Appendix B. Maps

Map 1. Existing Flood Infrastructure (2.1 Task 1 – Planning Area Description)

Map 2. Proposed or Ongoing Flood Mitigation Projects (2.1 Task 1 – Planning Area Description)

Map 3. Nonfunctional or Deficient Infrastructure (2.1 Task 1 – Planning Area Description)

Map 4. Existing Condition Flood Hazard (2.2.A.1 Existing Condition Flood Hazard Analysis)

Map 5. Existing Condition Flood Hazard - Gaps in Inundation Boundary Mapping including Identification of Known Flood-Prone Areas (2.2.A.1 Existing Condition Flood Hazard Analysis)

Map 6. Existing Condition Flood Exposure (2.2.A.2 Existing Condition Flood Exposure Analysis)

Map 7. Existing Condition Flood Vulnerability including Critical Infrastructure (2.2A.3 Existing Condition Vulnerability Analysis)

Map 8. Future Condition Flood Hazard (2.2.B.1 Future Condition Flood Hazard Analysis)

Map 9. Future Condition Flood Hazard - Gaps in Inundation Boundary Mapping including Identification of Known Flood-Prone Areas (2.2.B.1 Future Condition Flood Hazard Analysis)

Map 10. Extent of Increase of Flood Hazard Compared to Existing Condition (2.2.B.1 Future Condition Flood Hazard Analysis)

Map 11. Future Condition Flood Exposure (2.2.B.2 Future Condition Flood Exposure Analysis)

Map 12. Future Condition Flood Vulnerability including Critical Infrastructure (2.2.B.3 Future Condition Vulnerability Analysis)

Map 13. Floodplain Management (2.3.A Task 3A – Evaluation and Recommendations on Floodplain Management Practices)

Map 14. Greatest Gaps in Flood Risk Information (2.4.A Task 4A – Flood Mitigation Needs Analysis)

Map 15. Greatest Flood Risk (2.4.A Task 4A – Flood Mitigation Needs Analysis)

Map 16. Extent of Potential Flood Management Evaluations and Existing Mapping Needs (2.4.B Task 4B– Identification and Evaluation of Potential Flood Management Evaluations and Potentially Feasible Flood Management Strategies and Flood Mitigation Projects)

Map 17. Extent of Potential Flood Mitigation Projects (2.4.B Task 4B)

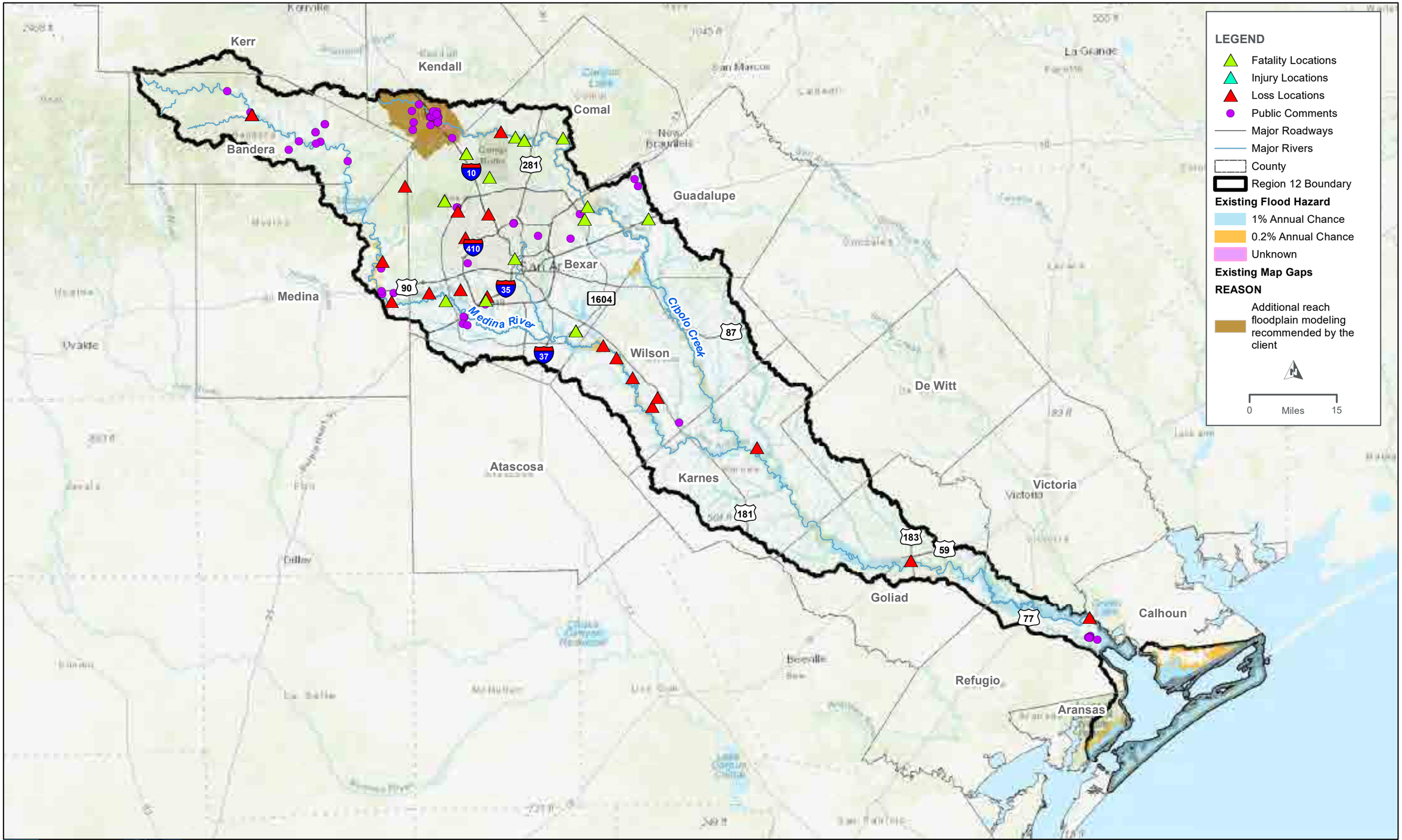
Map 18. Extent of Potential Flood Management Strategies (2.4.B Task 4B)

Map 19. Recommended Flood Management Evaluations (2.5.A Flood Management Evaluations)

Map 20. Recommended Flood Mitigation Projects (2.5.B Flood Mitigation Projects)

Map 21. Recommended Flood Management Strategies (2.5.C Flood Management Strategies)

Map 22. Model Coverage (2.4.C Task 4C – Prepare and Submit Technical Memorandum)



REGION 12 - MAP 5 - EXISTING CONDITIONS FLOOD HAZARD KNOWN DATA GAPS

FINAL

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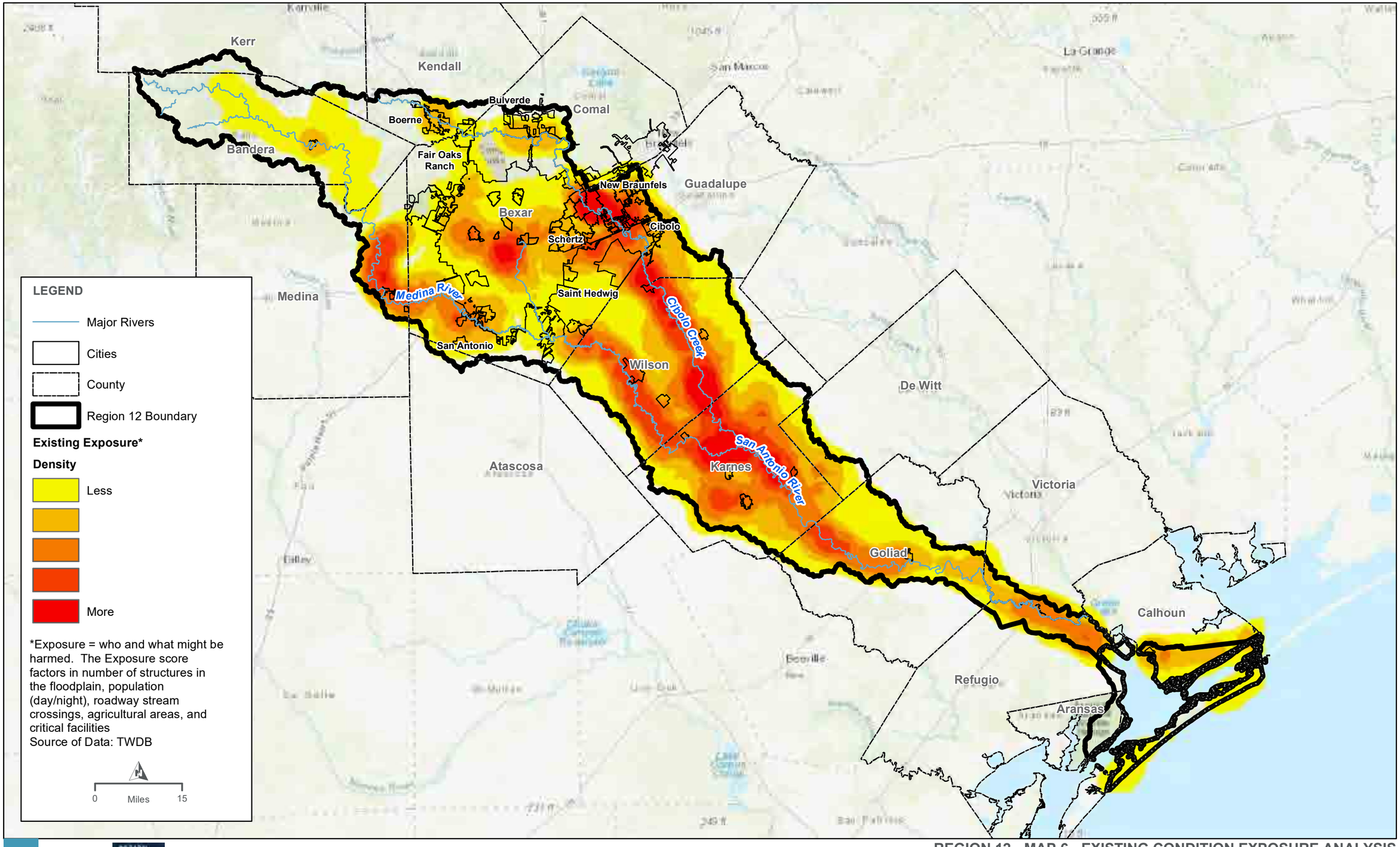

REGION 12 - MAP 6 - EXISTING CONDITION EXPOSURE ANALYSIS

FINAL

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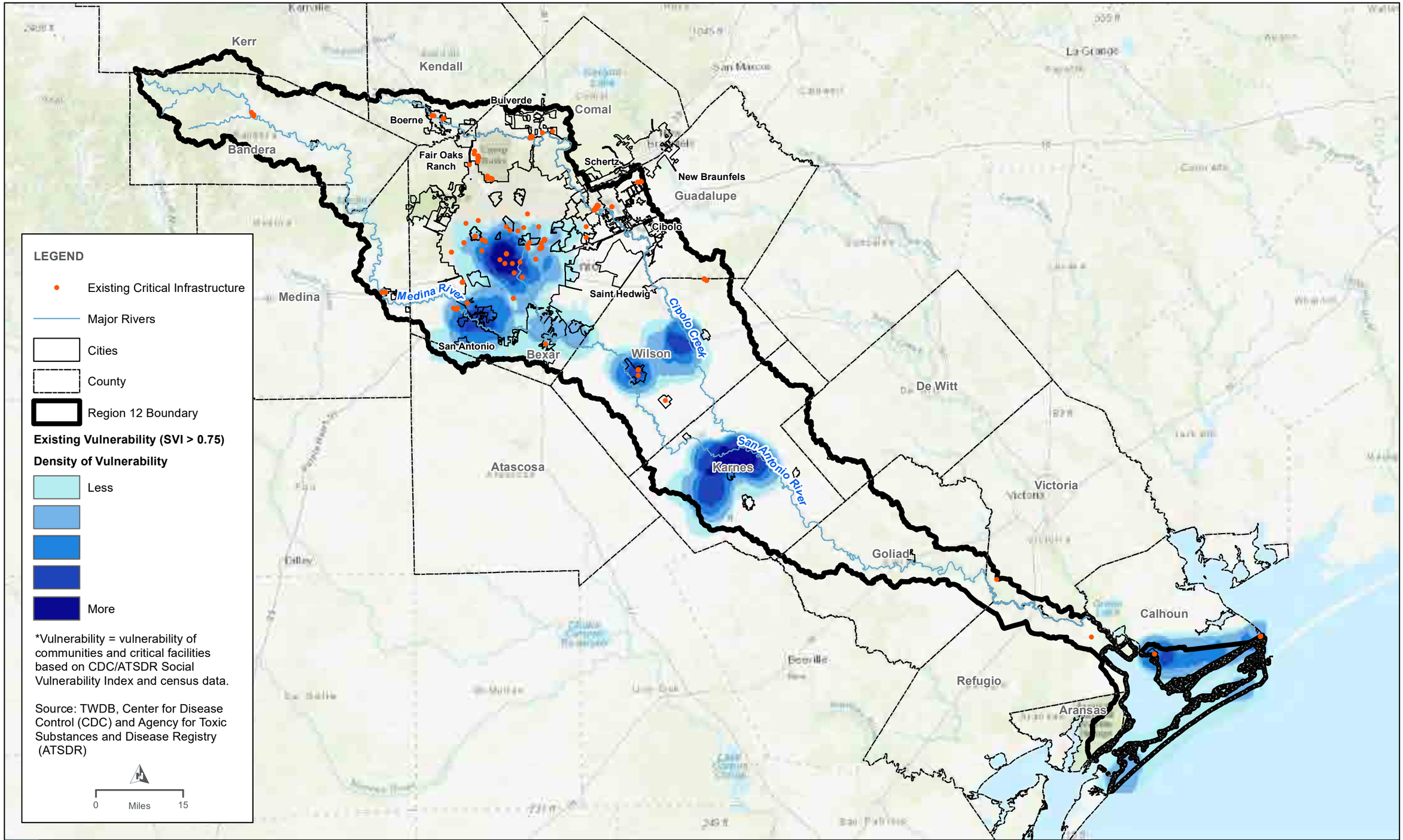

REGION 12 - MAP 7 - EXISTING CONDITION FLOOD VULNERABILITY ANALYSIS (SVI > 0.75)

FINAL

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ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

Kerr Co.

Bandera Co.

Kendall Co.

Medina Co.

Boerne

87

Medina River

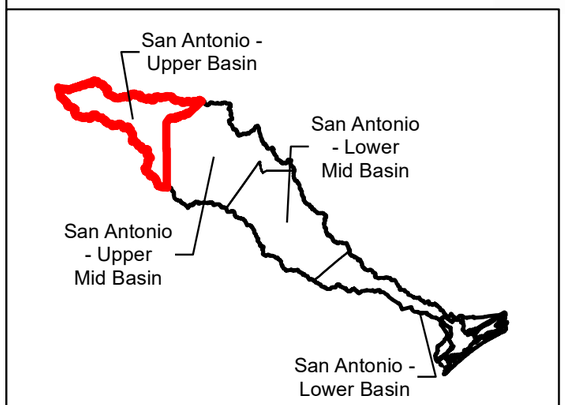
LEGEND

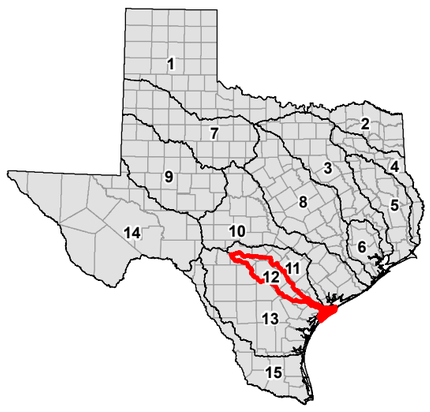
- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

Future Flood Hazard

- 1% Annual Chance
- 0.2% Annual Chance
- Unknown

0 Miles 5





REGION 12 - MAP 8A - SAN ANTONIO UPPER BASIN - FUTURE FLOOD HAZARD

FINAL

FIGURE 1

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP8\MAP8_FUTUREFLDHAZARD_GROUPA_11X17_FIG1.MXD - USER: PDUNNING - DATE: 6/9/2023

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roadways
- Cities
- County
- Region 12 Boundary

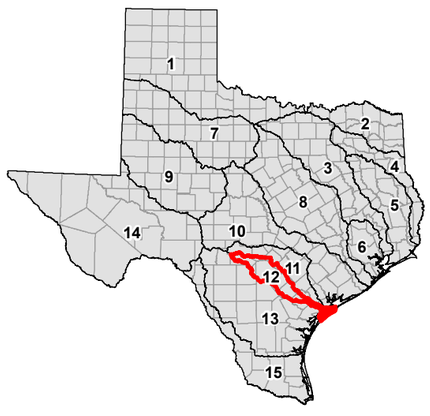
Future Flood Hazard

- 1% Annual Chance
- 0.2% Annual Chance
- Unknown

0 Miles 5

Comal Co.
Bulverde
Cibolo Creek
Fair Oaks Ranch
281
Helotes
35
Cibolo
1604
Converse
10
New Berlin
Saint Hedwig
Guadalupe Co.
410
San Antonio
90
San Antonio River
Bexar Co.
181
Medina River
37
Atascosa Co.

San Antonio - Upper Basin
San Antonio - Lower Mid Basin
San Antonio - Upper Mid Basin
San Antonio - Lower Basin



REGION 12 - MAP 8B - SAN ANTONIO UPPER MID BASIN - FUTURE FLOOD HAZARD

FINAL

FIGURE 2

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP8\MAP8_FUTUREFLDHAZARD_GROUPB_11X17_FIG2.MXD - USER: PDUNNING - DATE: 6/9/2023

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

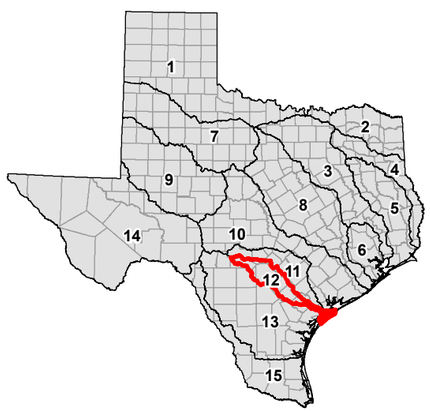
Future Flood Hazard

- 1% Annual Chance
- 0.2% Annual Chance
- Unknown

0 Miles 6

La Vernia
87
Elmendorf
Stockdale
Wilson Co.
Floresville
Cibolo Creek
Poth
181
Falls City
Nordheim
Runge
Karnes City
De Witt Co.
Karnes Co.
Kenedy

San Antonio - Upper Basin
San Antonio - Lower Mid Basin
San Antonio - Upper Mid Basin
San Antonio - Lower Basin



REGION 12 - MAP 8C - SAN ANTONIO LOWER MID BASIN - FUTURE FLOOD HAZARD

FINAL

FIGURE 3

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

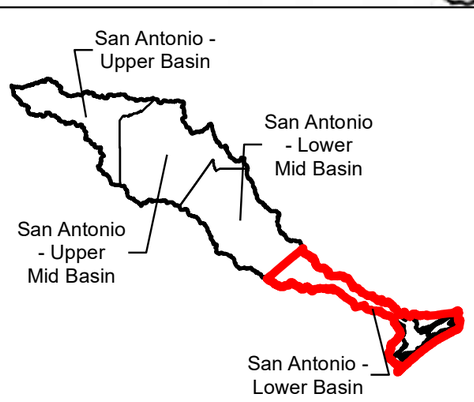
- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

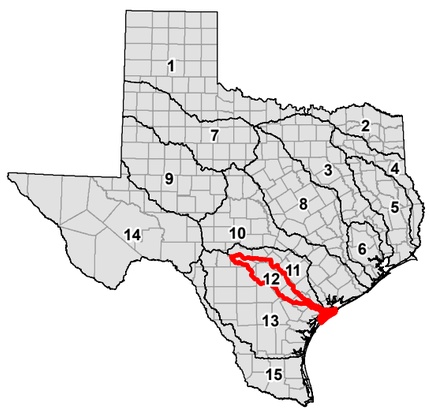
Future Flood Hazard

- 1% Annual Chance
- 0.2% Annual Chance
- Unknown

0 Miles 6

Goliad Co.
183
Goliad
59
Victoria Co.
77
San Antonio River
Refugio Co.
Austwell
Seadrift
Calhoun Co.
Aransas Co.





REGION 12 - MAP 8D - SAN ANTONIO LOWER BASIN - FUTURE FLOOD HAZARD

FINAL

FIGURE 4

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

Kerr Co.

Bandera Co.

Kendall Co.

Boerne

Medina Co.

Medina River

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

Future Flood Type

- Local
- Coastal
- Riverine

0 Miles 5

San Antonio - Upper Basin

San Antonio - Lower Mid Basin

San Antonio - Upper Mid Basin

San Antonio - Lower Basin

REGION 12 - MAP 8E - SAN ANTONIO UPPER BASIN - FUTURE FLOOD HAZARD TYPE

FINAL

FIGURE 1

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roadways
- Cities
- County
- Region 12 Boundary

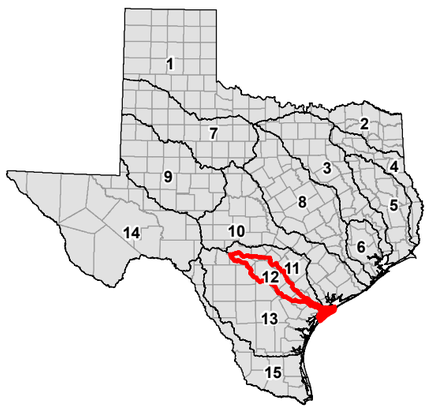
Future Flood Type

- Local
- Coastal
- Riverine

0 Miles 5

Comal Co.
Bulverde
Cibolo Creek
Fair Oaks Ranch
281
Helotes
35
Cibolo
1604
Converse
10
New Berlin
Saint Hedwig
Guadalupe Co.
410
San Antonio
90
San Antonio River
Bexar Co.
181
Medina River
37
Atascosa Co.

San Antonio - Upper Basin
San Antonio - Lower Mid Basin
San Antonio - Upper Mid Basin
San Antonio - Lower Basin



REGION 12 - MAP 8F - SAN ANTONIO UPPER MID BASIN - FUTURE FLOOD HAZARD TYPE

FINAL

FIGURE 2

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

Future Flood Type

- Local
- Coastal
- Riverine

0 Miles 6

La Vernia
87
Stockdale
Elmendorf
Wilson Co.
Floresville
Poth
181
Falls City
Nordheim
Runge
Karnes City
DeWitt Co.
Karnes Co.
Kenedy

San Antonio - Upper Basin
San Antonio - Lower Mid Basin
San Antonio - Upper Mid Basin
San Antonio - Lower Basin

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

REGION 12 - MAP 8G - SAN ANTONIO LOWER MID BASIN - FUTURE FLOOD HAZARD TYPE

FINAL

FIGURE 3

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

Future Flood Type

- Local
- Coastal
- Riverine

0 Miles 6

Goliad Co.
183
Goliad
59
Victoria Co.
77
San Antonio River
Refugio Co.
Austwell
Seadrift
Calhoun Co.
Aransas Co.

San Antonio - Upper Basin
San Antonio - Lower Mid Basin
San Antonio - Upper Mid Basin
San Antonio - Lower Basin

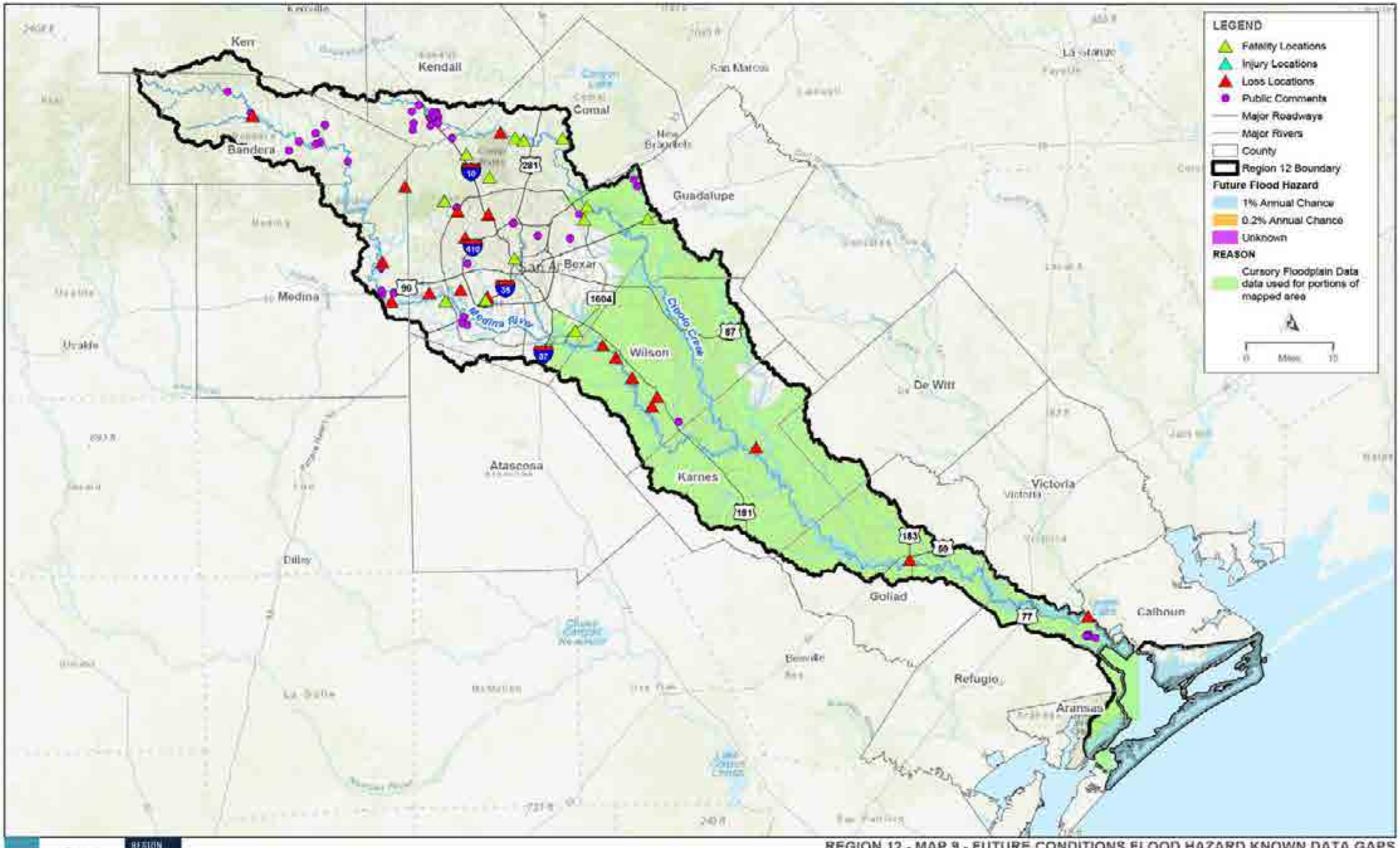
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

REGION 12

REGION 12 - MAP 8H - SAN ANTONIO LOWER BASIN - FUTURE FLOOD HAZARD TYPE

FINAL

FIGURE 4



REGION 12 - MAP 9 - FUTURE CONDITIONS FLOOD HAZARD KNOWN DATA GAPS

FINAL

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE

Kerr Co.

Bandera Co.

Kendall Co.

Boerne

87

Medina River

Medina Co.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

1% Annual Flood Hazard

- Existing
- Future

0 Miles 5

San Antonio - Upper Basin

San Antonio - Lower Mid Basin

San Antonio - Upper Mid Basin

San Antonio - Lower Basin

REGION 12 - MAP 10A - SAN ANTONIO UPPER BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITONS

FINAL

FIGURE 1

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

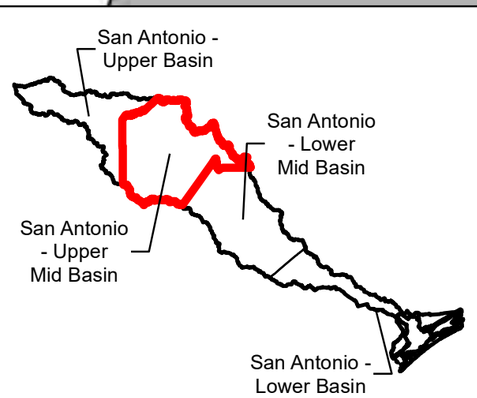
LEGEND

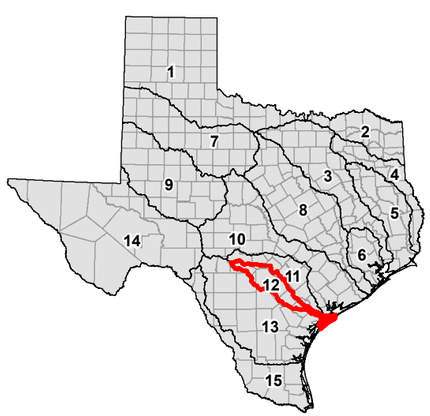
- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roadways
- Cities
- County
- Region 12 Boundary

1% Annual Flood Hazard

- Existing
- Future

0 Miles 5





Comal Co.
Bulverde
Cibolo Creek
Fair Oaks Ranch
281
Helotes
35
Cibolo
1604
Converse
10
New Berlin
Saint Hedwig
Guadalupe Co.
410
San Antonio
90
San Antonio River
Bexar Co.
181
Medina River
37
Atascosa Co.

REGION 12 - MAP 10B - SAN ANTONIO UPPER MID BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITION

FINAL

FIGURE 2

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP10\MAP10_100YR_EXTENT_OF_INCREASE_GROUPB_11X17.MXD - USER: PDUNNING - DATE: 6/9/2023

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

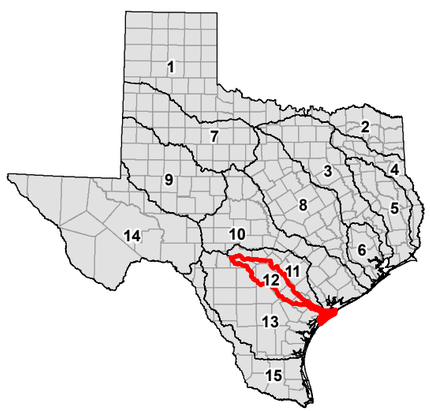
1% Annual Flood Hazard

- Existing
- Future

0 Miles 6

La Vernia
87
Elmendorf
Stockdale
Wilson Co.
Floresville
Cibolo Creek
Poth
181
Falls City
Nordheim
Runge
Karnes City
De Witt Co.
Karnes Co.
Kenedy

San Antonio - Upper Basin
San Antonio - Lower Mid Basin
San Antonio - Upper Mid Basin
San Antonio - Lower Basin



REGION 12 - MAP 10C - SAN ANTONIO LOWER MID BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITION

FINAL

FIGURE 3

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

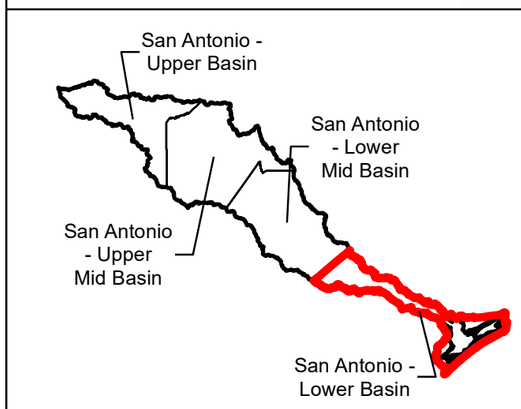
- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

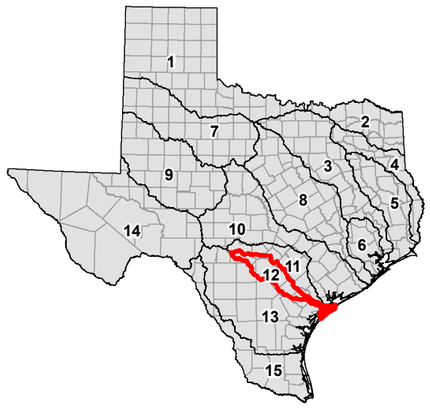
1% Annual Flood Hazard

- Existing
- Future

0 Miles 6

Goliad Co.
Goliad
183
59
Victoria Co.
77
San Antonio River
Refugio Co.
Austwell
Seadrift
Calhoun Co.
Aransas Co.





REGION 12 - MAP 10D - SAN ANTONIO LOWER BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITION

FINAL

FIGURE 4

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP10\MAP10_100YR_EXTENT_OF_INCREASE_GROUPD_11X17.MXD - USER: PDUNNING - DATE: 6/9/2023

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

Kerr Co.

Bandera Co.

Kendall Co.

Medina Co.

Boerne

87

Medina River

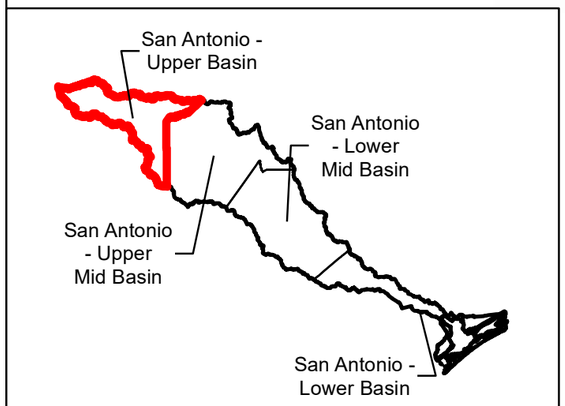
LEGEND

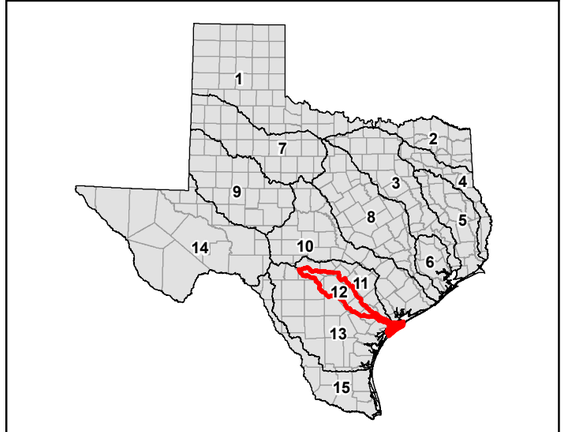
- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

0.2% Annual Flood Hazard

- Existing
- Future

0 Miles 5





REGION 12 - MAP 10E - SAN ANTONIO UPPER BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITION

FINAL

FIGURE 1

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP10\MAP10_500YR_EXTENT_OF_INCREASE_GROUPA_11X17.MXD - USER: PDUNNING - DATE: 6/9/2023

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

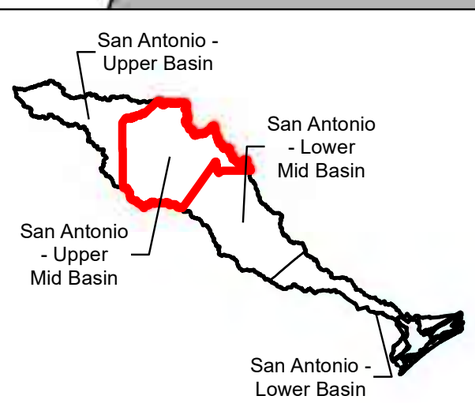
- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roadways
- Cities
- County
- Region 12 Boundary

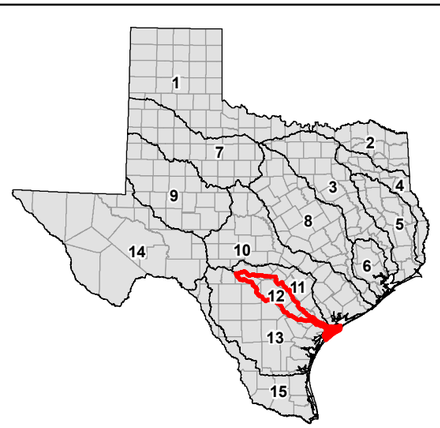
0.2% Annual Flood Hazard

- Existing
- Future

0 Miles 5

Comal Co.
Bulverde
Cibolo Creek
Fair Oaks Ranch
281
Helotes
35
1604
Converse
Cibolo
10
New Berlin
Saint Hedwig
Guadalupe Co.
410
San Antonio
90
San Antonio River
Bexar Co.
181
Medina River
37
Atascosa Co.





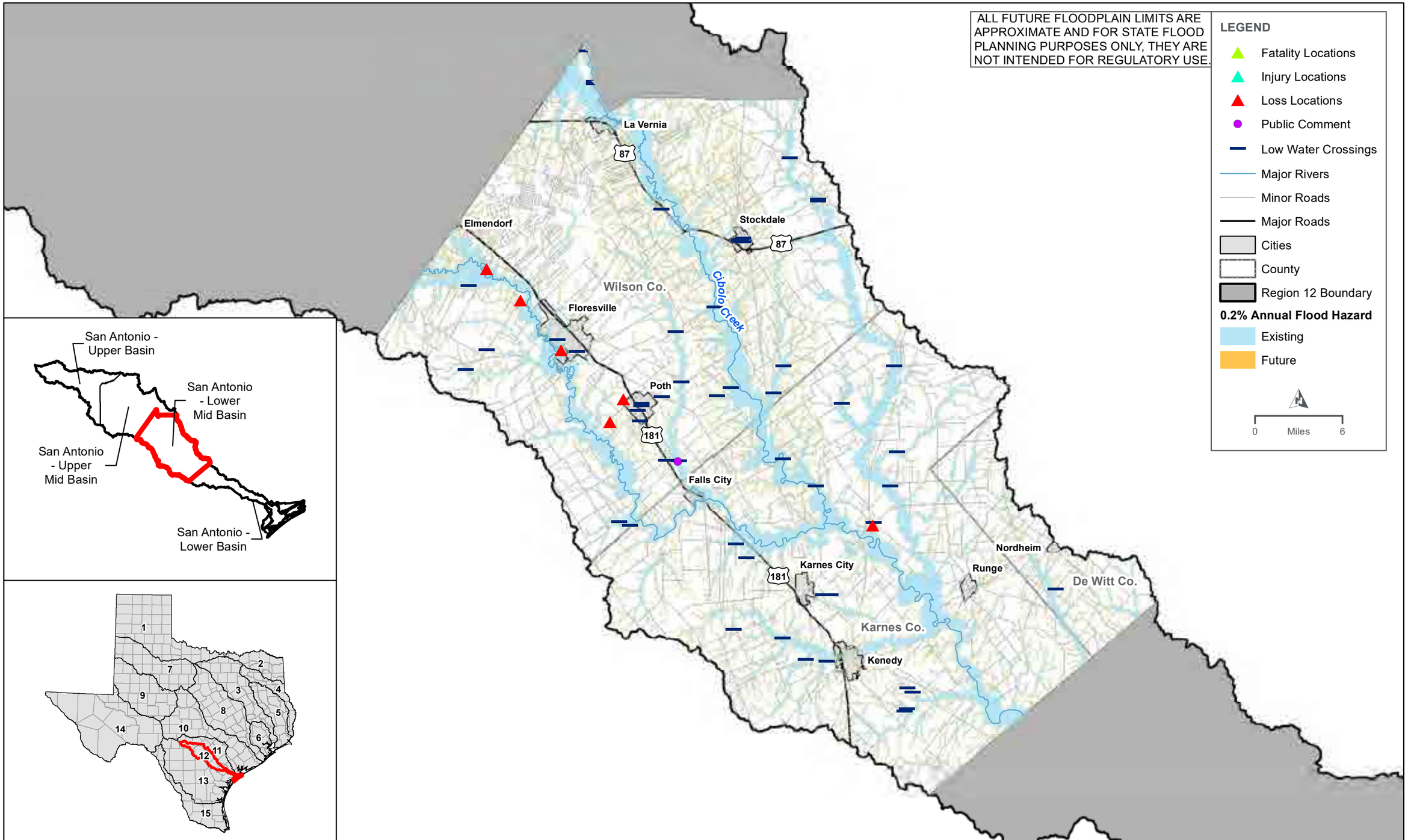
REGION 12 - MAP 10F - SAN ANTONIO UPPER MID BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITION

FINAL

FIGURE 2

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP10\MAP10_500YR_EXTENT_OF_INCREASE_GROUPB_11X17.MXD - USER: PDUNNING - DATE: 6/9/2023

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.



REGION 12 - MAP 10G - SAN ANTONIO LOWER MID BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITION

FINAL

FIGURE 3

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP10\MAP10_500YR_EXTENT_OF_INCREASE_GROUPC_11X17.MXD - USER: PDUNNING - DATE: 6/9/2023

ALL FUTURE FLOODPLAIN LIMITS ARE APPROXIMATE AND FOR STATE FLOOD PLANNING PURPOSES ONLY, THEY ARE NOT INTENDED FOR REGULATORY USE.

LEGEND

- Fatality Locations
- Injury Locations
- Loss Locations
- Public Comment
- Low Water Crossings
- Major Rivers
- Minor Roads
- Major Roads
- Cities
- County
- Region 12 Boundary

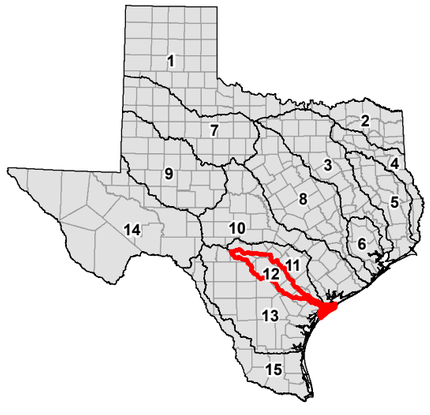
0.2% Annual Flood Hazard

- Existing
- Future

0 Miles 6

Goliad Co.
Goliad
183
59
Victoria Co.
77
San Antonio River
Refugio Co.
Austwell
Seadrift
Calhoun Co.
Aransas Co.

