



AIR-22-024
AGENDA REQUEST
BUSINESS OF THE CITY COUNCIL
CITY OF PEARLAND, TEXAS

AGENDA OF: City Council Regular Meeting - Jan 24 2022
DATE SUBMITTED: Jan 19 2022 **DEPT. OF ORIGIN:** Administration
PREPARED BY: Clay Pearson

SUBJECT: **Consideration and Possible Action** - Substitution to the Stormwater Utility Fee Proposition to provide an Alternative Path for Stormwater Capital and Operation Improvements.

ATTACHMENTS: [Stormwater Utility Alternative to meet Capital and Operating needs 17 Jan 2022](#)
[Exhibit A -\(SIGNED\) Pearland - Drainage Projects Memorandum- AK](#)

FUNDING:

<input type="checkbox"/> Grant	<input type="checkbox"/> Developer/Other	<input type="checkbox"/> Cash
<input type="checkbox"/> G.O. Bonds To Be Sold	<input type="checkbox"/> G.O. Bonds - Sold	<input type="checkbox"/> Rev. Bonds to Be Sold
<input type="checkbox"/> Rev. Bonds - Sold	<input type="checkbox"/> C.O.'s To Be Sold	<input type="checkbox"/> C.O.'s - Sold

EXECUTIVE SUMMARY

BACKGROUND

The purpose of the attached memo is to describe the background, define the level of service gap current and future, and to outline a viable and sustainable long-term alternative to meet stormwater drainage maintenance and capital needs for the protection of Pearland community property, people, and infrastructure. For the last four years, creation of a dedicated new stormwater utility has been discussed. For funding of that utility, a stormwater fee, allowable under State law to be levied on properties based upon actual impervious surface (concrete, asphalt, roof top) on benefitted property and collected on water/trash bills has been discussed in Pearland.

The dialogue and iterations for that new fee has evolved and been amended, but most recently at the City Council dais the discussion brought the beginnings of a new consensus – Step back from the advisory referendum to the public for a new dedicated stormwater fee and instead spend the next six months for community-wide dialogue on alternatives and commitment to a long-term solution for funding City of Pearland drainage needs.

The attached memo with recommendations for consideration and possible action are designed to give an alternative path to the stormwater utility fee to also provide additional service and stormwater protections without the separate fee, but with a combination of O&M property tax addition and traditional capital improvement bonding question to put to voters for consideration.

SCOPE OF CONTRACT/AGREEMENT

N/A

BID AND AWARD

N/A at this time

SCHEDULE

If followed, the process for budgeting and contracting engineering work for PERs can be undertaken and a City Council bond study committee can be formed at your next February 14 meeting with membership and a charge to begin work and come back with recommendations 90-120 days.

POLICY/GOAL CONSIDERATION

CURRENT AND FUTURE CIP FUNDING/FINANCIAL IMPACTS/DEBT SERVICE

Future Capital Improvement Projects TBD minimum ~ \$60 million and expandable depending upon work of bond study committee.

O&M IMPACT INFORMATION

Necessary for closing the level of service gap will be the additional O&M capacity to sustain maintenance and operations of the City's portion of drainage system that has grown and depended upon by the community.

Recommended Action

It is recommended that the City Council review and discuss the recommendations and provide direction on any or all of those recommendations for follow-up and action to begin.



Memo

To: Mayor and City Council members
From: Clay Pearson, City Manager
CC: Trent Epperson, Robert Upton
Date: 20 January 2022
Re: City of Pearland Stormwater Utility – Alternative to Meet Capital and operating needs

Purpose

The purpose of this paper is to recap background, define the level of service gap current and future, and to outline a viable and sustainable long-term alternative to meet stormwater drainage maintenance and capital needs for the protection of Pearland community property, people, and infrastructure. For the last four years, creation of a dedicated new stormwater utility has been discussed. For funding of that utility, a stormwater fee, allowable under State law to be levied on properties based upon actual impervious surface (concrete, asphalt, roof top) on benefitted property and collected on water/trash bills has been discussed in Pearland.

The dialogue and iterations for that new fee has evolved and been amended, but most recently at the City Council dais the discussion brought the beginnings of a new consensus – Step back from the advisory referendum to the public for a new dedicated stormwater fee and instead spend the next six months for community-wide dialogue on alternatives and commitment to a long-term solution for funding City of Pearland drainage needs.

Solution Parameters

The City Council has been briefed and received reports (recapped in background and references section herein) about the criticality and existing funding gap for capital projects and ongoing maintenance. **For the success in the future, new dollars for additional annual investment are needed for *both* capital and operating.**

Operations

Baseline *operations* is that the City has ongoing operations and maintenance as part of the Right-of-Way, Streets & Drainage Division of the Department of Engineering and Public Works (EPW). As described most recently in the Mobility update for the CIP Workshop, that division has 29 staff which is under-sized for current Pearland scope and responsibilities. Positions are moved within the division for assignments and needs, but only 6 City staff positions, inclusive of the supervisor are base funded for drainage. **The City currently has inventoried 313 miles of enclosed stormwater pipe and 145 miles of ditch/culvert.** As measure of one of the maintenance activities, for FY 21 – FY 22, there are 28,200 feet of ditch/culvert cleaning targeted for the contract. The City has a contract (currently awarded active with Texas Drainage; awarded July 2021) for ditch maintenance and excavation. The award of \$150,000 (expended \$147,210 already since July 2021) has completed 5.5 miles (28,851 linear feet) of ditch cleaning and 0.63 miles (3,348 lf) of culvert cleaning.

It is the goal of the division to establish a wholistic programmatic approach to the maintenance of the drainage infrastructure. The parameters are to review, inspect and clean the drainage system once every 10 years throughout the City. The City will be divided into 10 areas.

The program will result in a 3-fold increase to ditch cleaning (currently once every 30 years) and a 10-fold increase to enclosed pipe cleaning (currently no maintenance being conducted). **The *pro forma* for the stormwater utility fee was identified to bring just \$662,000 in new money for drainage operations in 2023 for the first full year.** The funding was identified for a new enclosed pipe cleaning crew, video inspection crew, and an associate engineer dedicated to drainage maintenance and capital solutions. Also, an enhanced ditch cleaning contract and more street sweeping.

Thus, for \$662,000 *additional annual* budget allocation, there would be dramatic and focused stormwater maintenance operations year-over-year. Additionally, based on the 2020 census (population over 100,000), the City will be a Phase II Level 4 MS4 in 2024 SWMP permit renewal with TCEQ which will require dry weather screening that include industrial stormwater sources. The new requirement will indicate a need of an ordinance to incorporate industrial stormwater sources and budget allocation of approximately \$125,000 annually. **The FY 24 amount with adding dry weather screening (required per the new MS4 permit) totals \$787,000 for operating additions from current state (*inclusive of the new MS4 permit and continuing the prior FY 23 investments*).**

The most reliable and controllable new money stream for operations and maintenance from existing possible regular City streams would be increasing the operating property tax rate. For \$787,000 in FY 24 in new money that would be approximately 0.0079 cents to the operating rate, or the GF O&M rate from \$0.3094 to \$0.3884. The challenges around 3.5% revenue cap will need to be reviewed, but the FY 22 rate was below the voter-approved rate and may provide some flexibility for FY 23 to build that up in allowable steps up.

Capital Improvements

For Capital Improvements, for reference, the 2019 bond election included \$28.498 million for drainage improvements and facilities. Five projects were cited in that – Willowcrest Subdivision Drainage Improvements was over half of that with the balance being for West Lea Subdivision Drainage Improvements, Hickory Slough Detention Pond Ph. II, Mimosa Acres Subdivision Drainage Improvements, and Piper Rd. Drainage Improvements. **There are no new additional capital projects funded in the adopted 2022-26 CIP other than these. All of the 2022-26 drainage CIP projects are either completed or already in construction with the exception of the Hickory Slough Regional Detention Pond.** The Hickory Slough Regional Detention Pond is currently scheduled to start design in FY23 with construction in FY24.

Going forward for capital projects, as a starting point, the *pro forma* for the \$5 (residential) stormwater fee discussion identified \$58.8 million in capital projects from 2022-26. There are additional capital projects that need to be investigated such as East and West Circle in

the Shadycrest neighborhood and also the City-responsibility capital projects from the joint City/BDD4 Master Drainage Plan.


DRAFT - Stormwater Utility Capital Improvement Program (5-Year CIP) - \$5/ERU Fee						
12/1/2021						
Project Name	2022	2023	2024	2025	2026	Totals
Hickory Slough Regional Detention Pond (DR1905) *	363,571	333,867				697,438
Cowarts Creek Detention Pump Station Generator (DR2101) *	700,000					700,000
PER for Future Bond Referendum (DR2302) *		300,000				300,000
Master Drainage Plan update (shared with BDD4) (review of Atlas 14)		500,000				500,000
Wagon Trail Road (south of Fite to Mary's Creek) (roadside ditch and culverts)		425,000				425,000
Pine Hollow Drainage Improvements		280,000	1,740,000			2,020,000
Veterans Drainage Improvements (Walnut to Mary's Creek)		1,211,000	8,510,000			9,721,000
Isla, N. Galveston, Cheryl Drive		350,000	2,500,000			2,850,000
Tranquility Lakes Detention pump station Rehabilitation and Generator			2,418,000			2,418,000
Hickory Slough Pump Station Generator			900,000			900,000
Hatfield Road (FM518 to Hickory Slough)			550,000			550,000
Harkey Road Drainage (Josephine to Mary's Creek)			3,200,000	12,500,000		15,700,000
Longwood Estates (roadside ditch and culverts)				3,200,000		3,200,000
FIRM Map updates (Letter of Map Revisions)**				500,000	500,000	1,000,000
Twin Creek Woods/Clear Creek Estates Detention Basin				500,000	2,000,000	2,500,000
E. Plumb (Old Alvin to Barry Rose Road)				350,000		350,000
Fite Road (Harkey to McLean)				2,500,000	6,780,000	9,280,000
Southwest Quadrant of Old Town (McLean to SH35 south of Broadway)				750,000	4,150,000	4,900,000
Land Acquisition			750,000			750,000
Project Totals	1,063,571	3,399,867	20,568,000	20,300,000	13,430,000	58,761,438
Available Funds	1,063,571	4,376,335	35,418,802	32,368,135	13,435,467	
Fund Balance	0	976,468	14,850,802	12,068,135	5,467	

* Currently funded or partially funded in the CIP with Certificates of Obligation (CO). Use of the Drainage Fee would reduce or eliminate the COs.
 ** Place holder for fees and documentation requirements to work with FEMA for map revisions.
 The projects identified in the plan are preliminary with preliminary costs developed. Further evaluation and vetting will occur should the fee be approved.

