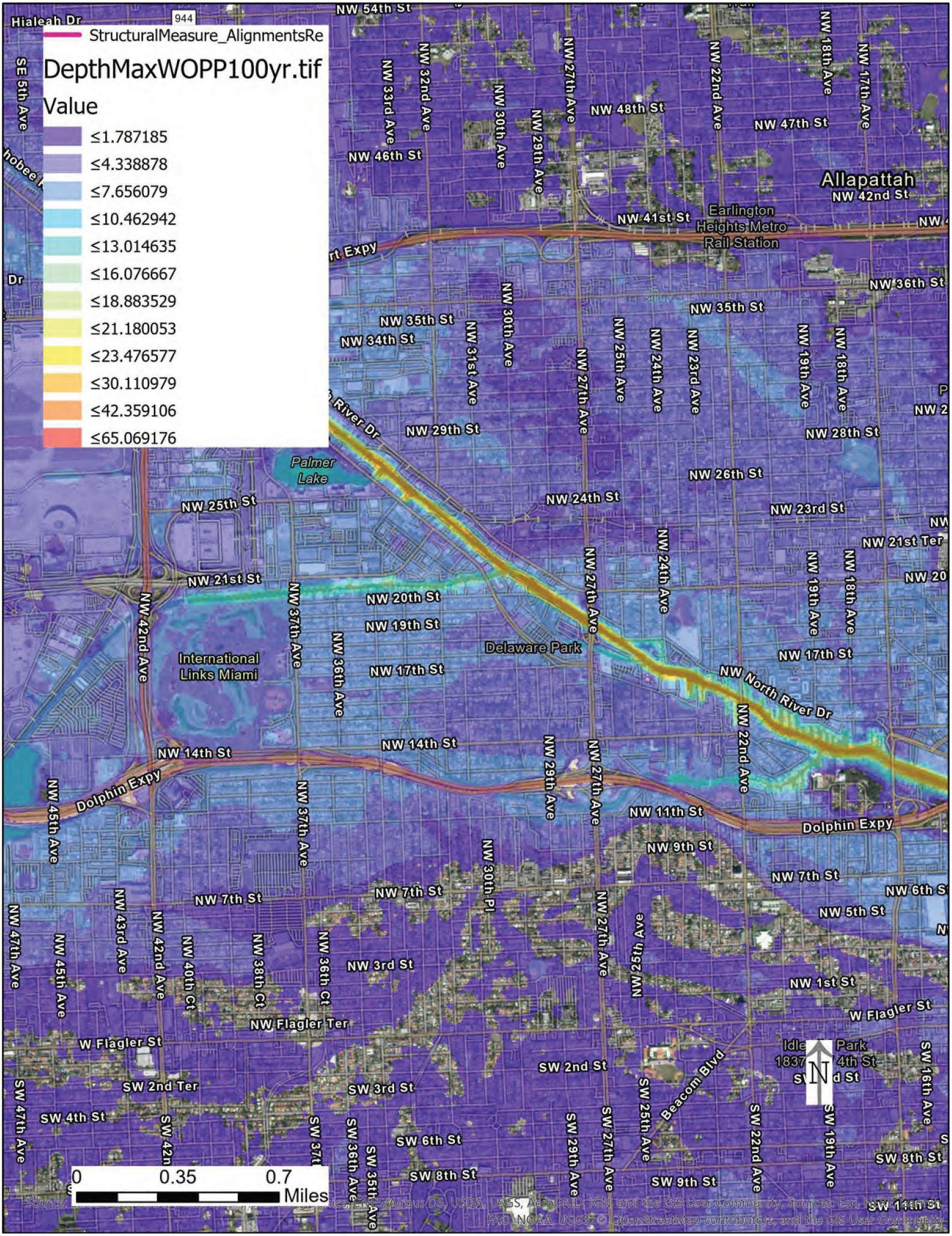
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≤23.476577
≤30.110979
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Hialeah Dr
944
NW 54th St
NW 48th St
NW 47th St
NW 46th St
NW 41st St
Allapattah
NW 42nd St
Earlington Heights Metro Rail Station
NW 36th St
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Palmer Lake
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International Links Miami
Delaware Park
NW North River Dr
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NW 40th Ct
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Beacom Blvd
Idlewild Park