San Antonio - Upper Basin
San Antonio - Lower Mid Basin
San Antonio - Upper Mid Basin
San Antonio - Lower Basin

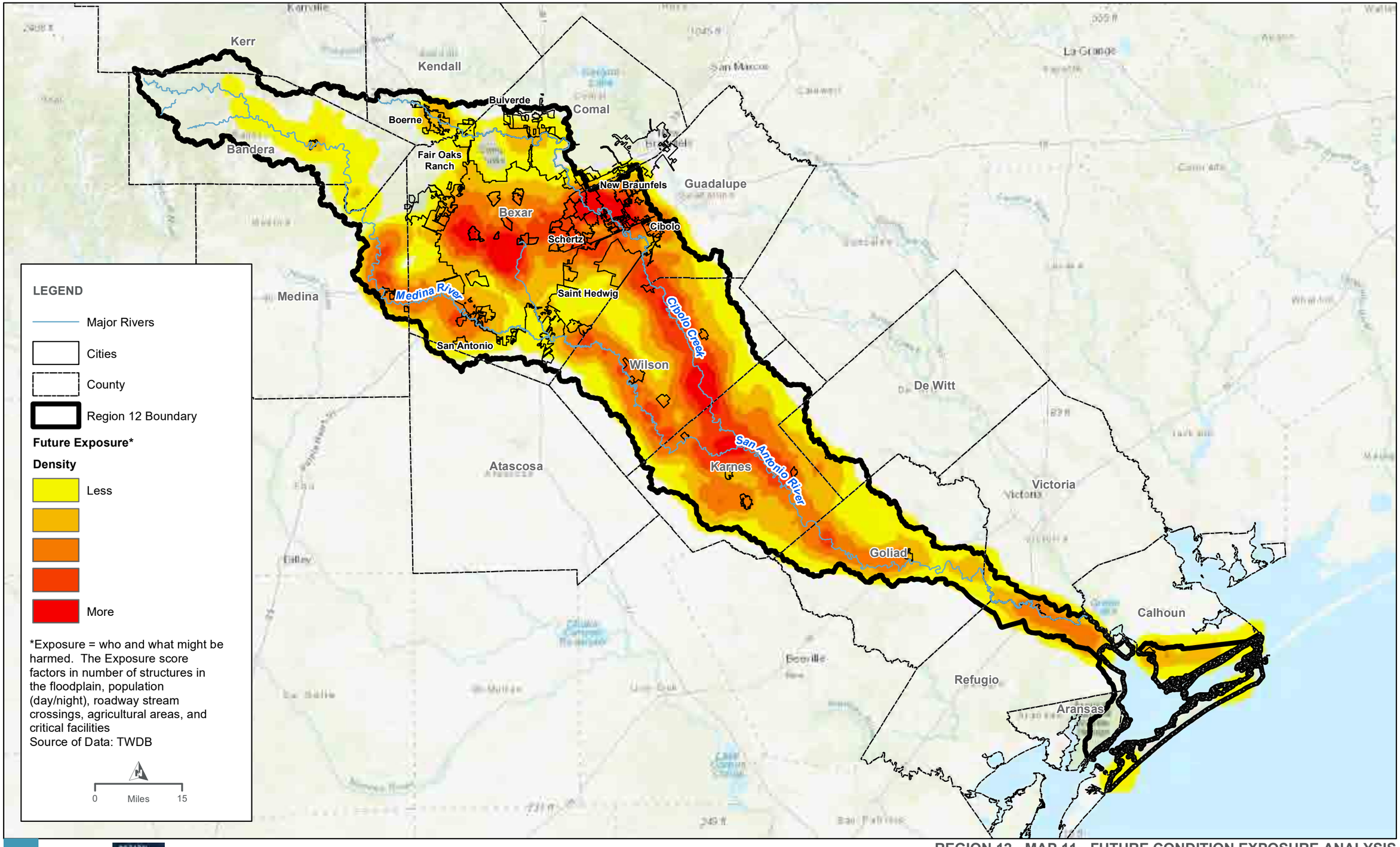


REGION 12 - MAP 10H - SAN ANTONIO LOWER BASIN - EXTENT OF INCREASE OF FLOOD HAZARD COMPARED TO EXISTING CONDITION

FINAL

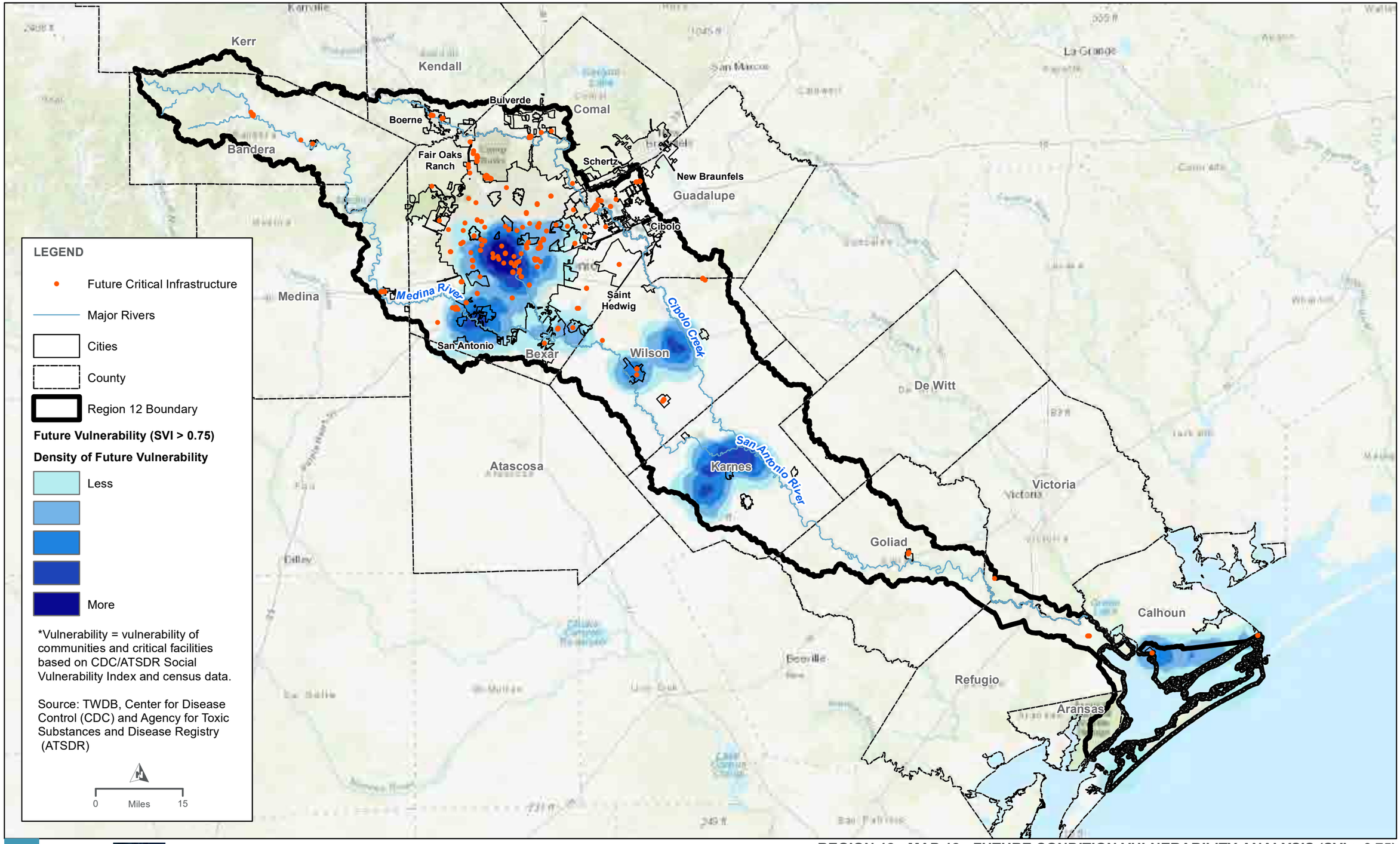
FIGURE 4

PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP10\MAP10_500YR_EXTENT_OF_INCREASE_GROUPD_11X17.MXD - USER: PDUNNING - DATE: 6/9/2023



REGION 12 - MAP 11 - FUTURE CONDITION EXPOSURE ANALYSIS

FINAL



REGION 12 - MAP 12 - FUTURE CONDITION VULNERABILITY ANALYSIS (SVI > 0.75)

FINAL

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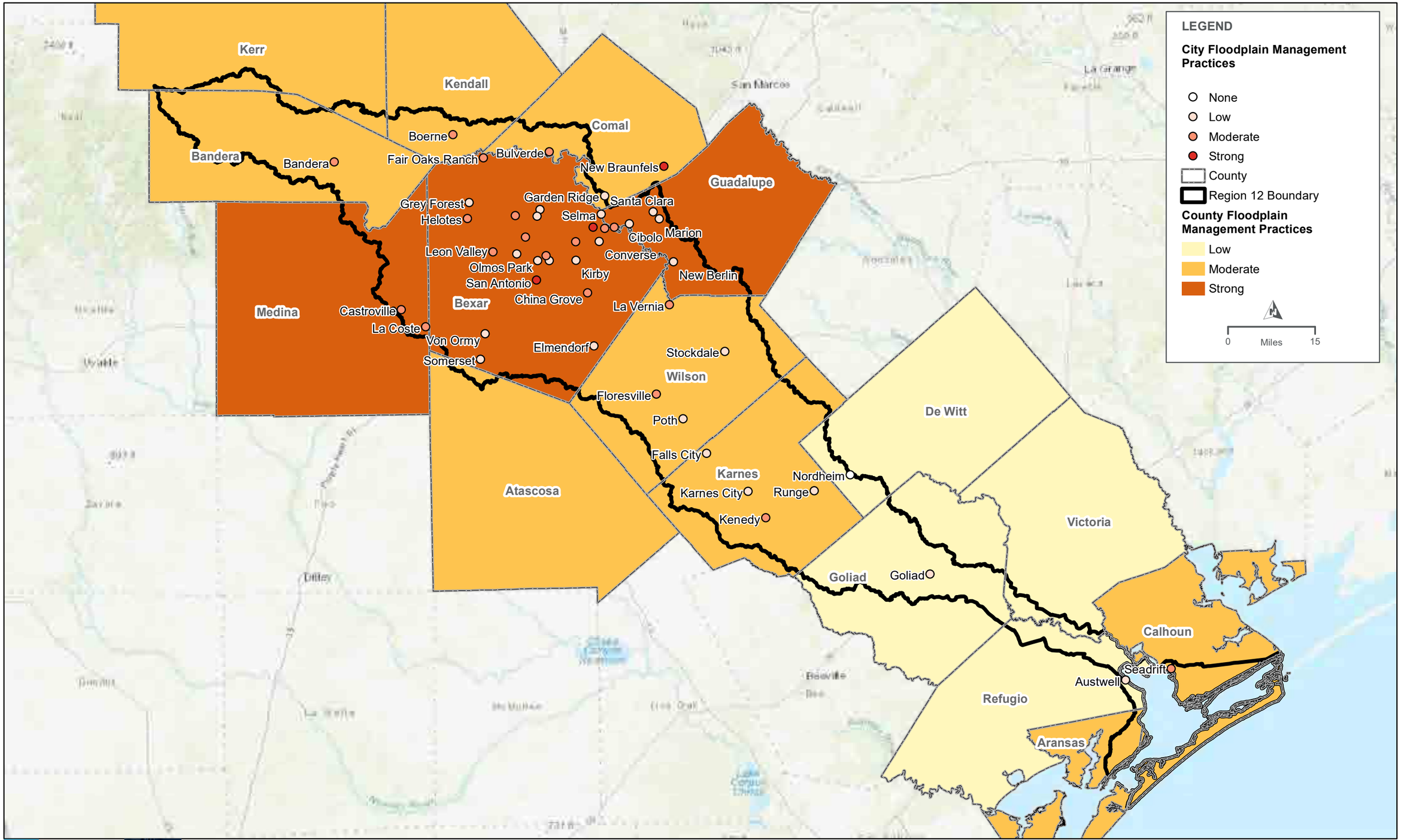

REGION 12 - MAP 13 - FLOODPLAIN MANAGEMENT PRACTICES

FINAL

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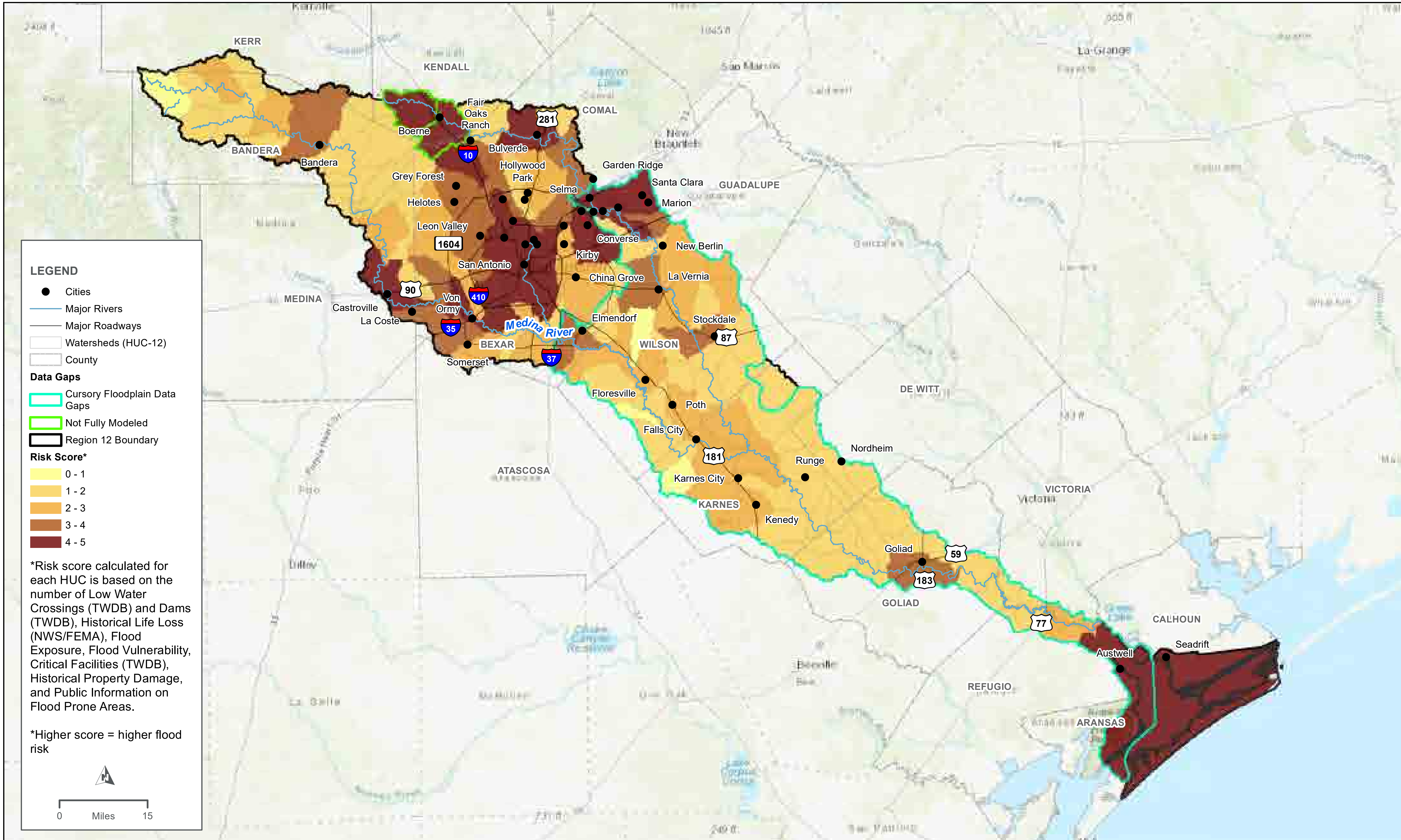
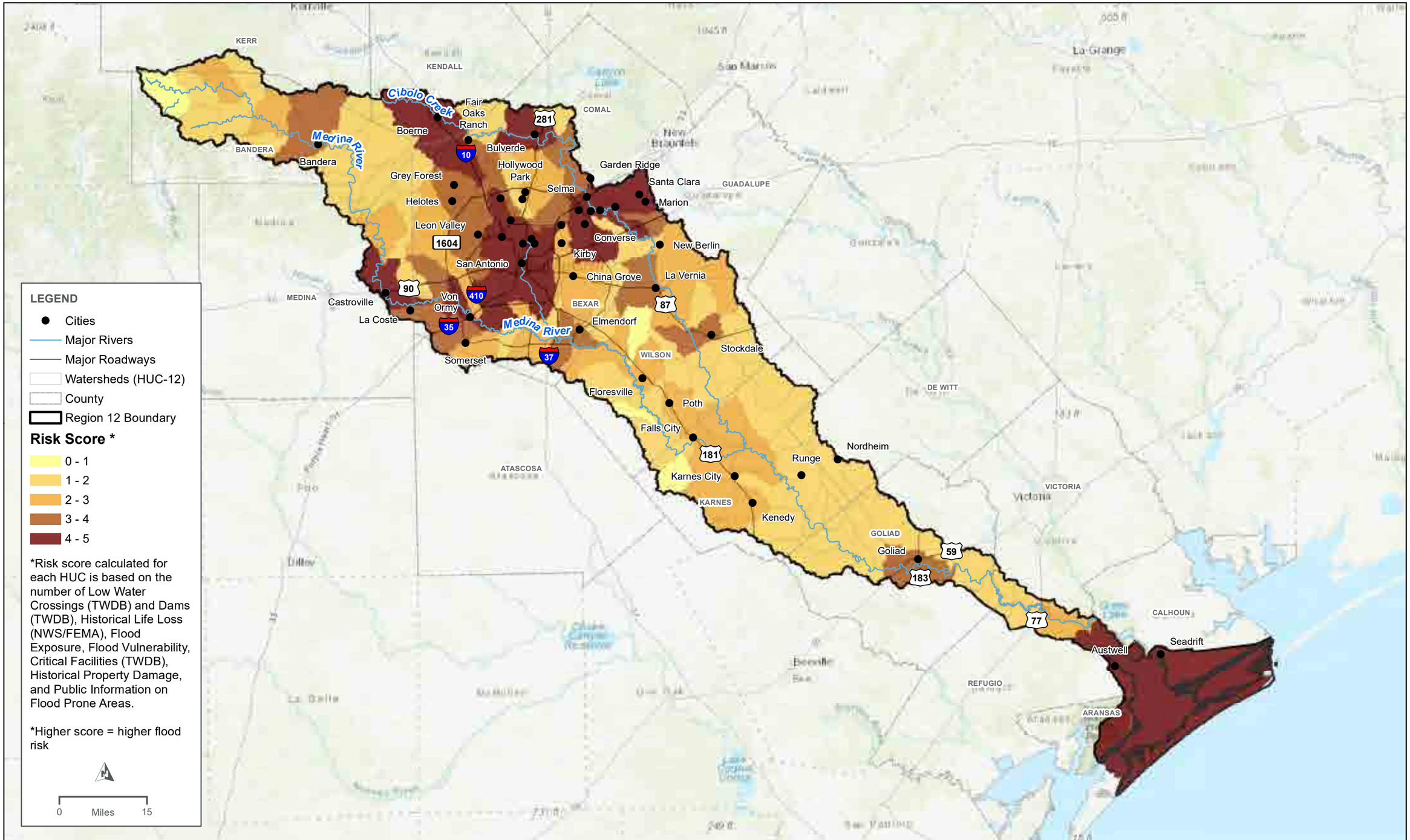


KERR
KENDALL
COMAL
BANDERA
GUADALUPE
MEDINA
BEXAR
WILSON
ATASCOSA
DE WITT
KARNES
VICTORIA
GOLIAD
CALHOUN
REFUGIO
ARANSAS
Fair Oaks Ranch
Boerne
Bulverde
Bandera
Hollywood Park
Garden Ridge
Grey Forest
Santa Clara
Selma
Helotes
Marion
Leon Valley
Converse
New Berlin
Kirby
San Antonio
China Grove
La Vernia
Castroville
Von Ormy
La Coste
Elmendorf
Stockdale
Somerset
Medina River
Floresville
Poth
Falls City
Nordheim
Runge
Karnes City
Kenedy
Goliad
Austwell
Seadrift
281
10
1604
90
410
35
37
87
181
59
183
77
LEGEND
Cities
Major Rivers
Major Roadways
Watersheds (HUC-12)
County
Data Gaps
Cursory Floodplain Data Gaps
Not Fully Modeled
Region 12 Boundary
Risk Score*
0 - 1
1 - 2
2 - 3
3 - 4
4 - 5
*Risk score calculated for each HUC is based on the number of Low Water Crossings (TWDB) and Dams (TWDB), Historical Life Loss (NWS/FEMA), Flood Exposure, Flood Vulnerability, Critical Facilities (TWDB), Historical Property Damage, and Public Information on Flood Prone Areas.
*Higher score = higher flood risk
0
Miles
15

REGION 12 - MAP 14 - GREATEST GAPS AND RISK SCORE

FINAL

DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP14_FLD_RISK_GAPS_11X17.MXD



REGION 12 - MAP 15 -HIGHEST FLOOD RISK

FINAL

DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFP\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP15_REGIONAL_HIGHEST_FLD_RISK_11X17.MXD

Regionwide FMEs	
FME_ID	*FME_NAME*
121000133	Natural capital inventory
121000134	Evaluation and prioritization of new gauge locations
121000135	Future conditions data refinement study
121000137	River Authority WWTP Resilience
121000161	Holistic Watershed based master planning consistent with Nature Based Solutions

*These are not displayed due to overlap with other FMEs

Kerr
Kendall
Comal
Bexar
Bandera
Medina
Uvalde
Guadalupe
Wilson
De Witt
Atascosa
Karnes
Victoria
Goliad
Calhoun
Refugio
Aransas

Cibolo Creek
Medina River
San Antonio River

10
281
87
90
410
35
1604
37
181
59
183
77

LEGEND

- Major Rivers
- Major Roadways
- Major Reservoirs
- TWDB FIF Category 1 Project - Karnes County 400111

FME TYPE

- Preparedness
- Project Planning
- Watershed Planning
- Watersheds (HUC-12)
- County
- Region 12 Boundary

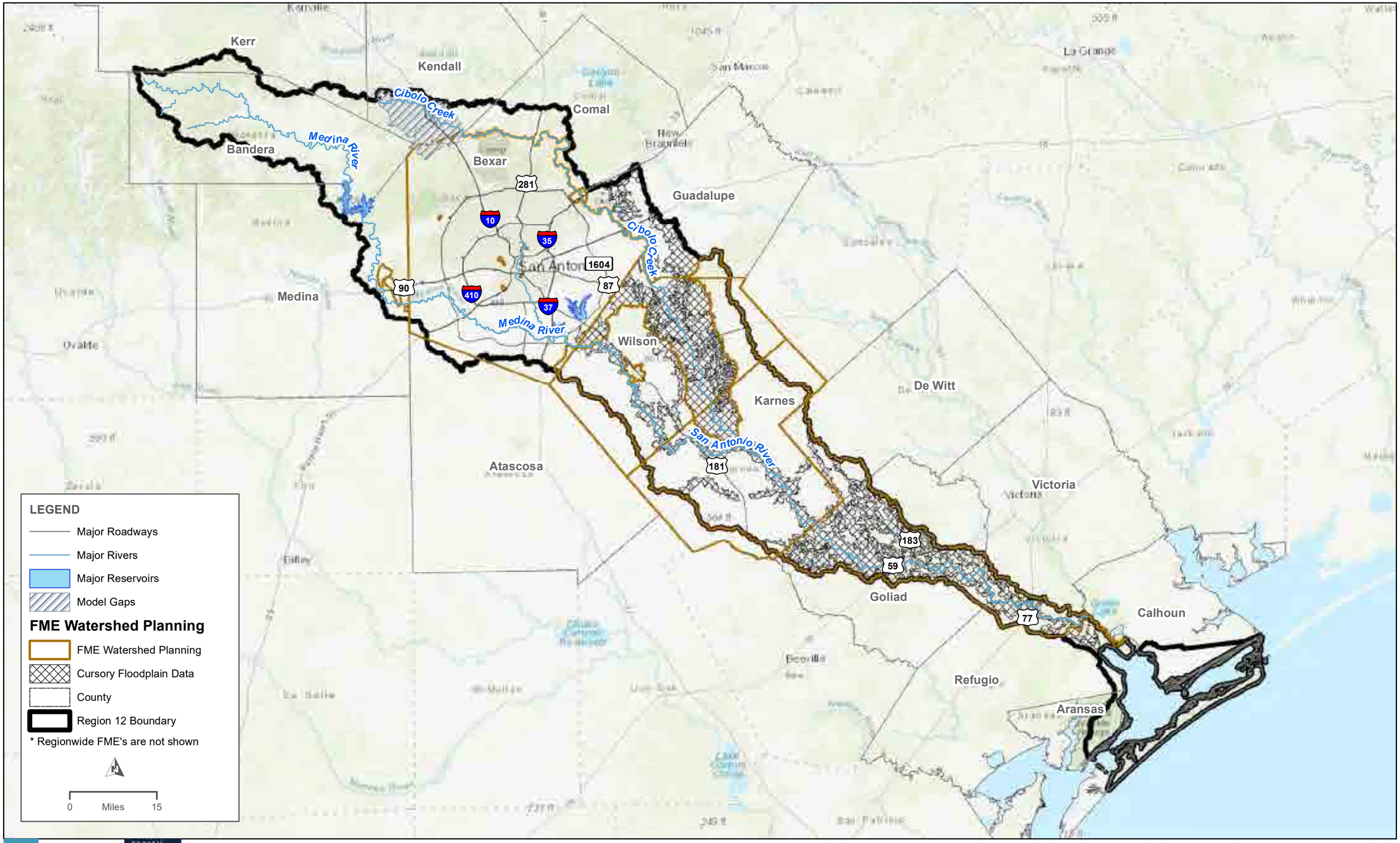
* Regionwide FME's are not shown

0 Miles 15

REGION 12 - MAP 16A - FLOOD MANAGEMENT EVALUATIONS

FINAL

DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFP\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP16\MAP16A_REGIONAL_FME_PROJECTPLANNING_11X17.MXD



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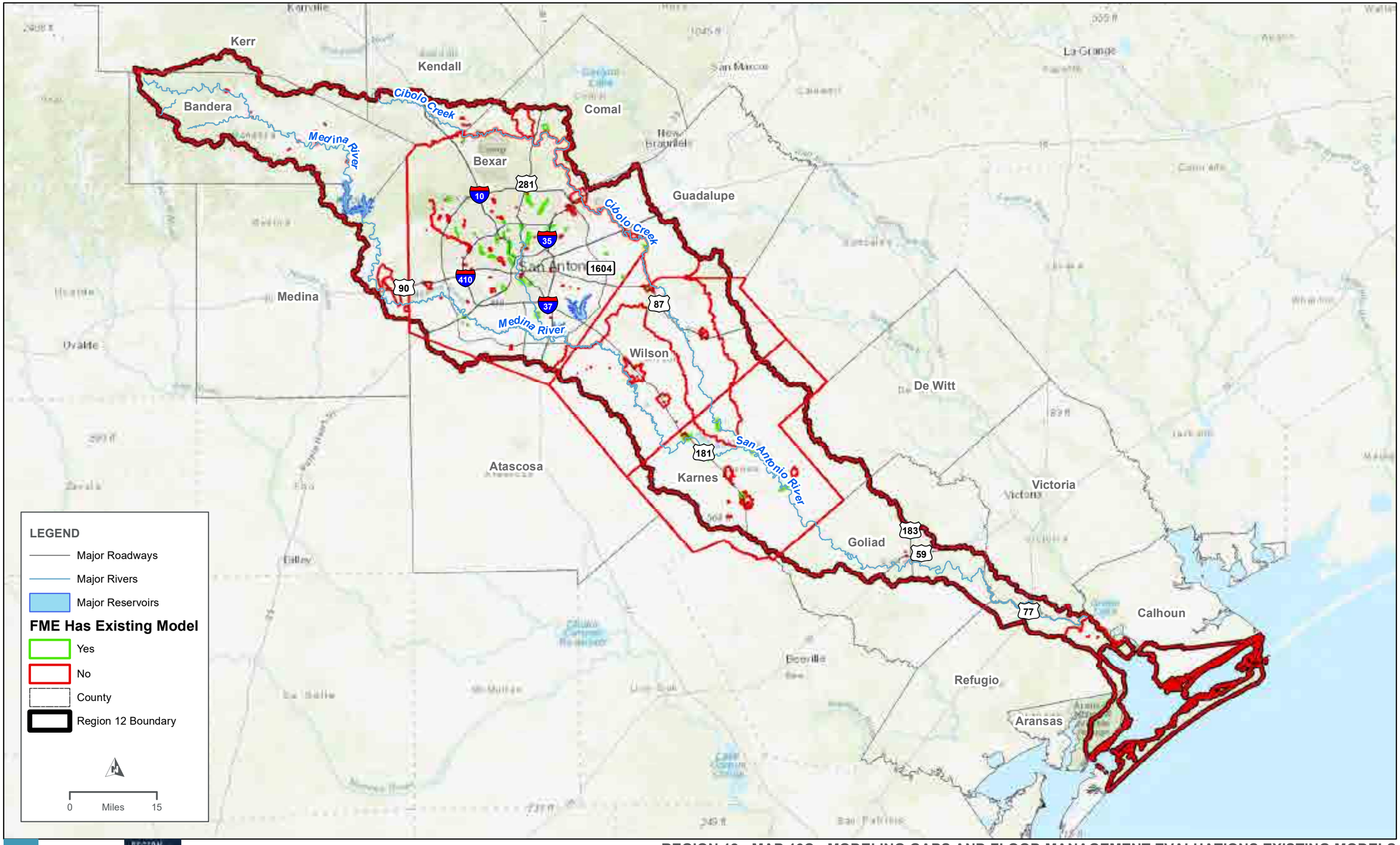
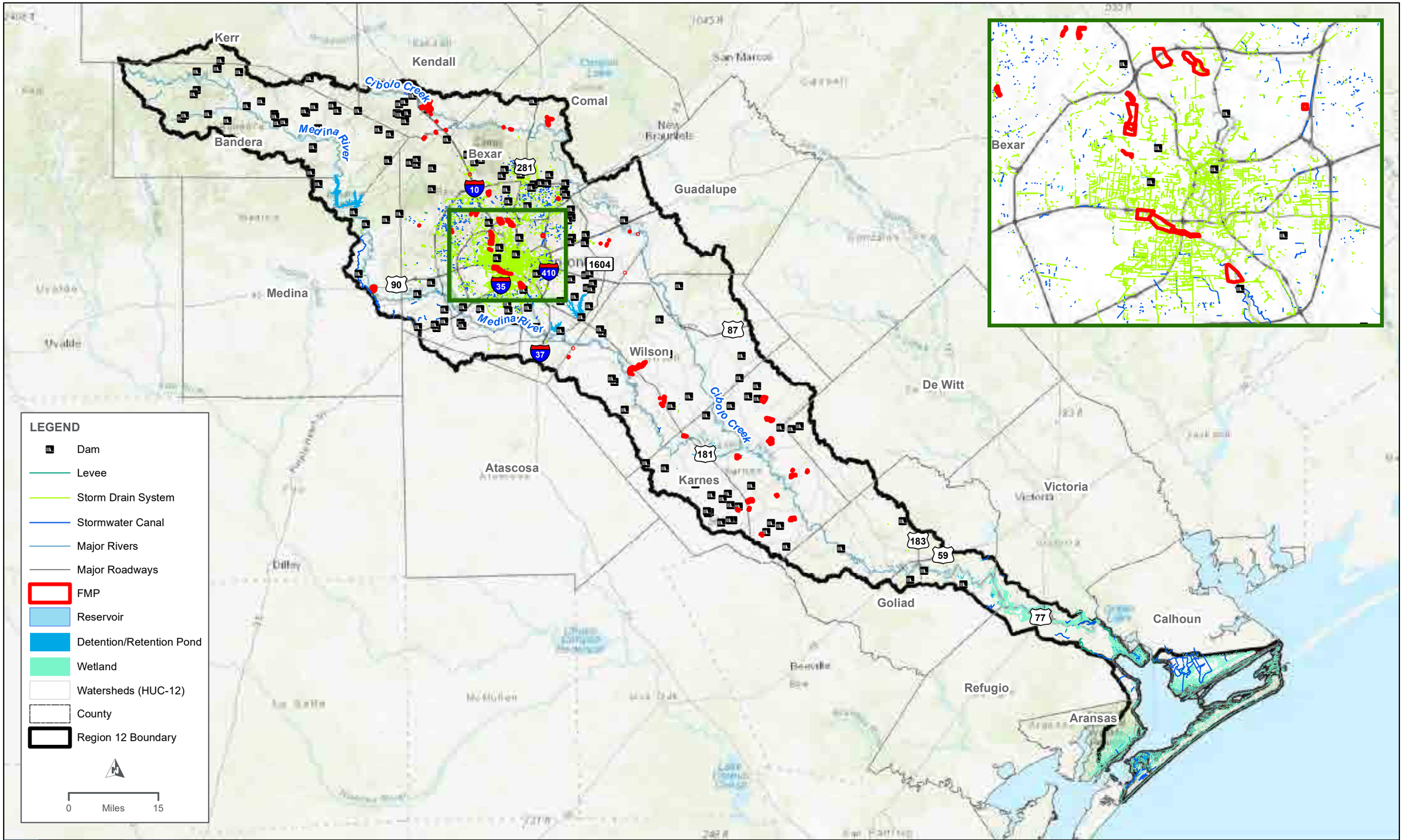


REGION 12 - MAP 16C - MODELING GAPS AND FLOOD MANAGEMENT EVALUATIONS EXISTING MODELS

FINAL



REGION 12 - MAP 17 - FLOOD MITIGATION PROJECTS

FINAL

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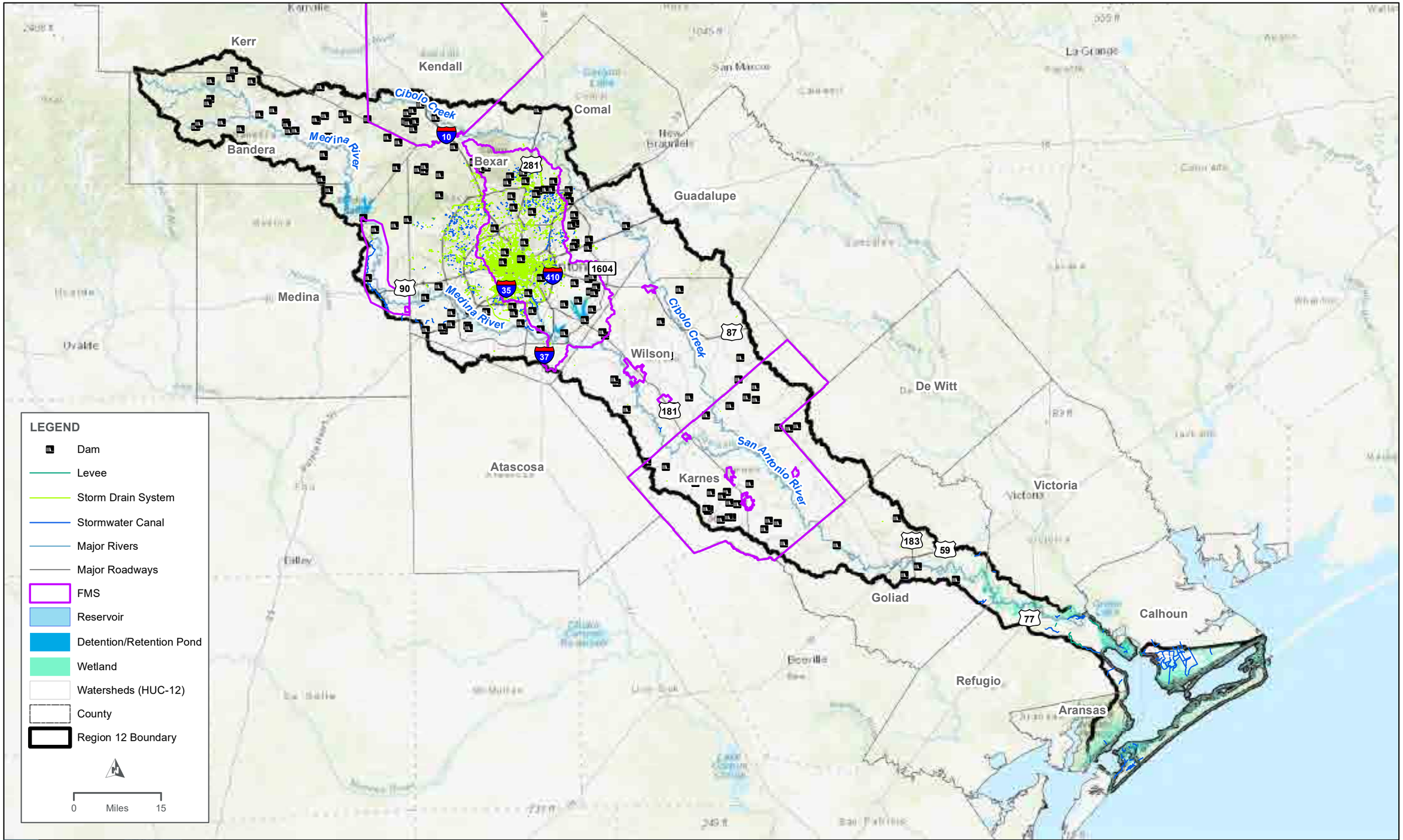
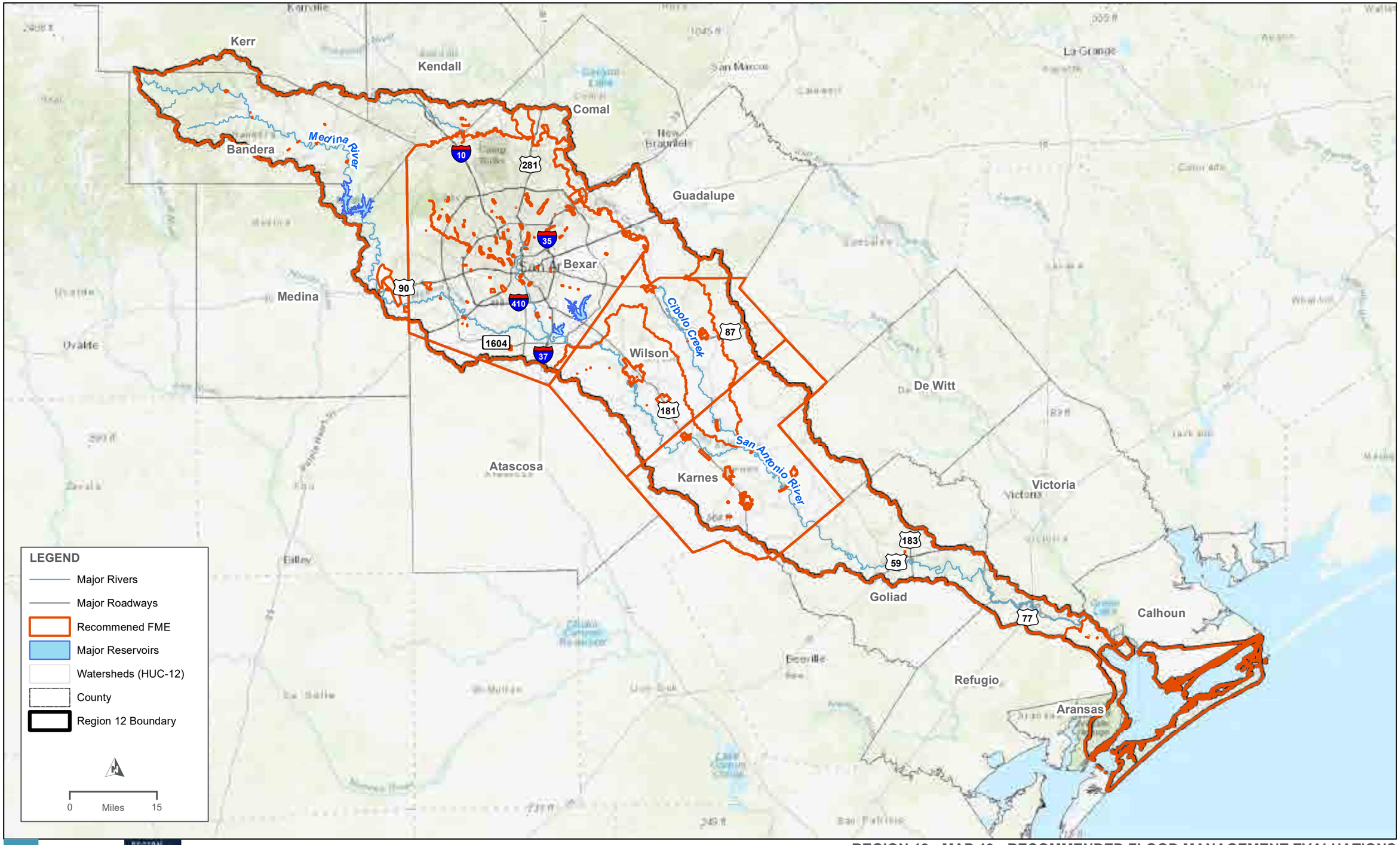


REGION 12 - MAP 18 - FLOOD MANAGEMENT STRATEGIES

FINAL

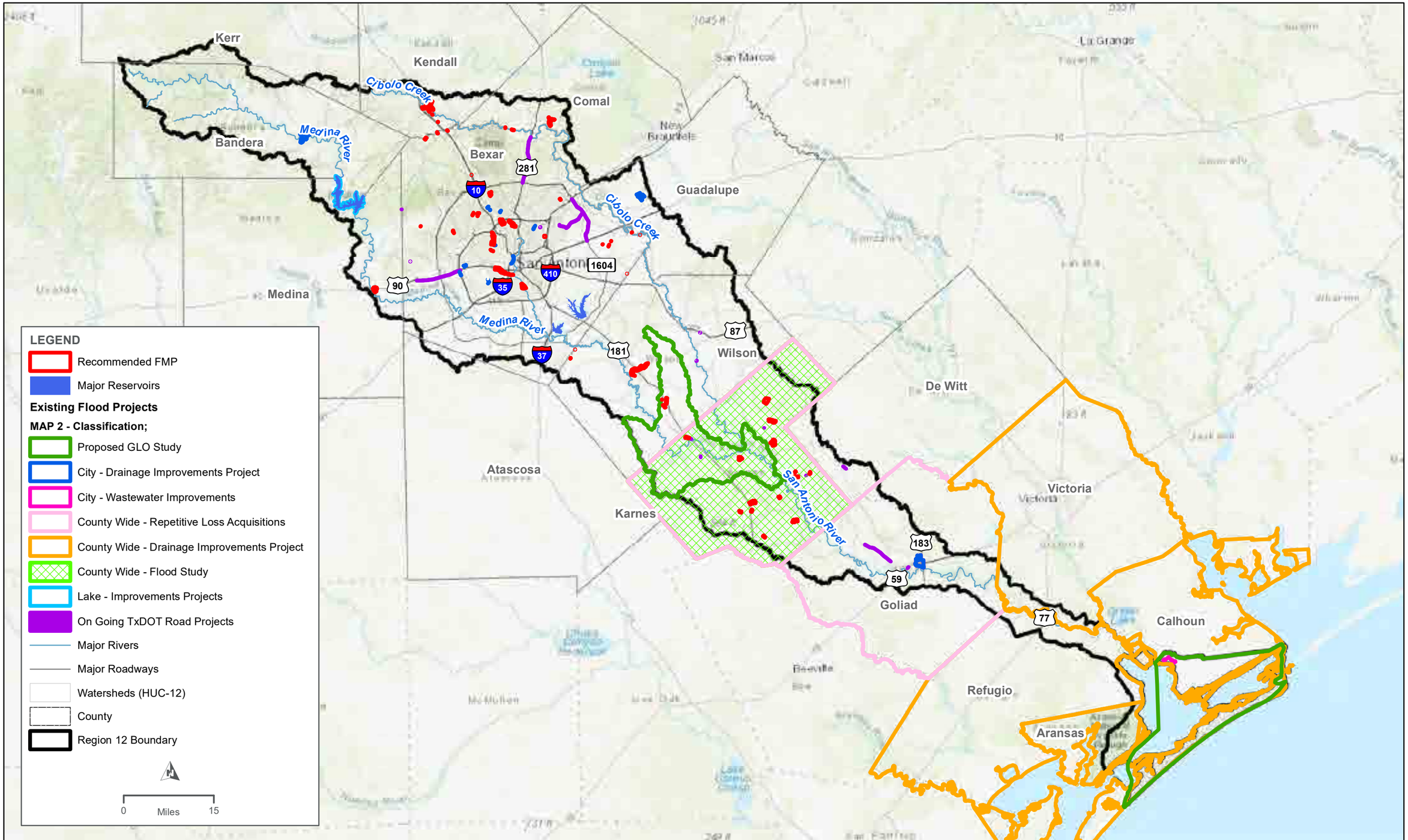
DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFP\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP18_REGIONAL_FMS_11X17.MXD



REGION 12 - MAP 19 - RECOMMENDED FLOOD MANAGEMENT EVALUATIONS

FINAL

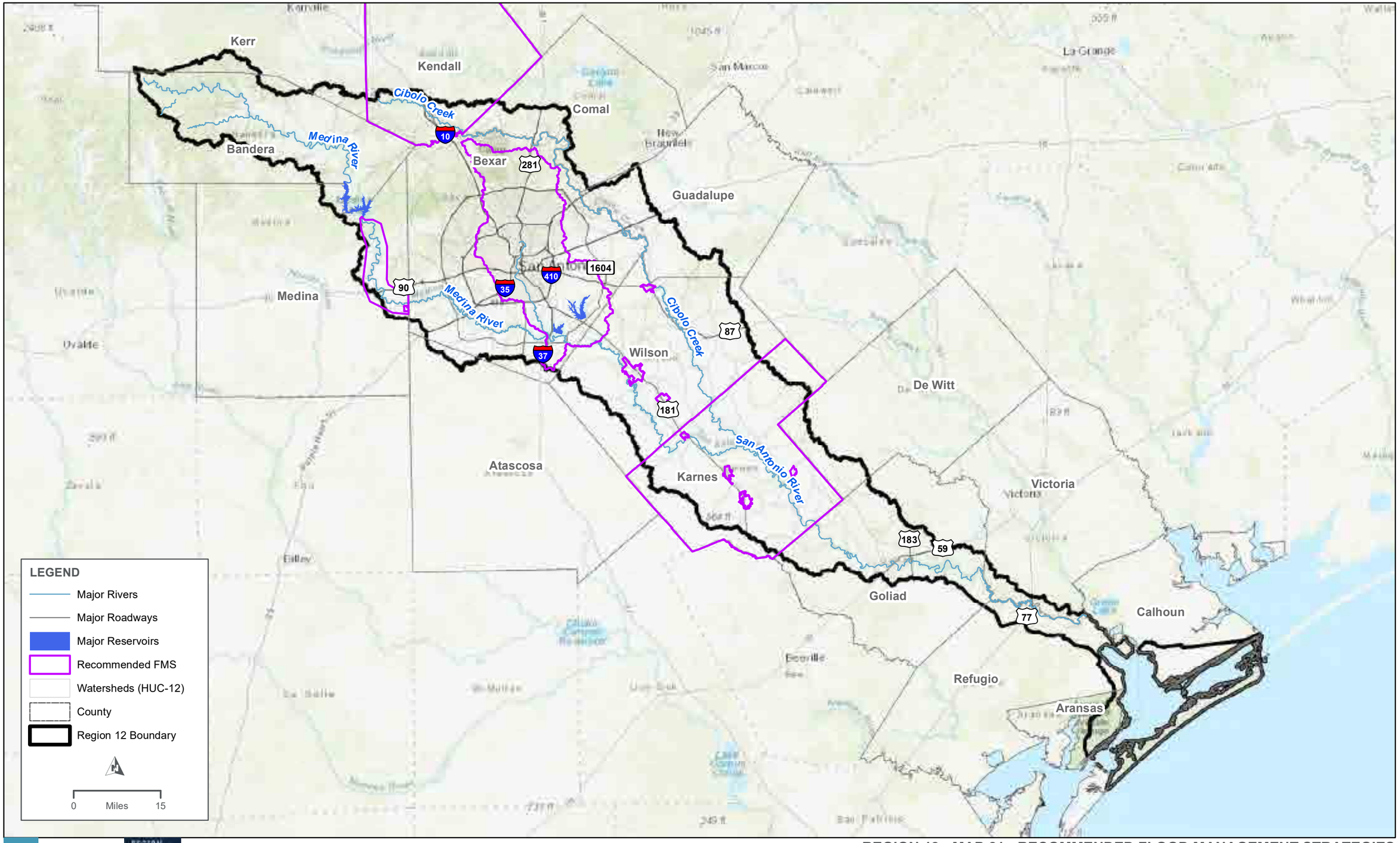
DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP19_REGIONAL_RECOMMENDEDFME_11X17.MXD



REGION 12 - MAP 20 - RECOMMENDED FLOOD MANAGEMENT PROJECTS

FINAL

DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP20_REGIONAL_RECOMMENDEDFMP_11X17.MXD



REGION 12 - MAP 21 - RECOMMENDED FLOOD MANAGEMENT STRATEGIES

FINAL

DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP21_REGIONAL_RECOMMENDEDFMS_11X17.MXD

Kerr
Kendall
Comal
Bandera
Bexar
Guadalupe
Medina
Uvalde
Wilson
De Witt
Atascosa
Karnes
Victoria
Goliad
Calhoun
Refugio
Aransas
La Grange
San Marcos
New Braunfels
San Antonio
Medina River
Cibolo Creek
San Antonio River
281
10
90
410
35
37
1604
87
181
183
59
77

LEGEND
- Major Rivers
- Major Roadways
- FMP Model Coverage
- Major Reservoirs
- County
- Watersheds (HUC-12)
- Region 12 Boundary

0 Miles 15

REGION 12 - MAP 22 -MODELING MAP
FINAL

DOCUMENT PATH: \\OMAPI-GISAPP03\PROJECTS\PROJECTS\TWDB\TWDB_RFPG\RFP2023_REGION12_ELECTRONICFILES_HDR_WORKING\MAP_DOCS\EXHIBITS\TM_FIGURES\MAP22_MODELINGMAP_11X17.MXD

Appendix C. Public Outreach Meeting Reports

San Antonio RFPG Public Meeting – Bandera County

San Antonio RFPG Public Meeting – St. Hedwig

San Antonio RFPG Public Meeting – Virtual

San Antonio RFPG Public Meeting – San Antonio

San Antonio RFPG Public Meeting – Schertz

San Antonio RFPG Public Meeting – Floresville

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San Antonio Regional Flood Planning Group
Public Meeting Documentation

Planning Region

Region 12 consisting of parts of Aransas, Atascosa, Bandera, Bexar, Caldwell, ! Calhoun, Comal, DeWitt, Goliad, Guadalupe, Karnes, Kendall, Kerr, Medina, ! Refugio, Victoria, and Wilson counties. !

Meeting Location, Time, and Date

Thursday, December 9, 2021 !
10 a.m. – 11:30 a.m. !
Bandera County River Authority and Conservation District (BCRAGD) !

Presenters

Ronald Branson, P.E, Project Manager, HDR, Inc. !
Troy Dorman, P.E., Assistant Project Manager, Halff, Inc. !
David Mauk, CFM, General Manager, BCRAGD !
Larry Thomas, CFM, Natural Resource Specialist, BCRAGD !

Elected Officials in Attendance

3

Total Number of Attendees (approx.)

10

Number of Comments Submitted at Meeting

3

San Antonio Regional Flood Planning Group
Public Meeting Documentation

Planning Region

Region 12 consisting of parts of Aransas, Atascosa, Bandera, Bexar, Caldwell, Calhoun, Comal, DeWitt, Goliad, Guadalupe, Karnes, Kendall, Kerr, Medina, Refugio, Victoria, and Wilson counties.

