

USING RISK-BASED ANALYSIS TO GUIDE STORMWATER PLANNING

Case Study in Bonita Springs, Florida



AMERICAN
STRUCTUREPOINT
INC.



INTRODUCTIONS



NICK HARRISON, PE
American Structurepoint,
Vice President

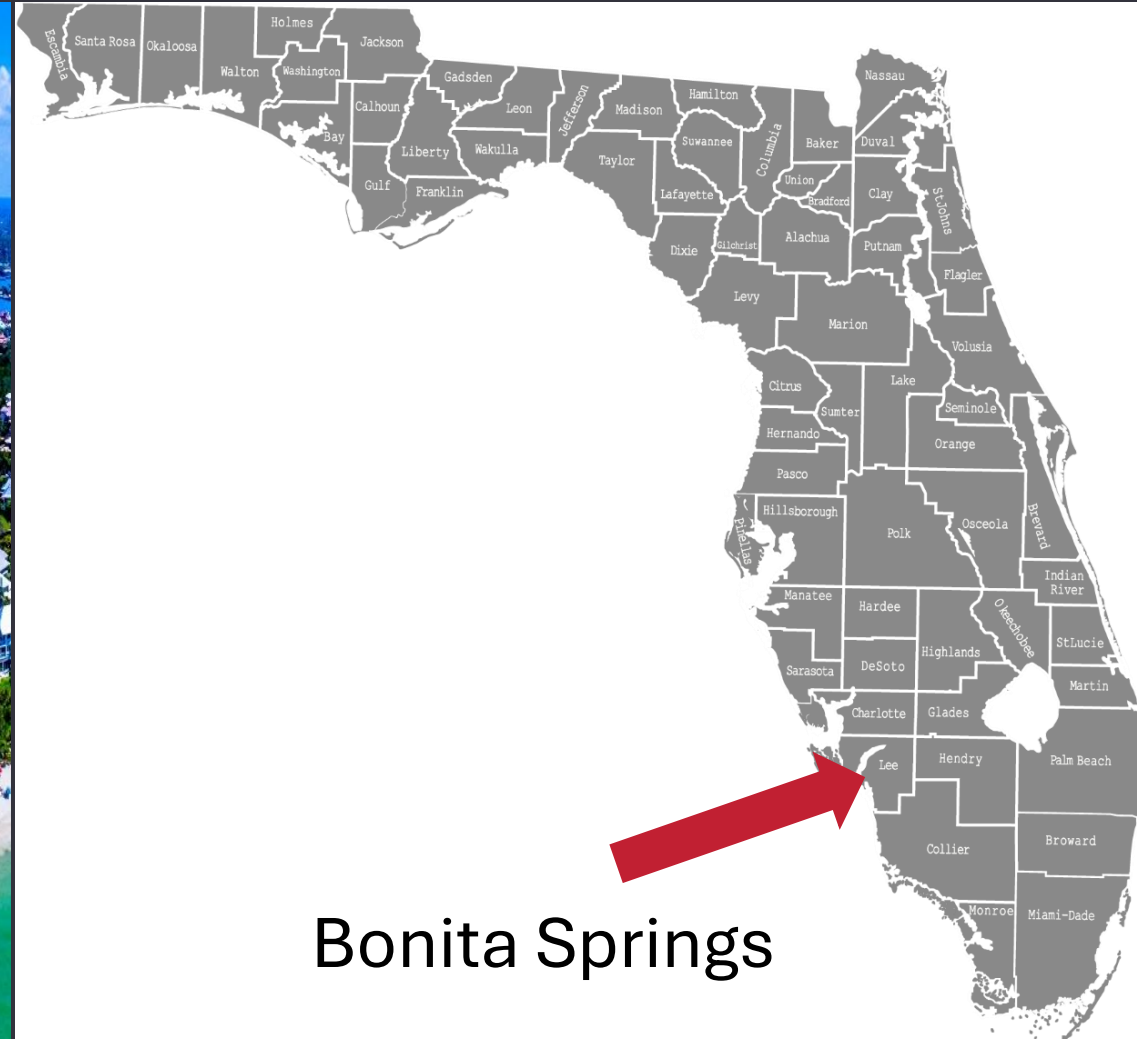


ELLY SOTO McKUEN
Bonita Springs, Senior
Project Manager

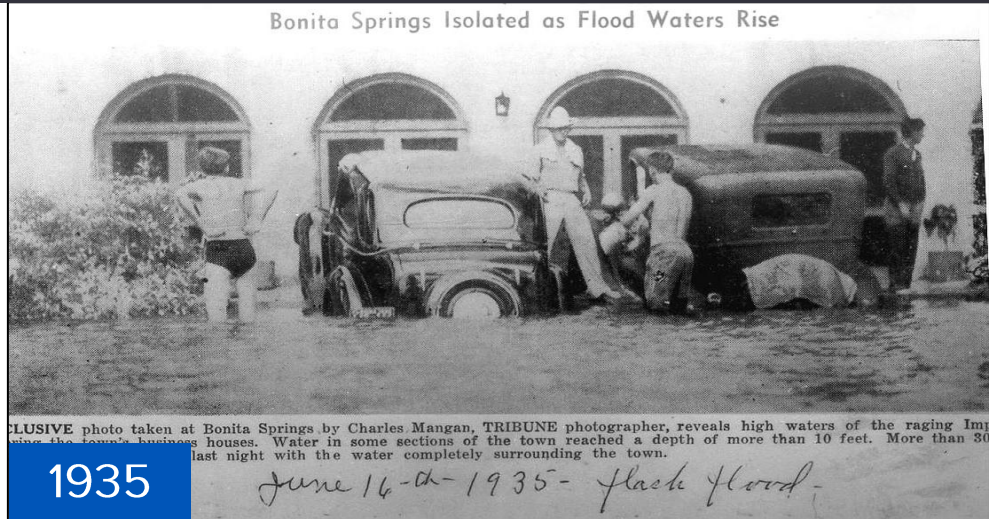


DAVE HAAS, PE
American Structurepoint,
Team Leader/Project Manager

Bonita Springs, Florida



Flooding: A Historic Issue



Summary of Recent Flooding Events

DATE	RECORDED FLOODING EVENT
August 1995	Tropical Storm Jerry
October 1995	Hurricane Opal
September 1999	Tropical Storm Harvey
August 2000	Unnamed Flooding Event
June 2003	Unnamed Flash Flooding Event
August 2008	Tropical Storm Fay
September 2017	Hurricane Irma
September 2022	Hurricane Ian

Hurricane Irma – September 2017



Impacts of Hurricane Irma

- Significant damage to homes and property
- Standing water inside 250+ homes
- Delays of power restoration and cleanup
- Impacts to water & sanitary sewer
- Residents out of their homes for months



Bonita Beach Road, City of Bonita Springs

How does a city maintain resilience and work to reduce future risk?

- Where do you start?
- How much is it going to cost?
- Who pays for it?
- What partners, if any, can you count on?
- Will the neighborhood support your solutions?
- How do you “stack” funding success?
 - Is it even possible to stack funding?
- What is the ultimate goal?



