

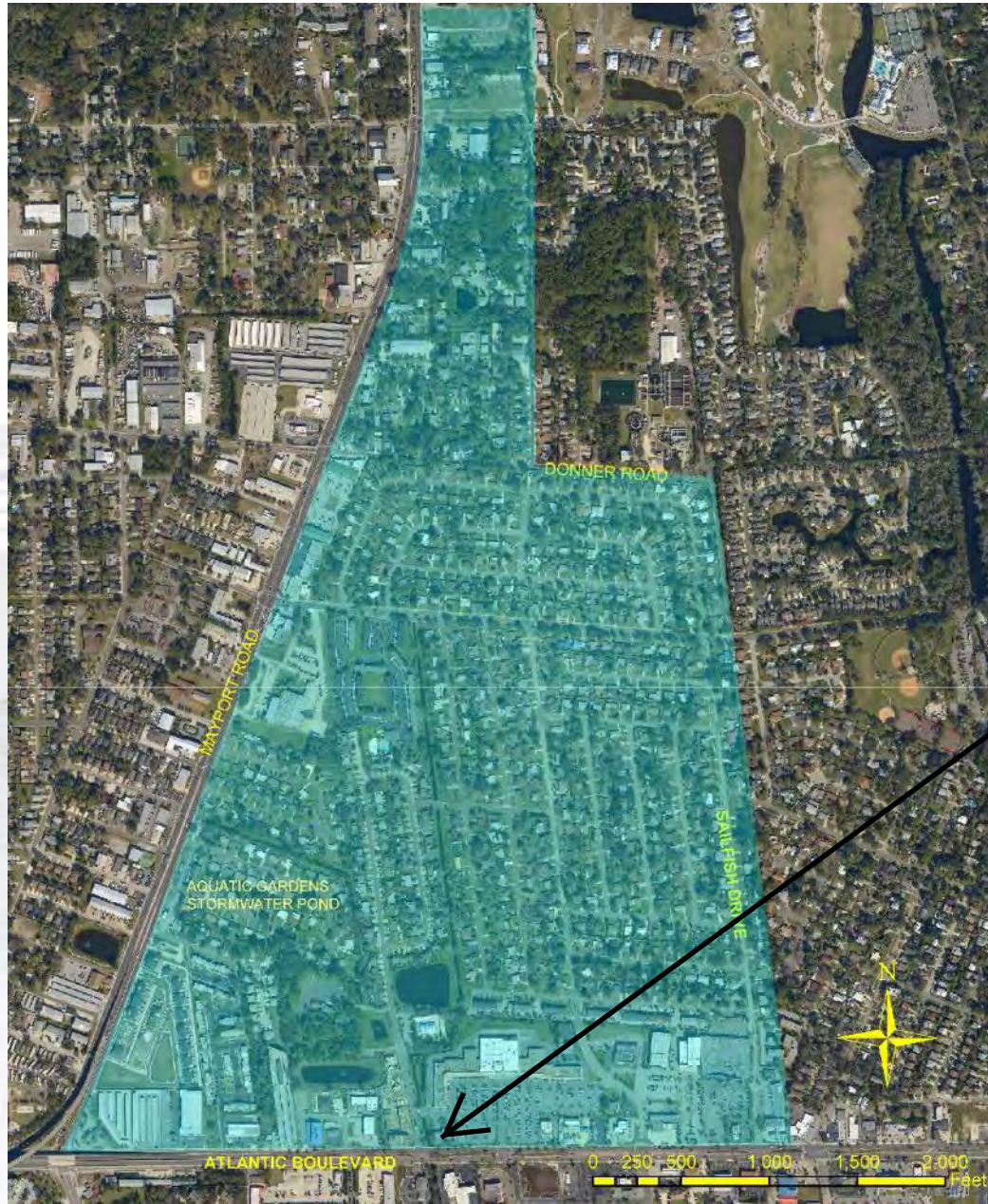
Aquatic Gardens Drainage Improvement Project