Additionally, the Master Drainage Plan (MDP) identifies projects that have responsibility between the City and BDD4 that we have traditionally shared the costs via Interlocal Agreements. The projects and costs that are identified within the MDP are regional in nature and there is a benefit to their improvements to the City. The MDP identifies large and small CIP projects. The 37 smaller CIP projects total in the range of \$30 million of which the City would be responsible for somewhere between 15-50% of each individual project. The improvements consist of bringing roadside ditches and conveyance ditches to the current standard of 3-year conveyance. The projects are regional and the City would need develop agreements with Brazoria Drainage District #4 determining the level of participation based on the benefits to the City. The projects are only identified in the MDP and need to be reviewed and vetted in more detail.

Harris County Flood Control District (HCFCD) is still in the review process for the drainage study and working with the U.S. Army Corps of Engineers (USACE) to receive approval for the Clear Creek Federal project. The current 'Scenario H' modifies the project scope based on current realities including available land and detention requirements outside the scope of the original project. The current project procurement and schedule information can be found here: [Clear Creek Federal Project - January 2022](#). Several additional projects with the potential to improve drainage for residences along or near Clear Creek cannot be started until a full understanding of the Clear Creek project design and water surface elevations is available and *may also require the Clear Creek project to be completed in 2029 before they can be built.*

Big picture, the goal is to share and understand the needs more clearly and to gain broader understanding from the Pearland community and different stakeholders of the needs, gaps, and alternatives. HOW to increase level of ongoing stormwater protections will be the work over the next months.




The alternative for the stormwater fee to support a dedicated stormwater utility remains a possibility for consideration by the table after the pause and discussion of alternatives, including that fee.

Recommendation

1. Presentations about the capital improvement program achievable through the stormwater fee reflected \$58.8 million in capital projects between 2022 and 2026. Inclusive of \$1.7 million already in the approved CIP, majority new projects in that pro forma, it is advisable to commit now to Preliminary Engineering Report (PER) contract for the identified pro forma capital projects to evaluate and assess their implications and to develop more defined costs and timeframes. For reference, PERs were committed and completed prior to the 2019 bond issue and helped expedite and tune the cost estimates for those projects in advance of full engineering design. **A \$350,000 mid-year FY 22 budget amendment now (can bring a budget amendment on February 14, 2022) from unallocated General Fund balance will allow for the Council and community to have more detailed information for planning.** The suggested amount will accomplish review of approximately seven projects. New project consideration from that list of projects needs to be considered as well before proceeding with the immediate PERs to recognize projects areas such as East and West Circle Dr. in Creek View subdivision and neighboring Shadycrest subdivision and the fact that at least one project, the Cowart Creek Standby Generator, has been awarded and is already proceeding with traditional 2022 Certificate of Obligation funding.
2. **City Council establishment of a drainage capital project review committee.** A group of community members, Chamber of Commerce, advisory from BDD4, etc. and community-wide outreach and discussions, particularly in repetitive loss areas, will sharpen the project inventory. A City Council-created committee with representation and charge to report back within 90-120 days and to conduct community listening sessions, could be formulated at your February 14 meeting. The committee can review tiers of projects and financial implications

for City finances and the property taxpayers at the base \$60 million, along with \$90 million and \$120 million for analysis.

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 Channel Level of Service (LOS) <i>Existing and Recommendations in MDP</i>					
Watershed	Streams/Tributaries	Existing LOS	Alt 2	Detention Vol (ac-ft)	Cost (M) \$
Hickory Slough	Hickory	3 yr-5yr	10 yr	2,850	133
Mary's	Main Stem	5 yr-10yr	25 yr	3,480	176
	North Fork	50 yr-100 yr			
	South Fork	50 yr-100 yr			
	Weatherford (Indus)	50 yr-100 yr			
	Corrigan	50 yr-100 yr			
Cowarts Creek (CC)	CC- Upper	<3yr	10 yr	5,475	325
	CC- Lower	25 yr – 50 yr			
	Diversion	50 yr -100 yr			

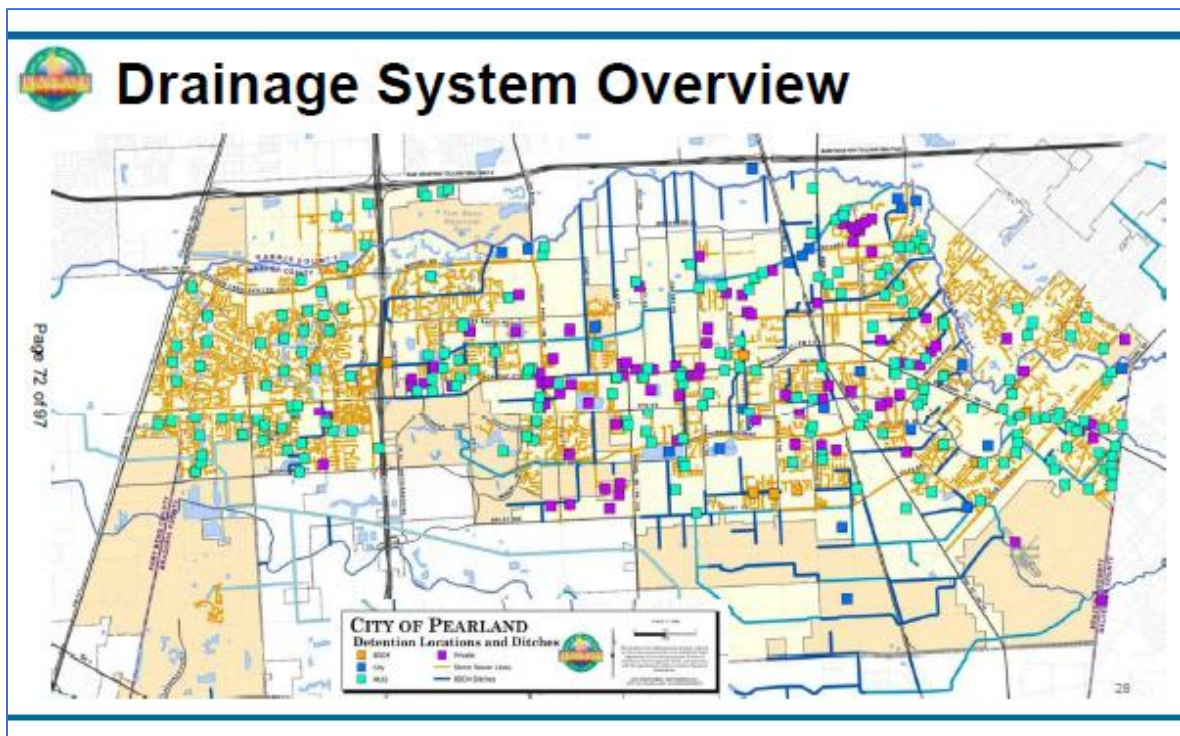
Good Conveyance system
Poor Conveyance System

32

- Concurrent with the drainage capital project review committee, for preparation and discussion with real data, the PERs for capital projects can be undertaken. The CIP can be updated, and projects reviewed by a committee over the summer of 2022 for consideration and putting to voters possibly potentially in November 2022, but no later than and most likely in May 2023. It can be presumed that the capital projects will involve a combination of smaller improvements and improving level of service from existing along the areas that were identified in the Master Drainage Plan (MDP).
- For ongoing regulation update, the most updated *rainfall frequencies analysis* (Atlas 14) by the National Oceanic and Atmospheric Administration (NOAA) has pushed the 100-year rainfall depth from 13.5 inches to 17.8 inches (approx.) for Pearland area. The new Atlas 14 rainfall data has been already adopted by HCFCD and HCFCD is currently working to prepare and implement new flood maps through the MAAPNext project. The new maps are expected to be effective by 2024 in Harris County's side of Clear Creek. **The City has to be prepared for adopting Atlas 14 and remapping of the floodplain area within the City's jurisdiction using two-dimensional hydraulic analysis consistent with MAAPnext project approach.**
- Provide community outreach and discussion for drainage operation support recommendation, either through ongoing increase to the City's O&M rate, a stormwater fee, or some additional dedicated revenue stream to provide the drainage enhancements identified above beginning in FY 23.


Background

Stormwater and floodplain management is one of the core public safety and economic viability responsibilities of the City of Pearland. Success of that responsibility entails providing Stormwater management is part of a complex and multi-faceted system consisting of closed storm sewer, open ditches, detention ponds along with major and minor tributaries owned and maintained by entities such as counties, drainage districts, city, and TxDOT. The system involves regulatory requirements for new construction and ongoing maintenance on private property. Those private systems must control and meet minimal onsite standards for stormwater but must eventually go offsite to a public system. The City of Pearland has experienced significant growth over the last several decades. Growth and the accompanying rise in development have resulted in an larger increase in the scope and complexity of the system, coupled with increased risk of flooding and demand for improved drainage system to reduce potential drainage hazard to the public and private properties.



Realizing the need for and importance of floodplain/stormwater management, the City developed Master Drainage Plan as early as 1990. The latest MDP dated 2019 has assessed the conveyance capacity of major drainage system and recommended drainage improvement (Channel widening, channel deepening, replacement of hydraulic structures, detention/mitigation volumes etc) to reduce future flood hazard. The City's MDP has made drainage improvement recommendations for major tributaries such as Hickory Slough, Mary's Creek, and Cowarts creek which ultimately drains to Clear Creek.

More than 90% (approximate) of the city drainage area drains to Clear Creek and It is evident that the efficiency of all tributaries depends on the conveyance efficiency of Clear Creek. The Clear Creek Federal Flood Risk Management Project expected to be completed in 2028 will be helpful to improve drainage conveyance and reduce flood loss. The project is a partnership between



USACE, HCFCD, BDD4. The City regularly attends the project update meetings with HCFCD and provides the needed help. Although, these major drainage improvement projects will improve the drainage capacity of major drainage system, it will not address relatively more frequent localized drainage issues resulting from older substandard drainage system. In addition to the older inefficient drainage system, there will be a need for the maintenance of newly constructed drainage infrastructure as they become older.

Furthermore, it is expected that the future drainage guidelines (eg. with Atlas 14 rainfall) will be more stringent and may be required to upsize the storm sewer system to meet future requirements while maintaining aged drainage system installed per current guideline.