Project Challenges and Goals

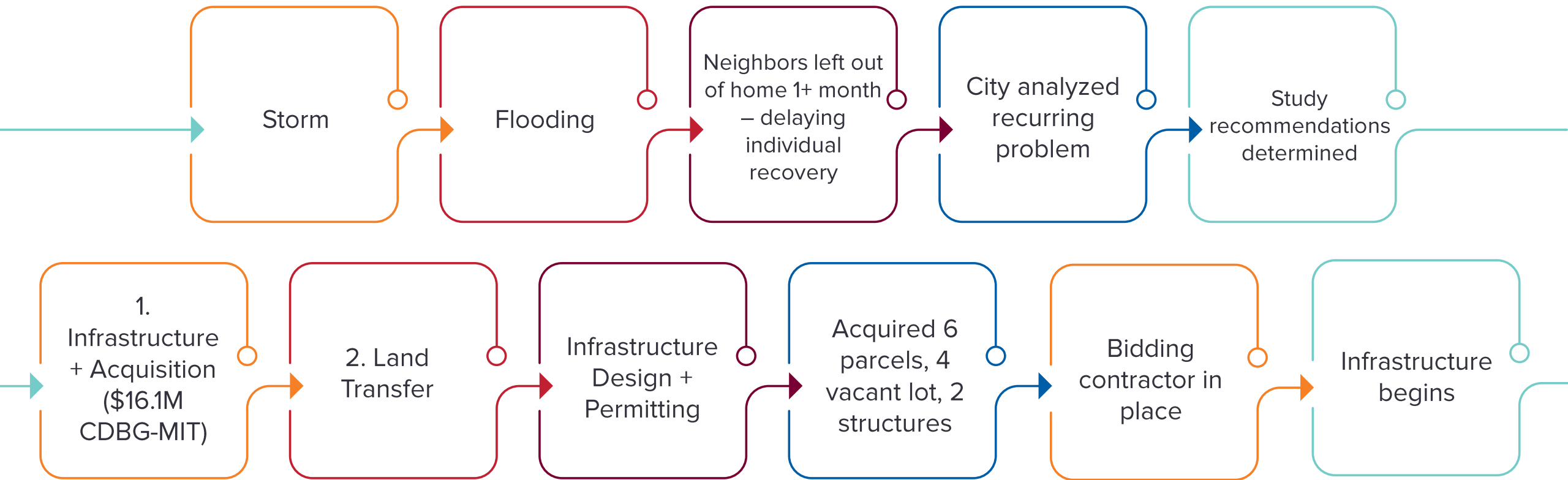
CHALLENGES

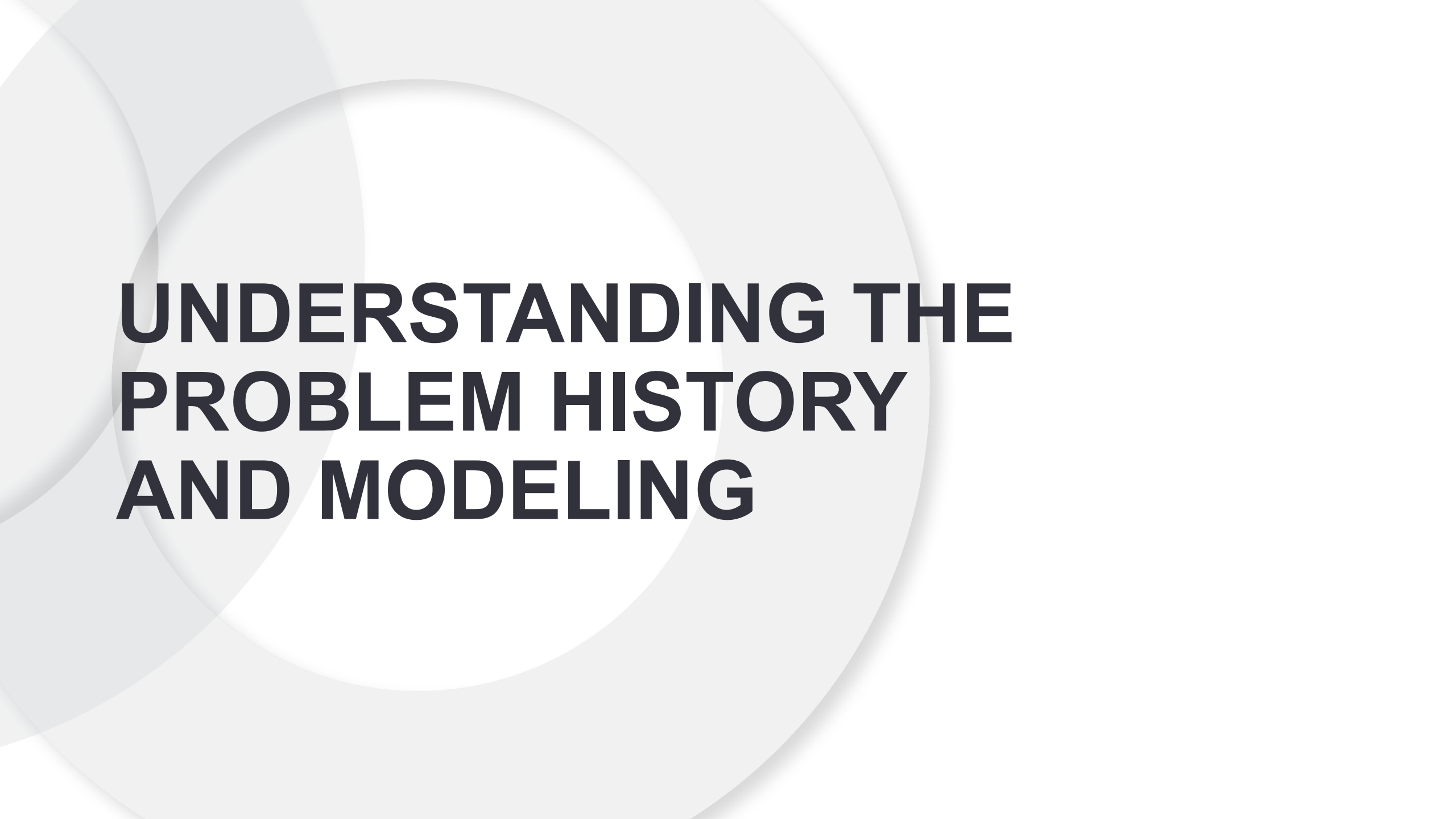
- Number of homes at risk of flooding.
- Frequency of storm events and history of flooding.
- Existing low-lying topography in the floodplain.
- Neighborhood proximity to the Imperial River.
- Risk reduction vs. flood protection.

GOALS

- Assess levels of existing flood risk in the project area.
- Communicate existing risk to neighborhood residents and property owners.
- Design stormwater infrastructure to reduce flooding extents and duration during, high-probability storm events.

Project Development Process





UNDERSTANDING THE PROBLEM HISTORY AND MODELING

Understanding the Problem – Study Areas



Understanding the Problem – Study Areas

Imperial Bonita Estates

- Lime Street to the west
- Imperial Pines Way to the north
- Mallard Lane to the east
- Imperial River to the south

Dean/Quinn Street South

- Imperial River to the north
- I-75 to the east
- Bonita Beach Road to the south
- Lime Street to the west