Project Goals

- **Primary Goal** – Provide Additional Protection to Homes
- **Secondary Goal** – Reduce Street & Property Flooding
 - Duration
 - Extent
- **Provide Flexibility for Future Expansion**
 - Sea Level Rise
 - Larger Rain Events
- **Be Cost Effective**

Hopkins Creek Drainage Basin



ABOUT 340 ACRES
DRAIN THROUGH
HOPKINS CREEK
ATLANTIC BLVD

1943 Overlay

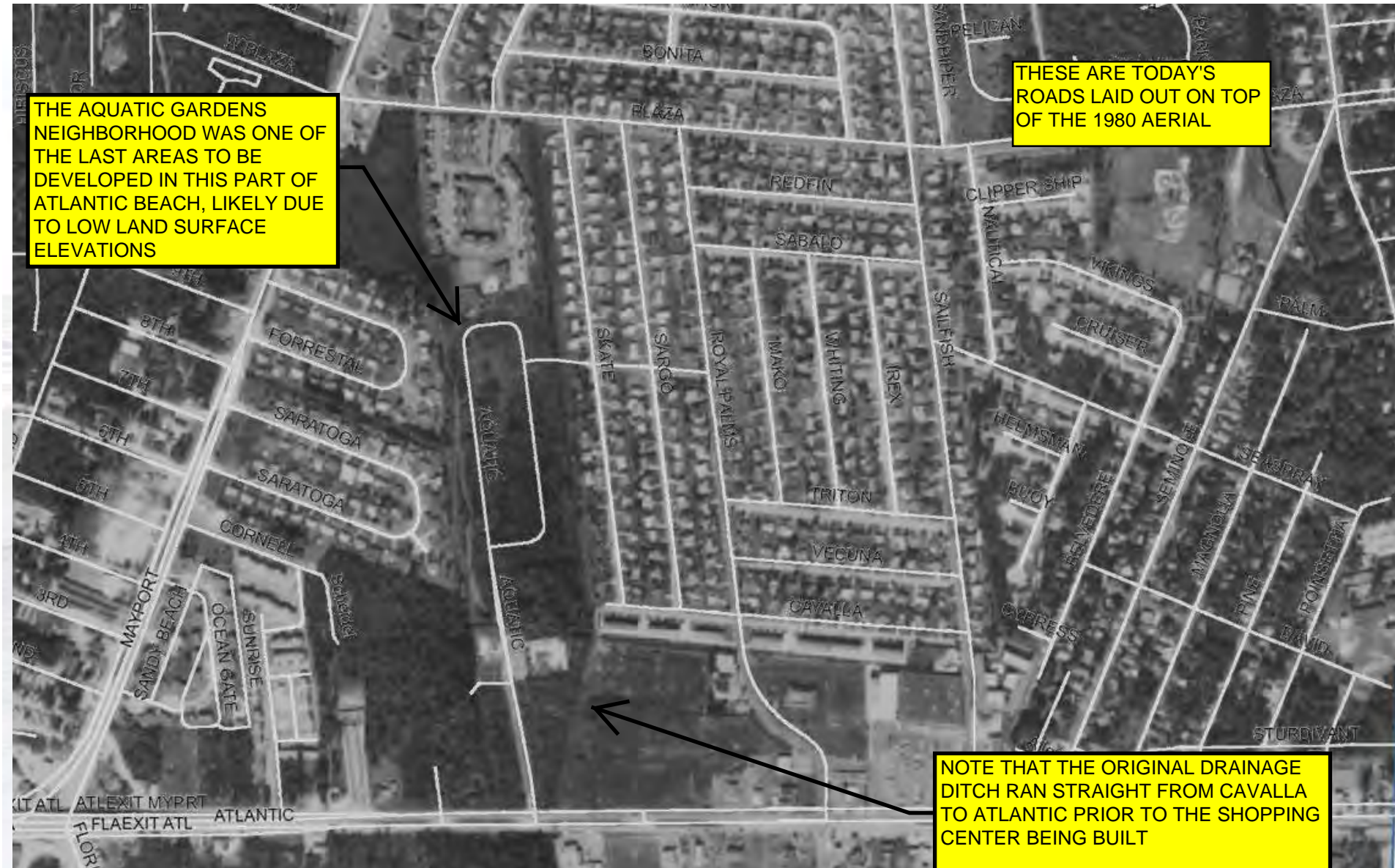


1980 Overlay

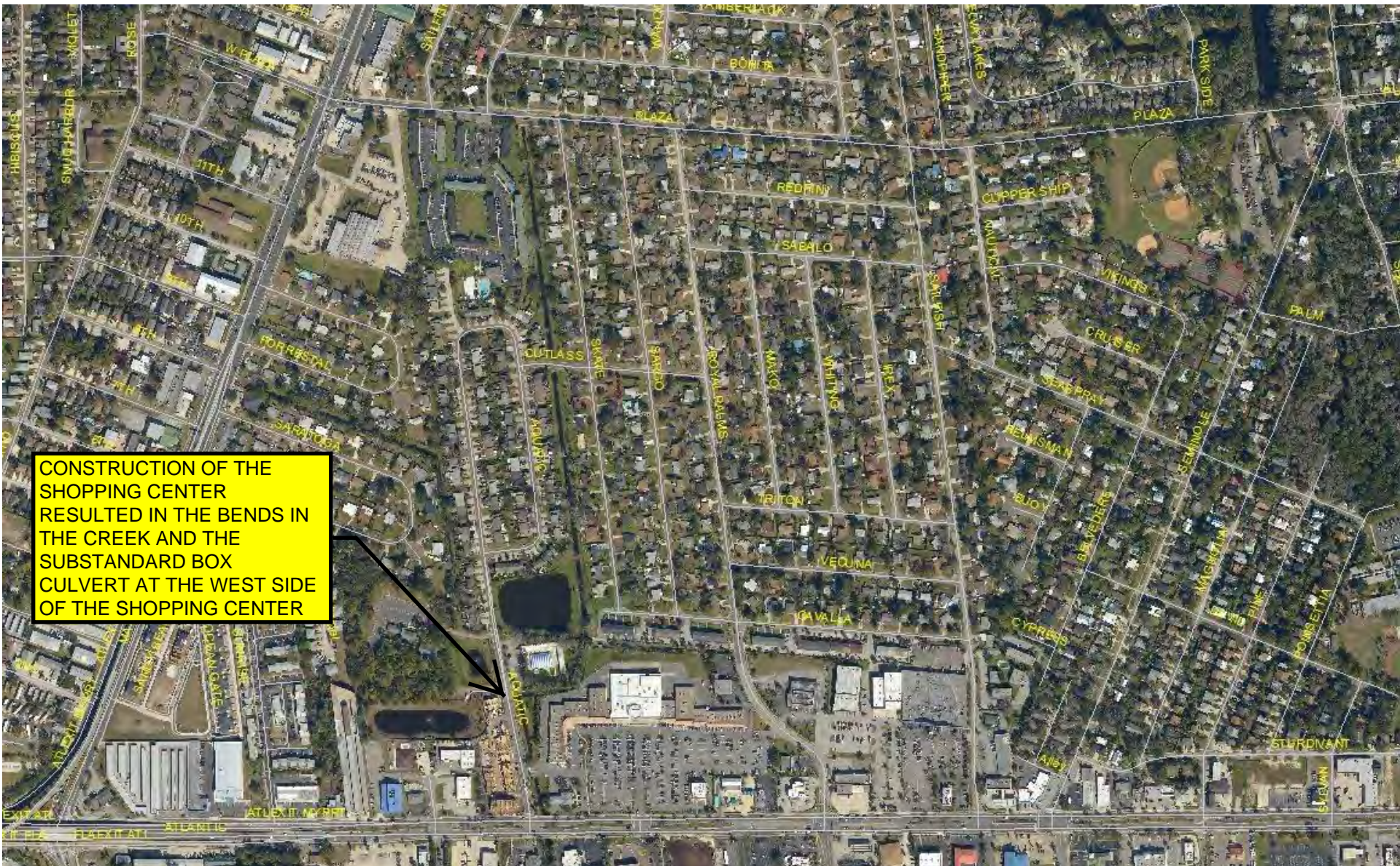
THE AQUATIC GARDENS NEIGHBORHOOD WAS ONE OF THE LAST AREAS TO BE DEVELOPED IN THIS PART OF ATLANTIC BEACH, LIKELY DUE TO LOW LAND SURFACE ELEVATIONS

