CITY OF LEON VALLEY
CITY COUNCIL SPECIAL MEETING
Leon Valley City Council Chambers
6400 El Verde Road, Leon Valley, Texas 78238
Tuesday, April 19, 2016

AGENDA

1. **6:00 P.M.** Call to order, Determine a Quorum is Present

2. Consideration of bids relating to the sale of obligations designated as "City of Leon Valley, Texas combination tax and limited pledge revenue Certificates of Obligation, Series 2016", consideration and approval of financial advisor's recommendation concerning this matter; and other matters in connection therewith. Presenter - Ann Burger Entrekin, First Southwest. **M&C #2016-04-19-01 (V. Wallace)**.

3. Consideration and approval of an ordinance authorizing the issuance of "City of Leon Valley, Texas combination tax and limited pledge revenue Certificates of Obligation, Series 2016"; providing for the payment of said certificates by the levy of an ad valorem tax upon all taxable property within the city and further securing said certificates by a lien on and pledge of the pledged revenues of the system; providing the terms and conditions of said certificates and resolving other matters incident and relating to the issuance, payment, security, sale, and delivery of said certificates, including the approval and distribution of an official statement pertaining thereto; authorizing the execution of a paying agent/registrar agreement and an official bid form; complying with the requirements of the letter of representations previously executed with the depository trust company; authorizing the execution of any necessary engagement agreements with the city's financial advisors and/or bond counsel; and providing an effective date. **M&C #2016-04-19-02 (V. Wallace)**.

4. Adjournment

CITY OF LEON VALLEY
CITY COUNCIL REGULAR MEETING
Leon Valley City Council Chambers
6400 El Verde Road, Leon Valley, Texas 78238
Tuesday, April 19, 2016

AGENDA

5. **7:00 P.M.** Call to order, Determine a Quorum is Present, Pledge of Allegiance.

6. **Citizens to Be Heard and Time for Objections to the Consent Agenda.** "Citizens to be heard" is for the City Council to receive information on issues that may be of concern to the public. The purpose of this provision of the Open Meetings Act is to ensure that the public is always given appropriate notice of the items that will be

discussed by the Council. Should a member of the public bring an item to the Council, for which the subject was not posted on the agenda of that meeting, the Council may receive the information but cannot act upon it during the meeting. Council may direct staff to contact the requestor or ask that the issue be placed on a future agenda for discussion by the Council.

Note: City Council may not debate any non-agenda issue, nor may any action be taken on any non-agenda issue at this time; however City Council may present any factual response to items brought up by citizens. [Attorney General Opinion – JC 0169]

7. Presentation of San Antonio River Authority "Who We Are" by Stephen T. Graham, P.E., CFM

8. Presentation of Proclamation of Appreciation to Donald Gordon, PhD, MD for thirty years of service to the City of Leon Valley.

9. Presentation of Earth Day Proclamation by Mayor Chris Riley.

CONSENT AGENDA

10. Approval of City Council Minutes. **(S. Passailaigue)**
    a) April 05, 2016 Regular City Council Meeting

REGULAR AGENDA

11. Consider, discuss and possible action on the adoption of the San Antonio River Authority's Leon Creek Water Shed Master Plan. **M&C #2016-04-19-03 (E. Carol)**.

12. Consider, discuss and possible action adopting Freeboarding provisions and related ordinance to Chapter 3, "Building Regulations," Article 3.03, "Flood Damage Prevention". **M&C #2016-04-19-04 (E. Carol)**.

13. Consider, discuss and possible action setting forth the Leon Valley Community Pool Operating Policy for 2016 Swimming Season. **M&C #2016-04-19-05 (D. Dimaline)**.

14. Consider, discuss and possible action to coordinate with the Office of Representative Joaquin Castro and the United States Post Office to designate 78238 as the only zip code for Leon Valley. **M&C #2016-04-19-06 (C. Caldera)**.

15. City Manager's Report:
    a) Approved Minutes from Boards, Commissions and Committees
    b) Future Agenda Items:
        - Sign Ordinance LED
        - Hand Gun Policy
        - Total funding cost of New City Hall Complex and Fire Department
    c) Upcoming Important Events:
        - Coffee with the Mayor and City Council, Saturday, April 23, 2016, 9:00 a.m. to 11:00 a.m. at the Leon Valley Conference Center

- Room Dedication Ceremony, Leon Valley Public Library, Saturday, May 7, 2016, 2:30 p.m. to 4:00 p.m.
- Annual Pet Parade, Saturday, May 14, 2016, 9:00 a.m. to 11:00 a.m.
- City Council Orientation, Council Chambers, Friday, May 20, 2016, 8:30 a.m. to 11:30 a.m.
- Neighborhood Renewal Program (NRP), Saturday, May 21, 2016, 7:30 a.m. to Noon.

16. Citizens to be heard.

17. Announcements by the Mayor and Council Members. At this time, reports about items of community interest, which no action will be taken may be given to the public as per Chapter 551.0415 of the Government Code, such as: expressions of thanks, congratulations or condolence, information regarding holiday schedules, reminders of social, ceremonial, or community events organized or sponsored by the governing body or that was or will be attended by a member of the Leon Valley City Council or a City official.

18. Adjournment.

Executive Session. The City Council of the City of Leon Valley reserves the right to adjourn into Executive Session at any time during the course of this meeting to discuss any of the matters listed on the posted agenda, above, as authorized by the Texas Government Code, Sections 551.071 (consultation with attorney), 551.072 (deliberations about real property), 551.073 (deliberations about gifts and donations), 551.074 (personnel matters), 551.076 (deliberations about security devices), and 551.087 (economic development).

Attendance by Other Elected or Appointed Officials: It is anticipated that members other City boards, commissions and/or committees may attend the open meeting in numbers that may constitute a quorum. Notice is hereby given that the meeting, to the extent required by law, is also noticed as a meeting of any other boards, commissions and/or committees of the City, whose members may be in attendance in numbers constituting a quorum. These members of other City boards, commissions, and/or committees may not deliberate or take action on items listed on the agenda. [Attorney General Opinion – No. GA-0957 (2012)].

I hereby certify that the above **NOTICE OF PUBLIC MEETING(S) AND AGENDA OF THE LEON VALLEY CITY COUNCIL** was posted at the Leon Valley City Hall, 6400 El Verde Road, Leon Valley, Texas, on April 14, 2016 at 5:30 a.m. and remained posted until after the meeting(s) hereby posted concluded. This notice is posted on the City website at www.leonvalleytexas.gov. This building is wheelchair accessible. Any request for sign interpretive or other services must be made 48 hours in advance of the meeting. To make arrangements, call (210) 684-1391, Extension 216.

Saundra Passailaigue

SAUNDRA PASSAILAIGUE, TRMC
City Secretary

CITY OF LEON VALLEY * TEXAS *

ITEM 2

MAYOR AND COUNCIL COMMUNICATION

M&C #2016-04-19-01

DATE: April 19, 2016

TO: Mayor and Council

FROM: Vickie Wallace, Finance Director

PRESENTER: Ann Burger Entrekin, FirstSouthwest

THROUGH: Kelly Kuenstler, City Manager

SUBJECT: Consideration of bids relating to the sale of obligations designated as "City of Leon Valley, Texas combination tax and limited pledge revenue Certificates of Obligation, Series 2016", consideration and approval of financial advisor's recommendation concerning this matter; and other matters in connection therewith.

PURPOSE:

On February 16, 2016 the Council approved a Resolution authorizing and approving publication of notice of intention to issue certificates of obligation for:

(1) constructing, acquiring, purchasing, renovating, enlarging, and improving the City's utility system;

(2) constructing street improvements (including utilities repair, replacement, and relocation), curb, gutters, sidewalk improvements, drainage, and landscaping incidental,

(3) the purchase of materials, supplies, equipment, machinery, landscaping, land, and rights-of-way for authorized needs and purposes relating to the aforementioned capital improvements; and

(4) the payment of professional services related to the design, construction, project management, and financing of the aforementioned projects.

The Certificates were offered for sale at competitive bidding with bids due prior to 11:00 AM, Tuesday, April 19, 2016.

Council must now officially accept the Financial Advisor's recommendation concerning the acceptance of the bids relating to the sale of the Obligations designated as "City of Leon Valley, Texas Combination Tax and Limited Pledge Revenue Certificates of Obligation, Series, 2016.

SEE LEON VALLEY

Social – Social Equity - A safe and reliable water supply benefits the health and safety of all citizens.

Economic Development – Maintaining a superior water system provides additional incentive for citizens and businesses to relocate or stay in Leon Valley.

Environmental Stewardship – The City has an active program for educating the public about water conservation.

Environmental – N/A

FISCAL IMPACT

The debt for the Certificates will be retired through Water user fees.

STRATEGIC GOALS

N/A

RECOMMENDATION

Accept the Financial Advisor's recommendation concerning the acceptance of the bids relating to the sale of the Obligations designated as "City of Leon Valley, Texas Combination Tax and Limited Pledge Revenue Certificates of Obligation, Series, 2016.

APPROVED: _____ DISAPPROVED: _____

APPROVED WITH THE FOLLOWING AMENDMENTS:

_____

_____

_____

_____

ATTEST:

_____
SAUNDRA PASSAILAIGUE, TRMC
City Secretary

Motion

Acceptance of Bids

A MOTION BY COUNCILMEMBER _____ AND SECONDED BY COUNCILMEMBER _____ THAT THE CITY COUNCIL ACCEPT THE FINANCIAL ADVISOR'S RECOMMENDATION CONCERNING THE ACCEPTANCE OF BIDS RELATING TO THE SALE OF OBLIGATIONS DESIGNATED AS "CITY OF LEON VALLEY, TEXAS COMBINATION TAX AND LIMITED PLEDGE REVENUE CERTIFICATES OF OBLIGATION, SERIES 2016"

ITEM 3

MAYOR AND COUNCIL COMMUNICATION

M&C #2016-04-19-02

DATE: April 19, 2016

TO: Mayor and Council

FROM: Vickie Wallace, Finance Director

THROUGH: Kelly Kuenstler, City Manager

SUBJECT: CONSIDERATION AND APPROVAL OF AN ORDINANCE AUTHORIZING THE ISSUANCE OF "CITY OF LEON VALLEY, TEXAS COMBINATION TAX AND LIMITED PLEDGE REVENUE CERTIFICATES OF OBLIGATION, SERIES 2016"; PROVIDING FOR THE PAYMENT OF SAID CERTIFICATES BY THE LEVY OF AN AD VALOREM TAX UPON ALL TAXABLE PROPERTY WITHIN THE CITY AND FURTHER SECURING SAID CERTIFICATES BY A LIEN ON AND PLEDGE OF THE PLEDGED REVENUES OF THE SYSTEM; PROVIDING THE TERMS AND CONDITIONS OF SAID CERTIFICATES AND RESOLVING OTHER MATTERS INCIDENT AND RELATING TO THE ISSUANCE, PAYMENT, SECURITY, SALE, AND DELIVERY OF SAID CERTIFICATES, INCLUDING THE APPROVAL AND DISTRIBUTION OF AN OFFICIAL STATEMENT PERTAINING THERETO; AUTHORIZING THE EXECUTION OF A PAYING AGENT/REGISTRAR AGREEMENT AND AN OFFICIAL BID FORM; COMPLYING WITH THE REQUIREMENTS OF THE LETTER OF REPRESENTATIONS PREVIOUSLY EXECUTED WITH THE DEPOSITORY TRUST COMPANY; AUTHORIZING THE EXECUTION OF ANY NECESSARY ENGAGEMENT AGREEMENTS WITH THE CITY'S FINANCIAL ADVISORS AND/OR BOND COUNSEL; AND PROVIDING AN EFFECTIVE DATE

PURPOSE

On April 19, 2016 Council accepted the Financial Advisor's recommendation concerning the acceptance of the bids relating to the sale of the Obligations designated as "City of Leon Valley, Texas Combination Tax and Limited Pledge Revenue Certificates of Obligation, Series, 2016.

Council must now adopt an Ordinance authorizing the issuance of "City of Leon Valley, Texas Combination Tax and Limited Pledge Revenue Certificates of Obligation, Series, 2016.

SEE LEON VALLEY

Social – Social Equity - A safe and reliable water supply benefits the health and safety of all citizens.

Economic Development – Maintaining a superior water system provides additional incentive for citizens and businesses to relocate or stay in Leon Valley.

Environmental Stewardship – The City has an active program for educating the public about water conservation.

Environmental – N/A

FISCAL IMPACT

The debt for the Certificates will be retired through Water user fees.

STRATEGIC GOALS

N/A

RECOMMENDATION

Adopt an Ordinance authorizing the issuance of "City of Leon Valley, Texas Combination Tax and Limited Pledge Revenue Certificates of Obligation, Series, 2016.

APPROVED: _____ DISAPPROVED: _____

APPROVED WITH THE FOLLOWING AMENDMENTS:

_____

_____

_____

_____

ATTEST:

_____
SAUNDRA PASSAILAIGUE, TRMC
City Secretary

Motion

Adoption of Ordinance for Issuance of Certificates

A MOTION BY COUNCILMEMBER _____ AND SECONDED BY COUNCILMEMBER _____ THAT THE CITY COUNCIL ADOPT AN ORDINANCE AUTHORIZING THE ISSUANCE OF "CITY OF LEON VALLEY, TEXAS COMBINATION TAX AND LIMITED PLEDGE REVENUE CERTIFICATES OF OBLIGATION, SERIES 2016"

AN ORDINANCE AUTHORIZING THE ISSUANCE OF "CITY OF LEON VALLEY, TEXAS COMBINATION TAX AND LIMITED PLEDGE REVENUE CERTIFICATES OF OBLIGATION, SERIES 2016"; PROVIDING FOR THE PAYMENT OF SAID CERTIFICATES BY THE LEVY OF AN AD VALOREM TAX UPON ALL TAXABLE PROPERTY WITHIN THE CITY AND FURTHER SECURING SAID CERTIFICATES BY A LIEN ON AND PLEDGE OF THE PLEDGED REVENUES OF THE SYSTEM; PROVIDING THE TERMS AND CONDITIONS OF SAID CERTIFICATES AND RESOLVING OTHER MATTERS INCIDENT AND RELATING TO THE ISSUANCE, PAYMENT, SECURITY, SALE, AND DELIVERY OF SAID CERTIFICATES, INCLUDING THE APPROVAL AND DISTRIBUTION OF AN OFFICIAL STATEMENT PERTAINING THERETO; AUTHORIZING THE EXECUTION OF A PAYING AGENT/REGISTRAR AGREEMENT AND AN OFFICIAL BID FORM; COMPLYING WITH THE REQUIREMENTS OF THE LETTER OF REPRESENTATIONS PREVIOUSLY EXECUTED WITH THE DEPOSITORY TRUST COMPANY; AUTHORIZING THE EXECUTION OF ANY NECESSARY ENGAGEMENT AGREEMENTS WITH THE CITY'S FINANCIAL ADVISORS AND/OR BOND COUNSEL; AND PROVIDING AN EFFECTIVE DATE

WHEREAS, the City Council of the City of Leon Valley, Texas (the *City*) has caused notice to be given of its intention to issue certificates of obligation in the maximum principal amount of $2,000,000 for the purpose of paying contractual obligations of the City to be incurred for making permanent public improvements and for other public purposes, to-wit: (1) constructing, acquiring, purchasing, renovating, enlarging, and improving the City's utility system; (2) constructing street improvements (including utilities repair, replacement, and relocation), curb, gutters, sidewalk improvements, drainage, and landscaping incidental thereto, (3) the purchase of materials, supplies, equipment, machinery, landscaping, land, and rights-of-way for authorized needs and purposes relating to the aforementioned capital improvements; and (4) the payment of professional services related to the design, construction, project management, and financing of the aforementioned projects. This notice has been duly published in a newspaper hereby found and determined to be of general circulation in the City, once a week for two (2) consecutive weeks, the date of the first publication of such notice being not less than thirty (30) days prior to the tentative date stated therein for the passage of the ordinance authorizing the issuance of such certificates of obligation; and

WHEREAS, no petition protesting the issuance of the certificates of obligation described in this notice, signed by at least 5% of the qualified electors of the City, has been presented to or filed with the City Secretary prior to the date tentatively set in such notice for the passage of this ordinance; and

WHEREAS, the City Council hereby finds and determines that the issuance of the certificates of obligation, under the terms herein specified, is in the best interests of the City and its residents; and

WHEREAS, the City Council hereby finds and determines that certificates of obligation in the principal amount of $_____ described in such notice should be issued and sold at this time; now, therefore,

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LEON VALLEY THAT:

SECTION 1. Authorization - Designation - Principal Amount - Purpose. The certificates of obligation of the City shall be and are hereby authorized to be issued in the aggregate principal amount _____ DOLLARS ($_____), to be designated and bear the title of "CITY OF LEON VALLEY, TEXAS COMBINATION TAX AND LIMITED PLEDGE REVENUE CERTIFICATES OF OBLIGATION, SERIES 2016" (the *Certificates*), for the purpose of paying contractual obligations of the City to be incurred for making permanent public improvements and for other public purposes, to-wit: (1) constructing, acquiring, purchasing, renovating, enlarging, and improving the City's utility system; (2) constructing street improvements (including utilities repair, replacement, and relocation), curb, gutters, sidewalk improvements, drainage, and landscaping incidental thereto, (3) the purchase of materials, supplies, equipment, machinery, landscaping, land, and rights-of-way for authorized needs and purposes relating to the aforementioned capital improvements; and (4) the payment of professional services related to the design, construction, project management, and financing of the aforementioned projects, pursuant to the authority conferred by and in conformity with the laws of the State of Texas, particularly the Certificate of Obligation Act of 1971, as amended, and Texas Local Government Code Section 271.041 through Section 271.064, Chapter 1502, as amended, Texas Government Code.

SECTION 2. Fully Registered Obligations - Authorized Denominations - Stated Maturities - Interest Rates -Certificate Date. The Certificates are issuable in fully registered form only; shall be dated May 1, 2016 (the *Certificate Date*) and shall be issued in denominations of $5,000 or any integral multiple (within a Stated Maturity) thereof, and the Certificates shall become due and payable on August 1 in each of the years and in principal amounts (the *Stated Maturities*) and bear interest on the unpaid principal amounts from the Certificate Date, or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for, to the earlier of redemption or Stated Maturity, at the per annum rates, while Outstanding, in accordance with the following schedule:

Years of Stated Maturity	Principal Amounts ($)	Interest Rates (%)
2017		
2018		
2019		
2020		
2021		
2022		

Years of Stated Maturity	Principal Amounts ($)	Interest Rates (%)
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		
2035		
2036		
2037		
2038		
2039		
2040		
2041		
2042		
2043		
2044		
2045		
2046		

The Certificates shall bear interest on the unpaid principal amounts from the Certificate Date, or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for, to Stated Maturity or prior redemption while Outstanding, at the rates per annum shown in the above schedule (calculated on the basis of a 360-day year of twelve 30-day months). Interest on the Certificates shall be payable on February 1 and August 1 in each year (each, an *Interest Payment Date*), commencing February 1, 2017, while the Certificates are Outstanding.

SECTION 3. Payment of Certificates - Paying Agent/Registrar. The principal of, premium, if any, and interest on the Certificates, due and payable by reason of Stated Maturity, redemption, or otherwise, shall be payable in any coin or currency of the United States of America which at the time of payment is legal tender for the payment of public and private debts, and such payment of principal of, premium, if any, and interest on the Certificates shall be without exchange or collection charges to the Holder (hereinafter defined) of the Certificates.

The selection and appointment of The Bank of New York Mellon Trust Company, N.A., Dallas, Texas (the *Paying Agent/Registrar*) to serve as the initial Paying Agent/Registrar for the Certificates is hereby approved and confirmed, and the City agrees and covenants to cause to be kept and maintained at the corporate trust office of the Paying Agent/Registrar books and records (the *Security Register*) for the registration, payment and transfer of the Certificates, all as provided herein, in accordance with the terms and provisions of a Paying Agent/Registrar Agreement, attached, in substantially final form, as Exhibit A hereto, and such reasonable rules and regulations as the Paying Agent/Registrar and City may prescribe. The City covenants to maintain and provide a Paying Agent/Registrar at all times while the Certificates are Outstanding, and any successor Paying Agent/Registrar shall be (i) a national or state banking institution or (ii) an association or a corporation organized and doing business under the laws of the United States of America or of any state, authorized under such laws to exercise trust powers. Such Paying Agent/Registrar shall be subject to supervision or examination by federal or state authority and authorized by law to serve as a Paying Agent/Registrar.

The City reserves the right to appoint a successor Paying Agent/Registrar upon providing the previous Paying Agent/Registrar with a certified copy of a resolution or ordinance terminating such agency. Additionally, the City agrees to promptly cause a written notice of this substitution to be sent to each Holder of the Certificates by United States mail, first-class postage prepaid, which notice shall also give the address of the new Paying Agent/Registrar.

Principal of, premium, if any, and interest on the Certificates, due and payable by reason of Stated Maturity, redemption, or otherwise, shall be payable only to the registered owner of the Certificates appearing on the Security Register (the *Holder* or *Holders*) maintained on behalf of the City by the Paying Agent/Registrar as hereinafter provided (i) on the Record Date (hereinafter defined) for purposes of payment of interest thereon, (ii) on the date of surrender of the Certificates for purposes of receiving payment of principal thereof upon redemption of the Certificates or at the Certificates' Stated Maturity, and (iii) on any other date for any other purpose. The City and the Paying Agent/Registrar, and any agent of either, shall treat the Holder as the owner of a Certificate for purposes of receiving payment and all other purposes whatsoever, and neither the City nor the Paying Agent/Registrar, or any agent of either, shall be affected by notice to the contrary.

Principal of and premium, if any, on the Certificates shall be payable only upon presentation and surrender of the Certificates to the Paying Agent/Registrar at its corporate trust office. Interest on the Certificates shall be paid to the Holder whose name appears in the Security Register at the close of business on the fifteenth day of the month next preceding an Interest Payment Date for the Certificates (the *Record Date*) and shall be paid (i) by check sent on or prior to the appropriate date of payment by United States mail, first-class postage prepaid, by the Paying Agent/Registrar, to the address of the Holder appearing in the Security Register or (ii) by such other method, acceptable to the Paying Agent/Registrar, requested in writing by the Holder at the Holder's risk and expense.

If the date for the payment of the principal of, premium, if any, or interest on the Certificates shall be a Saturday, Sunday, a legal holiday, or a day on which banking institutions in the city where the corporate trust office of the Paying Agent/Registrar is located are authorized by law or executive order to close, then the date for such payment shall be the next

succeeding day which is not such a day. The payment on such date shall have the same force and effect as if made on the original date any such payment on the Certificates was due.

In the event of a non-payment of interest on a scheduled payment date, and for thirty (30) days thereafter, a new record date for such interest payment (a *Special Record Date*) will be established by the Paying Agent/Registrar, if and when funds for the payment of such interest have been received from the City. Notice of the Special Record Date and of the scheduled payment date of the past due interest (the *Special Payment Date* - which shall be fifteen (15) days after the Special Record Date) shall be sent at least five (5) business days prior to the Special Record Date by United States mail, first-class postage prepaid, to the address of each Holder appearing on the Security Register at the close of business on the last business day next preceding the date of mailing of such notice.

SECTION 4. Redemption.

A. Mandatory Redemption. The Certificates stated to mature on August 1, ____ and August 1, ____ are referred to herein as the "Term Certificates". The Term Certificates are subject to mandatory sinking fund redemption prior to their stated maturities from money required to be deposited in the Certificate Fund for such purpose and shall be redeemed in part, by lot or other customary method, at the principal amount thereof plus accrued interest to the date of redemption in the following principal amounts on August 1 in each of the years as set forth below:

Term Certificates Stated to Mature on August 1, 20__		Term Certificates Stated to Mature on August 1, 20__	
Year	Principal Amount ($)	Year	Principal Amount ($)

*Payable at Stated Maturity.