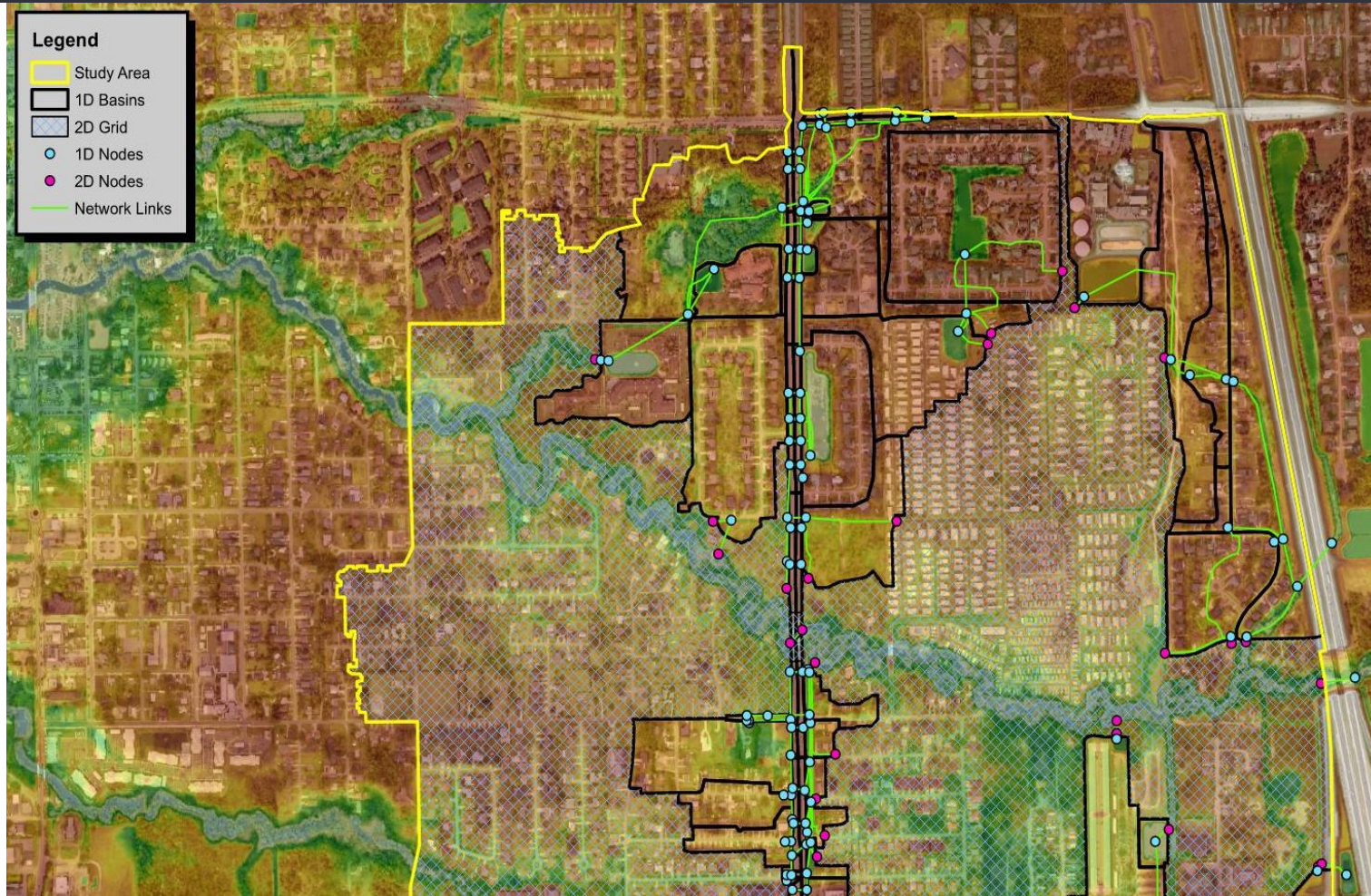
Understanding the System

1D Surface Flow:

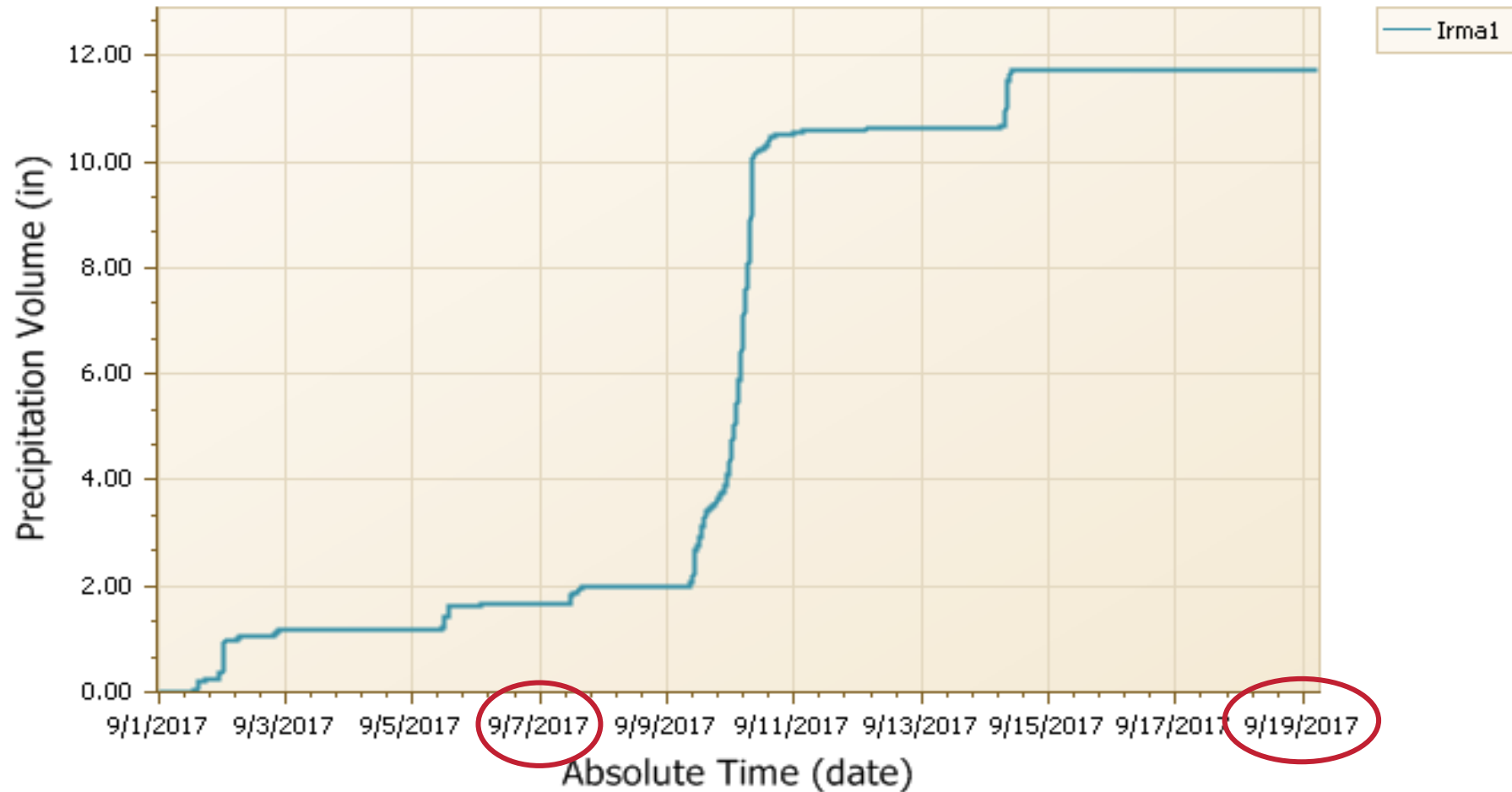
- Basins delineated in areas with existing stormwater storage and drainage infrastructure

2D Overland Flow:

- Mesh assigned to areas with little existing drainage infrastructure



Rainfall Data

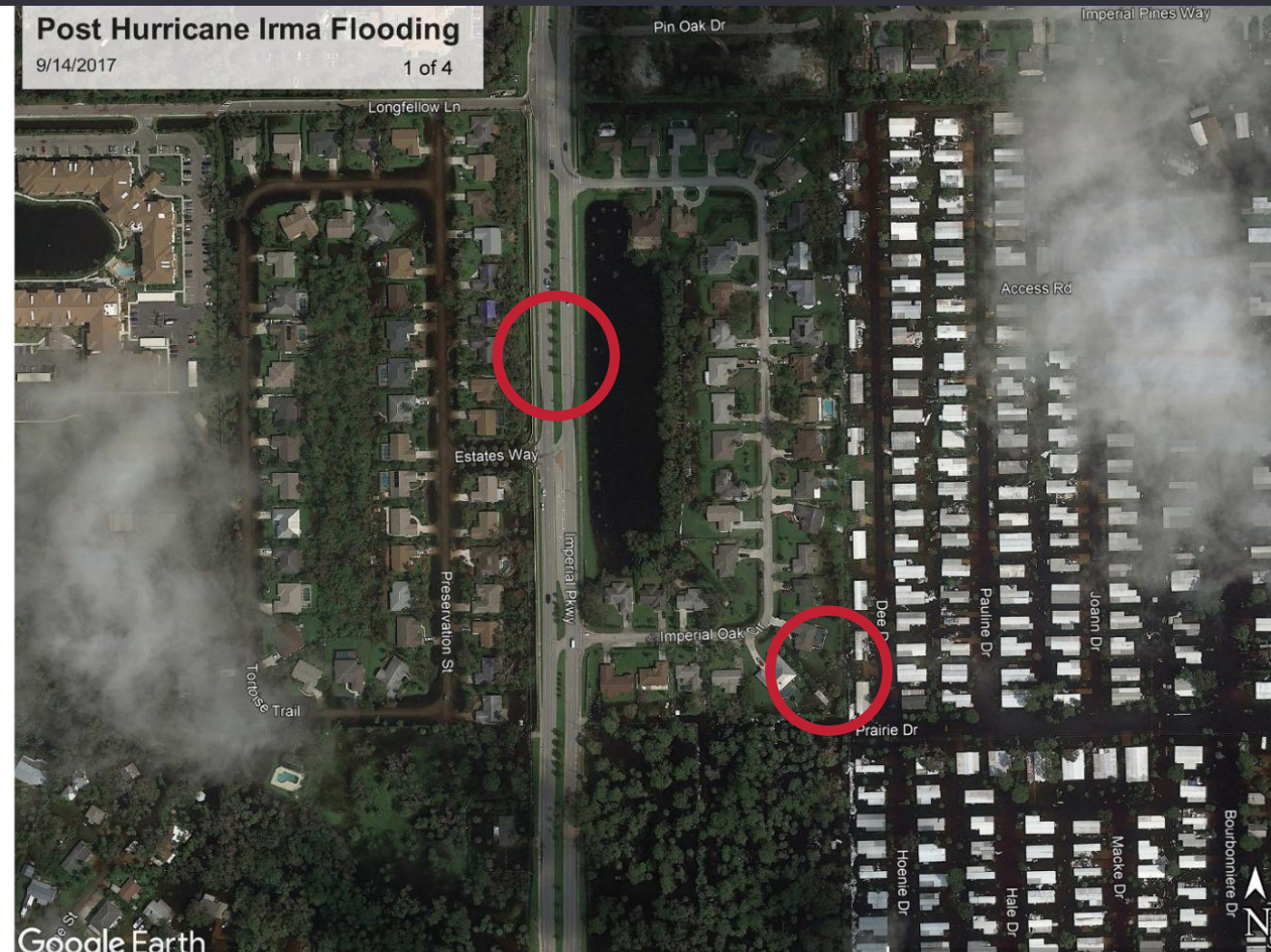


Model vs. Actual Flooding Comparison



Key: Max Depth (inches of water)