THESE ARE TODAY'S ROADS LAID OUT ON TOP OF THE 1980 AERIAL

NOTE THAT THE ORIGINAL DRAINAGE DITCH RAN STRAIGHT FROM CAVALLA TO ATLANTIC PRIOR TO THE SHOPPING CENTER BEING BUILT



Present Day



Drainage Considerations

- Flat Terrain
- Tidal Influence
- Existing Development
- Reduced Conveyance and Storage
- Sea Level Rise
- Outfall through Neptune Beach

THIS MEANS IT IS A HARD AREA TO DRAIN AND SMALL INCREASES IN DOWNSTREAM WATER LEVELS IMPACT THE ABILITY OF THE WATER TO EFFICIENTLY DRAIN

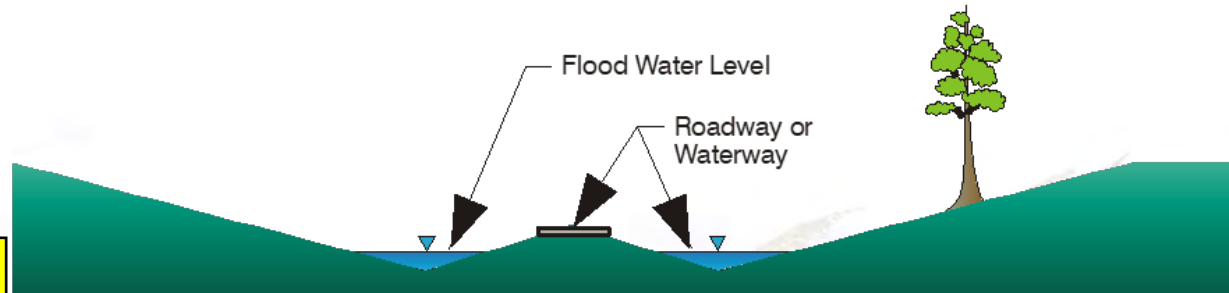
THIS IS NOW A FULLY DEVELOPED AREA AND THE WATER RUNS OFF MUCH FASTER THAN IT DID PRIOR TO DEVELOPMENT