References

[September 17, 2021 Capital Improvement Program \(CIP\) Update Series – Drainage and Facilities](#)

Pearlandtx.gov – [Stormwater management web page](#) hub

[Master Drainage Plan Update Phase I – Roadmap - March 2017](#) – Halff Associates on behalf of city of Pearland and Brazoria Drainage District No. 4

Pearlandtx.gov -- [Clear Creek Flood Risk Project web page](#) hub

City Council Agenda meeting item December 6, 2021 – [Resolution modifying the proposed election measure for submission to voters at the May 7, 2022 election seeking authorization to establish a Municipal Drainage Utility System pursuant to Texas Local Government Code Chapter 522](#)

Harris County Flood Control District – [C-03 Federal Flood Risk Management Project Clear Creek](#)

[Adopted City of Pearland Capital Improvement Program 2022-2026](#) – Drainage p. 13 – Summary below

CITY OF PEARLAND 2022 - 2026 CAPITAL IMPROVEMENT PROGRAM DRAINAGE									
Project No.	Project Name	Budgeted Thru 2021	2022	2023	2024	2025	2026	Project Total	2022 - 2026 Allocation
DR1903	Willowcreek Subdivision Drainage Improvements	15,025,000	-	-	-	-	-	15,025,000	
DR1904	West Lea Subdivision Drainage Improvements	5,592,000	-	-	-	-	-	5,592,000	
DR1905	Hickory Slough Regional Detention Pond	1,625,000	3,000,000	-	-	-	-	4,625,000	3,000,000
DR2101	Crowards Creek Detention Pump Station Generator	900,000	-	-	-	-	-	900,000	
DR2102	Brookland Acres Drainage Improvements	138,192	933,916	-	-	-	-	1,072,108	933,916
DR2103	Garden Rd/O'Day Rd Drainage Improvements	144,067	1,011,987	-	-	-	-	1,156,054	1,011,987
DR2104	Woody Road Drainage Improvements	283,988	-	-	-	-	-	283,988	
DR2201	Southeast Quadrant of Old Town Drainage Infrastructure	-	490,062	508,938	-	-	-	999,000	999,000
DR2301	Hickory Slough Sportsplex Detention Pond Ph 2	-	-	499,000	3,740,000	-	-	4,239,000	4,239,000
DR2302	PER for Future Bond Referendum	-	-	300,000	-	-	-	300,000	300,000
DR2401	Hickory Slough Detention Storm Water Pump Station Generator	-	-	-	900,000	-	-	900,000	900,000
TOTAL		24,609,247	5,435,965	1,307,938	4,640,000			35,993,150	11,383,903

SOURCE OF FUNDS		Budgeted Thru 2021	2022	2023	2024	2025	2026	Project Total	2022 - 2026 Allocation
Non-Debt Funded									
Other Funding Sources*		2,191,247	2,435,965					4,627,212	2,435,965
Tax Supported Debt (Debt Service Fund)									
Certificates of Obligation		200,000	1,397,438	300,000	900,000			2,797,438	2,597,438
2007 General Obligation Bonds			2,302,562	508,938				2,811,500	2,811,500
2019 General Obligation Bonds		5,196,000	16,332,000	499,000	3,740,000			25,767,000	20,571,000
Less Projects Appropriated in Previous Year									(17,032,000)
TOTAL		7,587,247	22,467,965	1,307,938	4,640,000			35,993,150	11,383,903



City of Pearland

Clay Pearson
City Manager of Pearland
3519 Liberty Drive
Pearland, Texas 77581

January 23, 2022

This memorandum is a response to the January 20, 2022 memorandum titled *City of Pearland Stormwater Utility – Alternative to Meet Capital and Operating Needs (Utility Memo)* attached hereto as Exhibit "A". I am in full concurrence with your summation under solutions.

Solution Parameters

The City Council has been briefed and received reports (recapped in background and references section herein) about the criticality and existing funding gap for capital projects and ongoing maintenance. **For the success in the future, new dollars for additional annual investment are needed for both capital and operating.**

In addition, I have heard City Engineer Robert Upton say on **no less than three** separate occasions that the City is not investing enough dollars to cover current maintenance, let alone add additional drainage capacity to comply with the new Atlas 14 rainfall amounts (± 17.8 inches).

Future Capitalization

Every stakeholder group that has been engaged in this multi year process believes that action needs to be taken to prepare for future storms that seem to be increasing in size, severity, and intensity. The discussion then turns to how to fund these drainage improvements to protect homes and businesses in our jurisdiction. The detractors of a stormwater utility fee have expressed interest in supporting a bond that would address these vital improvements.

As has been expressed multiple times, the Master Drainage Plan ("MDP") that was conducted by Brazoria Drainage District #4 ("BD4") and the City identified well over \$900M in drainage projects. These projects were broken up in to four categories as outlined in Exhibit "B".

- Large CIP Projects
- Reserve CIP Projects
- Small CIP Projects
- Small O&M Projects

The intent of the stormwater utility fee was to create a long term funding source to address projects in the Reserve CIP, Small CIP, and Small O&M categories. If the alternative to the stormwater utility fee is a bond program. **A bond program of a significant nature needs to cover the same breath of project scope and impact.**

Recommendation Comments

PER Allocations

defined costs and timelines. For reference, PERs were committed and completed prior to the 2019 bond issue and helped expedite and tune the cost estimates for those projects in advance of full engineering design. **A \$350,000 mid-year FY 22 budget amendment now (can bring a budget amendment on February 14, 2022) from unallocated General Fund balance will allow for the Council and community to have more detailed information for planning.** The suggested amount will accomplish review of approximately seven projects. New project consideration from that list of projects needs to

I am supportive of this recommendation. I would a supplemental amount to be presented at a later assuming the scope of recommendations from a bond county may exceed the current CIP.

Drainage Project Committee

2. **City Council establishment of a drainage capital project review committee.** A group of community members, Chamber of Commerce, advisory from BDD4, etc. and community-wide outreach and discussions, particularly in repetitive loss areas, will sharpen the project inventory. A City Council-created committee with representation and charge to report back within 90-120 days and to conduct community listening sessions, could be formulated at your February 14 meeting. The committee can review tiers of projects and financial implications

I am supportive of this recommendation with certain parameters.

- *The committee must have its guidance provided no later than May 15th, 2022*
- *The committee must have representation from the following stakeholder groups*
 - *Pearland Chamber of Commerce (1 member)*
 - *Alvin ISD (1 Member)*
 - *Pearland ISD (1 Member)*
 - *Brazoria Drainage District #4 (1 Member)*
 - *City Council of Pearland (3 Members (minimum 1 engineering staff))*

AK

Bond Proposal Timing

3. Concurrent with the drainage capital project review committee, for preparation and discussion with real data, the PERs for capital projects can be undertaken. The CIP can be updated, and projects reviewed by a committee over the summer of 2022 for consideration and putting to voters possibly potentially in November 2022, but no later than and most likely in May 2023. It can be presumed that the capital projects will involve a combination of smaller improvements and improving level of service from existing along the areas that were identified in the Master Drainage Plan (MDP).

I am in concurrence.

Atlas 14 Conversion

4. For ongoing regulation update, the most updated *rainfall frequencies analysis* (Atlas 14) by the National Oceanic and Atmospheric Administration (NOAA) has pushed the 100-year rainfall depth from 13.5 inches to 17.8 inches (approx.) for Pearland area. The new Atlas 14 rainfall data has been already adopted by HCFCD and HCFCD is currently working to prepare and implement new flood maps through the MAAPNext project. The new maps are expected to be effective by 2024 in Harris County's side of Clear Creek. **The City has to be prepared for adopting Atlas 14 and remapping of the floodplain area within the City's jurisdiction using two-dimensional hydraulic analysis consistent with MAAPnext project approach.**

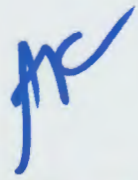
I am in concurrence.

Community Outreach

with MAAPnext project approach.

5. Provide community outreach and discussion for drainage operation support recommendation, either through ongoing increase to the City's O&M rate, a stormwater fee, or some additional dedicated revenue stream to provide the drainage enhancements identified above beginning in FY 23.

I am in concurrence. My request would be a minimum of three staff led "town halls" that would be in conjunction of the City Council appointed Bond Committee as outlined in recommendation #2.



Project Recommendations

In the Utility Memo under recommendation #2 for the City Council established drainage capital project review committee there is a note for a scope looking at \$60M, \$90M or \$120M based on additional projects. I am formally requesting these \$111M in additional projects that are notated in the MDP project list be reviewed and analyzed for addition in to our CIP for 2022-2026 with the intent to be included in any potential bond issue going to the voters.

Name of Project	Project Category	Priority	Acre/FT Mitigation	Cost in Millions
Hickory Slough Middle Segment	Large CIP	1	1010	\$ 43.20
Mary's Creek Middle Segment	Large CIP	5	1000	\$ 31.40
Mary's Creek Upper Segment	Large CIP	6	240	\$ 22.90
Hickory Slough H123-00-00	Small CIP	2	10 Yr LOS	\$ 4.30
Hickory Slough H125-02-00	Small CIP	13	10 Yr LOS	\$ 0.70
Mary's Creek B117-00-00	Small CIP	15	10 Yr LOS	\$ 1.90
Hickory Slough H123-01-00	Small CIP	24	10 Yr LOS	\$ 4.30
Cowart Creek C120-00-00	Small CIP	26	10 Yr LOS	\$ 1.50
Mary's Creek B114-01-01	Small CIP	30	10 Yr LOS	\$ 0.80
Subtotal				\$ 111.00

In closing, I am deeply appreciative of the staff and city council attention to significantly improving our drainage status in the City. It is clear from every stakeholder meeting that it is not a discussion if, but more so how we get these projects moving to protect Pearland citizens and businesses.

Sincerely,



Alex Kamkar
Councilor of Pearland

Attachments:

- Exhibit "A" – Utility Memo
- Exhibit "B" – MDP Projects
- Exhibit "C" – MDP Executive Summary
- Exhibit "D" – Capacity Analysis
- Exhibit "E" – FEMA Memo



Memo

To: Mayor and City Council members
From: Clay Pearson, City Manager
CC: Trent Epperson, Robert Upton
Date: 20 January 2022
Re: City of Pearland Stormwater Utility – Alternative to Meet Capital and operating needs

Purpose

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The dialogue and iterations for that new fee has evolved and been amended, but most recently at the City Council dais the discussion brought the beginnings of a new consensus – Step back from the advisory referendum to the public for a new dedicated stormwater fee and instead spend the next six months for community-wide dialogue on alternatives and commitment to a long-term solution for funding City of Pearland drainage needs.

Solution Parameters

The City Council has been briefed and received reports (recapped in background and references section herein) about the criticality and existing funding gap for capital projects and ongoing maintenance. **For the success in the future, new dollars for additional annual investment are needed for both capital and operating.**

Operations

Baseline *operations* is that the City has ongoing operations and maintenance as part of the Right-of-Way, Streets & Drainage Division of the Department of Engineering and Public Works (EPW). As described most recently in the Mobility update for the CIP Workshop, that division has 29 staff which is under-sized for current Pearland scope and responsibilities. Positions are moved within the division for assignments and needs, but only 6 City staff positions, inclusive of the supervisor are base funded for drainage. **The City currently has inventoried 313 miles of enclosed stormwater pipe and 145 miles of ditch/culvert.** As measure of one of the maintenance activities, for FY 21 – FY 22, there are 28,200 feet of ditch/culvert cleaning targeted for the contract. The City has a contract (currently awarded active with Texas Drainage; awarded July 2021) for ditch maintenance and excavation. The award of \$150,000 (expended \$147,210 already since July 2021) has completed 5.5 miles (28,851 linear feet) of ditch cleaning and 0.63 miles (3,348 lf) of culvert cleaning.

It is the goal of the division to establish a wholistic programmatic approach to the maintenance of the drainage infrastructure. The parameters are to review, inspect and clean the drainage system once every 10 years throughout the City. The City will be divided into 10 areas.