Blue: 1.01 – 2.00" | Purple: 2.01 – 3.00"
Pink: 3.01 – 5.00" | Red: 5.01 – 12.45"





ALTERNATIVE ANALYSIS

Considered Alternatives

Major conveyance upgrades

Pumping station

Large storage areas

Combinations

Floodwalls and levees

Others

Flood Risk Reduction Alternatives

- Based on results of existing conditions reviewed potential alternatives
- Alternatives were proposed to “build” off each other
 - Alt. 1 - Additional storm water infrastructure and backflow prevention
 - Alt. 2 – Strategic floodwater storage locations
 - Alt. 3a – Levees and portable pumps
 - Alt. 3b – Levees and pump stations



Advantages vs. Disadvantages of Alternatives

- **Alternative 1: Stormwater infrastructure – pipes and inlets**
 - **Advantages**
 - Relatively easy to construct
 - Gives locations for positive outlet to Imperial River
 - Relatively low cost
 - **Disadvantages**
 - Would not convey when Imperial River is high
 - Limited benefit for higher rainfall/flooding events



Advantages vs. Disadvantages of Alternatives

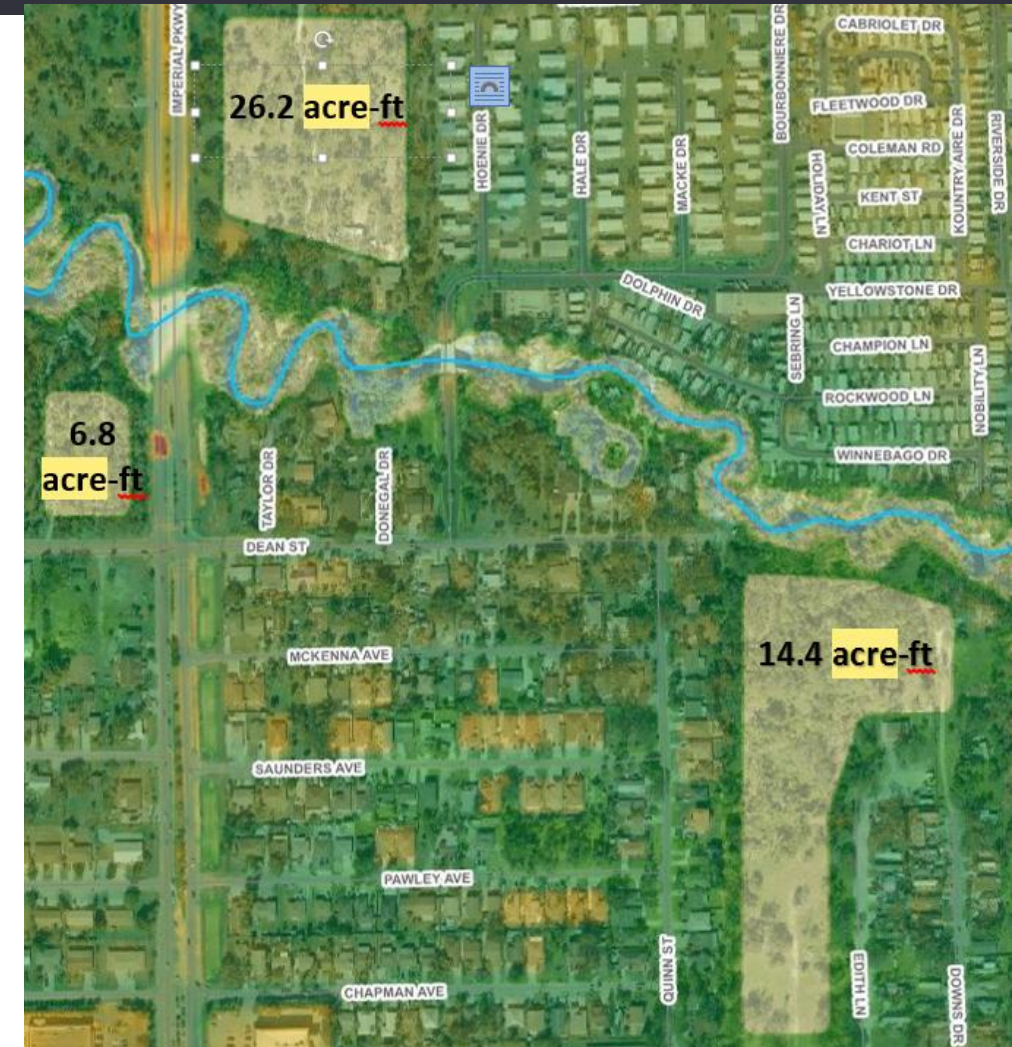
- **Alternative 2: Strategic flood storage locations**

- **Advantages**

- Relatively easy to construct
- Direct locations for potential pumping
- Relatively low cost to construct and maintain
- Helps for both local rainfall and riverine flooding

- **Disadvantages**

- Lack of available land
- Relatively high land cost



Advantages vs. Disadvantages of Alternatives

- **Alternative 3A & 3B: Levees and pump stations**
 - **Advantages**
 - Significantly reduced risk of flooding
 - If accredited, removal of area from floodplain
 - **Disadvantages**
 - Design criteria – federal regulation or recent event?
 - Federal – 10-foot wall
 - Irma – 4–5-foot wall
 - Very high cost
 - Lack of available land – create a wall?
 - How to evacuate people if surrounded by floodwaters
 - Significant operations and maintenance effort
 - Floods neighbors downstream



Recommended Solutions

Description	Estimated Construction Cost	Estimated Professional Services Fee	Estimated Land Costs	Estimated Total Cost of Project
Alt 1 - Storm Sewers and Backflow Prevention	\$5,351,379	\$535,138		\$5,886,517
Alt 2 - Strategic Flood Storage Areas	\$7,571,709	\$757,171	\$3,450,210	\$11,959,090
Alt 3A & 3B - Flood Walls w/ Pump Options	\$22,700,473 - \$45,247,123	\$2,270,047 - \$4,524,712	\$7,326,092 - \$7,326,092	\$32,296,612 - \$57,097,927

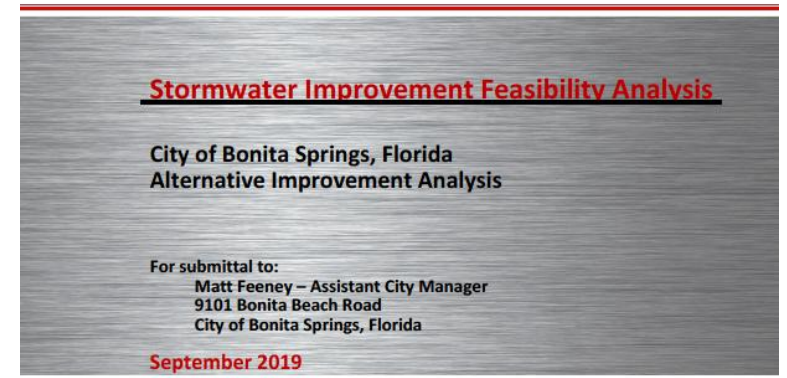


REFINING SCOPE AND DEFINING RISK

The map shows the project area in San Diego, California. The Imperial River flows through the center of the map, and Oak Creek is visible on the left. The project area is highlighted by a red rectangle, located between Dean St and Bonita Beach Rd SE. A blue label 'Project Area' is overlaid on the map. The map also shows various streets, including Imperial Pkwy, Pinecrest Ln, and Bonita Beach Rd SE.