The principal amount of a Term Certificate required to be redeemed pursuant to the operation of such mandatory redemption provisions shall be reduced, at the option of the City, by the principal amount of any Term Certificates of such Stated Maturity which, at least fifty (50) days prior to the mandatory redemption date (1) shall have been defeased or acquired by the City and delivered to the Paying Agent/Registrar for cancellation, (2) shall have been purchased and canceled by the Paying Agent/Registrar at the request of the City, or (3) shall have been redeemed pursuant to the optional redemption provisions set forth below and not theretofore credited against a mandatory redemption requirement.

B. Optional Redemption. The Certificates having Stated Maturities on and after August 1, ____ shall be subject to redemption prior to Stated Maturity, at the option of the City, on August 1, ____, or on any date thereafter, as a whole or in part, in principal amounts of $5,000 or any integral multiple thereof (and if within a Stated Maturity selected at random and

by lot by the Paying Agent/Registrar), at the redemption price of par plus accrued interest to the date of redemption.

C. Exercise of Redemption Option. At least forty-five (45) days prior to a date set for the redemption of Certificates (unless a shorter notification period shall be satisfactory to the Paying Agent/Registrar), the City shall notify the Paying Agent/Registrar of its decision to exercise the right to redeem Certificates, the principal amount of each Stated Maturity to be redeemed, and the date set for the redemption thereof. The decision of the City to exercise the right to redeem Certificates shall be entered in the minutes of the governing body of the City.

D. Selection of Certificates for Redemption. If less than all Outstanding Certificates of the same Stated Maturity are to be redeemed on a redemption date, the Paying Agent/Registrar shall select at random and by lot the Certificates to be redeemed, provided that if less than the entire principal amount of a Certificate is to be redeemed, the Paying Agent/Registrar shall treat such Certificate then subject to redemption as representing the number of Certificates Outstanding which is obtained by dividing the principal amount of such Certificate by $5,000.

E. Notice of Redemption. Not less than thirty (30) days prior to a redemption date for the Certificates, the Paying Agent/Registrar shall cause a notice of redemption shall be sent by United States mail, first-class postage prepaid, in the name of the City and at the City's expense, by the Paying Agent/Registrar to each Holder of a Certificate to be redeemed, in whole or in part, at the address of the Holder appearing on the Security Register at the close of business on the business day next preceding the date of mailing such notice, and any notice of redemption so mailed shall be conclusively presumed to have been duly given irrespective of whether received by the Holder.

All notices of redemption shall (i) specify the date of redemption for the Certificates, (ii) identify the Certificates to be redeemed and, in the case of a portion of the principal amount to be redeemed, the principal amount thereof to be redeemed, (iii) state the redemption price, (iv) state that the Certificates, or the portion of the principal amount thereof to be redeemed, shall become due and payable on the redemption date specified, and the interest thereon, or on the portion of the principal amount thereof to be redeemed, shall cease to accrue from and after the redemption date, and (v) specify that payment of the redemption price for the Certificates, or the principal amount thereof to be redeemed, shall be made at the corporate trust office of the Paying Agent/Registrar only upon presentation and surrender thereof by the Holder. This notice may also be published once in a financial publication, journal, or reporter of general circulation among securities dealers in the City of New York, New York (including, but not limited to, The Bond Buyer and The Wall Street Journal), or in the State of Texas (including, but not limited to, The Texas Bond Reporter).

If a Certificate is subject by its terms to redemption and has been called for redemption and notice of redemption thereof has been duly given or waived as herein provided, such Certificate (or the principal amount thereof to be redeemed) so called for redemption shall become due and payable, and if money sufficient for the payment of such Certificates (or of the principal amount thereof to be redeemed) at the then applicable redemption price is held for the purpose of such payment by the Paying Agent/Registrar, then on the redemption date designated in such notice, interest on the Certificates (or the principal amount thereof to be redeemed) called

for redemption shall cease to accrue and such Certificates shall not be deemed to be Outstanding in accordance with the provisions of this Ordinance.

F. Transfer/Exchange of Certificates. Neither the City nor the Paying Agent/Registrar shall be required (1) to transfer or exchange any Certificate during a period beginning forty-five (45) days prior to the date fixed for redemption of the Certificates or (2) to transfer or exchange any Certificate selected for redemption, provided, however, such limitation of transfer shall not be applicable to an exchange by the Holder of the unredeemed balance of a Certificate which is subject to redemption in part.

SECTION 5. Execution - Registration. The Certificates shall be executed on behalf of the City by its Mayor or Mayor Pro Tem under the seal of the City reproduced or impressed thereon and attested by its City Secretary. The signature of either of said officers on the Certificates may be manual or facsimile. Certificates bearing the manual or facsimile signatures of individuals who were, at the time of the Certificate Date, the proper officers of the City shall bind the City, notwithstanding that such individuals or either of them shall cease to hold such offices prior to the delivery of the Certificates to the Purchasers (hereinafter defined), all as authorized and provided in Chapter 1201, as amended, Texas Government Code.

No Certificate shall be entitled to any right or benefit under this Ordinance, or be valid or obligatory for any purpose, unless there appears on such Certificate either a certificate of registration substantially in the form provided in Section 8C, executed by the Comptroller of Public Accounts of the State of Texas or his duly authorized agent by manual signature, or a certificate of registration substantially in the form provided in Section 8D, executed by the Paying Agent/Registrar by manual signature, and either such certificate upon any Certificate shall be conclusive evidence, and the only evidence, that such Certificate has been duly certified or registered and delivered.

SECTION 6. Registration - Transfer - Exchange of Certificates - Predecessor Certificates. The Paying Agent/Registrar shall obtain, record, and maintain in the Security Register the name and address of every owner of the Certificates, or if appropriate, the nominee thereof. Any Certificate may, in accordance with its terms and the terms hereof, be transferred or exchanged for Certificates of other authorized denominations upon the Security Register by the Holder, in person or by his duly authorized agent, upon surrender of such Certificate to the Paying Agent/Registrar for cancellation, accompanied by a written instrument of transfer or request for exchange duly executed by the Holder or by his duly authorized agent, in form satisfactory to the Paying Agent/Registrar.

Upon surrender for transfer of any Certificate at the corporate trust office of the Paying Agent/Registrar, the City shall execute and the Paying Agent/Registrar shall register and deliver, in the name of the designated transferee or transferees, one or more new Certificates of authorized denomination and having the same Stated Maturity and of a like interest rate and aggregate principal amount as the Certificate or Certificates surrendered for transfer.

At the option of the Holder, Certificates may be exchanged for other Certificates of authorized denominations and having the same Stated Maturity, bearing the same rate of interest and of like aggregate principal amount as the Certificates surrendered for exchange upon surrender of the Certificates to be exchanged at the corporate trust office of the Paying

Agent/Registrar. Whenever any Certificates are so surrendered for exchange, the City shall execute, and the Paying Agent/Registrar shall register and deliver, the Certificates to the Holder requesting the exchange.

All Certificates issued upon any transfer or exchange of Certificates shall be delivered at the corporate trust office of the Paying Agent/Registrar, or be sent by registered mail to the Holder at his request, risk, and expense, and upon the delivery thereof, the same shall be the valid and binding obligations of the City, evidencing the same obligation to pay, and entitled to the same benefits under this Ordinance, as the Certificates surrendered upon such transfer or exchange.

All transfers or exchanges of Certificates pursuant to this Section shall be made without expense or service charge to the Holder, except as otherwise herein provided, and except that the Paying Agent/Registrar shall require payment by the Holder requesting such transfer or exchange of any tax or other governmental charges required to be paid with respect to such transfer or exchange.

Certificates canceled by reason of an exchange or transfer pursuant to the provisions hereof are hereby defined to be Predecessor Certificates, evidencing all or a portion, as the case may be, of the same debt evidenced by the new Certificate or Certificates registered and delivered in the exchange or transfer therefor. Additionally, the term Predecessor Certificates shall include any Certificate registered and delivered pursuant to Section 25 in lieu of a mutilated, lost, destroyed, or stolen Certificate which shall be deemed to evidence the same obligation as the mutilated, lost, destroyed, or stolen Certificate.

SECTION 7. Initial Certificate. The Certificates herein authorized shall be issued initially either (i) as a single fully registered Certificate in the total principal amount of $_____ with principal installments to become due and payable as provided in Section 2 and numbered T-1, or (ii) as one (1) fully registered Certificate for each year of Stated Maturity in the applicable principal amount and denomination and to be numbered consecutively from T-1 and upward (the *Initial Certificate*) and, in either case, the Initial Certificate shall be registered in the name of the Purchasers or the designee thereof. The Initial Certificate shall be the Certificates submitted to the Office of the Attorney General of the State of Texas for approval, certified and registered by the Office of the Comptroller of Public Accounts of the State of Texas and delivered to the Purchasers. Any time after the delivery of the Initial Certificate to the Purchasers, the Paying Agent/Registrar, pursuant to written instructions from the Purchasers or their designee, shall cancel the Initial Certificate delivered hereunder and exchange therefor definitive Certificates of authorized denominations, Stated Maturities, principal amounts and bearing applicable interest rates, on the unpaid principal amounts from the Certificate Date, or from the most recent Interest Payment Date to which interest has been paid or duly provided for, to Stated Maturity, and shall be lettered "R" and numbered consecutively from one (1) upward for transfer and delivery to the Holders named at the addresses identified therefor; all pursuant to and in accordance with such written instructions from the Purchasers, or the designee thereof, and such other information and documentation as the Paying Agent/Registrar may reasonably require.

SECTION 8. Forms.

A. Forms Generally. The Certificates, the Registration Certificate of the Comptroller of Public Accounts of the State of Texas, the Registration Certificate of Paying Agent/Registrar, and the form of Assignment to be printed on each of the Certificates shall be substantially in the forms set forth in this Section with such appropriate insertions, omissions, substitutions, and other variations as are permitted or required by this Ordinance and may have such letters, numbers, or other marks of identification (including insurance legends in the event the Certificates, or any Stated Maturities thereof, are insured and any reproduction of an opinion of Bond Counsel (hereinafter referenced)) and identifying numbers and letters of the Committee on Uniform Securities Identification Procedures of the American Bankers Association) and such legends and endorsements (including insurance legends and any reproduction of an opinion of Bond Counsel) thereon as may, consistent herewith, be established by the City or determined by the officers executing the Certificates as evidenced by their execution thereof. Any portion of the text of any Certificate may be set forth on the reverse thereof, with an appropriate reference thereto on the face of the Certificate.

The definitive Certificates shall be printed, lithographed, or engraved, produced by any combination of these methods, or produced in any other similar manner, all as determined by the officers executing the Certificates as evidenced by their execution thereof, but the Initial Certificate submitted to the Attorney General of the State of Texas may be typewritten or photocopied or otherwise reproduced.

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B. Form of Definitive Certificate.

REGISTERED
NO. _____

REGISTERED
PRINCIPAL AMOUNT
$_____

United States of America
State of Texas
County of Bexar
CITY OF LEON VALLEY, TEXAS
COMBINATION TAX AND LIMITED PLEDGE REVENUE
CERTIFICATE OF OBLIGATION, SERIES 2016

Certificate Date:	Interest Rate:	Stated Maturity:	CUSIP No.
May 1, 2016			

REGISTERED OWNER: _____

PRINCIPAL AMOUNT: _____

The City of Leon Valley, Texas (the *City*), a body corporate and municipal corporation in the County of Bexar, State of Texas, for value received, acknowledges itself indebted to and hereby promises to pay to the order of the Registered Owner specified above, or the registered assigns thereof, on the Stated Maturity date specified above, the Principal Amount specified above (or so much thereof as shall not have been paid upon prior redemption) and to pay interest on the unpaid Principal Amount hereof from the Certificate Date specified above, or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for until such Principal Amount has become due and payment thereof has been made or duly provided for, to the earlier of redemption or Stated Maturity, while Outstanding, at the per annum rate of interest specified above computed on the basis of a 360-day year of twelve 30-day months; such interest being payable on February 1 and August 1 of each year (each, an *Interest Payment Date*), commencing February 1, 2017.

Principal and premium, if any, of this Certificate shall be payable to the Registered Owner hereof (the *Holder*), upon presentation and surrender, at the corporate trust office of the Paying Agent/Registrar executing the registration certificate appearing hereon or a successor thereof. Interest shall be payable to the Holder of this Certificate (or one or more Predecessor Certificates, as defined in the Ordinance hereinafter referenced) whose name appears on the Security Register maintained by the Paying Agent/Registrar at the close of business on the Record Date, which is the fifteenth day of the month next preceding each Interest Payment Date. All payments of principal of and interest on this Certificate shall be in any coin or currency of the United States of America which at the time of payment is legal tender for the payment of public and private debts. Interest shall be paid by the Paying Agent/Registrar by check sent on or prior to the appropriate date of payment by United States mail, first-class postage prepaid, to the Holder hereof at the address appearing in the Security Register or by such other method, acceptable to the Paying Agent/Registrar, requested by the Holder hereof at the Holder's risk and expense.

This Certificate is one of the series specified in its title issued in the aggregate principal amount of $_____ (the *Certificates*) pursuant to an Ordinance adopted by the governing body of the City (the *Ordinance*), for the purpose of paying contractual obligations of the City to be incurred for making permanent public improvements and for other public purposes, to-wit: (1) constructing, acquiring, purchasing, renovating, enlarging, and improving the City's utility system; (2) constructing street improvements (including utilities repair, replacement, and relocation), curb, gutters, sidewalk improvements, drainage, and landscaping incidental thereto, (3) the purchase of materials, supplies, equipment, machinery, landscaping, land, and rights-of-way for authorized needs and purposes relating to the aforementioned capital improvements; and (4) the payment of professional services related to the design, construction, project management, and financing of the aforementioned projects, under and in strict conformity with the laws of the State of Texas, particularly the Certificate of Obligation Act of 1971, as amended, Texas Local Government Code, Section 271.041 through 271.064, and Chapter 1502, as amended, Texas Government Code.

As provided in the Ordinance, the Certificates stated to mature on August 1, ____ and August 1, ____ are referred to herein as the "Term Certificates". The Term Certificates are subject to mandatory sinking fund redemption prior to their stated maturities from money required to be deposited in the Certificate Fund for such purpose and shall be redeemed in part, by lot or other customary method, at the principal amount thereof plus accrued interest to the date of redemption in the following principal amounts on August 1 in each of the years as set forth below:

Term Certificates Stated to Mature on August 1, 20__		Term Certificates Stated to Mature on August 1, 20__	
Year	Principal Amount ($)	Year	Principal Amount ($)

*Payable at Stated Maturity.

The principal amount of a Term Certificate required to be redeemed pursuant to the operation of such mandatory redemption provisions shall be reduced, at the option of the City, by the principal amount of any Term Certificates of such Stated Maturity which, at least 50 days prior to the mandatory redemption date (1) shall have been defeased or acquired by the City and delivered to the Paying Agent/Registrar for cancellation, (2) shall have been purchased and canceled by the Paying Agent/Registrar at the request of the City, or (3) shall have been redeemed pursuant to the optional redemption provisions set forth below and not theretofore credited against a mandatory redemption requirement.

As provided in the Ordinance, the Certificates having Stated Maturities on and after August 1, ____ shall be subject to redemption prior to Stated Maturity, at the option of the City, on August 1, ____, or on any date thereafter, as a whole or in part, in principal amounts of $5,000 or any integral multiple thereof (and if within a Stated Maturity selected at random and

by lot by the Paying Agent/Registrar), at the redemption price of par plus accrued interest to the date of redemption and upon thirty (30) days prior written notice being given by United States mail, first-class postage prepaid, to Holders of the Certificates to be redeemed, and subject to the terms and provisions relating thereto contained in the Ordinance. If this Certificate is subject to redemption prior to Stated Maturity and is in a denomination in excess of $5,000, portions of the principal sum hereof in installments of $5,000 or any integral multiple thereof may be redeemed, and, if less than all of the principal sum hereof is to be redeemed, there shall be issued, without charge therefor, to the Holder hereof, upon the surrender of this Certificate to the Paying Agent/Registrar at its corporate trust office, a new Certificate or Certificates of like Stated Maturity and interest rate in any authorized denominations provided in the Ordinance for the then unredeemed balance of the principal sum hereof.

If this Certificate (or any portion of the principal sum hereof) shall have been duly called for redemption and notice of such redemption has been duly given, then upon such redemption date this Certificate (or the portion of the principal sum hereof to be redeemed) shall become due and payable, and, if the money for the payment of the redemption price and the interest accrued on the principal amount to be redeemed to the date of redemption is held for the purpose of such payment by the Paying Agent/Registrar, interest shall cease to accrue and be payable hereon from and after the redemption date on the principal amount hereof to be redeemed. If this Certificate is called for redemption, in whole or in part, the City or the Paying Agent/Registrar shall not be required to issue, transfer, or exchange this Certificate within forty-five (45) days of the date fixed for redemption; provided, however, such limitation of transfer shall not be applicable to an exchange by the Holder of the unredeemed balance hereof in the event of its redemption in part.

The Certificates of this series are payable from the proceeds of an ad valorem tax levied within the limitations prescribed by law, upon all taxable property within the City, and are further payable from and secured by a lien on and pledge of the Pledged Revenues (identified and defined in the Ordinance), being a limited amount of the Net Revenues derived from the operation of the City's combined utility system (the *System*), such lien on and pledge of the limited amount of Net Revenues being subordinate and inferior to the lien on and pledge of such Net Revenues securing payment of any Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations hereafter issued by the City. The City has previously authorized the issuance of the currently outstanding Limited Pledge Obligations (identified and defined in the Ordinance) that are payable, in part, from and secured by a lien on and pledge of a limited amount of the Net Revenues of the System in the manner and as described in the ordinance authorizing the issuance of the currently outstanding Limited Pledge Obligations. In the Ordinance, the City reserves and retains the right to issue Prior Lien Obligations, Junior Lien Obligations, Subordinate Lien Obligations, and Additional Limited Pledge Obligations (all as identified and defined in the Ordinance), while the Certificates are Outstanding, without limitation as to principal amount but subject to any terms, conditions or restrictions as may be applicable thereto under law or otherwise.

Reference is hereby made to the Ordinance, a copy of which is on file in the corporate trust office of the Paying Agent/Registrar, and to all of the provisions of which the Holder by his acceptance hereof hereby assents, for definitions of terms; the description of and the nature and extent of the tax levied and the revenues pledged for the payment of the Certificates; the terms and conditions under which the City may issue Prior Lien Obligations, Junior Lien Obligations,

Subordinate Lien Obligations, and Additional Limited Pledge Obligations; the terms and conditions relating to the transfer or exchange of the Certificates; the conditions upon which the Ordinance may be amended or supplemented with or without the consent of the Holder; the rights, duties, and obligations of the City and the Paying Agent/Registrar; the terms and provisions upon which this Certificate may be redeemed or discharged at or prior to the Stated Maturity thereof, and deemed to be no longer Outstanding thereunder; and for the other terms and provisions specified in the Ordinance. Capitalized terms used herein have the same meanings assigned in the Ordinance.

This Certificate, subject to certain limitations contained in the Ordinance, may be transferred on the Security Register upon presentation and surrender at the corporate trust office of the Paying Agent/Registrar, duly endorsed by, or accompanied by a written instrument of transfer in form satisfactory to the Paying Agent/Registrar duly executed by the Holder hereof, or his duly authorized agent, and thereupon one or more new fully registered Certificates of the same Stated Maturity, of authorized denominations, bearing the same rate of interest, and of the same aggregate principal amount will be issued to the designated transferee or transferees.

The City and the Paying Agent/Registrar, and any agent of either, shall treat the Holder hereof whose name appears on the Security Register (i) on the Record Date as the owner hereof for purposes of receiving payment of interest hereon, (ii) on the date of surrender of this Certificate as the owner hereof for purposes of receiving payment of principal hereof at its Stated Maturity or its redemption, in whole or in part, and (iii) on any other date as the owner hereof for all other purposes, and neither the City nor the Paying Agent/Registrar, or any such agent of either, shall be affected by notice to the contrary. In the event of a non-payment of interest on a scheduled payment date, and for thirty (30) days thereafter, a new record date for such interest payment (a Special Record Date) will be established by the Paying Agent/Registrar, if and when funds for the payment of such interest have been received from the City. Notice of the Special Record Date and of the scheduled payment date of the past due interest (the *Special Payment Date* - which shall be fifteen (15) days after the Special Record Date) shall be sent at least five (5) business days prior to the Special Record Date by United States mail, first-class postage prepaid, to the address of each Holder appearing on the Security Register at the close of business on the last business day next preceding the date of mailing of such notice.

It is hereby certified, covenanted, and represented that all acts, conditions, and things required to be performed, exist, and be done precedent to or in the issuance of this Certificate in order to render the same a legal, valid, and binding obligation of the City have been performed, exist, and have been done, in regular and due time, form, and manner, as required by the laws of the State of Texas and the Ordinance, and that issuance of the Certificates does not exceed any constitutional or statutory limitation; and that due provision has been made for the payment of the principal of, premium if any, and interest on the Certificates by the levy of a tax and collection of Pledged Revenues as aforestated. In case any provision in this Certificate or any application thereof shall be deemed invalid, illegal, or unenforceable, the validity, legality, and enforceability of the remaining provisions and applications shall not in any way be affected or impaired thereby. The terms and provisions of this Certificate and the Ordinance shall be construed in accordance with and shall be governed by the laws of the State of Texas.

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IN WITNESS WHEREOF, the City has caused this Certificate to be duly executed under its official seal.

CITY OF LEON VALLEY, TEXAS

By _____
Mayor

ATTEST:

_____
City Secretary

(CITY SEAL)

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C. *Form of Registration Certificate of Comptroller of Public Accounts to Appear on Initial Certificate Only.

REGISTRATION CERTIFICATE OF
COMPTROLLER OF PUBLIC ACCOUNTS

OFFICE OF THE COMPTROLLER OF	§	
PUBLIC ACCOUNTS	§	
	§	REGISTER NO. _____
THE STATE OF TEXAS	§	

I HEREBY CERTIFY that this Certificate has been examined, certified as to validity and approved by the Attorney General of the State of Texas, and duly registered by the Comptroller of Public Accounts of the State of Texas.

WITNESS my signature and seal of office this _____

_____
Comptroller of Public Accounts
of the State of Texas

(SEAL)

*NOTE TO PRINTER: Not to appear on printed Certificates.

D. Form of Certificate of Paying Agent/Registrar to Appear on Definitive Certificates Only.

REGISTRATION CERTIFICATE OF PAYING AGENT/REGISTRAR

This Certificate has been duly issued under the provisions of the within-mentioned Ordinance; the Certificate or Certificates of the above-entitled and designated series originally delivered having been approved by the Attorney General of the State of Texas and registered by the Comptroller of Public Accounts, as shown by the records of the Paying Agent/Registrar.

Registered this date:

THE BANK OF NEW YORK MELLON TRUST COMPANY, N.A., Dallas, Texas, as Paying Agent/Registrar

_____

By: _____
Authorized Signature

*NOTE TO PRINTER: Print on Definitive Certificates.

E. Form of Assignment.

ASSIGNMENT

FOR VALUE RECEIVED the undersigned hereby sells, assigns, and transfers unto (Print or typewrite name, address, and zip code of transferee): _____
_____
(Social Security or other identifying number): _____
the within Certificate and all rights thereunder, and hereby irrevocably constitutes and appoints _____attorney to transfer the within Certificate on the books kept for registration thereof, with full power of substitution in the premises.

