

# TURNING THE TIDE: INNOVATIVE SOLUTIONS FOR OAK ISLAND'S FLOODING CHALLENGES

Marc Horstman, PE, PH, BC.WRE  
Senior Project Manager





Located in  
**Brunswick County**

Population:

9,700

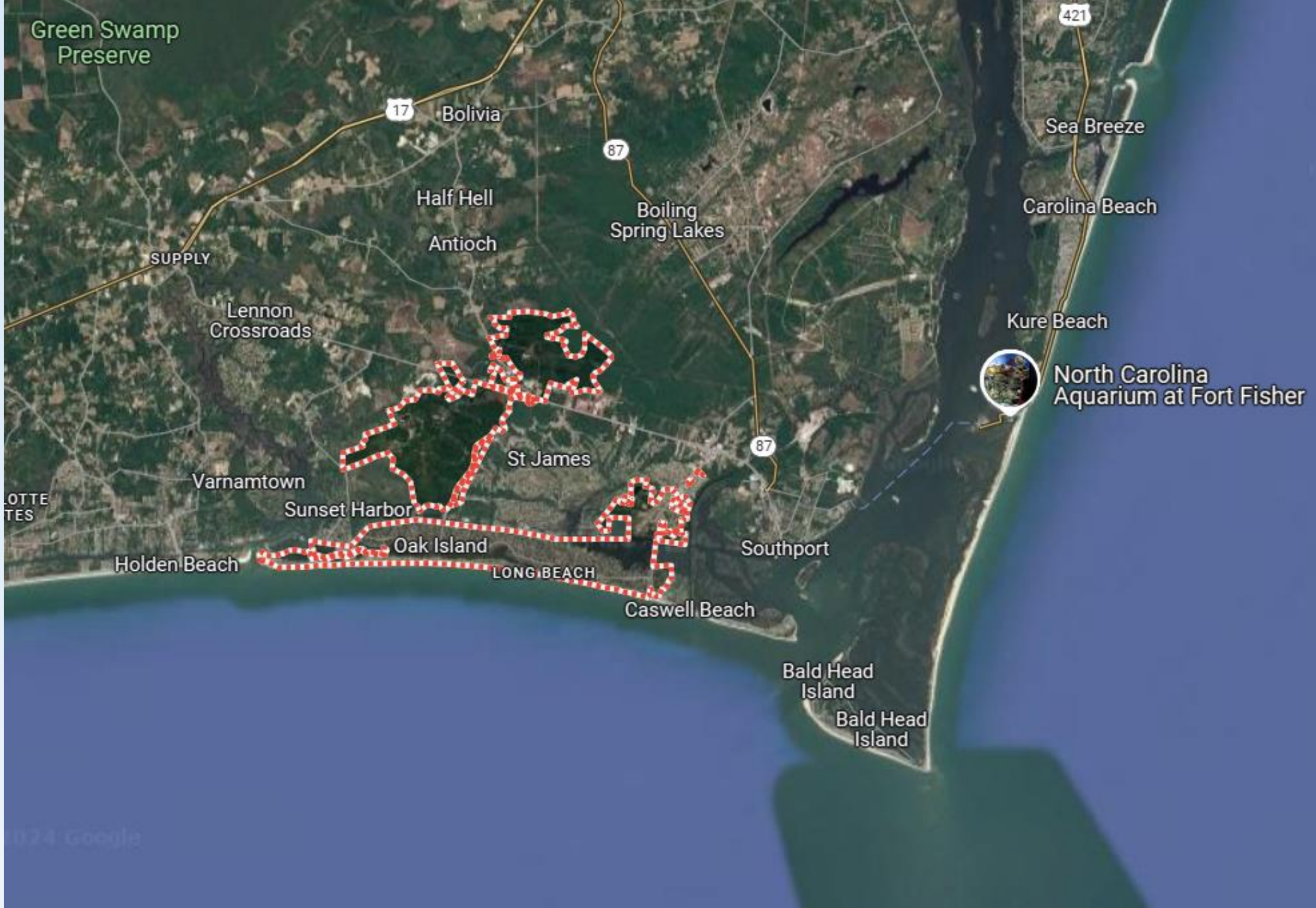
Year  
round

~50,000

Seasonal  
peak

Home of the Oak Island Nature  
Center, Oak Island Pier, and 801  
Ocean Event Center















# EMERGENCY ACCESS ISSUES



6"

loss of vehicle control  
and stalling

12"

vehicle floats

Severe storm events >6"

Moderate storm events <6"





# Stormwater Projects



## Town of Oak Island, NC Ocean Drive Drainage Study



July 2021

ed, and is already working to improve conditions



, which will reduce ponding and decrease  
events. This is similar to a system which has already  
m will increase the width of the area's secondary

eting on February 20, 2023, with August being the  
rtion of the February 20 Town Council meeting,

foundation for developing the the Dune Infiltration  
below, or [CLICK HERE](#).



**Legend**

-  Potential Site
-  Flooded Area



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



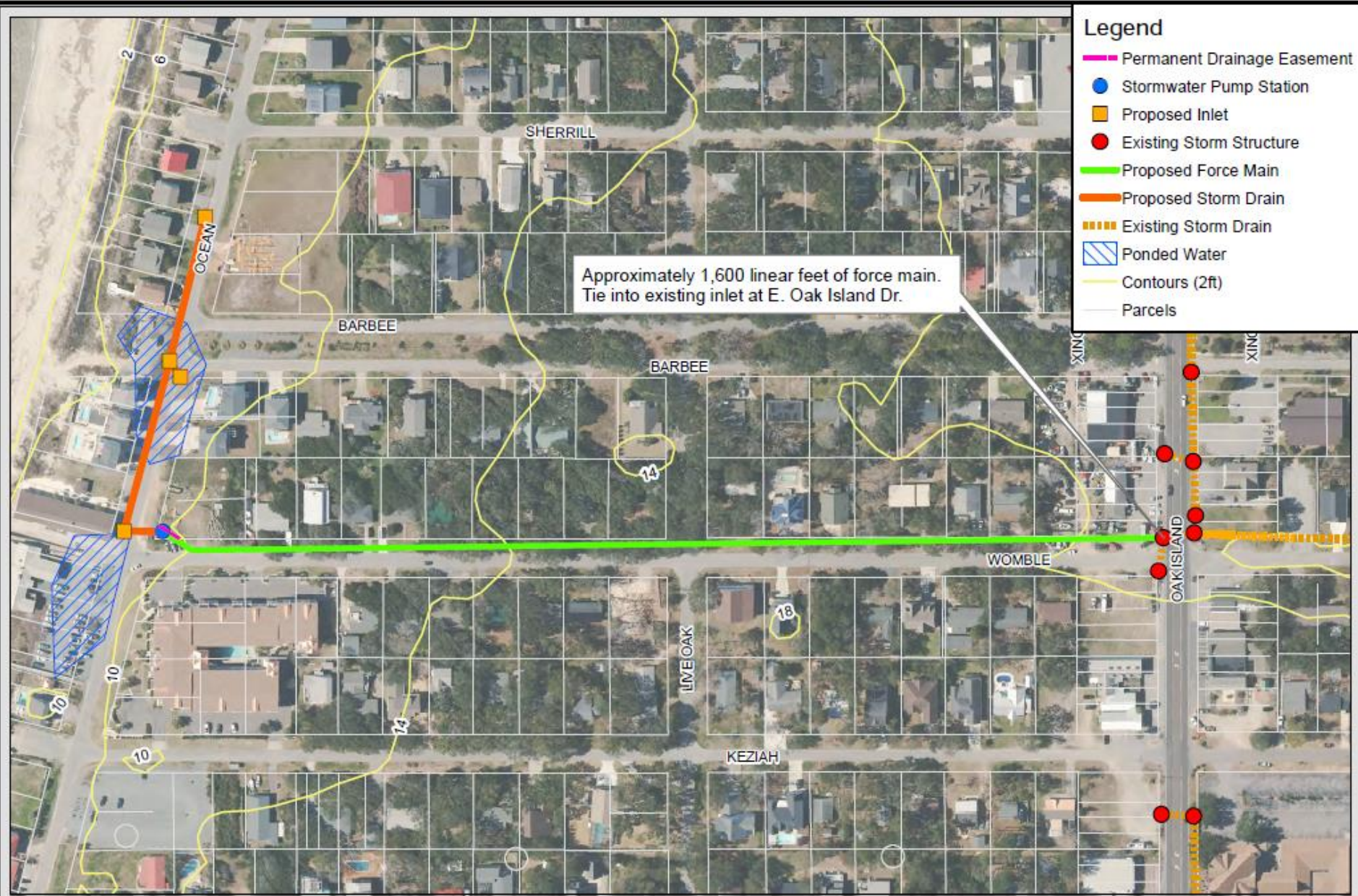
**Figure 1A**  
**Vicinity Map**  
**Ocean Drive Drainage Study**