FUTURE SEA LEVEL RISE WILL RESULT IN HIGHER DOWNSTREAM WATER LEVELS

THE CULVERTS AT FLORIDA BLVD AND FORREST AVE IN NEPTUNE BEACH ALSO RESTRICT THE DRAINAGE

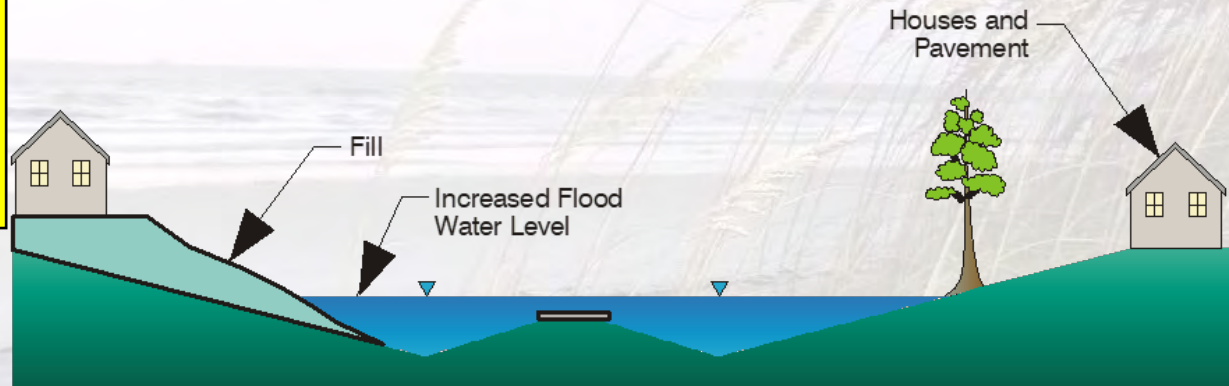
Impacts from Development

CASE 1:
Base Conditions

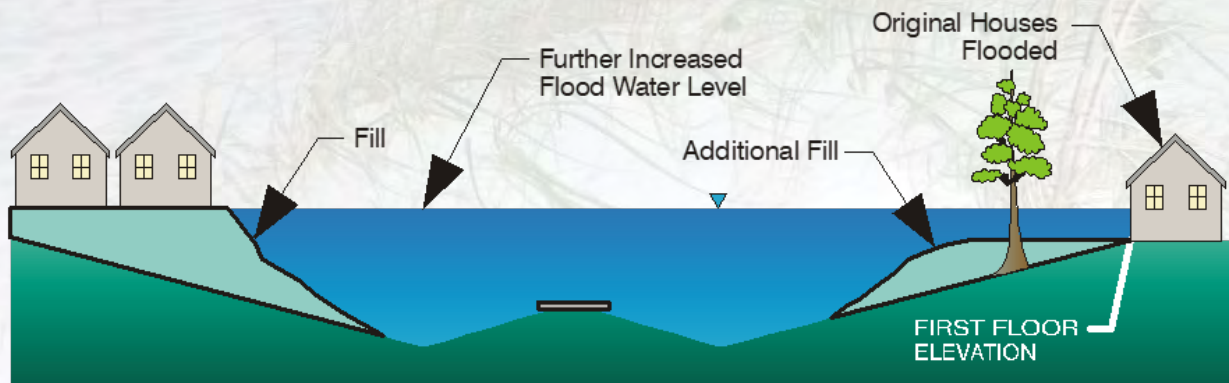


AS THE AREA WAS DEVELOPED, THE VOLUME OF RUNOFF INCREASED AND STORAGE IN THE SYSTEM DECREASED, RESULTING IN HIGHER WATER LEVELS IN THE DRAINAGE DITCH