DATED: _____

_____
NOTICE: The signature on this assignment must correspond with the name of the registered owner as it appears on the face of the within Certificate in every particular.

Signature guaranteed:

_____

[The remainder of this page intentionally left blank.]

F. The Initial Certificate shall be in the form set forth in paragraph B of this Section, except that the form of a single fully registered Initial Certificate shall be modified as follows:

(i) immediately under the name of the Certificate the headings "Interest Rate" and "Stated Maturity" shall both be completed "as shown below";

(ii) the first two paragraphs shall read as follows:

Registered Owner: _____

Principal Amount: _____

The City of Leon Valley, Texas (the *City*), a body corporate and municipal corporation in the County of Bexar, State of Texas, for value received, acknowledges itself indebted to and hereby promises to pay to the order of the Registered Owner named above, or the registered assigns thereof, the Principal Amount specified above stated to mature on the first day of August in each of the years and in principal amounts and bearing interest at per annum rates in accordance with the following schedule:

Years of Stated Maturity	Principal Amounts ($)	Interest Rates (%)

(Information to be inserted from schedule in Section 2 hereof)

(or so much thereof as shall not have been paid upon prior redemption) and to pay interest on the unpaid Principal Amounts hereof from the Certificate Date specified above, or from the most recent Interest Payment Date (hereinafter defined) to which interest has been paid or duly provided for until the Principal Amount has become due and payment thereof has been made or duly provided for, to the earlier of redemption or Stated Maturity, at the per annum rates of interest specified above, computed on the basis of a 360-day year of twelve 30-day months; such interest being payable on February 1 and August 1 of each year (each, an *Interest Payment Date*), commencing February 1, 2017.

Principal of this Certificate shall be payable to the Registered Owner hereof (the *Holder*), upon its presentation and surrender, to Stated Maturity or prior redemption, while Outstanding, at the corporate trust office of The Bank of New York Mellon Trust Company, N.A., Dallas, Texas (the *Paying Agent/Registrar*). Interest shall be payable to the Holder of this Certificate whose name appears on the Security Register maintained by the Paying Agent/Registrar at the close of business on the Record Date, which is the fifteenth day of the month next preceding each Interest Payment Date. All payments of principal of and interest on this Certificate shall be in any coin or currency of the United States of America which at the time of payment is legal tender for the payment of public and private debts. Interest shall be paid by the Paying Agent/Registrar by check sent on or prior to the appropriate date of payment by United States mail, first-class postage prepaid, to the Holder hereof at the address appearing in the Security Register or by such other method, acceptable to the Paying Agent/Registrar, requested by, and at the risk and expense of, the Holder hereof.

G. Insurance Legend. If bond insurance is obtained by the City or the Purchasers for the Certificates, the Definitive Certificates and the Initial Certificate shall bear an appropriate legend as provided by the insurer.

SECTION 9. Definitions. For all purposes of this Ordinance (as defined below), except as otherwise expressly provided or unless the context otherwise requires: (i) the terms defined in this Section have the meanings assigned to them in this Section, and certain terms used in Sections 27 and 44 of this Ordinance have the meanings assigned to them in Sections 27 and 44 of this Ordinance, and all such terms, include the plural as well as the singular; (ii) all references in this Ordinance to designated "Sections" and other subdivisions are to the designated Sections and other subdivisions of this Ordinance as originally adopted; and (iii) the words "herein", "hereof', and "hereunder" and other words of similar import refer to this Ordinance as a whole and not to any particular Section or other subdivision.

A. The term *Additional Limited Pledge Obligations* shall mean (i) any bonds, notes, warrants, certificates of obligation or other evidences of indebtedness hereafter issued by the City payable, in part, from a pledge of and lien on Net Revenues of the System, being a lien on and limited pledge of Net Revenues that is subordinate and inferior to the lien thereon and pledge thereof securing any Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations hereafter issued by the City, which pledge of revenues is limited pursuant to Section 1502.052, as amended, Texas Government Code all as further provided in Section 20 of this Ordinance, and (ii) any obligations issued to refund the foregoing as determined by the City Council in accordance with any applicable law.

B. The term *Authorized Officials* shall mean the Mayor, the Mayor Pro Tem, the City Manager, Finance Director, and/or the City Secretary.

C. The term *Certificates* shall mean the $_____ "CITY OF LEON VALLEY, TEXAS COMBINATION TAX AND LIMITED PLEDGE REVENUE CERTIFICATES OF OBLIGATION, SERIES 2016" authorized by this Ordinance.

D. The term *Certificate Fund* shall mean the special Fund created and established by the provisions of Section 10 of this Ordinance.

E. The term *City* shall mean the City of Leon Valley, located in Bexar County, Texas and, where appropriate, the City Council of the City.

F. The term *Closing Date* shall mean the date of physical delivery of the Initial Certificates in exchange for the payment of the agreed purchase price for the Certificates.

G. The term *Collection Date* shall mean, when reference is being made to the levy and collection of annual ad valorem taxes, the date the annual ad valorem taxes levied each year by the City become delinquent.

H. The term *Debt Service Requirements* shall mean, as of any particular date of computation, with respect to any obligations and with respect to any period, the aggregate of the amounts to be paid or set aside by the City as of such date or in such period for the payment of the principal of, premium, if any, and interest (to the extent not capitalized) on such obligations; assuming, in the case of obligations without a fixed numerical rate, that such obligations bear interest at the maximum rate permitted by the terms thereof and further assuming in the case of obligations required to be redeemed or prepaid as to principal prior to Stated Maturity, the principal amounts thereof will be redeemed prior to Stated Maturity in accordance with the mandatory redemption provisions applicable thereto.

I. The term *Depository* shall mean an official depository bank of the City.

J. The term *Fiscal Year* shall mean the annual financial accounting period for the System now ending on September 30th of each year; provided, however, the City Council may change such annual financial accounting period to end on another date if such change is found and determined to be necessary for accounting purposes or is required by applicable law.

K. The term *Government Securities*, as used herein, shall mean (i) direct noncallable obligations of the United States, including obligations that are unconditionally guaranteed by, the United States of America; (ii) noncallable obligations of an agency or instrumentality of the United States, including obligations that are unconditionally guaranteed or insured by the agency or instrumentality and that, on the date the governing body of the issuer adopts or approves the proceedings authorizing the issuance of refunding bonds, are rated as to investment quality by a nationally recognized investment rating firm not less than AAA or its equivalent; (iii) noncallable obligations of a state or an agency or a county, municipality, or other political subdivision of a state that have been refunded and that, on the date the governing body of the issuer adopts or approves the proceedings authorizing the issuance of refunding bonds, are rated as to investment quality by a nationally recognized investment rating firm not less than AAA or its equivalent, or (iv) any additional securities and obligations hereafter authorized by the laws of the State of Texas as eligible for use to accomplish the discharge of obligations such as the Certificates.

L. The term *Gross Revenues* for any period shall mean all revenue during such period in respect or on account of the operation or ownership of the System, excluding refundable meter deposits, restricted gifts, and grants in aid of construction, but including earnings and income derived from the investment or deposit of money in any special fund or account (except the Certificate Fund) created and established for the payment or security of the Certificates.

M. The term *Holder* or *Holders* shall mean the registered owner, whose name appears in the Security Register, for any Certificate.

N. The term *Interest Payment Date* shall mean the date interest is payable on the Certificates, being February 1 and August 1 of each year, commencing February 1, 2017, while any of the Certificates remain Outstanding.

O. The term *Junior Lien Obligations* shall mean (i) any bonds, notes, warrants, certificates of obligation or any similar obligations hereafter issued by the City that are payable wholly or in part from and equally and ratably secured by a lien on and pledge of the Net Revenues of the System, such pledge being junior and inferior to the lien on and pledge of the Net Revenues of the System that may be pledged to the payment of any Prior Lien Obligations hereafter issued by the City, but prior and superior to the lien on and pledge of the Net Revenues of the System that are or will be pledged to the payment of the currently outstanding Limited Pledge Obligations and the Certificates, any Subordinate Lien Obligations or Additional Limited Pledge Obligations hereafter issued by the City all as further provided in Section 20 of this Ordinance and (ii) obligations hereafter issued to refund any of the foregoing that are payable from and equally and ratably secured by a junior and inferior lien on and pledge of the Net Revenues as determined by the City Council in accordance with any applicable law.

P. The term *Limited Pledge Obligations* shall mean (i) the Certificates and the currently outstanding and unpaid obligations of the City that are payable, in part, from and secured by a subordinate and inferior lien on and pledge of a limited amount of the Net Revenues of the System and designated as follows:

(1) "City of Leon Valley, Texas Combination Tax and Limited Pledge Revenue Certificates of Obligation, Series 2014", dated August 1, 2014, in the original principal amount of $8,500,000.

and (ii) obligations hereafter issued to refund any of the foregoing as determined by the City Council in accordance with any applicable law.

Q. The term *Maintenance and Operating Expenses* shall mean all current expenses of operating and maintaining the System not paid from the proceeds of the Certificates, including (1) the cost of all salaries, labor, materials, repairs, and extensions necessary to render efficient service, but only if, in the case of repairs and extensions, they are, in the judgment of the City Council (reasonably and fairly exercised), necessary to maintain operation of the System and render adequate service to the City and the inhabitants thereof, or are necessary to meet some physical accident or condition which would otherwise impair obligations payable from Net Revenues, (2) payments to pension, retirement, health, hospitalization, and other employee benefit funds for employees of the City engaged in the operation or maintenance of the System, (3) payments under contracts for the purchase of water supply, treatment of sewage, or other materials, goods, or services for the System to the extent authorized by law and the provisions of such contract, (4) payments to auditors, attorneys, and other consultants incurred in complying with the obligations of the City hereunder, and (5) any legal liability of the City arising out of the operation, maintenance, or condition of the System, but excluding any allowance for depreciation, property retirement, depletion, obsolescence, and other items not requiring an outlay of cash and any interest on the Certificates or other bonds, notes, warrants, or similar obligations of the City payable from Net Revenues.

R. The term *Net Revenues* for any period shall mean the Gross Revenues of the System less the Maintenance and Operating Expenses of the System.

S. The term *Ordinance* shall mean this ordinance as finally passed and adopted by the City Council of the City.

T. The term *Outstanding* when used in this Ordinance with respect to Certificates shall mean, as of the date of determination, all Certificates issued and delivered under this Ordinance, except:

(2) those Certificates canceled by the Paying Agent/Registrar or delivered to the Paying Agent/Registrar for cancellation;

(3) those Certificates for which payment has been duly provided by the City in accordance with the provisions of Section 29 of this Ordinance; and

(4) those Certificates that have been mutilated, destroyed, lost, or stolen and replacement Certificates have been registered and delivered in lieu thereof as provided in Section 25 of this Ordinance.

U. The term *Pledged Revenues* shall mean, while the Certificates remain Outstanding, an amount of Net Revenues not in excess of $1,000. The Pledged Revenues shall be deposited, allocated, and expended in accordance with Section 10 of this Ordinance.

V. The term *Pledged Revenue Amount* shall mean the total amount, not to exceed $1,000 while the Certificates are Outstanding, of Net Revenues that may be transferred in whole or in part by the City in any given Fiscal Year (however, any amounts transferred prior to the final maturity date of the Certificates may not exceed the total amount of $1,000) to the Certificate Fund.

W. The term *Prior Lien Obligations* shall mean (i) any bonds, notes, warrants, certificates of obligation, or any similar obligations hereafter issued by the City that are payable, in whole or in part, from and equally and ratably secured by a first and prior lien on and pledge of the Net Revenues of the System, all as further provided in Section 20 of this Ordinance, and (ii) any obligations hereafter issued to refund the foregoing if issued in a manner so as to be payable from and equally and ratably secured by a first and prior lien on and pledge of the Net Revenues of the System as determined by the City Council in accordance with any applicable law.

X. The term *Purchasers* shall mean the initial purchaser or purchasers of the Certificates named in Section 26 of this Ordinance.

Y. The term *Stated Maturity* shall mean the annual principal payments of the Certificates payable on August 1 of each year the Certificates are Outstanding as set forth in Section 2 of this Ordinance.

Z. The term *Subordinate Lien Obligations* shall mean (i) any bonds, notes, warrants, certificates of obligation, or any similar obligations hereafter issued by the City that are payable, in whole or in part, from and equally and ratably secured by a lien on and pledge of the Net Revenues of the System, such pledge being subordinate and inferior to the lien on and pledge of the Net Revenues of the System, that are or may be pledged to the payment of any Prior Lien Obligations or Junior Lien Obligations hereafter issued by the City, but prior and superior to the lien on and pledge of the limited amount of the Net Revenues securing the payment of the currently outstanding Limited Pledge Obligations, the Certificates, or any Additional Limited Pledge Obligations hereafter issued by the City, all as further provided in Section 20 of this Ordinance and (ii) obligations hereafter issued to refund any of the foregoing that are payable from and equally and ratably secured by a subordinate and inferior lien on and pledge of the Net Revenues of the System as determined by the City Council in accordance with any applicable law.

AA. The term *System* shall mean all properties, facilities and plants currently owned, operated, and maintained by the City for the supply, treatment, transmission, and distribution of treated potable water, for the collection and treatment and disposal of waterborne wastes of wastewater, together will all future extensions, improvements, replacements and additions thereto, whether situated within or without the limits of the City and the City expressly reserves the right at its sole discretion to include additional utility, telecommunications, technology, or similar enterprise services as components of the System; provided, however, that notwithstanding the foregoing, and to the extent now or hereafter authorized or permitted by law,

the term System shall not mean to include facilities of any kind which are declared not to be a part of the System and which are acquired or constructed by or on behalf of the City with the proceeds from the issuance of *Special Facilities Bonds*, which are hereby defined as being special revenue obligations of the City which are not Prior Lien Obligations but which are payable from and secured by other liens on and pledges of any revenues, sources or payments, not pledged to the payment of the Prior Lien Obligations including, but not limited to, special contract revenues or payments received from any other legal entity in connection with such facilities.

SECTION 10. Certificate Fund – Investments. For the purpose of paying the interest on and to provide a sinking fund for the payment, redemption, and retirement of the Certificates, there shall be and is hereby created a special fund to be designated "COMBINATION TAX AND LIMITED PLEDGE REVENUE CERTIFICATES OF OBLIGATION, SERIES 2016, INTEREST AND SINKING FUND" (the *Certificate Fund*), which fund shall be kept and maintained at the Depository, and money deposited in the Certificate Fund shall be used for no other purpose and shall be maintained as provided in Section 27. Authorized Officials of the City are hereby authorized and directed to make withdrawals from the Certificate Fund sufficient to pay the purchase price or the amount of principal of, premium, if any, and interest on the Certificates as the same become due and payable and shall cause to be transferred to the Paying Agent/Registrar from money on deposit in the Certificate Fund an amount sufficient to pay the amount of principal and/or interest stated to mature on the Certificates, such transfer of funds to the Paying Agent/Registrar to be made in such manner as will cause immediately available funds to be deposited with the Paying Agent/Registrar on or before the last business day next preceding each interest and principal payment date for the Certificates.

The City, at its sole discretion, may deposit the Pledged Revenue Amount to the Certificate Fund. The Pledged Revenue Amount, if deposited, shall be expended annually to pay principal of and interest on the Certificates as the same become due and payable. This Pledged Revenue Amount shall be accounted for and transferred to the Paying Agent/Registrar in accordance with the provisions of the previous paragraph of this Section.

Pending the transfer of funds to the Paying Agent/Registrar, money deposited in any fund created and established by this Ordinance may, at the option of the City, be placed in time deposits, certificates of deposit, guaranteed investment contracts, or similar contractual agreements, as permitted by the provisions of the Public Funds Investment Act, as amended, Chapter 2256, Texas Government Code, secured (to the extent not insured by the Federal Deposit Insurance Corporation) by obligations of the type hereinafter described, or be invested, as authorized by any law, including investments held in book-entry form, in securities, including, but not limited to, direct obligations of the United States of America, obligations guaranteed or insured by the United States of America, which, in the opinion of the Attorney General of the United States, are backed by its full faith and credit or represent its general obligations, or invested in indirect obligations of the United States of America, including, but not limited to, evidences of indebtedness issued, insured or guaranteed by such governmental agencies as the Federal Land Banks, Federal Intermediate Credit Banks, Banks for Cooperatives, Federal Home Loan Banks, Government National Mortgage Association, Farmers Home Administration, Federal Home Loan Mortgage Association, Small Business Administration, or Federal Housing Association; provided that all such deposits and investments shall be made in such a manner that the money required to be expended from any fund will be available at the proper time or times.

All interest and income derived from deposits and investments in any fund established pursuant to the provisions of this Ordinance shall be credited to, and any losses debited to, such fund. All such investments shall be sold promptly when necessary to prevent any default in connection with the Certificates.

SECTION 11. Tax Levy. To provide for the payment of the Debt Service Requirements on the Certificates being (i) the interest on the Certificates and (ii) a sinking fund for their redemption at Stated Maturity or a sinking fund of 2% (whichever amount shall be the greater), there shall be and there is hereby levied for the current year and each succeeding year thereafter while the Certificates or any interest thereon shall remain Outstanding, a sufficient tax, within the limitations prescribed by law, on each one hundred dollars valuation of taxable property in the City, adequate to pay such Debt Service Requirements, full allowance being made for delinquencies and costs of collection; said tax shall be assessed and collected each year and applied to the payment of the Debt Service Requirements, and the same shall not be diverted to any other purpose. The taxes so levied and collected shall be paid into the Certificate Fund and are thereafter pledged to the payment of the Certificates. The City Council hereby declares its purpose and intent to provide and levy a tax legally and fully sufficient to pay the Debt Service Requirements, it having been determined that the existing and available taxing authority of the City for such purpose is adequate to permit a legally sufficient tax in consideration of all other outstanding indebtedness and other obligations of the City.

The amount of taxes to be provided annually for the payment of the principal of and interest on the Certificates shall be determined and accomplished in the following manner:

A. Prior to the date the City Council establishes the annual tax rate and passes an ordinance levying ad valorem taxes each year, the City Council shall determine:

(1) the amount of Debt Service Requirements to become due and payable on the Certificates between the Collection Date for the taxes then to be levied and the Collection Date for the taxes to be levied during the next succeeding calendar year;

(2) the amount on deposit in the Certificate Fund after (a) deducting therefrom the total amount of Debt Service Requirements to become due on Certificates prior to the Collection Date for the ad valorem taxes to be levied and (b) adding thereto the amount of the Pledged Revenues, if any, to be appropriated and allocated during such year to pay such Debt Service Requirements, if any, prior to the Collection Date for the ad valorem taxes to be levied; and

(3) the amount of Pledged Revenues, if any, to be appropriated and to be set aside for the payment of the Debt Service Requirements on the Certificates between the Collection Date for the taxes then to be levied and the Collection Date for the taxes to be levied during the next succeeding Fiscal Year.

B. The amount of taxes to be levied annually each year to pay the Debt Service Requirements on the Certificates shall be the amount established in paragraph (1) above less the sum total of the amounts established in paragraphs (2) and (3), after taking into consideration delinquencies and costs of collecting such annual taxes.

SECTION 12. Pledge of Revenues. The City hereby covenants and agrees that, subject to (i) any prior lien on and pledge of the Net Revenues of the System to the payment and security of any Prior Lien Obligations, Junior Lien Obligations or Subordinate Lien Obligations hereafter issued by the City and (ii) the lien on and pledge of a limited amount of the Net Revenues to the payment and security of the currently outstanding Limited Pledge Obligations, the Pledged Revenues are hereby irrevocably pledged to the payment of the principal of and interest on the Certificates and the pledge of Pledged Revenues herein made for the payment of the Certificates shall constitute a lien on the Pledged Revenues in accordance with the terms and provisions hereof and be valid and binding without any physical delivery thereof or further act by the City.

SECTION 13. System Fund. The City hereby covenants and agrees that all Gross Revenues derived from the operation of the System shall be kept separate and apart from all other funds, accounts and money of the City and shall be deposited as collected into the "CITY OF LEON VALLEY, TEXAS UTILITY SYSTEM FUND" (the *System Fund*). All money deposited in the System Fund shall be pledged and appropriated to the extent required for the following purposes and in the order of priority shown:

- First: to the payment of the reasonable and proper Maintenance and Operating Expenses of the System required by statute or ordinances authorizing the issuance of any indebtedness of the City to be a first charge on and claim against the Gross Revenues of the System;

- Second: To the payment of the amounts that must be deposited in the special funds and accounts created and established for the payment, security, and benefit of any Prior Lien Obligations hereafter issued by the City in accordance with the terms and provisions of any ordinance authorizing their issuance;

- Third: To the payment of the amounts that must be deposited in the special funds and accounts created and established for the payment, security, and benefit of any Junior Lien Obligations hereafter issued by the City in accordance with the terms and provisions of any ordinance authorizing their issuance;

- Fourth: To the payment of the amounts that must be deposited in the special funds and accounts created and established for the payment, security, and benefit of any Subordinate Lien Obligations hereafter issued by the City in accordance with the terms and provisions of any ordinance authorizing their issuance; and

- Fifth: To the payment of the amounts that may be deposited in the special funds and accounts established for the payment of the currently outstanding Limited Pledge Obligations, including the Certificates and any Additional Limited Pledge Obligations hereafter issued by the City in accordance with the terms and provisions of any ordinance authorizing their issuance.

Any Net Revenues remaining in the System Fund after satisfying the foregoing payments, or making adequate and sufficient provision for the payment, security and benefit thereof, may be appropriated and used for any other City purpose now or hereafter permitted by law.

SECTION 14. Deposits to Certificate Fund; Surplus Certificate Proceeds. The City hereby covenants and agrees to cause to be deposited in the Certificate Fund prior to a principal and interest payment date for the Certificates, from the Pledged Revenues in the System Fund, after the deduction of all payments required to be made to the special funds or accounts created for the payment, security, and benefit of (i) any Prior Lien Obligations, Junior Lien Obligations or Subordinate Lien Obligations hereafter issued by the City and (ii) the currently outstanding Limited Pledge Obligations, including the Certificates, and any amounts budgeted to be paid therefrom in such Fiscal Year.

Accrued interest received from the Purchasers of the Certificates shall be deposited to the Certificate Fund and ad valorem taxes levied and collected for the benefit of the Certificates shall be deposited to the Certificate Fund. In addition, any surplus proceeds, including investment income therefrom, from the sale of the Certificates not expended for authorized purposes shall be deposited in the Certificate Fund, and such amounts so deposited shall reduce the sums otherwise required to be deposited in said fund from ad valorem taxes.

SECTION 15. Security of Funds. All money on deposit in the funds for which this Ordinance makes provision (except any portion thereof as may be at any time properly invested as provided herein) shall be secured in the manner and to the fullest extent required by the laws of the State of Texas for the security of public funds, and money on deposit in such funds shall be used only for the purposes permitted by this Ordinance.

SECTION 16. Maintenance of System - Insurance. The City covenants and agrees that while the Certificates remain Outstanding it will maintain and operate the System with all possible efficiency and maintain casualty and other insurance (including a system of self-insurance) on the properties of the System and its operations of a kind and in such amounts customarily carried by municipal corporations in the State of Texas engaged in a similar type of business and that it will faithfully and punctually perform all duties with reference to the System required by the laws of the State of Texas. All money received from losses under such insurance policies, other than public liability policies, are held for the benefit of the holders of the Certificates until and unless the proceeds are paid out in making good the loss or damage in respect of which such proceeds are received, either by replacing the property destroyed or repairing the property damaged, and adequate provision for making good such loss or damage must be made within ninety (90) days after the date of loss. The payment of premiums for all insurance policies required under the provisions hereof shall be considered Maintenance and Operating Expenses. Nothing in this Ordinance shall be construed as requiring the City to expend any funds which are derived from sources other than the operation of the System but nothing herein shall be construed as preventing the City from doing so.