0 250 500  
Feet  
1 inch = 500 feet







### Ocean Drive Drainage Study

Figure 8 - Proposed Project Aerial Map  
Site #7 - Existing DOT Tie-In





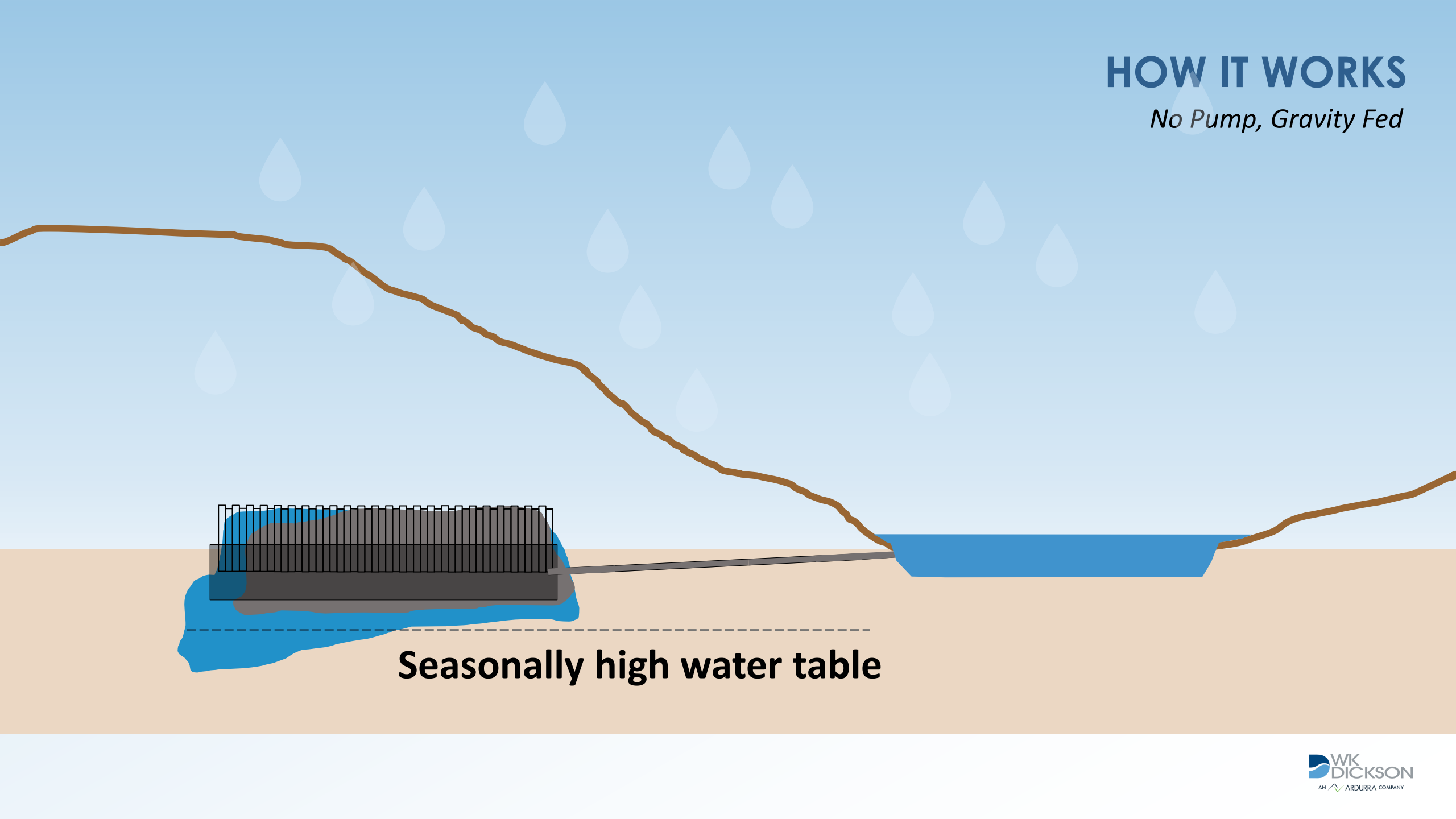






# HOW IT WORKS

*No Pump, Gravity Fed*

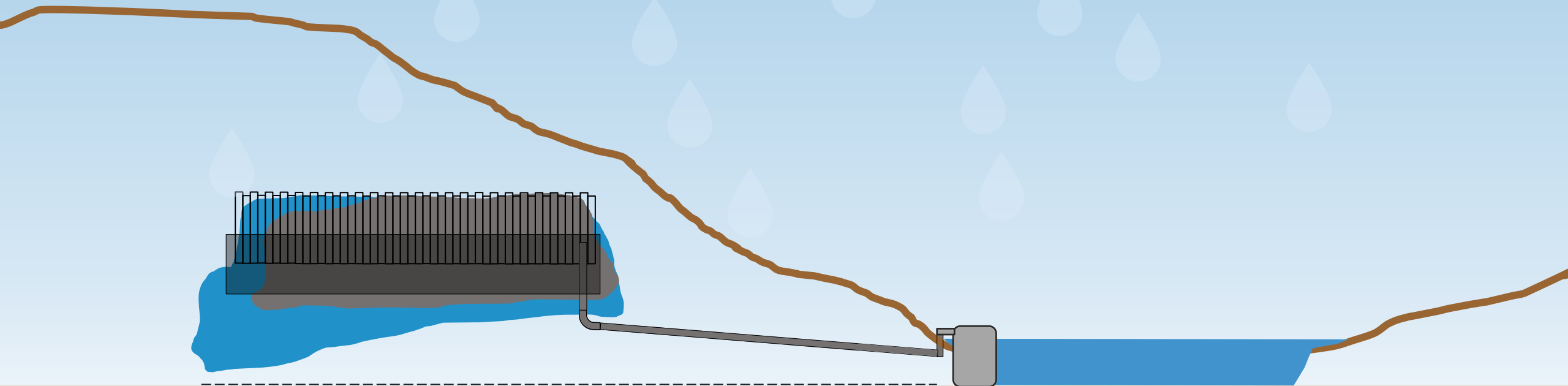


**Seasonally high water table**



# HOW IT WORKS

*Portable Pump*