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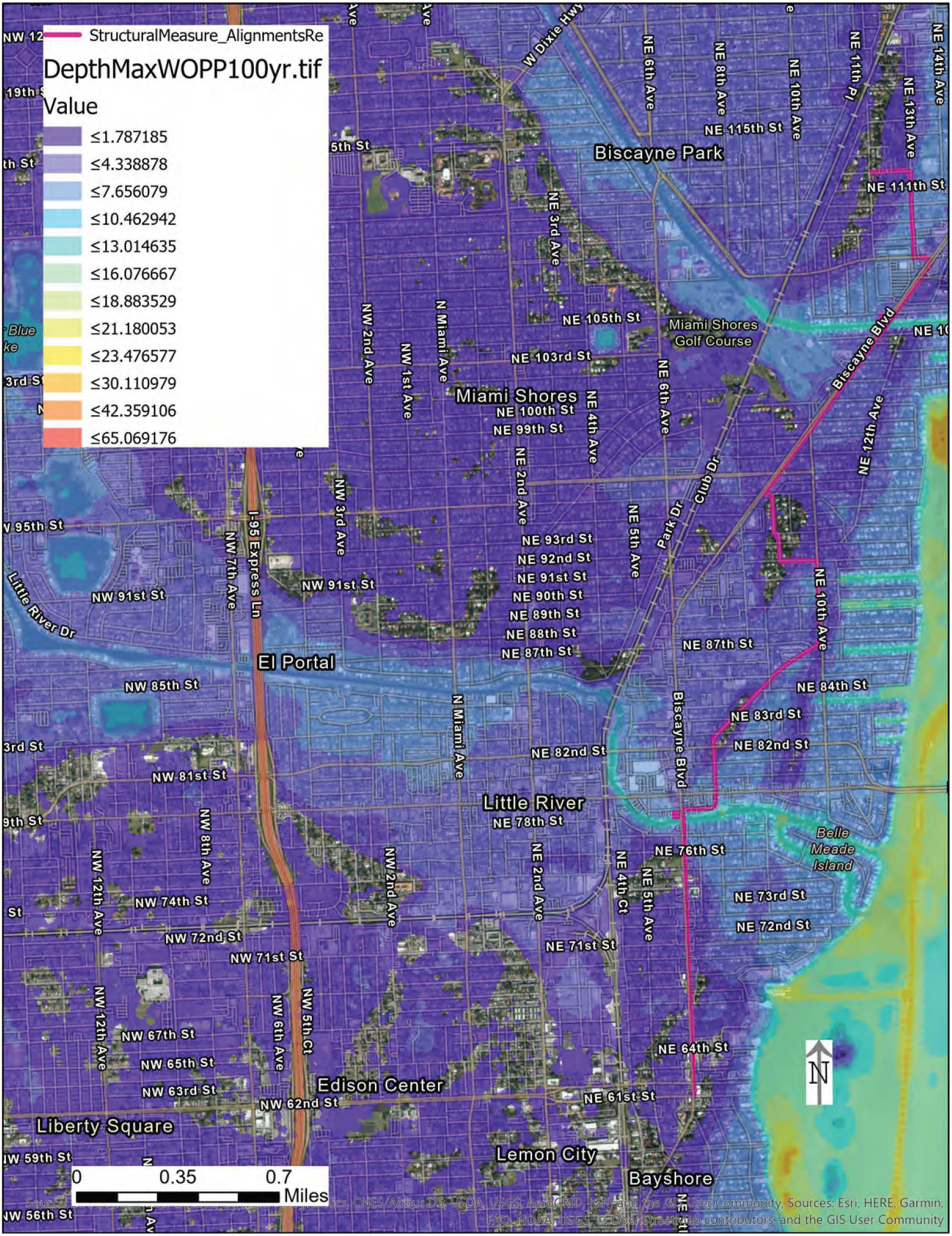
Miles
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community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≤23.476577
≤30.110979
≤42.359106
≤65.069176
Biscayne Park
Miami Shores Golf Course
Miami Shores
El Portal
Little River
Belle Meade Island
Edison Center
Liberty Square
Lemon City
Bayshore
W Dixie Hwy
NE 6th Ave
NE 8th Ave
NE 10th Ave
NE 11th Pl
NE 13th Ave
NE 14th Ave
NE 115th St
NE 111th St
NE 3rd Ave
NE 105th St
NE 103rd St
NW 2nd Ave
NW 1st Ave
N Miami Ave
NE 100th St
NE 99th St
NE 4th Ave
NE 6th Ave
Biscayne Blvd
NE 12th Ave
NE 2nd Ave
NW 3rd Ave
NE 93rd St