SECTION 17. Rates and Charges. The City hereby covenants and agrees with the Holders of the Certificates that rates and charges for utility services afforded by the System will be established and maintained to provide Gross Revenues sufficient at all times:

A. to pay, together with any other lawfully available funds, all operating, maintenance, depreciation, replacement, betterment, and other costs incurred in the maintenance and operation of the System, including, but not limited to, Maintenance and Operating Expenses; provided, however, that the City expressly reserves the right to utilize other lawfully available funds to pay the Maintenance and Operating Expenses;

B. to produce Net Revenues sufficient, together with any other lawfully available funds, to pay (i) the interest on and principal of any Prior Lien Obligations hereafter issued by the City as the same becomes due and payable and the amounts required to be deposited in any special fund created and established for the payment, security, and benefit thereof, (ii) the interest on and principal of any Junior Lien Obligations hereafter issued by the City as the same becomes due and payable and the amounts required to be deposited in any special fund created and established for the payment, security, and benefit thereof, (iii) the interest on and principal of any Subordinate Lien Obligations hereafter issued by the City as the same becomes due and payable and the amounts required to be deposited in any special fund created and established for the payment, security, and benefit thereof, and (iv) the amounts that may be deposited in the special funds established for the payment of the currently outstanding Limited Pledge Obligations, the Certificates or any Additional Limited Pledge Obligations hereafter issued by the City; and

C. to pay other legally incurred indebtedness payable from the Net Revenues of the System and/or secured by a lien on the System or the Net Revenues thereof.

SECTION 18. Records and Accounts - Annual Audit. The City further covenants and agrees that so long as any of the Certificates remain Outstanding it will keep and maintain separate and complete records and accounts pertaining to the operations of the System in which complete and correct entries shall be made of all transactions relating thereto, as provided by Chapter 1502, as amended, Texas Government Code, or other applicable law. The Holders of the Certificates or any duly authorized agent or agents of the Holders shall have the right to inspect the System and all properties comprising the same. The City further agrees that, following the close of each Fiscal Year, it will cause an audit of such books and accounts to be made by an independent firm of certified public accountants. Expenses incurred in making the annual audit of the operations of the System are to be regarded as Maintenance and Operating Expenses.

SECTION 19. Remedies in Event of Default. In addition to all the rights and remedies provided by the laws of the State of Texas, the City covenants and agrees particularly that in the event the City (a) defaults in the payments to be made to the Certificate Fund, or (b) defaults in the observance or performance of any other of the covenants, conditions, or obligations set forth in this Ordinance, the Holders of any of the Certificates shall be entitled to seek a writ of mandamus issued by a court of proper jurisdiction compelling and requiring the governing body of the City and other officers of the City to observe and perform any covenant, condition, or obligation prescribed in this Ordinance.

No delay or omission to exercise any right or power accruing upon any default shall impair any such right or power or shall be construed to be a waiver of any such default or acquiescence therein, and every such right and power may be exercised from time to time and as often as may be deemed expedient. The specific remedies herein provided shall be cumulative of all other existing remedies and the specification of such remedies shall not be deemed to be exclusive.

SECTION 20. Issuance of Prior Lien Obligations - Junior Lien Obligations – Subordinate Lien Obligations and Additional Limited Pledge Obligations. The City hereby expressly reserves the right to hereafter issue bonds, notes, warrants, certificates of obligation, or similar

obligations, payable, wholly or in part, as appropriate, from and secured by a pledge of and lien on the Net Revenues of the System with the following priorities, without limitation as to principal amount, but subject to any terms, conditions, or restrictions applicable thereto under existing ordinances, laws, or otherwise:

A. Prior Lien Obligations payable from and equally and ratably secured by a first and prior lien on and pledge of the Net Revenues of the System;

B. Junior Lien Obligations payable from and equally and ratably secured by a lien on and pledge of the Net Revenues that is junior and inferior to the lien on and pledge thereof securing the payment of any Prior Lien Obligations hereafter issued by the City, but prior and superior to the lien on and pledge of the Net Revenues securing, in part, the payment of the currently outstanding Limited Pledge Obligations and the Certificates and any Subordinate Lien Obligations or Additional Limited Pledge Obligations hereafter issued by the City; and

C. Subordinate Lien Obligations payable from and equally and ratably secured by a lien on and pledge of the Net Revenues that is subordinate and inferior to the lien on and pledge thereof securing the payment of any Prior Lien Obligations or Junior Lien Obligations hereafter issued by the City, but prior and superior to the lien on and pledge of the Net Revenues securing, in part, the payment of the currently outstanding Limited Pledge Obligations and the Certificates and any Additional Limited Pledge Obligations hereafter issued by the City; and

D. Additional Limited Pledge Obligations secured by a lien on and pledge of a limited amount of the Net Revenues in accordance with the provisions of the following paragraph.

Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations, if issued, may be payable, in whole or in part, from Net Revenues (without impairment of the obligation of contract with the holders of the currently outstanding Limited Pledge Obligations and the Certificates) upon such terms and conditions as the City Council may determine. Additional Limited Pledge Obligations, if issued and payable, in whole or in part, from Pledged Revenues (defined in the same or similar terms as provided in Section 9 of this Ordinance or in the ordinances authorizing the issuance of the currently outstanding Limited Pledge Obligations), shall not in any event be construed to be payable from the Pledged Revenues authorized by this Ordinance or in the ordinances authorizing the issuance of any Additional Limited Pledge Obligations to be budgeted and appropriated for the payment of the Certificates or the ordinances authorizing the issuance of the currently outstanding Limited Pledge Obligations. However, the lien on and pledge of the limited amount of Net Revenues securing, in part, the payment of any Additional Limited Pledge Obligations shall be subordinate and inferior to the pledge of and lien on the Net Revenues securing the payment of any Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations hereafter issued by the City.

SECTION 21. Special Covenants. The City hereby further covenants that:

A. it has the lawful power to pledge the Pledged Revenues supporting the Certificates and has lawfully exercised said powers under the laws of the State of Texas, including power existing under Chapter 1502, as amended, Texas Government Code, and the

Certificate of Obligation Act of 1971, as amended, Texas Local Government Code, Section 271.041 through Section 271.064;

B. other than for the payment of the currently outstanding Limited Pledge Obligations and the Certificates, the Net Revenues of the System have not in any manner been pledged to the payment of any debt or obligation of the City or of the System;

C. as long as any Certificates or any interest thereon remain Outstanding, the City will not sell, lease or encumber the System or any substantial part thereof, provided that this covenant shall not be construed to prohibit the sale of such machinery, or other properties or equipment which has become obsolete or otherwise unsuited to the efficient operation of the System;

D. to the extent that it legally may, the City further covenants and agrees that, so long as any of the Certificates, or any interest thereon, are Outstanding, no franchise shall be granted for the installation or operation of any competing utility systems other than those owned by the City, and the operation of any such systems by anyone other than the City is hereby prohibited; and

E. no free service of the System shall be allowed, and should the City or any of its agents or instrumentalities make use of the services and facilities of the System, payment of the reasonable value thereof shall be made by the City out of funds from sources other than the revenues and income of the System.

SECTION 22. Application of the Covenants and Agreements of any Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations. It is the intention of the City Council and accordingly hereby recognized and stipulated that the provisions, agreements, and covenants contained herein bearing upon the management and operations of the System, and the administration and application of Gross Revenues derived from the operation thereof, shall to the extent possible be harmonized with like provisions, agreements, and covenants contained in the ordinances authorizing the issuance of any Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations hereafter issued by the City, and to the extent of any irreconcilable conflict between the provisions contained herein and in the provisions, agreements and covenants contained therein shall prevail to the extent of such conflict and be applicable to this Ordinance, especially the priority of rights and benefits conferred thereby to the holders of any Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations hereafter issued by the City. It is expressly recognized that prior to the issuance of any Prior Lien Obligations, Junior Lien Obligations, or Subordinate Lien Obligations, the City must comply with each of the conditions precedent contained in the ordinance authorizing the issuance of the currently outstanding Limited Pledge Obligations and the Certificates.

SECTION 23. Notices to Holders, Waiver. Wherever this Ordinance provides for notice to Holders of any event, such notice shall be sufficiently given (unless otherwise herein expressly provided) if in writing and sent by United States mail, first-class postage prepaid, to the address of each Holder as it appears in the Security Register at the close of business on the business day next preceding the mailing of such notice.

In any case where notice to Holders is given by mail, neither the failure to mail such notice to any particular Holders, nor any defect in any notice so mailed, shall affect the sufficiency of such notice with respect to all other Holders. Where this Ordinance provides for notice in any manner, such notice may be waived in writing by the Holder entitled to receive such notice, either before or after the event with respect to which such notice is given, and such waiver shall be the equivalent of such notice. Waivers of notice by Holders shall be filed with the Paying Agent/Registrar, but such filing shall not be a condition precedent to the validity of any action taken in reliance upon such waiver.

SECTION 24. Cancellation. All Certificates surrendered for payment, redemption, transfer, exchange, or replacement, if surrendered to the Paying Agent/Registrar, shall be promptly canceled by it and, if surrendered to the City, shall be delivered to the Paying Agent/Registrar and, if not already canceled, shall be promptly canceled by the Paying Agent/Registrar. The City may at any time deliver to the Paying Agent/Registrar for cancellation any Certificates previously certified or registered and delivered which the City may have acquired in any manner whatsoever, and all Certificates so delivered shall be promptly canceled by the Paying Agent/Registrar. All canceled Certificates held by the Paying Agent/Registrar shall be destroyed as directed by the City.

SECTION 25. Mutilated, Destroyed, Lost, and Stolen Certificates. If (1) any mutilated Certificate is surrendered to the Paying Agent/Registrar, or the City and the Paying Agent/Registrar receive evidence to their satisfaction of the destruction, loss, or theft of any Certificate, and (2) there is delivered to the City and the Paying Agent/Registrar such security or indemnity as may be required to save each of them harmless, then, in the absence of notice to the City or the Paying Agent/Registrar that such Certificate has been acquired by a bona fide purchaser, the City shall execute and, upon its request, the Paying Agent/Registrar shall register and deliver, in exchange for or in lieu of any such mutilated, destroyed, lost, or stolen Certificate, a new Certificate of the same Stated Maturity and interest rate and of like tenor and principal amount, bearing a number not contemporaneously Outstanding.

In case any such mutilated, destroyed, lost, or stolen Certificate has become or is about to become due and payable, the City in its discretion may, instead of issuing a new Certificate, pay such Certificate.

Upon the issuance of any new Certificate or payment in lieu thereof, under this Section, the City may require payment by the Holder of a sum sufficient to cover any tax or other governmental charge imposed in relation thereto and any other expenses and charges (including attorney's fees and the fees and expenses of the Paying Agent/Registrar) connected therewith.

Every new Certificate issued pursuant to this Section in lieu of any mutilated, destroyed, lost, or stolen Certificate shall constitute a replacement of the prior obligation of the City, whether or not the mutilated, destroyed, lost, or stolen Certificate shall be at any time enforceable by anyone, and shall be entitled to all the benefits of this Ordinance equally and ratably with all other Outstanding Certificates.

The provisions of this Section are exclusive and shall preclude (to the extent lawful) all other rights and remedies with respect to the replacement and payment of mutilated, destroyed, lost, or stolen Certificates.

SECTION 26. Sale of the Certificates at Competitive Sale; Approval of Official Statement; Proceeds of Sale. The Certificates authorized by this Ordinance are hereby sold by the City to _____, _____, _____, as the authorized representative of a group of underwriters at a competitive sale (the *Purchasers*, having all of the rights, duties, and obligations of a Holder), in accordance with the provisions of an Official Bid Form (the "Official Bid Form"), dated April 19, 2016, attached hereto as Exhibit B and incorporated herein by reference as a part of this Ordinance for all purposes, at the price of par, plus a cash premium of $_____ (including the Purchasers' compensation of $_____ and an excess bid premium of $_____), plus accrued interest to the date of initial delivery of the Certificates to the Purchasers, and is hereby approved and confirmed. The Initial Certificate shall be registered in the name of _____. It is hereby officially found, determined, and declared that the Purchasers are the highest bidder for the Certificates whose bid, received as a result of invitations for competitive bids in compliance with applicable law, produced the lowest true interest cost to the City. The pricing and terms of the sale of the Certificates are hereby found and determined to be the most advantageous reasonably obtainable by the City. Any Authorized Official is hereby authorized and directed to execute the Official Bid Form for and on behalf of the City and as the act and deed of this City Council, and in regard to the approval and execution of the Official Bid Form, the City Council hereby finds, determines and declares that the representations, warranties, and agreements of the City contained in the Official Bid Form are true and correct in all material respects and shall be honored and performed by the City. Delivery of the Certificates to the Purchasers shall occur as soon as practicable after the adoption of this Ordinance, upon payment therefor in accordance with the terms of the Official Bid Form.

Proceeds from the sale of the Certificates shall be applied as follows:

(1) Accrued interest on the Certificates (in the amount of $_____) received from the Purchasers shall be deposited into the Certificate Fund.

(2) The City received an original issue reoffering premium from the sale of the Certificates of $_____ which is hereby allocated by the City in the following manner: (1) $_____ to pay the Purchasers' compensation, (2) $_____ shall be deposited into the construction account established in paragraph (3) below, and (3) $_____ shall be deposited to pay certain remaining costs of issuance of the Certificates.

(3) The balance of the proceeds derived from the sale of the Certificates (after paying costs of issuance) shall be deposited into the special construction account or accounts created for the projects to be constructed with the proceeds of the Certificates and used to pay costs of such projects. This special construction account shall be established and maintained at the Depository and shall be invested in accordance with the provisions of Section 10 of this Ordinance. Interest earned on the proceeds of the Certificates pending completion of construction of the projects financed with such proceeds shall be accounted for, maintained, deposited, and expended as permitted by the provisions of Chapter 1201, as amended, Texas Government Code, or as required by any other applicable law. Thereafter, such amounts shall be expended in accordance with Section 14 of this Ordinance.

Furthermore, the City hereby ratifies, confirms, and approves in all respects (i) the City's prior determination that the Preliminary Official Statement was, as of its date, "deemed final" in accordance with the Rule (hereinafter defined) and (ii) the use and distribution of the Official Notice of Sale, Official Bid Form, and Preliminary Official Statement by the Purchasers in connection with the public offering and sale of the Certificates. The final Official Statement, being a modification and amendment of the Preliminary Official Statement to reflect the terms of sale referenced in the Official Bid Form (together with such changes approved by any Authorized Official, any one or more of said officials), shall be and is hereby in all respects approved and the Purchasers are hereby authorized to use and distribute the final Official Statement, dated April 19, 2016, in the reoffering, sale and delivery of the Certificates to the public. The Mayor and/or City Secretary are further authorized and directed to manually execute and deliver for and on behalf of the City copies of the Official Statement in final form as may be required by the Purchasers, and such final Official Statement in the form and content manually executed by said officials shall be deemed to be approved by the City Council and constitute the Official Statement authorized for distribution and use by the Purchasers. The proper officials of the City are hereby authorized to execute and deliver a certificate pertaining to such Official Statement as prescribed therein, dated as of the date of payment for and delivery of the Certificates.

SECTION 27. Covenants to Maintain Tax-Exempt Status.

A. Definitions. When used in this Section, the following terms have the following meanings:

"*Closing Date*" means the date on which the Certificates are first authenticated and delivered to the initial purchasers against payment therefor.

"*Code*" means the Internal Revenue Code of 1986, as amended by all legislation, if any, effective on or before the Closing Date.

"*Computation Date*" has the meaning set forth in Section 1.148-1(b) of the Regulations.

"*Gross Proceeds*" means any proceeds as defined in Section 1.148-1(b) of the Regulations, and any replacement proceeds as defined in Section 1.148-1(c) of the Regulations, of the Certificates.

"*Investment*" has the meaning set forth in Section 1.148-1(b) of the Regulations.

"*Nonpurpose Investment*" means any investment property, as defined in section 148(b) of the Code, in which Gross Proceeds of the Certificates are invested and which is not acquired to carry out the governmental purposes of the Certificates.

"*Rebate Amount*" has the meaning set forth in Section 1.148-1(b) of the Regulations.

"*Regulations*" means any proposed, temporary, or final Income Tax Regulations issued pursuant to sections 103 and 141 through 150 of the Code, and 103 of the Internal Revenue Code of 1954, which are applicable to the Certificates. Any reference to any

specific Regulation shall also mean, as appropriate, any proposed, temporary or final Income Tax Regulation designed to supplement, amend or replace the specific Regulation referenced.

"Yield" of

(1) any Investment has the meaning set forth in Section 1.148-5 of the Regulations; and

(2) the Certificates has the meaning set forth in Section 1.148-4 of the Regulations.

B. Not to Cause Interest to Become Taxable. The City shall not use, permit the use of, or omit to use Gross Proceeds or any other amounts (or any property the acquisition, construction or improvement of which is to be financed or refinanced directly or indirectly with Gross Proceeds) in a manner which if made or omitted, respectively, would cause the interest on any Certificate to become includable in the gross income, as defined in section 61 of the Code, of the owner thereof for federal income tax purposes. Without limiting the generality of the foregoing, unless and until the City receives a written opinion of counsel nationally recognized in the field of municipal bond law to the effect that failure to comply with such covenant will not adversely affect the exemption from federal income tax of the interest on any Certificate, the City shall comply with each of the specific covenants in this Section.

C. No Private Use or Private Payments. Except to the extent that it will not cause the Certificates to become "private activity bonds" within the meaning of section 141 of the Code and the Regulations and rulings thereunder, the City shall at all times prior to the last Stated Maturity of Certificates:

(1) exclusively own, operate and possess all property the acquisition, construction or improvement of which is to be financed or refinanced directly or indirectly with Gross Proceeds of the Certificates, and not use or permit the use of such Gross Proceeds (including all contractual arrangements with terms different than those applicable to the general public) or any property acquired, constructed or improved with such Gross Proceeds in any activity carried on by any person or entity (including the United States or any agency, department and instrumentality thereof) other than a state or local government, unless such use is solely as a member of the general public; and

(2) not directly or indirectly impose or accept any charge or other payment by any person or entity who is treated as using Gross Proceeds of the Certificates or any property the acquisition, construction or improvement of which is to be financed or refinanced directly or indirectly with such Gross Proceeds, other than taxes of general application within the City or interest earned on investments acquired with such Gross Proceeds pending application for their intended purposes.

D. No Private Loan. Except as would not cause the Certificates to become "private activity bonds" within the meaning of section 141 of the Code and the Regulations and rulings thereunder, the City shall not use Gross Proceeds of the Certificates to make or finance loans to any person or entity other than a state or local government. For purposes of the foregoing covenant, such Gross Proceeds are considered to be "loaned" to a person or entity if- (1) property

acquired, constructed or improved with such Gross Proceeds is sold or leased to such person or entity in a transaction which creates a debt for federal income tax purposes; (2) capacity in or service from such property is committed to such person or entity under a take-or-pay, output or similar contract or arrangement; or (3) indirect benefits, or burdens and benefits of ownership, of such Gross Proceeds or any property acquired, constructed or improved with such Gross Proceeds are otherwise transferred in a transaction which is the economic equivalent of a loan.

E. Not to Invest at Higher Yield. Except as would not cause the Certificates to become "arbitrage bonds" within the meaning of section 148 of the Code and the Regulations and rulings thereunder, the City shall not at any time prior to the final Stated Maturity of the Certificates directly or indirectly invest Gross Proceeds in any Investment, if as a result of such investment the Yield of any Investment acquired with Gross Proceeds, whether then held or previously disposed of, materially exceeds the Yield of the Certificates.

F. Not Federally Guaranteed. Except to the extent permitted by section 149(b) of the Code and the Regulations and rulings thereunder, the City shall not take or omit to take any action which would cause the Certificates to be federally guaranteed within the meaning of section 149(b) of the Code and the Regulations and rulings thereunder.

G. Information Report. The City shall timely file the information required by section 149(e) of the Code with the Secretary of the Treasury on Form 8038-G or such other form and in such place as the Secretary may prescribe.

H. Rebate of Arbitrage Profits. Except to the extent otherwise provided in section 148(f) of the Code and the Regulations and rulings thereunder or except to the extent the City complies with Subsection J of this Section:

(1) The City shall account for all Gross Proceeds (including all receipts, expenditures and investments thereof) on its books of account separately and apart from all other funds (and receipts, expenditures and investments thereof) and shall retain all records of accounting for at least six years after the day on which the last Outstanding Certificate is discharged. However, to the extent permitted by law, the City may commingle Gross Proceeds of the Certificates with other money of the City, provided that the City separately accounts for each receipt and expenditure of Gross Proceeds and the obligations acquired therewith.

(2) Not less frequently than each Computation Date, the City shall calculate the Rebate Amount in accordance with rules set forth in section 148(f) of the Code and the Regulations and rulings thereunder. The City shall maintain such calculations with its official transcript of proceedings relating to the issuance of the Certificates until six years after the final Computation Date.

(3) As additional consideration for the purchase of the Certificates by the Purchasers and the loan of the money represented thereby and in order to induce such purchase by measures designed to insure the excludability of the interest thereon from the gross income of the owners thereof for federal income tax purposes, the City shall pay to the United States out of the Certificate Fund or its general fund, as permitted by applicable Texas statute, regulation or opinion of the Attorney General of the State of

Texas, the amount that when added to the future value of previous rebate payments made for the Certificates equals (i) in the case of a Final Computation Date as defined in Section 1.148-3(e)(2) of the Regulations, one hundred percent (100%) of the Rebate Amount on such date; and (ii) in the case of any other Computation Date, ninety percent (90%) of the Rebate Amount on such date. In all cases, the rebate payments shall be made at the times, in the installments, to the place and in the manner as is or may be required by section 148(f) of the Code and the Regulations and rulings thereunder, and shall be accompanied by Form 8038-T or such other forms and information as is or may be required by section 148(f) of the Code and the Regulations and rulings thereunder.

(4) The City shall exercise reasonable diligence to assure that no errors are made in the calculations and payments required by paragraphs (2) and (3), and if an error is made, to discover and promptly correct such error within a reasonable amount of time thereafter (and in all events within one hundred eighty (180) days after discovery of the error), including payment to the United States of any additional Rebate Amount owed to it, interest thereon, and any penalty imposed under Section 1.148-3(h) of the Regulations.

I. Not to Divert Arbitrage Profits. Except to the extent permitted by section 148 of the Code and the Regulations and rulings thereunder, the City shall not, at any time prior to the earlier of the Stated Maturity or final payment of the Certificates, enter into any transaction that reduces the amount required to be paid to the United States pursuant to Subsection H of this Section because such transaction results in a smaller profit or a larger loss than would have resulted if the transaction had been at arm's length and had the Yield of the Certificates not been relevant to either party.

J. No Rebate Required. The City need not comply with the covenants and duties imposed by the provisions of Subsection H. of this Section if:

(1) the City is a governmental unit with general taxing powers;

(2) 95% of the Net Proceeds of the Certificates and all income from the investment thereof will be used for the governmental activities of the City;

(3) the aggregate face amount, within the meaning of Section 1.148-8(c)(1) of the Regulations, of all debt obligations (other than private activity bonds) issued or expected to be issued by the City or any subordinate entity in the calendar year in which the Certificates are issued is not reasonably expected to exceed $5,000,000; and

(4) the City otherwise satisfies the requirements of paragraph (4)(D) of section 148(f) of the Code and Section 1.148-8 of the Regulations and rulings thereunder.