Refining the Project Area and Scope

- **Study phase**
 - Review all impacted areas – north and south of Imperial River
- **Project implementation focus – areas south of Imperial River**
 - Improvements to public infrastructure
 - Reducing flood risk to permanent residential areas
 - Resources to greatest impact to community
- **Scope of work**
- **Refined hydrologic and hydraulic modeling**
 - Risk-based analysis (property level)
 - Multiple flooding types and rainfall frequencies
- **Community engagement**
- **Design and permitting**



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Tampa, Florida 33609



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Defining Risk and Setting Expectations

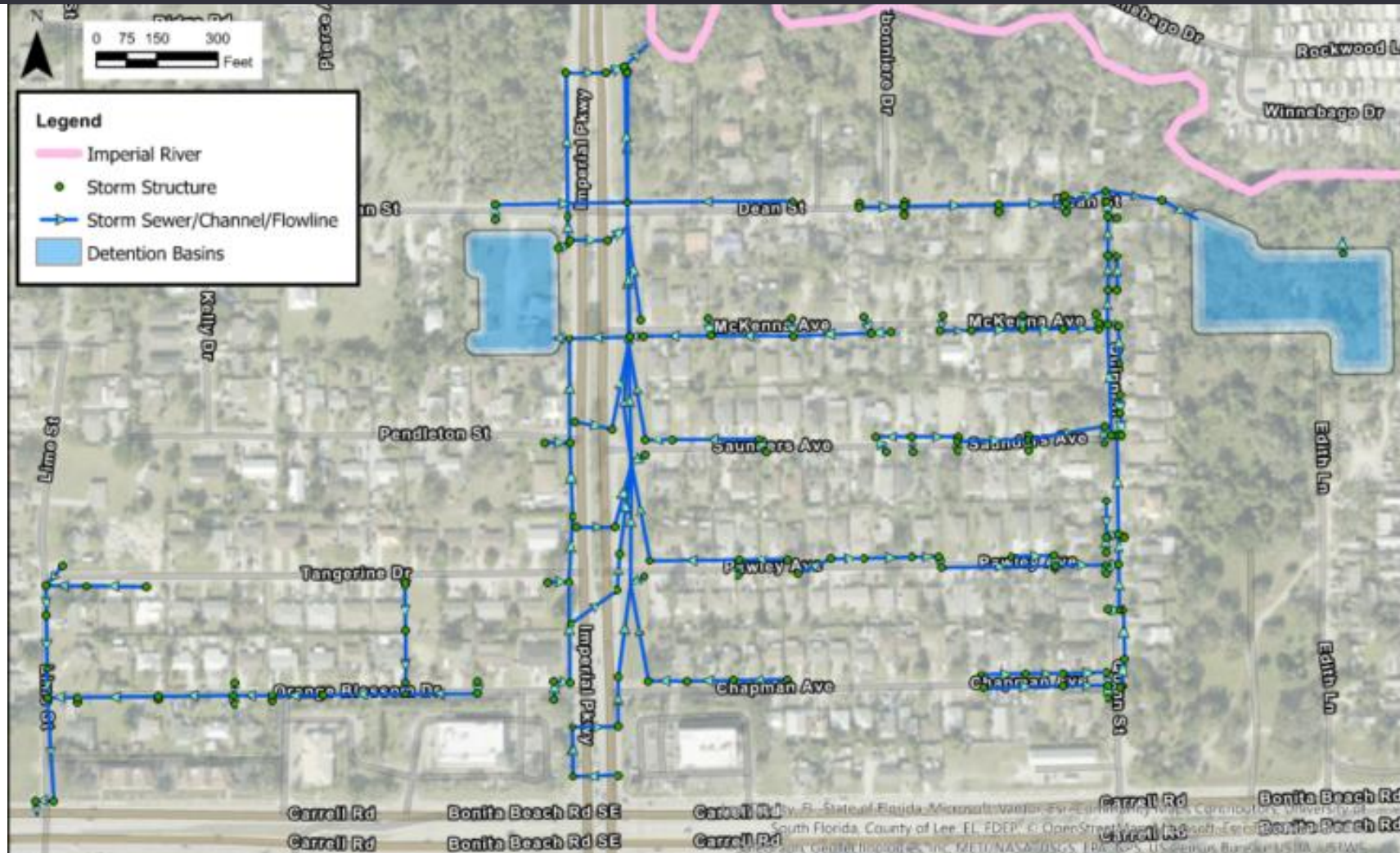
- Study – Broad understanding of issues and alternative solutions
- Detailed modeling – Refining understanding
- Risk Analysis – Refinement Results
- Communicating the risk
- Reducing the risk
 - Constructed infrastructure
 - Conveyance
 - Storage
 - Buyouts
 - Willing sellers
 - Relocate families out of harms way





DESIGN AND PERMITTING

Final Plan



Permits Acquired

- Environmental Resource Permit – South Florida Water Management District
- FDEP – U.S. Army Corps of Engineers (USACE) Nationwide General Permit
- Grant Requirements
 - Environmental assessments
 - Dependent on design and permits
 - Time constraints



ENGAGING THE COMMUNITY

Community Engagement Strategies

- Flyers in mailboxes (3 times)
- Door knocking to explain proposed improvements (4 times)
- Newsletters/website
- Multiple individual property owner letters (5 times)
- City email blasts (30,000+ contacts)
- Media articles (newspaper, television interviews)
- Eight (8) neighborhood meetings prior to grant submittal
- Two (2) neighborhood meetings after grant funding
- English/Spanish translations
- Slow start – “We are the government and we’re here to help you!”
 - “Sure, we’ve heard that before. Prove it.”
 - Lack of trust/fear
- City persisted
 - Maintained consistent message
 - Same consistent face
 - Constant briefings to Council

Community Engagement



Public Meetings



- Goals:
 - Focus on Risk
 - Set realistic expectations
- 600 mailers sent out
- Nearly 100 attendees

Community Engagement – Mailers



9101 Bonita Beach Road
Bonita Springs, FL 34135
Tel: (239) 949-6262
Fax: (239) 949-6239
www.cityofbonitasprings.org

Rick Steinmeyer
Mayor

Amy Quaremba
Council Member
District One

Jesse Purdon
Council Member
District Two

Laura Carr
Council Member
District Three

Chris Corrie
Council Member
District Four

Michael Gibson
Council Member
District Five

Fred Forbes, AIA
Council Member
District Six

Arleen M. Hunter
City Manager
(239) 949-6267

Derek P. Rooney
City Attorney
(239) 949-6254

City Clerk
(239) 949-6248

Public Works
(239) 949-6246

Neighborhood Services
(239) 949-6257

Parks & Recreation
(239) 992-2556

Community Development
(239) 444-6150



Dear Property Owner/Stakeholder:

The City of Bonita Springs will have a neighborhood meeting about proposed design of drainage improvements in the Neighborhoods of Quinn/Downs/Dean Streets and West of Imperial Parkway. The public meeting will discuss the overall stormwater project, present some preliminary design concepts and ideas regarding possible improvements, and receive public input on the project.

Information regarding the Voluntary Home Buyout Program will also be available at the meeting.

The purpose of the project is to reduce existing flooding issues in the neighborhood by providing new stormwater conveyance and storage infrastructure improvements and by providing information regarding flood risk.

The meeting will be held on Thursday, August 11, 2022, beginning at 5:30 pm at City Hall Council Chambers, 9101 Bonita Beach Road, Bonita Springs, FL 34135. Doors will open at 5:30 pm with a short formal presentation starting promptly at 6:00 pm.

All interested persons are welcome to attend the meeting. However, since you own property in the neighborhood, we are particularly interested in your thoughts, comments, and recommendations on the proposed stormwater improvements. The City encourages everyone an opportunity to express their views about the proposed concepts and ideas the city has regarding the project.

Also enclosed with this letter is a quick survey the City would request you complete. If you are unable to attend the August 11, 2022 meeting, please return your survey to the City of Bonita Springs. Again, your input is important to the success of this project. As a neighborhood property owner, the City encourages you to participate in the Neighborhoods of Quinn/Downs/Dean Streets and West of Imperial Parkway meeting.