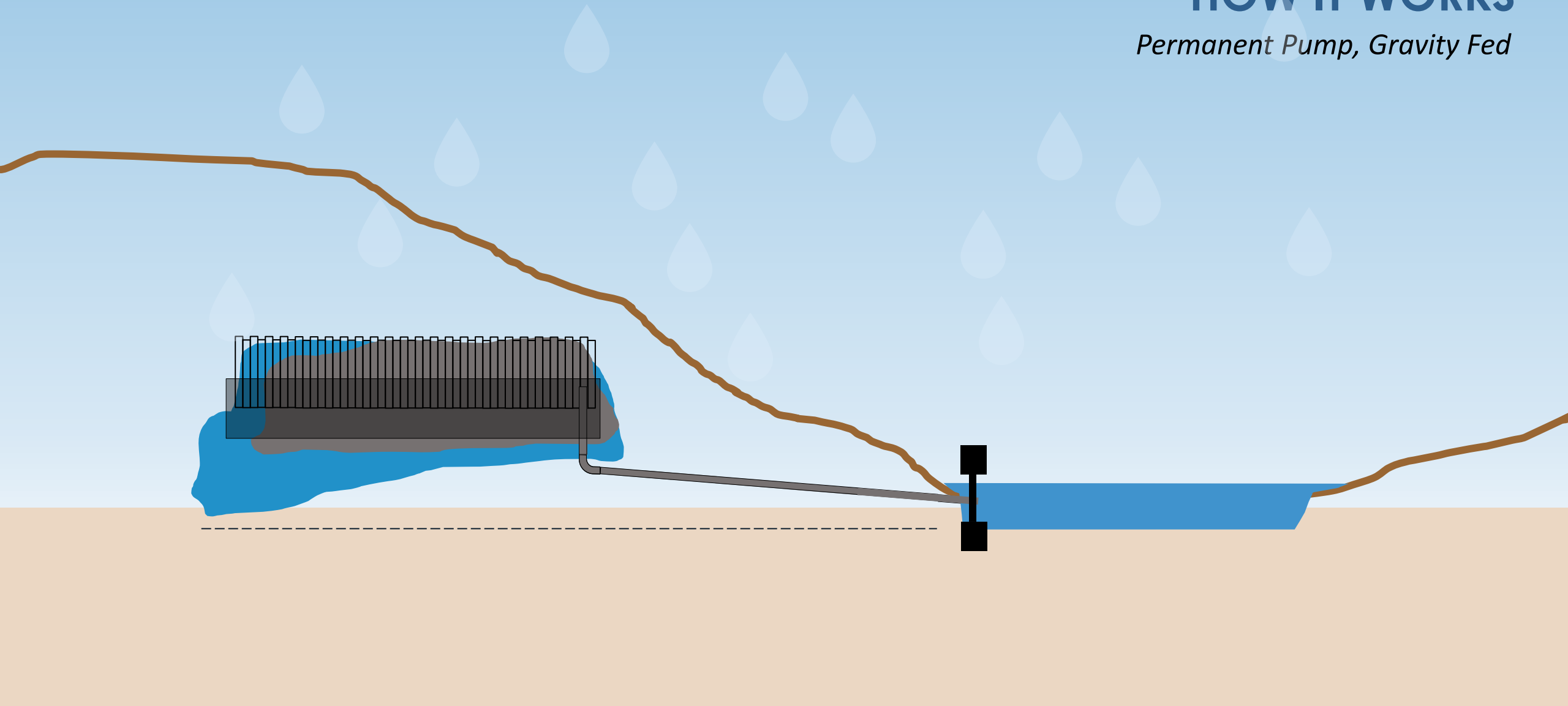


**Seasonally high water table**



# HOW IT WORKS

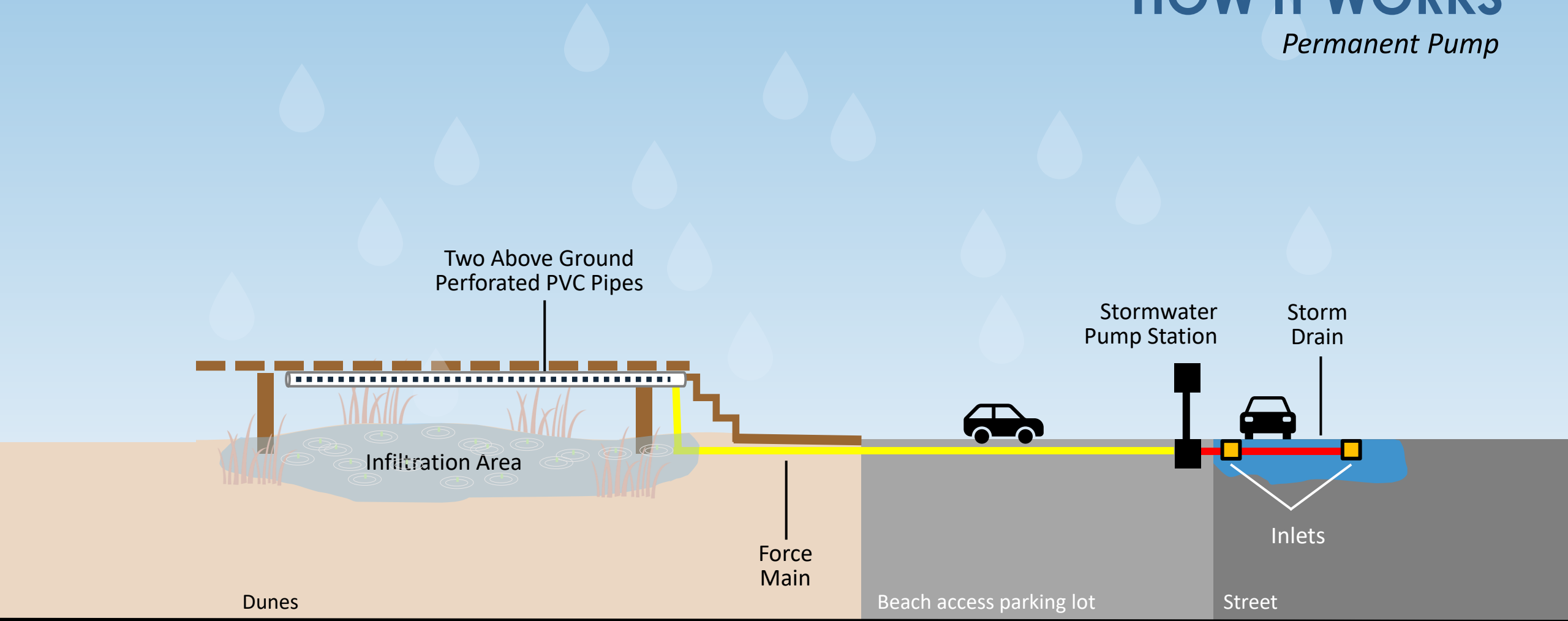
*Permanent Pump, Gravity Fed*





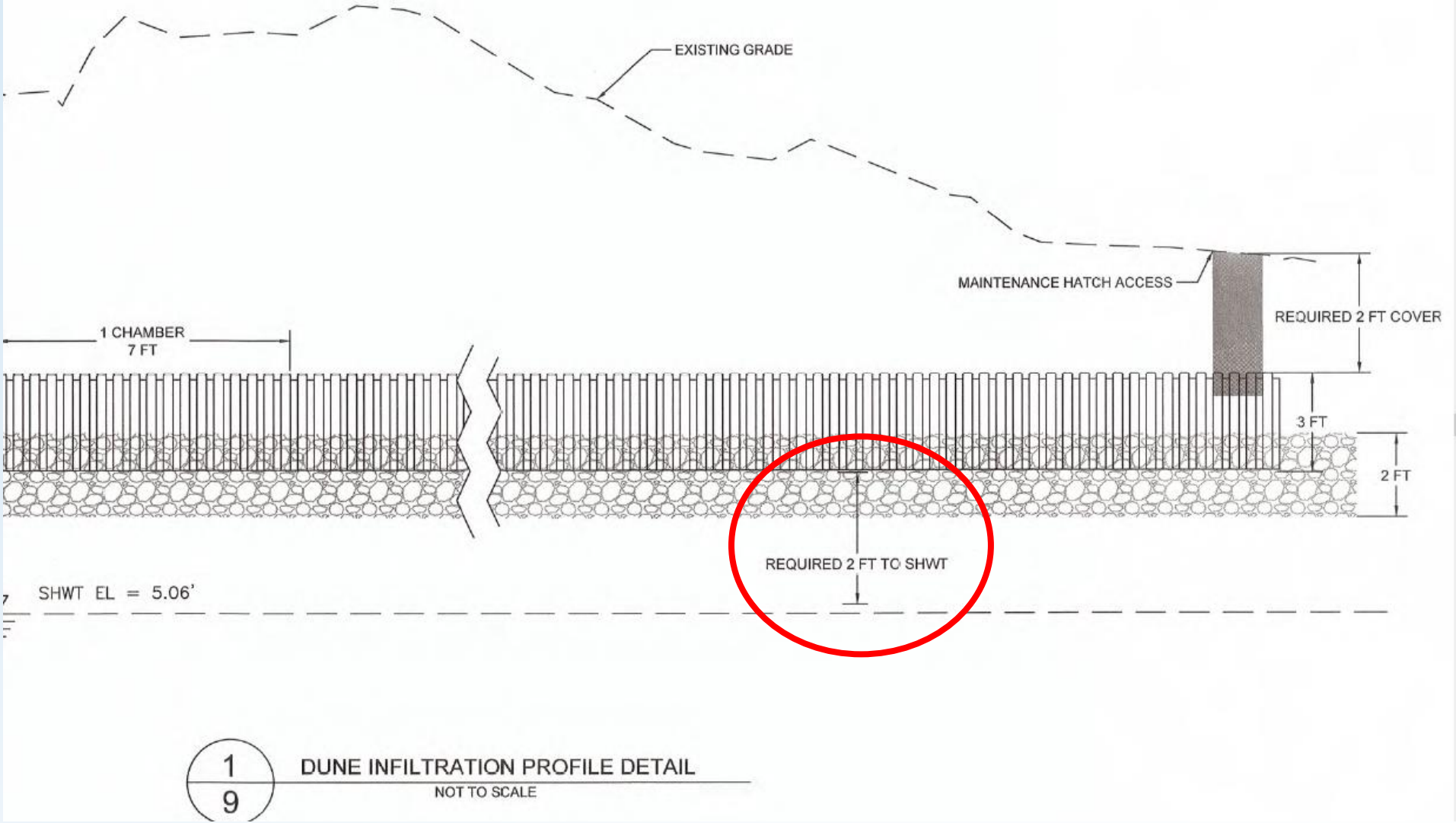
# HOW IT WORKS

## *Permanent Pump*





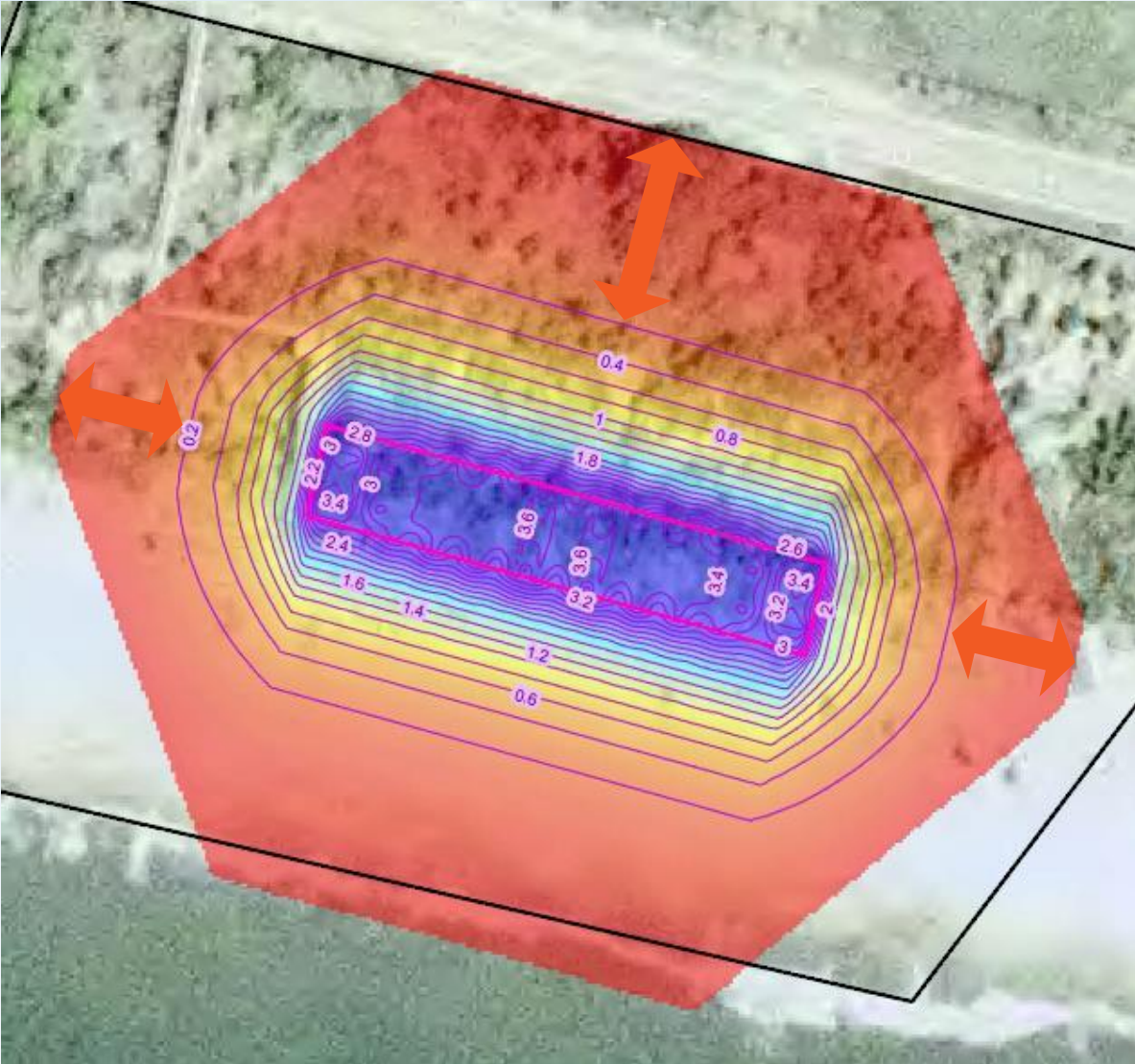
# CONSIDERATIONS



1  