CASE 2:
Runoff Increased Due to Pavement and Lost Floodplain Storage Due to Fill



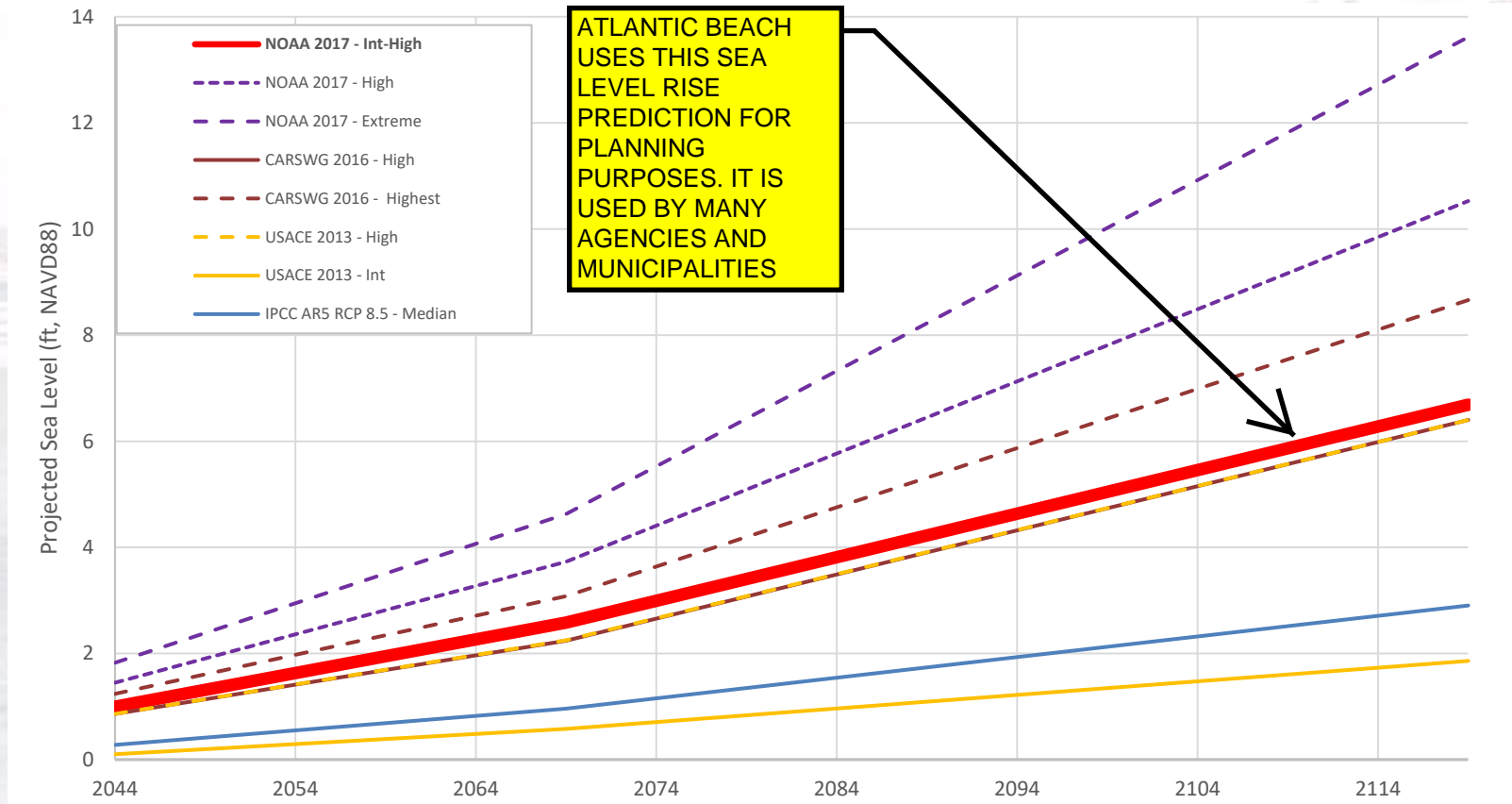
CASE 3:
Further Increases in Runoff Due to Pavement and Lost Floodplain Storage Due to Fill



FEMA 100-Yr Flood Event



Estimates of Sea Level Rise at Mayport



WE ARE CONSERVATIVELY EXPECTING OVER 1 FT OF SEA LEVEL RISE IN THE NEXT 25 YEARS

Scenario	Projected Sea Level Rise (feet)
2044	1.06
2069	2.65
2119	6.75

100-Yr Flood in 2044





Case Study

August 2016 Storm Event

- 2.3" of Rain
- Storm Duration = 1 hour
- Resulted in ditch bank overtopping and street flooding

THIS STORM WAS A TYPICAL AFTERNOON THUNDERSTORM EXCEPT THAT IT STALLED OUT OVER ATLANTIC BEACH, HENCE THE 2.3" OF RAIN.

IT IS A GOOD CASE STUDY BECAUSE IT HAPPENED DURING THE AFTERNOON AND PHOTOS AND MEASUREMENTS WERE ABLE TO BE MADE DURING AND AFTER THE STORM.

August 2016 Storm Event

OVERFLOWING ON TO
STREET AT AQUATIC DRIVE
JUST SOUTH OF BAC



VIEW TO NORTH
ALONG DRAINAGE
DITCH FROM
CAVALLA, AQUATIC
GARDENS POND IS
ON THE LEFT



NORTHEAST
CORNER OF
DRAINAGE DITCH
AT CUTLASS

August 2016 Storm Event



DRAINAGE DITCH
FILLED UP FASTER
THAN THE POND
AND OVERTOPPED
THE POND BANK

BLUE LINE WAS THE MEASURED WATER LEVEL AT THE PEAK OF THE STORM

Water Level Profile

Cutlass Dr

Cavalla Dr

Aquatic Dr

Atlantic Blvd

Florida Blvd

6.5

6.0

5.5

5.0

THIS SECTION OF THE LINE REPRESENTS THE PEAK WATER SURFACE BETWEEN CAVALLA DR AND THE BOX CULVERT AT THE SHOPPING CENTER ENTRANCE.