If you are not able to attend the presentation, or have further questions or comments, please contact Nick Harrison at 813-460-2622, Consultant Project Manager or Elly Soto McKuen with the City of Bonita Springs at 239-949-6262.

Sincerely,

Matt Feeney
Assistant City Manager, City of Bonita Springs

The City of Bonita Springs will not discriminate against individuals on the basis of race, color, national origin, sex, age, disability, religion, income, or marital status. To request an ADA-qualified reasonable modification at no charge to the requestor, please contact Lisa Roberson by calling 239-949-6262 at least 48 hours prior to the meeting.



NEIGHBORHOODS OF QUINN/DOWNS/DEAN STREETS AND WEST OF IMPERIAL PARKWAY DRAINAGE IMPROVEMENTS

PLEASE JOIN US FOR A PUBLIC WORKSHOP

Thursday, August 11, 2022 • 5:30 to 7 PM (short, formal presentation at 6 PM)

Bonita Springs City Hall • 9101 Bonita Beach Road, Bonita Springs, FL 34135

The City of Bonita Springs invites you to attend a neighborhood meeting regarding the proposed design of drainage improvements in the neighborhoods of Quinn/Downs/Dean Streets and west of Imperial Parkway. The meeting will discuss the overall project, present preliminary design concept/ideas regarding possible improvements, and receive public input on the project. Information regarding the Voluntary Home Buyout Program will also be available at the meeting.

PROPOSED IMPROVEMENTS

The purpose of the project is to reduce existing flooding issues in the neighborhood by providing new storm water storage infrastructure improvements and by providing information regarding flood risk.

HOW CAN YOU GET INVOLVED?

- Fill out a comment form and drop it in the comments box at the open house or mail it to the address on the form.
- Discuss the project with members of the project team at the workshop.
- Call the project manager, Nick Harrison, at (813) 460-2622.
- Information is also available on www.cityofbonitasprings.org.

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FOR MORE INFORMATION, CONTACT:

Ms. Elly Soto McKuen
City of Bonita Springs
(239) 949-6262
elly.mckuen@cityofbonitasprings.com



Community Engagement – Survey



NEIGHBORHOODS OF QUINN/DOWNS/ DEAN STREETS AND WEST OF IMPERIAL PARKWAY DRAINAGE IMPROVEMENTS

The City of Bonita Springs is asking for comments from residents and property owners regarding past flooding occurrences in the neighborhoods of Quinn/Downs/Dean Street and West of Imperial Parkway. If you have experienced flooding in your home, please fill out the survey on the back of this card.

AFFIX
POSTAGE
HERE

AMERICAN STRUCTUREPOINT
5405 CYPRESS CENTER DRIVE
SUITE 310
TAMPA, FL 33609

Thank you for completing this survey card. Please complete only one card per household.

Property Address _____
City/State/ZIP _____
Name _____

How long have you lived at your address? _____

Have you ever experienced flooding in your home? ☐ Yes ☐ No

If yes, have you experienced flooding more than once? ☐ Yes ☐ No

Can you provide an approximate
years when flooding occurred? _____

How much water did you have in your home? ☐ 6 inches or less ☐ 6 inches to 1 foot
☐ More than 1 foot ☐ Other _____

Are you interested in learning more about the Voluntary Home Buyout Program?

☐ Yes ☐ No

If yes, please provide your phone number and email: _____

Additional Comments: _____



VECINDARIOS DE LAS CALLES QUINN/DOWNS/ DEAN Y AL OESTE DE IMPERIAL PARKWAY MEJORAMIENTOS DE DRENAJE

La Ciudad de Bonita Springs solicita comentarios de los residentes y propietarios acerca de previas inundaciones en los Vecindarios de las calles Quinn/Downs/Dean y al Oeste de Imperial Parkway. Si usted ha experimentado inundaciones en su hogar, por favor complete la encuesta en la parte posterior de esta tarjeta.

COLOCAR
EL SELLO
AQUI

AMERICAN STRUCTUREPOINT
5405 CYPRESS CENTER DRIVE
SUITE 310
TAMPA, FL 33609

Gracias por participar en la encuesta. Por favor llene una tarjeta por casa.

Direccion de la Propiedad _____
Ciudad/Estado/Zip _____
Nombre _____

Por cuanto tiempo ha vivido en esta direccion? _____

Alguna vez ha experimentado inundacion en su hogar? ☐ Si ☐ No

Si su respuesta fue si, ha experimentado inundaciones mas de una vez? ☐ Si ☐ No

Puede proveer años cuando
ocurrieron las inundaciones? _____

Cuanta agua tuvo en su hogar? ☐ 6 pulgadas o menos ☐ 6 pulgadas a 1 pie
☐ Mas de 1 pie ☐ Otro _____

Esta interesado en aprender mas acerca del Programa Voluntario de Compra de

Viviendas? ☐ Si ☐ No

Si su respuesta fue si, por favor indique su numero de
telefono y direccion de correo electronico (e-mail): _____

Comentarios adicionales: _____

Community Engagement – Website



NEIGHBORHOODS OF QUINN/DOWNS/DEAN STREETS AND WEST OF IMPERIAL PARKWAY DRAINAGE IMPROVEMENTS MEETING

City of Bonita Springs / News / What's New / NEIGHBORHOODS OF QUINN/DOWNS/DEAN STREETS AND WEST OF IMPERIAL PARKWAY DRAINAGE IMPROVEMENTS MEETING



What's New

AlertLee is Lee County's Emergency Mass Notification System

City of Bonita Springs Storm Preparedness

Certificates of Appreciation to the Troop 109 Boy Scouts

Certificate of Appreciation to Dr. Michael Martin

Florida Disaster Preparedness Sales Tax Holiday

Lee County MPO Rail Trail Meeting

NEIGHBORHOODS OF QUINN/DOWNS/DEAN STREETS AND WEST OF IMPERIAL PARKWAY DRAINAGE IMPROVEMENTS MEETING

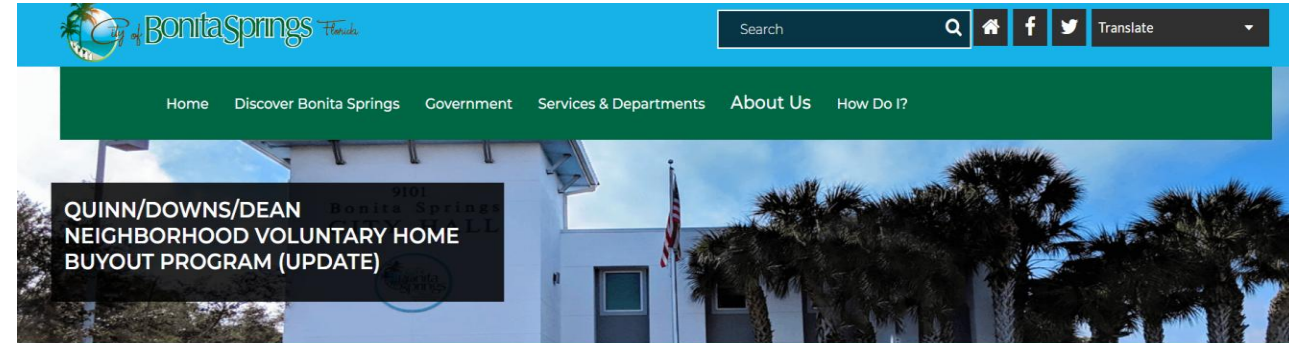
NEIGHBORHOODS OF QUINN/DOWNS/DEAN STREETS AND WEST OF IMPERIAL PARKWAY DRAINAGE IMPROVEMENTS MEETING

Posted on 08/08/2022



The City of Bonita Springs invites you to attend a neighborhood meeting regarding the proposed design of drainage improvements in the neighborhoods of Quinn/Down/Dean Streets and west of Imperial Parkway. The meeting will be held on Thursday, August 11, 2022 from 5:30 - 7:00 p.m. at Bonita Springs City Hall, 9101 Bonita Beach Road, Bonita Springs, in Council Chambers. This meeting will discuss the overall project, present preliminary design concept/ideas regarding possible improvements, and receive public input on the project. Information regarding the Voluntary Home Buyout Program will also be available at the meeting. For more information, see flyers below.