9 DUNE INFILTRATION PROFILE DETAIL  
NOT TO SCALE



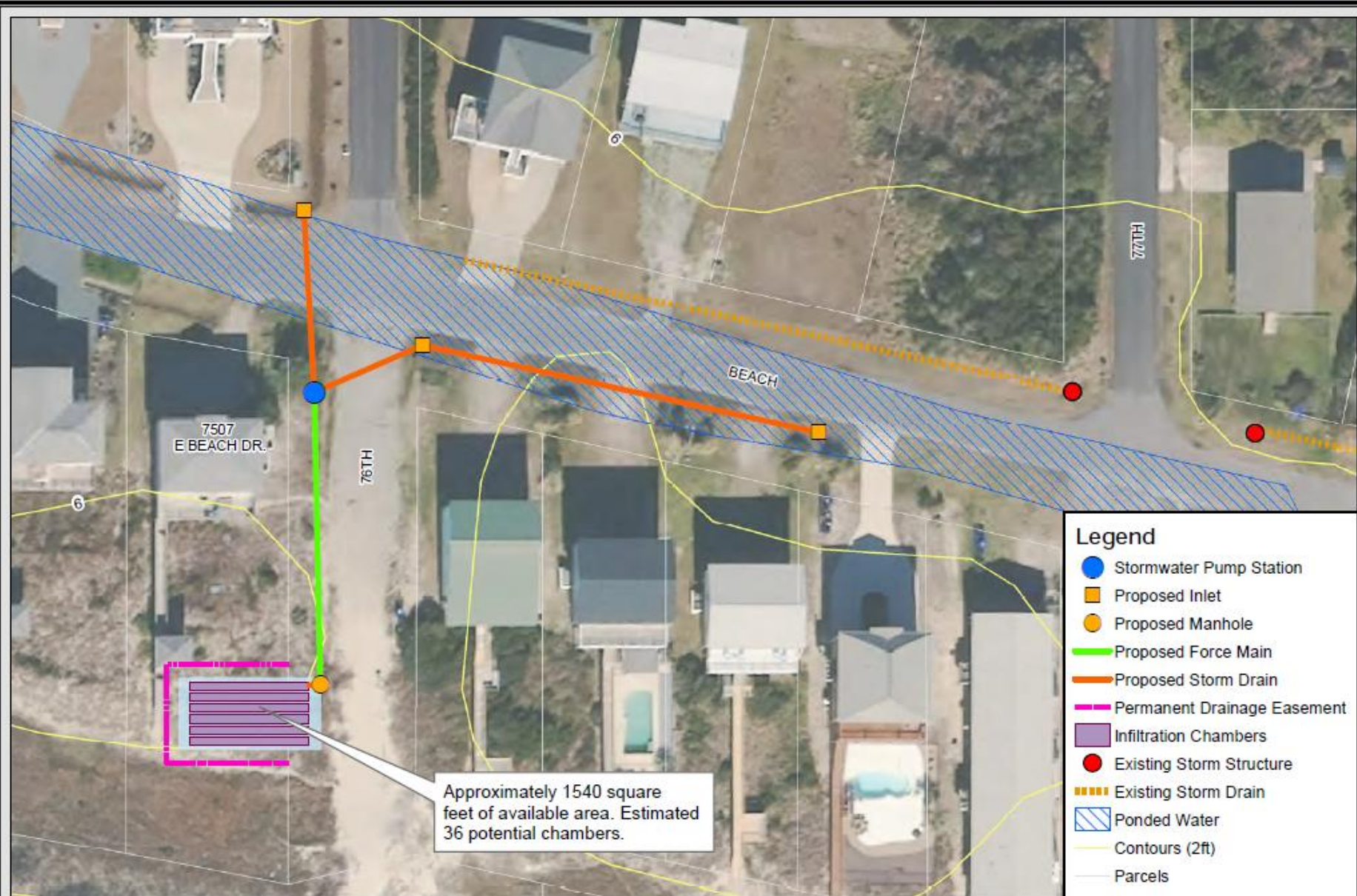
# CONSIDERATIONS



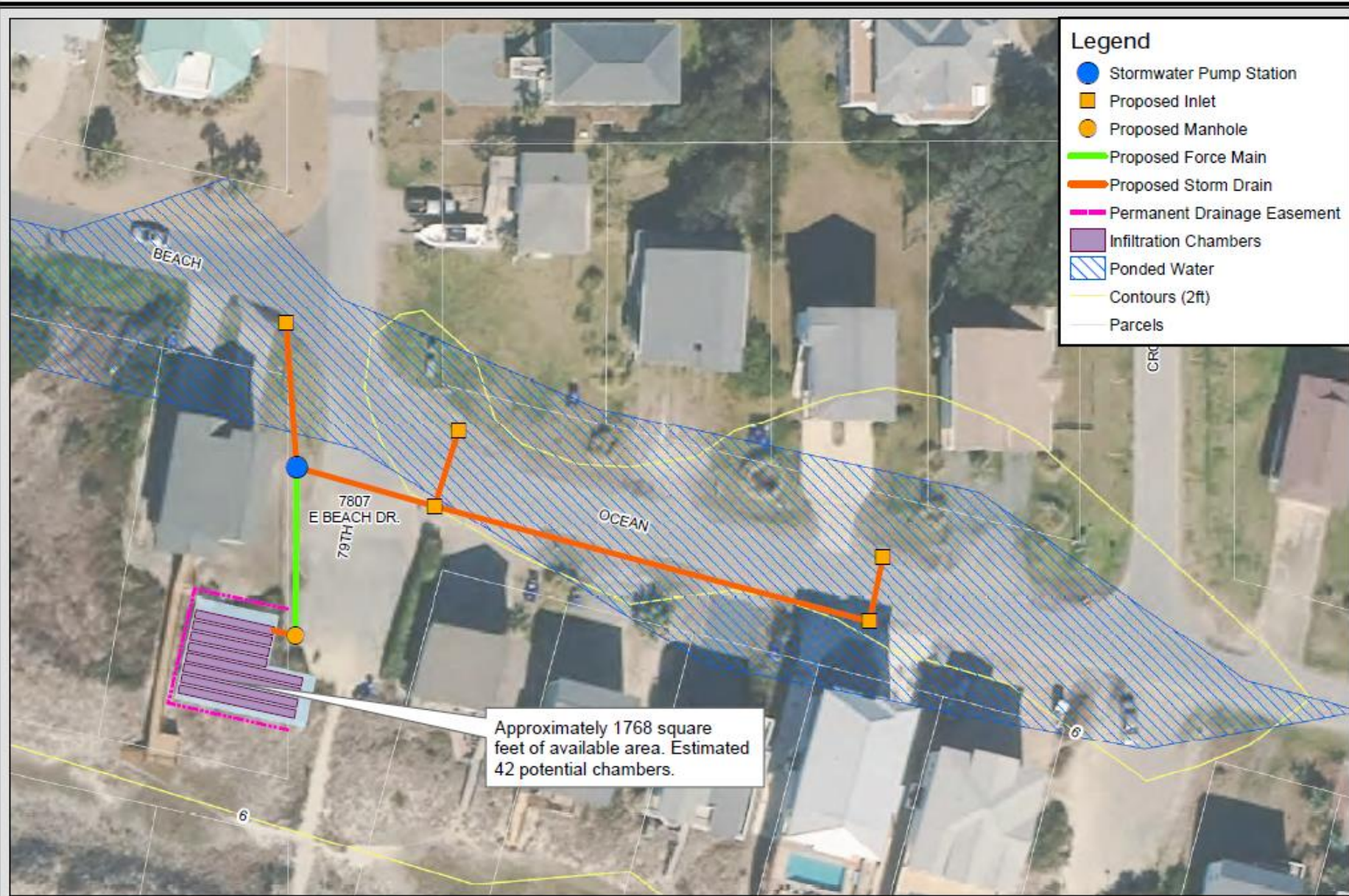






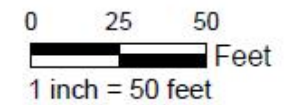




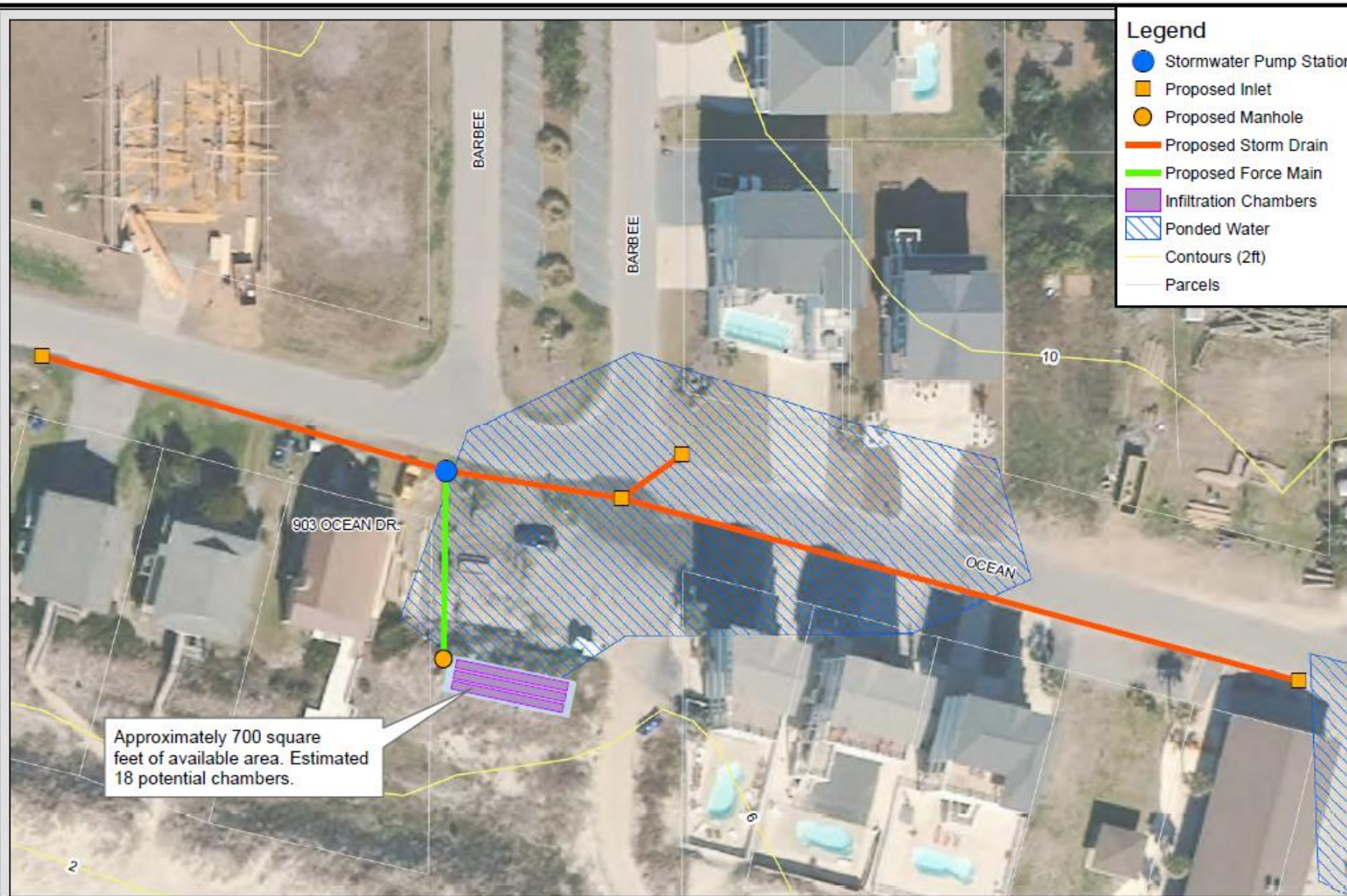


### Ocean Drive Drainage Study

Figure 4 - Proposed Project Aerial Map  
Site #3 - 7807 E Beach Dr.