Meeting Location, Time, and Date

Tuesday, January 11, 2021
6:30 p.m. – 8 p.m.
Tradition Elementary School Cafeteria
12885 FM 1346, St. Hedwig, TX 78152

Presenters

Ronald Branson, P.E, Project Manager, HDR, Inc.

Elected Officials in Attendance

1

Total Number of Attendees (approx.)

7

Number of Comments Submitted at Meeting

2

San Antonio Regional Flood Planning Group
Virtual Public Meeting Documentation

Planning Region

Region 12 consisting of parts of Aransas, Atascosa, Bandera, Bexar, Caldwell, ! Calhoun, Comal, DeWitt, Goliad, Guadalupe, Karnes, Kendall, Kerr, Medina, ! Refugio, Victoria, and Wilson counties. !

Virtual Meeting Date, Time and Location

Monday, February 7, 2022 !
6 p.m. – 7 p.m. !
Webex link at www.region12texas.org !

Presenters

Ronald Branson, P.E, Project Manager, HDR, Inc.

Elected Officials in Attendance

None

Total Number of Attendees (approx.)

3

Number of Comments Submitted

Any comments submitted by meeting participants can be found at www.region12texas.org and clicking the link in the Comment Map section of the webpage.

San Antonio Regional Flood Planning Group
Public Meeting Documentation

Planning Region

Region 12 consisting of parts of Aransas, Atascosa, Bandera, Bexar, Calhoun, Comal, DeWitt, Goliad, Guadalupe, Karnes, Kendall, Kerr, Medina, Refugio, Victoria, and Wilson counties.

Meeting Date, Time, and Location

Monday, June 6, 2022, 6:30 p.m. to 8 p.m.
Sam Rayburn Middle School
1400 Cedarhurst Dr.
San Antonio, TX 78227

Presenters

Ronald Branson, P.E, Project Manager, HDR, Inc.

Elected Officials in Attendance

0

Total Number of Attendees (approx.)

5

Number of Comments Submitted at Meeting

2

San Antonio Regional Flood Planning Group
Public Meeting Documentation

Planning Region

Region 12 consisting of parts of Aransas, Atascosa, Bandera, Bexar, Calhoun, Comal, DeWitt, Goliad, Guadalupe, Karnes, Kendall, Kerr, Medina, Refugio, Victoria, and Wilson counties.

Meeting Date, Time, and Location

Tuesday, June 7, 2022, 6:30 p.m. to 8 p.m.
City of Schertz North Center
3501 Morning Dr.
Schertz, TX 78108

Presenters

Ronald Branson, P.E, Project Manager, HDR, Inc.

Elected Officials in Attendance

1

Total Number of Attendees (approx.)

6

Number of Comments Submitted at Meeting

1

San Antonio Regional Flood Planning Group
Public Meeting Documentation

Planning Region

Region 12 consisting of parts of Aransas, Atascosa, Bandera, Bexar, Calhoun, Comal, DeWitt, Goliad, Guadalupe, Karnes, Kendall, Kerr, Medina, Refugio, Victoria, and Wilson counties.

Meeting Location, Time, and Date

Thursday, June 16, 2022, 6:30 p.m. to 8 p.m.
Jack's Café
507 Tenth Street
Floresville, TX 78114

Presenters

Ronald Branson, P.E, Project Manager, HDR, Inc.

Elected Officials in Attendance

2

Total Number of Attendees (approx.)

6

Number of Comments Submitted at Meeting

2

San Antonio Regional Flood Plan

January 11, 2022

Agenda

- **Introductions**
- **Plan Objectives and Benefits**
- **Background**
- **Planning Process and Other Studies**
- **Stakeholder Input**
- **Next Steps**

Meeting Purpose: Introduce the regional flood planning process and gather local knowledge of flood-prone areas, flood mitigation projects and needs.

Local management team has dedicated their careers to San Antonio Basin

Ron Branyon, PE, CFM

Project Manager

Point of contact/HDR

Added Value To SARFPG

- **Local, Responsive Project Manager**
- **20 years of experience delivering TWDB flood mitigation studies, drainage master plans, and floodplain mapping studies, in San Antonio River Basin**
- **Extensive experience in public outreach related to flood mitigation and mapping projects**
- **A strong working relationship with members of the Bexar Regional Watershed Management partnership.**
- **Track record for successful delivery of local high-profile projects, including nature- based solutions**

Relevant Experience To SARFP Tasks

- **SARA, City of San Antonio Drainage Master Plan — TX**
- **SARA, San Antonio River Watershed Cooperating Technical Partners (CTP) — TX**
- **SARA/Bexar County, San Pedro Creek Improvements Project — TX**
- **USACE, Leon Creek Master Plan — TX**
- **FEMA, DFIRM-Refugio, Calhoun, Aransas — TX**
- **USACE, Lower San Antonio River Basin Hydraulic Routing Models — TX**

"I work in Bexar County, reside in Wilson County and ranch in Goliad County, so this watershed is my home! From the headwaters to the Gulf I have seen it all and protecting the watershed and those who live here is what excites me about this opportunity."

What is the Region 12 Flood Plan?

- Historic Flooding – Realization of the need for flood planning
- In 2019, the 86th Texas legislature created and funded the first-ever regional and state flood planning process
- Schedule
  - Regional flood plans to be delivered by January 10, 2023, and then every five years thereafter
  - State plan to be adopted by September 1, 2024, and then every five years thereafter
- TWDB Flood Planning website:
- https://www.twdb.texas.gov/flood/planning/index.asp

Plan Objectives

- Document existing flood infrastructure and preparedness
- Identify current and future flood risk and hazard
- Develop flood mitigation/management goals
- Identify and evaluate flood management strategies and mitigation projects
- Evaluate benefits/impacts to water supply environment, and economics

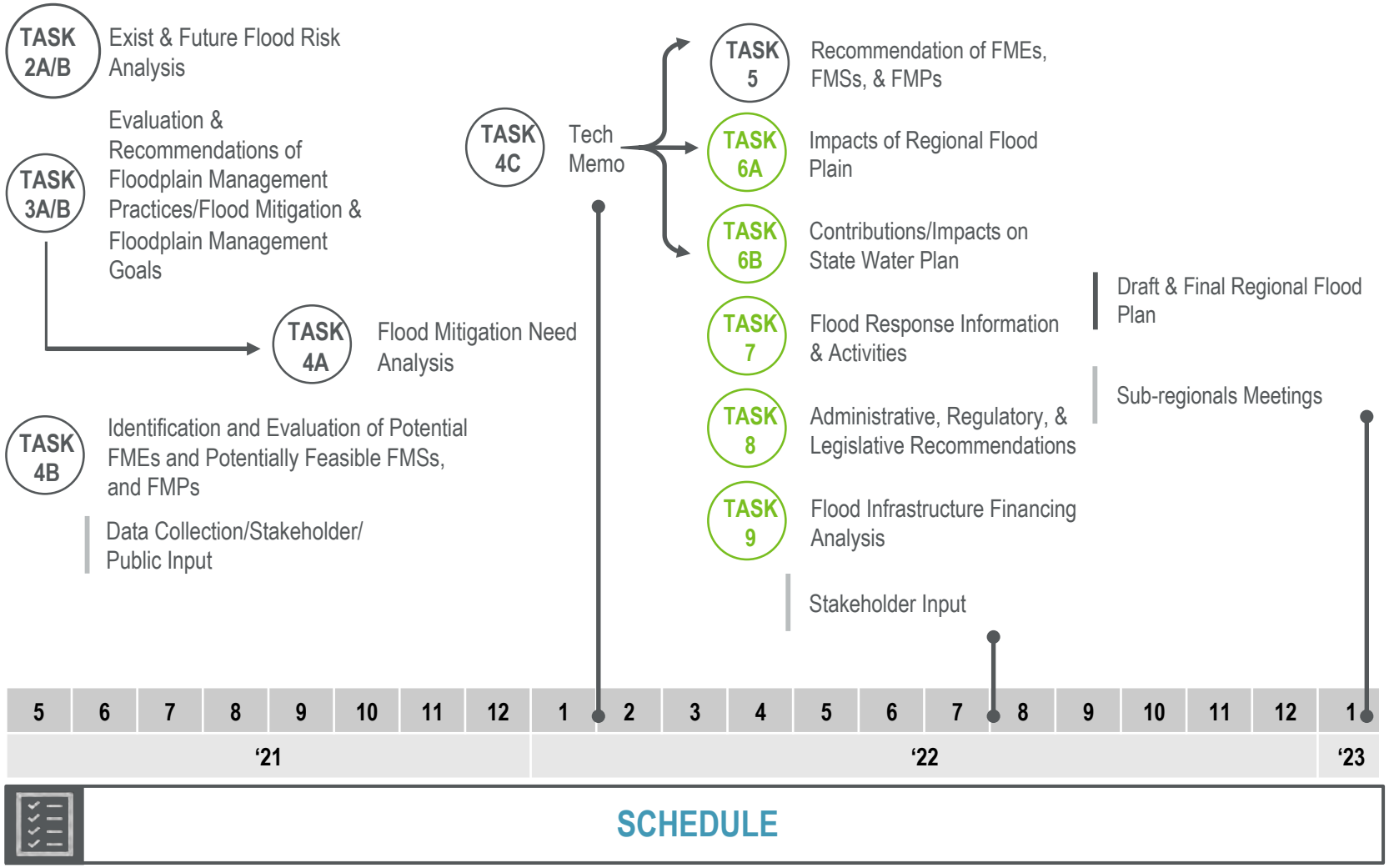
Region 12 Background

- **San Antonio Region Flood Planning Group (SARFPG)**
  - Created to represent diverse interest and to deliver the 2023 regional flood plan
- **Sponsor**
  - San Antonio River Authority
- **Technical Team**
  - HDR/Halff team selected as consultant to prepare plan

San Antonio Regional Flood Planning Group

- Flood Districts- Nefi Garza, *City of San Antonio (Chair)*
- River Authorities- Derek Boese, *SARA (Vice-Chair)*
- Water Districts- David Mauk, *Bandera Co River Authority & GWD*
- Municipalities- Jeffery Carrol, *City of Boerne*
- Agriculture- Brian Yanta, *Goliad County Ag-Extension*
- Counties- David Wegmann, *Bexar County*
- Electric-generating Utilities- Doris Cooksey, *CPS Energy*
- Environment- Debbie Reed, *Greater Edwards Aquifer Alliance*
- Industries- Cara Tackett, *Pape-Dawson Engineers*
- Non-Profit- Suzanne Scott, *Nature Conservancy*
- Public- John Beasley, *US Army Environmental Command*
- Small Business- Steve Gonzales, *Civil Tech Engineering, Inc.*
- Water Utilities- Steven Clouse, *SAWS*

TWDB Flood Planning Tasks



Schedule

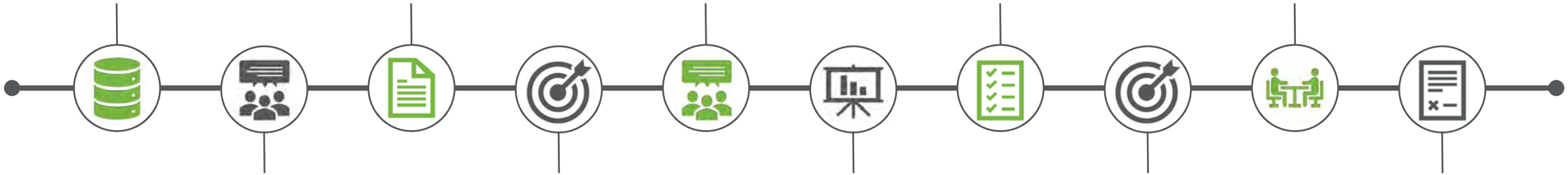
Updated Flood Risk Geodatabase – July 2021: Flood Risk Data used for base map for an interactive website for review and comment.

Draft Technical Memorandum – November 2021: We propose a workshop with you to review and collect comments for incorporation into the final document.

Regular RFPG Meeting Check-ins – February – July 2022: We will continue attending regular RFPG meetings to provide status updates on Tasks 5-9 progress.

Draft Plan – June 2022: We propose a workshop with you to review and collect comments on the Draft Plan to incorporate into the final Draft Plan.

Sub-regional Public Meeting(s) – September – October 2022: We will hold sub-regional public meetings to present the Draft Plan and incorporate public comments from the meetings and interactive website, along with TWDB's review comments into Final Plan.



Regular RFPG Meeting Check-ins – July – November 2021: We will attend regular RFPG meetings to provide status updates on Tasks 1-4 progress and discuss issues, decisions needed, action items, and next steps.

MAJOR DELIVERABLE- Technical Memorandum – January 7, 2022

Summary of Proposed Evaluations, Projects, and Strategies – May 2022: We propose a workshop with you to review preliminary list of potential flood management evaluations and potentially feasible flood mitigation projects and strategies.

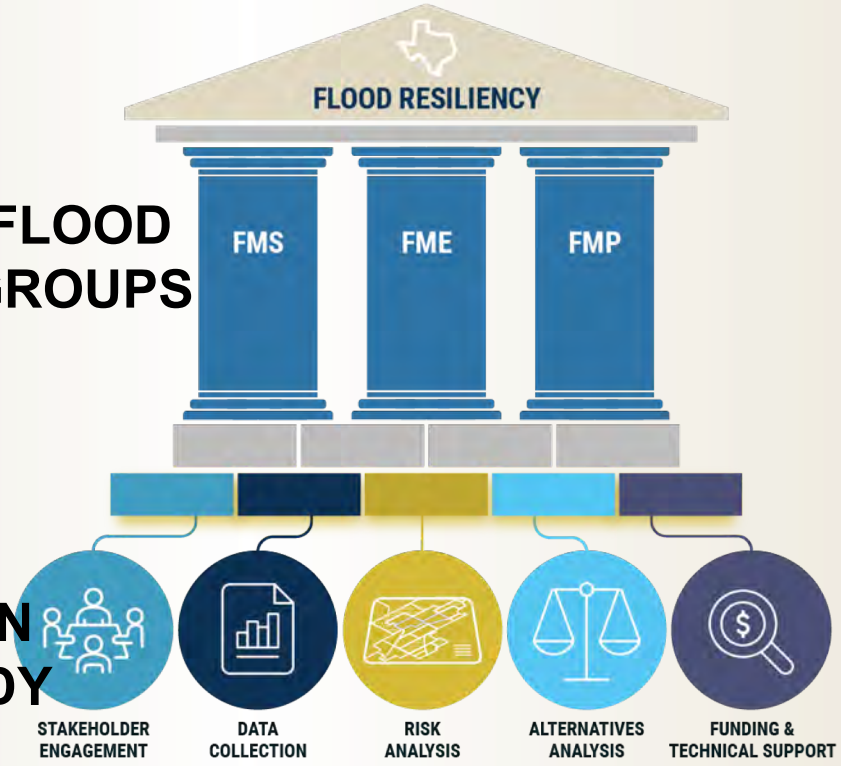
DELIVERABLE: Draft Plan – by August 1, 2022

December 2022: Once the Draft Final Plan is available, we will lead a workshop with you to review and collect final comments.

MAJOR DELIVERABLE: Final Plan – January 10, 2023

Additional Relevant Flood Studies and Coordination

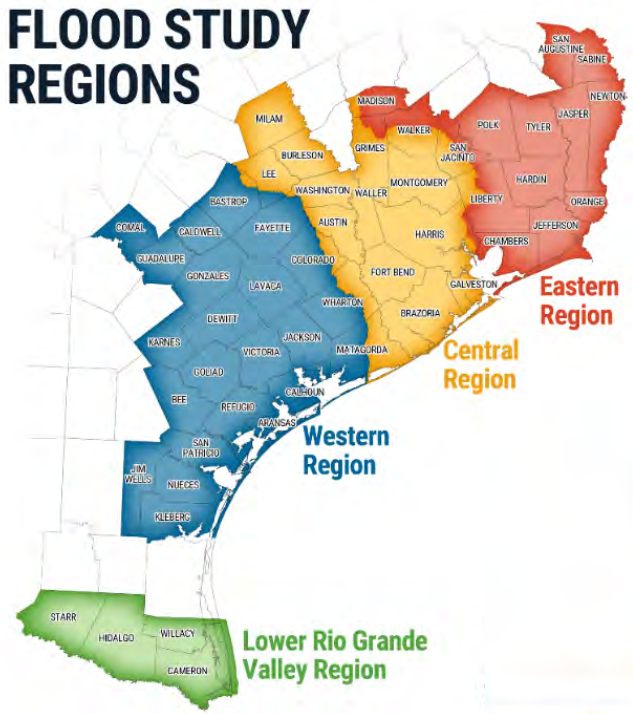
REGIONAL FLOOD PLANNING GROUPS



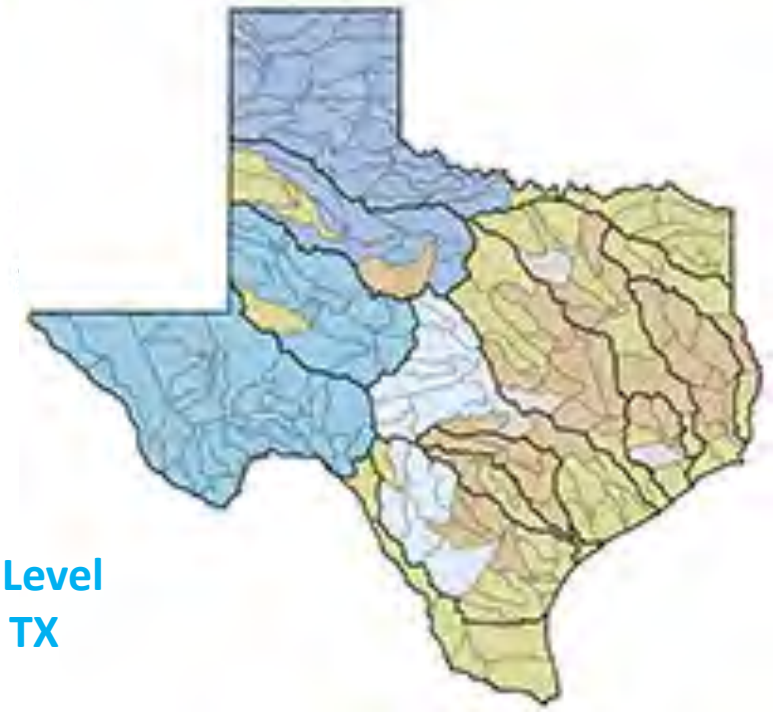
RIVER BASIN FLOOD STUDY

ACRONYMS

- **FMS: Flood Management Strategies**
- **FME: Flood Management Evaluations**
- **FMP: Flood Mitigation Projects**



GLO, Lower Rio Grande Valley Flood Study - TX

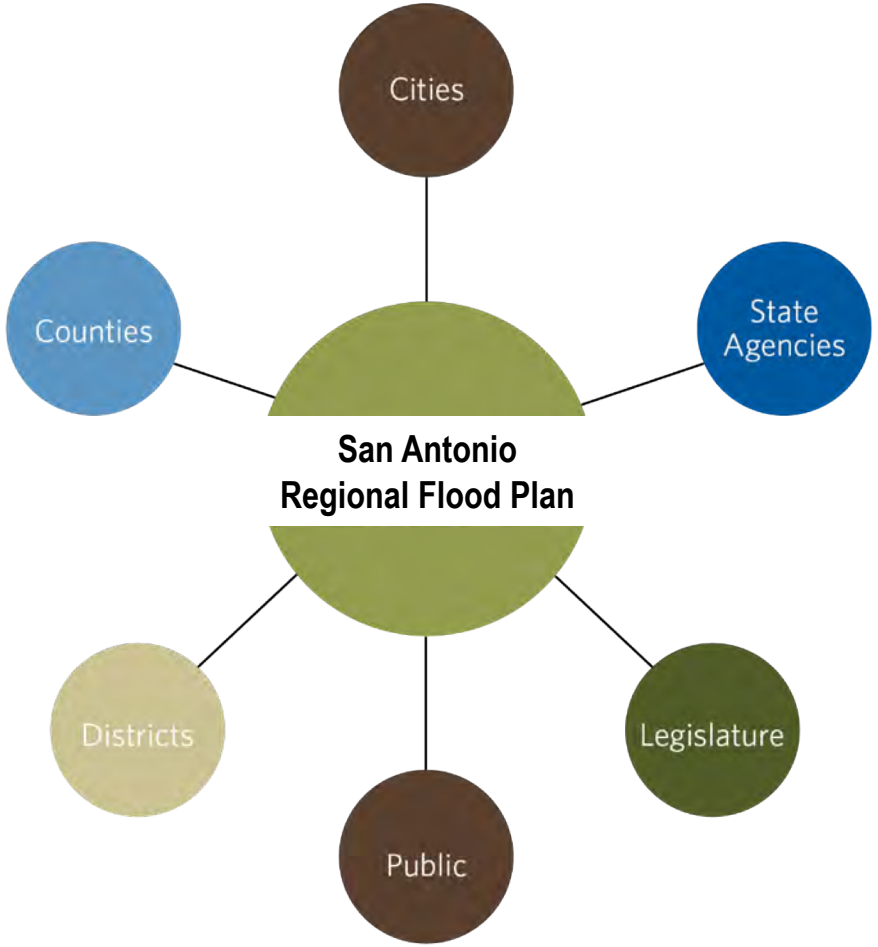


TWDB, Base Level Engineering- TX

Stakeholder Input

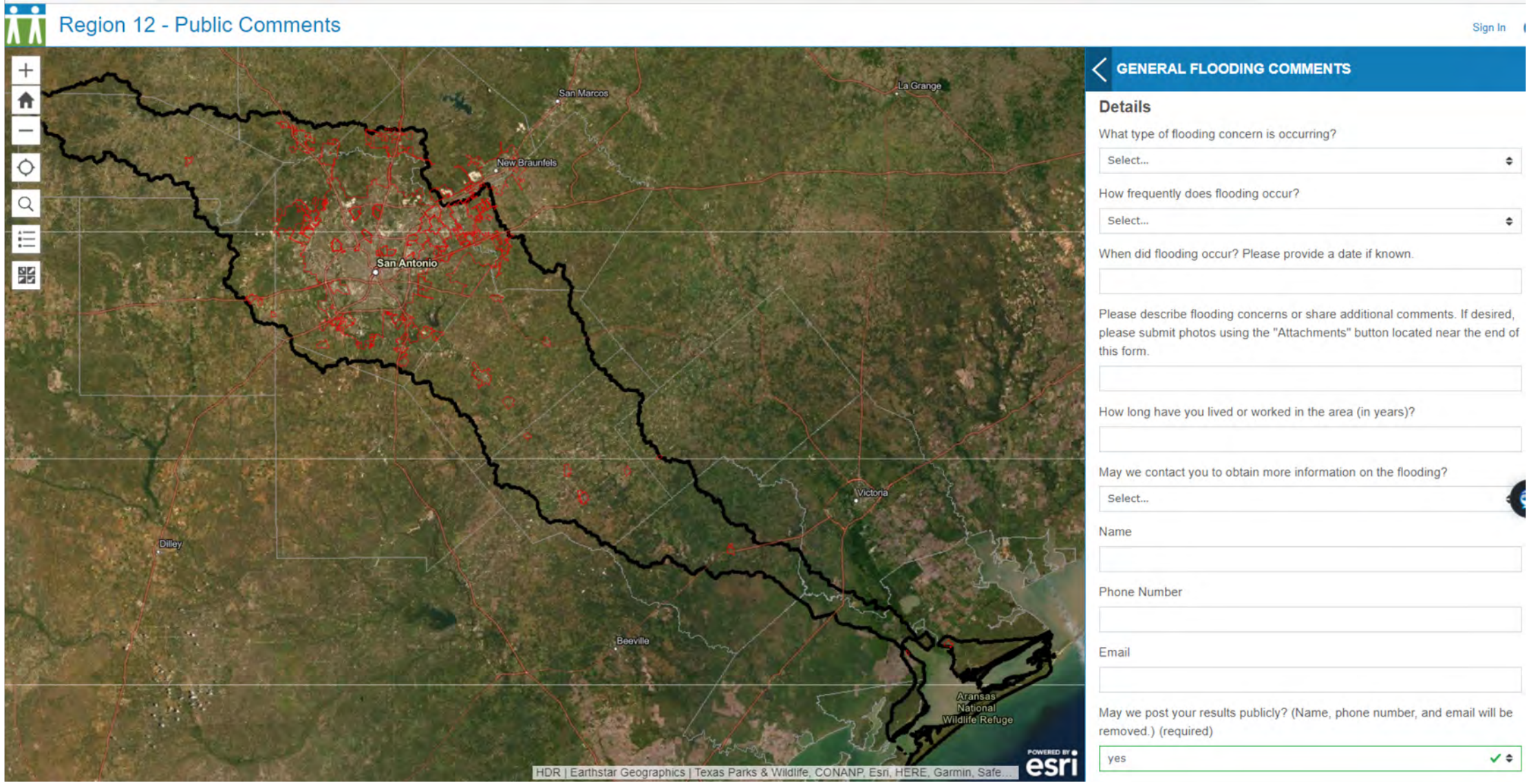
- Local knowledge, needs, and goals
  - **Flood Prone Areas**
  - Existing “Major” Flood Infrastructure
  - Proposed or Ongoing Flood Mitigation Projects
  - Existing flood management practices
  - Short- and long-term management goals
- Stay in touch through the Region 12 Website
- https://region12texas.org

  - *Anyone else that needs to be a part of this conversation?*



Interactive Comment Map

Region 12 - Public Comments (arcgis.com)



Stakeholder Input

- **Your insight is valuable**
  - Tell us your experience, where you have seen or know of flood concerns
  - A plan is only as good as the input
  - The flood plan needs to represent ALL community needs

- No one size fits all solutions, unique needs for each basin in the region

- **Funding opportunities for your much-needed projects**

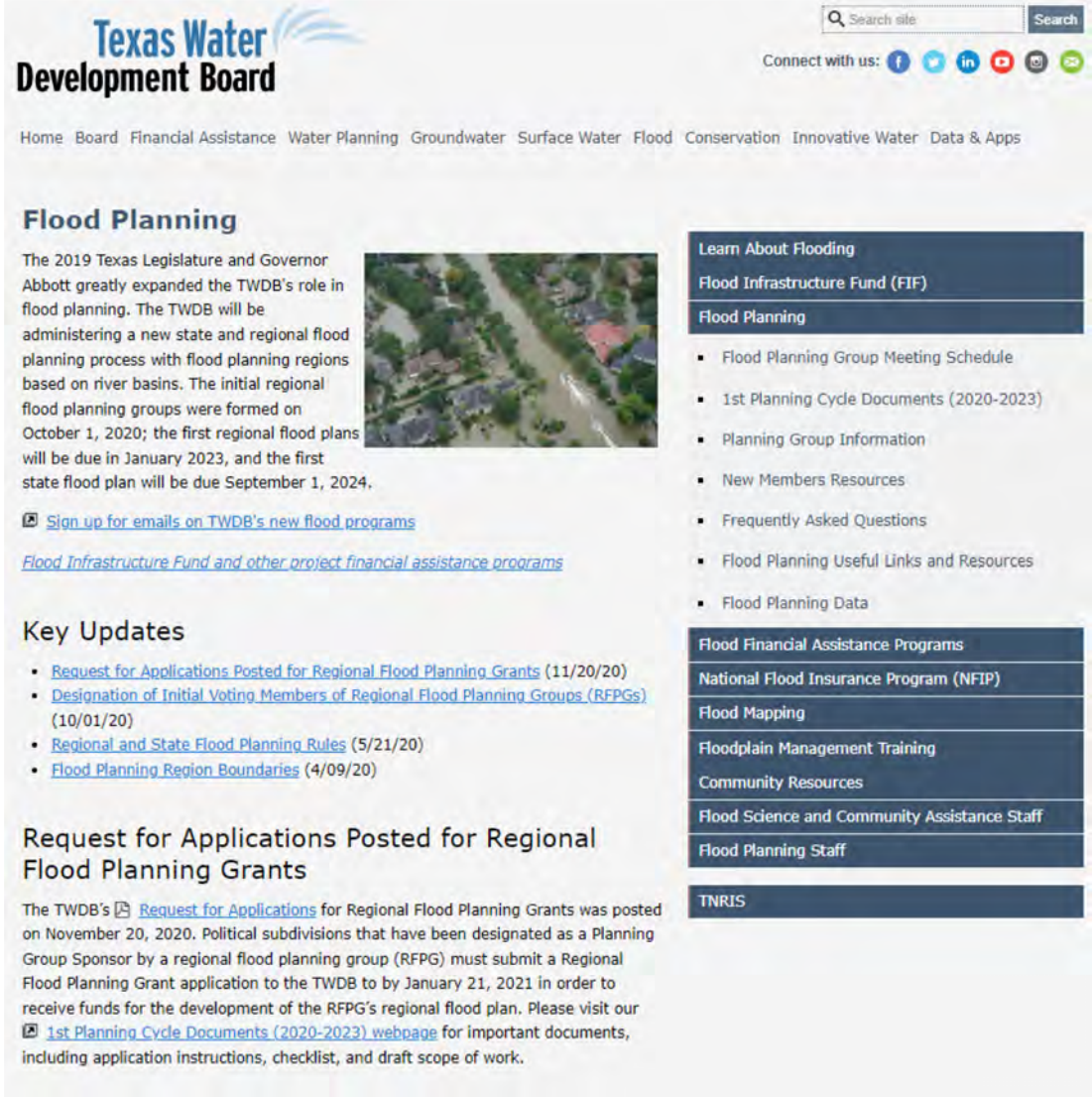
Stakeholder Input

HOW TO ENGAGE

- Contact us- https://region12texas.wpengine.com/contact-us/
- Share the Region 12 Website https://www.region12texas.org
- Regional Flood Plan Meetings (all public)
  - Posted on Region 12 Website
- Stakeholder Surveys/ Interactive Map

MORE INFORMATION ON STATE FLOOD PLANNING

https://www.twdb.texas.gov/flood/planning/index.asp



Any Questions

Contact info: Ron Branyon
Email: Ronald.branyon@hdrinc.com
Phone: 210.912.7105

Public Outreach
Flood Concerns Table

Comment Type	County	Flood Concern Type	Flood Freq	When Did It Start	Description	How Long (Yrs)
Feedback Form	Bandera		Frequently	8/2/2021	Frequent road and land that is getting worse every year	12
Feedback Form	Bandera				Attended to support low impact solutions to address water quality and flood oncerns while protecting natural infrastructure. Want county wide regulatory authority to manage just flood issues.	
Feedback Form	Bandera		Frequently	1997, 2002	Frequent Land flooding	30
Online Map	Bandera	Road	Few_Occasions	2016, 2015, 2002 - Major flood events	Closes the road down which is the main access for citizens	19
Online Map	Bandera	Road	Few_Occasions	2015, 2016, 2002 - Major Flood Events	Prevents access to citizens from the city	19
Online Map	Bandera	Road	Few_Occasions	Major storms	This low water crossing can sometimes remain flooded for months	12
Online Map	Bandera	Road	Few_Occasions	1978, 1998, 2002, 2015, and 2016	FM 2107 is the only path for residents to access community lifelines.	40
Online Map	Bandera	Road	Frequently	Minor and major flood events.	Impairs travel for citizens to reach community lifeline services.	40
Online Map	Bandera	Road	Frequently	Minor and major flood events	Lower Mason Creek and Bandera Creek contribute to flooding at SH 16.	40
Online Map	Bandera	Building	Frequently	Many minor and all major events	Wastewater treatment plant is in 100 yr floodplain	40
Online Map	Bandera	Building	Few_Occasions	Major flood events (1978)	Electrical sub-station	40
Online Map	Bandera	Road	Frequently	Rain, minor, and major flood events.	Bridge drainage is clogged.	40
Online Map	Bandera	Channel	Frequently	minor and major events	culverts are clogged at bridge.	40
Online Map	Bandera	Road	Frequently	Minor and Major Flood Events	blocks public access to lifelines in Bandera	40
Online Map	Bandera	Road	Frequently	Minor and Major Flood Events	Blocks people of Tarpley from EMS and other lifelines in the city of Bandera	40
Online Map	Kendall	Road	Frequently	<Null>	Road Overtops frequently in rain events at this low water crossing. In 2002 a fatality occurred at this location when car tried to drive thru the water.	20
Online Map	Kendall	Road	Frequently	overtops frequently. loss of life at his location in 2002	<Null>	20
Online Map	Kendall	Road	Few_Occasions	Memorial Day 2015	major intersection overtopped, limiting emergency response to area. see you tube video https://www.youtube.com/watch?v=qJJ6-2cFlNg	20
Online Map	Kendall	Other	Few_Occasions	<Null>	recent SARA studies show this location no longer providers 100-yr protection to City of Boerne.	20
Online Map	Kendall	Other	Few_Occasions	<Null>	recent SARA studies show this location no longer providers 100-yr protection to City of Boerne.	20
Online Map	Kendall	Other	<Null>	<Null>	recent SARA studies show this location no longer providers 100-yr protection to City of Boerne.	20
Online Map	Kendall	Other	Few_Occasions	<Null>	recent SARA studies show this location no longer providers 100-yr protection to City of Boerne.	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20

Public Outreach
Flood Concerns Table

Comment Type	County	Flood Concern Type	Flood Freq	When Did It Start	Description	How Long (Yrs)
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Few_Occasions	<Null>	TxDOT structure undersized	20
Online Map	Kendall	Road	Few_Occasions	<Null>	TxDOT structure undersized	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Few_Occasions	<Null>	existing road structure undersized	20
Online Map	Kendall	Road	Few_Occasions	Memorial Day 2015	River Road (hwy46) is 6-8 feet underwater during rain event	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Frequently	<Null>	road overtops frequently after small rain events	20
Online Map	Kendall	Road	Few_Occasions	5 Year + Rain Events at Min	<Null>	8
Online Map	Kendall	Road	Few_Occasions	5 Year + Rain Events	In addition to going over the road, it is also flooding several homes near by.	8
Online Map	Kendall	Road	Frequently	5 Year + Rain Events	Flooding over the road, keeps BPD from being able to get to Boerne at fastest route.	8
Online Map	Bexar	Land	Few_Occasions	mid 2021	New development on old golf course causes flooding that affects the adjacent homes that are backing up to the course	17
Online Map	Kendall	Road	Frequently	<Null>	Old Fredericksburg Rd crosses Balcones Creek at the Kendall/Bexar County line. This low water crossing is frequently impacted.	14
Online Map	Bexar	Channel	Frequently	14-Oct-21	Our house and property are located in the southeast corner of Cedar springs neighborhood in Helotes. The tail and of the French Creek drainage project passes along 430 feet of our property line between our house and the ditch is a green belt approximately 60 to 80 ft wide. On October 13 or 14 The ditch overflowed and put about 6 in of water up on our driveway, One about 170 ft from the ditch. Our neighbors on the other side of the ditch the Fores received several feet of water in their house. This is the second or third time their house has flooded because of the ditch. I have submitted comments on January 11th at the region 12 flood planning public meeting held in St Hedwig the.	3

Public Outreach
Flood Concerns Table

Comment Type	County	Flood Concern Type	Flood Freq	When Did It Start	Description	How Long (Yrs)
Online Map	Bexar	Building	Frequently	Last date Oct 12.	We built our home in 2000. Since construction development and Frenchcreek flood project it occurred twice last year. When we built home their was only a small part of creek that was in flood zone. Since construction and especially being at the end of the Frenchcreek project the surface water has been directed at our home. The water is rushing and we have no way of escaping. The project did not consider the creek bottles necks below our property making the increase of water to rush at our home placing us in danger. We would appreciate any help you can give us to prevent flooding of our home and neighbors. We did not flood at all until county did land across the creek. Now that we have more water directed at us we fear for our lives. Please see attach pictures of last flood. We are pleading for help.	21 years
Online Map	Bexar	Channel	Few_Occasions	Oct-21	The flooding of Strong Cedar street in Helotes has caused the cul-de-sac street to fill up with water. The water from the French Creek drainage project has risen above the curbs and goes a few feet up past the sidewalks towards our houses. The flooding in the street is so high at points that if our cars were left in the street water would get inside.	20
Online Map	Wilson	Road	Frequently	last time was 9/10/2020	The Marcelinas Creek has caused erosion to progress close to the county road right of way threatening the loss of the roadway.	20 yrs
Online Map	Bexar	Road	Frequently	Oct-21	<Null>	35
Online Map	Bexar	Land	Few_Occasions	<Null>	flooding in heavy rain occasion	35
Online Map	Bexar	Road	Few_Occasions	<Null>	complete road flooding on heavy rain occasion	35
Online Map	Bexar	Road	Few_Occasions	<Null>	complete road flooding on heavy rain occasion	35
Online Map	Bexar	Building	Frequently	2001 - current	Alley runoff floods abutting garage and has crossed street to enter onto other property. Additional 18" of base added to drives to prevent water from entering home.e	27 years
Online Map	Medina	Channel	Frequently	<Null>	Widespread creek flooding.	<Null>
Online Map	Medina	Channel	Frequently	<Null>	Widespread creek flooding.	<Null>
Online Map	Medina	Building	Frequently	<Null>	Frequent localized flooding of structures	<Null>
Online Map	Medina	Building	Frequently	<Null>	Frequent flooding of structures	<Null>

Public Outreach
Flood Concerns Table

Comment Type	County	Flood Concern Type	Flood Freq	When Did It Start	Description	How Long (Yrs)
Online Map	Guadalupe	Road	Few_Occasions	After any significant rainfall	Green Valley and Creek roads in northern Guadalupe County flood from Santa Clara Creek during rainfall events	4-5 years
Online Map	Bexar	Road	Few_Occasions	1998 was most severe	Decades of illegal fill placement in Indian Creek north of 410 south has essentially dammed the stream and high flow times now flood Somerset Road as well as adjacent properties. This has significantly elevated the 100 year flood plane in these areas. IMPORTANTLY, Somerset Road is a major thoroughfare and rectifying this flooding in the future will be extremely expensive. Indian Creek should be rechannelized to its original state.	35 years
Online Map	Bexar	Land	Frequently	May-21	51 neighbor's property flood, water in houses and garages, 10 acres	12 years
Online Map	Guadalupe	Road	Frequently	Several times every year when it rains	Green Valley and Creek and parts of Weil roads flood frequently.	5 years
Online Map	Bexar	Land	Unknown	<Null>	The vegetation is overgrown causing it to slow the flow of stormwater. In the vicinity of 640 Meadow Arbor Lane, Universal City, TX. . . east branch of Salatrillo Creek, where it crosses under 1604 near Kitty Hawk, to Meadowland Drive (and beyond) is overgrown, slowing runoff of storm waters. Last major rains it almost overflowed to houses on Meadow Arbor. City of UC does not adequately mow and/or dredge this area. They claim they can't mow it because it is always wet. They need special equipment to help them clean up this area, or, for someone else to come in and gain control of it. It's not a "big" flood concern, unless, you live there! (I don't, but have friends who do!)	<Null>
Feedback Form	Refugio	Road	<Null>	<Null>	Culvert improvement on Hatch St in Tivoli. The bridge on Hatch Street in Tivoli was replaced with a culvert which drains slow and causes the water to breach the levee.	<Null>
Feedback Form	Refugio	Channel	Frequently	<Null>	Culvert Improvement on Highway 239 in Tivoli. Some culverts on Highway 239 in Tivoli are too small causing water to get in houses.	<Null>
Feedback Form	Refugio	Channel	Unknown	<Null>	Underground Drain Maintenance in Tivoli. Underground drains in Tivoli on Highway 239, William Street and Wilson Street need cleaning. The blockage causes water to drain slow and creates potential flooding hazards	<Null>
Feedback Form	Refugio	Channel	Frequently	<Null>	Ditches and culverts Maintenance in Tivoli. Ditches and culverts in Tivoli need cleaning on Scott Street, Dedear Road, Bissett Road, Oleander Avenue, Garza Street, Villarreal Street, Lee Street, Eugen Lane and Raymond Lane, Layton Lane, and Bickford Road	<Null>
Feedback Form	Refugio	Land	Frequently	<Null>	Miller Creek on the Smoky Creek Ranch Drainage Improvements	<Null>
Feedback Form	Refugio	Road	Unknown	<Null>	The bridge on J.W. Johnson in Tivoli is in bad shape and needs to be replaced.	<Null>
Online Map	Kendall				Old Fredericksburg Rd crosses Balcones Creek at the Kendall/Bexar County line. This low water crossing is frequently impacted.	14

Appendix D. Draft 2023 San Antonio Regional Flood Plan Comments

TWDB Draft Plan Comments

TWDB Draft Plan Comments Response Log

Public Draft Plan Comments

- Great Springs Project
- Texas Parks and Wildlife Department
- Greater Edwards Aquifer Alliance
- Camp Bullis Sentinel Landscape Partnership
- National Wildlife Federation
- Other

Public Draft Plan Comments Response Log

- Great Springs Project
- Texas Parks and Wildlife Department
- Greater Edwards Aquifer Alliance
- Camp Bullis Sentinel Landscape Partnership
- National Wildlife Federation
- Other

TWDB Final Plan Comments

TWDB Final Plan Comments Response Log

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

October 21, 2022

Mr. Brian Mast
Manager of Government Affairs
San Antonio River Authority
100 E Guenther St,
San Antonio, TX 78204

RE: Texas Water Development Board Comments on Region 12 San Antonio RFPG's Draft Regional Flood Plan Contract No. 210792497

Dear Mr. Brian Mast:

Texas Water Development Board (TWDB) staff has performed a review of the draft regional flood plan submitted by August 1, 2022, on behalf of the Region 12 San Antonio Regional Flood Planning Group (RFPG). The attached comments will follow this format:

- **LEVEL 1**: Comments and questions that must be satisfactorily addressed to meet specific statute, rule, or contract requirements; and,
- **LEVEL 2**: Comments and suggestions for consideration that may improve the readability and/or overall understanding of the regional flood plan

Please note that while Level 2 comments are provided for the planning group's consideration, Level 1 comments must be addressed prior to the submission of final Regional Flood Plans by the January 10, 2023, deadline.

It is expected that the data contained in all written report sections, tables, excel spreadsheets, and the geodatabase will be consistent throughout. In cases where there are any discrepancies in data, the geodatabase dataset will supersede other data and the TWDB will utilize the geodatabase dataset when developing the state flood plan.

TWDB review of the draft regional flood plans is comprised of many spot checks of data across several deliverables and is not an all-encompassing review. Please note that TWDB's review does not imply accuracy of the data or draft regional flood plan. Each RFPG is responsible for ensuring the completeness and accuracy of all data.

To facilitate efficient and timely completion, and Board approval, of your final regional flood plan, please provide your TWDB Regional Flood Planner with a draft of your response to these comments (e.g., informally via email) on the draft RFP as soon as possible. This will allow TWDB staff to provide preliminary feedback on proposed RFPG responses to assist you in meeting your RFPG's timeline for approval and submission to TWDB of the final plan by the deadline. It will also help to minimize the need for subsequent follow-ups after final regional flood plan submission to TWDB.

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

Title 31 TAC §361.50(c) requires the regional flood planning group to consider any written or oral Comment received from the public on the draft regional flood plan (RFP); and the EA's written comment on the draft RFP prior to adopting a final RFP. Section 361.50(d) requires the final adopted plan include summaries of all timely written and oral comments received, along with a response, for each, explaining any resulting revisions or why changes are not warranted. Copies of TWDB's Level 1 and 2 written comments and the RFPG's responses must be included in the final, adopted RFP. While the comments included in this letter represent TWDB's review to date, please anticipate the need to respond to additional comments or questions, as necessary, regarding data integrity related to the Board's State Flood Plan Database (that is built from the 15 regional databases), even after submission of the final plan to TWDB.

Standard to all RFPGs is the need to include certain content in the final RFPs that was not yet available at the time that drafts were prepared and submitted. In your final RFP, please be sure to incorporate in the final submitted plan, documentation, for example, that a public meeting to receive comments was held as required and that comments received on the draft RFP were considered in the development of the final plan [31 TAC §361.50(d)].

If you have any questions regarding these comments or would like to discuss your approach to addressing any of these comments, please do not hesitate to contact Anita Machiavello at (512) 463-5158 via email at anita.machiavello@twdb.texas.gov. TWDB staff are available to assist you in any way possible to ensure successful completion of your final regional flood plan.

Lastly, on behalf of TWDB, I would like to thank you, the sponsor, the RFPG members and the technical consultants for accomplishing this major milestone of a herculean effort and advancing the flood risk reduction mission in our state.

Sincerely,

Reem J. Zoun, PE, CFM, ENV SP
Director
Flood Planning

Attachment: TWDB Comments

Cc: Derek Boese, RFPG Chair
Ronald Branyon, HDR, Inc.
Troy Dorman, Halff Associates
Matt Nelson, TWDB
James Bronikowski, TWDB
Anita Machiavello, TWDB

October 21, 2022

TWDB Comments on Region 12 San Antonio Regional Flood Planning Group's Draft Regional Flood Plan

Level 1: Comments and questions must be satisfactorily addressed to meet statutory, agency rule, and/or contract requirements.

General Comments

1. Please ensure that all "Submittal requirements" identified in each of the Exhibit C Guidance document sections are submitted in the final flood plan.

SOW Task 1

2. Existing Infrastructure GIS Feature Class, ExFldInfraPt: Please include all low water crossings (LWCs) identified during the flood planning process in this feature layer. The ExFldExpAll feature class appears to contain LWCs that are not included in the ExFldInfraPt feature class. Note: This is required in contrast to the optional LWC feature class. See Exhibit D Table 7 for a list of valid entries [31 TAC §361.31].Existing Projects (Exhibit C Table 2): Some of the projects in Table 2 do not appear to include an Expected Year of Completion. Please populate the expected year of completion field for all ongoing projects. [31 TAC §361.32(3)].
3. Existing Projects GIS Feature Class, *ExFldProjs*: Some required fields appear to be missing entries, including 'EXHAZ_ID', 'COST', and 'COMP_YR'. For 'EXHAZ_ID', please leave NULL or '999999' if there is no data. Please complete all required fields with valid entries per [31 TAC §361.32 & Exhibit D Table 8].

SOW Task 2A

4. Existing Condition Flood Exposure (Exhibit C Table 3):
    a. The day and night populations in Table 3 do not appear to match the *ExFldExpAll* feature class counts. Please review and reconcile.
    b. The Structure and Residential Structure counts in Table 3 do not appear to match the *ExFldExpAll* feature class counts. Please review and reconcile. [31 TAC §361.33 & Exhibit C 2.2.A.3].
5. Existing Condition Flood Vulnerability GIS Feature Class, *ExFldExpAll*:
    a. The day and night populations in Table 3 do not appear to match the *ExFldExpAll* feature class counts. Please review and reconcile.
    b. The Structure and Residential Structure counts in Table 3 do not appear to match the *ExFldExpAll* feature class counts. Please review and reconcile. [31 TAC §361.33(c), (d) & Exhibit C 2.2.A.2].
6. Model Coverage GIS Feature Class, *ModelCoverage*: It appears that some fields are missing entries, including 'MODEL_DESCR'. Please complete all required fields with valid entries per TWDB email Jan 31, 2022. [31 TAC §361.33(b)(2)].