K. Certificates Not Hedge Bonds.

(1) The City reasonably expects to spend at least 85% of the spendable proceeds of the Certificates within three years after such Certificates are issued.

(2) Not more than 50% of the proceeds of the Certificates will be invested in Nonpurpose Investments having a substantially guaranteed Yield for a period of 4 years or more.

L. Elections. The City hereby directs and authorizes any Authorized Official, either individually or any combination of them, to make elections permitted or required pursuant to the provisions of the Code or the Regulations, as they deem necessary or appropriate in connection with the Certificates, in the Certificate as to Tax Exemption or similar or other appropriate certificate, form or document. Such elections shall be deemed to be made on the Closing Date.

M. Qualified Tax-Exempt Obligations. The City hereby designates the Certificates as qualified tax-exempt obligations for purposes of section 265(b) of the Code. In furtherance of such designation, the City represents, covenants and warrants the following: (a) during the calendar year in which the Certificates are issued, the City (including any subordinate entities) has not designated nor will designate obligations, which when aggregated with the Certificates, will result in more than $10,000,000 of "qualified tax-exempt obligations" being issued; (b) the City reasonably anticipates that the amount of tax-exempt obligations issued during the calendar year 2016 by the City (including any subordinate entities) will not exceed $10,000,000; and the City will take such action or refrain from such action as is necessary in order that the Certificates will not be considered "private activity bonds" within the meaning of section 141 of the Code.

SECTION 28. Control and Custody of Certificates. The Mayor of the City shall be and is hereby authorized to take and have charge of all necessary orders and records pending investigation by the Attorney General of the State of Texas and shall take and have charge and control of the Certificates pending their approval by the Attorney General of the State of Texas, the registration thereof by the Comptroller of Public Accounts of the State of Texas and the delivery of the Certificates to the Purchasers.

Furthermore, any Authorized Official, either individually or any combination of them, is hereby authorized and directed to furnish and execute such documents relating to the City and its financial affairs as may be necessary for the issuance of the Certificates, the approval of the Attorney General of the State of Texas and their registration by the Comptroller of Public Accounts of the State of Texas and, together with the City's financial advisors, Bond Counsel, and the Paying Agent/Registrar, make the necessary arrangements for the delivery of the Initial Certificate to the Purchasers and, when requested in writing by the Purchasers, the initial exchange thereof for definitive Certificates.

SECTION 29. Satisfaction of Obligation of City. If the City shall pay or cause to be paid, or there shall otherwise be paid to the Holders, the principal of, premium, if any, and interest on the Certificates, at the times and in the manner stipulated in this Ordinance, then the pledge of taxes levied and the lien on and pledge of the Pledged Revenues under this Ordinance and all covenants, agreements, and other obligations of the City to the Holders shall thereupon cease, terminate, and be discharged and satisfied.

Certificates, or any principal amount(s) thereof, shall be deemed to have been paid within the meaning and with the effect expressed above in this Section when (i) money sufficient to pay in full such Certificates or the principal amount(s) thereof at Stated Maturity or to the redemption date therefor, together with all interest due thereon, shall have been irrevocably deposited with

and held in trust by the Paying Agent/Registrar, or an authorized escrow agent, and/or (ii) Government Securities shall have been irrevocably deposited in trust with the Paying Agent/Registrar, or an authorized escrow agent, which Government Securities have, in the case of a net defeasance, been certified by an independent accounting firm to mature as to principal and interest in such amounts and at such times as will insure the availability, without reinvestment, of sufficient money, together with any money deposited therewith, if any, to pay when due the principal of and interest on such Certificates, or the principal amount(s) thereof, on and prior to the Stated Maturity thereof or (if notice of redemption has been duly given or waived or if irrevocable arrangements therefor acceptable to the Paying Agent/Registrar have been made) the redemption date thereof for the Certificates. In the event of a gross defeasance of the Certificates, the City shall deliver a certificate from its financial advisor, the Paying Agent/Registrar, or another qualified third party concerning the deposit of cash and/or Government Securities to pay, when due, the principal of, redemption premium (if any), and interest due on any defeased Certificate. The City covenants that no deposit of money or Government Securities will be made under this Section and no use made of any such deposit which would cause the Certificates to be treated as arbitrage bonds within the meaning of section 148 of the Code (as defined in Section 27 hereof).

Any money so deposited with the Paying Agent/Registrar, and all income from Government Securities held in trust by the Paying Agent/Registrar, or an authorized escrow agent, pursuant to this Section which is not required for the payment of the Certificates, or any principal amount(s) thereof, or interest thereon with respect to which such money has been so deposited shall be remitted to the City or deposited as directed by the City. Furthermore, any money held by the Paying Agent/Registrar for the payment of the principal of and interest on the Certificates and remaining unclaimed for a period of three (3) years after the Stated Maturity of the Certificates, or applicable redemption date of the Certificates, such money was deposited and is held in trust to pay shall upon the request of the City be remitted to the City against a written receipt therefor, subject to the unclaimed property laws of the State of Texas.

Notwithstanding any other provision of this Ordinance to the contrary, it is hereby provided that any determination not to redeem defeased Certificates that is made in conjunction with the payment arrangements specified in subsection (i) or (ii) above shall not be irrevocable, provided that: (1) in the proceedings providing for such defeasance, the City expressly reserves the right to call the defeased Certificates for redemption; (2) gives notice of the reservation of that right to the owners of the defeased Certificates immediately following the defeasance; (3) directs that notice of the reservation be included in any redemption notices that it authorizes; and (4) at the time of the redemption, satisfies the conditions of (i) or (ii) above with respect to such defeased debt as though it was being defeased at the time of the exercise of the option to redeem the defeased Certificates, after taking the redemption into account in determining the sufficiency of the provisions made for the payment of the defeased Certificates.

SECTION 30. Printed Opinion. The Purchasers' obligation to accept delivery of the Certificates is subject to their being furnished a final opinion of Norton Rose Fulbright US LLP, San Antonio, Texas, as Bond Counsel, approving certain legal matters as to the Certificates, this opinion to be dated and delivered as of the date of initial delivery and payment for such Certificates. Printing of a true and correct copy of this opinion on the reverse side of each of the Certificates, with appropriate certificate pertaining thereto executed by facsimile signature of the City Secretary of the City is hereby approved and authorized.

SECTION 31. CUSIP Numbers. CUSIP numbers, may be printed or typed on the definitive Certificates. It is expressly provided, however, that the presence or absence of CUSIP numbers on the definitive Certificates shall be of no significance or effect as regards the legality thereof, and neither the City nor Bond Counsel are to be held responsible for CUSIP numbers incorrectly printed or typed on the definitive Certificates.

SECTION 32. Effect of Headings. The Section headings herein are for convenience only and shall not affect the construction hereof.

SECTION 33. Ordinance a Contract, Amendments - Outstanding Certificates. The City acknowledges that the covenants and obligations of the City herein contained are a material inducement to the purchase of the Certificates. This Ordinance shall constitute a contract with the Holders from time to time, binding on the City and its successors and assigns, and it shall not be amended or repealed by the City so long as any Certificate remains Outstanding except as permitted in this Section. The City may, without the consent of or notice to any Holders, from time to time and at any time, amend this Ordinance in any manner not detrimental to the interests of the Holders, including the curing of any ambiguity, inconsistency, or formal defect or omission herein. In addition, the City may, with the written consent of Holders holding a majority in aggregate principal amount of the Certificates then Outstanding affected thereby, amend, add to, or rescind any of the provisions of this Ordinance; provided, however, that, without the consent of all Holders of Outstanding Certificates, no such amendment, addition, or rescission shall (1) extend the time or times of payment of the principal of and interest on the Certificates, reduce the principal amount thereof, the redemption price therefor, or the rate of interest thereon, or in any other way modify the terms of payment of the principal of, premium, if any, or interest on the Certificates, (2) give any preference to any Certificate over any other Certificate, or (3) reduce the aggregate principal amount of Certificates required for consent to any such amendment, addition, or rescission.

SECTION 34. Benefits of Ordinance. Nothing in this Ordinance, expressed or implied, is intended or shall be construed to confer upon any person other than the City, Bond Counsel, Paying Agent/Registrar, and the Holders, any right, remedy, or claim, legal or equitable, under or by reason of this Ordinance or any provision hereof, this Ordinance and all its provisions being intended to be and being for the sole and exclusive benefit of the City, Bond Counsel, Paying Agent/Registrar, and the Holders.

SECTION 35. Inconsistent Provisions. All ordinances and resolutions, or parts thereof, which are in conflict or inconsistent with any provision of this Ordinance are hereby repealed to the extent of such conflict, and the provisions of this Ordinance shall be and remain controlling as to the matters ordained herein.

SECTION 36. Governing Law. This Ordinance shall be construed and enforced in accordance with the laws of the State of Texas and the United States of America.

SECTION 37. Severability. If any provision of this Ordinance or the application thereof to any person or circumstance shall be held to be invalid, the remainder of this Ordinance and the application of such provision to other persons and circumstances shall nevertheless be valid, and the City Council hereby declares that this Ordinance would have been enacted without such invalid provision.

SECTION 38. Construction of Terms. If appropriate in the context of this Ordinance, words of the singular number shall be considered to include the plural, words of the plural number shall be considered to include the singular, and words of the masculine, feminine or neuter gender shall be considered to include the other genders.

SECTION 39. Incorporation of Preamble Recitals. The recitals contained in the preamble hereof are hereby found to be true, and such recitals are hereby made a part of this Ordinance for all purposes and are adopted as a part of the judgment and findings of the City Council of the City.

SECTION 40. Authorization of Paying Agent/Registrar Agreement. The City Council of the City hereby finds and determines that it is in the best interest of the City to authorize the execution of a Paying Agent/Registrar Agreement concerning the payment, exchange, registration, and transferability of the Certificates. A copy of the Paying Agent/Registrar Agreement is attached hereto, in substantially final form, as Exhibit A and is incorporated by reference to the provisions of this Ordinance.

SECTION 41. Public Meeting. It is officially found, determined, and declared that the meeting at which this Ordinance is adopted was open to the public and public notice of the time, place, and subject matter of the public business to be considered at such meeting, including this Ordinance, was given, all as required by Chapter 551, as amended, Texas Government Code.

SECTION 42. Unavailability of Authorized Publication. If, because of the temporary or permanent suspension of any newspaper, journal, or other publication, or, for any reason, publication of notice cannot be made meeting any requirements herein established, any notice required to be published by the provisions of this Ordinance shall be given in such other manner and at such time or times as in the judgment of the City or of the Paying Agent/Registrar shall most effectively approximate such required publication and the giving of such notice in such manner shall for all purposes of this Ordinance be deemed to be in compliance with the requirements for publication thereof.

SECTION 43. No Recourse Against City Officials. No recourse shall be had for the payment of principal of, premium, if any, or interest on any Certificate or for any claim based thereon or on this Ordinance against any official of the City or any person executing any Certificate.

SECTION 44. Continuing Disclosure Undertaking.

A. Definitions.

As used in this Section, the following terms have the meanings ascribed to such terms below:

EMMA means the MSRB's Electronic Municipal Market Access system, accessible by the general public, without charge, on the internet through the uniform resource locator (URL) http://www.emma.msrb.org.

MSRB means the Municipal Securities Rulemaking Board.

Rule means SEC Rule 15c2-12, as amended from time to time.

SEC means the United States Securities and Exchange Commission.

B. Annual Reports.

The City shall file annually with the MSRB, (1) within six months after the end of each fiscal year of the City ending in or after 2016, financial information and operating data with respect to the City of the general type included in the final Official Statement authorized by Section 26 of this Ordinance, being the information described in Exhibit C hereto, and (2) if not provided as part of such financial information and operating data, audited financial statements of the City, when and if available. Any financial statements so to be provided shall be (i) prepared in accordance with the accounting principles described in Exhibit C hereto, or such other accounting principles as the City may be required to employ from time to time pursuant to state law or regulation, and (ii) audited, if the City commissions an audit of such financial statements and the audit is completed within the period during which they must be provided. If the audit of such financial statements is not complete within such period, then the City shall file unaudited financial statements within such period and audited financial statements for the applicable fiscal year to the MSRB, when and if the audit report on such financial statements becomes available. Under current Texas law, including, but not limited to, Chapter 103, as amended, Texas Local Government Code, the City must have its records and accounts audited annually and shall have an annual financial statement prepared based on the audit. The annual financial statement, including the auditor's opinion on the statement, shall be filed in the office of the City Secretary within 180 days after the last day of the City's fiscal year. Additionally, upon the filing of this financial statement and the annual audit, these documents are subject to the Texas Open Records Act, as amended, Texas Government Code, Chapter 552.

If the City changes its fiscal year, it will file notice of such change (and of the date of the new fiscal year end) with the MSRB prior to the next date by which the City otherwise would be required to provide financial information and operating data pursuant to this Section.

C. Notice of Certain Events.

The City shall file notice of any of the following events with respect to the Certificates to the MSRB in a timely manner and not more than 10 business days after occurrence of the event:

(1) Principal and interest payment delinquencies;

(2) Non-payment related defaults, if material;

(3) Unscheduled draws on debt service reserves reflecting financial difficulties;

(4) Unscheduled draws on credit enhancements reflecting financial difficulties;

(5) Substitution of credit or liquidity providers, or their failure to perform;

(6) Adverse tax opinions, the issuance by the Internal Revenue Service of proposed or final determinations of taxability, Notices of Proposed Issue (IRS Form 5701-TEB), or other

material notices or determinations with respect to the tax status of the Certificates, or other material events affecting the tax status of the Certificates;

(7) Modifications to rights of holders of the Certificates, if material;

(8) Certificate calls, if material, and tender offers;

(9) Defeasances;

(10) Release, substitution, or sale of property securing repayment of the Certificates, if material;

(11) Rating changes;

(12) Bankruptcy, insolvency, receivership, or similar event of the City, which shall occur as described below;

(13) The consummation of a merger, consolidation, or acquisition involving the City or the sale of all or substantially all of its assets, other than in the ordinary course of business, the entry into of a definitive agreement to undertake such an action or the termination of a definitive agreement relating to any such actions, other than pursuant to its terms, if material; and

(14) Appointment of a successor or additional paying agent/registrar or the change of name of a paying agent/registrar, if material.

For these purposes, any event described in the immediately preceding paragraph (12) is considered to occur when any of the following occur: the appointment of a receiver, fiscal agent, or similar officer for the City in a proceeding under the United States Bankruptcy Code or in any other proceeding under state or federal law in which a court or governmental authority has assumed jurisdiction over substantially all of the assets or business of the City, or if such jurisdiction has been assumed by leaving the existing governing body and officials or officers in possession but subject to the supervision and orders of a court or governmental authority, or the entry of an order confirming a plan of reorganization, arrangement, or liquidation by a court or governmental authority having supervision or jurisdiction over substantially all of the assets or business of the City.

The City shall file notice with the MSRB, in a timely manner, of any failure by the City to provide financial information or operating data in accordance with this Section by the time required by this Section.

D. Limitations, Disclaimers, and Amendments.

The City shall be obligated to observe and perform the covenants specified in this Section for so long as, but only for so long as, the City remains an "obligated person" with respect to the Certificates within the meaning of the Rule, except that the City in any event will give notice of any deposit that causes the Certificates to be no longer Outstanding.

The provisions of this Section are for the sole benefit of the holders and beneficial owners of the Certificates, and nothing in this Section, express or implied, shall give any benefit

or any legal or equitable right, remedy, or claim hereunder to any other person. The City undertakes to provide only the financial information, operating data, financial statements, and notices which it has expressly agreed to provide pursuant to this Section and does not hereby undertake to provide any other information that may be relevant or material to a complete presentation of the City's financial results, condition, or prospects or hereby undertake to update any information provided in accordance with this Section or otherwise, except as expressly provided herein. The City does not make any representation or warranty concerning such information or its usefulness to a decision to invest in or sell Certificates at any future date.

UNDER NO CIRCUMSTANCES SHALL THE CITY BE LIABLE TO THE HOLDER OR BENEFICIAL OWNER OF ANY CERTIFICATE OR ANY OTHER PERSON, IN CONTRACT OR TORT, FOR DAMAGES RESULTING IN WHOLE OR IN PART FROM ANY BREACH BY THE CITY, WHETHER NEGLIGENT OR WITH OR WITHOUT FAULT ON ITS PART, OF ANY COVENANT SPECIFIED IN THIS SECTION, BUT EVERY RIGHT AND REMEDY OF ANY SUCH PERSON, IN CONTRACT OR TORT, FOR OR ON ACCOUNT OF ANY SUCH BREACH SHALL BE LIMITED TO AN ACTION FOR *MANDAMUS* OR SPECIFIC PERFORMANCE.

No default by the City in observing or performing its obligations under this Section shall constitute a breach of or default under this Ordinance for purposes of any other provision of this Ordinance.

Nothing in this Section is intended or shall act to disclaim, waive, or otherwise limit the duties of the City under federal and state securities laws.

The provisions of this Section may be amended by the City from time to time to adapt to changed circumstances that arise from a change in legal requirements, a change in law, or a change in the identity, nature, status, or type of operations of the City, but only if (1) the provisions of this Section, as so amended, would have permitted an underwriter to purchase or sell Certificates in the primary offering of the Certificates in compliance with the Rule, taking into account any amendments or interpretations of the Rule to the date of such amendment, as well as such changed circumstances, and (2) either (a) the holders of a majority in aggregate principal amount (or any greater amount required by any other provision of this Ordinance that authorizes such an amendment) of the Outstanding Certificates consent to such amendment or (b) a person that is unaffiliated with the City (such as nationally recognized bond counsel) determines that such amendment will not materially impair the interests of the holders and beneficial owners of the Certificates. The City may also repeal or amend the provisions of this Section if the SEC amends or repeals the applicable provisions of the Rule or any court of final jurisdiction enters judgment that such provisions of the Rule are invalid, and the City also may amend the provisions of this Section in its discretion in any other manner or circumstance, but in either case only if and to the extent that the provisions of this sentence would not have prevented an underwriter from lawfully purchasing or selling Certificates in the primary offering of the Certificates, giving effect to (a) such provisions as so amended and (b) any amendments or interpretations of the Rule. If the City so amends the provisions of this Section, the City shall include with any amended financial information or operating data next provided in accordance with this Section an explanation, in narrative form, of the reasons for the amendment and of the impact of any change in the type of financial information or operating data so provided.

E. Information Format – Incorporation by Reference.

The City information required under this Section shall be filed with the MSRB through EMMA in such format and accompanied by such identifying information as may be specified from time to time thereby. Under the current rules of the MSRB, continuing disclosure documents submitted to EMMA must be in word-searchable portable document format (PDF) files that permit the document to be saved, viewed, printed, and retransmitted by electronic means and the series of obligations to which such continuing disclosure documents relate must be identified by CUSIP number or numbers.

Financial information and operating data to be provided pursuant to this Section may be set forth in full in one or more documents or may be included by specific reference to any document (including an official statement or other offering document) available to the public through EMMA or filed with the SEC.

SECTION 45. Book-Entry Only System.

The Certificates shall initially be registered so as to participate in a securities depository system (the *DTC System*) with the Depository Trust Company, New York, New York, or any successor entity thereto (*DTC*), as set forth herein. Each Stated Maturity of the Certificates shall be issued (following cancellation of the Initial Certificates described in Section 7) in the form of a single definitive Certificate. Upon issuance, the ownership of each such Certificate shall be registered in the name of Cede & Co., as the nominee of DTC, and all of the Outstanding Certificates shall be registered in the name of Cede & Co., as the nominee of DTC. The City and the Paying Agent/Registrar are authorized to execute, deliver, and take the actions set forth in such letters to or agreements with DTC as shall be necessary to effectuate the DTC System, including the Letter of Representations attached hereto as Exhibit D (the *Representation Letter*).

With respect to the Certificates registered in the name of Cede & Co., as nominee of DTC, the City and the Paying Agent/Registrar shall have no responsibility or obligation to any broker-dealer, bank, or other financial institution for which DTC holds the Certificates from time to time as securities depository (a *Depository Participant*) or to any person on behalf of whom such a Depository Participant holds an interest in the Certificates (an *Indirect Participant*). Without limiting the immediately preceding sentence, the City and the Paying Agent/Registrar shall have no responsibility or obligation with respect to (i) the accuracy of the records of DTC, Cede & Co., or any Depository Participant with respect to any ownership interest in the Certificates, (ii) the delivery to any Depository Participant or any other person, other than a registered owner of the Certificates, as shown on the Security Register, of any notice with respect to the Certificates, including any notice of redemption, or (iii) the delivery to any Depository Participant or any Indirect Participant or any other Person, other than a Holder of a Certificate, of any amount with respect to principal of, premium, if any, or interest on the Certificates. While in the DTC System, no person other than Cede & Co., or any successor thereto, as nominee for DTC, shall receive a bond certificate evidencing the obligation of the City to make payments of principal, premium, if any, and interest pursuant to this Ordinance. Upon delivery by DTC to the Paying Agent/Registrar of written notice to the effect that DTC has determined to substitute a new nominee in place of Cede & Co., and subject to the provisions in this Ordinance with respect to interest checks or drafts being mailed to the Holder, the word "Cede & Co." in this Ordinance shall refer to such new nominee of DTC.

In the event that (a) the City determines that DTC is incapable of discharging its responsibilities described herein and in the Representation Letter, (b) the Representation Letter shall be terminated for any reason, or (c) DTC or the City determines that it is in the best interest of the beneficial owners of the Certificates that they be able to obtain certificated Certificates, the City shall notify the Paying Agent/Registrar, DTC, and the Depository Participants of the availability within a reasonable period of time through DTC of bond certificates, and the Certificates shall no longer be restricted to being registered in the name of Cede & Co., as nominee of DTC. At that time, the City may determine that the Certificates shall be registered in the name of and deposited with a successor depository operating a securities depository system, as may be acceptable to the City, or such depository's agent or designee, and if the City and the Paying Agent/Registrar do not select such alternate securities depository system then the Certificates may be registered in whatever name or names the Holders of Certificates transferring or exchanging the Certificates shall designate, in accordance with the provisions hereof.

Notwithstanding any other provision of this Ordinance to the contrary, so long as any Certificate is registered in the name of Cede & Co., as nominee of DTC, all payments with respect to principal of, premium, if any, and interest on such Certificate and all notices with respect to such Certificate shall be made and given, respectively, in the manner provided in the Representation Letter.

SECTION 46. Further Procedures. The officers and employees of the City are hereby authorized, empowered and directed from time to time and at any time to do and perform all such acts and things and to execute, acknowledge and deliver in the name and under the corporate seal and on behalf of the City all such instruments, whether or not herein mentioned, as may be necessary or desirable in order to carry out the terms and provisions of this Ordinance, the initial sale and delivery of the Certificates, the Official Bid Form, the Paying Agent/Registrar Agreement, and the Official Statement. In addition, prior to the initial delivery of the Certificates, any Authorized Official and Bond Counsel are hereby authorized and directed to approve any technical changes or corrections to this Ordinance or to any of the instruments authorized and approved by this Ordinance and as described in the Official Statement necessary in order to (i) correct any ambiguity or mistake or properly or more completely document the transactions contemplated and approved by this Ordinance, (ii) obtain a rating from any of the national bond rating agencies, or (iii) obtain the approval of the Certificates by the Texas Attorney General's office. In case any officer of the City whose signature shall appear on any certificate shall cease to be such officer before the delivery of such certificate, such signature shall nevertheless be valid and sufficient for all purposes the same as if such officer had remained in office until such delivery.