The program will result in a 3-fold increase to ditch cleaning (currently once every 30 years) and a 10-fold increase to enclosed pipe cleaning (currently no maintenance being conducted). **The *pro forma* for the stormwater utility fee was identified to bring just \$662,000 in new money for drainage operations in 2023 for the first full year.** The funding was identified for a new enclosed pipe cleaning crew, video inspection crew, and an associate engineer dedicated to drainage maintenance and capital solutions. Also, an enhanced ditch cleaning contract and more street sweeping.

Thus, for \$662,000 *additional annual* budget allocation, there would be dramatic and focused stormwater maintenance operations year-over-year. Additionally, based on the 2020 census (population over 100,000), the City will be a Phase II Level 4 MS4 in 2024 SWMP permit renewal with TCEQ which will require dry weather screening that include industrial stormwater sources. The new requirement will indicate a need of an ordinance to incorporate industrial stormwater sources and budget allocation of approximately \$125,000 annually. **The FY 24 amount with adding dry weather screening (required per the new MS4 permit) totals \$787,000 for operating additions from current state (*inclusive of the new MS4 permit and continuing the prior FY 23 investments*).**

The most reliable and controllable new money stream for operations and maintenance from existing possible regular City streams would be increasing the operating property tax rate. For \$787,000 in FY 24 in new money that would be approximately 0.0079 cents to the operating rate, or the GF O&M rate from \$0.3094 to \$0.3884. The challenges around 3.5% revenue cap will need to be reviewed, but the FY 22 rate was below the voter-approved rate and may provide some flexibility for FY 23 to build that up in allowable steps up.

Capital Improvements

For Capital Improvements, for reference, the 2019 bond election included \$28.498 million for drainage improvements and facilities. Five projects were cited in that – Willowcrest Subdivision Drainage Improvements was over half of that with the balance being for West Lea Subdivision Drainage Improvements, Hickory Slough Detention Pond Ph. II, Mimosa Acres Subdivision Drainage Improvements, and Piper Rd. Drainage Improvements. **There are no new additional capital projects funded in the adopted 2022-26 CIP other than these. All of the 2022-26 drainage CIP projects are either completed or already in construction with the exception of the Hickory Slough Regional Detention Pond.** The Hickory Slough Regional Detention Pond is currently scheduled to start design in FY23 with construction in FY24.

Going forward for capital projects, as a starting point, the *pro forma* for the \$5 (residential) stormwater fee discussion identified \$58.8 million in capital projects from 2022-26. There are additional capital projects that need to be investigated such as East and West Circle in

the Shadycrest neighborhood and also the City-responsibility capital projects from the joint City/BDD4 Master Drainage Plan.

DRAFT - Stormwater Utility Capital Improvement Program (5-Year CIP) - \$5/ERU Fee
12/1/2021

Project Name	2022	2023	2024	2025	2026	Totals
Hickory Slough Regional Detention Pond (DR1905) *	363,571	333,867				697,438
Cowarts Creek Detention Pump Station Generator (DR2101) *	766,000					766,000
PER for Future Bond Referendum (DR2302) *		300,000				300,000
Master Drainage Plan update (shared with BDD4) (review of Atlas 14)		500,000				500,000
Wagon Trail Road (south of Fite to Mary's Creek) (roadside ditch and culverts)		425,000				425,000
Pine Hollow Drainage Improvements		280,000	1,740,000			2,020,000
Veterans Drainage Improvements (Walnut to Mary's Creek)		1,211,000	8,510,000			9,721,000
Isla, N. Galveston, Cheryl Drive		350,000	2,500,000			2,850,000
Tranquility Lakes Detention pump station Rehabilitation and Generator			2,418,000			2,418,000
Hickory Slough Pump Station Generator			900,000			900,000
Hatfield Road (FM518 to Hickory Slough)			550,000			550,000
Harkey Road Drainage (Josephine to Mary's Creek)			3,200,000	12,500,000		15,700,000
Longwood Estates (roadside ditch and culverts)				3,200,000		3,200,000
FIRM Map updates (Letter of Map Revisions)**				500,000	500,000	1,000,000
Twin Creek Woods/Clear Creek Estates Detention Basin				500,000	2,000,000	2,500,000
E. Plumb (Old Alvin to Barry Rose Road)				350,000		350,000
Fite Road (Harkey to McLean)				2,500,000	6,780,000	9,280,000
Southwest Overpass of Old Town (McLean to SH35 south of Broadway)				750,000	4,150,000	4,900,000
Land Acquisition			750,000			750,000
Project Totals	1,063,571	3,399,867	20,568,000	20,300,000	13,430,000	58,761,438
Available Funds	1,063,571	4,376,335	35,418,802	32,368,135	13,435,467	
Fund Balance	0	976,468	14,850,802	12,068,135	5,467	

* Currently funded or partially funded in the CIP with Certificates of Obligation (CO). Use of the Drainage Fee would reduce or eliminate the COs.
 ** Place holder for fees and documentation requirements to work with FEMA for map revisions.
 The projects identified in the plan are preliminary with preliminary costs developed. Further evaluation and vetting will occur should the fee be approved.

Additionally, the Master Drainage Plan (MDP) identifies projects that have responsibility between the City and BDD4 that we have traditionally shared the costs via Interlocal Agreements. The projects and costs that are identified within the MDP are regional in nature and there is a benefit to their improvements to the City. The MDP identifies large and small CIP projects. The 37 smaller CIP projects total in the range of \$30 million of which the City would be responsible for somewhere between 15-50% of each individual project. The improvements consist of bringing roadside ditches and conveyance ditches to the current standard of 3-year conveyance. The projects are regional and the City would need develop agreements with Brazoria Drainage District #4 determining the level of participation based on the benefits to the City. The projects are only identified in the MDP and need to be reviewed and vetted in more detail.

Harris County Flood Control District (HCFCD) is still in the review process for the drainage study and working with the U.S. Army Corps of Engineers (USACE) to receive approval for the Clear Creek Federal project. The current 'Scenario H' modifies the project scope based on current realities including available land and detention requirements outside the scope of the original project. The current project procurement and schedule information can be found here: [Clear Creek Federal Project - January 2022](#). Several additional projects with the potential to improve drainage for residences along or near Clear Creek cannot be started until a full understanding of the Clear Creek project design and water surface elevations is available and *may also require the Clear Creek project to be completed in 2029 before they can be built.*

Big picture, the goal is to share and understand the needs more clearly and to gain broader understanding from the Pearland community and different stakeholders of the needs, gaps, and alternatives. HOW to increase level of ongoing stormwater protections will be the work over the next months.

The alternative for the stormwater fee to support a dedicated stormwater utility remains a possibility for consideration by the table after the pause and discussion of alternatives, including that fee.

Recommendation

1. Presentations about the capital improvement program achievable through the stormwater fee reflected \$58.8 million in capital projects between 2022 and 2026. Inclusive of \$1.7 million already in the approved CIP, majority new projects in that pro forma, it is advisable to commit now to Preliminary Engineering Report (PER) contract for the identified pro forma capital projects to evaluate and assess their implications and to develop more defined costs and timeframes. For reference, PERs were committed and completed prior to the 2019 bond issue and helped expedite and tune the cost estimates for those projects in advance of full engineering design. **A \$350,000 mid-year FY 22 budget amendment now (can bring a budget amendment on February 14, 2022) from unallocated General Fund balance will allow for the Council and community to have more detailed information for planning.** The suggested amount will accomplish review of approximately seven projects. New project consideration from that list of projects needs to be considered as well before proceeding with the immediate PERs to recognize projects areas such as East and West Circle Dr. in Creek View subdivision and neighboring Shadycrest subdivision and the fact that at least one project, the Cowart Creek Standby Generator, has been awarded and is already proceeding with traditional 2022 Certificate of Obligation funding.
2. **City Council establishment of a drainage capital project review committee.** A group of community members, Chamber of Commerce, advisory from BDD4, etc. and community-wide outreach and discussions, particularly in repetitive loss areas, will sharpen the project inventory. A City Council-created committee with representation and charge to report back within 90-120 days and to conduct community listening sessions, could be formulated at your February 14 meeting. The committee can review tiers of projects and financial implications

for City finances and the property taxpayers at the base \$60 million, along with \$90 million and \$120 million for analysis.

Channel Level of Service (LOS)
Existing and Recommendations in MDP

Watershed	Streams/Tributaries	Existing LOS	Alt 2	Detention Vol (ac-ft)	Cost (M) \$
Hickory Slough	Hickory	3 yr-5yr	10 yr	2,850	133
Mary's	Main Stem	5 yr-10yr	25 yr	3,480	176
	North Fork	50 yr-100 yr			
	South Fork	50 yr-100 yr			
	Weatherford (Indus)	50 yr-100 yr			
	Corrigan	50 yr-100 yr			
Cowarts Creek (CC)	CC- Upper	<3yr	10 yr	5,475	325
	CC- Lower	25 yr – 50 yr			
	Diversion	50 yr -100 yr			

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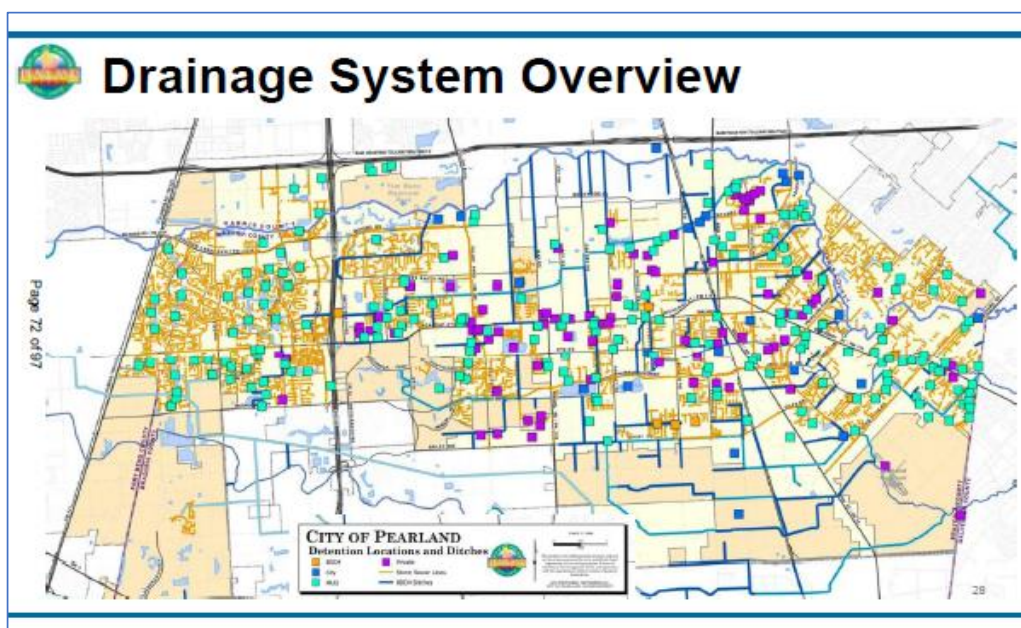
Good Conveyance system
Poor Conveyance System

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- Concurrent with the drainage capital project review committee, for preparation and discussion with real data, the PERs for capital projects can be undertaken. The CIP can be updated, and projects reviewed by a committee over the summer of 2022 for consideration and putting to voters possibly potentially in November 2022, but no later than and most likely in May 2023. It can be presumed that the capital projects will involve a combination of smaller improvements and improving level of service from existing along the areas that were identified in the Master Drainage Plan (MDP).
- For ongoing regulation update, the most updated *rainfall frequencies analysis* (Atlas 14) by the National Oceanic and Atmospheric Administration (NOAA) has pushed the 100-year rainfall depth from 13.5 inches to 17.8 inches (approx.) for Pearland area. The new Atlas 14 rainfall data has been already adopted by HCFCD and HCFCD is currently working to prepare and implement new flood maps through the MAAPNext project. The new maps are expected to be effective by 2024 in Harris County's side of Clear Creek. **The City has to be prepared for adopting Atlas 14 and remapping of the floodplain area within the City's jurisdiction using two-dimensional hydraulic analysis consistent with MAAPnext project approach.**
- Provide community outreach and discussion for drainage operation support recommendation, either through ongoing increase to the City's O&M rate, a stormwater fee, or some additional dedicated revenue stream to provide the drainage enhancements identified above beginning in FY 23.