SOW Task 2B

7. Future Condition Flood Hazard Vulnerability, *Text*: Please expand the description of the future conditions vulnerability analysis by considering factors such as proximity to a floodplain, proximity to other bodies of water, past flooding issues, emergency management plans, and location of critical systems like primary and back-up power. [31 TAC §361.34 & Exhibit C 2.2.B.3].

SOW Task 3B

8. Goals, *Text*: Tables 3-5 through 3-9 in Chapter 3 contain 36 goals, while the Exhibit C Table 11 and *Goals* feature class appears to contain 33 goals. Please review and reconcile for consistency. [31 TAC §361.36 & Exhibit C 2.3.B].
9. Goals (Exhibit C Table 11):
    a. It appears that some fields are missing entries, including Residual Risk. Please complete all required fields with valid entries
    b. Tables 3-5 through 3-9 in Chapter 3 contain 36 goals, while the Exhibit C Table 11 and *Goals* feature class appears to contain 33 goals. Please review and reconcile for consistency. [31 TAC §361.36 & Exhibit C 2.3.B].
10. Goals GIS Feature Class, *Goals*:
    a. It appears that the required field 'RESIDUAL' contains only NULL values. Please ensure required fields are populated with valid entries per Exhibit D Table 21 [31 TAC §361.36].
    b. Tables 3-5 through 3-9 in Chapter 3 contain 36 goals, while the Exhibit C Table 11 and *Goals* feature class appears to contain 33 goals. Please review and reconcile for consistency. [31 TAC §361.36].

SOW Task 4B

11. Flood Management Evaluation (Exhibit C Table 12): Some FMEs list $0 for Estimated Study Cost (i.e., FME_IDs 121000015 and 121000033). Please review these FMEs for accuracy and reconcile as needed. [31 TAC §361.38(i) & Exhibit C 2.4.B].
12. Flood Management Evaluations GIS Feature Class, *FME*: It appears that some fields are missing entries, including 'NEW_MODEL', 'HUC8', 'FLD_TP_RIV', and 'FLD_TP_LOC'. Please complete all required fields with valid entries per Exhibit D Table 23.
13. Flood Management Evaluation (Exhibit C Map 16): Please indicate on the map whether the identified FME area is associated with a previously studied area that requires an update or if the identified study area does not have any existing or anticipated flood mapping, models, etc., and therefore requires an initial study. [31 TAC §361.38(m)].
14. Flood Mitigation Project GIS Feature Class, *FMP*: It appears that some fields are missing entries, including 'HUC8', 'FLD_TP_RIV', 'FLD_TP_LOC', and 'ASSOCIATED'. Please populate all required fields with valid entries per Exhibit D Table 24. [31 TAC §361.38(c-e) & Exhibit D 3.11.1].
15. Flood Mitigation Strategies GIS Feature Class, *FMS*: It appears that some fields are missing entries, including 'ENTITY_ID', 'NEG_IMPACT', and 'ASSOCIATED'. Please complete all required fields with valid entries per Exhibit D Table 26. For ENTITY_ID, leave NULL or '999999' if there is no data.

SOW Task 5

16. Flood Management Evaluation Recommendations (Exhibit C Table 15): Some FMEs list $0 for Estimated Study Cost (i.e., FME_IDs 121000015 and 121000033). Please review these FMEs for accuracy and reconcile as needed. [31 TAC §361.39(c), (f) & Exhibit C 2.5.A].
17. Flood Management Evaluation Recommendations GIS Feature Class, *FME*:
    a. It appears that some fields are missing entries, including 'NEW_MODEL', 'HUC8', 'FLD_TP_RIV', and 'FLD_TP_LOC'. Please complete all required fields with valid entries per Exhibit D Table 23.
18. Flood Mitigation Projects, *Text*:
    a. The description of No Negative Impact Determinations on pages 5-30 and 5-31 references Table 5-4 that would include "A general description of the scope of work and a summary of the expected impacts of the proposed improvements for each potentially feasible FMP", however, this table could not be located. Please reconcile. [31 TAC §361.39 & Exhibit C 2.5.B].
    b. Each recommended FMP must be accompanied with an associated model or supporting documentation to show no negative impact. Please confirm that this was done and provide reference to supporting materials. As per the draft report (page 5-31), "A comparative assessment of pre- and post-project conditions for the 1% annual chance event (100-yr flood) was performed for each potentially feasible FMP based on their reported hydrologic and hydraulic model results. Study results for floodplain boundary extents, resulting water surface elevations, and peak discharge values were reviewed to verify potential FMPs conform to the no negative impacts requirements." For each recommended FMP, please identify in the plan how no negative impact was determined as required by the Exhibit C Section 3.6.A (page 108), either via a model or a study, and submit the associated model or include the study name in tabular format.
19. Flood Mitigation Projects Recommendations (Exhibit C Table 16):
    a. FMP_ID 123000021 does not appear to include a BCR in Table 13, Table 16, FMP_Details table, and the *FMP* feature class. Please populate the BCR field Table 13, Table 16, and FMP Details table, and populate the 'BC_RATIO' field in the *FMP* feature class as required. If no BCR is available, please remove this FMP from the recommended FMP list in the plan.
    b. Twenty-seven recommended FMPs list "Y" for Negative Impact and are blank for Negative Impact Mitigation. Please review these FMPs to ensure accuracy of these data fields.§361.39
    c. It appears that some fields are missing entries, including Water Supply Benefit. Please complete all required fields with valid entries per Exhibit C Table 16. [31 TAC §361.39 & Exhibit C 2.5.B].
20. Flood Mitigation Project Recommendations GIS Feature Class, *FMP*:
    d. It appears that some fields are missing entries, including 'HUC8', 'FLD_TP_RIV', 'FLD_TP_LOC', and 'ASSOCIATED'. Please complete all required fields with valid entries per Exhibit D Table 24.
    e. Twenty-seven recommended FMPs list "Yes" for 'NEG_IMPACT' and "No" for 'NEG_MITIG'. Please review these FMPs to ensure accuracy of these data fields. [31 TAC §361.39 & Exhibit D 3.11.1].
21. Flood Mitigation Project Details Geodatabase, *FMP_Details*: The FMP Details table provided in the geodatabase appears blank. Please complete as required in §361.40

22. Flood Mitigation Strategies Recommendations GIS Feature Class, FMS: It appears that some fields are missing entries, including 'ENTITY_ID', 'NEG_IMPACT', and 'ASSOCIATED'. Please complete all required fields with valid entries per Exhibit D Table 26. For 'ENTITY_ID', leave NULL or 999999 if there is no data. [31 TAC §361.39 & Exhibit D 3.10].

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional flood plan.

General Comments

23. To better align with our agency's preferred nomenclature, please consider using the name, "Cursory Floodplain Data" instead of "Fathom" or Cursory Fathom Data" throughout the regional flood plan.

SOW Task 1

24. Watersheds GIS Feature Class, *Watersheds*: Please populate the applicable ID fields to associate the *Watersheds* feature class with identified FME/FMS/FMP.
25. Existing Infrastructure, Text: Please provide a description of how Low Water Crossings were identified within the text of Chapter 1.
26. Existing Infrastructure GIS Feature Class, *ExFldInfraPt*: There appear to be Low Water Crossings in the TNRIS dataset which do not appear to be included in the *ExFldInfraPt* feature class. Please consider reviewing the TNRIS dataset for potential inclusion.
27. Deficient Infrastructure (Exhibit C Map 3): Please consider renaming map to Non-Functional or Deficient Infrastructure since the map includes dams and levees.
28. Existing Projects, *Text*:
    a. Please refer to Table 2 in the text of Chapter 1.
    b. Please ensure Map 2 is referenced in a similar manner. Chapter 4 is referenced in the text of Chapter 1 (and Chapter 4 references Map 2), however, for the sake of ease and convenience, please consider providing the reference to the Map 2 in Chapter 1 (in addition to the map's reference in Chapter 4). It appears all of this can be accomplished by referencing Table 2 and Map 2 within the following sections: "1.12.4 Proposed or Ongoing Flood Mitigation Projects" and "1.12.5 Implementation of Nonstructural Flood Mitigation Projects" in Chapter 1 (as well as Chapters 4).
29. SOW Task 2AExisting Condition Flood Exposure GIS Feature Class, *ExFldExPol*:
    a. The agricultural coverage layers appear to have irregular triangle and rectangular features that may be a result of the conversion of a raster to polygon.
    b. The agricultural coverage layers appear to have irregular triangle and rectangular features that may be a result of the conversion of a raster to polygon. Please review and revise, as appropriate.
30. Existing Condition Flood Exposure Vulnerability GIS Feature Class, *ExFldExpAll*: It appears that some entries with 'EXP_TYPE' listed as "Other" may better fit in the provided 'EXP_TYPE' valid entries. Please consider reviewing and revising as appropriate using the updated 'CRIT_TYPE' valid entry list: "Medical, Police, Fire, EMS, Shelter, School, Infrastructure, Water Treatment, Wastewater Treatment, Power Generation, Other".
31. Existing Condition Vulnerability: Please consider modifying the map color scheme to enhance critical infrastructure legibility.

32. Model Coverage, *Text*: Please consider providing a table of models within Chapter 2 or appendix that includes the modeling information contained in the *ModelCoverage* feature class.

SOW Task 2B

33. Future Condition Flood Hazard Map Gaps (Exhibit C Map 9): Please consider changing the colors used for the Unknown future flood hazard and the areas where Cursory Floodplain Data (Fathom data) was used.
34. Future Condition Flood Exposure GIS Feature Class, FutFldExpPol:
    a. The agricultural coverage layers appear to have irregular triangle and rectangular features that may be a result of the conversion of a raster to polygon. Please review and revise.
    b. Bldg_IDs 6025014 and 6331393 both appear to be within the extent of the *FutFldHazard* layer but do not appear to be identified in the *FutFldExpPol* feature class.
    c. Bldg_ID 6080782 (A Hospital) appears to be within the extent of the extent of the *FutFldHazard* layer but does not appear to be identified in the *FutFldExpPol* feature class.
    d. Bldg_ID 6028788 (A power generating facility) appears to be within the extent of the extent of the *FutFldHazard* layer but does not appear to be identified in the *FutFldExpPol* feature class.
    e. Please review the FutFldHazard layer confirm that buildings within the extent are properly identified in the *FutFldExpPol* feature class. Some buildings do not appear to include the entire building footprints.
35. Future Condition Flood Exposure Vulnerability GIS Feature Class, FutFldExpALL: FTEXPALLID 156611 is the site of San Antonio Fire Department Station 49, however, it does not appear to be identified as critical infrastructure. Please consider reviewing all critical infrastructure layers and modify, as appropriate, to identify them in the *FutFldExpAll* feature class.

SOW Task 4B

36. Streams GIS Feature Class, Streams:
    a. Please consider linking this feature class to any relevant FMEs, FMSs, or FMPs when appropriate by populating the associated ID fields.
    b. Please ensure that identified streams are within the boundary of the associated FME, FMP, and FMS.
37. Flood Management Evaluation, *Text*: In areas where there is an ongoing TWDB-funded FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).
38. Flood Management Evaluation (Exhibit C Table 12) In areas where there is an ongoing TWDB-funded, FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).

39. Flood Management Evaluation (Exhibit C Map 16):
    a. Map 16 does not include region-wide FMEs. Please consider providing an additional map that would show all of the FMEs within the region.
    b. Please include TWDB-funded, FIF Category 1 studies in the indication of a previously studied area.
40. Flood Mitigation Projects (Exhibit C Table 13): Some FMPs list "0" for Project Area. Please review and ensure that these values are accurate.
41. Flood Mitigation Projects GIS Feature Class, *FMP_HazPost*: Please consider developing a *FMP_HazPost* feature class showing an updated hazard area that accounts for the impact of recommended FMPs.
42. Flood Mitigation Project (Exhibit C Map 17): Consider providing a zoomed in "inset" map of the San Antonio area to improve the legibility of the FMP extents.
43. Flood Mitigation Strategies GIS Feature Class, *FMS*: For county-wide watershed strategies where majority of the county falls outside of the RFPG boundary, please include justification how the strategy benefits the region and please coordinate with other RFPGs to make sure the efforts are not duplicated.

SOW Task 5

44. Flood Management Evaluation Recommendations, *Text*: In areas where there is an ongoing TWDB-funded, FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).
45. Flood Management Evaluation Recommendations (Exhibit C Table 15): In areas where there is an ongoing TWDB-funded, FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).Flood Management Evaluations GIS Feature Class, *FME*: Please consider adding the 'ASSOCIATED' field to the *FME* feature class and populating as applicable.

SOW Task 9

46. Please consider providing the supporting calculation and supporting data that is the basis for the statement: “Of this $1,184,840,000 it is projected that $1,005,017,000 in state and federal grant funding is needed for implementation of these projects”. (Page 9-16).
47. Flood Infrastructure Financing Analysis text: Please review section for language accuracy. Please consider revising "rant" to "grant" in the subtitle of Chapter 9.1.6.
48. Water Supply, *Text*:
    a. Table 6-6 in Section 6.6 does not appear to include the estimated, quantified annual volume of water associated with the three identified FMPs. Please review and reconcile. [31 TAC §361.41 & Exhibit C 2.6.B].
    b. On p. 6-6, there is a brief discussion about coordination with RWPGs to determine impacts on WMSs. The text states that the results of coordination are presented in "the following tables", but the tables appear to not be included. Please include a

summary and a table identifying any negative impacts to water supply. If no negative impacts are identified, please include a statement to that effect.

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Level 1	1	Plan	General Comment	1.Please ensure that all “Submittal requirements” identified in each of the Exhibit C Guidance document sections are submitted in the final flood plan.	Agree.
Level 1	2	GIS	SOW Task 1	2. a. Existing Infrastructure GIS Feature Class, ExFldInfraPt: Please include all low water crossings (LWCs) identified during the flood planning process in this feature layer. The ExFldExpAll feature class appears to contain LWCs that are not included in the ExFldInfraPt feature class. Note: This is required in contrast to the optional LWC feature class. See Exhibit D Table 7 for a list of valid entries [31 TAC §361.31]. b. Existing Projects (Exhibit C Table 2): Some of the projects in Table 2 do not appear to include an Expected Year of Completion. Please populate the expected year of completion field for all ongoing projects. [31 TAC §361.32(3)].	a. There are a total of 496 LWC's identified in the ExFldInraPt layer, this was reduced/modified from the original TNRIS LWC dataset based on the comment from March 7th about locations of the ExFldExpPt layer not lining up with Road and Stream CL. Of the 496 LWC identified in the ExFldInfraPt layer 443 were identified in the submittal ExFldExpPt layer. However after doing a select by location on the LWC in the ExFldInfraPt layer only 441 LWC's were selected. This indicated that there was a change that was not capture in the submittal. Reran the ExFldExpPt layer to fix. b. Agree. Years of completion have been updated based on the most up to date available information.
Level 1	3	GIS	SOW Task 1	3.Existing Projects GIS Feature Class, ExFldProjs: Some required fields appear to be missing entries, including 'EXHAZ_ID', 'COST', and ‘COMP_YR’. For 'EXHAZ_ID', please leave NULL or ‘999999’ if there is no data. Please complete all required fields with valid entries per [31 TAC §361.32 & Exhibit D Table 8].	Agree, attributes have been updated based on the most up to date available information. Some of the ExFldProjs do not intersect with the floodplains, the EXHAZ_ID for those will be NULL.
Level 1	4	Plan	SOW Task 2A	4.Existing Condition Flood Exposure (Exhibit C Table 3): a. The day and night populations in Table 3 do not appear to match the ExFldExpAll feature class counts. Please review and reconcile. b. The Structure and Residential Structure counts in Table 3 do not appear to match the ExFldExpAll feature class counts. Please review and reconcile. [31 TAC §361.33 & Exhibit C 2.2.A.3].	a. After spot checking some counties it does appear to match. b. However, there a instances where buildings are in more than one county and to prevent duplicate counting the location of the ExFldExpAll point is taken into account and only reported for whichever county it falls within.
Level 1	5	GIS	SOW Task 2A	5.Existing Condition Flood Vulnerability GIS Feature Class, ExFldExpAll: a. The day and night populations in Table 3 do not appear to match the ExFldExpAll feature class counts. Please review and reconcile. b. The Structure and Residential Structure counts in Table 3 do not appear to match the ExFldExpAll feature class counts. Please review and reconcile. [31 TAC §361.33(c), (d) & Exhibit C 2.2.A.2].	a. After spot checking some counties it does appear to match. b. However, there a instances where buildings are in more than one county and to prevent duplicate counting the location of the ExFldExpAll point is taken into account and only reported for whichever county it falls within.
Level 1	6	GIS	SOW Task 2A	6. Model Coverage GIS Feature Class, *ModelCoverage* : It appears that some fields are missing entries, including 'MODEL_DESCR'. Please complete all required fields with valid entries per TWDB email Jan 31, 2022. [31 TAC §361.33(b)(2)].	Agree, will update.

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Level 1	7	Plan	SOW Task 2B	7. Future Condition Flood Hazard Vulnerability, *Text* : Please expand the description of the future conditions vulnerability analysis by considering factors such as proximity to a floodplain, proximity to other bodies of water, past flooding issues, emergency management plans, and location of critical systems like primary and back-up power. [31 TAC §361.34 & Exhibit C 2.2.B.3].	Agree, added more explanation.
Level 1	8	Plan	SOW Task 3B	8. Goals, *Text* : Tables 3-5 through 3-9 in Chapter 3 contain 36 goals, while the Exhibit C Table 11 and *Goals* feature class appears to contain 33 goals. Please review and reconcile for consistency. [31 TAC §361.36 & Exhibit C 2.3.B].	Agree, updated Goal IDs.
Level 1	9	Plan	SOW Task 3B	9.Goals (Exhibit C Table 11): a. It appears that some fields are missing entries, including Residual Risk. Please complete all required fields with valid entries b. Tables 3-5 through 3-9 in Chapter 3 contain 36 goals, while the Exhibit C Table 11 and Goals feature class appears to contain 33 goals. Please review and reconcile for consistency. [31 TAC §361.36 & Exhibit C 2.3.B].	a. Filled in "Unknown" for Residual Risk field, per additional guidance. b. Agree, will update to match.
Level 1	10	Plan	SOW Task 3B	10.Goals GIS Feature Class, Goals: a. It appears that the required field 'RESIDUAL' contains only NULL values. Please ensure required fields are populated with valid entries per Exhibit D Table 21 [31 TAC §361.36]. b. Tables 3-5 through 3-9 in Chapter 3 contain 36 goals, while the Exhibit C Table 11 and Goals feature class appears to contain 33 goals. Please review and reconcile for consistency. [31 TAC §361.36].	a. Filled in "Unknown" for Residual Risk field, per additional guidance. b. Agree, will update to match.
Level 1	11	Plan	SOW Task 4B	11.Flood Management Evaluation (Exhibit C Table 12): Some FMEs list $0 for Estimated Study Cost (i.e., FME_IDs 121000015 and 121000033). Please review these FMEs for accuracy and reconcile as needed. [31 TAC §361.38(i) & Exhibit C 2.4.B].	Agree, will update.
Level 1	12	Plan	SOW Task 4B	12.Flood Management Evaluations GIS Feature Class, FME: It appears that some fields are missing entries, including 'NEW_MODEL', 'HUC8', 'FLD_TP_RIV', and 'FLD_TP_LOC'. Please complete all required fields with valid entries per Exhibit D Table 23.	Agree, will update.
Level 1	13	Plan	SOW Task 4B	13.Flood Management Evaluation (Exhibit C Map 16): Please indicate on the map whether the identified FME area is associated with a previously studied area that requires an update or if the identified study area does not have any existing or anticipated flood mapping, models, etc., and therefore requires an initial study. [31 TAC §361.38(m)].	Agree, will update.

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Level 1	14	Plan	SOW Task 4B	14.Flood Mitigation Project GIS Feature Class, FMP: It appears that some fields are missing entries, including 'HUC8', 'FLD_TP_RIV', 'FLD_TP_LOC', and 'ASSOCIATED'. Please populate all required fields with valid entries per Exhibit D Table 24. [31 TAC §361.38(c-e) & Exhibit D 3.11.1].	Agree, will update.
Level 1	15	Plan	SOW Task 4B	15.Flood Mitigation Strategies GIS Feature Class, FMS: It appears that some fields are missing entries, including 'ENTITY_ID', 'NEG_IMPACT', and 'ASSOCIATED'. Please complete all required fields with valid entries per Exhibit D Table 26. For ENTITY_ID, leave NULL or '999999' if there is no data.	Agree, will update.
Level 1	16	Plan	SOW Task 5	16.Flood Management Evaluation Recommendations (Exhibit C Table 15): Some FMEs list $0 for Estimated Study Cost (i.e., FME_IDs 121000015 and 121000033). Please review these FMEs for accuracy and reconcile as needed. [31 TAC §361.39(c), (f) & Exhibit C 2.5.A].	Agree, will update.
Level 1	17	Plan	SOW Task 5	17.Flood Management Evaluation Recommendations GIS Feature Class, FME: a. It appears that some fields are missing entries, including 'NEW_MODEL', 'HUC8', 'FLD_TP_RIV', and 'FLD_TP_LOC'. Please complete all required fields with valid entries per Exhibit D Table 23.	Agree, will update.
Level 1	18	Plan	SOW Task 5	18.Flood Mitigation Projects, Text: a.The description of No Negative Impact Determinations on pages 5-30 and 5-31 references Table 5-4 that would include "A general description of the scope of work and a summary of the expected impacts of the proposed improvements for each potentially feasible FMP", however, this table could not be located. Please reconcile. [31 TAC §361.39 & Exhibit C 2.5.B]. b. Each recommended FMP must be accompanied with an associated model or supporting documentation to show no negative impact. Please confirm that this was done and provide reference to supporting materials. As per the draft report (page 5- 31), "A comparative assessment of pre- and post-project conditions for the 1% annual chance event (100-yr flood) was performed for each potentially feasible FMP based on their reported hydrologic and hydraulic model results. Study results for floodplain boundary extents, resulting water surface elevations, and peak discharge values were reviewed to verify potential FMPs conform to the no negative impacts requirements." For each recommended FMP, please identify in the plan how no negative impact was determined as required by the Exhibit C Section 3.6.A (page 108), either via a model or a study, and submit the associated model or include the study name in tabular format.	a. Corrected to "Table 5-5". Scope descriptions are included. b. Agree, per TWDB guidance added a column "No Negative Impacts Designation".
Level 1	19	Plan	SOW Task 5	19.Flood Mitigation Projects Recommendations (Exhibit C Table 16): a. FMP_ID 123000021 does not appear to include a BCR in Table 13, Table 16, FMP_Details table, and the FMP feature class. Please populate the BCR field Table 13, Table 16, and FMP Details table, and populate the 'BC_RATIO' field in the FMP feature class as required. If no BCR is available, please remove this FMP from the recommended FMP list in the plan. b. Twenty-seven recommended FMPs list "Y" for Negative Impact and are blank for Negative Impact Mitigation. Please review these FMPs to ensure accuracy of these data fields.§361.39 c. It appears that some fields are missing entries, including Water Supply Benefit. Please complete all required fields with valid entries per Exhibit C Table 16. [31 TAC §361.39 & Exhibit C 2.5.B].	Agree, will update. Agree, will update. Agree, will update.

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Level 1	20	Plan	SOW Task 5	20.Flood Mitigation Project Recommendations GIS Feature Class, FMP: d. It appears that some fields are missing entries, including 'HUC8', 'FLD_TP_RIV', 'FLD_TP_LOC', and 'ASSOCIATED'. Please complete all required fields with valid entries per Exhibit D Table 24. e. Twenty-seven recommended FMPs list "Yes" for 'NEG_IMPACT' and "No" for 'NEG_MITIG'. Please review these FMPs to ensure accuracy of these data fields. [31 TAC §361.39 & Exhibit D 3.11.1].	Agree, will update. Agree, will update.
Level 1	21	Plan	SOW Task 5	21.Flood Mitigation Project Details Geodatabase, FMP_Details: The FMP Details table provided in the geodatabase appears blank. Please complete as required in §361.40	Agree, will update.
Level 1	22	Plan	SOW Task 5	22.Flood Mitigation Strategies Recommendations GIS Feature Class, FMS: It appears that some fields are missing entries, including 'ENTITY_ID', 'NEG_IMPACT', and 'ASSOCIATED'. Please complete all required fields with valid entries per Exhibit D Table 26. For 'ENTITY_ID', leave NULL or 999999 if there is no data. [31 TAC §361.39 & Exhibit D 3.10].	Agree, will update.
Level 2	23	Plan	General Comment	23.To better align with our agency's preferred nomenclature, please consider using the name, "Cursory Floodplain Data" instead of "Fathom" or Cursory Fathom Data" throughout the regional flood plan.	Agree The regional flood plan will be updated in the report and associated maps to reflect TWDBs preferred nomenclature. No changes will be made to the GIS feature classes, specifically ExFldHazard and FutFldHazards layers.
Level 2	24	Plan	SOW Task 1	24.Watersheds GIS Feature Class, Watersheds: Please populate the applicable ID fields to associate the Watersheds feature class with identified FME/FMS/FMP.	Agree, these fields have been updated.
Level 2	25	Plan	SOW Task 1	25.Existing Infrastructure, Text: Please provide a description of how Low Water Crossings were identified within the text of Chapter 1.	Agree - Expanded on how some LWCs were evaluated. Added "Low-water crossings were all evaluated, some were moved to be more in line with the stream centerline and road centerline, and some were removed that did not correlate with a road that was overtopping."
Level 2	26	Plan	SOW Task 1	26.Existing Infrastructure GIS Feature Class, ExFldInfraPt: There appear to be Low Water Crossings in the TNRIS dataset which do not appear to be included in the ExFldInfraPt feature class. Please consider reviewing the TNRIS dataset for potential inclusion.	LWC's were all evaluated, some were moved to be more in line with the stream CL and road CL, and some were removed that did not seem to be correct based on road overtopping, based on the March 7th TM comments. In short, ExFldInfraPt layer was modified which was used to identify LWC's that intersected the ExFldHazard layer to produce the ExFldExpPt layer that then fed into the ExFldExpAll (vulnerability) layer.
Level 2	27	Plan	SOW Task 1	27.Deficient Infrastructure (Exhibit C Map 3): Please consider renaming map to Non- Functional or Deficient Infrastructure since the map includes dams and levees.	Agree, will update.

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Level 2	28	Plan	SOW Task 1	28.Existing Projects, Text: a. Please refer to Table 2 in the text of Chapter 1. b. Please ensure Map 2 is referenced in a similar manner. Chapter 4 is referenced in the text of Chapter 1 (and Chapter 4 references Map 2), however, for the sake of ease and convenience, please consider providing the reference to the Map 2 in Chapter 1 (in addition to the map's reference in Chapter 4). It appears all of this can be accomplished by referencing Table 2 and Map 2 within the following sections: "1.12.4 Proposed or Ongoing Flood Mitigation Projects" and "1.12.5 Implementation of Nonstructural Flood Mitigation Projects" in Chapter 1 (as well as Chapters 4).	a. Agree, updated to Table 2. b. Agree, will update.
Level 2	29	Plan	SOW Task 2A	29. Existing Condition Flood Exposure GIS Feature Class, ExFldExPol: a. The agricultural coverage layers appear to have irregular triangle and rectangular features that may be a result of the conversion of a raster to polygon. b. The agricultural coverage layers appear to have irregular triangle and rectangular features that may be a result of the conversion of a raster to polygon. Please review and revise, as appropriate.	a. Based on the March/April comments we reprocessed the Agricultural raster into polygons that were rectangles as opposed to triangles. The August submittal had the rectangles. b. Same comment
Level 2	30	Plan	SOW Task 2A	30.Existing Condition Flood Exposure Vulnerability GIS Feature Class, ExFldExpAll: It appears that some entries with 'EXP_TYPE' listed as "Other" may better fit in the provided 'EXP_TYPE' valid entries. Please consider reviewing and revising as appropriate using the updated 'CRIT_TYPE' valid entry list: "Medical, Police, Fire, EMS, Shelter, School, Infrastructure, Water Treatment, Wastewater Treatment, Power Generation, Other".	a. "Other" was used in EXP_TYPE for Gas pipelines, Electrical Transmission lines and Railroad Segments. There did not seem to be a better category available for this field. However we categorized Gas and Transmission line as "Yes" in the CRITICAL field and used the "Infrastructure" classification in the CRIT_TYPE field. For the Railroad segments we did not consider as critical similar to the logic for the Roadway segments.
Level 2	31	Plan	SOW Task 2A	31.Existing Condition Vulnerability: Please consider modifying the map color scheme to enhance critical infrastructure legibility.	Agree, changed the infrastructure to orange.
Level 2	32	Plan	SOW Task 2A	32.Model Coverage, Text: Please consider providing a table of models within Chapter 2 or appendix that includes the modeling information contained in the ModelCoverage feature class.	Agree, due to the amount of H&H models available, we will provided a link to the D2MR website in the section 2.1.1 Existing H&H Model Availability.
Level 2	33	Plan	SOW Task 2B	33.Future Condition Flood Hazard Map Gaps (Exhibit C Map 9): Please consider changing the colors used for the Unknown future flood hazard and the areas where Cursory Floodplain Data (Fathom data) was used.	Agree, updated color to red.

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Level 2	34	Plan	SOW Task 2B	34.Future Condition Flood Exposure GIS Feature Class, FutFldExpPol: a. The agricultural coverage layers appear to have irregular triangle and rectangular features that may be a result of the conversion of a raster to polygon. Please review and revise. b. Bldg_IDs 6025014 and 6331393 both appear to be within the extent of the FutFldHazard layer but do not appear to be identified in the FutFldExpPol feature class. c. Bldg_ID 6080782 (A Hospital) appears to be within the extent of the extent of the FutFldHazard layer but does not appear to be identified in the FutFldExpPol feature class. d. Bldg_ID 6028788 (A power generating facility) appears to be within the extent of the extent of the FutFldHazard layer but does not appear to be identified in the FutFldExpPol feature class. e. Please review the FutFldHazard layer confirm that buildings within the extent are properly identified in the FutFldExpPol feature class. Some buildings do not appear to include the entire building footprints.	a. Based on the March/April comments we reprocessed the Agricultural raster into polygons that were rectangles as opposed to triangles. The August submittal had the rectangles. b. After rechecking the August submittal these buildings do appear to be shown in the FutFldExpPol layer as is expected. c. After rechecking the August submittal this building does appear to be shown in the FutFldExpPol layer as is expected and classified as a critical Medical facility in the FutFldExpAll layer. d. After rechecking the August submittal this building does appear to be shown in the FutFldExpPol layer as is expected and classified as a critical Power Generation facility in the FutFldExpAll layer.
Level 2	35	Plan	SOW Task 2B	35.Future Condition Flood Exposure Vulnerability GIS Feature Class, FutFldExpALL: FTEXPALLID 156611 is the site of San Antonio Fire Department Station 49, however, it does not appear to be identified as critical infrastructure. Please consider reviewing all critical infrastructure layers and modify, as appropriate, to identify them in the FutFldExpAll feature class.	This is captured in the FutFldExpAll layer as a Fire facility but the ID's don't match up. The issue could be from reviewing potentially out dated data and not the August submittal. The ID I see is FTEXPALLID 120176170
Level 2	36	Plan	SOW Task 4B	36.Streams GIS Feature Class, Streams: a. Please consider linking this feature class to any relevant FMEs, FMSs, or FMPs when appropriate by populating the associated ID fields. b. Please ensure that identified streams are within the boundary of the associated FME, FMP, and FMS.	a. Agree, this was previously done. b. Agree, done.
Level 2	37	Plan	SOW Task 4B	37.Flood Management Evaluation, Text: In areas where there is an ongoing TWDB-funded FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).	Agree, will expand on the on the text in section 5.1.3. We are also working with the TWDB contractors to coordinate any developing studies in future amendments.
Level 2	38	Plan	SOW Task 4B	38.Flood Management Evaluation (Exhibit C Table 12) In areas where there is an ongoing TWDB-funded, FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).	Agree, added the “ASSC_FIF” field to the FME/FMP/FMS layers and have spatially joined the overlapping FIF projects using the FIF ID.
Level 2	39	Plan	SOW Task 4B	39.Flood Management Evaluation (Exhibit C Map 16): a.Map 16 does not include region-wide FMEs. Please consider providing an additional map that would show all of the FMEs within the region. b.Please include TWDB-funded, FIF Category 1 studies in the indication of a previously studied area.	a. Agree, added table to Map 16.A a list of Region wide FMEs. b. Agree, FIF Category 1 studies will be added to the FME map (Exhibit C Map 16) prior to submittal of the final plan.
Level 2	40	Plan	SOW Task 4B	40.Flood Mitigation Projects (Exhibit C Table 13): Some FMPs list "0" for Project Area. Please review and ensure that these values are accurate.	Agree, will add.
Level 2	41	Plan	SOW Task 4B	41.Flood Mitigation Projects GIS Feature Class, FMP_HazPost: Please consider developing a FMP_HazPost feature class showing an updated hazard area that accounts for the impact of recommended FMPs.	Agree, will add.
Level 2	42	Plan	SOW Task 4B	42.Flood Mitigation Project (Exhibit C Map 17): Consider providing a zoomed in "inset" map of the San Antonio area to improve the legibility of the FMP extents.	Agree, updated map.

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Level 2	43	Plan	SOW Task 4B	43.Flood Mitigation Strategies GIS Feature Class, FMS: For county-wide watershed strategies where majority of the county falls outside of the RFPG boundary, please include justification how the strategy benefits the region and please coordinate with other RFPGs to make sure the efforts are not duplicated.	Agree, There was coordination with other Regions, see text in Chapter 10. Only one FMS identified has the majority of the boundary outside of the SAFPR, see description for strategy benefits.
Level 2	44	Plan	SOW Task 5	44.Flood Management Evaluation Recommendations, Text: In areas where there is an ongoing TWDB-funded, FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).	Agree, will expand on the on the text in section 5.1.3. We are also working with the TWDB contractors to coordinate any developing studies in future amendments.
Level 2	45	Plan	SOW Task 5	45.Flood Management Evaluation Recommendations (Exhibit C Table 15): In areas where there is an ongoing TWDB-funded, FIF Category 1 study, please consider describing how duplication of efforts would be avoided and how FIF Category 1 study data would be incorporated into the proposed FMEs. For example, several FMEs appear to overlap spatially with current FIF Category 1 funded Karnes County Flood Protection Planning Study (FIF ID 40011).Flood Management Evaluations GIS Feature Class, FME: Please consider adding the 'ASSOCIATED' field to the FME feature class and populating as applicable.	Agree, added the “ASSC_FIF” field to the FME/FMP/FMS layers and have spatially joined the overlapping FIF projects using the FIF ID.
Level 2	46	Plan	SOW Task 9	46.Please consider providing the supporting calculation and supporting data that is the basis for the statement: “Of this $1,184,840,000 it is projected that $1,005,017,000 in state and federal grant funding is needed for implementation of these projects”. (Page 9-16).	Agree, expanded on.
Level 2	47	Plan	SOW Task 9	47.Flood Infrastructure Financing Analysis text: Please review section for language accuracy. Please consider revising "rant" to "grant" in the subtitle of Chapter 9.1.6.	Agree, corrected.
Level 2	48	Plan	SOW Task 9	48.Water Supply, Text: a. Table 6-6 in Section 6.6 does not appear to include the estimated, quantified annual volume of water associated with the three identified FMPs. Please review and reconcile. [31 TAC §361.41 & Exhibit C 2.6.B]. b. On p. 6-6, there is a brief discussion about coordination with RWPGs to determine impacts on WMSs. The text states that the results of coordination are presented in "the following tables", but the tables appear to not be included. Please include a summary and a table identifying any negative impacts to water supply. If no negative impacts are identified, please include a statement to that effect.	Agree, will add.

Proposed Flood Management Evaluation (FME) of Great Springs Project

Submitted to: San Antonio Regional Flood Planning Group
c/o San Antonio River Authority
100 East Guenther St.
San Antonio, Texas 78283-9980
Ludivine.Varga@hdrinc.com.

Submitted by: Great Springs Project
Attn: Lyda Creus Molanphy
Chief Strategy & Operations Officer
Great Springs Project
(512) 751-1636
PO Box 12331
Austin, TX 78711
lyda@greatspringsproject.org

Submitted on: September 16, 2022

Purpose

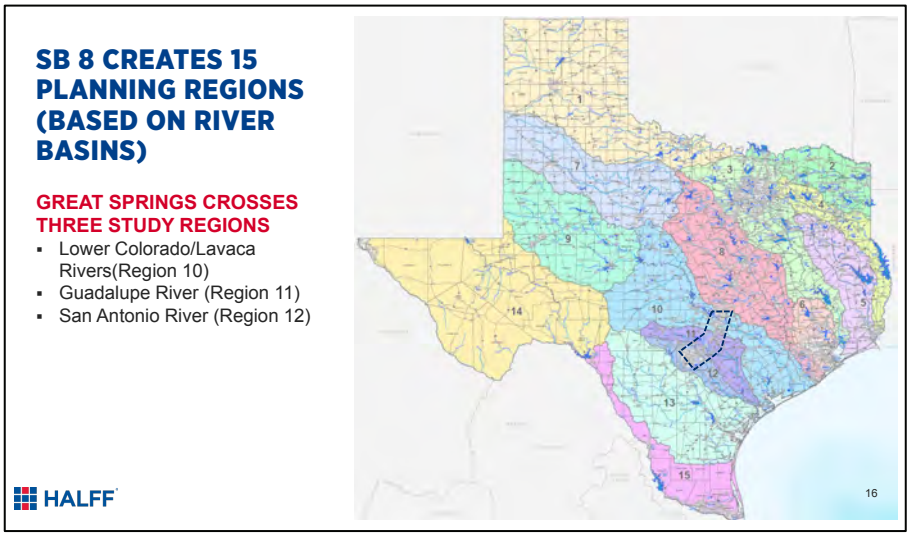
The purpose of this proposed Flood Management Evaluation (FME) is to:

1. Assess the flood mitigation potential and benefits of the Great Springs Project in the Region 12 Flood Plan,
2. Identify opportunities to enhance the flood mitigation features of the Great Springs Project and to increase the benefit-cost ratio of related flood mitigation efforts by others,
3. Quantify the flood mitigation and other associated benefits of the Great Springs Project,
4. Identify potential collaboration with flood mitigation efforts by local governments, regional authorities and state agencies,
5. Quantify the added benefits of collaborative efforts, and
6. Recommend subsequent Flood Management Strategies (FMSs) and Flood Management Projects (FMPs) to cost-effectively reduce flood risk in the San Antonio Flood Planning Region.

Background

Established as a 501(c)3 organization in 2018, the Great Springs Project (GSP) is conserving an additional 50,000 acres of sensitive land in the Austin-San Antonio corridor and building a spring-to-spring trail.[1] As shown in Figure 1, the GSP geography of interest overlaps with the Region 12 area in northern Bexar, southern Comal, and southwestern Guadalupe County.

Figure 1. Overlap of Region 12 and GSP areas. Courtesy of Jim Carrillo, FAICP, Halff Associates.



Land conservation is generally recognized as contributing to flood mitigation[2] and has been identified as such in the draft of Chapter 3 of the Draft 2023 San Antonio Regional Flood Plan.

[1] See the GSP website for more information: https://greatspringsproject.org/

[2] Johnson, Kris A., et al. "A benefit–cost analysis of floodplain land acquisition for US flood damage reduction." *Nature Sustainability* 3.1 (2020): 56-62.

In fact, the draft Region 12 Flood Plan has goals of a 10% increase in protected open space by 2033 and an unspecified increase by 2053.

Great Springs Project intends to acquire aquifer recharge and contributing land which is strategically valuable for flood mitigation purposes since this would simultaneously reduce flood risk while enhancing the recharge of the Edwards Aquifer. In addition, the trail portion of GSP can reinforce and enhance the benefits of the land conservation by:

1. Incorporating swales and other features to facilitate the infiltration of stormwater,
2. Stabilizing creek and river banks,
3. Providing connected segments of conserved lands to enhance the value of the habitat for native species,
4. Potentially providing access to flood monitoring equipment and other facilities, and
5. Generally adding recreational, public health, transportation, education, carbon sequestration, economic development, wildfire mitigation, and other benefits to flood mitigation efforts in the Region 12 flood planning area.

Chapter 6 of the Draft 2023 San Antonio Regional Flood Plan states that conserved lands for flood plains are often utilized for hiking and biking trails and that the San Antonio RFPG will encourage secondary benefits, such as recreational opportunities. This proposed FME would bring these opportunities into focus.

Scope of Work

Great Springs Project would recruit and manage consultants to conduct the following tasks as part of the FME:

1. Assemble relevant information about the land parcels that are, or may be, included in GSP and related trail development as well as adjacent, relevant flood planning FMEs, FMSs and FMPs,
2. Determine the flood risks involved in the affected area,
3. Assess and quantify the flood mitigation impacts of GSP land conservation and trail development as well as how GSP may contribute to adjacent flood mitigation efforts,
4. Identify possible and appropriate modifications to open space and trail features that would enhance the flood mitigation of GSP and adjacent flood mitigation efforts,
5. Quantify the added benefits of combining GSP efforts with Region 12 flood mitigation projects,
6. In cooperation with the affected local governments, develop appropriate proposals for FMS(s) and FMP(s) for inclusion in the San Antonio Regional Flood Plan, and
7. Submit a final report within one year of FME funding.

Note that, based on this FME, GSP would, in cooperation with relevant local governments, apply for funding of the resulting FMSs and/or FMPs.

Budget

The budget for this FME is estimated to be $250,000 which includes administrative overhead by GSP.

September 30, 2022

TEXAS PARKS & WILDLIFE

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Nefi Garza, Chair
San Antonio Flood Planning Region c/o
San Antonio River Authority
100 E. Gunter Street
San Antonio, Texas 78283

Re: 2023 San Antonio Regional Flood Plan

Dear Mr. Garza,

In 2019 Senate Bills 7 and 8 established a regional and state flood planning process for Texas, aimed at better managing flood risk to reduce loss of life and property. As part of the process, Texas Parks and Wildlife Department (TPWD) was identified as a member of the regional flood planning groups (Texas Water Code Sec. 16.062). The mission of TPWD is to manage and conserve the natural and cultural resources of Texas and its ability to provide opportunities of hunting, fishing, and outdoor recreation for the use and enjoyment of present and future generations. TPWD values this opportunity to contribute to the flood planning process with the goal of enhancing flood risk management and achieving beneficial flood mitigation outcomes. Toward this effort TPWD members serve a dual role of supporting the voting membership in development of the plans and representing the natural resource interests of the state.

TPWD applauds the San Antonio Regional Flood Planning Group (SARFPG) for their efforts in completing the inaugural regional flood plan (RFP) especially considering the abbreviated timeline. Through the exceptional efforts of the RFPG, this plan will be a meaningful tool for reducing flood impacts to society, especially in those disastrous events that cause loss of life and injury. Because this represents the initial region-wide plan, it has the potential to be precedent setting for subsequent iterations. As such, it is important this plan recognizes the role nature and nature-based solutions can play in flood risk management and promotes opportunities to protect, enhance and restore the flood mitigation benefits provided by natural landforms.

TPWD is supportive of the planning process outlined by the Texas Water Development Board (TWDB) because it aims to achieve an integrative flood risk management (FRM) approach that prioritizes risk reduction through implementation of floodplain management, land use regulations, policy, and a balanced use of grey and natural and nature-based (NNBS) flood mitigation measures that are formed by inclusive participation at all levels of society. TPWD believes this integrative approach when implemented holistically will achieve the maximum benefits for society and natural ecosystems while minimizing environmental impacts. Recent published works on FRM and NNBS (Bridges et al 2021, Glick et al 2020, World Wildlife Fund 2016, Sayers et al 2013) support TWDB integrative flood management approach and provide extensive resources for flood planners.

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In the interest of achieving the state's flood risk management goals while protecting the state's fish and wildlife resources, TPWD reviewed regional flood plans based on the TWDB guidance principals as described in 31 Texas Administrative Code Chapters 361 and 362. Special focus was provided on the following subset of guidance principals due to its relevance to fish and wildlife management.

- Does the draft flood plan use the best available science, data, models, and flood risk mapping?
- Does the draft flood plan consider the potential upstream and downstream effects, including environmental, of potential flood management strategies (and associated projects) of neighboring areas?
- Does the draft flood plan include strategies and projects that provide for a balance of structural and non-structural flood mitigation measures, including projects that use nature-based features that lead to long-term mitigation of flood risk?
- Does the draft flood plan consider natural systems and beneficial functions of floodplains, including flood peak attenuation and ecosystem services?
- Does the draft flood plan encourage flood mitigation design approaches that work with, rather than against, natural patterns and conditions of floodplains?
- Does the draft flood plan seek to not cause long-term impairment to the designated water quality as shown in the state water quality management plan as a result of a recommended flood management strategy or project?
- Does the draft flood plan consider benefits of flood management strategies to water quality, fish and wildlife, ecosystem function, and recreation, as appropriate?
- Does the draft flood plan minimize adverse environmental impacts and conform with adopted environmental flow standards?
- Does the draft flood plan consider multi-use opportunities such as green space, parks, water quality, or recreation, portions of which could be funded, constructed, and or maintained by additional, third-party project participants?

Additionally, TPWD emphasizes that the following FRM concepts identified in the forementioned literature be incorporated into the RFP.

- Flood is a natural process that has many benefits to human and natural systems.
- Promoting some flooding as desirable and making room for water promotes native species, maintains vital ecosystem services, and reduces the chance of flooding elsewhere.
- Natural landscapes and watersheds provide flood mitigation functions that should be promoted, protected, enhanced, and restored.
- Prioritize risk reduction over flood control by focusing first on reducing loss of life and injury.
- Utilize limited resources fairly.

- Address flood risk using a portfolio approach to first implement non-structural (policy, land management, emergency management) followed by structural (grey and natural and nature-based) strategies.
- Criteria for assessing projects strategies should include a comprehensive suite of measures spanning economical, operational, societal, and environmental advantages and disadvantages. Assessments focusing on economics alone (number of buildings, acres) should be avoided.

San Antonio Regional Flood Plan Comments

Texas Conservation Action Plan (TCAP) is a guiding document for conservation in the state of Texas, with the goals of realizing conservation benefits, preventing species listings, and preserving our natural heritage for future generations. Species of Greatest Conservation Need (SGCN) include numerous aquatic species such as fish, freshwater mussels, and salamanders. The TCAP handbook (Texas Parks and Wildlife Department, 2012) includes six types of priority habitats, three of which are aquatic: water resources; riparian and floodplains; and caves and karst. Issues affecting these environments include environmental flows, impoundments and dam operations, and water quality issues (including stormwater runoff).