SECTION 47. Contracts with Financial Advisor and/or Bond Counsel. The City Council authorizes the Mayor and/or the City Manager, or their designees, to take all actions necessary to execute any necessary financial advisory contracts with FirstSouthwest, a division of Hilltop Securities Inc., as the financial advisor to the City (the *Financial Advisor*). The City understands that under applicable federal securities laws and regulations that the City must have a contractual arrangement with its Financial Advisor relating to the sale, issuance, and delivery of the Certificates. In addition, the City Council also authorizes the Mayor and/or the City Manager, or their designees, to take all actions necessary to execute any necessary engagement agreement with Norton Rose Fulbright US LLP, as the Bond Counsel to the City.

SECTION 48. City's Consent to Provide Information and Documentation to the Texas MAC. The Municipal Advisory Council of Texas (the *Texas MAC*), a non-profit membership corporation organized exclusively for non-profit purposes described in section 501(c)(6) of the Internal Revenue Code and which serves as a comprehensive financial information repository regarding municipal debt issuers in Texas, requires provision of written documentation regarding the issuance of municipal debt by the issuers thereof. In support of the purpose of the Texas MAC and in compliance with applicable law, the City hereby consents to and authorizes any Authorized Official, Bond Counsel to the City, and/or Financial Advisor to the City to provide to the Texas MAC information and documentation requested by the Texas MAC relating to the Certificates; provided, however, that no such information and documentation shall be provided prior to the Closing Date. This consent and authorization relates only to information and documentation that is a part of the public record concerning the issuance of the Certificates.

SECTION 49. Effective Date. This Ordinance shall be in force and effect from and after its final passage, and it is so ordained.

[The remainder of this page intentionally left blank.]

PASSED AND ADOPTED on the 19th day of April, 2016.

CITY OF LEON VALLEY, TEXAS

_____
Mayor

ATTEST:

_____
City Secretary

(CITY SEAL)

INDEX TO EXHIBITS

EXHIBIT A

Paying Agent/Registrar Agreement

See Tab No. ___

EXHIBIT B

Official Bid Form

See Tab No. ___

EXHIBIT C

Description of Annual Financial Information

The following information is referred to in Section 44 of this Ordinance.

Annual Financial Statements and Operating Data

The financial information and operating data with respect to the City to be provided annually in accordance with such Section are as specified (and included in the Appendix or under the headings of the Official Statement referred to) below:

(1) The City's audited financial statements for the most recently concluded fiscal year or to the extent these audited financial statements are not available, the portions of the unaudited financial statements of the City attached to the Official Statement as Appendix B, but for the most recently concluded fiscal year.

(2) The information of the type included in Tables 1 through 6 and 8 through 12, and in Appendix B.

Accounting Principles

The accounting principles referred to in such Section are generally accepted accounting principles for governmental units as prescribed by the Government Accounting Standards Board from time to time.

EXHIBIT D

DTC Letter of Representations

See Tab No. ___

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

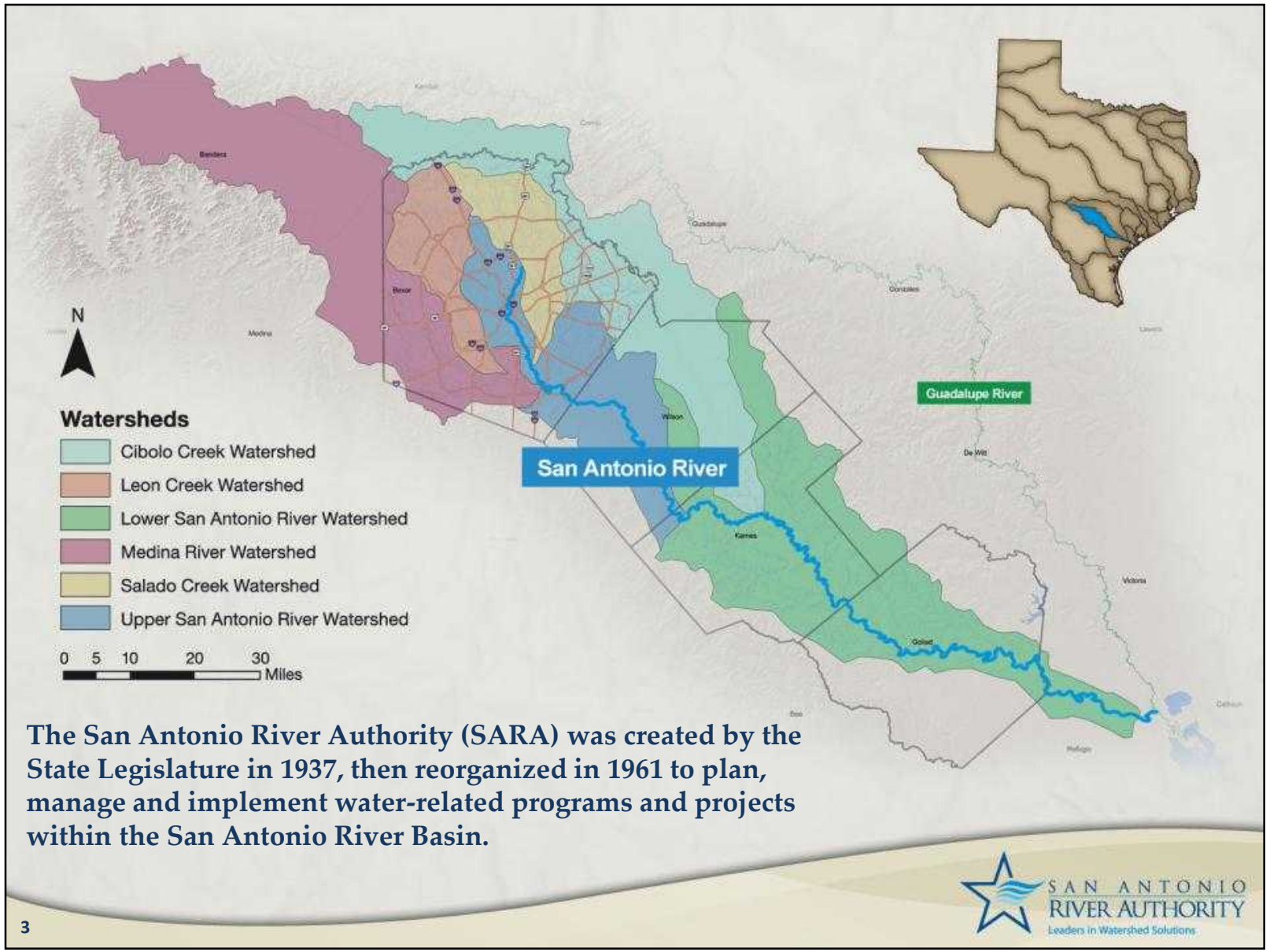
WHO WE ARE AND WHAT WE DO

Leon Valley City Council
April 19th, 2016

Presentation Outline

- Agency Background
- Agency Goals
- Taxing Authority
- Services:
  - Watershed Engineering
  - Environmental Sciences
  - Environmental Investigations
  - Watershed and Park Operations
  - Utility and Community Assistance/Outreach

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions



The San Antonio River Authority (SARA) was created by the State Legislature in 1937, then reorganized in 1961 to plan, manage and implement water-related programs and projects within the San Antonio River Basin.

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

SARA's Board of Directors

Twelve Board Members represent SARA's constituency in four counties. Elections are held every other year. Terms are six years and staggered.

Sally Buchanan
Bexar County
At-Large

Alicia Lott Cowley
Goliad County
At-Large

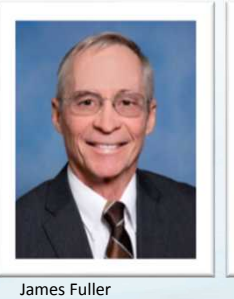
Hector Morales
Bexar County
At-Large

Gaylon Oehlke
Karnes County
At-Large

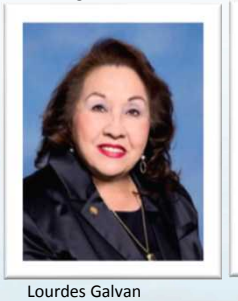
Darrell T. Brownlow, Ph.D.
Wilson County
At-Large

Jim Campbell
Bexar County
District 4

John Flieller
Wilson County
At-Large



James Fuller
Goliad County
At-Large



Lourdes Galvan
Bexar County
District 2

Jerry G. Gonzales
Bexar County
District 1

Michael W.
Lackey, P.E.
Bexar County
District 3

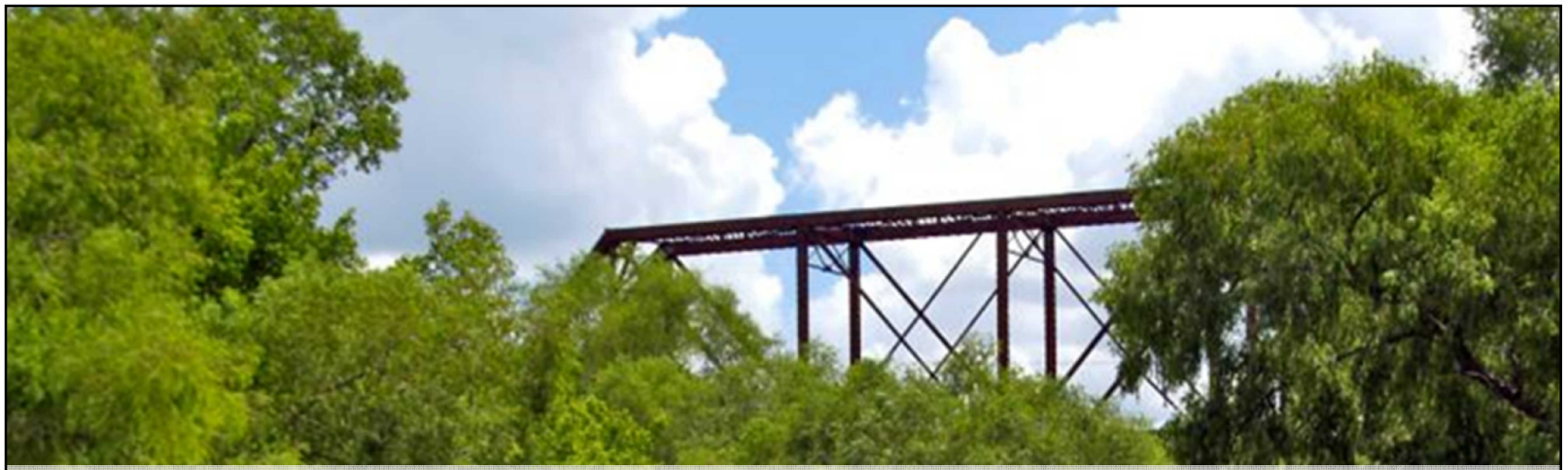
Trip Ruckman
Karnes County
At-Large

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

General Manager, Suzanne B. Scott

Suzanne Scott has served as the General Manager of the San Antonio River Authority since September of 2007

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions



Vision: Inspiring actions for healthy creeks and rivers
Mission: Protect and enhance our creeks and rivers

6

SARA's Agency Goals

- Generate lasting and recognized improvements to the health and safety of our creeks, rivers, estuaries and bays.
- Enhance community appreciation for and recreational use of our creeks and rivers.
- Advance and apply our expertise to influence, develop and implement watershed solutions that balance the environmental, economic and quality of life needs of our communities.
- Strengthen, develop and anticipate expertise at all levels to enhance results, improve service efficiencies, and build employee dedication.
- Expand, diversify and leverage funding sources and partnerships by delivering results.

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

SARA's Taxing Authority

- Ad valorem tax capped at $0.02 per $100 of assessed value
- May only be used for O&M activities.
- Current tax rate is $0.01729 per $100 assessed value
- The annual tax levied on the average residence homestead value throughout SARA's jurisdiction is approximately $27.43 per year
- Tax rate is same for Goliad, Karnes, Wilson, and Bexar counties

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

Watershed Engineering

Detailed study on tributary in Floresville

- Floodplain Management
- Mapping & Modeling Improvements
- Technical Support
- Watershed Master Planning
- Project Management

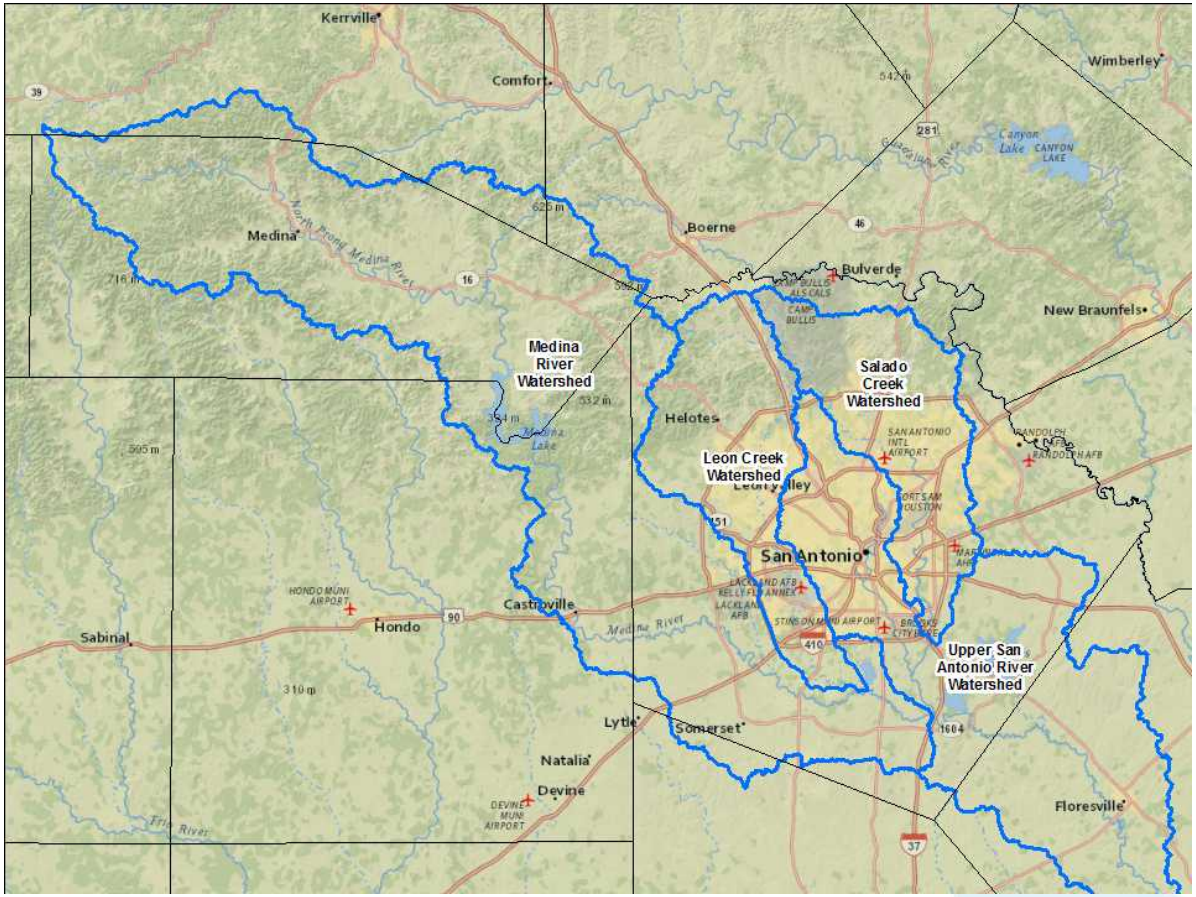
SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

Watershed Master Planning

- Flooding
- Water Quality
- Nature-Based Park Planning
- Geographic Information Systems (GIS)
- Funding Sources
- Stream Restoration
- Mitigation Banking

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

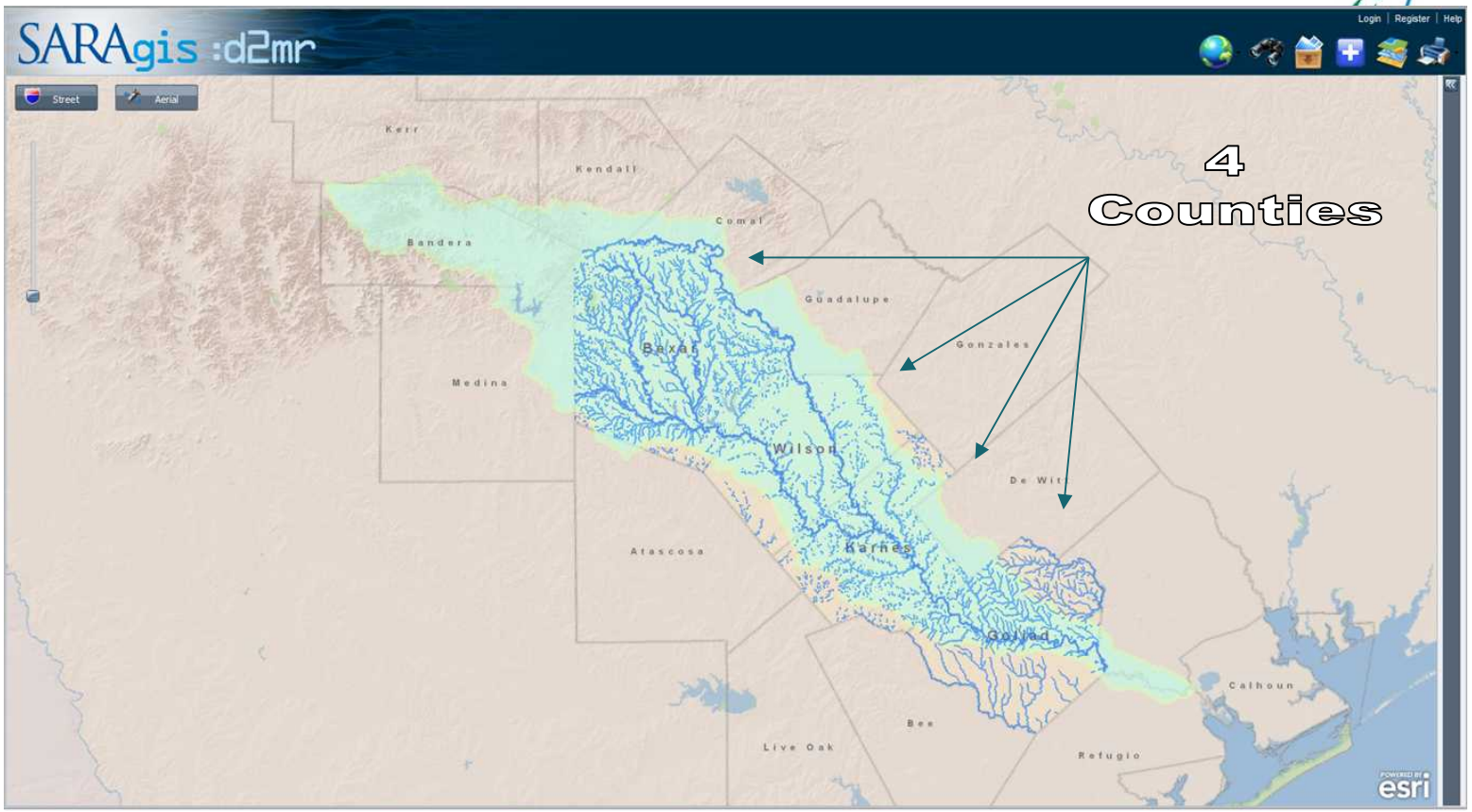
COMPREHENSIVE WATERSHED MASTER PLANS

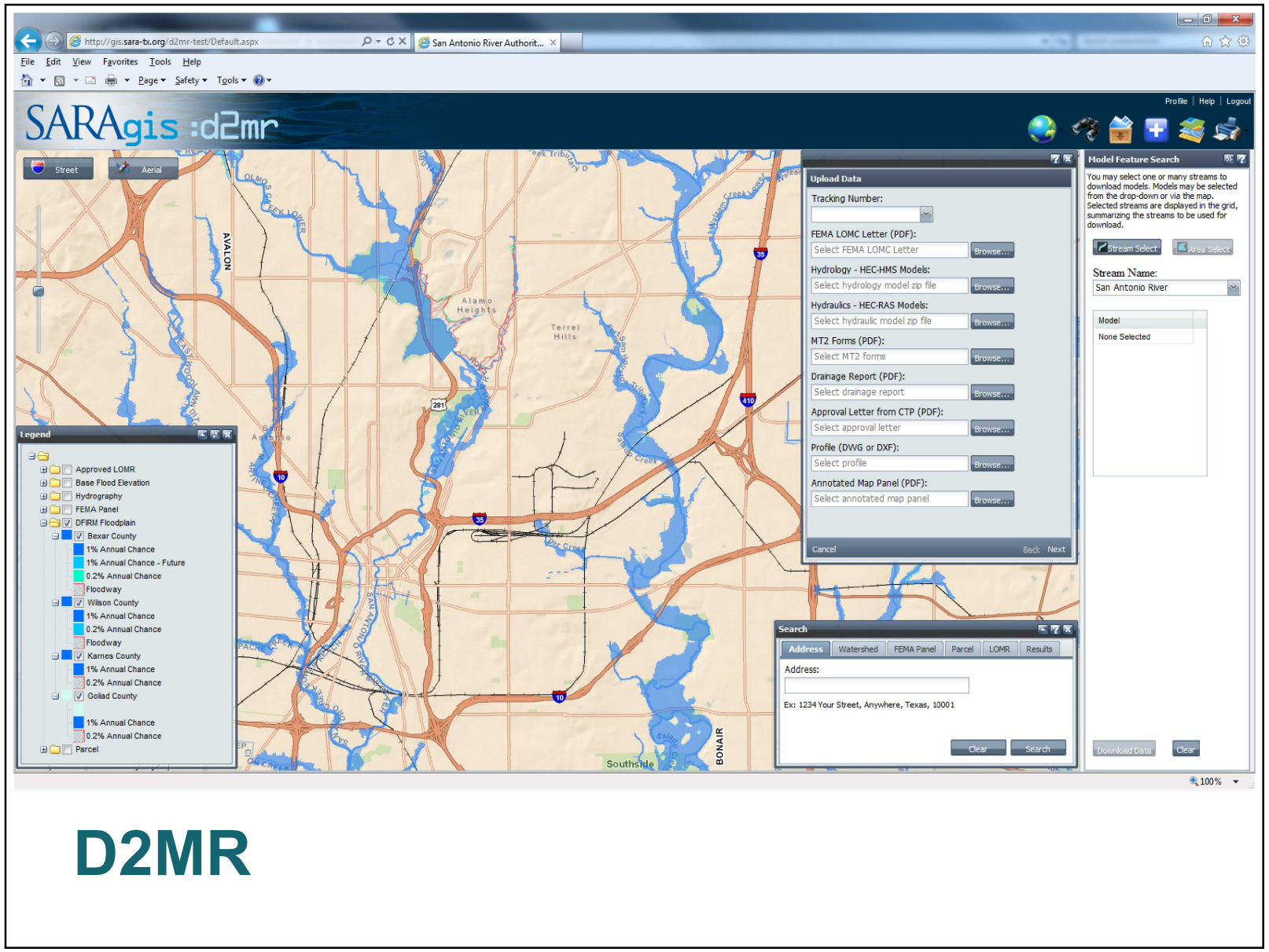


11

SAN ANTONIO RIVER BASIN

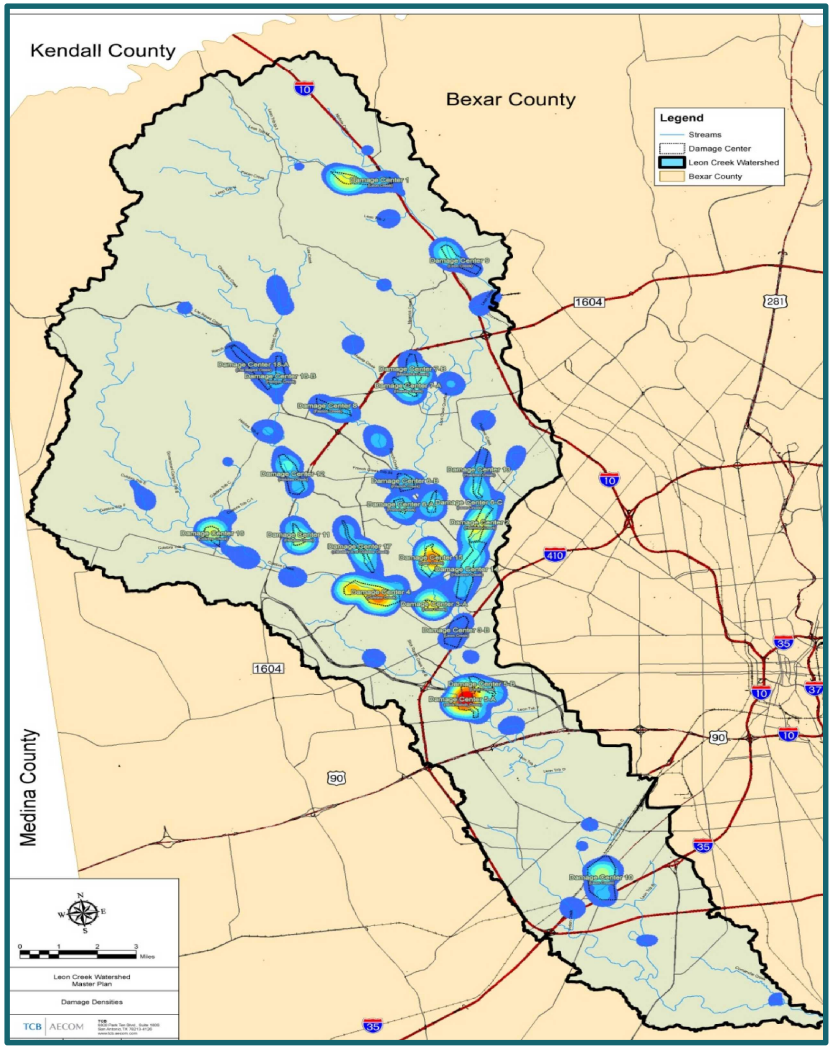
Digital Data and Models Repository Areas