# CASE STUDY OF THE 801 BUILDING DIS SOLUTION









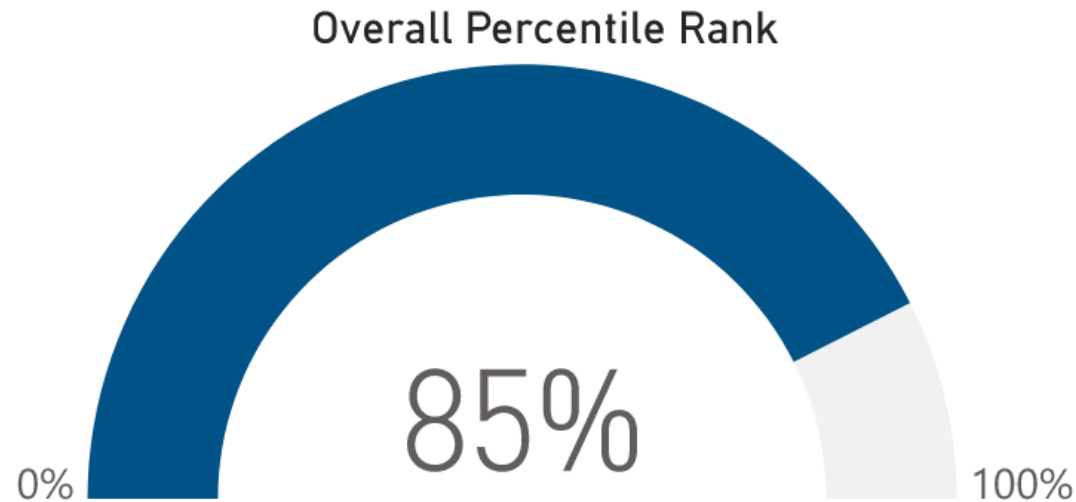


# FY 21 BRIC Qualitative Review Memo

| Recipient Name                             | Subgrant ID          | Subrecipient Name   | Subapplication Title                    |
|--|----------------------|---------------------|---|