Background

Stormwater and floodplain management is one of the core public safety and economic viability responsibilities of the City of Pearland. Success of that responsibility entails providing Stormwater management is part of a complex and multi-faceted system consisting of closed storm sewer, open ditches, detention ponds along with major and minor tributaries owned and maintained by entities such as counties, drainage districts, city, and TxDOT. The system involves regulatory requirements for new construction and ongoing maintenance on private property. Those private systems must control and meet minimal onsite standards for stormwater but must eventually go offsite to a public system. The City of Pearland has experienced significant growth over the last several decades. Growth and the accompanying rise in development have resulted in an larger increase in the scope and complexity of the system, coupled with increased risk of flooding and demand for improved drainage system to reduce potential drainage hazard to the public and private properties.



Realizing the need for and importance of floodplain/stormwater management, the City developed Master Drainage Plan as early as 1990. The latest MDP dated 2019 has assessed the conveyance capacity of major drainage system and recommended drainage improvement (Channel widening, channel deepening, replacement of hydraulic structures, detention/mitigation volumes etc) to reduce future flood hazard. The City's MDP has made drainage improvement recommendations for major tributaries such as Hickory Slough, Mary's Creek, and Cowarts creek which ultimately drains to Clear Creek.

More than 90% (approximate) of the city drainage area drains to Clear Creek and It is evident that the efficiency of all tributaries depends on the conveyance efficiency of Clear Creek. The Clear Creek Federal Flood Risk Management Project expected to be completed in 2028 will be helpful to improve drainage conveyance and reduce flood loss. The project is a partnership between



USACE, HCFCD, BDD4. The City regularly attends the project update meetings with HCFCD and provides the needed help. Although, these major drainage improvement projects will improve the drainage capacity of major drainage system, it will not address relatively more frequent localized drainage issues resulting from older substandard drainage system. In addition to the older inefficient drainage system, there will be a need for the maintenance of newly constructed drainage infrastructure as they become older.

Furthermore, it is expected that the future drainage guidelines (eg. with Atlas 14 rainfall) will be more stringent and may be required to upsize the storm sewer system to meet future requirements while maintaining aged drainage system installed per current guideline.

References

[September 17, 2021 Capital Improvement Program \(CIP\) Update Series – Drainage and Facilities](#)

Pearlandtx.gov – [Stormwater management web page](#) hub

[Master Drainage Plan Update Phase I – Roadmap - March 2017](#) – Half Associates on behalf of city of Pearland and Brazoria Drainage District No. 4

Pearlandtx.gov -- [Clear Creek Flood Risk Project web page](#) hub

City Council Agenda meeting item December 6, 2021 – [Resolution modifying the proposed election measure for submission to voters at the May 7, 2022 election seeking authorization to establish a Municipal Drainage Utility System pursuant to Texas Local Government Code Chapter 522](#)

Harris County Flood Control District – [C-03 Federal Flood Risk Management Project Clear Creek Adopted City of Pearland Capital Improvement Program 2022-2026](#) – Drainage p. 13 – Summary below

CITY OF PEARLAND 2022 - 2026 CAPITAL IMPROVEMENT PROGRAM DRAINAGE									
Project No.	Project Name	Budgeted Thru 2021	2022	2023	2024	2025	2026	Project Total	2022 - 2026 Allocation
DR1903	Willowcrest Subdivision Drainage Improvements	15,925,000	-	-	-	-	-	15,925,000	
DR1904	West Lea Subdivision Drainage Improvements	5,592,000	-	-	-	-	-	5,592,000	
DR1905	Hickory Slough Regional Detention Pond	1,625,000	3,000,000	-	-	-	-	4,625,000	3,000,000
DR2101	Cowarts Creek Detention Pump Station Generator	900,000	-	-	-	-	-	900,000	
DR2102	Brookland Area Drainage Improvements	138,192	933,935	-	-	-	-	1,072,127	933,935
DR2103	Garden Road/Daw Rd Drainage Improvements	144,067	1,011,987	-	-	-	-	1,156,054	1,011,987
DR2104	Woody Road Drainage Improvements	283,988	-	-	-	-	-	283,988	
	Southeast Quadrant of Old Town Drainage	-	-	-	-	-	-	-	-
DR2201	Infrastructure	-	490,062	508,938	-	-	-	999,000	999,000
DR2301	Hickory Slough Sportsplex Detention Pond Ph 2	-	-	490,000	3,740,000	-	-	4,230,000	4,230,000
DR2302	PER for Future Bond Referendum	-	-	300,000	-	-	-	300,000	300,000
DR2401	Hickory Slough Detention Storm Water Pump Station Generator	-	-	-	900,000	-	-	900,000	900,000
	TOTAL	24,609,247	5,435,965	1,307,938	4,640,000			35,963,150	11,383,903

SOURCE OF FUNDS									
	Budgeted Thru 2021	2022	2023	2024	2025	2026	Project Total	2022 - 2026 Allocation	
Non-Debt Funded									
Other Funding Sources*	2,191,247	2,435,965					4,627,212	2,435,965	
Tax Supported Debt (Debt Service Fund)									
Certificates of Obligation	200,000	1,397,438	300,000	600,000			2,797,438	2,697,438	
2007 General Obligation Bonds		2,302,662	508,938				2,811,600	2,811,600	
2019 General Obligation Bonds	5,186,000	16,332,000	499,000	3,740,000			25,757,000	20,671,000	
Less Projects Appropriated in Previous Year								(17,032,000)	
TOTAL	7,577,247	22,467,965	1,307,938	4,640,000			35,963,150	11,383,903	

11.0 Implementation Plan

As part of the Pearland and Brazoria Drainage District No. 4 Master Drainage Plan Update, an implementation plan was prepared to help prioritize the projects and provide guidance on the size, scope and order of projects moving forward. The plan is intended to be a stand-alone document and, as such, include some of the same information presented in this report including:

- A discussion of the study background and goals
- Some of the limitations of the plan
- Existing Flood Damages
- Flood Reduction Strategies
- Flood Reduction Metrics and Project Prioritization
- Project Recommendations
- A breakdown of recommended projects into smaller projects
- A general timeline for implementation

The implementation plan is based on current conditions and information and will likely need to be adapted over time. The full implementation plan, including project fact sheets for the recommended Large CIP projects, is provided in **Appendix G**. The tables provided below include recommendations for each of the four project categories discussed:

- **Large CIP Projects:** Top 10 scoring main channel segment projects, will need to be phased
- **Reserve CIP Projects:** Main channel projects that rank from 11-15 and may provide benefits
- **Small CIP:** Local ditch projects from the Top 50 that cost more than \$500k
- **Small O&M:** Local ditch projects from the Top 50 that cost less than \$500k

Each of these project categories should be considered in the CIP planning proceed for both the City of Pearland and BDD4. It should be noted that the Large CIP and Reserve CIP projects will most likely need to be phased in order to implement within budget. The Large CIP fact sheets have a potential phasing breakdown and cost estimate for each of the Top 10 recommended projects.

Table 23 - Large Capital Improvement Project (CIP) Recommendations

PROJECT PRIORITY	WATERSHED SEGMENT	PROJECT DESCRIPTION	PROJECT COSTS (M)			
			CHANNEL	DETENTION	ROW	TOTAL
1	Hickory Slough Middle Segment	100-year LOS; Channel modifications from Cullen Blvd. to Garden Rd. and 1010 ac-ft mitigation. Max ROW width of 170 ft.	\$6.7	\$19.2	\$17.3	\$43.2
2 +	Cowart Creek Segment 16	10-year LOS; Channel modifications from Wells Dr. to BNSF Railroad. Max ROW width of 200 ft.	\$2.1	-	\$5.2	\$7.3
3	West Fork Chocolate Cold River Ranch Ditch	100-year LOS; Channel modifications from Rio Lindo St. to Hwy 6 and 580 ac-ft mitigation. Max ROW width of 180 ft.	\$6.4	\$10.4	\$4.2	\$21.0
4	Cannon Ditch Segment 2	100-year LOS; Channel modifications from Pearland Site Rd. to Amoco Industrial St. and 9800 ac-ft mitigation. Max ROW width of 120 ft.	\$4.8	\$37.5	\$4.2	\$46.5
5	Mary's Creek Upper Segment	25-year LOS; Channel modifications from B129-01-00 to McLean Rd. and 240 ac-ft mitigation. Max ROW width of 250 ft.	\$10.5	\$4.5	\$7.9	\$22.9
6 +	Mary's Creek Middle Segment	25-year LOS; Channel modifications from Magnolia Dr. to SH35 and 1000 ac-ft mitigation. Max ROW width of 250 ft.	\$10.7	\$17.6	\$3.1	\$31.4
7	Mustang Bayou Upper Segment	25-year LOS; Channel modifications from CR521 to Airline Rd and 890 ac-ft mitigation. Max ROW width of 240 ft.	\$10.7	\$44.4	\$46.9	\$102.0
8	Mary's Creek Lower Segment	25-year LOS; Channel modifications from SH35 to downstream of Pearland Pkwy. and 1670 ac-ft mitigation. Max ROW width of 220 ft.	\$14.8	\$55.2	\$51.8	\$121.8
9	Mustang Bayou Middle Segment	25-year LOS; Channel modifications from Airline Rd. to SH288 and 1070 ac-ft mitigation. Max ROW width of 260 ft.	\$5.8	\$31.9	\$22.8	\$60.5
10	Hickory Slough Lower Segment	10-year LOS; Channel modifications from Garden Rd. to SH35 and 1310 ac-ft mitigation. Max ROW width of 170 ft.	\$12.4	\$24.7	\$15.2	\$52.3