NE 92nd St
NE 91st St
NE 90th St
NE 89th St
NE 88th St
NE 87th St
NE 5th Ave
Park Dr
Club Dr
NE 10th Ave
NE 87th St
NE 84th St
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Miles
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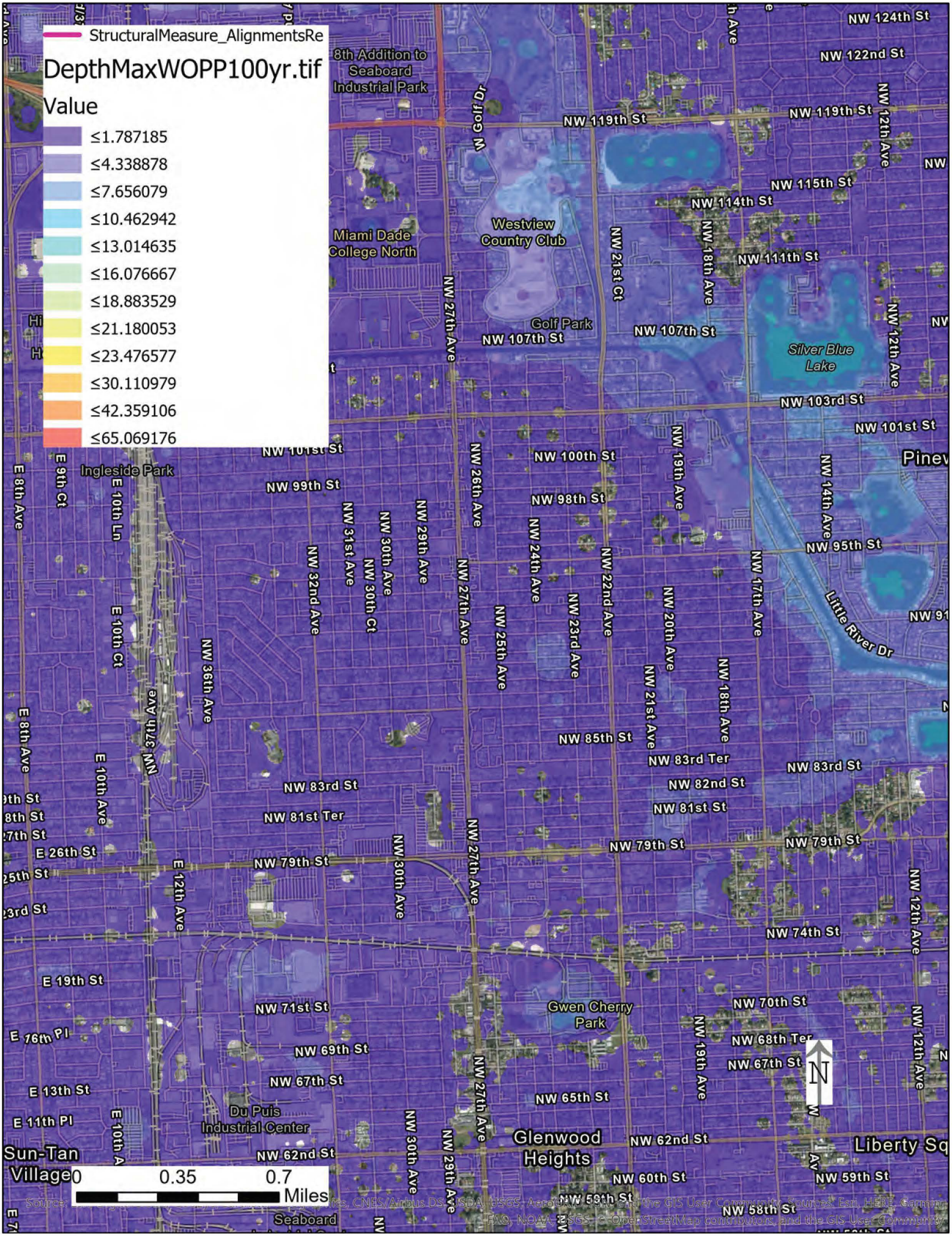
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≤30.110979
≤42.359106
≤65.069176
8th Addition to Seaboard Industrial Park
Miami Dade College North
Westview Country Club
Golf Park
Silver Blue Lake
Ingleside Park
Gwen Cherry Park
Du Puis Industrial Center
Glenwood Heights
Sun-Tan Village
Seaboard
Little River Dr
NW 124th St
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