| NORTH CAROLINA DEPARTMENT OF PUBLIC SAFETY | EMA-2021-BR-005-0015 | OAK ISLAND, TOWN OF | Oak-Island-Ocean Drive Drainage Project |



FEMA BRIC



DR-4487-NC

\$1,942,937

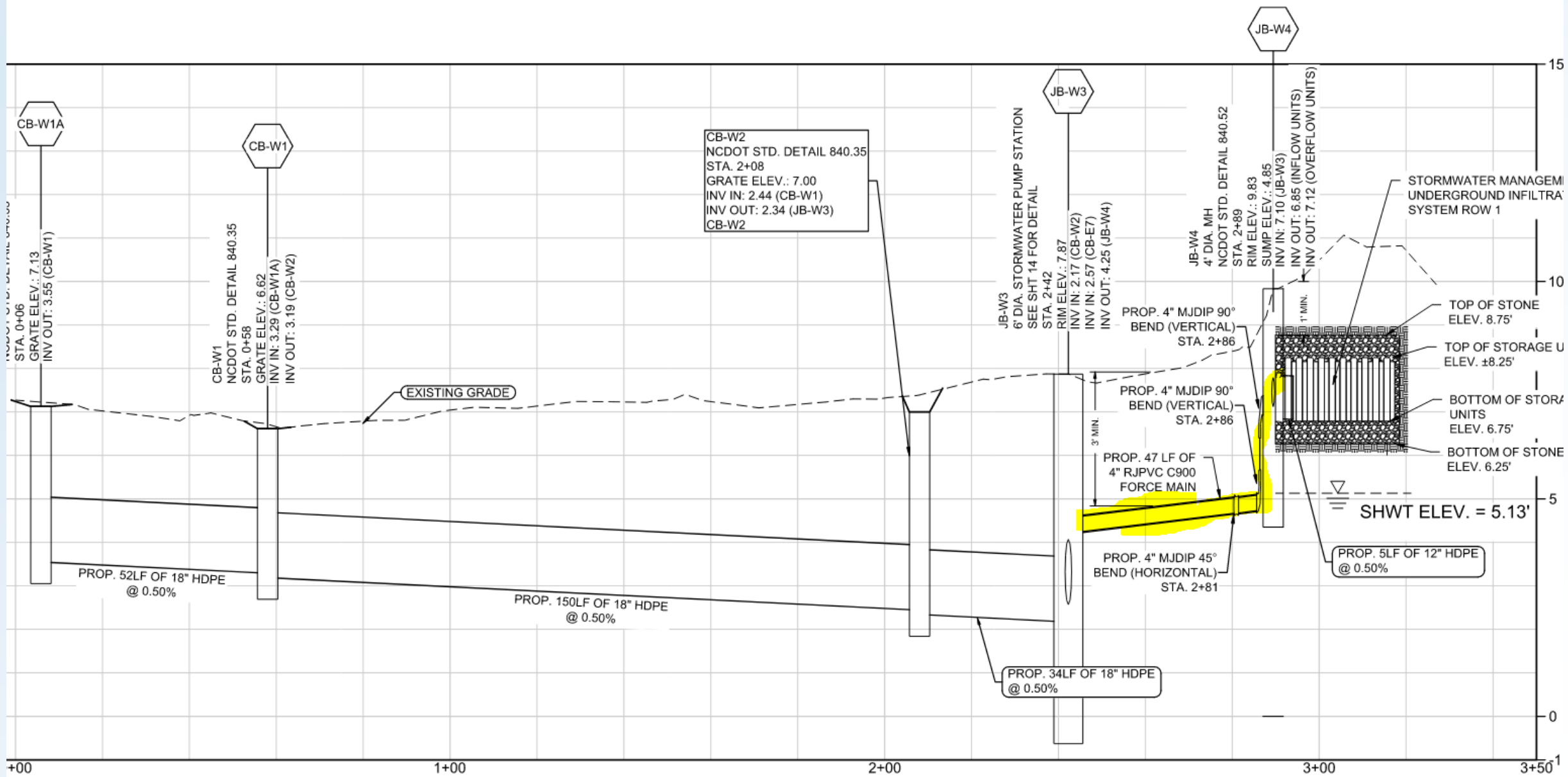
Subapplications selected in the FY 2021 National Competition performed between 31% to 98% in the National Panel Review