La Ciudad de Bonita Springs le invita a la reunión acerca de los mejoramientos propuestos al drenaje en los vecindarios de las calles Quinn y Dean Street South. La reunión se llevará a cabo el día Jueves 11 de agosto de 2022 de 5:30 a 7:00 p.m. en las cámaras del consejo municipal de la municipalidad de Bonita Springs localizada en 9101 Bonita Beach Road, Bonita Springs. La reunión tratará sobre el proyecto en general, presentará conceptos e ideas preliminares de diseño de las posibles mejoras, y recibirá aporte público acerca del proyecto. Información acerca del Programa de Compra Voluntaria de Viviendas también estará disponible en la reunión.



QUINN/DOWNS/DEAN NEIGHBORHOOD VOLUNTARY HOME BUYOUT PROGRAM (UPDATE)

City of Bonita Springs / News / What's New / Quinn/Downs/Dean Neighborhood Voluntary Home Buyout Program (Update)



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Quinn/Downs/Dean Neighborhood Voluntary Home Buyout Program (Update)

Quinn/Downs/Dean Neighborhood Voluntary Home Buyout Program (Update)

Posted on 11/10/2021



Council has approved a purchase agreement for 3 homes in the hazard area outlined in the Home Buyout Program. The purchase agreements reflect current market value for the properties. Once the City closes on the properties, the structures will be demolished, will remain vacant and in the City's ownership in perpetuity. The lands may be used for stormwater improvements or passive open space.

About the Home Buyout Program

The focus of the buyout program is to acquire properties that are in a Special Flood Hazard Area (SFHA) and in high-risk flood areas to help reduce the impact of future disasters. The program also assists property owners to relocate outside the threat of flooding. The City is using federal U.S. Housing and Urban Development, Community Development Block Grant-Disaster Recovery (HUD CDBG-DR) funds to acquire parcels in the Quinn/Downs/Dean Neighborhood through the Voluntary Home Buyout Program (VHBP). Participants in this program must adhere to specific



GRANT SUBMITTAL AND FUNDING

Study Submitted – Funding Provided



HUD funding as pass through from Florida Commerce awarded in 2020 Acquisition/Demolition Project - \$5,000,000 Stormwater Infrastructure Project - \$11,021,919



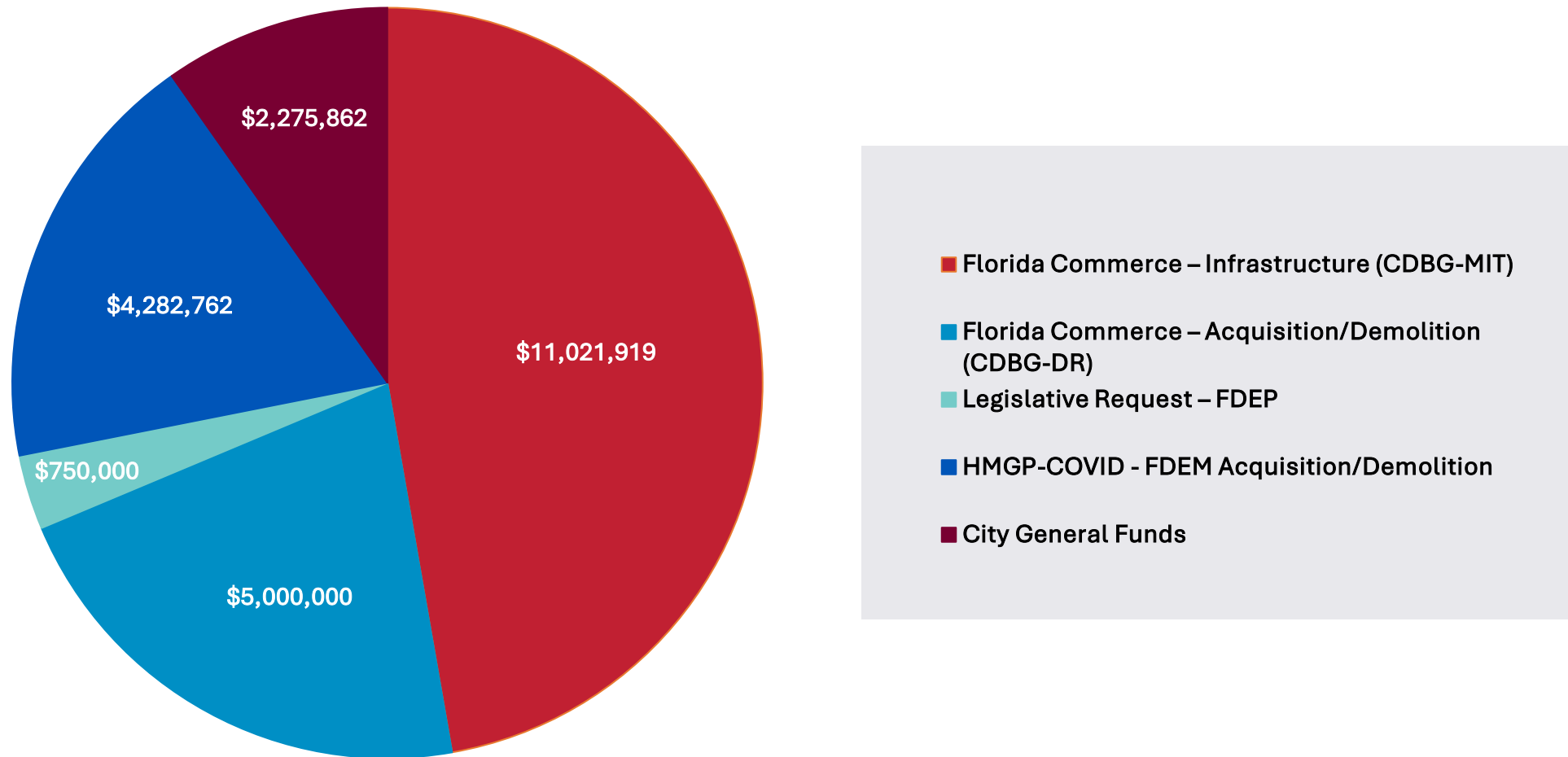
Additional funds awarded in 2022 - 2024

- Legislative Request - \$750,000
- City contribution - \$1,800,000 acquisition/demolition funds



Currently HMGP-COVID acquisition/demolition project - \$4,282,761.60 (City \$475,862.40)