THE TIGHT NARROW TURNS IN THE DITCH IN THIS AREA RESULTS IN RESTRICTIONS TO WATER FLOW. BECAUSE OF THESE RESTRICTIONS, THE WATER LEVEL AT CAVALLA WAS OVER 8" HIGHER THAN IT WAS AT THE BOX CULVERT

THIS IS THE BOX CULVERT AT AQUATIC DRIVE AT THE SHOPPING CENTER DRIVEWAY

BECAUSE THE BOX CULVERT IS UNDERSIZED, WATER CAN'T FREELY FLOW THROUGH IT. BECAUSE OF THIS RESTRICTION, THE WATER LEVEL WAS ABOUT 3" HIGHER ON THE UPSTREAM SIDE THAN IT WAS ON THE DOWNSTREAM SIDE

TAKE HOME MESSAGE IS THAT RESTRICTIONS IN THE DITCH RESULTED IN THE WATER LEVEL AT CAVALLA DR TO BE ALMOST 12" HIGHER THAN AT ATLANTIC BLVD DURING THIS STORM EVENT

August 3, 2016 Storm Event

10-Year Storm Event, Preliminary FIS Map

50-Year Storm Event, Preliminary FIS Map

Improvements Made to Date



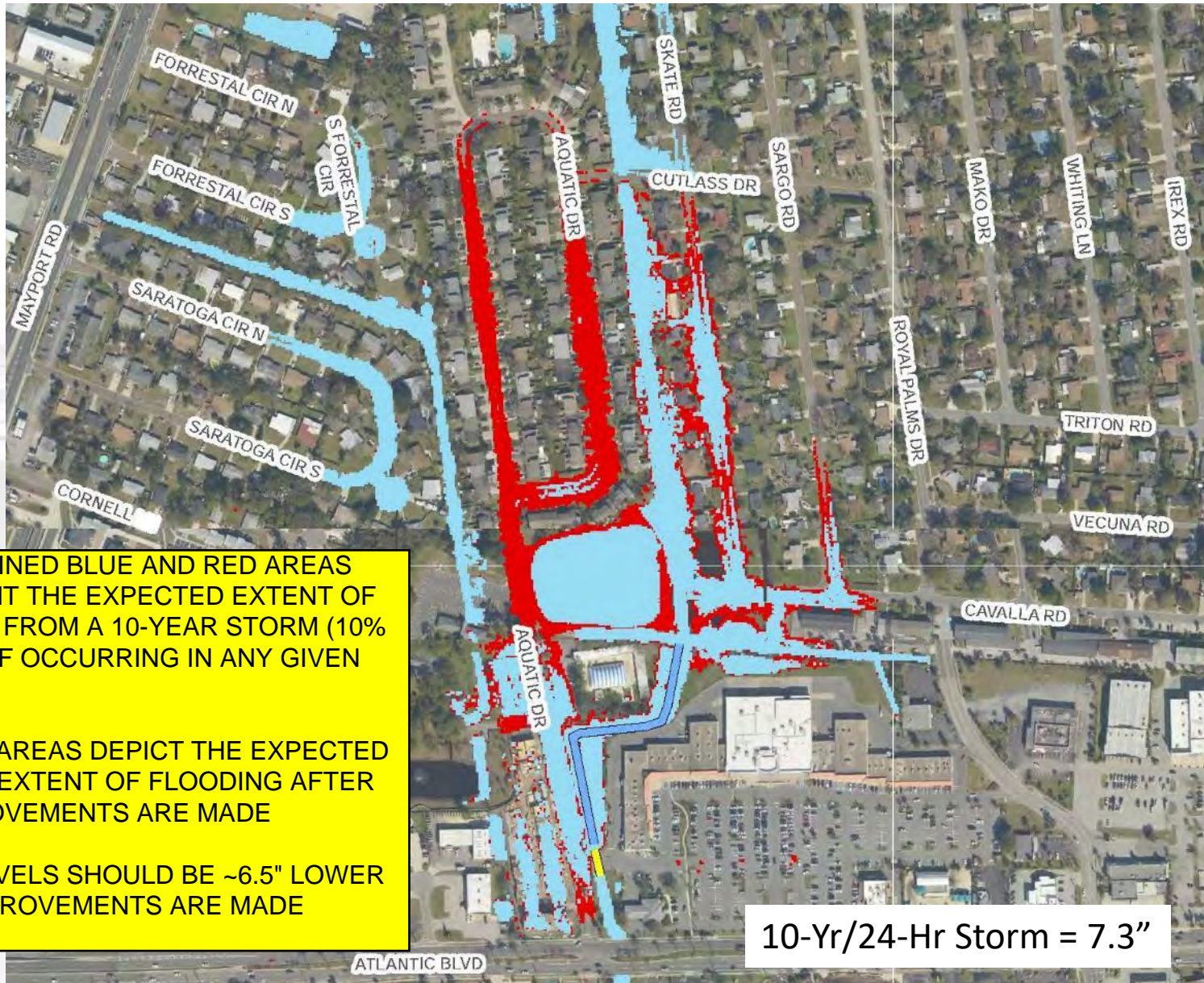
Proposed Improvements



Proposed Improvements



10-Year Flood Event



25-Year Flood Event



THE COMBINED BLUE AND RED AREAS REPRESENT THE EXPECTED EXTENT OF FLOODING FROM A 10-YEAR STORM (4% CHANCE OF OCCURRING IN ANY GIVEN YEAR)

THE BLUE AREAS DEPICT THE EXPECTED REDUCED EXTENT OF FLOODING AFTER THE IMPROVEMENTS ARE MADE (~7.5\"/>

ALTHOUGH THE IMPROVEMENTS DON'T APPEAR TO BE TOO GREAT, REMEMBER THIS IS A VERY FLAT AREA AND INCHES MATTER. THESE IMPROVEMENTS ARE ACTUALLY PRETTY SIGNIFICANT

25-Yr/24-Hr Storm = 9.2\"/>