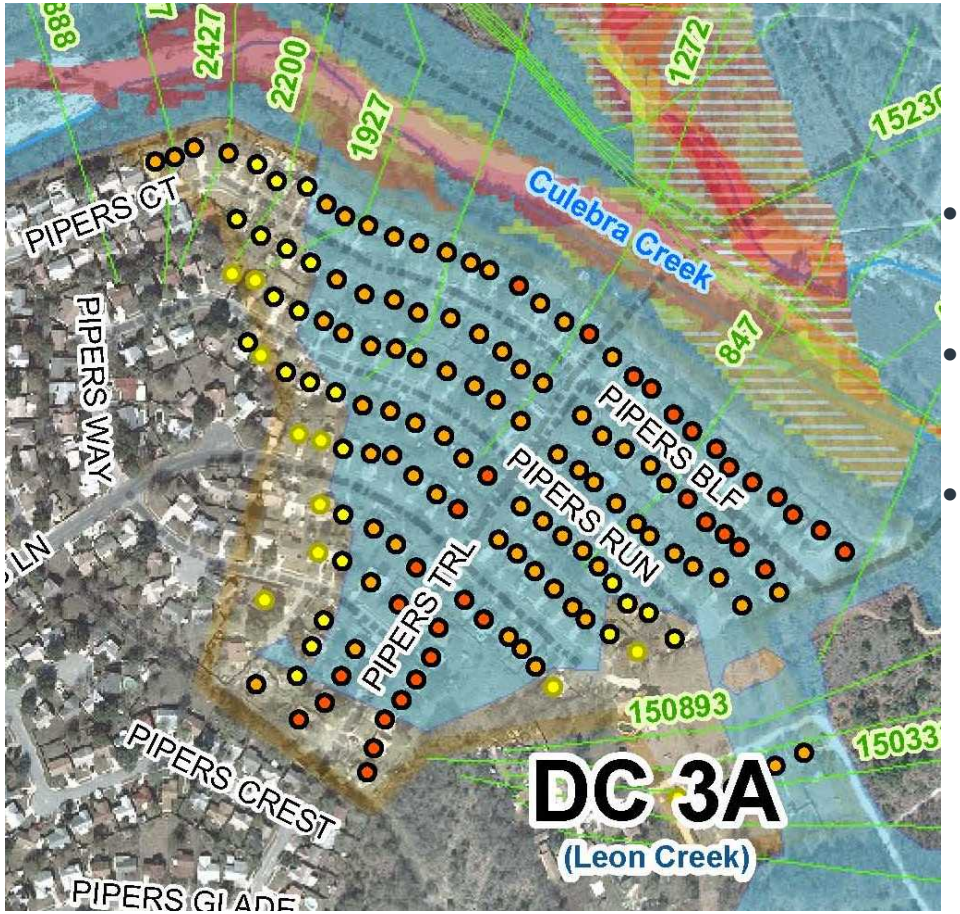

SARAgis :d2mr
Profile | Help | Logout
Street
Aerial
Legend
Approved LOMR
Base Flood Elevation
Hydrography
FEMA Panel
DFIRM Floodplain
Bexar County
1% Annual Chance
1% Annual Chance - Future
0.2% Annual Chance
Floodway
Wilson County
1% Annual Chance
0.2% Annual Chance
Floodway
Karnes County
1% Annual Chance
0.2% Annual Chance
Goliad County
1% Annual Chance
0.2% Annual Chance
Parcel
Upload Data
Tracking Number:
FEMA LOMC Letter (PDF):
Select FEMA LOMC Letter
Browse...
Hydrology - HEC-HMS Models:
Select hydrology model zip file
Hydraulics - HEC-RAS Models:
Select hydraulic model zip file
MT2 Forms (PDF):
Select MT2 forms
Drainage Report (PDF):
Select drainage report
Approval Letter from CTP (PDF):
Select approval letter
Profile (DWG or DXF):
Select profile
Annotated Map Panel (PDF):
Select annotated map panel
Cancel
Back
Next
Model Feature Search
You may select one or many streams to download models. Models may be selected from the drop-down or via the map. Selected streams are displayed in the grid, summarizing the streams to be used for download.
Stream Select
Area Select
Stream Name:
San Antonio River
Model
None Selected
Download Data
Clear
Search
Address
Watershed
FEMA Panel
Parcel
LOMR
Results
Address:
Ex: 1234 Your Street, Anywhere, Texas, 10001
Clear
Search
AVALON
Alamo Heights
Terrell Hills
Southside
BONAIR
100%

D2MR

DAMAGE DENSITY MAP



DAMAGE CENTER 3



- Red Dot
  - 10yr storm – 6" rain
- Orange dot
  - 50yr storm – 9" rain
- Yellow dot
  - 100yr storm – 10" rain

Environmental Sciences

- Collect and analyze water quality and biological samples collected throughout the San Antonio River Basin
- The San Antonio River Authority laboratory has a **Nationally Accredited Environmental Laboratory (NELAP)**
- Collections include:
  - routine water quality measurements
  - information on fish and aquatic insect communities
  - aquatic habitat and flow

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

Instream and Environmental Flows

- SARA participates in:
  - Instream Flows Program
  - Environmental Flows Stakeholder Committee (GSA-BBASC)
  - Ecological Dynamic Simulation Model (EDYS)
    - San Antonio Bay
    - Goliad, Refugio and Victoria
    - Wilson and Karnes
  - Estuary Response
  - Rangia Clam Investigation (Complete Sept. 2015)
  - Environmental Flows Validation Study (Complete Sept. 2015)

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

Bay and Estuary Support

- San Antonio Bay Partnership (SABP) – A stakeholder-driven watershed/estuary protection and management program for the San Antonio Bay/Guadalupe Estuary System.

- SARA funds $25,000 annually to the SABP Challenge Grant Program, a program designed to increase donations by matching contributions dollar for dollar to the non-profit.

Whooping Crane

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

Environmental Investigators

- To report illegal activities or dumping call SARA's Environmental Investigations Coordinators:
  - Ronnie Hernandez or Amanda Nasto
  - (210) 227-2373
  - (866) 345-7272 (toll free)

- Investigations may include:
  - Citizen complaints and concerns
  - Fish kills, spills, permit violations and illegal dumping
  - Habitat destruction
  - Floodplain and encroachment violations
  - Unauthorized activities

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

The Runoff

http://www.hrwc.org/author/riclawson/

http://www.acogok.org/Programs_and_Services/Water_Resources/Storm_Water.asp

http://gordonenergy.com/erosion-control-silt-fences.php

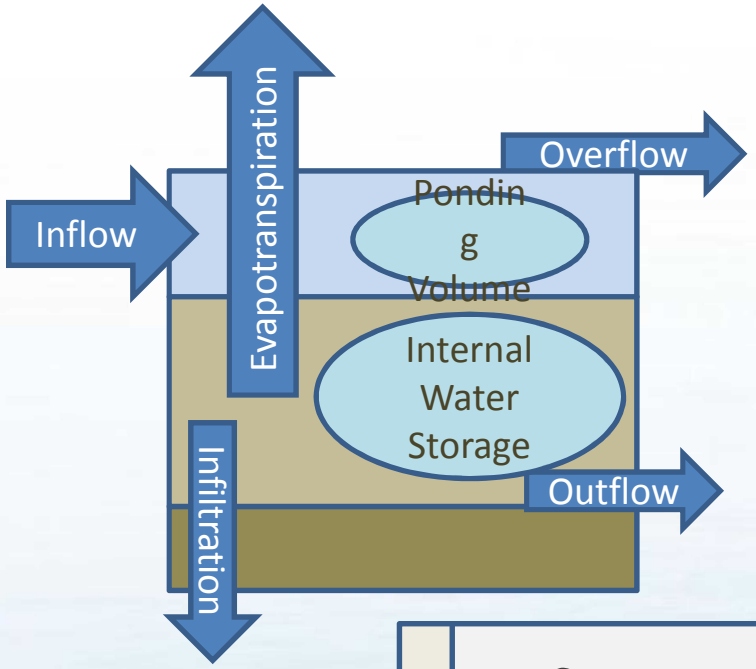
The Impairments

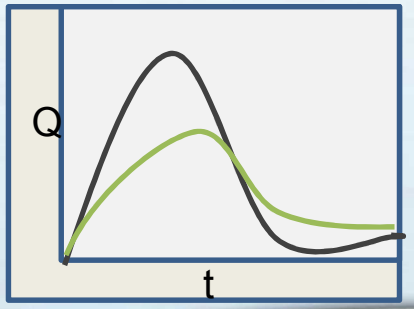
How does LID work?

Slow it down.

Spread it out.

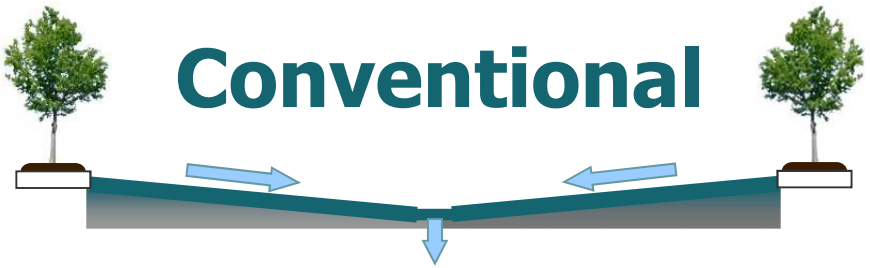
Soak it in.





SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

Conventional



To
Inlet

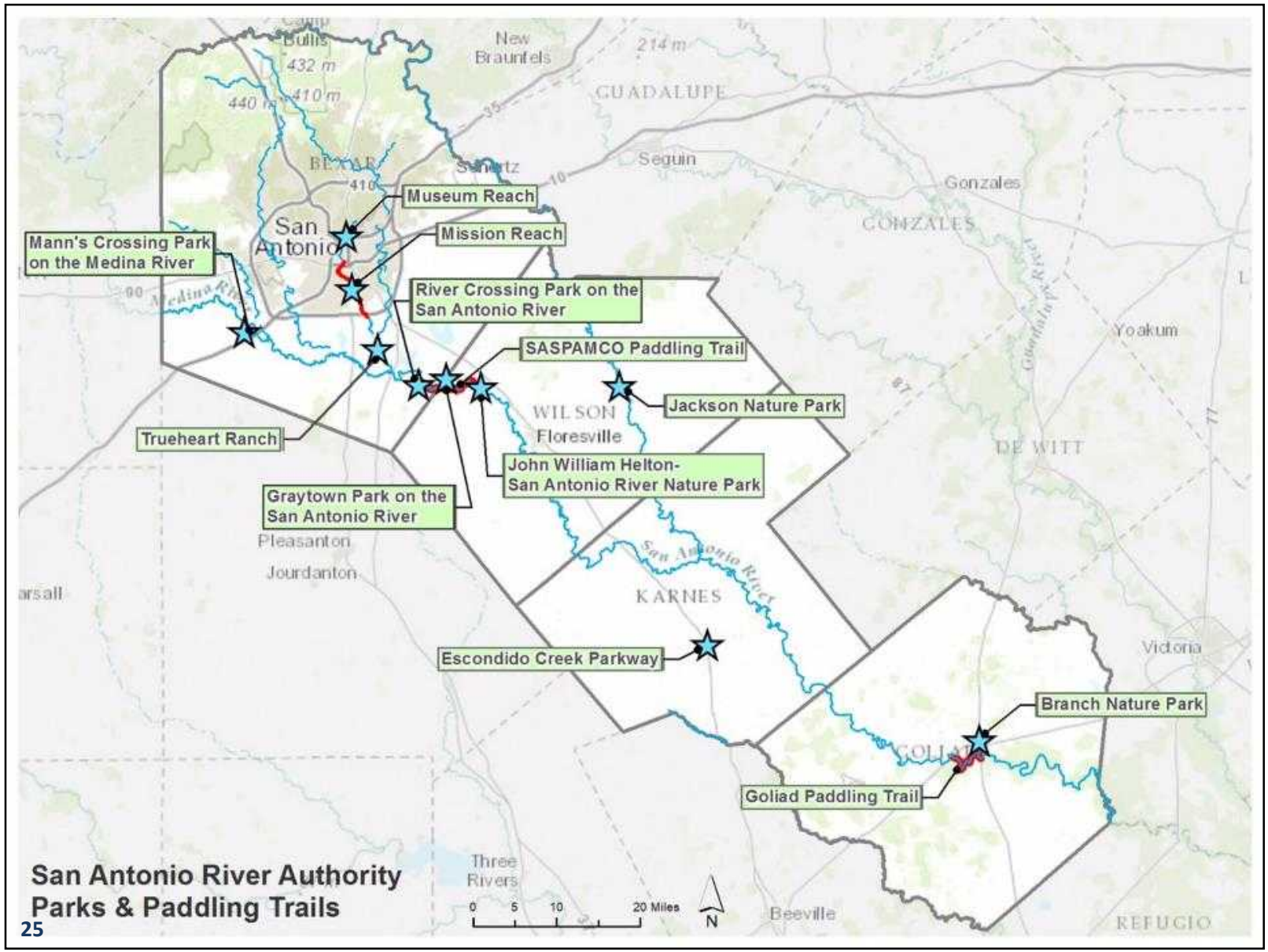
Potential

WHAT IS LID?

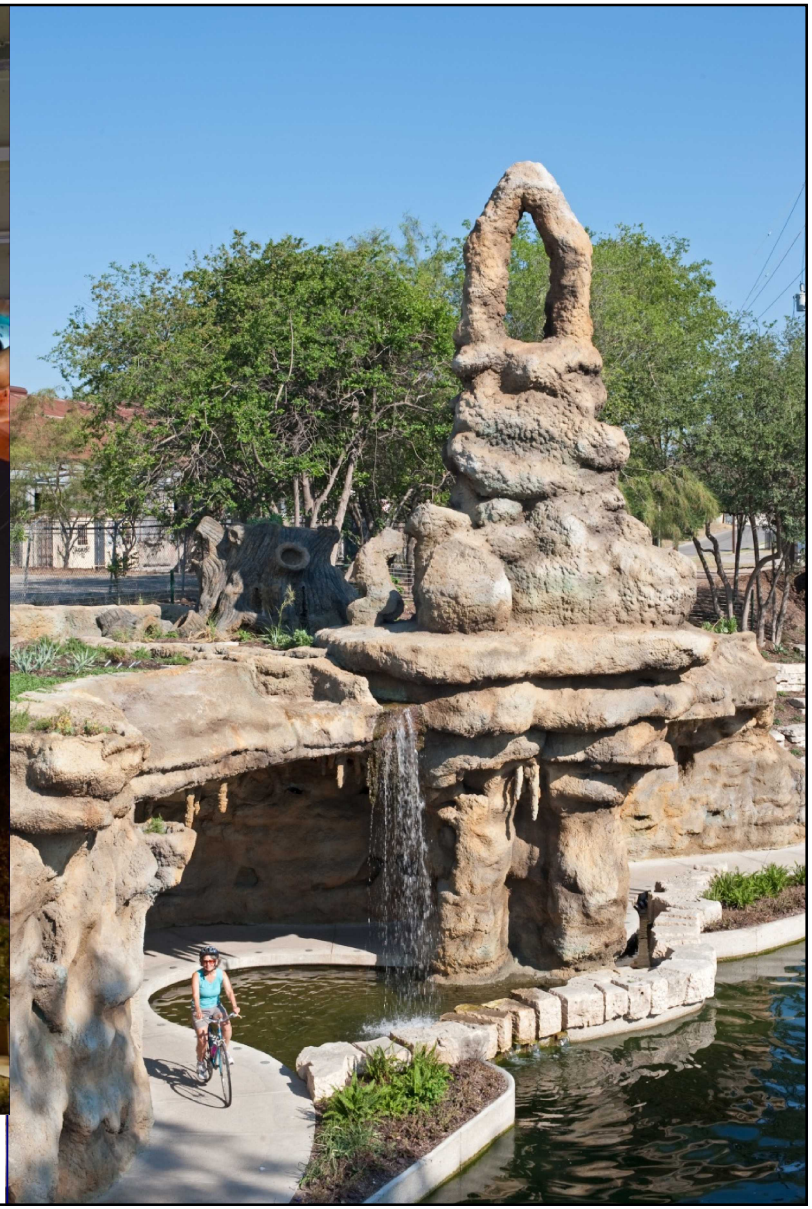
Sustainable Solutions

Watershed & Parks Operations

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions


Museum Reach
Mission Reach
Mann's Crossing Park on the Medina River
River Crossing Park on the San Antonio River
SASPAMCO Paddling Trail
Jackson Nature Park
Trueheart Ranch
John William Helton- San Antonio River Nature Park
Graytown Park on the San Antonio River
Escondido Creek Parkway
Branch Nature Park
Goliad Paddling Trail
San Antonio River Authority
Parks & Paddling Trails
0 5 10 20 Miles
N
New Braunfels
Seguin
Gonzales
San Antonio
Floresville
Pleasanton
Jourdanton
Yoakum
Victoria
Three Rivers
Beeville
GUADALUPE
WILSON
KARNES
DE WITT
REFUGIO

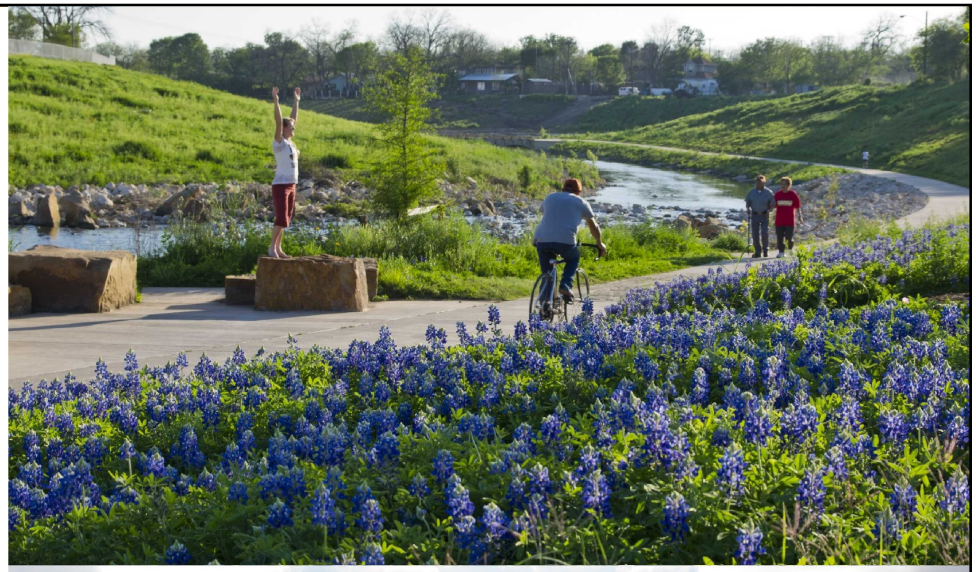
Roy Smith Street looking downstream



Photos: San Antonio River Foundation and Mark Menjivar

Mission Reach

- 8 mile ecosystem restoration and recreation project
- Restoring river previously channelized by U.S. Army Corps of Engineers for flood control
- Two miles opened in 2011
- One additional mile opened in 2012
- Remaining five miles opened in 2013



Debris Removal

Karnes County, CR 302 Before & After

Wilson County, Dry Creek Bridge Before & After

30

Utilities & Community Assistance

- Aug. 2014: LID Training (sponsor various cities & county staff)
- April 2015: Texas Riparian & Stream Ecosystem Workshop (sponsored with Wilson County SWCD)
- **Floresville**
  - October 2014: Clean Wastewater Lines
  - March 2015: General Assistance
  - April 2015: Vactor Use and Hauling
- **La Vernia**
  - October 2014: Line Break Emergency
- **Poth**
  - September & October 2014: Manhole/Sewer Backup
- **Floresville**
  - August 2015: Labor provided for Vactor Use and Hauling (Floresville billed for equipment usage)
  - In Process: Geotechnical Study at Floresville City Park

Floresville – Pumping out chamber

Floresville – Pumping out chamber

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

Household Hazardous Waste Collection Events

Location	Date	Totals
Goliad County (once a year)	**Saturday, September 19, 9 a.m. - 12 p.m.** Goliad Memorial Auditorium Parking Lot 925 U.S. Hwy 183 South, Goliad, TX	Est. trash collected ~ 7,079 lbs
Wilson County (twice a year)	**Saturday, October 17, 8 a.m. - 12 p.m.** Wilson County Precinct 1 Maintenance Yard 104 Mesquite St., Stockdale, TX	Est. trash collected ~
Karnes County (twice a year)	**Saturday, November 7, 8a.m. - 12 p.m.** Karnes County Youth Show Barn 1480 CR 345, Kenedy, TX	Est. trash collected ~ TBD

Upcoming events:

- Karnes County March 5th, 2016
- Wilson County March 19th, 2016

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

River Reach

- River Reach quarterly newsletter contains articles relevant throughout the basin
- One page insert published 12 times per year in local newspapers throughout the Southern Basin

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

QUESTIONS?