Funding





LAND ACQUISITION AND CONSTRUCTION

Infrastructure Acquisition

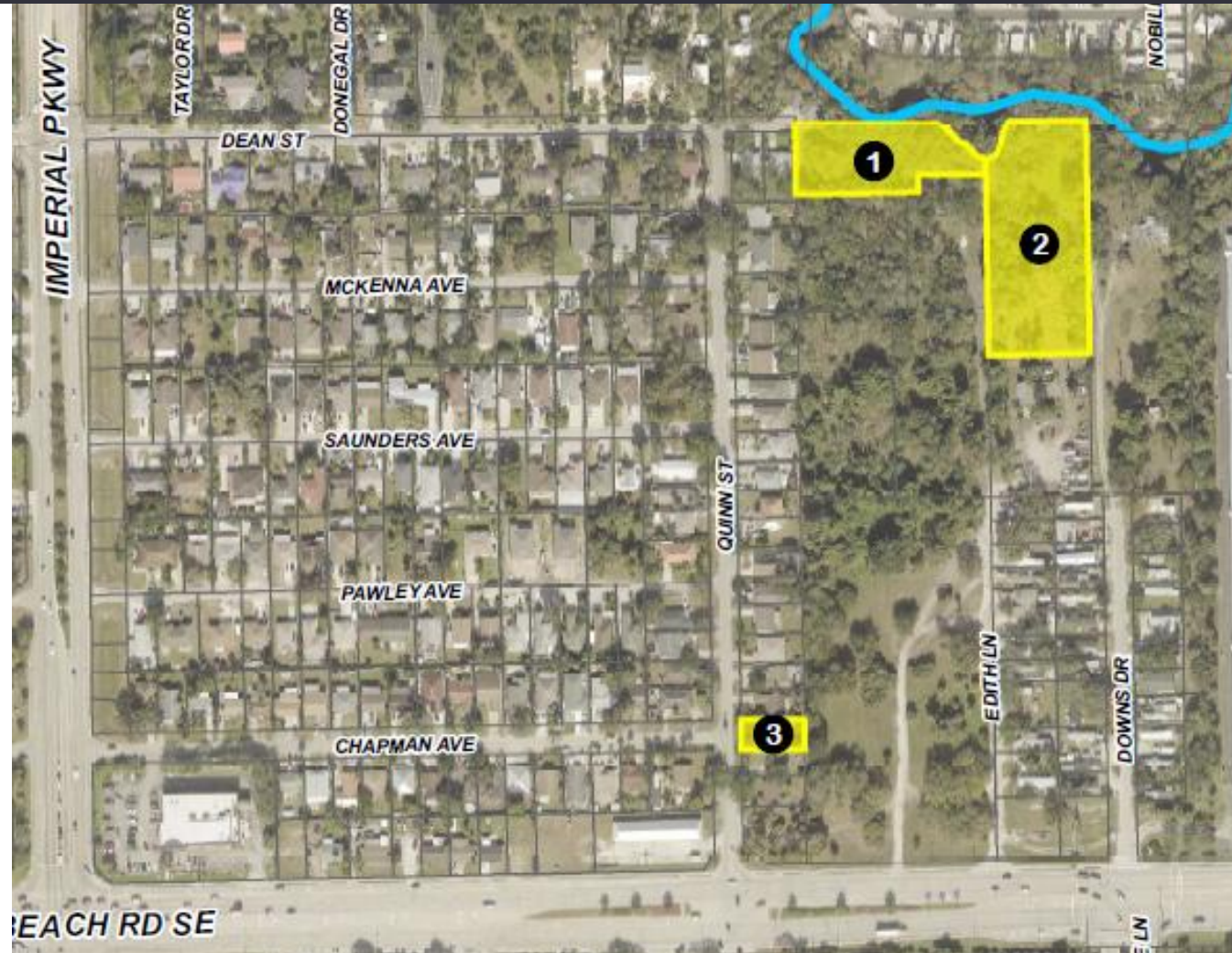
Infrastructure Acquisition

- 2 retention ponds
 - Acquired 6 parcels
 - 2 structures – rental single-family home and duplex (relocated 3 families – Uniform Relocation Act)



Land Transfer from Lee County

- Identified 3 parcels in neighborhood (2 large parcels – 1 small residential lot came with the package)
- Parcels purchased with FEMA HMGP funds in 1998
- County approval, city approval, Florida Commerce approval
- Followed 44 CFR 80.19 to transfer land from County to City
- Worked with FDEM for their approval for recommendation to FEMA
- FDEM sent approved recommendations to FEMA
- FEMA issued approval of transfer in November 2025
- Transfer from County to City complete



Concurrent with Infrastructure Design & Permitting – Voluntary Home Buyout Program

- \$5M – CDBG-DR through Florida Commerce
- Identify and target most vulnerable residents (located in floodway & flood prone neighborhood)
- Willing seller
- Program paid appraisal, survey, title search, and closing cost
- Homeowner paid mortgage and any liens on property
- Property transferred to City's ownership
- Demolished
- Open space, limited recreation, stormwater management
- 13 properties acquired relocating families out of harms way for the next storm
- Relocated 6 families from rental housing (Uniform Relocation Act)

Land Acquisition/Buyouts

Acquisition/Demolition (CDBG-DR)

- 13 properties acquired
 - 6 rental families relocated (URA)



City of Bonita Springs
FLORIDA
Small Town Charm.
Big Bright Future.

City of Bonita Springs
VOLUNTARY HOME BUYOUT PROGRAM



DEO
FLORIDA DEPARTMENT OF
ECONOMIC OPPORTUNITY

This home was purchased and demolished by the City of Bonita Springs as part of a flood mitigation program. The vacant land will remain in the City's name in perpetuity and only used for open space, recreational facilities, or stormwater management.



Funding for the project is through a partnership between the City and Florida Department of Economic Opportunity.



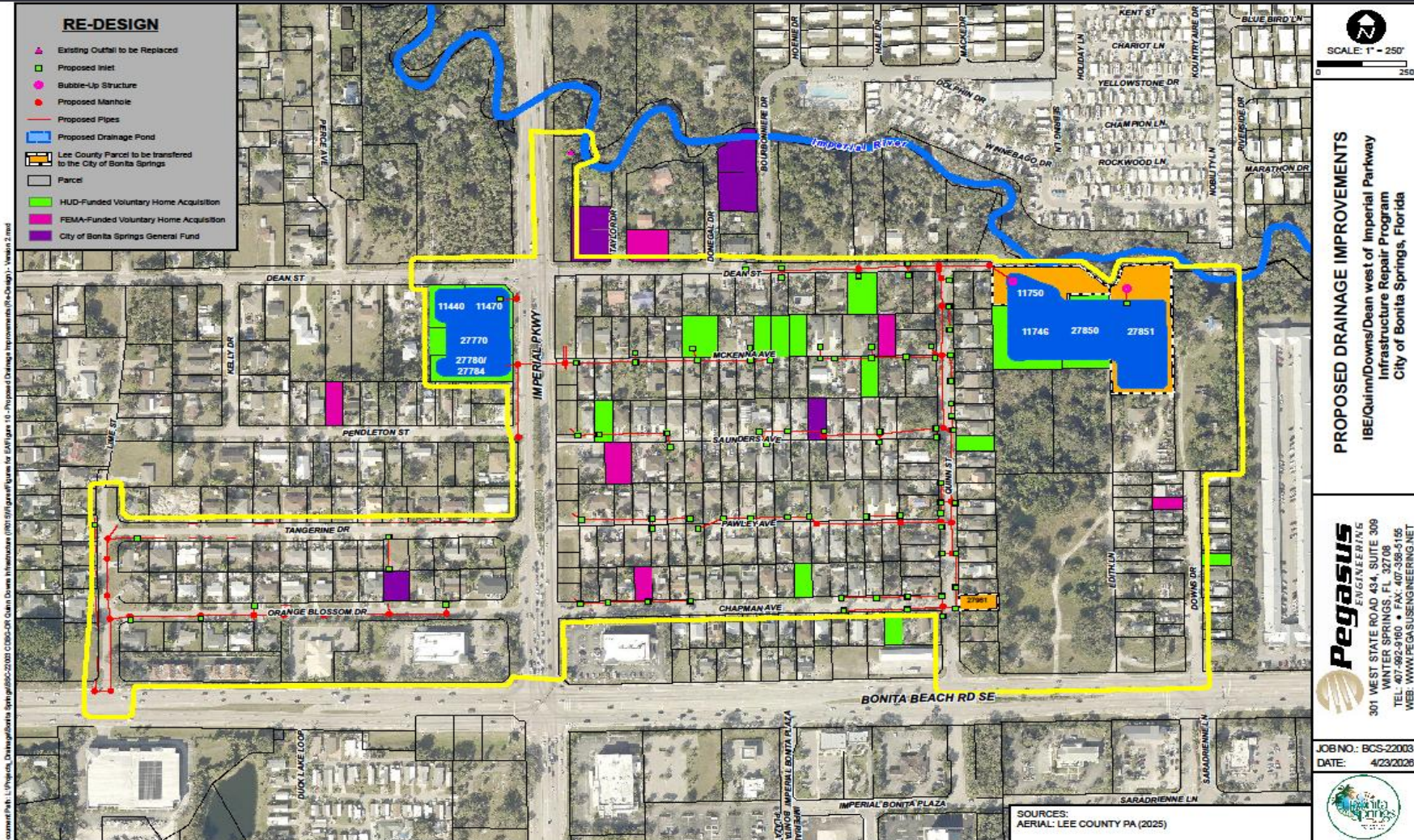
If you are interested in selling your home to the City or would like more information on this program, please call (239) 949-6262.



HMGP-COVID Acquisition/Demolition \$4.2M

- Similar to VHBP with exception that demolition must occur within 90 days of acquisition
- 11 properties identified in addition to the 13 properties from VHBP
- Acquisition/demolition currently ongoing
- Acquired & demolished 2 structures, 1 SF home, 1 duplex (relocated 2 families through Uniform Relocation Act)

All the Pieces



Utility Diversion Construction Photos



Existing Outfall to be Replaced
Proposed Inlet
Bubble-Up Structure
Proposed Manhole
Proposed Pipes

Retention Pond B under Construction



SCALE: 1" = 250'

PROPOSED DRAINAGE IMPROVEMENTS

**IBE/Quinn/Downs/Dean west of Imperial Parkway
Infrastructure Repair Program
City of Bonita Springs, Florida**

WEB: WWW.PEGASUSENGINEERING.NET

Questions