## Subapplication Qualitative Performance

FEMA convenes a National Review Panel to score competitive subapplications based on qualitative evaluation criteria during the National Competition. The subapplication performance is a percentage that is measured against the BRIC FY 21 NRP subapplication pool. The percentage in the visual is not a reflection of the subapplication's







CB-W2  
 NCDOT STD. DETAIL 840.35  
 STA. 2+08  
 GRATE ELEV.: 7.00  
 INV IN: 2.44 (CB-W1)  
 INV OUT: 2.34 (JB-W3)  
 CB-W2

JB-W3  
 6" DIA. STORMWATER PUMP STATION  
 SEE SHT 14 FOR DETAIL  
 STA. 2+42  
 RIM ELEV.: 7.87  
 INV IN: 2.17 (CB-W2)  
 INV IN: 2.57 (CB-E7)  
 INV OUT: 4.25 (JB-W4)

JB-W4  
 4" DIA. MH  
 NCDOT STD. DETAIL 840.52  
 STA. 2+89  
 RIM ELEV.: 9.83  
 SUMP ELEV.: 4.85  
 INV IN: 7.10 (JB-W3)  
 INV OUT: 6.85 (INFLOW UNITS)  
 INV OUT: 7.12 (OVERFLOW UNITS)

STORMWATER MANAGEMENT UNDERGROUND INFILTRATION SYSTEM ROW 1

TOP OF STONE ELEV. 8.75'  
 TOP OF STORAGE UNITS ELEV. ±8.25'  
 BOTTOM OF STORAGE UNITS ELEV. 6.75'  
 BOTTOM OF STONE ELEV. 6.25'

SHWT ELEV. = 5.13'

C-STRM-WEST PROFILE

H: 1"=20'

V: 1"=2'



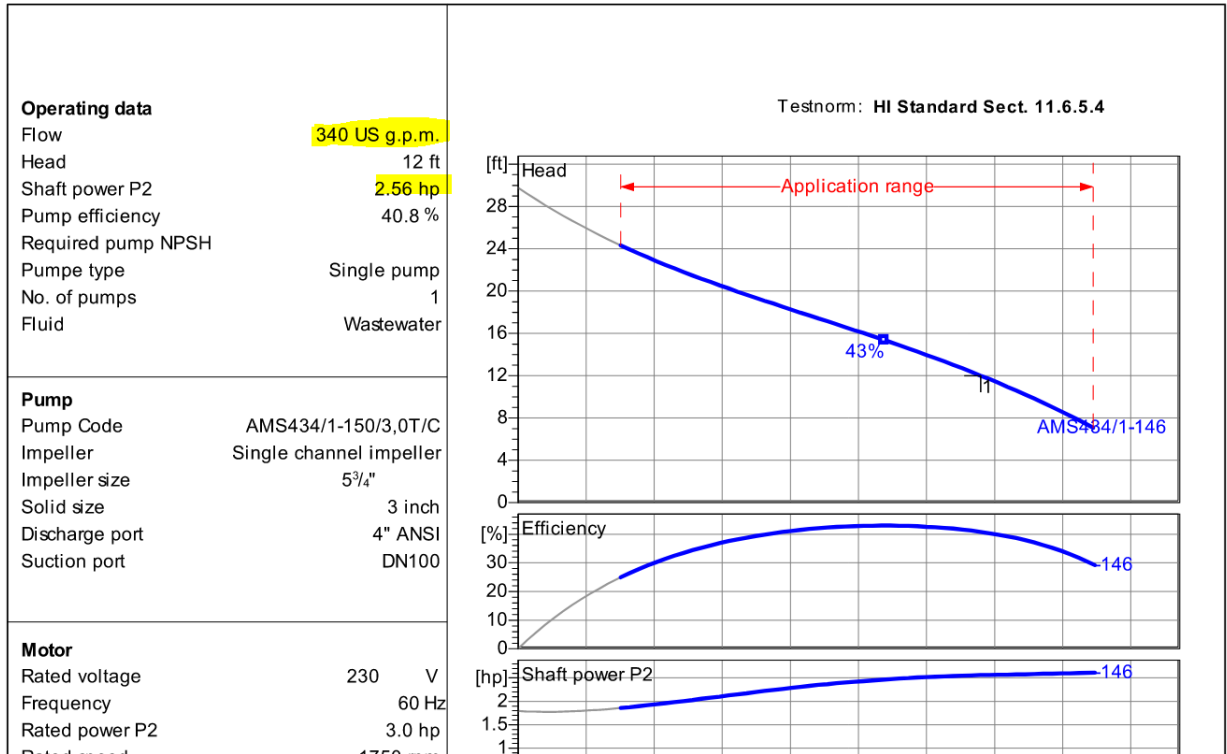






## Technical Information

AMS434/1-150/3,0T/C













So, what  
about  
the  
Cost?





**BID TABULATION SHEET**

OWNER: Town of Oak Island  
 PROJECT: Oak Island Building 801 Flooding Improvements  
 LOCATION: 720 Corproate Center Dr, Raleigh, NC 27607  
 DATE: 11/11/2022

~\$502,780



Raleigh, N.C.