† Detention is included in downstream segment; however, mitigation will be required for conveyance improvements and should be evaluated in the PER Phase

Table 24 - Reserve Capital Improvement Project (CIP) Recommendations

PROJECT PRIORITY	WATERSHED SEGMENT	PROJECT DESCRIPTION	PROJECT COSTS			
			CHANNEL	DETENTION	ROW	TOTAL
11	West Chocolate Bayou CR 383 Ditch	5-year LOS; Channel modifications from E101-02-00 to confluence with West Fork Chocolate Bayou and 1260 ac-ft mitigation. Max ROW width of 190 ft.	\$8.90	\$27.60	\$215.70	\$252.20
12	West Fork Chocolate Bayou	5-year LOS; Channel modifications from county boundary to confluence with E101-00-00 and 3700 ac-ft mitigation. Max ROW width of 260 ft.	\$16.10	\$69.50	\$17.90	\$103.50
13	Hickory Slough Upper Segment	100-year LOS; Channel modifications from CR 94 to confluence with H126-00-00 and 280 ac-ft mitigation. Max ROW width of 170 ft.	\$2.40	\$19.60	\$34.70	\$56.70
14 †	East Chocolate Bayou E103-00-00	10-year LOS; Channel modifications from SH288 to confluence with Rodeo Palms Ditch and 2210 ac-ft mitigation. Max ROW width of 220 ft.	\$1.70	-	\$0.70	\$2.40
15 †	West Fork Chocolate Cold River Ranch Ditch	5-year LOS; Channel modifications from Hwy 6 to confluence with West Fork Chocolate Bayou and 50 ac-ft mitigation. Max ROW width of 250 ft.	\$8.70	-	\$1.20	\$9.90

† Detention is included in downstream segment; however, mitigation will be required for conveyance improvements and should be evaluated in the PER Phase

Table 25 - Small Capital Improvement Project (CIP) Recommendations

DITCH PRIORITY	WATERSHED	DITCH	3-YR LOS		10-YR LOS	
			TOP WIDTH	COST	TOP WIDTH	COST
1	Cowart Creek	C123-00-00	56	\$ 918,000	66	\$ 1,161,000
2	Hickory Slough	H123-00-00	311	\$ 3,017,000	451	\$ 4,356,000
3	Chocolate Bayou	E100-00-00	72	\$ 1,490,000	91	\$ 1,946,000
4	Cowart Creek	C118-00-00	37	\$ 961,000	41	\$ 1,199,000
5	Cowart Creek	C122-00-00	71	\$ 1,069,000	83	\$ 1,332,000
6	West Chocolate	E101-01-06	66	\$ 806,000	80	\$ 1,029,000
7	Chigger Creek	J101-02-00	146	\$ 2,401,000	171	\$ 2,920,000
8	Cowart Creek	C128-00-00	34	\$ 671,000	40	\$ 864,000
9	Chigger Creek	J102-05-01	50	\$ 1,492,000	60	\$ 1,910,000
10	Cowart Creek	C120-01-00	26	\$ 632,000	26	\$ 776,000
11	Cowart Creek	C124-01-00	42	\$ 551,000	49	\$ 701,000
12	Clear Creek	A105-05-00	83	\$ 847,000	101	\$ 1,074,000
13	Hickory Slough	H125-02-00	158	\$ 718,000	159	\$ 772,000
14	Cowart Creek	C107-03-01	35	\$ 784,000	39	\$ 984,000
15	Mary's Creek	B117-00-00	33	\$ 1,545,000	37	\$ 1,929,000
16	Hickory Slough	H114-00-00	34	\$ 1,124,000	38	\$ 1,421,000
17	West Chocolate	E101-01-01	52	\$ 648,000	60	\$ 810,000
18	Clear Creek	A113-00-00	34	\$ 665,000	34	\$ 799,000
19	Mary's Creek	B102-01-01	56	\$ 499,000	66	\$ 631,000
20	Chocolate Bayou	E102-00-00	50	\$ 1,009,000	67	\$ 1,373,000
21	Clear Creek	A115-00-00	39	\$ 1,132,000	44	\$ 1,420,000
22	Cowart Creek	C124-00-00	34	\$ 669,000	35	\$ 805,000
23	Cowart Creek	C119-00-00	28	\$ 698,000	30	\$ 875,000
24	Hickory Slough	H123-01-00	311	\$ 3,017,000	451	\$ 4,356,000
25	Clear Creek	A116-00-00	25	\$ 870,000	33	\$ 1,181,000
26	Cowart Creek	C120-00-00	91	\$ 1,216,000	110	\$ 1,534,000
27	Cowart Creek	C100-00-00	28	\$ 532,000	31	\$ 676,000
28	Clear Creek	A111-00-00	31	\$ 989,000	34	\$ 1,241,000
29	Chigger Creek	J101-02-01	94	\$ 1,094,000	114	\$ 1,382,000
30	Mary's Creek	B114-01-01	37	\$ 660,000	43	\$ 843,000
31	Cowart Creek	CR 414 Ditch	21	\$ 775,000	23	\$ 993,000
32	Cowart Creek	C101-00-00	60	\$ 2,659,000	79	\$ 3,580,000
33	Chigger Creek	J102-00-00	116	\$ 3,312,000	160	\$ 4,525,000
34	Hickory Slough	H125-01-00	50	\$ 1,141,000	50	\$ 1,330,000
35	Hickory Slough	C103-03-00	39	\$ 535,000	42	\$ 657,000
36	Cowart Creek	Cowart's Creek Ditch	35	\$ 784,000	39	\$ 984,000

Table 26 - Small O&M Project Recommendations

DITCH PRIORITY	WATERSHED	DITCH	3-YR LOS		10-YR LOS	
			TOP WIDTH	COST	TOP WIDTH	COST
1	Chigger Creek	J101-01-01	61	\$ 190,000	139	\$ 238,000
2	Chigger Creek	J101-01-00	16	\$ 233,000	19	\$ 298,000
3	Clear Creek	A122-00-00	34	\$ 479,000	35	\$ 583,000
4	Chigger Creek	J101-01-01	23	\$ 239,000	26	\$ 309,000
5	Cowart Creek	C105-01-00	34	\$ 77,000	41	\$ 100,000
6	Cowart Creek	B102-01-03	33	\$ 217,000	38	\$ 278,000
7	Cowart Creek	C107-10-01	62	\$ 429,000	71	\$ 546,000
8	Clear Creek	A121-01-00	42	\$ 397,000	50	\$ 511,000
9	Cowart Creek	C125-00-00	22	\$ 193,000	23	\$ 241,000
10	Cowart Creek	C107-01-02	24	\$ 244,000	28	\$ 319,000
11	Cowart Creek	C107-04-01	31	\$ 361,000	34	\$ 453,000
12	Hickory Slough	H111-00-00	30	\$ 85,000	30	\$ 103,000
13	Chocolate Bayou	E100-01-01	56	\$ 430,000	72	\$ 572,000

Exhibit "C"



CITY OF PEARLAND
BRAZORIA DRAINAGE DISTRICT NO. 4

MASTER DRAINAGE PLAN UPDATE

FINAL REPORT

HALFF ASSOCIATES, INC.
JULY 2019



Executive Summary

Over the last several decades, the City of Pearland (City) and Brazoria Drainage District No. 4 (BDD4) have experienced significant growth. This growth and the accompanying rise in development have resulted in an increased risk of flooding, which can present hazards to the public and property. To more effectively identify flood risks, plan drainage improvements, and consider regulatory measures aimed at minimizing negative development impacts, the City and BDD4 initiated a two-phase effort with Halff Associates, Inc. (Halff) to update and combine the master drainage plans for Pearland and BDD4 into one document, along with updated hydrologic and hydraulic modeling for all major streams within the study area and provide a capacity analysis for more than 90 miles of local drainage ditches.

ES.1 Master Plan Background

The previous Master Drainage Plans were developed in the late 1990's. Within the nearly 20 years since the current plans were completed, the City and BDD4 have successfully implemented numerous projects, including channel improvements, channel diversions, regional detention facilities, and storm sewer improvements. The intent of this master plan update is to leverage the success of these efforts and to modernize the plan based on physical changes to the area, changes in City and BDD4 goals, changes in modeling technologies, and changes in the CIP funding of both the City and BDD4 since the last plan.

The master planning update effort considered these past drainage improvements but focused on how to manage drainage issues along the bayous and major ditches as the area continues to develop. Updating the current hydrologic and hydraulic modeling will facilitate future development growth by better informing citizens of their potential flood risk as well as identifying and prioritizing drainage improvements needed to reduce flooding risk. The evaluation of local drainage infrastructure (roadside ditches or storm sewers) was not included in this master plan, where the emphasis was on channel capacity and detention projects needed to meet the desired level of service (i.e. 100-year or other) for the major streams.

Pearland and BDD4 has long history of flooding, with damages dating back to the 1970s. The region has experienced several significant flooding events, with the most recent event being Hurricane Harvey in 2017. According to the City of Pearland's Hurricane Harvey Drainage Assessment Report, the rainfall ranged from 30 to 49 inches for the City and surrounding area over 4 days, which resulted in widespread damage. Approximately 1,080 properties experienced minor damage while 641 properties had major damage based on City of Pearland's Hurricane Harvey Drainage Assessment Report.

ES.2 Study Area Description

The City and BDD4 Master Plan area lies in the northern part of Brazoria County and consists of the shared boundary of the City and BDD4, which encompasses a combined area of nearly 97 square miles. The area is generally bound by Clear Creek to the north and FM 521 to the west. The Galveston County line serves as the primary eastern boundary. A majority of BDD4 is located north of SH6, except for a small area near the Fort Bend County line. Major streams to be included in the study will be Clear Creek, Hickory Slough, Mary's Creek, Cowart Creek, Chigger Creek, West Fork of Chocolate Bayou, and Mustang Bayou. The western half of the study area is generally flat while the eastern half has more elevation change as the ground slopes down to Clear Creek. The dominant flow direction across the study area is west to east, with the exception of Chocolate Bayou, which generally flows from north to south. The majority of the City of Pearland is developed with a majority of residential, commercial development along major roadways, pockets of industrial use, and some institutional and parks/open space. There is significantly less development in the Cowart and Chigger Creek watersheds, with large rural tract predominant in the area. Mustang is similar to Cowart; however, there are some residential areas surrounding SH288. Chocolate Bayou has a mix of newly developed residential areas, mostly north of SH6, and undeveloped open space to the south.