The Draft San Antonio Regional Flood Plan (SARFP) calculated and mapped flood risk analysis for both 1% and 0.2% annual chance storm events for current and future conditions. A model of the current conditions risk of flooding was created by compiling local knowledge, United States Geological Survey (USGS) gage information, San Antonio River Authority (SARA) data, National Flood Hazard Layer (NFHL) data, FEMA Base Level Engineering data, Fathom data, and National Oceanic and Atmospheric Administration (NOAA) Atlas-14 rainfall data. TPWD appreciates and supports the use of the best available science and most relevant data and encourages the consideration of environmental flow standards for the San Antonio River, Medina River, Mission River, Cibolo Creek, and San Antonio Bay. These environmental flow standards were established by the Texas Commission on Environmental Quality to ensure that natural flow regimes are maintained which include large seasonal pulse flows.

The goals of the Draft SARFP include education and outreach, improving flood warning and readiness, increasing the number of flood studies, increasing the prevention of flooding, and supporting flood infrastructure projects. TPWD encourages the inclusion of the ecological and societal benefits of flooding in any education program and appreciates the repeated mention of nature-based solutions in the education and outreach goals of the SARFP.

The SARFP identified 29 potentially feasible Flood Management Projects (FMPs), 165 potentially feasible Flood Management Evaluations (FMEs), and 20 potentially feasible Flood Management Strategies (FMSs). It appears that most of the recommended FMPs are infrastructure based with only one nature-based solution being put forward. TPWD appreciates that the Draft SARFP acknowledges the gap in flood risk and mitigation in relation to nature-based infrastructure in the region. TPWD understands that the goal of

the RFP is to mitigate floods to reduce risk to life and property but would like to encourage the use of nature-based solutions where possible. The Draft SARFP states that none of the projects or strategies are anticipated to have negative downstream effects.

TPWD would like to encourage all the FMX (an FMP, FME, or FMS) proponents to consider stream crossing designs that allow for sediment transport and passage of aquatic organisms and do not impound water. Basically, designs that are invisible to the creek. This includes bridges that span the creek where possible or culverted crossings designed with the culvert(s) in the active channel area lower than those in the floodplain benches so that the flow in the channel is not overly spread out. The central/low-flow culvert(s) should be large enough to handle a 1.5-year flow without backing up water. The bottoms of these lower culverts should be set at least a foot below grade (i.e., recessed) to allow natural substrate to cover the culvert bottom and to allow for aquatic organism passage. These lower, recessed culverts should be installed in the thalweg or deepest part of the channel and be aligned with the low flow channel (Clarkin et al., 2006).

The Draft SARFP includes a number of channel improvement projects which may include widening, deepening, and straightening streams. Channelization and over-widening of streams slows flow, which increases deposition of sediment, decreases fish habitat, increases water temperatures, and can result in channel erosion. Streams in good condition naturally reach bankfull and start spilling onto the floodplain during a 1.5 to 2-year flood event. Widening and deepening a stream channel to force it to contain the 100-year flow negatively impacts the adjacent water table and riparian area and has geomorphic effects upstream and downstream of the modification. If channelization is necessary, constructing a two-stage channel with a low-flow channel and a floodplain allows for the continued transport of sediment, habitat for aquatic wildlife, and can reduce maintenance (Rosgen 1996). TPWD encourages the RFPG to protect existing streams, riparian areas, and floodplains.

Thank you for your consideration of these comments. TPWD looks forward to continuing to work with the planning group to develop flood plans that protect life and property that are also beneficial to the environment. Please contact me at (512) 389 – 8214 or at Marty.Kelly@TPWD.Texas.gov if you have any questions or comments.

Sincerely,

Marty Kelly
Water Resources Program Coordinator

References

Bridges, T. S., J. K. King, J. D. Simm, M. W. Beck, G. Collins, Q. Lodder, and R. K. Mohan, eds. 2021. International Guidelines on Natural and Nature-Based Features for Flood Risk Management. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

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Greater Edwards Aquifer Alliance

Member Organizations

Alamo, Austin, and Lone Star chapters of the Sierra Club
Bexar Audubon Society
Austin, Bexar and Travis Green Parties
Bexar Grotto
Boerne Together
Bulverde Neighborhood Alliance
Bulverde Neighbors for Clean Water
Cibolo Center for Conservation
Citizens for the Protection of Cibolo Creek
Comal County Conservation Alliance
Environment Texas
First Universalist Unitarian Church of SA
Friends of Canyon Lake
Friends of Dry Comal Creek
Friends of Government Canyon
Fuerza Unida
Green Society of UTSA
Guadalupe River Road Alliance
Guardians of Lick Creek
Headwaters at Incarnate Word
Helotes Heritage Association
Hill Country Alliance
Kendall County Well Owners Association
Kinney County Ground Zero
Leon Springs Business Association
Native Plant Society of Texas – SA
Northwest Interstate Coalition of Neighborhoods
Pedernales River Alliance – Gillespie Co.
Preserve Castroville
Preserve Lake Dunlop Association
Preserve Our Hill Country Environment
RiverAid San Antonio
San Antonio Audubon Society
San Antonio Conservation Society
San Geronimo Valley Alliance
San Marcos Greenbelt Alliance
San Marcos River Foundation
Save Barton Creek Association
Save Our Springs Alliance
Scenic Loop/Boerne Stage Alliance
Securing a Future Environment
SEED Coalition
Signal Hill Area Alliance
Sisters of the Divine Providence
Solar San Antonio
Texas Cave Management Association
Trinity Edwards Spring Protection Assoc.
Water Aid – Texas State University
Wildlife Rescue & Rehabilitation
Wimberley Valley Watershed Association

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October 7, 2022

Chairman Derek Boese and Stakeholders
Regional Flood Planning Group 12

Re: Recommendations to the TWDB Promoting the Protection of Natural Flood Mitigation Features and Use of Nature Based Flood Mitigation Solutions

Dear Chairman Boese and Appointed Stakeholders of RFPG 12,

These comments are submitted on behalf of the fifty-five member groups of the Greater Edwards Aquifer Alliance and the undersigned supporting organizations.

Background

State legislation enabling the Regional Flood Plan process provided guidelines and deliverables to be accomplished by each flood planning group, with regional plans becoming the basis of a state flood plan. Included in deliverable was the request for proposed flood mitigation projects to be considered for future funding. Enabling legislation also directed the Texas Water Development Board (TWDB) to identify and evaluate natural flood mitigation features and include Nature Based Solutions (NBS) within proposed flood mitigation projects.

While TWDB has been very responsive to the questions and concerns expressed by the various Regional Flood Planning Groups (RFPG), the process highlighted several areas of concern regarding the evaluation of natural flood mitigation features for their level of function and use in flood mitigation. This process highlighted the current lack of data specific to Texas regions needed to accurately evaluate natural flood mitigation features and, therefore, the need for methods beyond a traditional Hydrologic Engineering Center's - River Analysis System (HEC-RAS) approach. In addition, Technical Consultant outreach to communities demonstrated the need to increase knowledge on incorporating not only the protection and restoration of natural flood mitigation features but also in general, NBS into flood control strategies.

Nature Based Solutions will need to be woven into every facet of this program and incorporated into future policies and strategies in order to empower community collaboration and leveraging the state's vast network of natural ecosystems in building resilient communities.

Recommendations

Broad and specific recommendations have been collected across the state from RFPG committee members and collaborators, including:

1. Increase funding for and use of Nature Based Solutions, and reduce hurdles to their incorporation into the Regional Flood Plans as Flood Mitigation Strategies, Evaluations and Projects by:
    a. Increasing number of trainings and workshops on accurate cost benefit analysis and use of NBS;

b. Improving modeling methods to provide greater sensitivity beyond traditional hydrological models to include soil porosity and moisture holding capacity, plant interception, evaporation, and transpiration; and other processes that affect flows and interactions with groundwater; as well as water quality improvements and groundwater recharge that can be realized with NBS;
c. Expanding the TWDB's concept of "adverse impact" to include loss of functioning floodplains and the resiliency that they provide;
d. Incentivizing collaboration across watersheds and jurisdictions towards a regional approach to floodplain management using NBS by prioritizing such projects.

2. Ensure that the TWDB's cost benefit analysis appropriately weights projects offering:
    a. Increased social and environmental benefits,
    b. Reduced negative environmental impact,
    c. Reduced cost avoidance for infrastructure replacement (for data on gray infrastructure replacement costs: https://mediaspace.du.edu/media/David+Skuodas+-+Seeing+the+Forest+and+the+Trees/1_g90zp1xz), and
    d. Increased flood prevention for future conditions while also creating resiliency to recover after natural disasters.

3. Recognize the role that land development codes and location of infrastructure have on flood impacts:
    a. Educate on the need for counties to use their ability provided by the State to exert authority to influence development and reduce negative impacts to natural features that mitigate flooding and enable counties to levy stormwater/drainage utility fees to retrofit and maintain natural flood infrastructure,
    b. Promote and fund the use of NBS throughout watersheds with the understanding that most natural flood mitigation features, including floodplains, are in some state of degradation and can be improved with appropriate land use policies,
    c. Recommend policy changes that enable Counties or Groundwater Conservation Districts to protect Natural Aquifer Storage and Recovery features (e.g., karst, fracture zones, and sinkholes) that help mitigate flood severity while transferring potential flood water into aquifers, and
    d. Partner with other agencies to incorporate flood considerations into applicable agency activities (e.g., ensure TxDOT builds to 1% annual probability ("100-year") standards and uses updated flood maps defined by the National Oceanic and Atmospheric Administration (currently the Atlas 14 data) and that such infrastructure does not increase downstream flooding nor damage floodplains and riparian corridors.

4. Specific project recommendations:
    a. Fund a Texas Watershed Initiative similar to Louisiana's[1] with a robust program on use and adoption of NBS,

[1] https://watershed.la.gov/nature-based-solutions

b. Provide training and technical resources to flood districts, river authorities, municipal utility districts, water control and improvement districts, and municipal and county floodplain managers to advance understanding and adoption of NBS and best practices for maintaining floodplains and other natural flood mitigation features to fully realize potential benefits,
c. Use all available federal and state programs to prioritize the preservation and restoration of natural flood mitigation features throughout watersheds,
d. Develop a compendium of Nature-Based resources for non-coastal communities, and
e. Review submitted FMPs, FMEs and FMSs submitted for this first 5-year cycle to determine the feasibility to augment with NBS aspects.

Conclusions

If preventative flood mitigation strategies are not prioritized for funding, then flood events will be more frequent and cause greater harm, leading to much higher costs for Texas taxpayers. Similarly, if natural infrastructure that mitigates flooding is degraded, undoing the damage to some of these features may be cost-prohibitive. Retrofitting with flood control projects is also not cost-effective, given pathways for prevention already in use in many other states. Conversely, strategically protecting natural infrastructure and placing Nature Based Solutions throughout a watershed can significantly reduce flood risks along tributaries and major riverine systems alike.

Thank you for the opportunity to submit these comments.

Respectfully,

Annalisa Peace
Executive Director
Greater Edwards Aquifer Alliance

Luke Metzger
Executive Director
Environment Texas

Suzanne Scott
State Director, Texas Chapter
The Nature Conservancy

Antonio Diaz
Spokesperson Texas Indigenous Council
Co-Chair Bexar County Green Party

Britt Coleman
President
Bexar Audubon Society

education
conservation
cooperation

hill country alliance

San Antonio Regional Flood Planning Group c/o San Antonio River Authority
100 East Guenther St.
San Antonio, Texas 78283-9980

October 11, 2022

Dear Regional Flood Planning Group 12,

Thank you for your ongoing work to create a comprehensive flood plan for the San Antonio River Basin planning area. I am writing to encourage the Planning Group (i) to consider use of nature-based solutions as a primary tool for mitigating flooding and extreme weather events, as well as (ii) to engage the Camp Bullis Sentinel Landscape Partnership as we implement and learn from nature-based solutions in a multi-county focal area around Joint Base San Antonio's Camp Bullis, in the Upper San Antonio River Basin.

JBSA-Camp Bullis provides training for 266 partners, including the institutional and field training component for all Department of Defense enlisted and officer medical training. The continuation and protection of the Camp Bullis training mission directly and significantly affect strategic national defense initiatives as articulated in the National Defense Strategy. Several stressors to the military installation, including encroachment, drought, and flooding, threaten the training mission.

In 2020, the Camp Bullis Sentinel Landscape Partnership—a collaborative now of over 50 organizations—was created to address these and other stressors by enhancing natural resources conservation, agricultural productivity, military readiness, and resilience to extreme weather events such as drought and flooding. Camp Bullis is drained by several creeks, including Cibolo and Salado Creeks, subject to flooding during high rainfall periods. Several personnel have been killed on base from flash floods. The CBSL Partnership is advancing nature-based solutions to enhance groundwater replenishment and mitigate inland flooding to benefit Camp Bullis and surrounding communities.

For example, Texas A&M Natural Resources Institute recently secured an $8.57 million grant from the USDA on behalf of the CBSL Partnership to work with volunteering private landowners to advance nature-based solutions (e.g. enhancing soil health and infiltration). The City of Boerne is protecting and quantifying impacts of riparian stewardship for flood mitigation and groundwater recharge; the University of Texas-San Antonio is assessing how four different permeable pavement designs can mitigate the water quality and quantity of stormwater runoff compared to impermeable pavement surfaces over the Edwards Aquifer Recharge Zone; and the Edwards Aquifer Authority, along with the University of Texas at San Antonio, is studying the impacts of land stewardship practices (e.g. on-contour berms and swales, as well as log and rock structures) on soil infiltration, surface water runoff, and aquifer recharge at the Authority's new Field Research Park.

We invite the RFPG to learn with and support us on how we can most effectively implement nature-based solutions to mitigate flooding, while achieving other co-benefits such as groundwater

replenishment, habitat, agricultural productivity, and public recreation in the Upper San Antonio River Basin.

We appreciate your efforts to protect the people and places that define this region. Please let me know if you have any questions or would like to discuss the CBSL Partnership at your convenience. I can be reached by cell phone at 210-287-0478 or by e-mail at Daniel@HillCountryAlliance.Org.

Respectfully,

Daniel Oppenheimer
HCA Land Program Director &
Camp Bullis Sentinel Landscape Partnership Coordinator

CC:

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National Wildlife Federation's Letter of Recommendations to Region 12 Regional Flood Planning Group Promoting an Equitable Regional Flood Plan, the Protection of Natural Flood Mitigation Features, and Use of Nature Based Flood Mitigation Solutions

Background

State legislation enabling the Regional Flood Plan process provided guidelines and deliverables to be accomplished by each flood planning group, with regional plans becoming the basis of a state flood plan. These plans would be developed through the creation and identification of projects to be considered for future funding. Enabling legislation also directed the Texas Water Development Board (TWDB) to identify and evaluate natural flood mitigation features and include Nature Based Solutions (NBS) among proposed flood mitigation projects.

Region 12, along with all the other Regional Flood Planning Groups (RFPGs) have had to work under a tight timeline during the initial planning round – and we appreciate the work the Region has put into making a holistic flood plan. In particular, in addition to the various flood mitigation evaluations, strategies, and projects that incorporate nature-based solutions, we are encouraged by the following items included in Region 12's draft Regional Flood Plan:

- Regulatory and Administrative Recommendations:
    - 8.1.3. (TxDOT should employ roadway design criteria to require all new and reconstructed state roadways to be designed and constructed, to the extent practicable, at elevations at or above the 1.0% annual chance event water surface elevation. TxDOT should also consider future conditions, such as urbanization and changing rainfall, in its roadway design criteria for drainage and flood risk reduction);
    - 8.1.4 (Establish programs and funding to evaluate and update development code and educate local and regional officials to the floodplain management tools they have available along with nature-based solutions);
    - 8.1.7 (Revise the scoring criteria for funding associated with stormwater and flood-related projects that benefit nature based solutions and agricultural activities);
    - 8.1.8 (Provide financial or technical assistance and training to smaller/rural jurisdictions to help educate them on implementing flood mitigation policy, practices, and funding opportunities);
- *Legislative Recommendations*:
    - 8.2.1 (Direct state funding to counties to maintain drainage and stormwater infrastructure in unincorporated areas);

    - 8.2.2. (Provide funding and/or technical assistance to develop regulatory floodplain maps)
    - 8.2.3. (Provide funding and/or technical assistance to update drainage criteria and development standards that prevents development in or impacts to the Effective FEMA floodplain); and
    - 8.2.9 (Establish perpetual and dedicated funding to implement projects identified in the state flood plan).
- *Regional Flood Planning Process Recommendations:*
    - *8.3.2 (Develop a fact sheet and/or other publicity measures to encourage entities to participate in the SAFPR effort);*
    - *8.3.4 (Develop a process to efficiently amend approved regional flood plans to incorporate additional recommended FMEs, FMSs, and FMPs, and to allow the San Antonio RFPG to advance the recommended FMEs to FMPs);*
    - *8.3.6 Revise the criteria for the "No Adverse Impact" certification required for FMPs.*
    - *8.3.14 Develop guidance and a standardized evaluation criteria for the benefits of nature-based solutions.*
- *Adopted Flood Protection Goals*:
    - *Increase the number of participating Community Rating System (CRS) entities in the FPR by 5 (short term) and 100% (long term);*
    - *Increase the number of entities which regulate to the 1% annual chance future conditions floodplains as part of new development and redevelopment by 10% (short term) and 50% (long term);*
    - *Increase the number of entities above the established baseline that have adopted a holistic watershed approach using existing Natural Flood Mitigation Features (NFMF) such as headwaters, buffers, and conservation easements for flood risk reduction as a basis for comprehensive subdivision regulations;*
    - *Establish a baseline and increase the number of acres of publicly protected open space by 10 % as part of land conservation and acquisitions to reduce future impacts of flooding;*
    - *Reduce the number of NFIP repetitive-loss properties in the FPR by 25% (short term) and 75% (long term);*
    - *Reduce the number of vulnerable critical facilities located within the existing and future 1% annual chance (100-year) floodplain by 50%;*
    - *Increase the number of structural projects by 10% (short term) and 50% (long term) that include a NBS or Green Infrastructure (GI) component.*

While Region 12 and the TWDB has been very responsive to the questions and concerns expressed by the public and various RFPGs, the process and initial regional planning round has highlighted several areas of concern regarding the evaluation of natural flood mitigation features for their level of function and the incorporation of NBS into flood control strategies.

This process highlighted the current lack of data specific to Texas regions needed to accurately evaluate natural flood mitigation features and, therefore, the need for methods beyond a traditional Hydrologic Engineering Center's - River Analysis System (HEC-RAS) approach. In addition, Technical Consultant outreach to communities demonstrated the need to increase knowledge on incorporating Nature Based Solutions into flood control strategies.

Equity and nature-based solutions will need to be woven into every facet of this program and incorporated into future policies and strategies in order to empower community collaboration and leverage the state's vast network of natural ecosystems in building resilient communities.

The following **comments and recommendations specific to Region 12** seek to better ensure an equitable flood plan, and one that centers natural infrastructure and nature-based projects. We recognize that the region will not be able to address some comments provided, however it is our hope that during subsequent rounds, these comments will be taken into consideration.

I. *Adopt NFIP participation as a minimum floodplain management standard*

Region 12 did not adopt any minimum floodplain management standards into its draft plan. Minimum floodplain management standards can be adopted by the region, which local entities must adopt before a FME, FMS, or FMP is included under the Regional Flood Plan, and therefore eligible for funding under FIF.

We encourage Region 12 to consider NFIP participation as a minimum floodplain management standard. Participation in the NFIP requires participants to adopt a floodplain management ordinance and to designate a floodplain administrator who is responsible for understanding and interpreting local floodplain management regulations and reviewing them for compliance with NFIP standards.

Since floodplain management ordinances and designation of a floodplain administrator are essential to proper flood planning at the local level, requiring the remaining communities to participate in the NFIP seems like an appropriate baseline, before entities can potentially receive funding for flood mitigation projects. We recommend that the Region uses its power to adopt minimum floodplain standards, by requiring NFIP participation as a minimum standard.

II. *Refine Assessment and Identification of Flood Mitigation Needs*

Critical facilities in particular need additional attention when assessing and identifying flood mitigation needs. Certain critical facilities pose higher risk to surrounding communities during flooding, such as superfund sites and refineries. We recommend that the Region include in its weighted approach risks based on the number of industrial facilities that pose environmental

justice risks to neighboring and fenceline communities. If facilities are identified that are within floodplains and are not adequately protected, the region should propose legislative, administrative, and regulatory recommendations to better ensure facilities do not pose a risk to neighboring communities during flooding.

III. *Revise description of Nature-Based Features under section 5.1*

Section 5.1 defines multiple structural and nonstructural strategies to mitigate flooding. Nature-based features is defined in the structural section as the following:

> "FMPs can include nature-based features as part of flood mitigation solutions where applicable including, but not limited to, stream and coastal restorations, wetlands, natural channel design, other green infrastructure elements, and land preservation. Although nature-based solutions generally do not provide significant flood risk reduction to 1% annual chance flood hazards (100-year floods), they can improve stormwater quality, provide ecological function uplift, and reduce riverine and coastal erosion risk."[1]

We disagree with the statement that "nature-based solutions generally do not provide significant flood risk reduction to 1% annual chance flood hazards." Nature-based solutions can provide significant benefits to communities, and can provide risk reduction to the 1% annual chance flood. Numerous reports and studies continue to show the benefits of nature-based solutions for flood mitigation – including the U.S. Army Corps of Engineer's International Guidelines on NNBF for Flood Risk Management report released earlier this year. In addition to their ability to provide significant flood mitigation benefits, nature-based solutions are also not associated with negative downstream impacts, commonly associated with traditional gray infrastructure approaches, such as channelization. The description of nature-based features should be revised to acknowledge the considerable mitigation these techniques can have.

IV. *Consider discretion when analyzing nature-based FMPs and provide an administrative recommendations to the TWDB on how to apply potential FMP requirements to nature-based projects*

Only projects with significant amounts of detail are incorporated as Flood Management Projects in the Draft Regional Flood Plans. We are concerned that since no nature-based projects were recommended by the RFPG, natural infrastructure projects may have been downgraded to FMSs due to lack of data provided to the Region. It is important to note that analyses like the BCR are not always tailored for natural infrastructure projects. For example, while preserving open space within the floodplain helps protect land from development which could negatively impact

[1] Region 12, Draft Regional Flood Plan at 5-10.

flooding, a traditional BCR may not adequately account for protection of development that hasn't occurred yet. Since we are unsure where to view which projects were submitted to the Region, but subsequently removed because it didn't align with a goal or other reason, or downgraded to a strategy, we recommend the RFPG to provide discretion to potential FMPs that are largely nature-based. We also encourage the Region to provide an administrative recommendation to the TWDB to provide guidance to the Regions on how to apply potential FMP requirements to nature-based projects.

V. *Recommend that the Flood Planning Process be revised to remove the TWDB minimum screening requirement of "the evaluation /strategy/project addresses a flood problem with drainage area of 1 square mile or greater. "*

Many small, distributed projects can provide significant benefits to the floodplain. For example, multiple green stormwater infrastructure projects across a city can reduce runoff. It can also act as a demonstration so that other applicants can implement their own projects. We do not, therefore, believe that the 1 square mile requirement should be included in this criteria. We appreciate that Region 12 did not exclude good flood reduction projects that had a drainage area less than 1 mile.[2]

VI. *Include impact to natural infrastructure when analyzing "No Negative Impacts"*

There seemed to be considerable discretion from the Region on which projects to incorporate, using engineering judgment. Open spaces, such as parks, provide significant flood mitigation benefits to neighboring communities. The analysis of "No Negative Impacts"should therefore include impacts to natural infrastructure, which should be mitigated to the greatest extent possible.

VII. *Add a Flood Protection Goal to decrease number of FMPs that have negative impacts associated with the project and add an administrative recommendation to provide best management practices to local entities on how to avoid negative impacts*

In the draft Flood Plan, the majority of recommended FMPs showed "#N/A" under the negative impacts analysis. TThe region, therefore, should strive to better analyze negative impacts, and decrease the amount of projects with negative impacts over time – which could be reflected in a Flood Protection Goal. Further, Region 12 can provide an administrative recommendation to the TWDB to provide best management practices to local entities on how to reduce negative impacts associated with projects.

VIII. *Add a Flood Protection Goal to have increased enforcement of floodplain ordinances*

[2] Region 12, Draft Regional Flood Plan at 5-22.

Region 12 noted that approximately 10 out of 14 entities within the region have moderate, low, or no enforcement of floodplain regulations. These entities have a significant opportunity to improve the effectiveness of their ordinance or court order by increasing the enforcement of their existing floodplain ordinances. In order to address this shortfall, we recommend that Region 12 adopt a Goal to increase enforcement of floodplain ordinances.

IX. We applaud Region 12's use of local studies to determine "future conditions analysis"

For Region 12, the existing 0.2% flood risk areas were used as a proxy for the future 1% flood risk areas in areas where future 1% flood risk areas did not exist, per Method 2 in TWDB's guidance. Method 3, a San Antonio RFPG method, was used to calculate the 0.2% future storm event risk area given as a buffer value utilizing the 2018 San Antonio River Basin Future Precipitation Study, developed by SARA. This analysis showed the average increase in the 0.2% annual chance storm event peak flows throughout the basin were between 30% and 40% for the 20- and 40-year future projections, respectively. From this data, HDR estimated a 35% increase in 0.2% annual chance storm event peak flows for a 30-year future event. While we applaud Region 12 for utilizing local studies to determine future 500 year floodplain, we believe there should be some discussion of whether this methodology comports with the State Climatologist's recommendations to determine the extent of the future 500 year floodplain.[3]

We appreciate the work the Region is doing to help better plan for and protect our communities from flooding. Further, we appreciate the opportunity to submit these comments. In addition to the comments, above, we've attached a letter providing additional comments for consideration by the region during future planning cycles.

Sincerely,

Arsum Pathak
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Danielle Goshen
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National Wildlife Federation

[3] John Nielsen-Gammon and Savannah Jorgensen, Climate Change Recommendations for Regional Flood Planning Group (April 16, 2021), available at: https://climatexas.tamu.edu/files/CliChFlood.pdf.

GoshenD@NWF.org

Draft 2023 San Antonio Regional Flood Plan
Comments

Other Public Comments

Type	Submission Date	Comments
Feedback Form	Aug 22, 2022	Yes, we would be interested in funding some of our problem areas that we have here at the city.
Feedback Form	Aug 18, 2022	I am expressing an interest in the flood prevention meeting. I don't think I will make it there but I've lived in Bexar County since 1979. I would agree that the county should do something about the bridges around here and of course it will take tax dollars. **For example the bridge going over Salado which is on Fort Sam Houston was very smallish and the water went right over it!** Uncle Sam must've created a really good bridge using tax dollars. And I think more of those bridges should be forthcoming because it saves lives. It's not likely that anyone died on this particular bridge but I know a family who died in Comanche Park in 98, And I'm not opposed to building new bridges and I'm not opposed to new infrastructure. Thank you for reading my message Julie M
Feedback Form	Aug 17, 2022	I have two homes one here in Bexar and one in NUECES county, the city of San Antonio has undoubtedly the dirtiest roads and streets I watch the main expressway's here the trash that builds up on the sides O watched this one object for 9 months!! on I-10!! Do we not have sweepers Corpus sweeps their main roads and streets weekly cause we are prone to flooding by them sweeping keeps us from flooding . I never see sweepers in San Antonio anymore and why is that if San Antonio would sweep their streets and roads just maybe there would not be so much flooding cause Texas has a lot of inconsiderate trashy people who cares less which is SAD. I would like to see San Antonio get clean. Thank you

Draft 2023 San Antonio Regional Flood Plan
Comments

Other Public Comments

Type	Submission Date	Comments
Feedback Form	Sep 20, 2022	On page 1-54 of the Draft Flood plan here https://www.region12texas.org/wp-content/uploads/2022/08/RFP_Region-12_R.pdf, one of the goals of the SA River Watershed master plan is: "Identify needs and opportunities related to flood risk, water quality issues, low impact development, stream restoration, nature based park planning, mitigation banking, and conservation easements." **But in the proposed projects from the 9/20 Technical Committee meeting, there are very few projects involving low impact development, stream restoration, nature based park planning, mitigation banking, and conservation easements. Most projects aim to reduce the floodplain through enhanced conveyance or channelization.** I was surprised to see on the last page of the agenda packet from the 9/20 meeting, **a project aimed at channelizing the SA River through the River Road neighborhood south of Mulberry**, in an area that contains a natural section of the San Antonio River within the city itself (a rarity). **Hopefully this one isn't implemented.**
Feedback Form	Sep 17, 2022	Excellent work being done here. The work done at Padre Park in San Antonio, at the Tamöx Talöm food forest is of particular interest in relation to non-structural infrastructure. **A food forest being introduced on the flood zone will help to sequester carbon, build healthy souls that can better fight erosion, and offer an opportunity to grow food, which brings additional opportunities for education, commerce, and culture.** The success, and mere idea can be replicated as needed throughout the state. A set it and forget it strategy while engineers come up with additional solutions. Thank you for your considerations.
Feedback Form	15-Sep-22	(from in-person public meeting on 9/15/22) Concern of impact to San Antonio watershed south of projects 121000080 and 121000092 to SA watershed from E Mulbery Ave. to E Craig Ave San Antonio Tx. Flood Impact: "CLOMAR's and LOMAR's" are better than the south of proposed projects 121000080 and 121000092

Draft 2023 San Antonio Regional Flood Plan
Comments

Other Public Comments

Type	Submission Date	Comments
Emailed	17-Sep-22	I'm sending you a few photos of Dreamland between Lockhill-selma and Vance Jackson. It will go many feet sbive road during serious flood. I will try to send photos during next big flood. There may have been a death and at least rescue within last 35 years. Actually there was an entire VIA bus stalled duting the flood of October 25 2019—8 people had to be rescued through hatch. Check it out on internet!
Emailed	6-Oct-22	Nelson Wolfe stopped his **Frenchcreek flood project** right at the start of our property line. He directed all flood waters at our house and neighbors across the creek. We have flooded twice in our house twice last year since the finish of his project. He did not take notice the creek narrows and is blocked right below us to 1604 which make our home a lake. Our lives have been endangered. We have no way out to egress. We have called his office with no return calls. Can you help us, please

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	Great Springs Project

Type	**Comment**	**Response**
Proposed Projects	In order to identify and quantify the possible synergies of the GSP effort combined with the individual flood mitigation projects in the regional flood plan, GSP suggests the inclusion of the attached Flood Management Evaluation (FME) in the updated regional flood plan. Thank you for the opportunity to provide input to this important work. **Great Springs Project would recruit and manage consultants to conduct the following tasks as part of the FME:** 1. Assemble relevant information about the land parcels that are, or may be, included in GSP and related trail development as well as adjacent, relevant flood planning FMEs, FMSs and FMPs, 2. Determine the flood risks involved in the affected area, 3. Assess and quantify the flood mitigation impacts of GSP land conservation and trail development as well as how GSP may contribute to adjacent flood mitigation efforts, 4. Identify possible and appropriate modifications to open space and trail features that would enhance the flood mitigation of GSP and adjacent flood mitigation efforts, 5. Quantify the added benefits of combining GSP efforts with Region 12 flood mitigation projects, 6. In cooperation with the affected local governments, develop appropriate proposals for FMS(s) and FMP(s) for inclusion in the San Antonio Regional Flood Plan, and 7. Submit a final report within one year of FME funding.	This FME will be considered in the amended plan.

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	Texas Parks and Wildlife Department

Type	Comment	Response
San Antonio Regional Flood Plan Comments	The goals of the Draft SARFP include education and outreach, improving flood warning and readiness, increasing the number of flood studies, increasing the prevention of flooding, and supporting flood infrastructure projects. **TPWD encourages the inclusion of the ecological and societal benefits of flooding in any education program and appreciates the repeated mention of nature-based solutions in the education and outreach goals of the SARFP.**	Noted, will consideration in future flood plan goals.
San Antonio Regional Flood Plan Comments	The SARFP identified 29 potentially feasible Flood Management Projects (FMPs), 165 potentially feasible Flood Management Evaluations (FMEs), and 20 potentially feasible Flood Management Strategies (FMSs). It appears that most of the recommended FMPs are infrastructure based with only one nature-based solution being put forward. TPWD appreciates that the Draft SARFP acknowledges the gap in flood risk and mitigation in relation to nature-based infrastructure in the region. TPWD understands that the goal of the RFP is to mitigate floods to reduce risk to life and property **but would like to encourage the use of nature-based solutions where possible.** The Draft SARFP states that none of the projects or strategies are anticipated to have negative downstream effects.	The Region 12 FPG encourages the use of natural design features during the design phase of the project.
San Antonio Regional Flood Plan Comments	**TPWD would like to encourage all the FMX (an FMP, FME, or FMS) proponents to consider stream crossing designs that allow for sediment transport and passage of aquatic organisms and do not impound water.** Basically, designs that are invisible to the creek. This includes bridges that span the creek where possible or culverted crossings designed with the culvert(s) in the active channel area lower than those in the floodplain benches so that the flow in the channel is not overly spread out. The central/low flow culvert(s) should be large enough to handle a 1.5-year flow without backing up water. The bottoms of these lower culverts should be set at least a foot below grade (i.e., recessed) to allow natural substrate to cover the culvert bottom and to allow for aquatic organism passage. These lower, recessed culverts should be installed in the thalweg or deepest part of the channel and be aligned with the low flow channel (Clark in et at., 2006).	Will encourage this during the design phase.
San Antonio Regional Flood Plan Comments	The Draft SARFP includes a number of channel improvement projects which may include widening, deepening, and straightening streams. Channelization and over-widening of streams slows flow, which increases deposition of sediment, decreases fish habitat, increases water temperatures, and can result in channel erosion. Streams in good condition naturally reach bank full and start spilling onto the floodplain during a 1.5 to 2 year flood event. Widening and deepening a stream channel to force it to contain the 100-year flow negatively impacts the adjacent water table and riparian area and has geomorphic effects upstream and downstream of the modification. If channelization is necessary, constructing a two-stage channel with a low-flow channel and a floodplain allows for the continued transport of sediment, habitat for aquatic wildlife, and can reduce maintenance (Rosgen 1996). **TPWD encourages the RFPG to protect existing streams, riparian areas, and floodplains.**	Encourages the consideration of these topics during the design phase.

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	Greater Edwards Aquifer Alliance

Type	**Comment**	**Response**
1. *Increase funding for and use of Nature Based Solutions, and reduce hurdles to their incorporation into the Regional Flood Plans as Flood Mitigation Strategies, Evaluations and Projects by:*		
1	a. Increasing number of trainings and workshops on accurate cost benefit analysis and use of NBS;	This is captured in the Goals of the RFPG
1	b. Improving modeling methods to provide greater sensitivity beyond traditional hydrological models to include soil porosity and moisture holding capacity, plant interception, evaporation, and transpiration; and other processes that affect flows and interactions with groundwater; as well as water quality improvements and groundwater recharge that can be realized with NBS;	Improved accepted floodplain modeling and mapping methodology by SARA/FEMA is being release next year. TWDB is also developing guidance on NBS.
1	c. Expanding the TWDB's concept of "adverse impact" to include loss of functioning floodplains and the resiliency that they provide;	Will provide this comment to the TWDB.
1	d. Incentivizing collaboration across watersheds and jurisdictions towards a regional approach to floodplain management using NBS by prioritizing such projects.	Will provide this comment to the TWDB.
2. *Ensure that the TWDB's cost benefit analysis appropriately weights projects offering:*		
2	a. Increased social and environmental benefits,	Will provide this comment to the TWDB.
2	b. Reduced negative environmental impact,	Will provide this comment to the TWDB.
2	c. Reduced cost avoidance for infrastructure replacement (for data on gray infrastructure replacement costs: https://mediaspace.du.edu/media/David+Skuodas+-+Seeing+the+Forest+and+the+Trees/1_g90zp1xz), and	Will provide this comment to the TWDB.
2	d. Increased flood prevention for future conditions while also creating resiliency to recover after natural disasters.	Will provide this comment to the TWDB.

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	Greater Edwards Aquifer Alliance

Type	**Comment**	**Response**
	3. *Recognize the role that land development codes and location of infrastructure have on flood impacts:*	
3	a. Educate on the need for counties to use their ability provided by the State to exert authority to influence development and reduce negative impacts to natural features that mitigate flooding and enable counties to levy stormwater/drainage utility fees to retrofit and maintain natural flood infrastructure,	These topics were included in chapter 8 Legislative Recommendations
3	b. Promote and fund the use of NBS throughout watersheds with the understanding that most natural flood mitigation features, including floodplains, are in some state of degradation and can be improved with appropriate land use policies,	These topics were included in chapter 8 Legislative Recommendations
3	c. Recommend policy changes that enable Counties or Groundwater Conservation Districts to protect Natural Aquifer Storage and Recovery features (e.g., karst, fracture zones, and sinkholes) that help mitigate flood severity while transferring potential flood water into aquifers, and	These topics were included in chapter 8 Legislative Recommendations
3	d. Partner with other agencies to incorporate flood considerations into applicable agency activities (e.g., ensure TxDOT builds to 1% annual probability ("100-year") standards and uses updated flood maps defined by the National Oceanic and Atmospheric Administration (currently the Atlas 14 data) and that such infrastructure does not increase downstream flooding nor damage floodplains and riparian corridors.	These topics were included in chapter 8 Legislative Recommendations

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	Greater Edwards Aquifer Alliance

Type	**Comment**	**Response**
	4. *Specific project recommendations:*	
4	a. Fund a Texas Watershed Initiative similar to Louisiana's with a robust program on use and adoption of NBS,	Will provide this comment to the TWDB.
4	b. Provide training and technical resources to flood districts, river authorities, municipal utility districts, water control and improvement districts, and municipal and county floodplain managers to advance understanding and adoption of NBS and best practices for maintaining floodplains and other natural flood mitigation features to fully realize potential benefits,	This is part of the Region 12 flood planning goals.
4	c. Use all available federal and state programs to prioritize the preservation and restoration of natural flood mitigation features throughout watersheds,	Will provide this comment to the TWDB.
4	d. Develop a compendium of Nature-Based resources for non-coastal communities, and	TWDB is also developing guidance on NBS.
4	e. Review submitted FMPs, FMEs and FMSs submitted for this first 5-year cycle to determine the feasibility to augment with NBS aspects.	The Region 12 FPG encourages the use of natural design features during the design phase of the project.

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	Camp Bullis Sentinel Landscape Partnership

Type	**Comment**	**Response**
General	(i) to consider use of nature-based solutions as a primary tool for mitigating flooding and extreme weather events	The Plan does consider Nature-Based solutions when searching for eligible FMXs.
General	(ii) to engage the Camp Bullis Sentinel Landscape Partnership as we implement and learn from nature-based solutions in a multi-county focal area around Joint Base San Antonio's Camp Bullis, in the Upper San Antonio River Basin	We will continue to engage CBSL as the flood planning process continues and thereon future flood plans by including them on in the stakeholders.

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	National Wildlife Federation

Type	**Comment**	**Response**
	The following comments and recommendations specific to Region 12	
I. Adopt NFIP participation as a minimum floodplain management standard	Region 12 did not adopt any minimum floodplain management standards into its draft plan. Minimum floodplain management standards can be adopted by the region, which local entities must adopt before a FME, FMS, or FMP is included under the Regional Flood Plan, and therefore eligible for funding under FIF. **We encourage Region 12 to consider NFIP participation as a minimum floodplain management standard.** Participation in the NFIP requires participants to adopt a floodplain management ordinance and to designate a floodplain administrator who is responsible for understanding and interpreting local floodplain management regulations and reviewing them for compliance with NFIP standards. Since floodplain management ordinances and designation of a floodplain administrator are essential to proper flood planning at the local level, requiring the remaining communities to participate in the NFIP seems like an appropriate baseline, before entities can potentially receive funding for flood mitigation projects. We recommend that the Region uses its power to adopt minimum floodplain standards, by requiring NFIP participation as a minimum standard.	We do; "The San Antonio RFPG recommends that entities that are not currently NFIP participants should adopt at least the minimum standards and take the necessary steps in order to become active NFIP participants."
II. Refine Assessment and Identification of Flood Mitigation Needs	Critical facilities in particular need additional attention when assessing and identifying flood mitigation needs. Certain critical facilities pose higher risk to surrounding communities during flooding, such as superfund sites and refineries. **We recommend that the Region include in its weighted approach risks based on the number of industrial facilities that pose environmental justice risks to neighboring and fence line communities.** If facilities are identified that are within floodplains and are not adequately protected, the region should propose legislative, administrative, and regulatory recommendations to better ensure facilities do not pose a risk to neighboring communities during flooding.	TWDB sets the criteria
III. Revise description of Nature-Based Features under section 5.1	Section 5.1 defines multiple structural and nonstructural strategies to mitigate flooding. Nature-based features is defined in the structural section as the following: "FMPs can include nature-based features as part of flood mitigation solutions where applicable including, but not limited to, stream and coastal restorations, wetlands, natural channel design, other green infrastructure elements, and land preservation. Although nature-based solutions generally do not provide significant flood risk reduction to 1% annual chance flood hazards (100-year floods), they can improve stormwater quality, provide ecological function uplift, and reduce riverine and coastal erosion risk." **We disagree with the statement that "nature-based solutions generally do not provide significant flood risk reduction to 1% annual chance flood hazards.**" Nature-based solutions can provide significant benefits to communities, and can provide risk reduction to the 1% annual chance flood. Numerous reports and studies continue to show the benefits of nature-based solutions for flood mitigation – including the U.S. Army Corps of Engineer's International Guidelines on NNBF for Flood Risk Management report released earlier this year. In addition to their ability to provide significant flood mitigation benefits, nature-based solutions are also not associated with negative downstream impacts, commonly associated with traditional gray infrastructure approaches, such as channelization. The description of nature-based features should be revised to acknowledge the considerable mitigation these techniques can have.	We will update the wording in this chapter.

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	National Wildlife Federation

Type	**Comment**	**Response**
IV. Consider discretion when analyzing nature-based FMPs and provide an administrative recommendations to the TWDB on how to apply potential FMP requirements to nature-based projects	Only projects with significant amounts of detail are incorporated as Flood Management Projects in the Draft Regional Flood Plans. We are concerned that since no nature-based projects were recommended by the RFPG, natural infrastructure projects may have been downgraded to FMSs due to lack of data provided to the Region. It is important to note that analyses like the BCR are not always tailored for natural infrastructure projects. For example, while preserving open space within the floodplain helps protect land from development which could negatively impact flooding, a traditional BCR may not adequately account for protection of development that hasn't occurred yet. Since we are unsure where to view which projects were submitted to the Region, but subsequently removed because it didn't align with a goal or other reason, or downgraded to a strategy, we recommend the RFPG to provide discretion to potential FMPs that are largely nature-based. **We also encourage the Region to provide an administrative recommendation to the TWDB to provide guidance to the Regions on how to apply potential FMP requirements to nature-based projects.**	The Region 12 Flood Plan has several goals that encourage the use of Nature Based Solutions. In addition, we have included an FME that will develop the metrics to evaluate existing NBS and provide a flood prevention value and economic value.
V. Recommend that the Flood Planning Process be revised to remove the TWDB minimum screening requirement of "the evaluation /strategy/project addresses a flood problem with drainage area of 1 square mile or greater. "	Many small, distributed projects can provide significant benefits to the floodplain. For example, multiple green stormwater infrastructure projects across a city can reduce runoff. It can also act as a demonstration so that other applicants can implement their own projects. **We do not, therefore, believe that the 1 square mile requirement should be included in this criteria.** We appreciate that Region 12 did not exclude good flood reduction projects that had a drainage area less than 1 mile.	Will provide this comment to the TWDB.

Draft 2023 San Antonio Regional Flood Plan
Comment Response

Organization	National Wildlife Federation

Type	**Comment**	**Response**
VI. Include impact to natural infrastructure when analyzing "No Negative Impacts"	There seemed to be considerable discretion from the Region on which projects to incorporate, using engineering judgment. Open spaces, such as parks, provide significant flood mitigation benefits to neighboring communities. **The analysis of "No Negative Impacts "should therefore include impacts to natural infrastructure, which should be mitigated to the greatest extent possible.**	Will provide this comment to the TWDB.
VII. Add a Flood Protection Goal to decrease number of FMPs that have negative impacts associated with the project and add an administrative recommendation to provide best management practices to local entities on how to avoid negative impacts	In the draft Flood Plan, the majority of recommended FMPs showed "#N/A" under the negative impacts analysis. **The region, therefore, should strive to better analyze negative impacts**, and decrease the amount of projects with negative impacts over time – which could be reflected in a Flood Protection Goal. Further, Region 12 can provide an administrative recommendation to the TWDB to provide best management practices to local entities on how to reduce negative impacts associated with projects.	No negative impact was evaluated for all projects as part of the TWDB required criteria. This field was inadvertently entered as #N/A in the draft plan but has been corrected.
VIII. Add a Flood Protection Goal to have increased enforcement of floodplain ordinances	Region 12 noted that approximately 10 out of 14 entities within the region have moderate, low, or no enforcement of floodplain regulations. These entities have a significant opportunity to improve the effectiveness of their ordinance or court order by increasing the enforcement of their existing floodplain ordinances. In order to address this shortfall, **we recommend that Region 12 adopt a Goal to increase enforcement of floodplain ordinances.**	Several of the Region 12 goals promote increased floodplain regulations and ordinances, see section 3 of the Plan.
IX. We applaud Region 12's use of local studies to determine "future conditions analysis"	For Region 12, the existing 0.2% flood risk areas were used as a proxy for the future 1% flood risk areas in areas where future 1% flood risk areas did not exist, per Method 2 in TWDB's guidance. Method 3, a San Antonio RFPG method, was used to calculate the 0.2% future storm event risk area given as a buffer value utilizing the 2018 San Antonio River Basin Future Precipitation Study, developed by SARA. This analysis showed the average increase in the 0.2% annual chance storm event peak flows throughout the basin were between 30% and 40% for the 20- and 40-year future projections, respectively. From this data, HDR estimated a 35% increase in 0.2% annual chance storm event peak flows for a 30-year future event. While we applaud Region 12 for utilizing local studies to determine future 500 year floodplain, **we believe there should be some discussion of whether this methodology comports with the State Climatologist's recommendations to determine the extent of the future 500 year floodplain.**	This methodology was identified by the TWDB guidelines and is believed to be the best available data for the region at the time. Future floodplain analysis will be updated in each of the planning cycles as more data becomes available.