NC License No F-0374

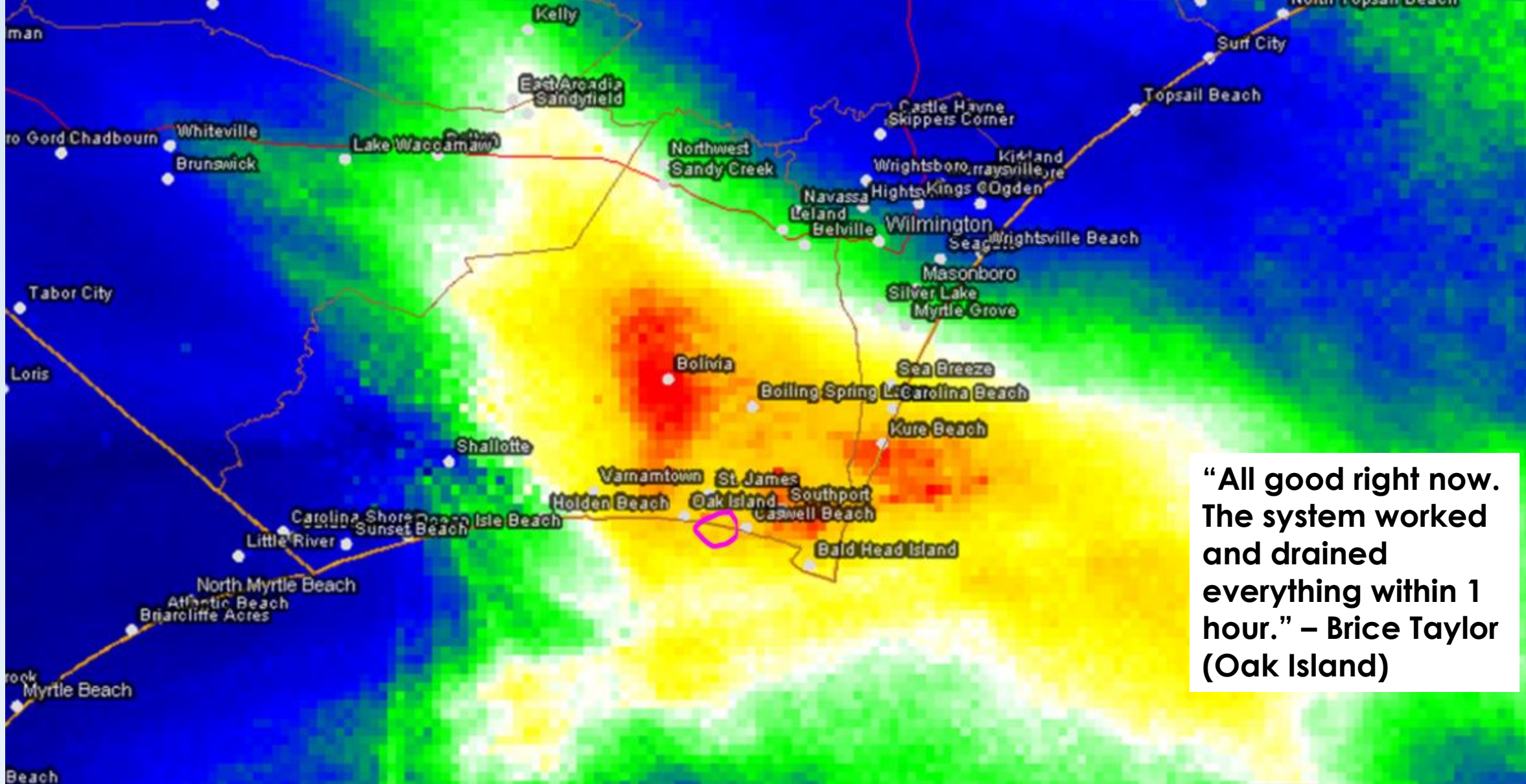
Please note that items that have been bolded, highlighted and italicized are mathematical corrections.

Nov 11 2022 12:56 PM

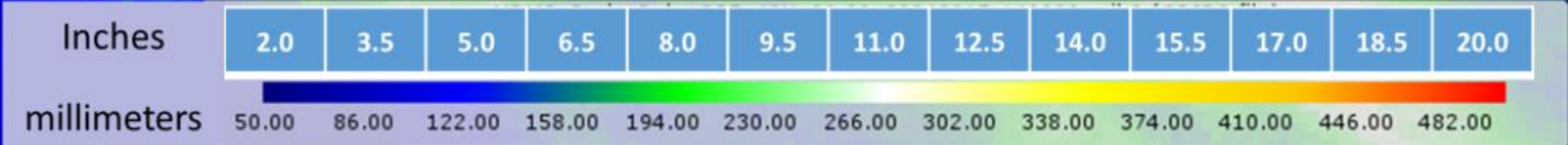
|                         |                |
|-------------------------|----------------|
| Firm:                   |                |
| Address:                |                |
| License Number/Bid Bond | NC License No. |

| ITEM NO. | PAYMENT SPECIFICATION REFERENCE | DESCRIPTION  | EST QTY        | UNIT          | UNIT PRICE        | TOTAL PRICE  |
|----------|---------------------------------|--|----------------|---------------|-------------------|--------------|
| 1        | 17113                           | Mobilization (5% of Total Cost)  | 1              | LS            | \$ 22,217.55      | \$ 22,217.55 |
| 2        | 311000                          | Clearing and Grubbing (Including shrub removal)  | 1              | LS            | \$ 2,650.00       | \$ 2,650.00  |
| 3        | SP-1                            | Furnish and Install Stormwater Management Underground Infiltration System (Storage Units Stone, Geotextiles, Grading, Testing, etc.) | 1165           | SF            | \$ 42.75          | \$ 49,803.75 |
| 4        | 329300                          | Dune Planting - Sea Oats   | 200            | EA            | \$ 3.18           | \$ 636.00    |
| 5        | 329300                          | Dune Planting - American Beachgrass  | 81             | EA            | \$ 3.18           | \$ 257.58    |
| 6        | 329300                          | Dune Planting - Saltmeadow Cordgrass   | 120            | EA            | \$ 3.18           | \$ 381.60    |
| 7        | <del>329300</del>               | <del>Dune Planting - Seashore Elder</del>  | <del>400</del> | <del>EA</del> | <del>\$0.00</del> | 0            |
| 8        | <del>329300</del>               | <del>Dune Planting - Beachgrass</del>  | <del>2</del>   | <del>EA</del> | <del>\$0.00</del> | 0            |
| 9        | <del>329300</del>               | <del>Dune Planting - Virginia Creeper</del>  | <del>8</del>   | <del>EA</del> | <del>\$0.00</del> | 0            |
| 10       | <del>329300</del>               | <del>Dune Planting - Shining Sumac</del>   | <del>2</del>   | <del>EA</del> | <del>\$0.00</del> | 0            |





“All good right now. The system worked and drained everything within 1 hour.” – Brice Taylor (Oak Island)







WATCH FOR  
**BEACH WARNING LIGHTS**  
LUCES DE ADVERTENCIA DE PLAYA

- Red - High Hazard**  
Strong Currents and/or High Waves  
Rojo - Peligro Alto, Corrientes Fuertes o Olas Altas
  - Yellow - Medium Hazard**  
Moderate Currents and/or Waves  
Amarillo - Peligro Medio, Corrientes Moderadas o Olas
  - Green - Low Hazard**  
Calm Conditions, Exercise Caution  
Verde - Peligro Bajo, Condiciones Tranquilas, Precaución Del Ejercicio
  - Purple - Stinging Marine Life**  
Man o' War and/or Jellyfish and/or Stingrays  
Purpura - Vida Marina Punzante, Fragata Portuguesa o Medusas o Rayas
  - Double Red - Water Closed**  
No Swimming Allowed, Water Closed to Public  
Doble Rojo - No Se Permite Nadar, Agua Cerrada al Publico
- Absence of Lights Does Not Indicate Safe Waters  
La Ausencia de Luces No Indica Aguas Seguras

WFN  
Town of Oak Island  
Beach Safety Information At:  
[OakIslandNC.gov/SAFETY](http://OakIslandNC.gov/SAFETY)  
SwimSmart



**SHARED VISION:  
ENTELECHY -> PRACTICAL USEFULNESS COMPARED TO  
THEORETICAL ELEGANCE.**





# Thank You!

Marc T. Horstman, PE, PH, BC.WRE, CFM  
Senior Project Manager  
[mhorstman@wkdickson.com](mailto:mhorstman@wkdickson.com)