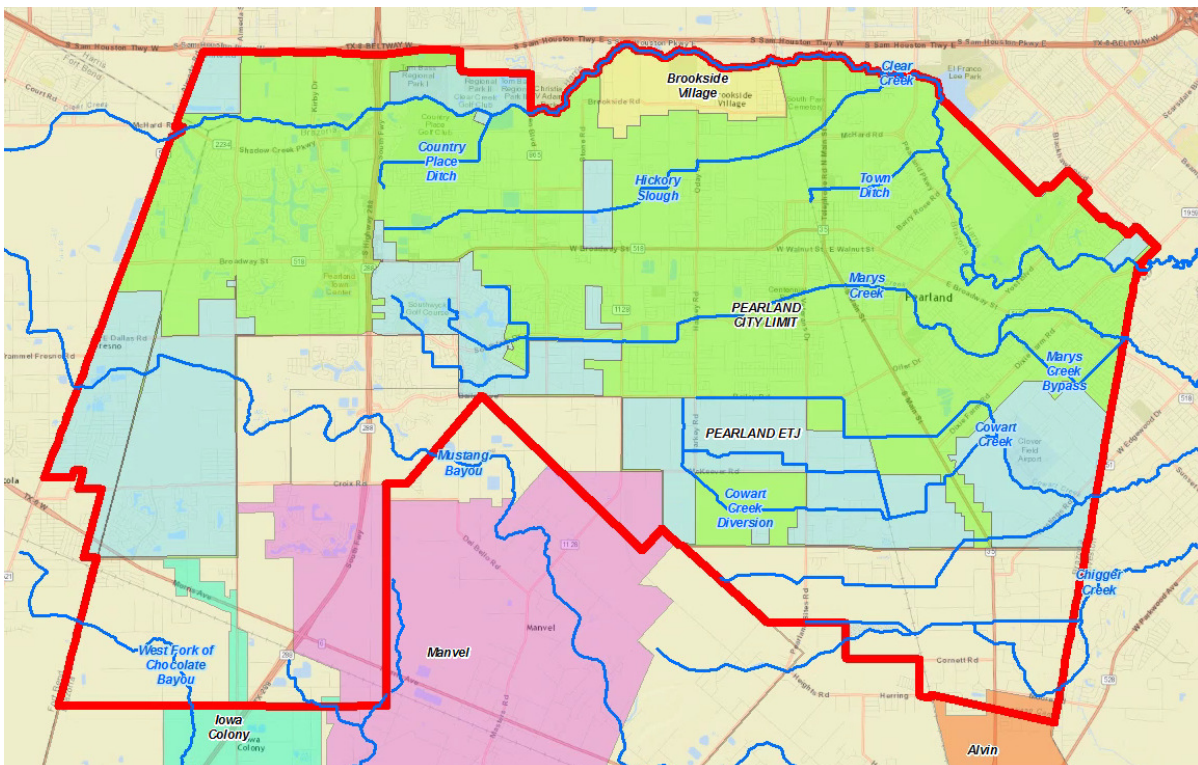


Figure ES1. Master Drainage Plan Area

ES.3 Data Collection

Information relevant to the watershed and beneficial to this study was collected including previous drainage reports, the FEMA hydrologic and hydraulic models (effective modeling), historical rainfall and gage information, and field data. Updated FEMA mapping, developed through Risk Map 6, was included as well as FEMA flood claim and Hurricane Harvey damage data. A significant field investigation effort was conducted to document the existing conditions drainage in the watersheds. The field reconnaissance and collected data were reviewed and used to create a comprehensive database of available drainage information from various sources. The model and field data inventory were utilized during the modeling update process and helped facilitate the City and BDD4 managing their data more effectively.

ES.4 Existing Conditions Model Updates

A major component of this study was updating the existing conditions modeling. Halff, in conjunction with the City and BDD4, updated the hydrologic models to reflect changes in the development and major channel and detention projects. Updates to the hydrology were performed in accordance with HCFCD methodology to maintain consistency with previous HCFCD studies for Clear Creek. Differences in peak flow rates between the revised existing conditions (Halff) and the current FEMA models can be attributed to significant differences in development levels and storage routing.

The FEMA effective hydraulic models for the major streams were converted to the most current version of HEC-RAS and then revised to account for changes in terrain (based on 2008 LiDAR) and new hydraulic structure data. New hydraulic models were developed for the areas where no previous models were available, which included Mustang Bayou, East Fork Chocolate Bayou, and West Fork Chocolate Bayou. Hickory Slough and Mary's Creek were modeled using unsteady HEC-RAS to more effectively capture the impact of multiple regional detention ponds.

The existing modeling results showed that most of the major streams within the study area have less than a 3-year capacity. Mary's Creek provides approximately 5-year capacity and portions of Cowart have upwards of 25- to 5-year capacity. There are a few ditches or major bayou segments higher capacity, but the majority of the existing channels provide limited conveyance. The flat terrain and low existing capacity of the major streams result in wide floodplains, resulting in large areas experiencing flooding from relatively frequent storms. In addition, the existing conveyance capacity of local drainage ditches located throughout the study area was evaluated, and the capacity estimations indicated that many of these local ditches do not have the capacity necessary to adequately convey runoff to receiving channels.

ES.5 Flood Reduction Analysis

Two flood reduction alternatives were evaluated for the entire study area based on a desired carrying capacity or level of service (LOS). Alternative 1 was developed to provide the 100-year LOS for each of the major watersheds. Alternative 2 was developed to provide a lower cost improvement, but still show significant flood reduction benefits. The Alternative 2 LOS varied by channel and depended on the existing channel capacity; the goal being to provide an increase of 1-2 levels of service. For example, the goal for a channel with less than 3-year capacity would be to get 5- to 10-year capacity.

The focus of the flood reduction alternative analysis was on structural improvements throughout the study watersheds, specifically channel conveyance improvements and regional detention. Channel improvements consisted of widening the existing channel and providing a uniform, trapezoidal shape. Detention was provided for both reduction of peak discharges as well as for mitigation of flow increases associated with channel conveyance modifications. Bridges and culverts were upsized where necessary to reflect the widened top width of the channels due to proposed channel conveyance improvements and to reduce hydraulic restrictions, which contribute to flooding along the major streams.

While the intent of the flood reduction measures is to address existing flooding concerns within the Pearland BDD4 area, the planning effort considered future development conditions (i.e. ultimate build-out) to ensure that improvements provide the necessary long-term protection. Future conditions hydrology accounted for increases to impervious cover associated with expected development, which result in increased runoff volumes. The future conditions flows were used to size the proposed channel conveyance improvements and detention ponds for the two different flood reduction alternatives.

ES.6 Flood Reduction Project Recommendations

The study resulted in the recommendation of major projects in 29 separate stream segments, which will address flood reduction needs across the entire project area. Each of these projects is comprised of multiple components including detention and channel conveyance improvements. Given the diverse development conditions across the watershed, a variety of metrics were used to prioritize projects. Traditional benefit-cost analyses (BCA) were considered for project prioritization using information from a Flood Damage Assessment; however, the limited number of structures in watersheds like Cowart, Chigger, and Mustang, would result in those projects being pushed way down the priority list. A “Prioritization Based on Need” assessment was developed, which scored projects based on the number of structures at risk for the 10- and 100-year rainfall events, the number of flood insurance claims, and the channel level of service. In addition, an evaluation was performed of the inundation removed from

structures, land acreage, and roadway miles. These metrics provided a bit more balanced comparison of the projects in the different watersheds, but those areas with higher levels of development are still heavily favored. Finally, the development potential and projected future buildout timeframes were considered, this measure gave some weight to those watersheds that are still largely undeveloped but may experience growth in the future. The various metrics were weighted to provide a single score for each project, which was used to set the priority. It should be noted that many of the more rural projects would fall under the jurisdiction of BDD4 alone, and as such should be considered separately from projects in the City of Pearland. Recommended projects are listed in the table below.

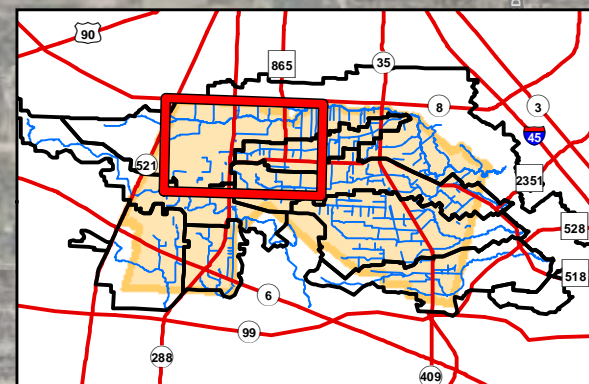
ES.7 Implementation Planning

An implementation plan was developed to help outline a path forward for the recommended projects provided in the study. The plan includes the development of a project prioritization methodology and identification of the projects to be completed both for major creeks and bayous as well as local ditches. Specific projects are listed in the tables below. Projects were divided into 4 categories:

- **Large CIP Projects:** Top 10 scoring main channel segment projects, will need to be phased
- **Reserve CIP Projects:** Main channel projects that rank from 11-15 and may provide benefits
- **Small CIP:** Local ditch projects from the Top 50 that cost more than \$500k
- **Small O&M:** Local ditch projects from the Top 50 that cost less than \$500k

The primary challenges to implementation of flood reduction measures include project costs, ROW acquisition, environmental constraints, and utility conflicts. ROW availability was a significant issue in developing proposed alternatives throughout the watershed, particularly within the City of Pearland where high levels of urbanization limit the amount of undeveloped land for drainage improvements. ROW will be needed for both the conveyance improvements and the associated detention to mitigate any potential flow impacts. Another major concern is potential utility conflicts with large oil and gas pipelines that are located throughout the watershed. Environmentally sensitive areas or areas with identified cultural resources need to also be considered and avoided when possible.

The work completed as part of this master drainage plan study represent a major effort in streamlining and modernizing the drainage analysis for the City and BDD4. The updated hydrologic and hydraulic modeling will help facilitate more efficient updates to the master plan in the future as the area continues to develop in order to more accurately identify and manage flooding risks. The development of flood reduction alternatives and supporting analysis and cost estimates will benefit the City and BDD4 as they plan out their short-term and long-term Capital Improvement Planning.