Draft 2023 San Antonio Regional Flood Plan
Comment Responses

Other Public Comment Responses

Type	Submission Date	Comments	Response
Feedback Form	Aug 22, 2022	Yes, we would be interested in funding some of our problem areas that we have here at the city.	From City of Schertz. Follow up with the city with no response.
Feedback Form	Aug 18, 2022	I am expressing an interest in the flood prevention meeting. I don't think I will make it there but I've lived in Bexar County since 1979. I would agree that the county should do something about the bridges around here and of course it will take tax dollars. **For example the bridge going over Salado which is on Fort Sam Houston was very smallish and the water went right over it!** Uncle Sam must've created a really good bridge using tax dollars. And I think more of those bridges should be forthcoming because it saves lives. It's not likely that anyone died on this particular bridge but I know a family who died in Comanche Park in 98, And I'm not opposed to building new bridges and I'm not opposed to new infrastructure. Thank you for reading my message Julie M	Bexar County is proposing various FMXs to upgrade structures. Area has been studied.
Feedback Form	Aug 17, 2022	I have two homes one here in Bexar and one in NUECES county, the city of San Antonio has undoubtedly the dirtiest roads and streets I watch the main expressway's here the trash that builds up on the sides O watched this one object for 9 months!! on I-10!! Do we not have sweepers Corpus sweeps their main roads and streets weekly cause we are prone to flooding by them sweeping keeps us from flooding . I never see sweepers in San Antonio anymore and why is that if San Antonio would sweep their streets and roads just maybe there would not be so much flooding cause Texas has a lot of inconsiderate trashy people who cares less which is SAD. I would like to see San Antonio get clean. Thank you	Equipment not flood control related.
Feedback Form	Sep 20, 2022	On page 1-54 of the Draft Flood plan here https://www.region12texas.org/wp-content/uploads/2022/08/RFP_Region-12_R.pdf, one of the goals of the SA River Watershed master plan is: "Identify needs and opportunities related to flood risk, water quality issues, low impact development, stream restoration, nature based park planning, mitigation banking, and conservation easements." **But in the proposed projects from the 9/20 Technical Committee meeting, there are very few projects involving low impact development, stream restoration, nature based park planning, mitigation banking, and conservation easements. Most projects aim to reduce the floodplain through enhanced conveyance or channelization.** I was surprised to see on the last page of the agenda packet from the 9/20 meeting, **a project aimed at channelizing the SA River through the River Road neighborhood south of Mulberry**, in an area that contains a natural section of the San Antonio River within the city itself (a rarity). **Hopefully this one isn't implemented.**	An FME is proposed to determine feasibility.

Draft 2023 San Antonio Regional Flood Plan
Comment Responses

Other Public Comment Responses

Type	Submission Date	Comments	Response
Feedback Form	Sep 17, 2022	Excellent work being done here. The work done at Padre Park in San Antonio, at the Tamöx Talöm food forest is of particular interest in relation to non-structural infrastructure. **A food forest being introduced on the flood zone will help to sequester carbon, build healthy souls that can better fight erosion, and offer an opportunity to grow food, which brings additional opportunities for education, commerce, and culture.** The success, and mere idea can be replicated as needed throughout the state. A set it and forget it strategy while engineers come up with additional solutions. Thank you for your considerations.	NBS are encouraged on the Plan.
Feedback Form	15-Sep-22	(from in-person public meeting on 9/15/22) Concern of impact to San Antonio watershed south of projects 121000080 and 121000092 to SA watershed from E Mulbery Ave. to E Craig Ave San Antonio Tx. Flood Impact: "CLOMAR's and LOMAR's" are better than the south of proposed projects 121000080 and 121000092	An FME is proposed to determine feasibility.

Draft 2023 San Antonio Regional Flood Plan
Comment Responses

Other Public Comment Responses

Type	Submission Date	Comments	Response
Emailed	17-Sep-22	I'm sending you a few photos of Dreamland between Lockhill-selma and Vance Jackson. It will go many feet sbive road during serious flood. I will try to send photos during next big flood. There may have been a death and at least rescue within last 35 years. Actually there was an entire VIA bus stalled duting the flood of October 25 2019—8 people had to be rescued through hatch. Check it out on internet!	FME 121000072 is being proposed for this site.
Emailed	6-Oct-22	Nelson Wolfe stopped his **Frenchcreek flood project** right at the start of our property line. He directed all flood waters at our house and neighbors across the creek. We have flooded twice in our house twice last year since the finish of his project. He did not take notice the creek narrows and is blocked right below us to 1604 which make our home a lake. Our lives have been endangered. We have no way out to egress. We have called his office with no return calls. Can you help us, please	Coordinated with City. Flood Prone Area Added, detailed modeling present.

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

March 13, 2023

Mr. Brian Mast:
Manager of Government Affairs
San Antonio River Authority
100 E Guenther St,
San Antonio, TX 78204

RE: Request for Information: Regional Flood Planning Grant Contract with San Antonio River Authority; Contract No. 210792497, Final Regional Flood Plan

Dear Mr. Brian Mast:

Thank you for submitting the 2023 Region 12 San Antonio Regional Flood Plan (RFP) to the Texas Water Development Board (TWDB) under the above referenced contract.

During our review we noticed some deficiencies that need to be addressed before the regional flood plan will be considered acceptable by TWDB. Please see the attached spreadsheet that contains a listing of these issues.

It is expected that the data presented within and across all written report sections, tables, excel spreadsheets, and the geodatabase which constitute the single RFP submission will be consistent. In cases where there are any discrepancies between equivalent data, the submitted geodatabase dataset shall supersede other data and the TWDB shall utilize the geodatabase dataset when developing the state flood plan.

For Level 1 comments:
Staff members have completed their initial review and have found these items either missing or not sufficient for our review. These Level 1 comments must be addressed with all relevant files resubmitted before our final plan review may continue.

For Level 2 comments:
We noted several issues that will require attention. Note that these issues are not required to be resolved and resubmitted. However, we do request that you work to address these issues as part of the Amended Regional Flood Plan due by July 14, 2023.

Please email your Planner with a response, including resubmission of all relevant files, to the above information request(s) no later than March 27, 2023.

If you have any questions, please do not hesitate to contact Anita Machiavello of our Flood Planning staff at (512) 463-5158 via email at anita.machiavello@twdb.texas.gov.

Sincerely,

Reem Zoun, PE, CFM
Director, Flood Planning
Office of Planning

Attachment: TWDB Final Regional Flood Plan Review Comments

cc: Derek Boese, RFPG Chair
Kendall Hayes, San Antonio River Authority
Ronald Branyon, HDR, Inc.
Troy Dorman, Halff Associates
Anita Machiavello, TWDB
James Bronikowski, TWDB
Matt Nelson, TWDB

Region 12 San Antonio Regional Flood Plan

Comment No.	SOW Task No.	Task Name	Item Type	Ex C Item	Ex D Table No.	Ex D feature class	Level 1	Level 2	RFPG Response
1	2A	Existing Exposure	Table	Table 3			Roadway Stream Crossings in 1% annual risk is 1,570 in the geodatabase as opposed to 2,767 in the Exhibit C Table 3. Please reconcile.		
2	2A	Existing Exposure	Table	Table 3			Critical Facilities in 1% annual risk is 4,077 in the geodatabase as opposed to 191 in the Exhibit C Table 3. Please reconcile.		
3	2A	Existing Exposure	Table	Table 3			Roadway Stream Crossings in Unknown% annual risk is 3 in the geodatabase as opposed to 0 in the Exhibit C Table 3. Please reconcile.		
4	2A	Existing Exposure	Table	Table 3				Structures in 1% annual risk is 19,110 in the geodatabase as opposed to 19,120 in the Exhibit C Table 3. Please reconcile.	
5	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll	Roadway Stream Crossings in 1% annual risk is 1,570 in the geodatabase as opposed to 2,767 in the Exhibit C Table 3. Please reconcile.		
6	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll	Critical Facilities in 1% annual risk is 4,077 in the geodatabase as opposed to 191 in the Exhibit C Table 3. Please reconcile.		
7	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll	Roadway Stream Crossings in Unknown% annual risk is 3 in the geodatabase as opposed to 0 in the Exhibit C Table 3. Please reconcile.		
8	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll		Structures in 1% annual risk is 19,110 in the geodatabase as opposed to 19,120 in the Exhibit C table. Please reconcile.	
9	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll		Critical infrastructure type 'EMS' appears to be missing, but may be included as 'Fire'. Please confirm if correct.	
10	2A	Model Coverage	GIS feature class		N/A	ModelCoverage		There appears to be one model type mismatch between the submitted HHModels spreadsheet and TDIS for MODEL ID 120000000017. Please reconcile.	
11	2B	Future Exposure	Table	Table 5			Critical Facilities in 1% annual risk is 4,275 in the geodatabase as opposed to 220 in the Exhibit C Table 3. Please reconcile.		
12	2B	Future Exposure + Vulnerability	GIS feature class		19	FutFldExpAll	Critical Facilities in 1% annual risk is 4,275 in the geodatabase as opposed to 220 in the Exhibit C Table 3. Please reconcile.		
13	4B	FME	GIS feature class		23	FME		In the FME feature class, 1 FME has a higher total population than the max of day and night populations. Please reconcile.	
14	5	FMP Recs	Table	Table 16			Projects with Negative Impact may not be included in the plan. The FMP feature class lists 27 projects with negative impact and Excel lists 27. Please review and reconcile as needed.		
15	5	FMP Recs	GIS feature class		24	FMP	Projects with Negative Impact may not be included in the plan. The FMP feature class lists 27 projects with negative impact and Excel lists 27. Please review and reconile as needed.		
16	5	FMP Details	Table	Section 3.9 Tables 23-40				Please consider including FMP Project Details scoring information within the appendices.	
17	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	The sum of Project Cost is $464,746,881 in FMP as opposed to $439,710,464 in FMP_Details. Please reconcile.		
18	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	# of Structures with Reduced 1% Annual Chance Flood Risk is 2772 in FMP as opposed to 606 in FMP_Details (negative values). Please reconcile.		
19	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	Cost per Structure Removed is $6,797,987 in FMP as opposed to $6,286,090 in FMP_Details (negative values). Please reconcile.		
20	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	# of Structures in 1% Annual Chance FP (Pre-Project) is 657 as opposed to 4,575 in FMP_Details. Please reconcile.		

Region 12 San Antonio Regional Flood Plan

Comment No.	SOW Task No.	Task Name	Item Type	Ex C Item	Ex D Table No.	Ex D feature class	Level 1	Level 2	RFPG Response
21	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	There appear to be BCR discrepancies between the FMP feature class and FMP_Details gdb table. Please reconcile.		
22	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	Eleven projects appear to have population discrepancies. Please reconcile.		
23	5	FMP Recs	Table				Summary table of No Negative Impact: Table 5-5 on page 5-31 of RFP: Please include unique Model_ID of associated models that were utilized to determine no negative impact.		
24	All	Accessibility			Section 2.2			Figures alternative text and other elements alternative text failed in accessibility check. Please consider adding alternative text as appropriate.	
25	All	Accessibility			Section 2.2		We noted 9 failures when reviewing the PDF submittal with the Adobe Acrobat accessibility full check. At a minimum, please ensure that the following document properties are satisfied. PDF documents must have a very good document title, the primary language must be set to English, and the primary view must be set to document title. PDFs must also be tagged documents.		

Final 2023 San Antonio Regional Plan
TWDB Comment Response

Comment No.	SOW Task No.	Task Name	Item Type	Ex C Item	Ex D Table No.	Ex D feature class	Level 1	Level 2	RFPG Response
1	2A	Existing Exposure	Table	Table 3			Roadway Stream Crossings in 1% annual risk is 1,570 in the geodatabase as opposed to 2,767 in the Exhibit C Table 3. Please reconcile		Agree, Table 3 updated to match geodatabase.
2	2A	Existing Exposure	Table	Table 3			Critical Facilities in 1% annual risk is 4,077 in the geodatabase as opposed to 191 in the Exhibit C Table 3. Please reconcile		Agree, Table 3 updated to match geodatabase.
3	2A	Existing Exposure	Table	Table 3			Roadway Stream Crossings in Unknown% annual risk is 3 in the geodatabase as opposed to 0 in the Exhibit C Table 3. Please reconcile		Agree, Table 3 updated to match geodatabase.
4	2A	Existing Exposure	Table	Table 3				Structures in 1% annual risk is 19,110 in the geodatabase as opposed to 19,120 in the Exhibit C Table 3. Please reconcile	The GDB shows 19,120 (See image 1 tab below), TWDB is not taking into account the "Power Generation" category of buildings
5	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll	Roadway Stream Crossings in 1% annual risk is 1,570 in the geodatabase as opposed to 2,767 in the Exhibit C Table 3. Please reconcile		Agree, Table 3 updated to match geodatabase.
6	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll	Critical Facilities in 1% annual risk is 4,077 in the geodatabase as opposed to 191 in the Exhibit C Table 3. Please reconcile		Agree, Table 3 updated to match geodatabase.
7	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll	Roadway Stream Crossings in Unknown% annual risk is 3 in the geodatabase as opposed to 0 in the Exhibit C Table 3. Please reconcile		Agree, Table 3 updated to match geodatabase.
8	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll		Structures in 1% annual risk is 19,110 in the geodatabase as opposed to 19,120 in the Exhibit C table. Please reconcile	The GDB shows 19,120 (See image 1 tab below), TWDB is not taking into account the "Power Generation" category of buildings
9	2A	Existing Exposure + Vulnerability	GIS feature class		14	ExFldExpAll		Critical infrastructure type 'EMS' appears to be missing, but may be included as 'Fire'. Please confirm if correct.	Correct. Received data from HIFLD that had a combination of Fire Department, Emergency Services, and Emergency Medical Services. These were all categorized under the term "Fire".
10	2A	Model Coverage	GIS feature class		N/A	ModelCoverage		There appears to be one model type mismatch between the submitted HHModels spreadsheet and TDIS for MODEL ID 120000000017. Please reconcile	Agree, TDIS ID updated to match the HHModels spreadsheet.
11	2B	Future Exposure	Table	Table 5			Critical Facilities in 1% annual risk is 4,275 in the geodatabase as opposed to 220 in the Exhibit C Table 3. Please reconcile		Agree, Table 5 updated to match geodatabase.
12	2B	Future Exposure + Vulnerability	GIS feature class		19	FutFldExpAll	Critical Facilities in 1% annual risk is 4,275 in the geodatabase as opposed to 220 in the Exhibit C Table 3. Please reconcile		Agree, Table 5 updated to match geodatabase.
13	4B	FME	GIS feature class		23	FME		In the FME feature class, 1 FME has a higher total population than the max of day and night populations. Please reconcile	FME ID 121000096 and FME 121000069 had a incorrect POP100, these have been adjusted.
14	5	FMP Recs	Table	Table 16			Projects with Negative Impact may not be included in the plan. The FMP feature class lists 27 projects with negative impact and Excel lists 27. Please review and reconcile as needed		Corrected, no projects have negative impact and geodatabase and tables have been updated.
15	5	FMP Recs	GIS feature class		24	FMP	Projects with Negative Impact may not be included in the plan. The FMP feature class lists 27 projects with negative impact and Excel lists 27. Please review and reconcile as needed		Corrected, no projects have negative impact and geodatabase tables been updated.
16	5	FMP Details	Table	Section 3.9 Tables 23-40				Please consider including FMP Project Details scoring information within the appendices.	Agree, will add in the July deliverable.
17	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	The sum of Project Cost is $464,746,881 in FMP as opposed to $439,710,464 in FMP_Details. Please reconcile.		Corrected, Project Details and GIS now match.
18	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	# of Structures with Reduced 1% Annual Chance Flood Risk is 2772 in FMP as opposed to 606 in FMP_Details (negative values). Please reconcile		Corrected, Project Details and GIS now match.
19	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	Cost per Structure Removed is $6,797,987 in FMP as opposed to $6,286,090 in FMP_Details (negative values). Please reconcile		Corrected, Project Details and GIS now match.
20	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	# of Structures in 1% Annual Chance FP (Pre-Project) is 657 as opposed to 4,575 in FMP_Details. Please reconcile.		Corrected, Project Details and GIS now match.
21	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	There appear to be BCR discrepancies between the FMP feature class and FMP_Details gdb table. Please reconcile.		Corrected, Project Details and GIS now match.
22	5	FMP Details	GDB	3.10.C		3.11.3 [FMP_Details]	Eleven projects appear to have population discrepancies. Please reconcile.		Corrected, Project Details and GIS now match.

Final 2023 San Antonio Regional Plan
TWDB Comment Response

Comment No.	SOW Task No.	Task Name	Item Type	Ex C Item	Ex D Table No.	Ex D feature class	Level 1	Level 2	RFPG Response
23	5	FMP Recs	Table				Summary table of No Negative Impact: Table 5-5 on page 5-31 of RFP: Please include unique Model_ID of associated models that were utilized to determine no negative impact.		Agree, Table updated to include No Negative Impact Model ID.
24	All	Accessibility			Section 2.2			Figures alternative text and other elements alternative text failed in accessibility check. Please consider adding alternative text as appropriate.	The PAC 2021 checker was use to verify the document passed the acessibilty requirements. We will insure that the final document passes both the Adobe Acrobat full check and PAC 2021 checker
25	All	Accessibility			Section 2.2		We noted 9 failures when reviewing the PDF submittal with the Adobe Acrobat accessibility full check. At a minimum, please ensure that the following document properties are satisfied. PDF documents must have a very good document title, the primary language must be set to English, and the primary view must be set to document		The PAC 2021 checker was use to verify the document passed the acessibilty requirements. We will insure that the final document passes both the Adobe Acrobat full check and PAC 2021 checker.

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Appendix E. 2023 San Antonio Regional Flood Plan Amended Projects

Task 12 – Actions Further Evaluated Summary Table

Task 12 – Methodologies and Procedures Memorandum

FMPs Summary Reports

FMEs Summary Reports

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Community	Flood Mitigation Action	HDR/Halff	FMP	FME	Notes
Bexar	Abbott Road and Graytown at Martinez Creek Study	HDR		x	Stayed an FME (need a more in-depth study)
Bexar	Abbott Road at Tributary A to Salitrillo Creek and at Salitrillo Creek Bridge	HDR	x		Moved FME to FMP
Bexar	Abbott Road at Unnamed Tributary 1 to Salitrillo Creek LWC Improvement	HDR	x		Moved FME to FMP
Bexar/Guadalupe County line	Bexar Bowling Way at Cibolo Creek Bridge	HDR	x		Moved FME to FMP
Bexar/Comal County line	Blanco Road at Cibolo Creek	Halff	x		Moved FME to FMP
Bexar/Kendal County line	Boerne Stage Road at Balcones Creek	Halff	x		Moved FME to FMP
City of Poth	Build Detention Pond	Halff			Removed - duplicate of Damage Center 1 Project 1 - Detention in East Branch Poth Creek
Guadalupe	Cibolo Creek Spill Study	HDR		x	Added (due to Task 12 analysis)
City of San Antonio	Concepcion	HDR	x		Stayed FMP - updated BCA
City of Poth	Damage Center 1 Project 1 – Detention in East Branch Poth Creek	Halff	x		Moved FME to FMP
City of Floresville	Damage Center 1: Project 1A, 1B, 1C	HDR	x		Moved FME to FMP
City of San Antonio	Damage Center 14- Airport Trib	Halff		x	To remain as FME
City of Poth	Damage Center 2- Project 2 Road connection from Mosspoint to Sunshine	Halff	x		Moved FME to FMP
City of Poth	Damage Center 2-Project 1 Culvert Improvements at Manchaca	Halff	x		Moved FME to FMP
City of San Antonio	Damage Center 38-Olmos Creek Lower Reach Near Montview	Halff		x	To remain as FME
City of San Antonio	Damage Center 39-Olmos Creek and Olmos Creek East Channel	Halff			Removed per City of San Antonio
City of San Antonio	Damage Center 40-San Antonio River DS Reach near Roosevelt	Halff		x	To remain as FME
City of San Antonio	Damage Center 44-San Antonio River Near Center Road	Halff			Removed per City of San Antonio
City of Shavano Park	De Zavala/ Ripple Creek	Halff - KFW	x		Added per City of Shavano Park
City of Shavano Park	Elm Spring	Halff - KFW	x		Added per City of Shavano Park
Bexar/Wilson County line	Felix Road at Dry Hollow Creek Barrier Arms	HDR	x		Moved FME to FMP

Community	Flood Mitigation Action	HDR/Halff	FMP	FME	Notes
City of Bulverde	FM 1863 at Cibolo Creek LWC	Halff		x	Stayed as FME 121000098 per Bexar County
Bexar County	FM1346 Crossing Upgrade Study	HDR		x	Added (due to Task 12 analysis)
Bexar	Freudenburg Road at Salitrillo Creek Barrier Arms	HDR	x		Moved FME to FMP
Bexar	Gass Road at Culebra Creek Tributary D Bridge	HDR	x		Moved FME to FMP
City of San Antonio	Huebner Creek Flood Protection Barrier	Halff			Removed per City of San Antonio
Bexar County	Live Oak at Salitrillo Creek Improvements	HDR		x	Stayed an FME (need a more in-depth study)
Von Ormy	Live Oak Slough Creek Improvements Study	HDR		x	Added per Von Ormy
Kendall/Bexar County line	LWC at Old Fredericksburg Rd and Balcones Creek	Halff	x		Moved FME to FMP
Von Ormy	North Benton City Road Improvements Study	HDR		x	Added per Von Ormy
Bexar/Atascosa County line	Old Frio City Road at North Prong Creek Bridge	HDR	x		Moved FME to FMP - Moved to R13 based on location
Von Ormy	Quintana Road Drainage Improvements Study	HDR		x	Added per Von Ormy
Von Ormy	South Evans Road Improvements Study	HDR		x	Added per Von Ormy
Bexar/Atascosa County line	Smith Road at Unnamed Trib 75 to Elm Creek	HDR			Removed - No issue present in existing conditions. Bexar Co instructed us to remove 3/23.
Bexar/Comal County line	Smithson Valley Road at Cibolo Creek	Halff			Removed - RFPG meeting 2/9 Dave W. said funding was acquired.
Von Ormy	South Benton City Road Improvements Study	HDR		x	Added per Von Ormy
Bexar/Comal County line	Specht/Obst Road at Cibolo Creek	Halff	x		Moved FME to FMP
Bexar/Kendal County line	Toutant Beauregard at Balcones Creek	Halff	x		Moved FME to FMP
Bexar/Guadalupe County lin	Trainer Hale at Cibolo Creek	Halff		x	Remain as FME

2023 San Antonio Regional Flood Plan Amended Projects Task 12 - Actions Further Evaluated Summary Table

Community	Flood Mitigation Action	HDR/Halff	FMP	FME	Notes
Bexar/Guadalupe County line	Ullrich Road at Cibolo Creek Barrier Arms	HDR	x		Moved FME to FMP
Wilson County	Wilson 10 - Acquisitions of Flooded Structures	HDR	x		Moved FME to FMP
City of Balcones Heights	Woodlawn Lawn Lake Option 1(Phase 1-3)	Halff			Removed existing FME 121000070; no longer feasible
City of Balcones Heights	Woodlawn Lawn Lake Option 1(Phase 1-3) or Option 2	Halff	x		Moved FME to FMP

Task 12 - Methodologies and Procedures Memorandum

2023 San Antonio Regional Flood Plan
Amended Projects

July 14, 2023

This report was released for review purposes only on July 14, 2023, by HDR Engineering, Inc., Texas Board of Professional Engineers, and Land Surveyors Registered Firm F-754, Texas Board of Professional Geoscientists Firm No. 50226.

It is not to be used for any other purpose.

7/14/2023
Ron Branyon, P.E.
HDR Engineering, Inc.

1 Background

As part of the amended 2023 San Antonio Regional Flood Plan (the Plan), Task 12 expands on previously identified projects from the Plan dated January 10th, 2023. HDR Engineering, Inc. (HDR) advanced Flood Mitigation Projects (FMPs) for several communities within the San Antonio flood planning region. This analysis was done to provide data for the 2023 San Antonio Regional Flood Plan concerning potential FMPs to be recommended in the 2023 Plan.

This memorandum documents the assumptions, methodologies and processes used to advance the FMP in accordance with the Texas Water Development Board (TWDB) Exhibit C Technical Guidelines for Regional Flood Planning FMPs.

2 TWDB Requirements

The TWDB FMP requirements include the following components and are discussed later in this document –

- Hydrologic and Hydraulic (H&H) Modeling
- Impact Analysis
- Costs Estimates
- Benefit Cost Analysis (BCA)

Table 1 summarizes the type of work completed for each recommended FMPs to meet the TWDB requirements. Additional supporting documentation for each FMP are located in the digital submittal of the Plan including Summary Sheets, Narratives, Cost Estimates, and Exhibits.

Table 1: Task 12 Work Completed Per Project

Project	Task 12 Work			
	H&H Modeling	Cost Estimate	Impact Analysis	BCA
Abbott Road at Tributary A to Salitrillo Creek and at Salitrillo Creek Bridge	✓	✓	✓	✓
Abbott Road at Unnamed Tributary 1 to Salitrillo Creek LWC Improvement	✓	✓	✓	✓
Bexar Bowling Way at Cibolo Creek Bridge	✓	✓	✓	✓
Blanco Road at Cibolo Creek	✓	✓	✓	✓
Boerne Stage Road at Balcones Creek	✓	✓	✓	✓
Concepcion				✓
Damage Center 1: Project 1A, B, C		✓	✓	✓
Damage Center 1 – Project 1 – Detention in East Branch Poth Creek	✓	✓	✓	✓

Damage Center 2 – Project 1 Culvert Improvements at Manchaca	✓	✓	✓	✓
Damage Center 2- Project 2 Road connection from Mosspoint to Sunshine	✓	✓		✓
De Zavala/ Ripple Creek				✓
Elm Spring				✓
Felix Road at Dry Hollow Creek Barrier Arms	✓	✓		✓
Freudenburg Road at Salitrillo Creek Barrier Arms	✓	✓		✓
Gass Road at Culebra Creek Tributary D Bridge	✓	✓	✓	✓
LWC at Old Fredericksburg Rd and Balcones Creek	✓	✓	✓	✓
Old Frio City Road at North Prong Creek Bridge	✓	✓	✓	✓
Specht/Obst Road at Cibolo Creek	✓	✓	✓	✓
Toutant Beauregard at Balcones Creek	✓	✓	✓	✓
Ullrich Road at Cibolo Creek Barrier Arms		✓		✓
Wilson 10 - Acquisitions of Flooded Structures	✓	✓	✓	✓
Woodlawn Lake Option 2	✓		✓	✓

3 Data Collection

Data used in the FMP evaluation included previously collected information under Task 4B, as well as additional data collected from other sources.

Previous community engagement and data collection efforts are documented in the Plan under Chapter 5 - *Identification and Evaluation of Potential Flood Management Evaluations and Potentially Feasible Flood Management Strategies and Flood Mitigation Projects* and Chapter 10 - *Public Participation and Adoption of Plan*. Previously collected data can also be found in the digital submittal of the Plan.

Data gathered from other sources are summarized below. All data were obtained as digital files.

- San Antonio River Authority (SARA) Digital Data and Model Repository (D2MR) website – the SARA D2MR serves as a centralized location for the storage, management, and dissemination of H&H models and data related to the Federal Emergency Management Agency (FEMA) Digital Flood Insurance Rate Maps (DFIRM) and subsequent updates. Most of the H&H models found on the D2MR website use Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS) and Hydrologic Engineering Center River Analysis System (HEC-RAS) software. The models collected from this source are summarized below.
- Texas Natural Resources Information System (TNRIS) – United States Geological Survey (USGS) 1-meter resolution 2018 and 2019 LiDAR-based digital elevation models (DEMs)

- TWDB – 2021 Texas Buildings with Social Vulnerability Index (SVI) and Estimated Population (TWDB, Centers for Disease Control and Prevention [CDC], Oak Ridge National Laboratory [ORNL])

Table 2 summarizes the hydraulic and hydrologic models collected for the Task 12 FMPs.

Table 2: Data Sources Per Project

Project	FEMA Effective Model*			Other Source	
	HEC-HMS	HEC-RAS	Other	Modeling Software	Notes
Abbott Road at Tributary A to Salitrillo Creek and at Salitrillo Creek Bridge	✓	✓			
Abbott Road at Unnamed Tributary 1 to Salitrillo Creek LWC Improvement	✓	✓			
Bexar Bowling Way at Cibolo Creek Bridge	✓	✓			
Blanco Road at Cibolo Creek		✓			
Boerne Stage Road at Balcones Creek		✓			
Concepcion				XPSWMM	City of San Antonio
Damage Center 1: Project 1A, B, C				HEC-HMS HEC-RAS	San Antonio River Authority
Damage Center 1 – Project 1 – Detention in East Branch Poth Creek	✓	✓			
Damage Center 2 – Project 1 Culvert Improvements at Manchaca	✓	✓			
Damage Center 2- Project 2 Road connection from Mosspoint to Sunshine	✓	✓			
De Zavala/ Ripple Creek				XPStorm	City of Shavano Park
Elm Spring				XPStorm	City of Shavano Park
Felix Road at Dry Hollow Creek Barrier Arms	✓	✓			
Freudenburg Road at Salitrillo Creek Barrier Arms	✓	✓			
Gass Road at Culebra Creek Tributary D Bridge	✓	✓			
LWC at Old Fredericksburg Rd and Balcones Creek		✓			
Old Frio City Road at North Prong Creek Bridge	✓	✓			
Specht/Obst Road at Cibolo Creek		✓			
Toutant Beauregard at Balcones Creek		✓			
Ullrich Road at Cibolo Creek Barrier Arms	✓	✓			

Wilson 10 - Acquisitions of Flooded Structures					N/A for type for FMP
Woodlawn Lake Option 2				XPSWMM	From City of San Antonio

*Please refer to the Flood Insurance Study (FIS) reports for discussions on the following topics: General Study Information, Terrain Data, Land Cover, Rainfall, Hydrologic Methodologies, Hydraulic Methodologies

4 Hydrologic and Hydraulic Modeling

4.1 Hydrologic Modeling

In most cases, hydrologic models collected for the Task 12 FMP evaluation were used without modification. These models were unmodified because they met the TWDB hydrologic model criteria and are considered best available. Two FMP hydrologic models were updated as described below.

Poth Creek

The hydrologic model named Poth Creek was updated to account for precipitation changes. Updates were made to the 10-, 25-, 50- and 100- year frequency storm events for the Meteorological Models in HEC-HMS using NOAA Atlas 14 precipitation frequency estimates for Poth, Texas. The Poth Creek hydrology model is used for Damage Center 2-Project 1 Culvert Improvements at Manchaca.

East Branch Poth Creek

The hydrologic model named East Branch Poth Creek was updated to account for precipitation changes. Updates were made to the 10-, 25-, 50- and 100- year frequency storm events for the Meteorological Models in HEC-HMS using NOAA Atlas 14 precipitation frequency estimates for Poth, Texas. The East Branch Poth Creek hydrology model is for the Damage Center 1 – Project 1 – Detention in East Branch Poth Creek project. A proposed Basin Model was created to analyze impacts of the proposed detention pond on East Branch Poth Creek.

4.2 Hydraulic Modeling

Hydraulic models collected for Task 12 were used to evaluate baseline and proposed hydraulic conditions. These models were modified to conduct the drainage analysis and help with the other requirements (Impact Analysis and BCA). Updates for these models included:

- Adding, adjusting, or extending cross sections for more creek definition,
- Adjusting/extending the center line,
- Adding terrain, and
- Refining the Manning's values

In addition, HDR developed a new hydraulic model to study FMP impacts as described below.

Abbott Road at Salitrillo Creek and at Tributary A to Salitrillo Creek

The floodplains of Tributary A to Salitrillo Creek (Trib A) and Salitrillo Creek converge at Abbott Road where they are assumed to share the same water surface elevation (WSE). In the effective models both streams are modeled separately, which may result in an underestimation of flows crossing Abbott Road. To better evaluate the crossing conveyance capacity and assess potential improvements a new 1D model was created that includes flows for both creek segments as they cross Abbott Road.

5 Impact Analysis

An FMP is required to have no negative impacts in the neighboring area, either upstream or downstream of the project. No negative impact means that a project will not increase flood risk of surrounding properties. The increase in flood risk must be measured by the 100-year frequency storm water surface elevation and peak discharge using the best available data. No rise in water surface elevation or discharge is permissible, and the study area must be sufficiently large to demonstrate that proposed project conditions are equal to or less than the existing (baseline) conditions.

For the purposes of regional flood planning efforts, a determination of no negative impacts can be established if stormwater runoff does not increase inundation of infrastructure such as residential and commercial structures or exceed the design capacity of stormwater systems. According to the TWDB Exhibit C Technical Guidelines, all of the following requirements should be met to establish no negative impact, as applicable:

1. Stormwater does not increase inundation in areas beyond the public right-of-way, project property, or easement.

2. Stormwater does not increase inundation of storm drainage networks, channels, and roadways beyond design capacity.

3. Maximum increase of 1D Water Surface Elevation must round to 0.0 feet (<0.05 ft) measured along the hydraulic cross-section.

4. Maximum increase of 2D Water Surface Elevations must round to 0.3 feet (<0.35 ft) measured at each computation cell.

5. Maximum increase in hydrologic peak discharge must be <0.5 percent measured at computation nodes (sub-basins, junctions, reaches, reservoirs, etc.). This discharge restriction does not apply to a 2D overland analysis.

If the analysis was performed using 1D modeling software, requirements #1, #2, and #3 are applicable. If the analysis was performed using a 2D modeling software, requirements #1, #2, and #4 are applicable. Please refer to the project Narratives for specific reported numbers to support these requirements.

6 Cost Estimate

Estimated project costs for all FMPs were calculated using 2020 prices. The cost estimates contain all the required applicable TWDB FMP costs including basic engineering fees, special services such as surveying, environmental, and geotech, other

costs such as land/easement acquisition and administration, fiscal services, and contingency. The following assumptions were applied in estimating costs:

- Design – Design costs were estimated using the City of San Antonio 2020 Planning Studies fee table. Depending on estimated construction costs, the design fee percentage ranges between 9.5% to 20%.
- Engineering Contingency – Estimated as 10% of the estimated construction costs.
- Environmental, Archaeological, and Historical Resources – Estimated as $10,000.
- Permit Requirements Costs – Estimated as $8,000.
- Material Testing – Estimated as 1.5% or 2% of the estimated construction costs for projects with construction costs greater than $3M or less than $3M, respectively.
- Construction Contingency – Estimated as 10% of the estimated construction costs.

Utility relocation costs were not included in the FMP cost estimation, so estimated costs may increase if utility relocations are found to be required during later project design phases. For a detailed cost breakdown of each FMP, refer to the project's Cost Summary Sheet in the digital submittal of the Plan.

7 Benefit Cost Analysis

Per the TWDB, each FMP included in the Plan is required to have a benefit cost analysis (BCA) performed. Some flood mitigation studies document a computed benefit cost ratio (BCR) and those can be incorporated into the Plan. For situations where a BCR is not available for a project, TWDB has developed the BCA Input Tool to facilitate the calculation of costs and benefits. The tool estimates flood impacts before and after implementation of the FMP for up to three recurrence interval flood events. Impacts that could be evaluated include impacts to residential buildings, commercial structures, street flooding, low water crossing (LWC) ponding, and recreational benefits.

In addition to the TWDB tool assumptions, the following section describes other assumptions which were applied during the BCA.

7.1 BCA Cost

The 2023 estimated total costs were used in the BCA. A Construction Cost Index (CCI) factor 1.14 was applied to convert the costs from 2020 to 2023 dollars. Costs were input as noted in the FMP reporting tables.

7.2 Construction Year

Construction is assumed to start in the near future, dependent on funding and the community. The construction year start and end dates are set per project and can be found in the BCA in the digital submittal of the Plan.

7.3 Residential

Residential structures are evaluated by the size and amount flooded for the existing (baseline) and proposed project conditions. Based on the BCA Input Tool, size

categories for residential structures are designated as “Small Home” (1000 sq. ft.), “Average Home” (2,500 sq. ft.), and “Large Home” (5,000 sq. ft.). For the analysis, the following refinements to the BCA size assumptions were made:

- Small: x <2500 sq.ft.
- Average: 2500 sq.ft.< x <5000 sq.ft.
- Large: x >5000 sq.ft.

The TWDB tool limits the total amount of residential buildings that can be assessed per project to 100 structures. For some projects, more than 100 structures were impacted. Instead of looking at each individual structure’s damages for existing (baseline) and proposed conditions, the total amount of impacted structures within the same size categories and inundation depths (rounded to the nearest inch) were totaled per analyzed flood event.

7.4 Commercial

Commercial building damages are determined by business type and size (square footage). Due to limited available data on commercial building types, all commercial buildings were assumed to be of “Retail-Clothing” type since this type is closest in “damages per sq.ft.” to the average “damages per sq.ft.” value of all BCA commercial types. To calculate building damages from flood depth data, inundation depths were rounded to the nearest inch.

7.5 Flooded Streets

Streets are considered impassable if the flood depth is above 6 inches. The daily traffic count was estimated based on the TxDOT daily traffic count or the nearest adjacent road, as provided by the TxDOT TPP District Traffic Web Viewer (https://txdot.maps.arcgis.com/apps/webappviewer/index.html?id=06fea0307dda42c1976194bf5a98b3a1). The additional time that the longest detour takes for an individual is calculated assuming a speed limit of 35 miles per hour (mph). The Normal Emergency Medical Services (EMS) response time for both existing (baseline) and proposed conditions is assumed to be 14.5 minutes, based on the rural mean value from Table 2 of the NIH JAMA Surgery study (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5831456/). The EMS response time during a storm event is assumed to double for existing (baseline) conditions compared to the normal response time. For proposed conditions, the EMS response time is scaled to match the difference between detour routes (existing [baseline] and post-project). The number of households impacted by EMS delay due to flooded streets is assumed to be equal to the total number of residential buildings inundated during the given storm event. Similarly, the number of commercial buildings impacted by EMS delay due to flooded streets is assumed to be the total number of commercial buildings inundated during the given storm event.

7.6 Low water crossings

Low water crossings (LWC) are considered impassable if the flood depth is above 6 inches. Projects with LWC benefits are also assumed to have Flooded Streets benefits, both of these benefits were considered in the BCA. LWC benefits are based on reduced

rescues/injuries/fatalities associated with people attempting to cross, whereas Flooded Streets benefits are based on reduced detours.

If there are multiple LWCs in a project that are all in close proximity to one another, it was assumed to evaluate the benefits as one LWC. Aggregate all costs and all benefits to compute one BCA for the multiple LWCs for flood planning purposes.

7.7 Acquisitions and Raising Elevations

Some proposed projects include residential and commercial structures be bought out or raised out of the floodplain by raising the finished floor elevations (FFE) of the structure. To calculate the BCR, pre-calculated benefits were assumed based on the FEMA memorandum with subject titled “Update to ‘Cost-Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas Using Pre-Calculated Benefits”. According to this memorandum, the pre-calculated benefits of acquisitions and elevations are:

- Acquisitions: $323,000 per structure
- Elevations: $205,000 per structure

7.8 Benefit Result

The BCA Input Tool is intended to be used in conjunction with the FEMA BCA Toolkit 6.0, which calculates annual benefits from the information compiled in the TWDB BCA Input Tool. The annual benefits data are then entered back into the TWDB BCA Input Tool to compute the resulting BCR for the project. The results table summarizes the impacts as well as the estimated BCR for each FMP per flood event. FMP BCA results are provided in the digital submittal of the Plan.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Abbott Road at Tributary A to Salitrillo Creek and at Salitrillo Creek Bridge

FMP ID: 123000053

Project Sponsor: Bexar County

Project Source: 2022 Bexar County Drainage Needs

Cost Information

Category	Cost*
Design	$748,247
Real Estate	$0
Environmental	$30,000
Construction	$4,689,635
Total Cost**	**$5,468,000**

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

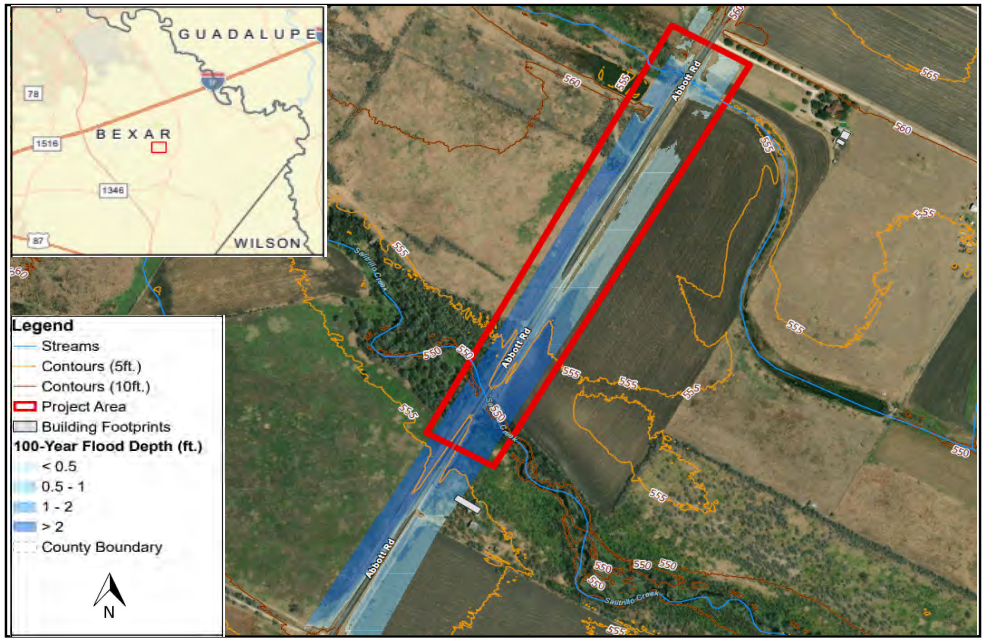
Event Damages	Baseline	Project
10-year storm	$154,238	-
25-year storm	$231,357	-
100-year storm	$223,628	-
Total Benefits	**$ 253,070**	
BCA	**0.05**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Critical	-	-	-
Flooded Roads (miles)	0.3	0.3	0.3
Others Note	N/A	N/A	N/A
SVI Score			0.280

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	50-Yr Depth Over Road (ft)	100-Yr Depth Over Road (ft)
Existing	< 10-Yr	3.2 ft	3.4 ft
Proposed	50-Yr	0 ft	0.3 ft



Project Description:

This project will eliminate overtopping of Abbott Road and provide 50-year conveyance design, removing structures from the existing conditions floodplain extents. Proposed improvements consist of channel regrading, increasing the road elevation, upgrading culverts, and adding a bridge. The proposed road profile will increase 3ft from existing. The existing six 24" RCP will be replaced with three 5ft x 2ft culverts and the four 48" RCP will be replaced with a 300ft wide bridge with a 5.5ft high opening. Salitrillo Creek is a stream on an inventory that will require a mussel survey based on requirements by TPWD, an additional cost of $20K was added to account for this.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Abbott Road at Unnamed Tributary 1 to Salitrillo Creek LWC Improvement

FMP ID: 123000054

Project Sponsor: Bexar County

Project Source: 2022 Bexar County Drainage Needs

Cost Information

Category	Cost*
Design	$121,440
Real Estate	$0
Environmental	$10,000
Construction	$607,908
Total Cost**	**$740,000**

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 112,943	$ -
25-year storm	$ 169,415	$ -
100-year storm	$ 254,122	$ -
Total Benefits	**$ 211,773**	
BCA	**0.3**	

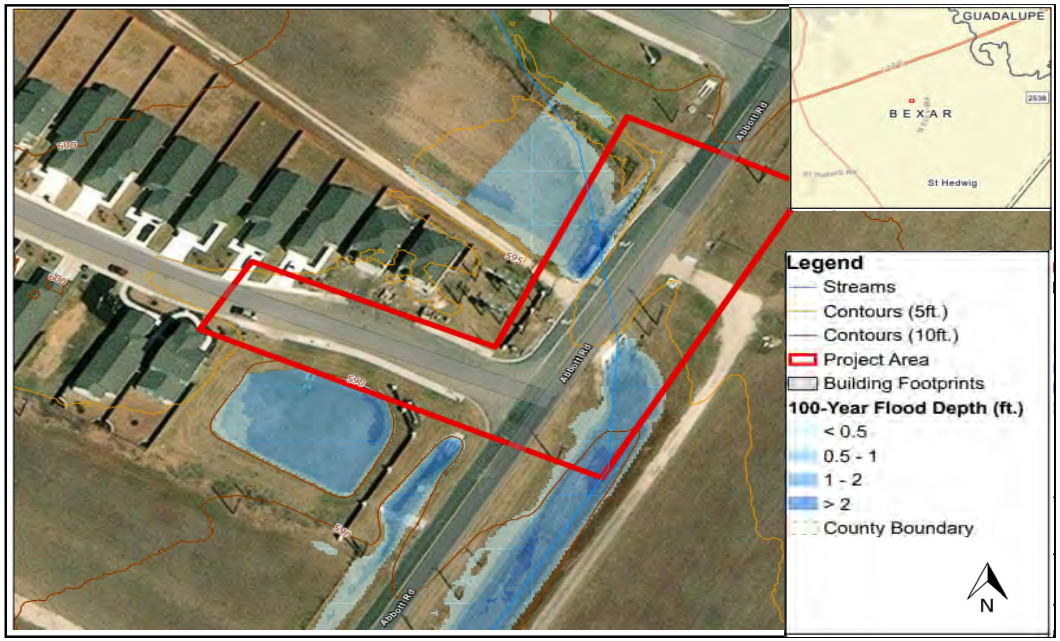
*Costs are using 2020 prices
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Road (miles)	0.25	0.25	0.25
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.2803

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over
Existing	< 10-Yr	2.1 ft
Proposed	100-Yr	0 ft



Project Description:

This project will eliminate overtopping of Abbott Road and provide 100-year conveyance design, removing structures from the existing conditions floodplain extents. Proposed improvements consist of channel regrading and culvert upgrades. The existing two 36” RCP will be replaced by three 10ft x 3ft reinforced concrete boxes.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Bexar Bowling Way at Cibolo Creek Bridge

FMP ID: 123000055

Project Sponsor: Bexar County and Guadalupe County

Project Source: 2022 Bexar County Drainage Needs

Cost Information

Category	Cost*
Design	$1,711,296
Real Estate	$0
Environmental	$30,000
Construction	$11,510,150
Total Cost**	**$13,252,000**

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 34,370	$ -
25-year storm	$ 51,554	$ -
100-year storm	$ 68,739	$ -
Total Benefits	**$ 69,900**	
BCA	**$ 0.01**	

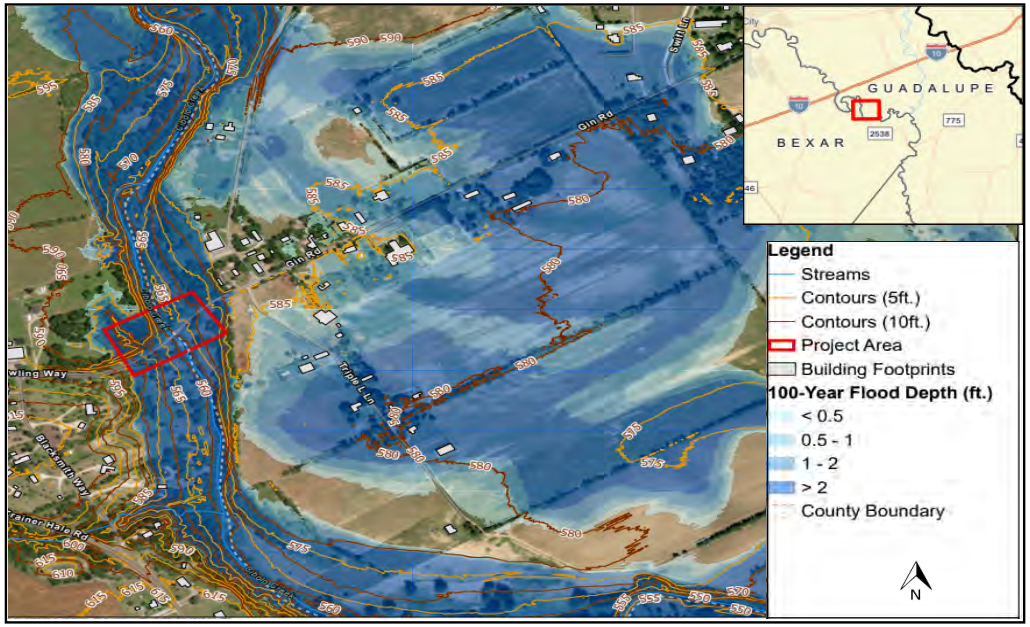
*Costs are using 2020 prices
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Critical	-	-	-
Flooded Road(miles)	0.25	0.25	0.25
Others Note	N/A	N/A	N/A
SVI Score			0.2696

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 10-Yr	22ft
Proposed	100-Yr	0



Project Description:

This project will eliminate overtopping of Bexar Bowling Way and provide conveyance for the 100-year storm event, removing the crossing from the existing conditions 100-year floodplain. Proposed improvements consist of removing the existing culvert and adding a bridge. The existing eight 27" corrugated metal pipes will be replaced with an 800ft bridge with a 25ft high opening. Cibolo Creek is a stream that will require a mussel survey based on requirements by TPWD, an additional $20K cost was added to account for this.