Timeline & Cost

Timeline

Design Complete	Nov 2020
Award Bid	Jan 2021
Complete Construction	Dec 2021

Cost

Design	\$314,000
Construction	<u>\$2,400,000</u>
Total Cost	\$2,714,000

Funding Sources

HMGP Design Grant	\$236,000 - Awarded
HMGP Construction Grant	\$1,500,000 - Awarded
Legislative Appropriation	\$200,000 - Awarded
CDBG-MIT Grant	<u>\$1,854,000</u> - Under Review
	\$3,790,000

COMPLETE DESIGN PLANS AND PERMITS ARE EXPECTED BY THE END OF NOVEMBER.

THIS PROJECT WILL BE PRIMARILY FUNDED THROUGH A \$1.5M FEMA HAZARD MITIGATION GRANT (HMGP). THE GRANT HAS BEEN AWARDED TO THE CITY AND WHEN THE DESIGN AND PERMITTING ARE COMPLETED, FEMA WILL RELEASE THE CONSTRUCTION FUNDS.

RELEASE OF THE FUNDS SHOULD OCCUR QUICKLY ALLOWING CONSTRUCTION TO BEGIN IN THE FIRST QUARTER OF 2021

With CDBG-MIT Grant award – Additional ditch widening and replacement of the box culvert at Cutlass Dr. will be completed

Future Improvements

IF THE CITY IS AWARDED THE CDBG-MIT GRANT WE APPLIED FOR, THESE IMPROVEMENTS COULD POTENTIALLY BEGIN NEXT YEAR

- Enlarge Cutlass Dr. culvert
- Widen ditch to Plaza
- Work with Jax & Neptune Bch to enlarge Florida Blvd & Forrest Ave Culverts

THESE TWO CULVERTS ARE UNDERSIZED AND CAN RESTRICT FLOW DURING SEVERE STORMS. ENLARGING THEM WILL HELP FURTHER REDUCE THE WATER LEVELS IN THE DITCH