**CITY OF PEARLAND
BRAZORIA DD4
MASTER DRAINAGE PLAN
UPDATE - PHASE II**

**EXHIBIT 8B
EXISTING
CHANNEL CAPACITY
ANALYSIS**

July 2019
AVO 32516



1 in = 1,500 feet



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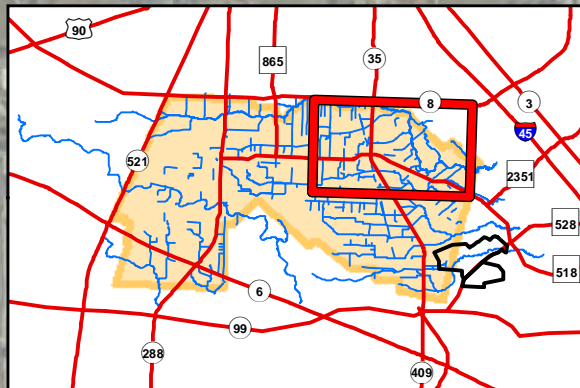
Legend

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- BDD4_Channels
 ▭ Pearlland/BDD4 Watersheds
 ▭ Pearlland/BDD4 MDP Area
 ▭ County Line
- Capacity Analysis Channels
- 100yr
 - 50yr
 - 25yr
 - 10yr
 - 5yr
 - 3yr
 - <3yr

**Fort Bend
County**

Harris County

**Brazoria
County**



CITY OF PEARLAND
BRAZORIA DD4
MASTER DRAINAGE PLAN
UPDATE - PHASE II

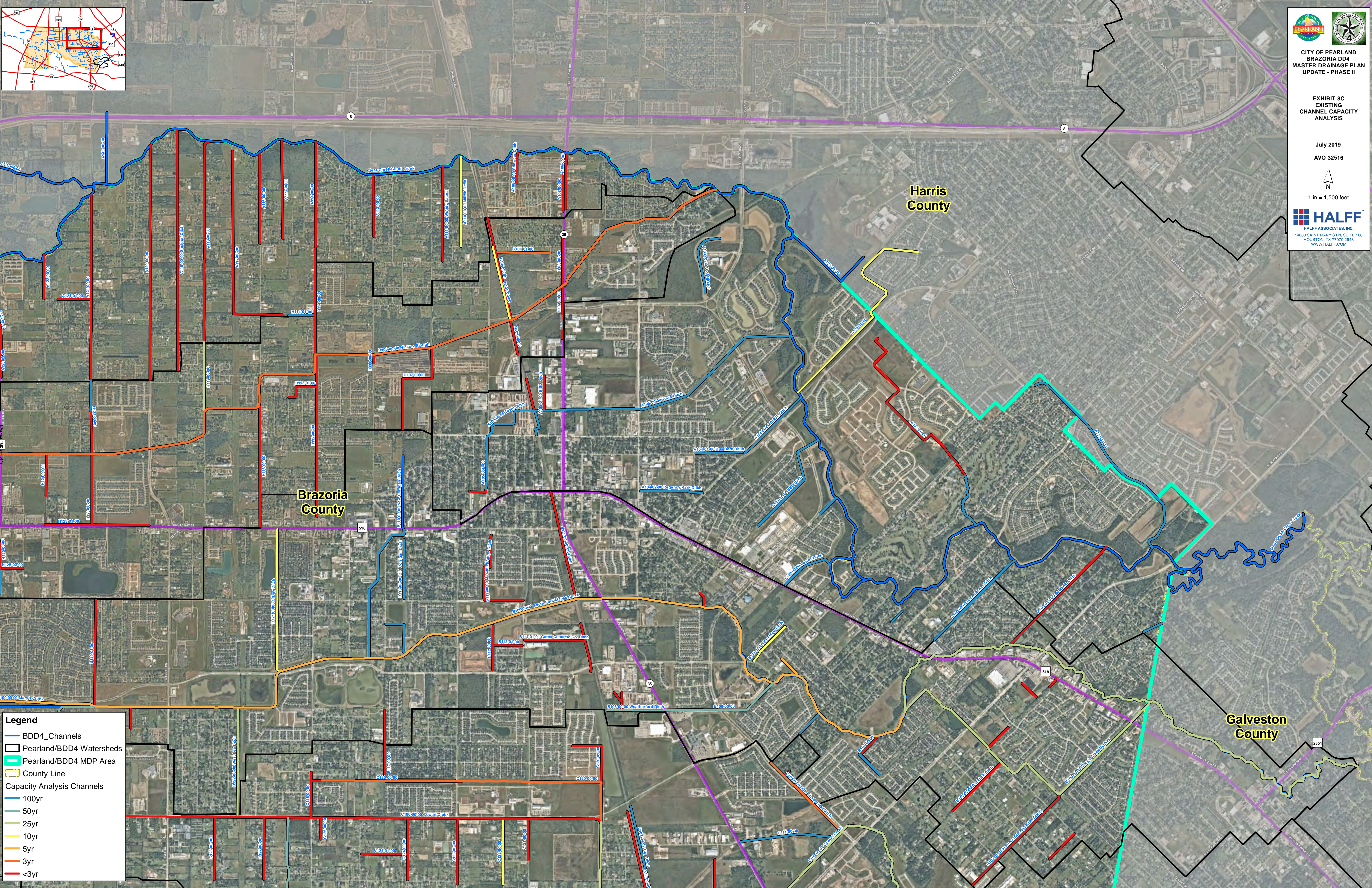
EXHIBIT 8C
EXISTING
CHANNEL CAPACITY
ANALYSIS

July 2019

AVO 32516

1 in = 1,500 feet

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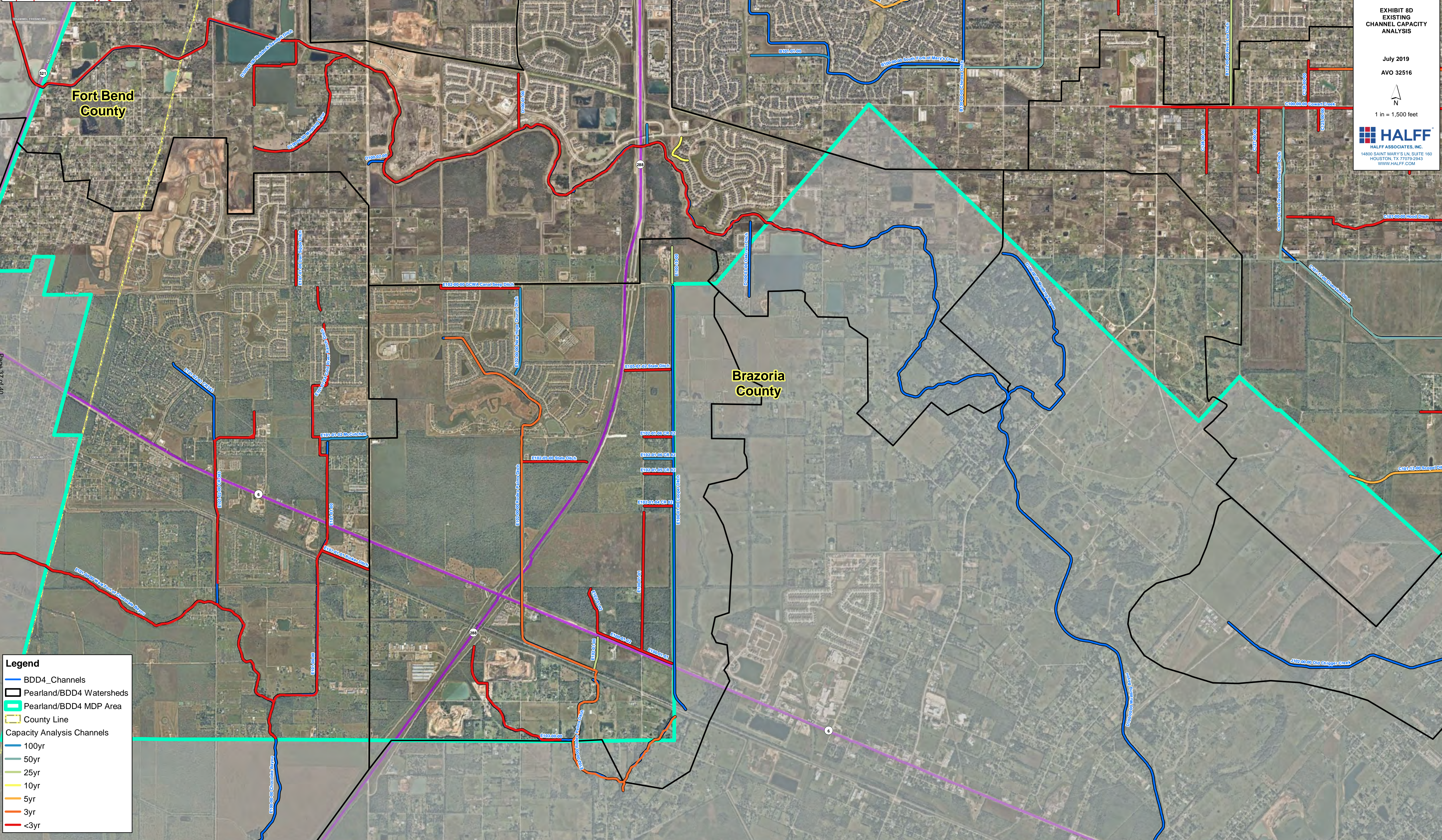


Legend

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- County Line

Capacity Analysis Channels

- 100yr
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FEMA Updates Its Flood Insurance Rating Methodology to Deliver More Equitable Pricing

Release Date: April 1, 2021

WASHINGTON—FEMA is updating the National Flood Insurance Program's pricing methodology to communicate flood risk more clearly, so policyholders can make more informed decisions on the purchase of adequate insurance and on mitigation actions to protect against the perils of flooding.

The 21st century rating system, Risk Rating 2.0—Equity in Action, provides actuarially sound rates that are equitable and easy to understand. It transforms a pricing methodology that has not been updated in 50 years by leveraging improved technology and FEMA's enhanced understanding of flood risk.

"The new pricing methodology is the right thing to do. It mitigates risk, delivers equitable rates and advances the Agency's goal to reduce suffering after flooding disasters," said David Maurstad, senior executive of FEMA's National Flood Insurance Program. "Equity in Action is the generational change we need to spur action now in the face of changing climate conditions, build individual and community resilience, and deliver on the Biden Administration's priority of providing equitable programs for all."

The National Flood Insurance Program provides about \$1.3 trillion in coverage for more than 5 million policyholders in 22,500 communities across the nation. Understanding the magnitude of even the smallest changes of a program of this scale, FEMA devoted thousands of hours to develop the new pricing methodology to ensure equity and accuracy.

In developing the new rates, FEMA coordinated with subject matter experts from the U.S. Army Corps of Engineers, U.S. Geological Survey and the National Oceanic and Atmospheric Administration along with experts from across the insurance industry and actuarial science to ensure alignment with federal regulations, systems, guidance and policies.



The new methodology allows FEMA to equitably distribute premiums across all policyholders based on the value of their home and the unique flood risk of their property. Currently, many policyholders with lower-value homes are paying more than they should and policyholders with higher-value homes are paying less than they should.

To provide more equity, FEMA now has the capability and tools to address rating disparities by incorporating more flood risk variables. These include flood frequency, multiple flood types—river overflow, storm surge, coastal erosion and heavy rainfall—distance to a water source and property characteristics such as elevation and the cost to rebuild.

The cost to rebuild is key to an equitable distribution of premiums across all policyholders because it is based on the value of their home and the unique flood risk of their property. This has been an industry standard for years.

FEMA is conscious of the far-reaching economic impacts COVID-19 has had on the nation and existing policyholders and is taking a phased approach to rolling out the new rates.

- **In Phase I:** New policies beginning Oct. 1, 2021 will be subject to the new rating methodology. Also beginning Oct. 1, existing policyholders eligible for renewal will be able to take advantage of immediate decreases in their premiums.
- **In Phase II:** All remaining policies renewing on or after April 1, 2022 will be subject to the new rating methodology.

FEMA continues to engage with Congress, its industry partners and state, local, tribal and territorial agencies to ensure clear understanding of these changes.

For the latest information on Risk Rating 2.0, visit [fema.gov](https://www.fema.gov).