The project is on the border of Bexar and Guadalupe County, these counties will need to coordinate on cost and construction phasing.

During the analysis of crossings at Bexar Bowling Way and Ullrich Road at Cibolo Creek, it was determined that a 2D hydraulic study flood study would be needed to evaluate spill flow from the creek.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Blanco Road at Cibolo Creek

FMP ID: 123000036

Project Sponsor: Bexar County/Comal County

Project Source: Bexar County

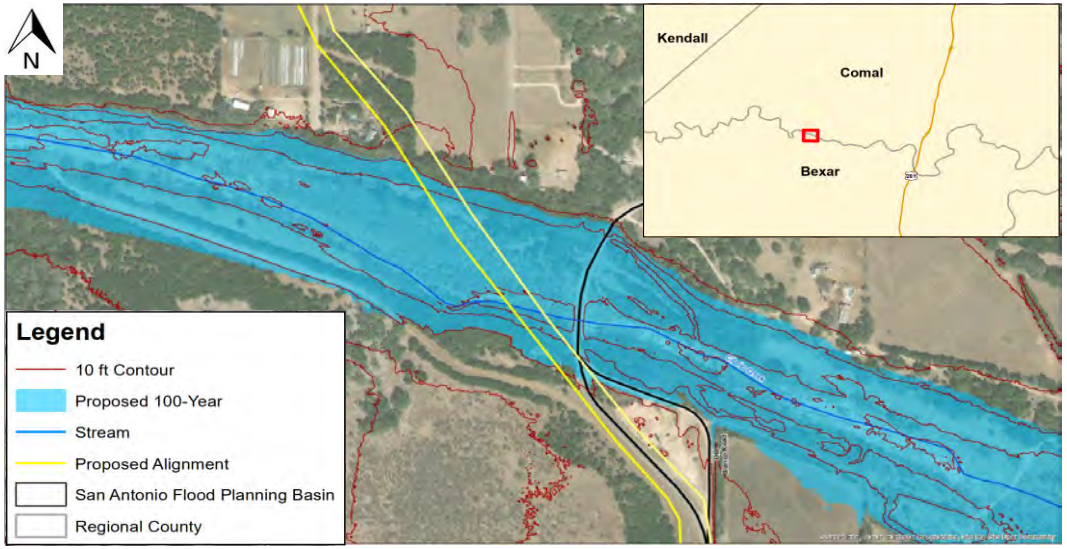
Cost Information

Category	Cost*
Design	$2,871,815
Real Estate	$126,054
Environmental	$10,000
Construction	$18,709,033
Total Cost**	**$21,717,000**

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 1,082,941	$ -
50-year storm	$ 1,285,885	$ -
100-year storm	$ 1,615,172	$ -
Total Benefits	**$ 1,560,152**	
BCA	**0.1**	



Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	50-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.111	0.129	0.143
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.20

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 10-Yr	16
Proposed	100-Yr	0

Project Description:

The low water crossing of Blanco Road at Cibolo Creek along the Bexar/Comal County line is undersized and results in it being overtopped during the 2-year storm event. The existing structure consists of 4 corrugated metal pipe culverts. The 100-year storm event overtops Blanco Road by a max depth of 16 ft. When the structure overtops, it cuts off the main route for the nearby neighborhood. The proposed project at Blanco Road and Cibolo Creek is designed to convey the 100-year storm event by completely replacing the existing culvert system with a 550 ft long by 144 ft wide bridge. The proposed bridge will require increasing the road elevation by 20 ft above the existing road elevation. The future expansion of Blanco Road will require roadway realignment and the bridge is intended to align with future expansion plans for Blanco Road by Comal and Bexar County. While a final alignment has not been determined, this study makes assumptions on bridge alignment and property acquisition that would accommodate the future roadway project. The design removes the roadway/bridge from Cibolo Creek's floodplain, which provides access to a main road. The project location is also adjacent to the Air Force Base property "Camp Bullis", a critical facility.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Boerne Stage Road at Balcones Creek

FMP ID: 123000038

Project Sponsor: Kendall County (borders with Bexar County)

Project Source: Kendall County (borders with Bexar County)

Cost Information

Category	Cost*
Design	$833,545
Real Estate	$493,470
Environmental	$10,000
Construction	$4,517,301
Total Cost**	**$5,855,000**

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 376,840	$ -
Total Benefits	**$ 467,622**	
BCA	**0.1**	

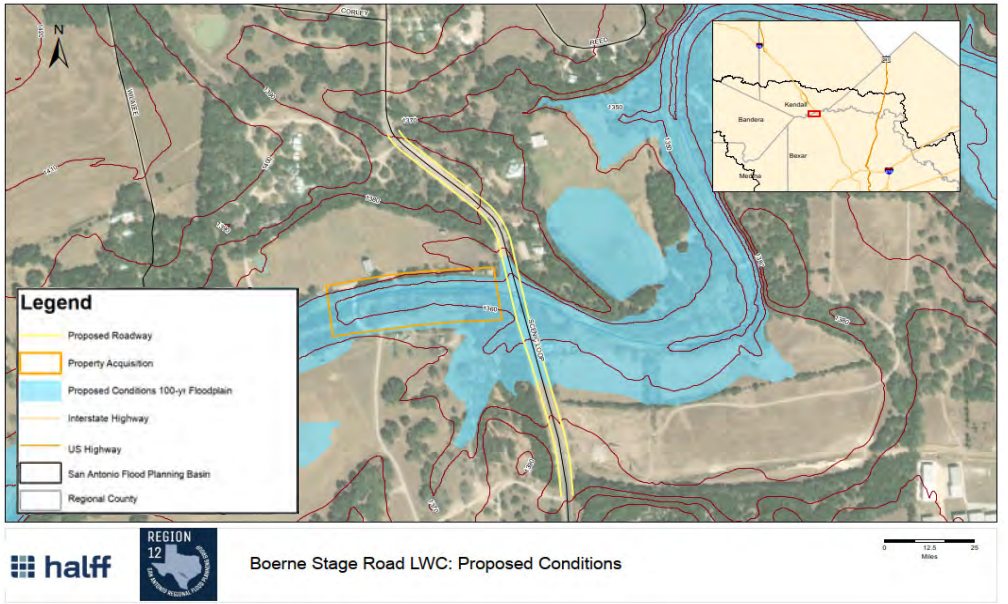
* Costs use September 2020 pricing
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	50-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.083	-	-
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.35

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	10-Yr Depth Over Road (ft)
Existing	< 10-Yr	6.7
Proposed	10-Yr	0



Project Description:

At the Boerne Stage Road crossing with Balcones Creek, the road is overtopped by the 10-year flood event at a maximum depth of 6.5 ft. The length of roadway flooded is approximately 0.13 miles. The proposed project is a bridge that will raise the roadway over the low water crossing at the intersection of Balcones Creek and Boerne Stage Road. The proposed bridge will convey the 10-year flood event and lower the depth of water overtopping the roadway for larger flood events. Due to right of way and topography constraints, the 100-year design was not considered for this proposed improvement. The proposed roadway and bridge alignment will straighten the sharp curves that currently exist in Boerne Stage Road within the proximity of the Balcones Creek crossing. The proposed bridge will be approximately 280' in length with an elevated roadway approach of 250' that ties into the existing road. In addition, the project will remove 2 inline structures directly upstream of the proposed structure, which will require property access or acquisition. A flood beacon will be installed for safety at higher flood events. For this study, the most conservative estimate assumes acquisition for a public right of way easement. This project is located at the Kendall County/Bexar County line.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Damage Center 1: Project 1A, B, C

FMP ID: 123000056

Project Sponsor: Floresville

Project Source: 2012 Wilson County Watershed Master Plan

Cost Information

Category	Cost*
Design	$1,082,552
Real Estate	$287,334
Environmental	$10,000
Construction	$2,928,368
Total Cost**	**$4,309,000**

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 1,374,634	$ 948,149
50-year storm	$ 2,360,181	$ 1,672,657
100-year storm	$ 6,189,177	$ 2,083,814
Total Benefits	**$ 1,354,496**	
BCA	**0.3**	

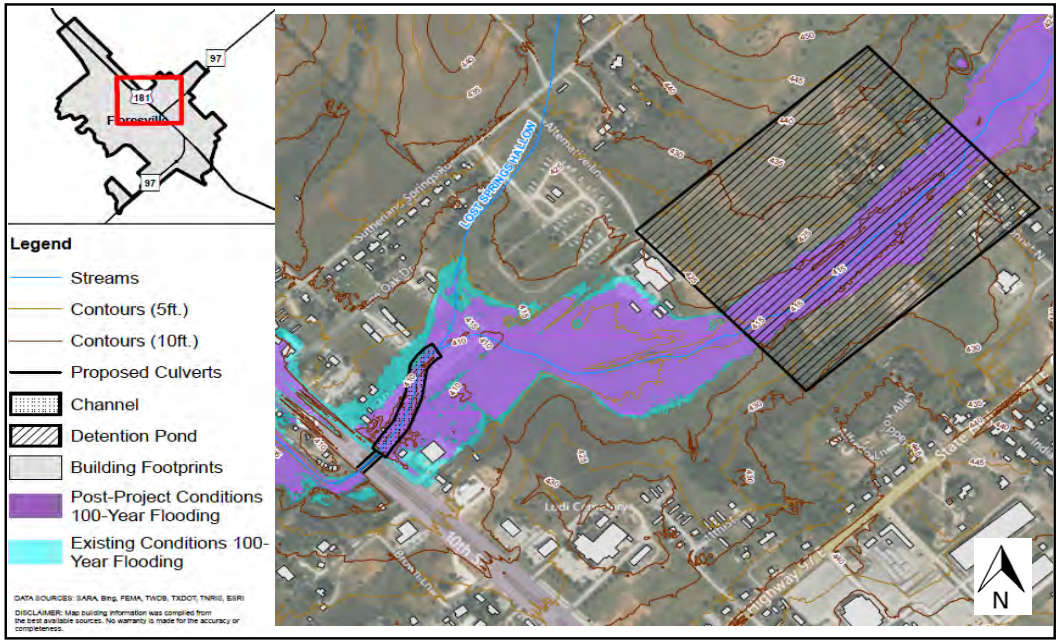
*Costs Adjusted from 2012 to 2020 using CCI
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	50-year	100-year
Residential	4	6	6
Commercial	5	3	4
Critical	-	-	1
Road (miles)	-	-	0.25
Others Note	N/A	N/A	N/A
SVI Score			0.84

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 100-Yr	0.4 ft
Proposed	100-Yr	0 ft



Project Description:

Detention pond, channel improvements, and additional culverts are required to reduce the downstream flooding, aid in removing the majority of the existing structures from the FEMA floodplain and convey the 100-Yr flow. The proposed detention pond will be located along Lodi Branch north of Haddox Alley and store approximately 60-acres-ft. The proposed channel improvements run along Lodi Branch, from the confluence with Lost Springs Hallow to US Highway 181. The proposed channel will be 1,200ft long with a bottom width of 100ft. Currently there are nine 4-ft by 7-ft culverts under Highway 181, this project proposes to add three additional 4-ft by 7-ft. A USACE 404 permit and a TxDOT ROW Permit will be required.
The cost estimate for landscaping was increased to 10% to allow for potential water quality components.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Damage Center 1 Project 1 – Detention in East Branch Poth Creek

FMP ID: 123000029

Project Sponsor: City of Poth

Project Source: 2012 Wilson County Watershed Master Plan (San Antonio River Authority)

Cost Information

Category	Cost*
Design	$270,224
Real Estate	$724,998
Environmental	$30,000
Construction	$889,348
Total Cost**	**$1,915,000**

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

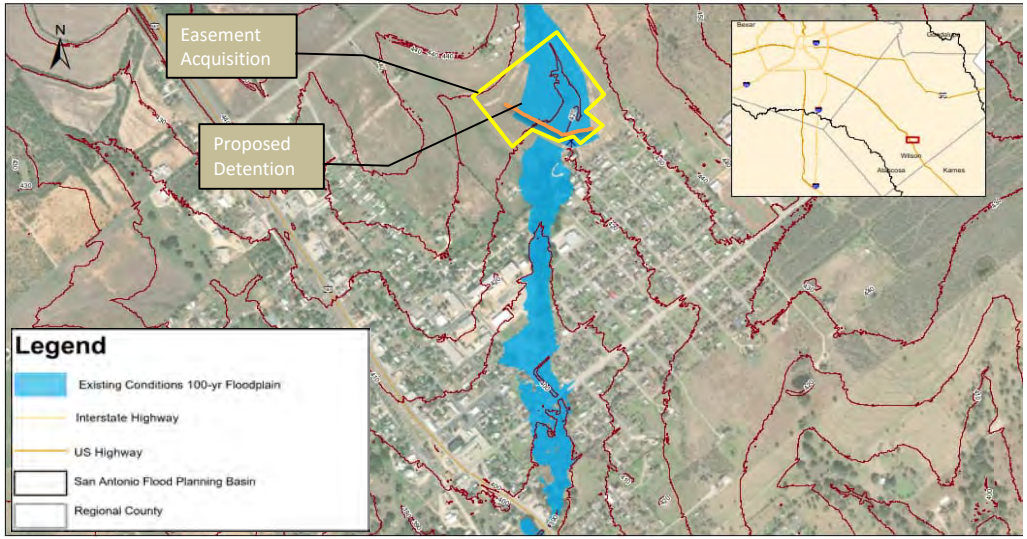
Event Damages	Baseline	Project
10-year storm	$ 2,125,754	$ -
25-year storm	$ 3,160,196	$ 2,092,187
100-year storm	$ 3,766,602	$ 2,598,603
Total Benefits	**$ 2,558,946**	
BCA	**1.6**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	2	6	9
Commercial	-	-	-
Flooded Roads (miles)	0	0.02	0.026
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.36

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	50-Yr Depth Over Road (ft)
Existing	25-Yr	0.6
Proposed	50-Yr	0



Project Description:

The problem area is in Wilson County in the City of Poth. The 2012 Master Plan explored detention as an alternative for relieving property and infrastructure flooding throughout the City of Poth. The proposed detention pond will be located along East Branch of Poth Creek upstream of the intersection of Eschenburg Street and Welhausen Street. While the Master Plan proposed a 27-acre pond, based on topography and the location of several structures, the updated analysis included a 17-acre pond. The detention pond could hold 52 ac-ft of water and reduce flows by 400 cfs. The proposed improvements will reduce the depth of flooding for several structures and improve access at US Highway 181 for the 50-year flood event. This project will require acquisition of inundation easements for the area of impoundment and property acquisition for the detention ponds berm.

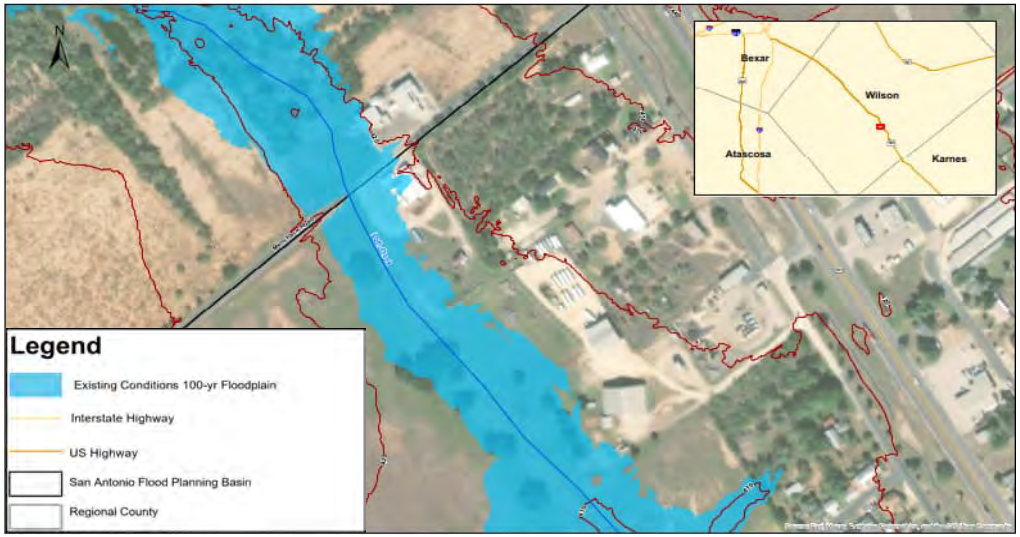
2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Damage Center 2-Project 1 Culvert Improvements at Menchaca

FMP ID: 123000030

Project Sponsor: City of Poth

Project Source: 2012 Wilson County Watershed Master Plan (San Antonio River Authority)



Cost Information

Category	Cost*
Design	$367,872
Real Estate	$0
Environmental	$10,000
Construction	$1,825,973
Total Cost**	**$2,204,000**

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$390,698	-
25-year storm	$468,852	-
100-year storm	$520,947	-
Total Benefits	**$550,850**	-
BCA	**0.3**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.0275	0.044	0.0465
Critical	-	-	-
Others Note	N/A	N/A	**N/A**
SVI Score			0.36

LWC Level of Service Existing vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 10-Yr	2 ft
Proposed	100-Yr	0

Project Description:

The existing crossing at Menchaca (County Road 220) consists of one 3 ft by 5 ft box culvert. This box culvert is unable to pass the 10 year flood event without significant overtopping. Results of the hydraulic analysis indicate that flooding for up to the 100-year flood event could be alleviated by the addition of a 250 ft long bridge. Improving this crossing would provide emergency access to the areas of Poth west of Poth Creek and allow the school district to utilize their property more effectively. Citizens would also have a safe route to the existing schools and town center.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Damage Center 2- Project 2 Road connection from Mosspoint to Sunshine

FMP ID: 121000051

Project Sponsor: City of Poth

Project Source: 2012 Wilson County Watershed Master Plan

Cost Information

Category	Cost*
Design	$202,508
Real Estate	$76,050
Environmental	$10,000
Construction	$1,100,245
Total Cost**	**$1,389,000**

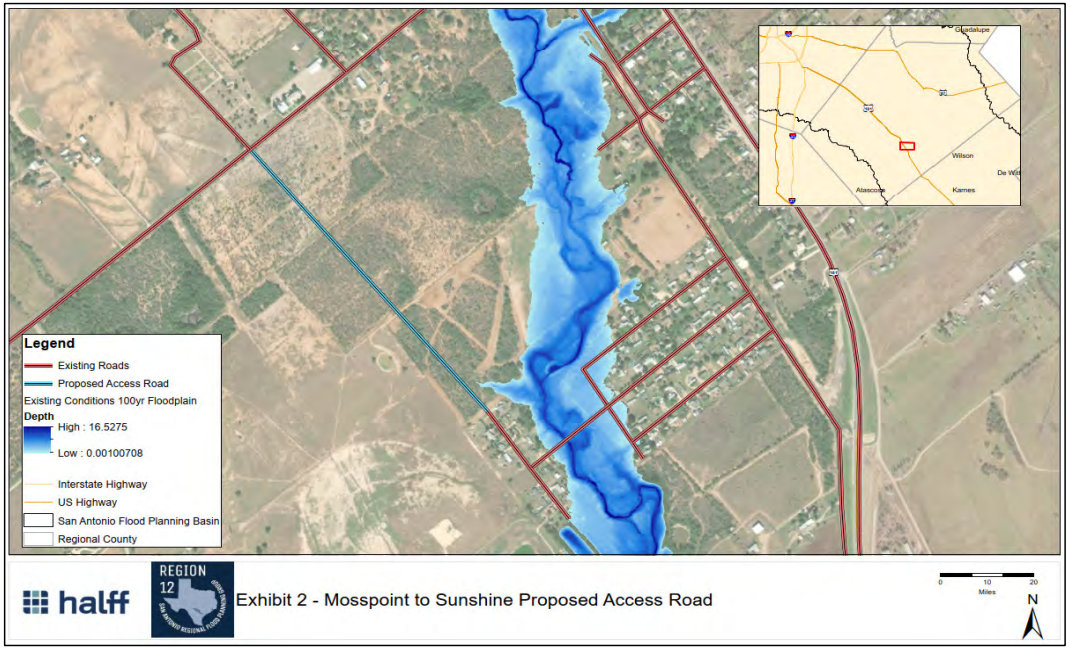
Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 3,920	$ -
50-year storm	$ 3,924	$ -
100-year storm	$ 3,928	$ -
Total Benifits	**$ 4,864**	
BCA	**0.02**	

* Cost set to September 2020 values
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	50-year	100-year
Residential			
Commercial			
Critical	-	-	-
Road (miles)	0.09	0.11	0.14
Others Note			
SVI Score			0.36



Project Description:

Residents along Moss Point Street in Poth, Texas to no have a safe route of travel for evacuation during a flood event. In addtion, emergency vehicles are unable to access the area, cutting off police, fire and EMS. At Moss Point Drive, the only outlet, Oakland Street, becomes overtopped starting at the 10-year flood event and flood waters cover up to 0.09 miles of Oakland Street at depths of up to 3 feet. This project will provide unflooded access from Moss Point Street to Sunshine Drive. Adding a new roadway from the dead end of Moss Point, north towards FM 541 at Sunshine Dr, will provide safe access in the event of a 100-year flood. Under current conditions, they will remain trapped during the 10-year, 50-year, 100-year flood events. In addition to safe passage for residents, this additional access will allow emergency vehicles to access the are during a flood event. The proposed access road will be approximately 3000 feet in length with a width of 28 feet that will tie to both FM 541 and Sunshine Drive.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: DeZavala/Ripple Creek

FMP ID: 123000035

Project Sponsor: City of Shavano Park

Project Source: 2020 Preliminary Engineering Report

Cost Information

Category	Cost*
Design	$280,861.58
Real Estate	$0.00
Environmental	$10,000.00
Construction	$1,496,394.73
Total Cost**	**$1,788,000.00**

*Costs Adjusted using CCI

**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
25-year storm	$ 420,818	$ 297,492.00
100-year storm	$ 140,032	$ 126,140.00
Total Benefits	**$ 31,577**	
BCA	**0.0**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	25-year	100-year	
Residential	4.00	1.00	
Commercial			
Critical			
Road (miles)	0.10	0.11	
Others Note			
SVI Score		0.01	

Project Description:

Currently a significant amount of runoff collects in a low spot along De Zavala Rd, northeast of Ripple Creek Rd. This pooled up storm water is then conveyed through a natural low which traverses behind almost two dozen homes towards Olmos Creek subjecting at least nine homes to varying degrees of flooding. The natural channel also crosses Ripple Creek Rd, rendering the roadway unnavigable by nearby residents during any storm event and relegating residents to alternative access points.

This project proposes an underground storm drain system that intercepts much of the runoff from the low at De Zavala Rd through a 4-way inlet and conveys it southwest towards an existing culvert crossing on De Zavala Rd where it then discharges into Olmos Creek.

This design is anticipated to remove a significant stretch of De Zavala Rd from the floodplain as well as at least one home from both the 25-year and 100-year floodplains.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Elm Spring

FMP ID: 123000034

Project Sponsor: City of Shavano Park

Project Source: Shavano Park Preliminary Engineering Report'

Cost Information

Category		Cost*
Design		$340,048.99
Real Estate		$0.00
Environmental		$10,000.00
Construction	$	1,679,059.39
Total Cost**	**$**	**2,030,000.00**

*Costs Adjusted using CCI

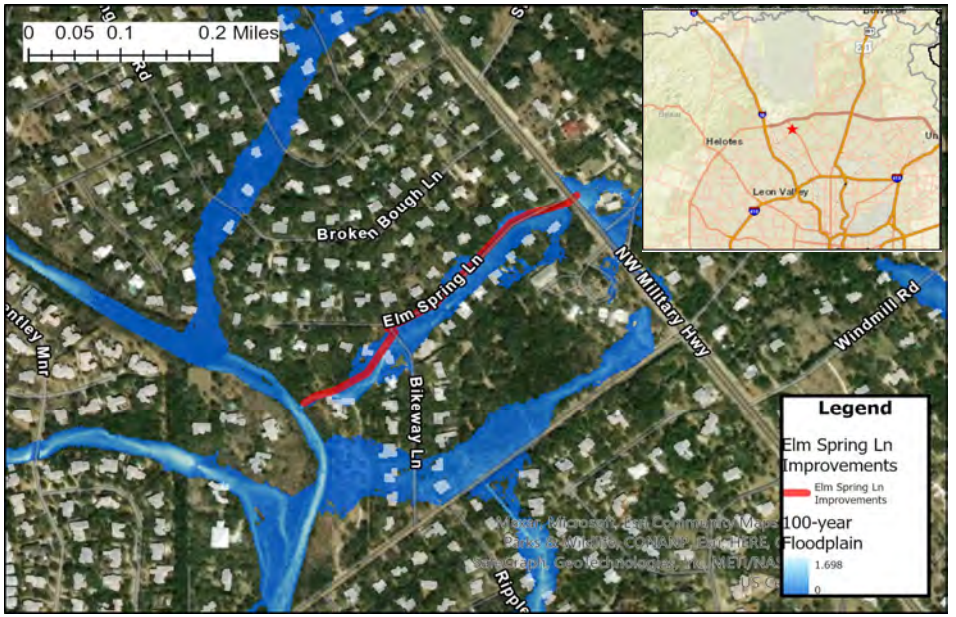
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

Event Damages		Baseline		Project
25-year storm	$	205,491	$	-
100-year storm	$	663,007	$	-
Total Benefits	**$**	**219,677**		
BCA		**0.1**		

Impact Analysis

Post-Project Total Removed	Storm Event		
	25-year	100-year	
Residential	2.00	4.00	
Commercial			
Critical			
Road (miles)	0.06	0.09	
Others Note			
SVI Score		0.01	



Project Description:

Currently, almost all of Elm Spring Ln experiences significant flooding in any rainfall event eliminating access to to all but one home along Elm Spring Ln. The flooding occurs at the intersection of Elm Spring and and NW Military Hwy and extends beyond the Bikeway Ln and Elm Spring Ln intersection.

An underground storm drain system has been proposed to alleviate roadway flooding by intercepting water near NW Military with a 4-way inlet, conveying it through the underground system and discharging into an earthen channel that flows downstream into Olmos Creek.

The project is anticipated to remove at least two of the ten homes from the limits of the 25-year floodplain and four from the 100-year floodplain.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Felix Road at Dry Hollow Creek Barrier Arms

FMP ID: 123000057

Project Sponsor: Bexar County and Wilson County

Project Source: 2022 Bexar County Drainage Needs

Cost Information

Category	Cost*
Design	$30,636
Real Estate	$0
Environmental	$0
Construction	$133,199
Total Cost**	**$164,000**

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

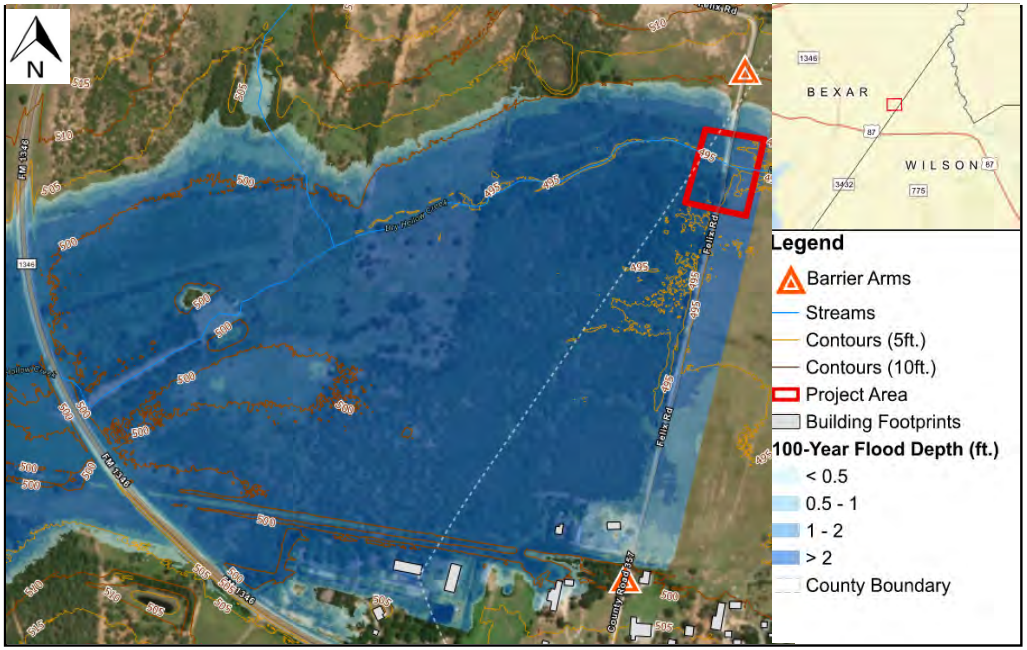
Event Damages	Baseline	Project
10-year storm	$ 14,452	-
25-year storm	$ 26,289	-
100-year storm	$ 25,455	-
Total Benefits	**$ 27,313**	
BCA	**$ 0.17**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.4	0.4	0.4
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.4472

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 10-Yr	3 ft



Project Description:

This project will reduce potential danger at the LWC by discouraging vehicles from crossing the road during a flood event. The proposed improvements consist of adding flashing lights and an automatic barrier arm on each side of the LWC that will be lowered when the road is overtopped. The LWC is on the border of Bexar and Wilson County, an automatic barrier arm is anticipated to be placed in each county. It is recommended that these counties coordinate on cost and construction.

Other alternatives were considered, such as upgrading the LWC to a bridge. These alternatives were deemed infeasible due to high construction costs and few estimated benefits associated with raising this non-critical road out of the floodplain.

A more crucial crossing to improve is FM 1346. This crossing is 3,000ft upstream of Felix Road and is overtopped during the 10% flood event. This is the main road for residents and the detour route would take 13mins.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Freudenburg Road at Salitrillo Creek Barrier Arms

FMP ID: 123000058

Project Sponsor: Bexar County

Project Source: 2022 Bexar County Drainage Needs

Cost Information

Category	Cost*
Design	$30,636
Real Estate	$0
Environmental	$0
Construction	$133,199
Total Cost**	**$164,000**

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

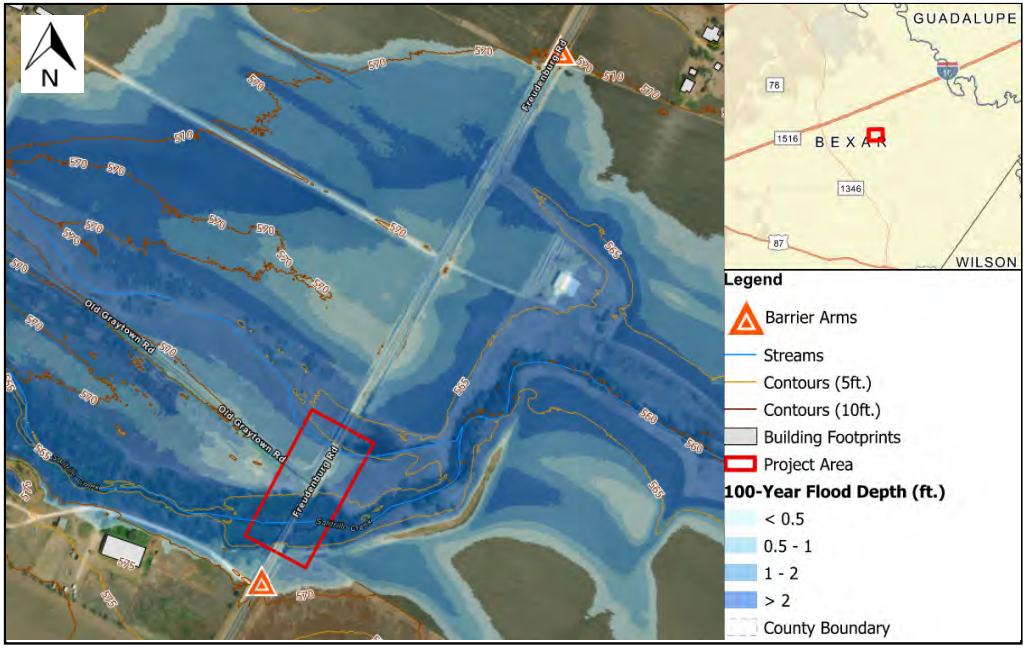
Event Damages	Baseline	Project
10-year storm	$ 15,041	-
25-year storm	$ 22,561	-
100-year storm	$ 106,197	-
Total Benefits	**$ 45,107**	
BCA	**0.3**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.4	0.4	0.4
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.2803

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 25-Yr	1-3 ft



Project Description:

This project will reduce potential danger at the LWC by discouraging vehicles from crossing the road during a flood event. The proposed improvements consist of adding flashing lights and an automatic barrier arm on each side of the LWC that will be lowered when the road is overtopped. Other alternatives were considered, such as upgrading the LWC to two 250ft span bridges and six 6ft x 5ft concrete boxes. These alternatives were deemed infeasible due to high construction costs and few estimated benefits associated with raising this non-critical road out of the floodplain.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Gass Road at Culebra Creek Tributary D Bridge

FMP ID: 123000059

Project Sponsor: Bexar County

Project Source: 2022 Bexar County Drainage Needs

Cost Information

Category	Cost*
Design	$536,927
Real Estate	$0
Environmental	$10,000
Construction	$3,350,875
Total Cost**	**$3,898,000**

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 4,655,612	$ -
25-year storm	$ 5,603,250	$ -
100-year storm	$ 5,761,320	$ -
Total Benefits	**$ 6,281,841**	
BCA	**1.7**	

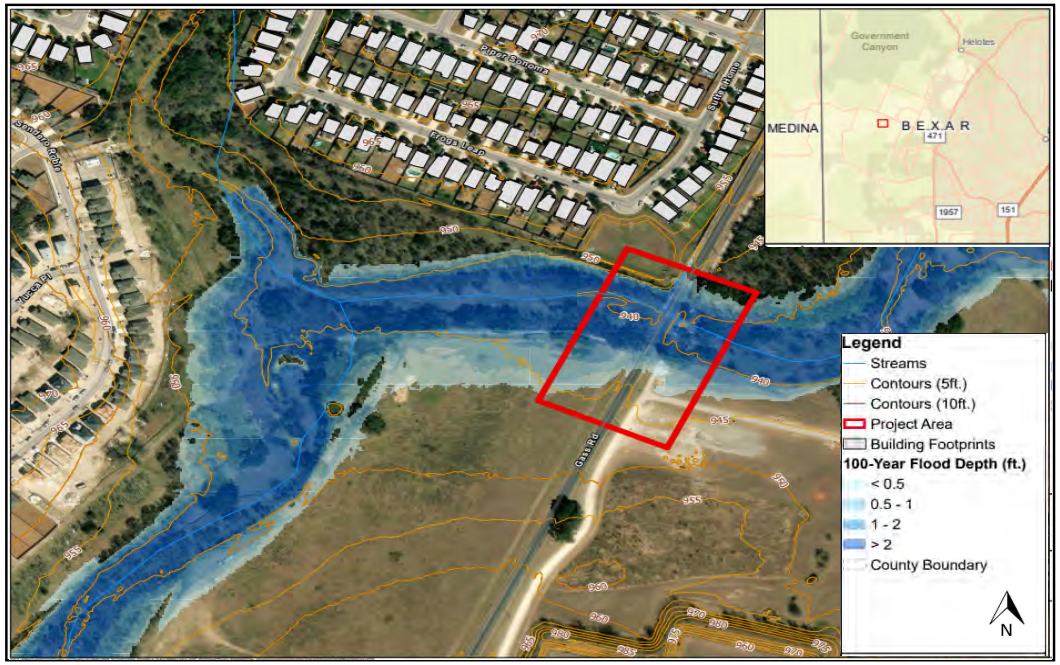
*Costs are using 2020 prices
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Road (miles)	0.25	0.25	0.25
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.211

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 10-Yr	3.3 ft
Proposed	100-Yr	0



Project Description:

This project will eliminate overtopping of Gass Road and provide 100-year conveyance design, removing structures from the existing conditions floodplain extents. Proposed improvements consist of channel regrading, increasing the road elevation and adding a bridge. The proposed road profile will increase 8ft from existing. The existing one 2.25" arch pipe will be replaced with a 300ft wide bridge with a 6ft high opening.
Note that when this road floods, there is no detour route present.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Old Fredericksburg Road at Balcones Creek

FMP ID: 123000033

Project Sponsor: Kendall County/Bexar County

Project Source: Kendall County/Bexar County

Cost Information

Category	Cost*
Design	$1,412,860
Real Estate	$264,039
Environmental	$10,000
Construction	$8,582,295
Total Cost**	**$10,270,000**

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 105,699	$ -
50-year storm	$ 106,160	$ -
Total Benefits	**$ 131,511**	
BCA	**0**	

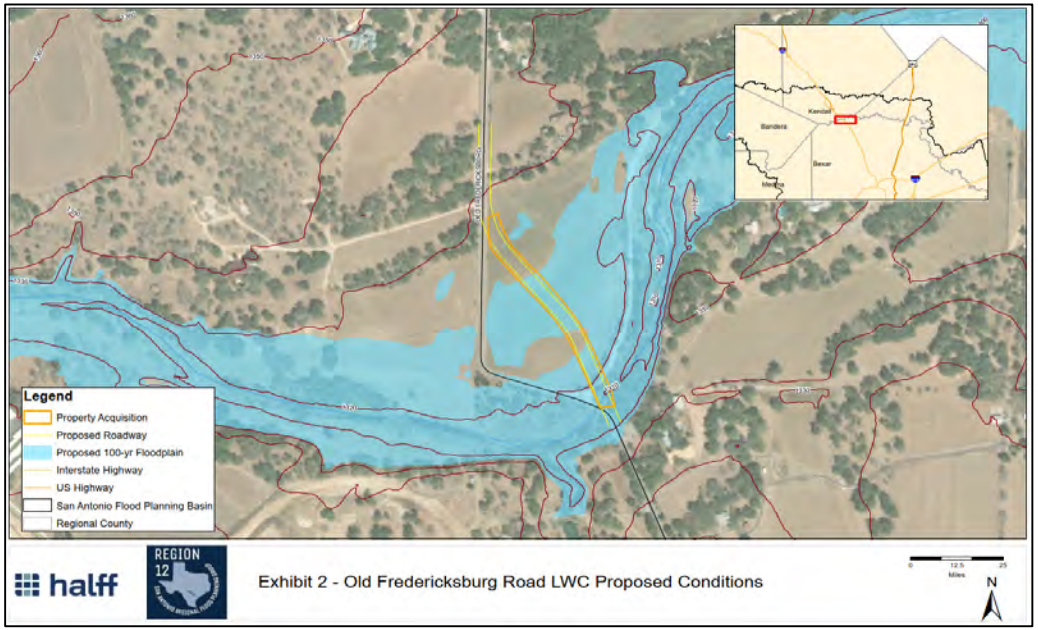
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	50-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.067	0.087	-
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.35

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	50-Yr Depth Over Road (ft)
Existing	< 10-Yr	10.45
Proposed	50-Yr	0



Project Description:

At the Old Fredericksburg Road crossing with Balcones Creek, the road is currently overtopped by the 10-year flood event and flood waters reach a maximum depth of 10 feet. The length of roadway flooded is approximately 0.12 miles at the 100-year flood event. The proposed improvements include constructing a bridge to raise the roadway over the low water crossing at the intersection of Balcones Creek and Old Fredericksburg Road and roadway realignment to straighten the sharp curves that currently exist on Old Fredericksburg Road near the Balcones Creek crossing. The proposed bridge will safely pass the 50-year flood event and lower the depth of water overtopping the roadway during larger flood events. In addition, a flood beacon will be added for safety. The proposed bridge will be approximately 400 feet in length with a connecting roadway realignment of 1350 feet that ties into the existing road. This project is near the county boundary of Bexar and Kendall Counties.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Specht & Obst Road at Cibolo Creek

FMP ID: 123000037

Project Sponsor: Bexar County/Comal County

Project Source: Bexar County/Comal County

Cost Information

Category	Cost*
Design	$695,091
Real Estate	$21,182
Environmental	$10,000
Construction	$3,766,868
Total Cost**	**$4,494,000**

*Costs from 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

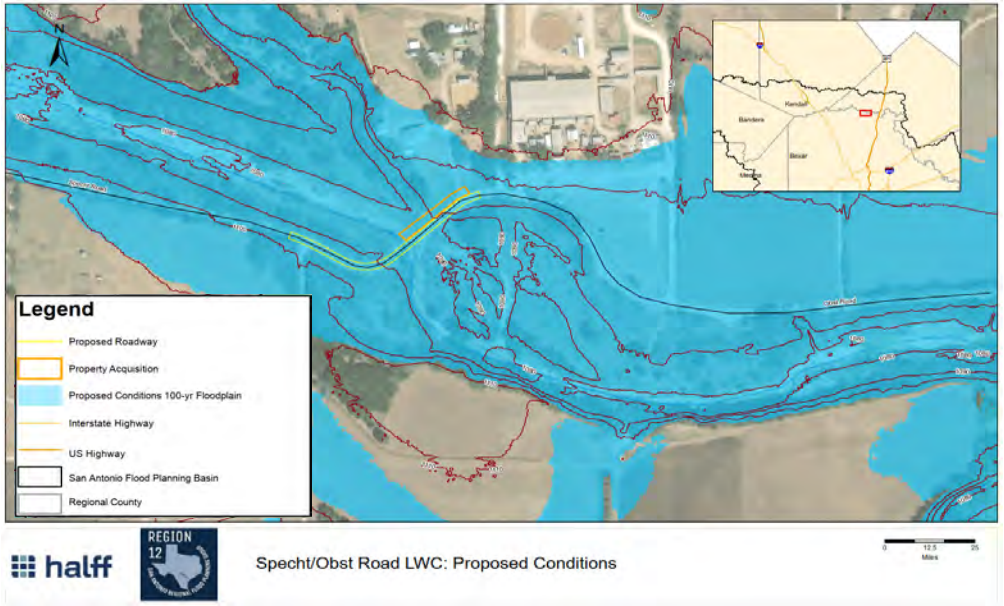
Event Damages	Baseline	Project
2-year storm	$ 378,726	$ 1,494
10-year storm	$ 378,726	$ 189,363
100-year storm	$ 378,726	$ 189,363
Total Benefits	**$ 2,031,323**	
BCA	**0.5**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	2-year	10-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.08	-	-
Critical	-	-	-
Others Note	1 Death		
SVI Score			0.20

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	2-Yr Depth Over Road (ft)
Existing	< 2-Yr	8
Proposed	2-Yr	0



Project Description:

At the Specht and Obst Road crossing with Cibolo Creek, the road is currently being overtopped by the 2-year flood event at a maximum depth of 7.8 ft. In 2010, there was a fatality at this crossing during a flash flood event. The length of roadway being flooded is approximately 2.2 miles. This project proposed construction of a bridge to raise the roadway over the low water crossing at the intersection of Cibolo Creek and Specht and Obst Road. The proposed bridge will safely pass the 2-year flood event and lower the depth of water overtopping the roadway for larger flood events. The proposed roadway and bridge alignment will raise the road for residents in the proximity of Cibolo Creek crossing and access will be required to properly tie in adjoining driveways to the proposed raised roadway. In addition, a flood beacon will be added for safety at higher flood events. The proposed bridge will be approximately 270' in length with a connecting roadway realignment of 470' that ties into the existing road. This project is located at the Bexar County/Comal County line.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Toutant Beauregard at Balcones Creek

FMP ID: 123000038

Project Sponsor: Kendall County/Bexar County Kendall

Project Source: County/Bexar County

Cost Information

Category	Cost*
Design	$577,048
Real Estate	$118,550
Environmental	$10,000
Construction	$2,940,681
Total Cost**	**$3,647,000**

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 209,868	$ -
50-year storm	$ 209,868	$ 66,145
Total Benefits	**$ 243,677**	
BCA	**0.1**	

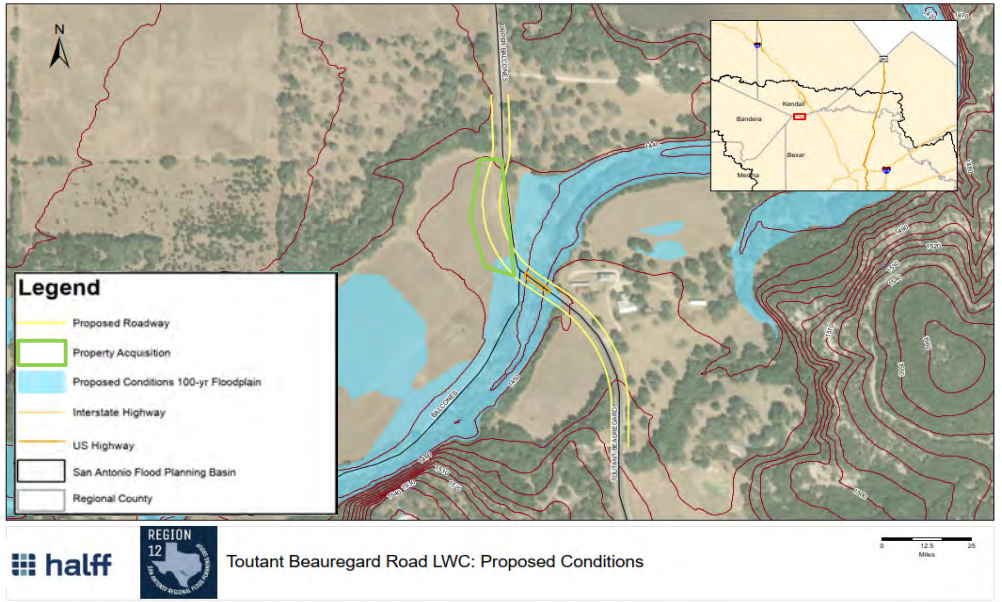
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	50-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.045	-	-
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.13

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	10-Yr Depth Over Road (ft)
Existing	< 10-Yr	7.5
Proposed	10-Yr	0



Project Description:

At the Toutant Beauregard crossing with Balcones Creek, the road is currently being overtopped by the 10-year flood event at a maximum depth of 7.5 ft. The length of roadway being flooded is approximately 0.065 miles at the 100-year flood event. Constructing a bridge to raise the roadway over the low water crossing at the intersection of Balcones Creek and Toutant Beauregard. In addition, a flood beacon will be added for safety. The proposed bridge will overtop the 10-year flood event and lower the depth of water overtopping the roadway for larger flood events. The proposed roadway and bridge alignment will straighten the sharp curves that currently exist in Toutant Beauregard over the Balcones Creek crossing and move the curve or the road out to the abutting property. The proposed bridge will be approximately 150' in length with a connecting roadway realignment of 450' that ties into the existing road. Project is located at the Kendall County/Bexar County line.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Ullrich Road at Cibolo Creek Barrier Arms

FMP ID: 123000061

Project Sponsor: Bexar County and Guadalupe County

Project Source: 2022 Bexar County Drainage Needs

Cost Information

Category	Cost*
Design	$43,956
Real Estate	$0
Environmental	$0
Construction	$199,799
Total Cost**	**$244,000**

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

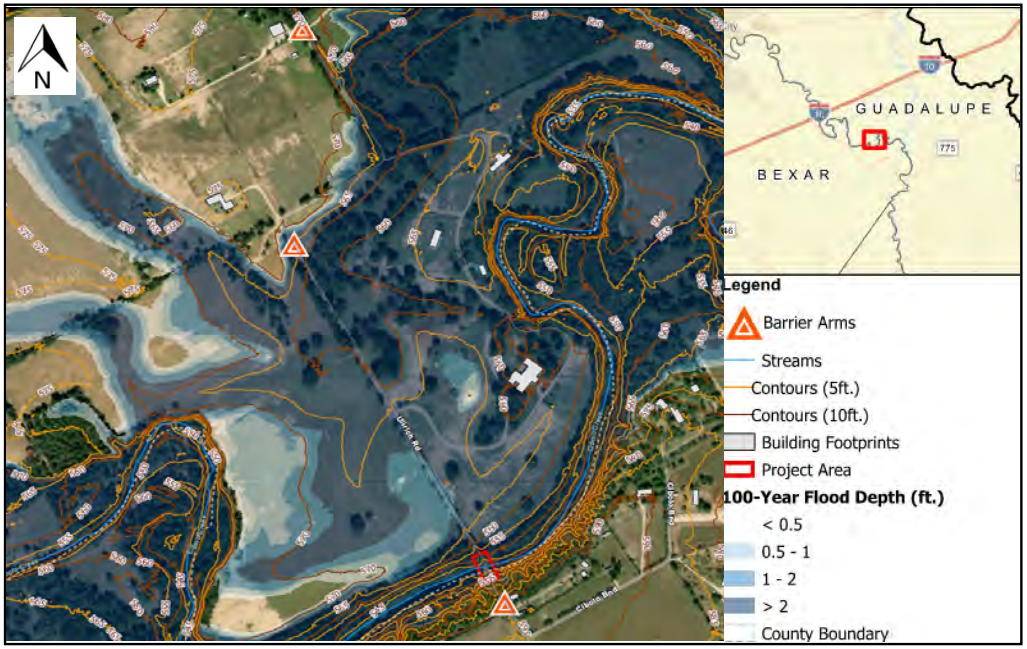
Event Damages		Baseline	Project
10-year storm	$	6,494	-
25-year storm	$	9,741	-
100-year storm	$	12,988	-
Total Benefits	**$**	**11,714**	
BCA	**$**	**0.05**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	-
Commercial	-	-	-
Flooded Roads (miles)	0.4	0.4	0.4
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.1371

LWC Level of Service Existing Vs. Proposed

Condition	Level of Service	100-Yr Depth Over Road (ft)
Existing	< 10-Yr	27 ft



Project Description:

This project will reduce potential danger at the LWC by discouraging vehicles from crossing the road during a flood event. The proposed improvements consist of adding flashing lights and an automatic barrier arm on each side of the LWC that will be lowered when the road is overtopped. The LWC is on the border of Bexar and Guadalupe County, an automatic barrier arm is anticipated to be placed in each county. It is recommended that these counties coordinate on cost and construction.

Approximately 0.5 miles north of the LWC, Cibolo Creek overtops the roadway at an additional location near the intersection of Ullrich Road and Rio Cibolo Way. Based on best available hydraulic modeling, the floodplain is estimated to overtop this location during the 25-year storm event with a depth of nearly 4-ft. A third single-lane barrier arm is recommended at this location to discourage southbound traffic while still allowing northbound traffic (i.e., from Rio Cibolo Way) to exit.

Other alternatives were considered, such as upgrading the LWC to a bridge. These alternatives were deemed infeasible due to high construction costs and few estimated benefits associated with raising this non-critical road out of the floodplain.

During the analysis of crossings at Bexar Bowling Way and Ullrich Road at Cibolo Creek, it was determined that a 2D hydraulic study flood study would be needed to evaluate spill flow from the creek.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Wilson 10 - Acquisitions of Flooded Structures

FMP ID: 123000062

Project Sponsor: Wilson County

Project Source: 2012 Karnes and Wilson County Hazard Mitigation Action Plan

Cost Information

Category	Cost*
Coordination/Documents	$98,432
Real Estate	$492,161
Environmental	-
Construction	-
Total Cost**	**$591,000**

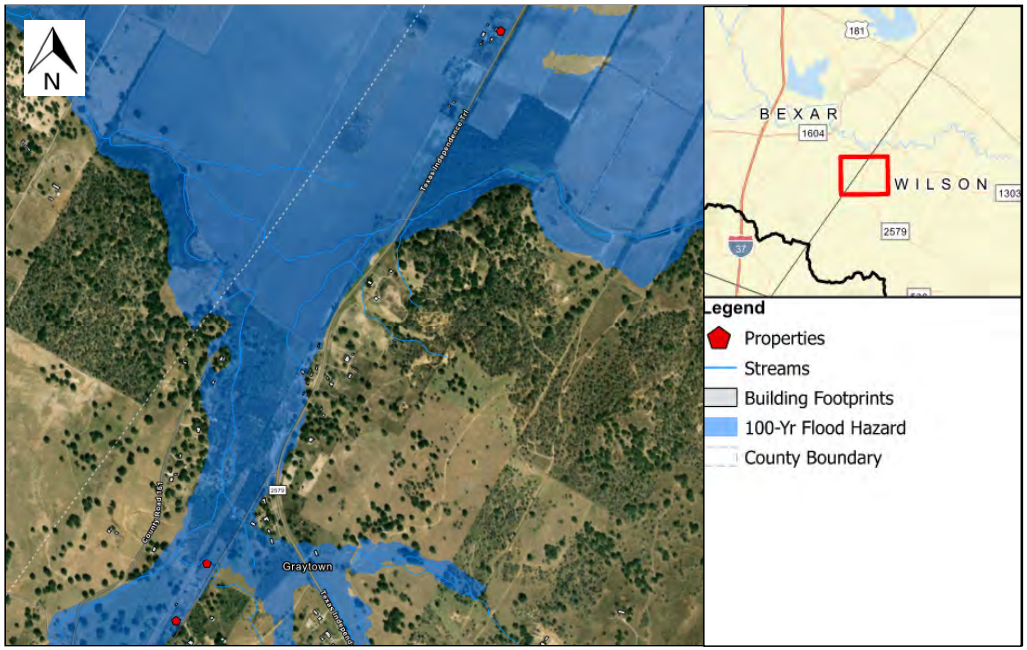
Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	-	-
25-year storm	-	-
100-year storm	$ 969,900	-
Total Benefits	**$ 969,900**	
BCA	**1.4**	

*Costs are using 2020 prices
**Rounded up to the nearest thousand

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	25-year	100-year
Residential	-	-	3
Commercial	-	-	-
Flooded Roads (miles)	-	-	-
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.5776



Project Description:

This project proposes to acquire the three frequently flooded properties and remove the structures from the existing conditions floodplain extents through demolition or relocation. Properties that will be purchased are the following:
•Mobile Home - 246 CR 126, Floresville, TX 78114; PID#13127
•Single Family Home - 8185 FM 2579, Floresville, TX 78114; PID#13165
•Mobile Home - 366 CR 126, Floresville, TX 78114; PID#13119
Based on the FEMA memorandum with subject titled “Update to ‘Cost-Effectiveness Determinations for Acquisitions and Elevations in Special Flood Hazard Areas Using Pre-Calculated Benefits”, HDR used the pre-calculated benefits listed in the memorandum to calculate the BCA. For an acquisition, the pre-calculated benefit value is $323,000 per structure.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Woodlawn Lake Option 2

FMP ID: 123000032

Project Sponsor: City of Balcones Heights

Project Source: San Antonio River Authority

Cost Information

Category	Cost*
Design	$1,302,147
Real Estate	$0
Environmental	$117,000
Construction	$7,776,532
Total Cost**	**$9,196,000**

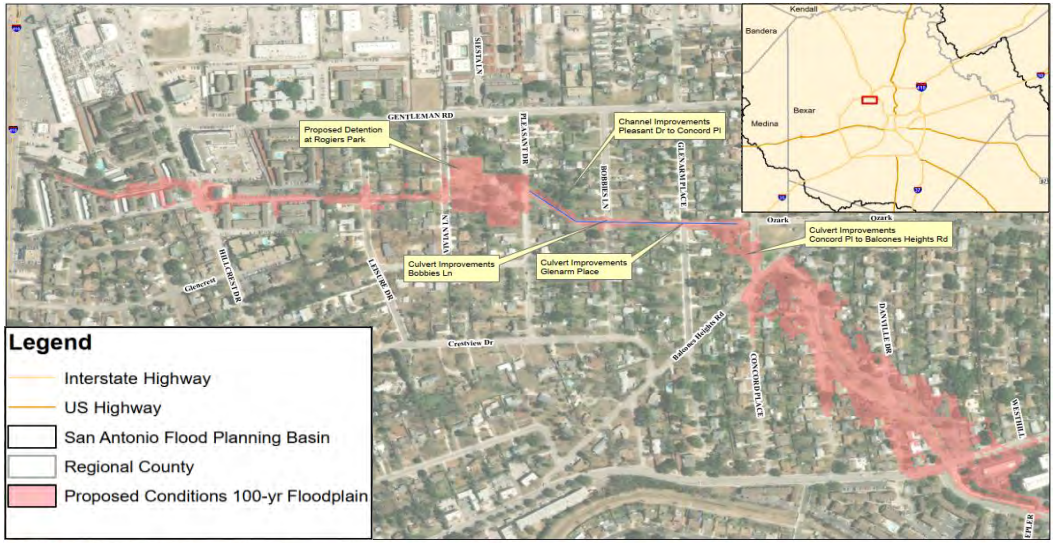
*Costs are using 2020 prices
**Rounded up to the nearest thousand

Benefit Cost Analysis (BCA)

Event Damages	Baseline	Project
10-year storm	$ 882,219	$ -
25-year storm	$ 966,414	$ -
100-year storm	$ 1,008,694	$ 195,993
Total Benefits	**$ 1,140,006**	
BCA	**0.1**	

Impact Analysis

Post-Project Total Removed	Storm Event		
	10-year	50-year	100-year
Residential	9	9	7
Commercial	-	-	-
Flooded Roads (miles)	0.21	0.2	0.17
Critical	-	-	-
Others Note	N/A	N/A	N/A
SVI Score			0.72



Project Description:

Flooding occurs in the City of Balcones Heights from an Unnamed Tributary of Alazan Creek. The Upper Woodlawn Lake Drainage Study created for the San Antonio River Authority in 2014 proposed two options for flood mitigation through the City. Option 2 is the only viable option since land scoped for detention in Option 1 has since been developed. The Option 2 improvements include channel widening, 3 culvert upgrades, and development of a detention pond in the City of Balcones' Rogiers Park. Channel improvements include concrete-lining in high velocity areas or where ROW constraints limited the top width of the proposed channel. The proposed culvert upgrades are at Concord Place, Glenarm Place and Bobbies Lane. The proposed pond at Rogiers Park has two chambers with a total storage capacity of 8.6 acre-feet and a maximum depth of 6 feet. The pond was divided into two chambers; each chamber had a 36-inch concrete pipe outfall connecting to the existing storm drains upstream of Pleasant Drive. Mapping of the proposed improvements show a decrease the floodplain from Pleasant Drive to Balcones Heights Rd, however, flooding still occurs over Concord Pl to Balcones Heights Road. 7 homes would be removed from the 100-year annual chance rain event. Downstream impacts are mitigated by the proposed detention pond.

2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Abbott Road and Graytown Road at Martinez Creek Study

FME ID: 121000164

Project Sponsor: Bexar County

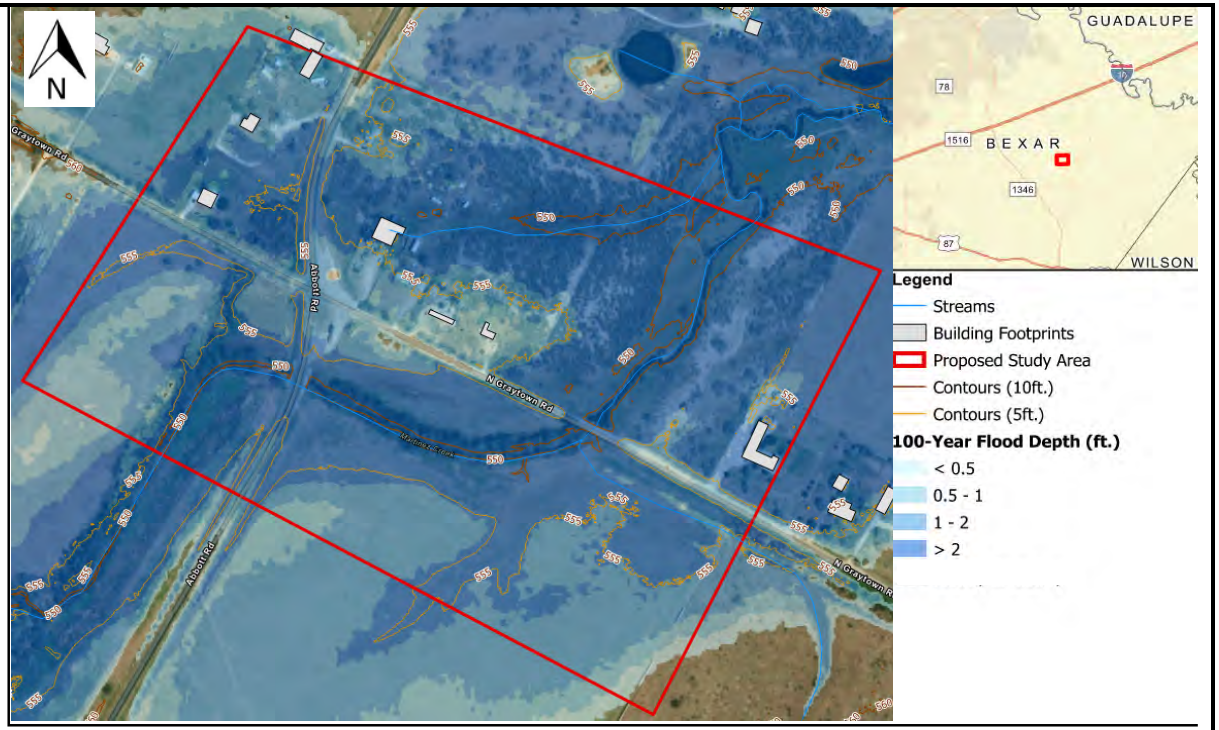
Project Source: 2022 Bexar County Drainage Needs

Study Type: Project Planning

Project Cost: (2020 Prices) $ 300,000

Project Description:

During the analysis of crossings Abbott Road and Graytown Road at Martinez Creek, it was determined that a 2D hydraulic study flood study would be needed to evaluate alternatives to remove these roads from overtopping. Priority should be placed on this study due to the recent flood-related death that occurred on Graytown Road in 2021.
The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Cibolo Creek Spill Study

FME ID: 121000165

Project Sponsor: Guadalupe County

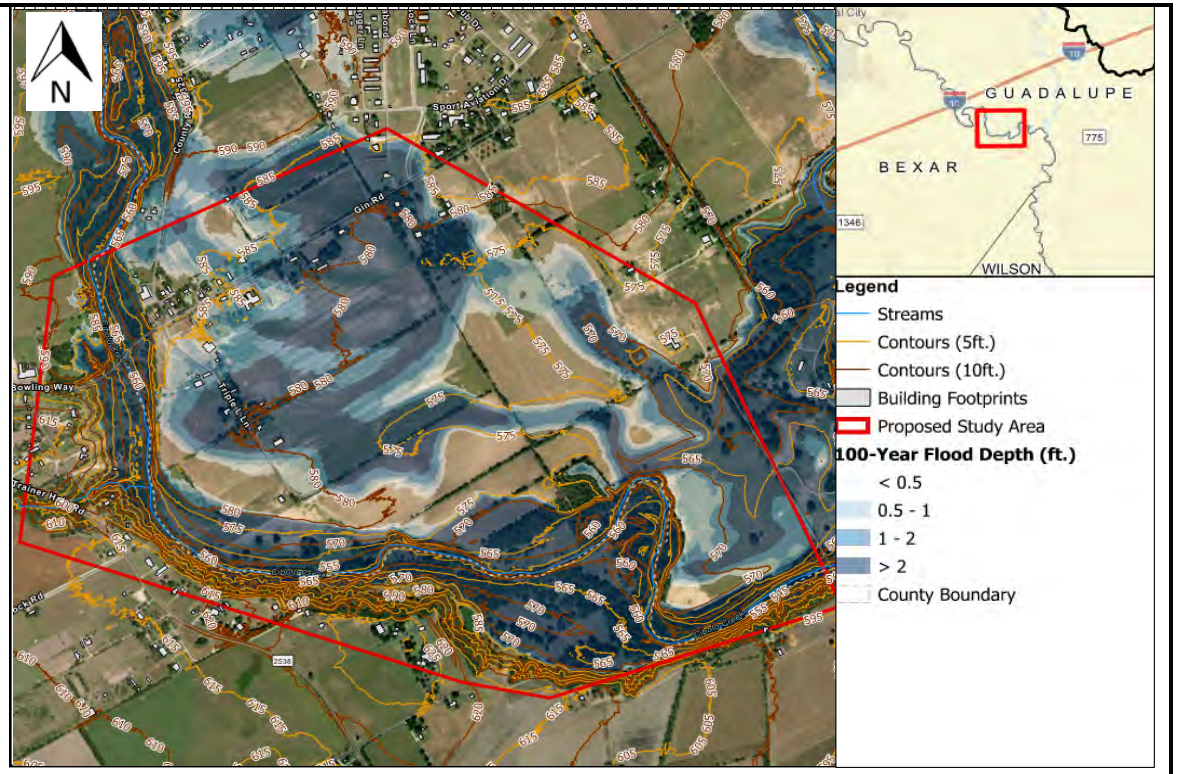
Project Source: 2022 Bexar County Drainage Needs

Study Type: Watershed Planning

Project Cost: (2020 Prices) $ 250,000

Project Description:

During the analysis of crossings at Bexar Bowling Way and Ullrich Road at Cibolo Creek, it was determined that a 2D hydraulic study flood study would be needed to evaluate spill flow from the creek. The spill starts 2,500ft upstream of the Bexar Bowling Way Crossing to 2,000ft north of Ullrich Road Crossing.
The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Watershed Planning.
The study areas covers 1.2 square miles.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: FM1346 Crossing Upgrade Study

FME ID: 121000166

Project Sponsor: Bexar County

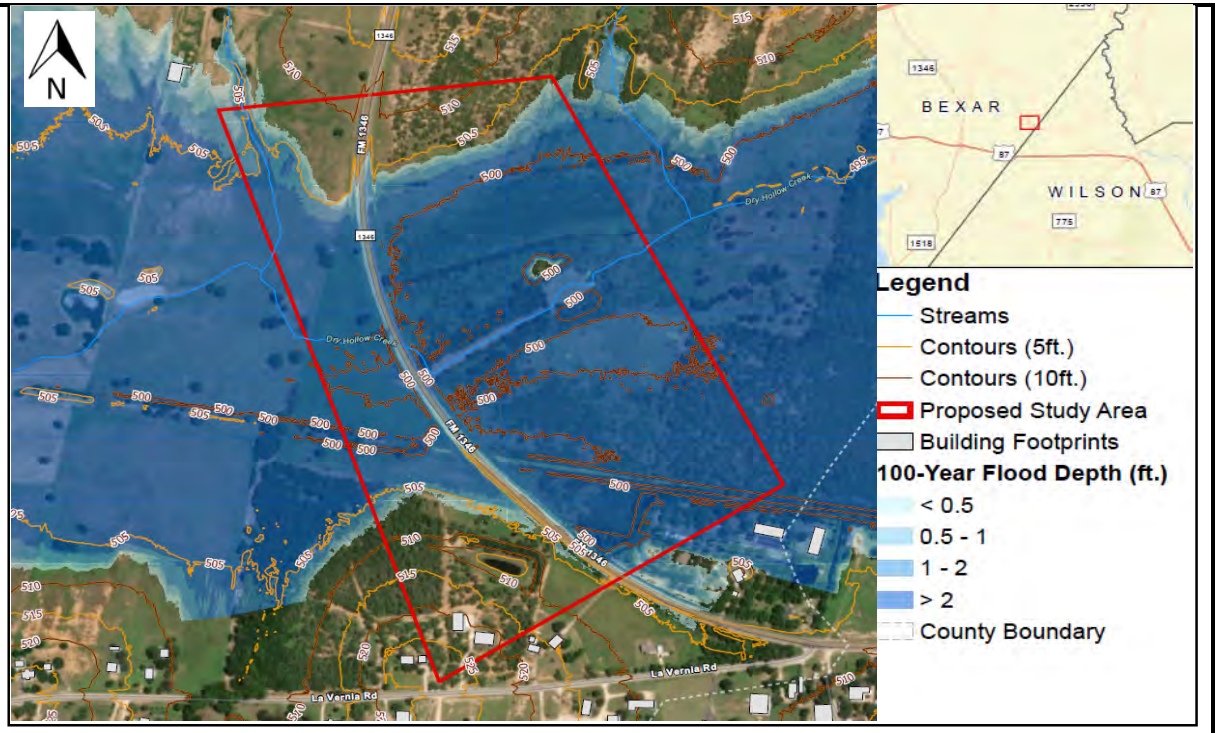
Project Source: 2022 Bexar County Drainage Needs

Study Type: Project Planning

Project Cost: (2020 Prices) $ 150,000

Project Description:

During the analysis of crossings Felix Road at Dry Hollow Creek, it was determined that an additional hydraulic study is needed to evaluate alternatives to removing the FM1346 crossing from overtopping. Improvements to this road are important due to limited detour routes available.
The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: FM 1863 at Cibolo Creek Low Water Crossing

FME ID: 121000095

Project Sponsor: Comal County/Bexar County

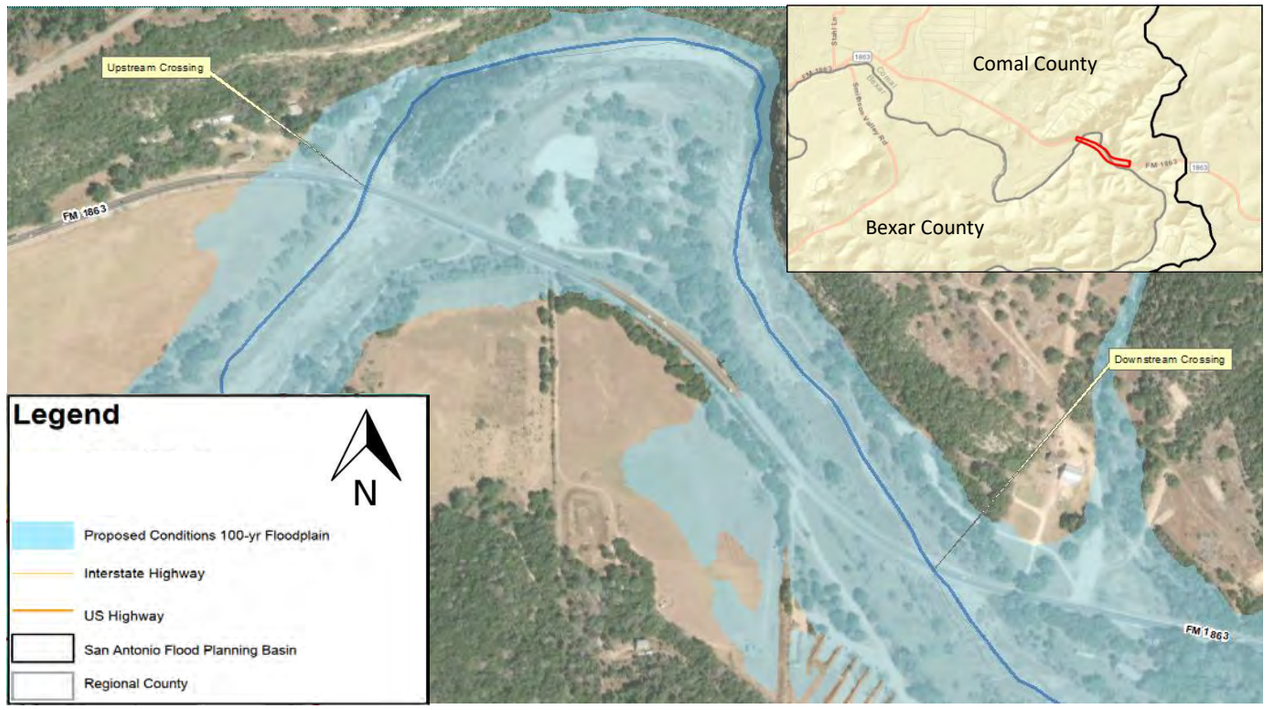
Project Source: Cibolo Creek Watershed Holistic Master Plan

Study Type: Engineering Project Plan

Project Cost: (2020 Prices) $ 150,000

Project Description:

This project has been identified on Table 12 - Potential Flood Management Evaluations Identified by RFPG. There are two low water crossings on FM 1863 at Cibolo Creek on the Comal/Bexar County line that are overtopped by the 2-year annual chance flood event. In addition, a tributary confluences with Cibolo Creek just downstream of the second crossing, where an additional crossing upgrade is required. A major realignment and possible private property encroachment would be required to provide a level of service greater than a 2-year annual chance flood event. A more detailed study is required. Additionally, TxDOT coordination would be required as FM 1863 is a TxDOT operated and maintained asset. Project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Engineering Project Planning - $150,000.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Live Oak at Salitrillo Creek Improvements

FME ID: 121000158

Project Sponsor: Bexar County

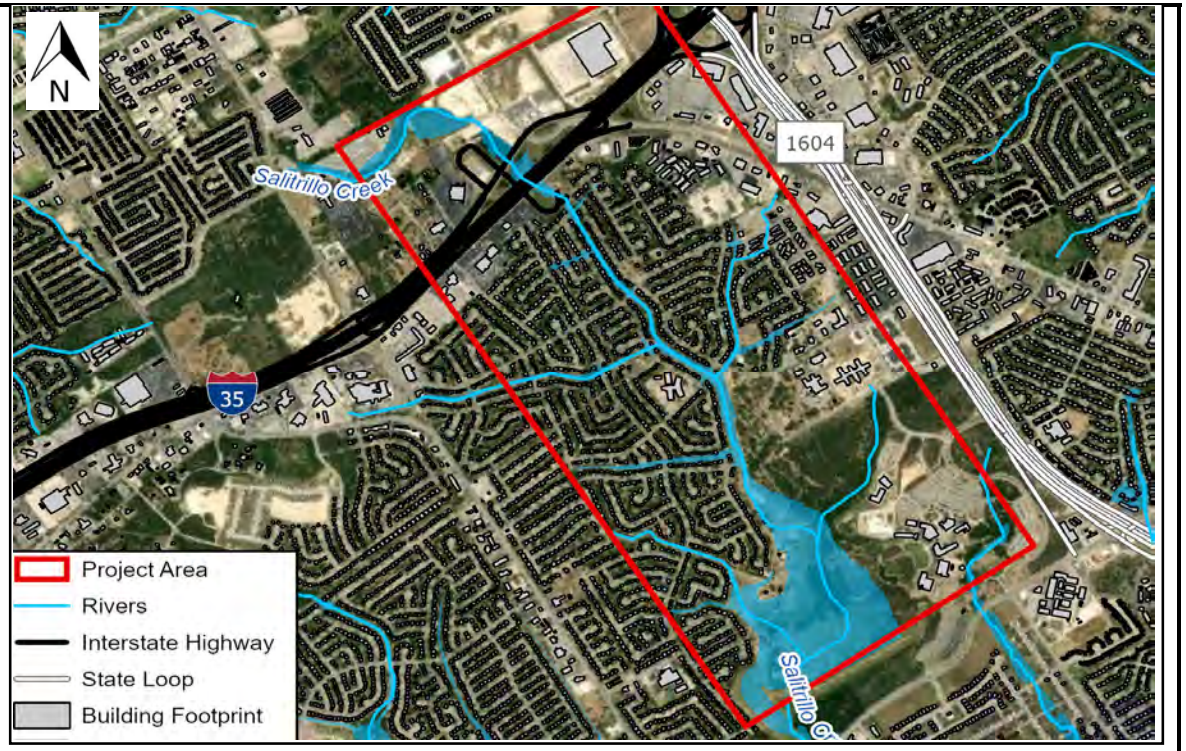
Project Source: 2022 Bexar County Drainage Needs

Study Type: Project Planning

Project Cost: (2020 Prices) $ 250,000

Project Description:

Engineering study to assess removal of residential structures from the Salitrillo Creek 100-Yr flood plain upstream of Martinez Creek Dam No. 5.
The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Live Oak Slough Creek Improvements Study

FME ID: 121000167

Project Sponsor: City of Von Ormy

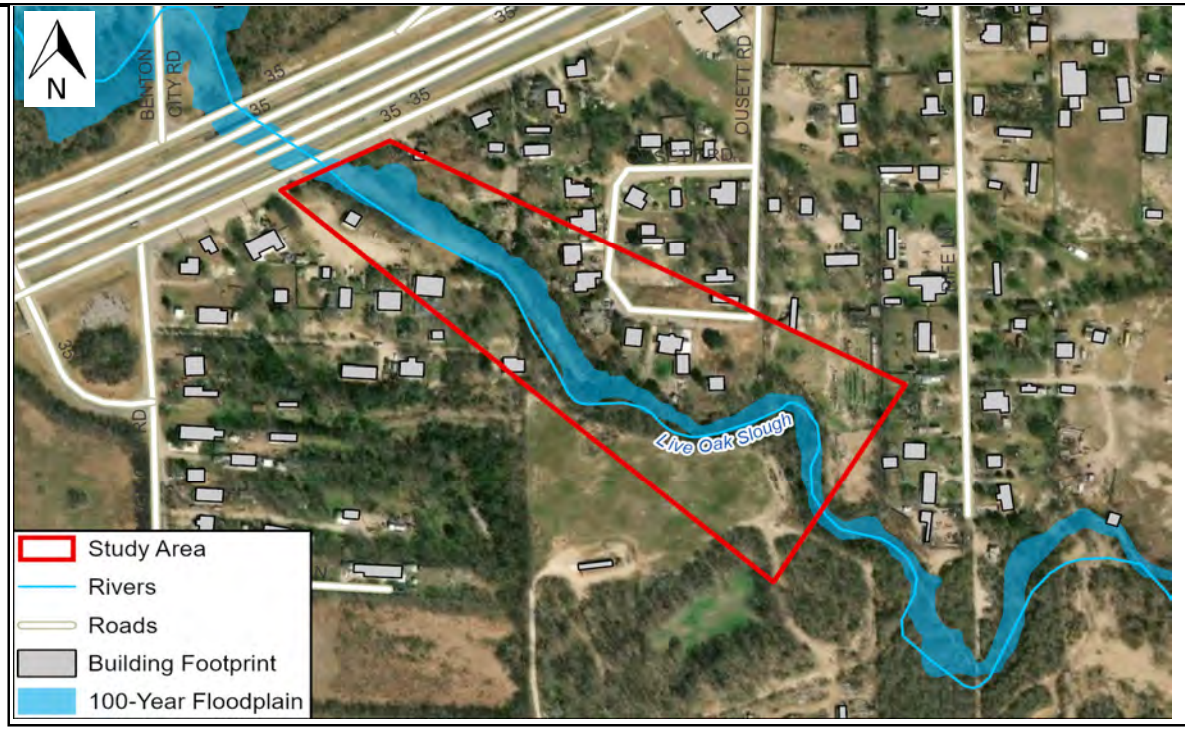
Project Source: 2022 Von Ormy Drainage Needs

Study Type: Project Planning

Project Cost: $ 250,000
(2020 Prices)

Project Description:

The residents living along this slough are experiencing run-off water damage to their land causing the Live Oak Slough Creek to widened, and leaving them with less land usage. The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: North Benton City Road Improvements Study

FME ID: 121000168

Project Sponsor: City of Von Ormy

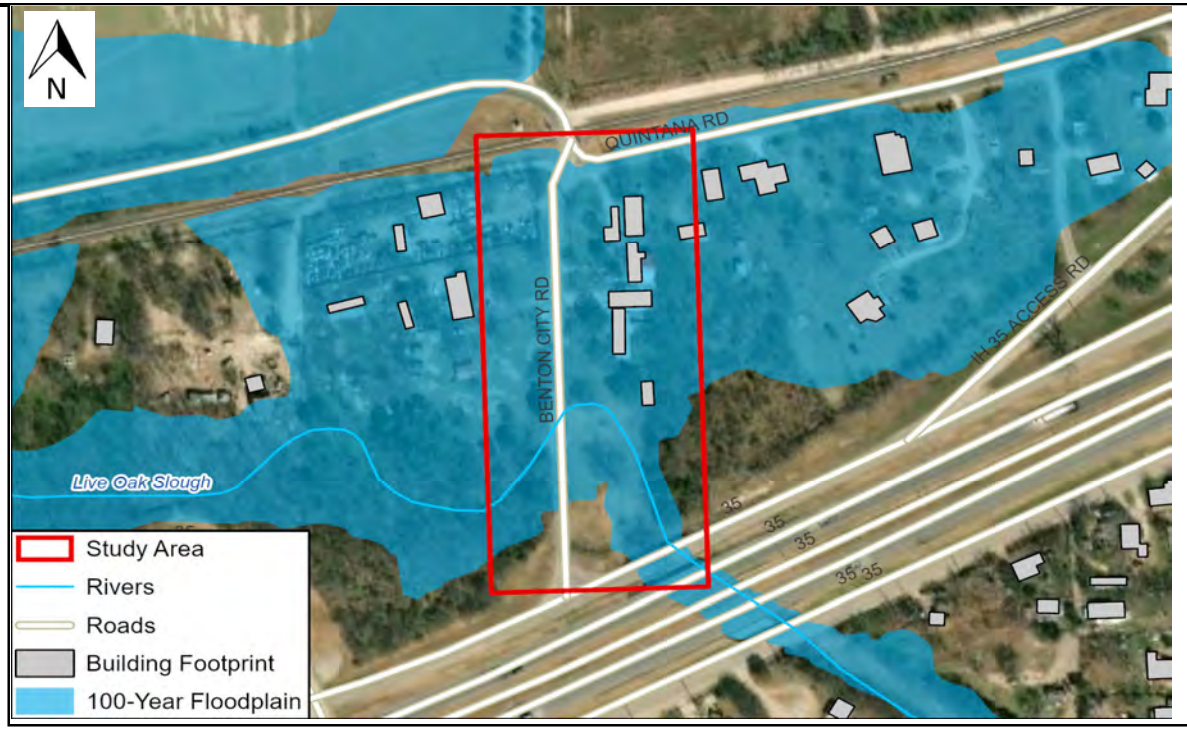
Project Source: 2022 Von Ormy Drainage Needs

Study Type: Project Planning

Project Cost: (2020 Prices) $ 150,000

Project Description:

Study to improve the road and remove it from being flooded during heavy rains. The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Quintana Road Drainage Improvements Study

FME ID: 121000169

Project Sponsor: City of Von Ormy

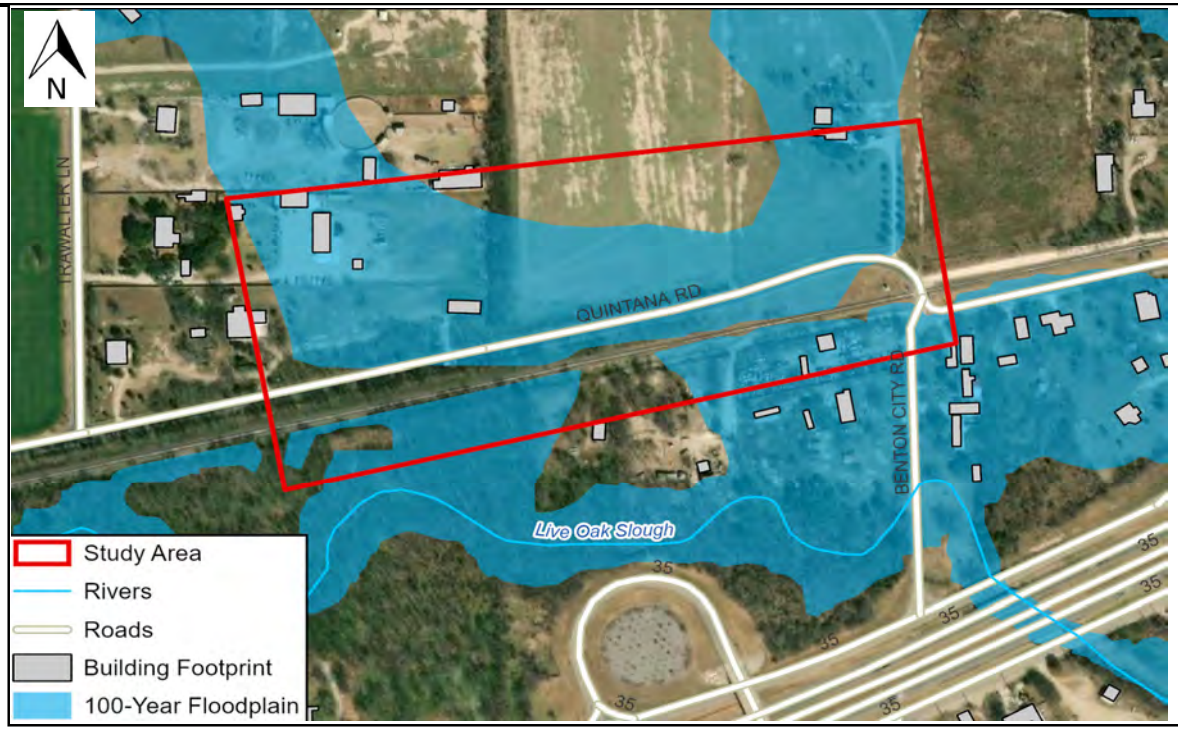
Project Source: 2022 Von Ormy Drainage Needs

Study Type: Project Planning

Project Cost: (2020 Prices) $ 250,000

Project Description:

Study to improve the drainage around Quintana Road and remove it from being flooded during heavy rains.
The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: South Benton City Road Improvements Study

FME ID: 121000170

Project Sponsor: City of Von Ormy

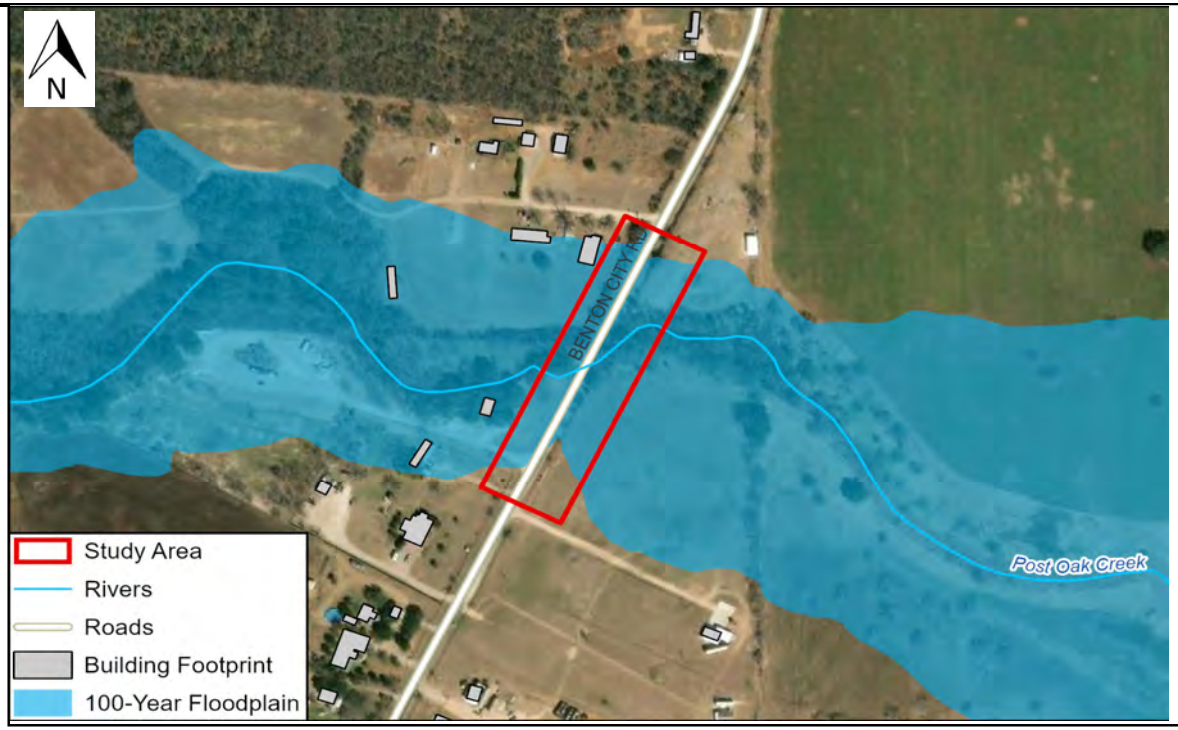
Project Source: 2022 Von Ormy Drainage Needs

Study Type: Project Planning

Project Cost: (2020 Prices) $ 150,000

Project Description:

Study to improve the road and remove it from being flooded during heavy rains. The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: South Evans Road Improvements Study

FME ID: 121000171

Project Sponsor: City of Von Ormy

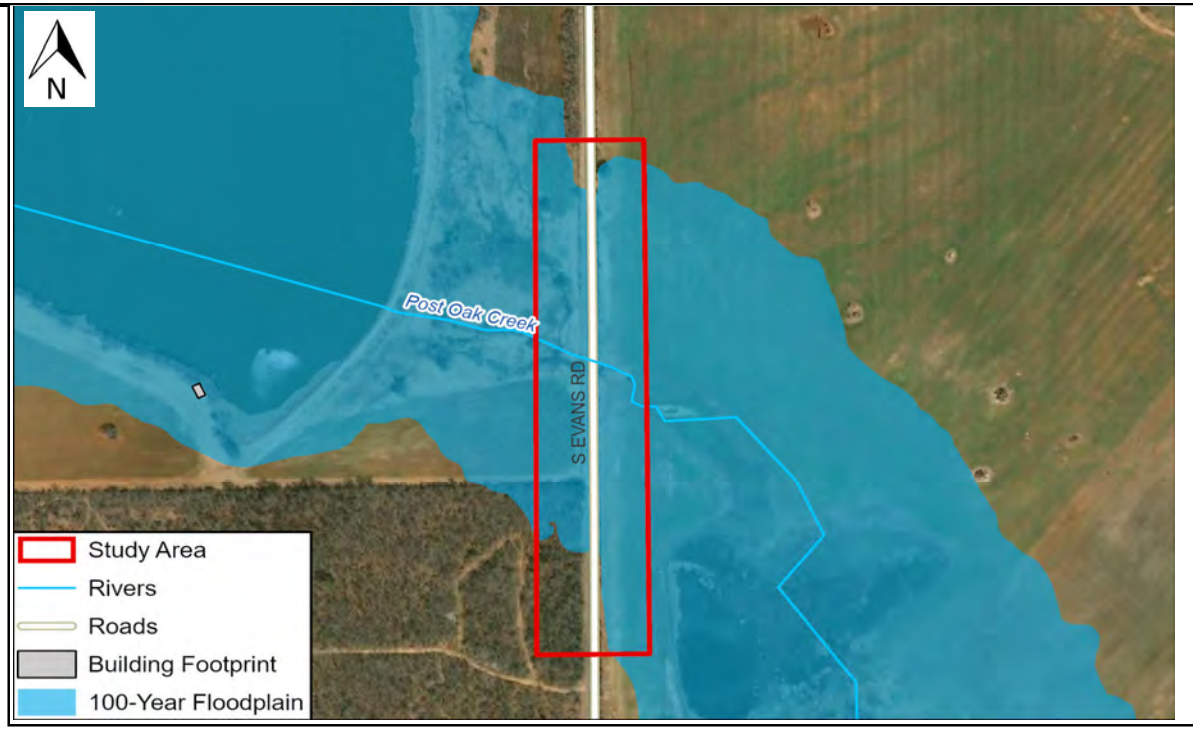
Project Source: 2022 Von Ormy Drainage Needs

Study Type: Project Planning

Project Cost: (2020 Prices) $ 150,000

Project Description:

Study to improve the road and remove it from being flooded during heavy rains. The project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Project Planning.



2023 San Antonio Regional Flood Plan
Project Summary Sheet

Project Name: Trainer Hale at Cibolo Creek

FME ID: 121000164

Project Sponsor: Bexar County/Guadalupe County

Project Source: Bexar County

Study Type: Engineering Project Plan

Project Cost: (2020 Prices) $ 150,000

Project Description:

At the Trainer Hale Rd (FM 2538) crossing with Cibolo Creek, the road is currently overtopped by the 10-year flood event at a maximum depth of 21 ft. Trainer Hale Rd crossing is along Bexar/Guadalupe County line and within TxDOT's right-of-way. The bridge is a TxDOT maintained asset. Major realignment and property access considerations should be evaluated in addition to increasing the bridges level of service, therefore, a more detailed study is required. Additionally, TxDOT coordination would be required as FM 2538 is a TxDOT operated and maintained asset.

Project cost was developed using FME Planning Cost Estimates found in section 5.2.1.1 of the San Antonio Regional Flood Plan for Engineering Project Planning - $150,000.