CONTACT INFORMATION

- **Steve Graham, P.E., CFM, SARA Assistant General Manager**
  - **(210) 302-3622; sgraham@sara-tx.org**

SAN ANTONIO RIVER AUTHORITY
Leaders in Watershed Solutions

PROCLAMATION OF APPRECIATION

WHEREAS, *Donald Gordon, PhD, MD has completed Thirty-Years of service as Medical Director serving the City of Leon Valley and its citizens since October 1986; and*

WHEREAS, *the City of Leon Valley appreciates the value of Donald Gordon, PhD, MD who has provided years of dedicated service to the City and feels that such service and direction is deserving of public recognition; and*

WHEREAS, *his contributions to Emergency Medical Services in and around the City of Leon Valley are credited with innovation in treatment that helped and saved countless lives; and*

NOW THEREFORE*, I, Chris Riley, Mayor of the City of Leon Valley, Texas, together with the entire Leon Valley City Council, do hereby express our heartfelt thanks and sincere appreciation to Donald Gordon, PhD, MD for his Thirty years of dedicated and loyal service to our community.*

Signed by my hand on this the 19th day of April, 2016.

Chris Riley

Mayor Chris Riley

EARTH DAY PROCLAMATION

***WHEREAS**, the first Earth Day was celebrated on April 22, 1970, with the goal of inspiring environmental awareness and encouraging the conservation, protection, and appreciation of our nation's natural resources; and,*

***WHEREAS,** it is the responsibility of each of us to safeguard the environment, by recognizing that all human life depends upon the Earth and upon one another for our mutual existence, well-being, and development; and,*

***WHEREAS,** the steps we can take to protect and preserve our natural environment through education, partnerships, and positive actions should be encouraged in Leon Valley; and,*

***WHEREAS,** the citizens of Leon Valley are committed not only to the protection and preservation of our environment, but also to the restoration of ecosystems and habitat; and,*

***WHEREAS,** the City of Leon Valley proudly recognizes all who participate in Earth Day, for their dedication to taking a proactive role in shaping the future of our environment and in protecting Leon Valley's precious natural resources.*

***NOW, THEREFORE, I, CHRIS RILEY, MAYOR,** on behalf of the Leon Valley City Council, do hereby proclaim the month of April, 2016 as Earth Month in the City of Leon Valley, and encourage the citizens of Leon Valley to be mindful of local, state, and national laws which protect our environment, and to join in efforts to preserve the beauty and wonder of the land, sky, and water of the Earth in all its diversity.*

Signed by my hand on this the 19th day of April, 2016.

Chris Riley

Chris Riley, Mayor

CITY OF LEON VALLEY
CITY COUNCIL REGULAR MEETING
Leon Valley City Council Chambers
6400 El Verde Road, Leon Valley, Texas 78238
Tuesday, April 05, 2016

MINUTES

The City Council of the City of Leon Valley, Texas met on the 5th day of April, 2016 at the Leon Valley City Hall located at 6400 El Verde Road, Leon Valley, Texas for the purpose of the following business:

REGULAR CITY COUNCIL MEETING

Mayor Riley called the Regular City Council Meeting to order at 7:00 p.m. and welcomed Troop 604/LDS Valley-Hi (Christian Goff, Monty Black, Joshua Hack, Raiden Simpson, Zeth Tucker, and Scout Leaders: Asst. Scoutmasters – Martin and Chris. Mayor asked them to lead the Pledge of Allegiance.

Mayor Riley asked that the minutes reflect that the following members of City Council were present: Council Members David Edwards, Monica Alcocer, Carmen Sanchez, Benny Martinez and David Jordan.

Also in attendance were:

City Manager Kelly Kuenstler, ACM/HR Director Crystal Caldera, City Secretary Saundra Passailaigue, City Attorney Roxann Pais Cotroneo, Public Works Director Melinda Moritz, Assistant Public Works Director David Dimaline, Community Development Director Elizabeth Carol, Fire Chief Luis Valdez, Police Chief Randall Wallace, Economic Development Assistant Ana Federico and Assistant Finance Director Wesley Jackson.

Mayor Riley welcomed everyone and wished them all a happy fiesta and invited them all to get a Leon Valley Fiesta pin.

Citizens to Be Heard and Time for Objections to the Consent Agenda.

Mayor Riley asked if any of the Council Members wished to pull any item from the Consent Agenda for discussion. No items were pulled.

- Ty Sambila, 6509 Charles Field, asked that the City Council consider amending the City Code as it relates to vehicles parking on Shadow Mist.
- Mayor Riley asked Mr. Sambila to get with the city attorney to further discuss this issue.

DRAFT

CONSENT AGENDA

Approval of City Council Minutes. (S. Passailaigue)
a) March 15, 2016 Regular City Council Meeting

Consideration of an ordinance to implement and enforce the Texas State Rule on locally enforced motor vehicle idling limitations and to authorize the City Manager to enter into a memorandum of agreement with the Texas Commission on Environmental Quality to enforce this rule locally. M&C #2016-04-05-03 (K. Kuenstler).

A motion was made by Council Member Benny Martinez and seconded by Council Member Carmen Sanchez, to approve Consent Agenda Item #6 (March 15, 2016 Regular City Council Meeting), and Item #7 (Ordinance No. 16-011) as presented. Upon a unanimous vote, Mayor Riley announced the motion carried.

Presentation of 2015 Project of the Year Between $5 - $10 Million from American Subcontractors Association – Mr. Manny Valdez of Bartlett Cocke General Contractors for City of Leon Valley Municipal Office, Police Station & Fire Station.

Mayor Riley invited Mr. Manny Valdez of Bartlett Cocke General Contractors up to accept the award presented by the American Subcontractors Association. Mr. Valdez then presented the award back to the City to keep and display.

Presentation by the Forest Oaks Community Pool Committee, Assistant Public Works Director David Dimaline. M&C #2016-04-05-01 (D. Dimaline).

Assistant Public Works Director David Dimaline presented a briefing from the Forest Oaks Pool Committee. The purpose of the Committee is to determine the feasibility of the City owning, operating and maintaining the Forest Oaks Pool and its other assets. The two main areas of focus are the financial component and the amenities of the Forest Oaks Pool. The Committee consists of eleven members with representatives appointed by the Mayor and City Council, and representation from the Park Commission, Leon Valley EDC, and the Beautification Committee. The Chairman of the Committee is Mr. Larry Proffitt. The Forest Oaks Pool Committee has met several times since February 29, 2016. The first meeting consisted of a tour of the facilities and this was provided by Mr. and Mrs. Kelley. Also at this meeting the discussion consisted of an overview of operations and finances of both the Forest Oaks Pool and the Community Pool. At our second meeting, Mr. Paul Merritt of San Antonio Pool Management provided the Committee with helpful information regarding the day to day operations of the Community Pool, and responsibilities per the contract that is in place with the City of Leon Valley. Mr. and Mrs. Kelley of the Forest Oaks Pool provided an operational budget, By-laws, operating schedule and fee structure to the Committee. An operating budget, schedule, and attendance breakdown for the Community Pool from the 2015 season was also provided. Mr. Dimaline continued to say that at the third meeting, a list of recommended action items was formulated and will be provided this evening. The Committee will work to formulate additional recommendations as they relate to financial and the amenities components of the

DRAFT

Forest Oaks Pool. These will be brought forth to the Mayor and City Council at a future briefing.

Committee Chair Larry Proffitt attempted to present an overview of the committee's recommendations.

Council Member Monica Alcocer said she preferred to wait to hear the committee's recommendations until after the 2016 swim season.

Presentation of the Leon Valley Neighborhood Renewal Program (NRP) of the Old Mill Subdivision, Assistant Public Works Director David Dimaline. M&C #2016-04-05-02 (D. Dimaline).

Council Member Monica Alcocer motioned to table this item until the City Council had an opportunity to discuss it in closed session before they make a commitment because she said she found it to be a little different in some ways than what was anticipated at the Town Hall meeting and for that she said, she would like to table it until a future meeting.

Council Member Benny Martinez said he would rather hear the presentation tonight and reminded the Council that they did not have to take any action. Council Member Carmen Sanchez agreed. Mayor Riley said they would proceed with the presentation. There being no second to Council Member Alcocer's motion that motion died.

Assistant Public Works Director David Dimaline presented this item in an effort of implementing a Neighborhood Renewal Program (NRP) modeled after the City of Live Oak's Fix Up Day. The first target area will be within the Old Mill Subdivision between Timberhill, Blacksmith, and Autumn Chase. The area includes 78 residential properties. The neighborhood was assessed on March 23rd by Code Compliance and Public Works staff. The cleanup date is set for Saturday, May 21, 2016, 7:30 a.m. to Noon. Clean up efforts that day will include painting of two houses by volunteers. A homeowner waiver of liability and disclaimer will be required. On that day, the Fire Department will be available to install or replace smoke detectors, and the Police Department will be on-site promoting their safety programs. In the weeks leading up to the event, the Public Works Department will be working in this neighborhood to address signage, repair of sidewalks, mowing of City right of way, and Stormwater inlet cleanup. The City's goal is to target two areas per year, which will coincide with the brush and bulky item pickup provided by Waste Management. The next NRP date will occur in September during the fall brush pickup. There would be minimal financial impact as these services are provided by volunteers. Public Works will perform activities during regular scheduled work; however, overtime would be required for some staff on Saturday, May 21st.

Mayor Riley thanked Assistant Public Works Director Dimaline for putting together this program so quickly and volunteered to help.

Council Member Monica Alcocer praised Assistant Public Works Director Dimaline for his efforts in putting this event together so thoroughly. No action was taken.

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REGULAR AGENDA

Presentation, consider, discuss and possible action on the Citizens Police Advisory Commission. M&C #2016-04-05-04 (R. Wallace).

Police Chief Randall Wallace presented this item in an effort to development of a Police Department Citizens Advisory Committee. This idea came out of the Annual Town Hall meeting and the comments made by citizens. Chief Wallace said that if developed, the committee would serve as an advocate for programs, ideas, and methods to improve the relationship between the police and community and to enhance the quality of life and safety in our community. The Committee will not have independent authority (at least initially), but will work in conjunction with the Police Department. The Committee will provide counsel and input to the Mayor and City Council. The Committee will be an independent citizens group that meets monthly with the Police Chief. Residents will apply for commission membership and will be appointed by City Council for two (2) year terms. The Committee will be responsible to the Mayor and City Council of Leon Valley and to the general public. The Committee shall have voting members appointed by the Mayor and City Council. The Committee Chair will provide an update to the City Council on a quarterly basis. The committee shall advise and assist the Police Department in the following ways: Create dialog and explore the perceptions of the Police Department, and the community concerning the inter-relationship with each other regarding public safety issues within the community; Receive information concerning the Police Department programs and operations; Assist in developing new programs that will increase the public safety activities of the Police Department; Provide input to the Police Department regarding service needs within the community; Assist the Police Department in assessing the effectiveness of department operations and programs; Identify gaps in services and/or communication; Enhance the community understanding of the capabilities of the Police Department in providing services to the community; Identify potential Police-Community partnerships to address public safety related issues within the community; and identify community resources and support for public safety activities; and give input concerning perceived effectiveness. Chief Wallace concluded the presentation saying the authority and rights of the Committee will be set forth in the "Police Department Citizens Advisory Charter".

The presentation was followed by a discussion.

City Manager Kelly Kuenstler added that this item is merely a follow up from the Town Hall meeting based on Dr. Romero's report.

A motion was made by Council Member Carmen Sanchez and seconded by Council Member Benny Martinez, to have Council Members Alcocer and Edwards to take the proposed plan, revise it and bring back their recommendation to the entire City Council for consideration in the next thirty (30) days. Upon a unanimous vote, Mayor Riley announced the motion carried.

Consider, discuss and possible action on the approval of an ordinance Amending Appendix A, Fee Schedule, Article A11.000 Water and Sewer Fees. M&C #2016-04-05-05 (M. Moritz).

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Public Works Director Melinda Moritz presented this item for City Council to consider approval of an amendment to Leon Valley City Code Appendix A, Fee Schedule, in the water fee sections, to move the date of the first water rate increase from October of 2017 to October of 2016, to correspond with the new debt payment for water capital improvements. Public Works Director Moritz proceeded to give a background on the item saying in July of 2015, Staff identified necessary Capital Improvements for the water utility that include new water wells and associated improvements, which was presented to the City Council. At the same time, NH Consulting was hired to conduct a cost of service and rate design study for the water utility and included the cost of these improvements in their model, with the assumption that new debt would be issued in 2016, with the first payment due in 2017. The final study and proposed rate changes were approved by City Council in December of 2015. The sewer rates were increased due to a 5.3% increase from the San Antonio Water System and are pass-through fees. The new sewer rates went into effect with the billing period of March 2016. A flyer was sent out to all Leon Valley customers at the end of January, as required, to alert them to the new water and sewer rates and their effective dates (see attached flyer). The new water rates are designed to cover the costs for improvements to the Leon Valley water system and they increase over a three year period of time. While the new water rate section goes into effect in October 2016, the first rate increase won't be effective until October of 2017, which would require the City to make the first payment on the Certificates of Obligation from the Enterprise Reserve Fund, as the additional rate funds wouldn't be available that first year. The proposed change corrects this situation and makes the funds available. A revised flyer will be sent to the customers in July to inform them of the revised rate change date.

The amendment to the ordinance assures the first water rate increase becomes effective the first day of the water billing cycle for October 2016. The Certificates of Obligation should be issued in April of this year, with the first payment due in 2017, which would be approximately $114,000 per year for 30 years.

The presentation was followed by a brief discussion.

A motion was made by Council Member Benny Martinez and seconded by Council Member Carmen Sanchez, to approve the ordinance Amending Appendix A, Fee Schedule, Article A11.000 Water and Sewer Fees as presented. Upon a unanimous vote, Mayor Riley announced the motion carried.

Consider, discuss and possible action to accept bids and award contracts for the 2016 Water Well Project; and authorize the City Manager to sign contracts, with change orders up to fifty thousand dollars, as allowed by State Law. M&C #2016-04-05-06 (M. Moritz).

Public Works Director Melinda Moritz presented this item which allows the City Council to consider accepting the lowest qualified bidders and award two contracts for the Fiscal Year 2016 Water Well Project; and to authorize the City Manager to sign the contracts, with change orders up to an additional fifty thousand dollars ($50,000.00), as authorized by state law. The contracts will be reviewed by the City Attorney prior to any signatures being affixed. The 2016 Water Well project consists of two parts, with the first being the water well drilling portion and

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the second being the plant portion, which consists of the San Antonio Water System (SAWS) Interconnection, piping, electrical, and the Variable Frequency Drive panels (VFD's). The advertisement for the well drilling portion of the project was very carefully prepared to assure that bidders had successfully drilled large diameter aquifer wells within the past five years. The plant portion of the bid was designed so as to include only SAWS qualified utility contractors.

A motion was made by Council Member Monica Alcocer and seconded by Council Member David Jordan, to accept the bids and award the contracts for the 2016 Water Well Project; and authorize the City Manager to sign contracts, with change orders up to fifty thousand dollars, as allowed by State Law. Upon a unanimous vote, Mayor Riley announced the motion carried.

Mayor Riley thanked Clarence Littlefield who is the consultant on this project for all of his hard work.

Consider, discuss and possible action on the approval of a budget adjustment to fund engineering, design, and construction management for the reconstruction of the Evers Road bridge, with attached ordinance; and authorize the City Manager to sign a contract with IDS Engineering Group. Inc., with change orders up to fifty thousand dollars. M&C #2016-04-05-07 (M. Moritz).

Public Works Director Melinda Moritz presented this item to request approval of a budget adjustment for the engineering, design, and construction management of the reconstruction of the Evers Road bridge, and authorize the City Manager to sign a contract with IDS Engineering, Inc., with change orders up to fifty thousand dollars ($50,000.00). In September of 2015, the City Council approved the initial study of the Evers Road bridge reconstruction and directed IDS Engineering, Inc. and staff to develop options for the reconstruction. In November of 2015, the City Council approved a bridge design. On December 1, 2015, the design and application for funding was submitted to the Alamo Area Metropolitan Planning Organization (MPO) for their consideration. The project was approved for funding by the MPO on April 1, 2016, and the engineering and design portion of the project may now begin. The expected timeline for this project is as follows: April to Sept 2016 - Engineering and design, TxDOT & utility review and coordination; October to November 2016 - Final design, TxDOT approval, Bid advertisement; December 2016 - Council approval of bidder, start construction; and Construction completed in June of 2017 with road closed, or November if road is to remain open

Staff is recommending that the City Council approve a budget adjustment in the amount of $458,410, for the engineering, design, and construction management of the reconstruction of the Evers Road bridge, and authorize the City Manager to sign a contract with IDS Engineering, Inc., with change orders up to fifty thousand dollars ($50,000.00).

A motion was made by Council Member Monica Alcocer and seconded by Council Member David Jordan, to put out a Request for Qualifications (RFP) as soon as possible for the engineering design and whatever is needed to get this to the next step. Upon a unanimous vote, Mayor Riley announced the motion carried.

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- Olen Yarnell, 7230 Sulky Lane, asked if the bridge would stay open or be closed during construction.

Consider, discuss and possible action on user alternatives for the Leon Valley Community Pool in the 2016 swim season. M&C #2016-04-05-08 (M. Moritz).

Assistant Public Works Director David Dimaline presented this item in order for City Council to consider and take action on user alternatives for the Leon Valley Community Pool in the 2016 swim season. The City owns and operates a community swimming pool at 6600 Strawflower Drive. The pool is open to the public free of charge, from Memorial Day to Labor Day and is not restricted to Leon Valley residents. During last year's swim season, the Public Works Department received a few complaints regarding large group users such as daycares, soccer clubs, and karate clubs. Also received were reports of some overcrowding on weekends early in the season, but not during the week, nor at end of the summer. The Forest Oaks Community Association reported that membership at their pool decreased 16% in 2015 and there were concerns expressed about further decreases in 2016, and that this may be due to the City's current "no fee" policy at the Community Pool.

Assistant Public Works Director David Dimaline added that at the December 15th City Council meeting, some suggestions were given about users at the pool, but no action has been taken. Some options for the pool are: Leave as is – offer free to all for this season; Limit to "residents only" by use of wristbands – would cause some Staff time at cashier window to give out and accept application, check residency, and issue the wristbands; or charge for entry by the use of a "membership" – suggest $40 Individual, and $75 Family.

Funding for the pool was approved by City Council in the FY 2015-2016 budget at $60,052. Staff recommends leaving the policy as is for this swim season and consider changing it next year, when a decision is made about the Forest Oaks Pool. Options include: Offer free to all for this season and re-evaluate next season; Limit to "residents only" by use of armbands; and Charge for entry by memberships ($40.00 / Individual and $75.00 / Family).

- Lynn Joseph, Trotter, spoke regarding her concern with Forest Oaks Pool.
- Olen Yarnell, 7230 Sulky Lane, asked what the Council's goal was on this item.
- Lori Kellie, Forest Oaks Pool, said she would come to the Council if they were "in immediate danger" of closing.
- Belinda Ealy, spoke in favor of free admission to Leon Valley citizens.

A motion was made by Council Member Benny Martinez to table this item tonight and bring it back at the next City Council meeting with discussion about both, the Leon Valley pool and the Forest Oaks pool and make a decision at that time. There being no second, the motion died.

A motion was made by Council Member Carmen Sanchez and seconded by Council Member Monica Alcocer, to keep the City of Leon Valley as it is now, a free pool to the public, but restricted only to Leon Valley residents as to how, to be determined by staff with staff bringing back a recommendation.

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Mayor Riley requested a roll call vote to which the City Council replied: Council Member Edwards – Aye; Council Member Sanchez – Aye; Council Member Alcocer – Aye; Council Member Martinez – Nae; and Council Member Jordan – Aye.

Upon a vote of four (4) for and one (1) against, with Council Member Benny Martinez casting the negative vote, Mayor Riley announced the motion carried.

City Manager Kelly Kuenstler asked Mayor Riley to consider moving Agenda Item 16 up in order to assist the family present to speak on that item to be able to get their small children home and to bed. Mayor Riley obliged.

Consider, discuss and possible action on a sign variance(s) request by Sydney Onuagu and Blessing Maduka, owner of The Precinct Academy and Daycare, to Chapter 3.04.013, "Temporary Signs," to display two (2) temporary banners for six (6) months generally located at 7500 Eckhert Road, Suite 140. M&C #2016-04-05-12 (E. Carol).

Community Development Director Elizabeth Carol presented the item for City Council to consider a sign variance which would allow the owner of The Precinct Academy and Daycare to utilize two (2) temporary vinyl banners for six (6) consecutive months to advertise their business. One banner will consist of the business name and the second banner will state Now Enrolling. Community Development Director Carol said that Chapter 3.04.013 of the Leon Valley Code of Ordinances allows one (1) banner for a period of thirty (30) days, once every six (6) months. This is a limit of two (2) banners total per year. The Sign Code allows consideration of variances for seasonal signs up to 120 days/4months. The previous owner had an unpermitted fence, on which included a painted unpermitted sign. The applicant appealed to the City Council, which approved the fence height variance; however they would have to remove the sign from the fence and apply for a new sign. They applied for a fence permit and a temporary banner sign. The applicant subsequently applied for the Façade and Signage Grant to the Leon Valley Economic Development Corporation (LVEDC), which was denied. The owners did not remove the sign after the thirty day period, and staff did not follow-up on their expired sign. Community Development Department has worked with Code Compliance to develop a system to better track these temporary sign permits and monitor their expiration. The business was sold and the new owners are changing the name of the daycare from New Friends Learning Center to The Precinct Academy and Daycare and are in the process of securing their license from the Department of Family Protective Services (DFPS), which is anticipated to be issued in April. Code Compliance has advised them of their sign violation, and the applicant has requested a variance, and noted that they are investing in Leon Valley and have secured a proposal for a new sign from Accurate Marketing in Leon Valley at $8,200. The applicant then noted that they need six months to raise the capital for this expense.

A motion was made by Council Member Monica Alcocer and seconded by Council Member David Edwards, to grant a three (3) month variance to allow the sign to remain with the caveat that if it is not completed by the third month that the variance is extended for three (3) more months only without them having to come back. Upon a unanimous vote, Mayor Riley announced the motion carried.

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Mayor Riley asked City Manager Kuenstler if there were any of the upcoming items that could be postponed to the next Council meeting. Manager Kuenstler said that Items 13, 14 and 17 could be postponed to the next meeting.

A motion was made by Council Member Monica Alcocer and seconded by Council Member David Jordan, to move Item 13, Item 14 and Item 17 from the April 05, 2016 City Council meeting to the April 19, 2016 City Council meeting. Upon a unanimous vote, Mayor Riley announced the motion carried.

Consider, discuss and possible action on the adoption of the San Antonio River Authority's Leon Creek Water Shed Master Plan. M&C #2016-04-05-09 (E. Carol).

This item was postponed to the April 19, 2016 City Council meeting.

Consider, discuss and possible action adopting Freeboarding provisions and related ordinance to Chapter 3, "Building Regulations," Article 3.03, "Flood Damage Prevention". M&C #2016-04-05-10 (E. Carol).

This item was postponed to the April 19, 2016 City Council meeting.

Consider, discuss and possible action on the adoption of an ordinance to amend the Leon Valley Code of Ordinance, Appendix A "General Provisions" to remove the Contractors Registration fee for Plumbers. M&C #2016-04-05-11 (E. Carol).

Community Development Director Elizabeth Carol presented the item saying the City of Leon Valley requires all contractors to register and pay an annual registration fee. Texas Legislature recently made changes to the Occupation Code, Title 8. "Regulation of Environmental and Industrial Trades, Chapter 1301.551 Plumbers". This revision prohibits municipalities from assessing a plumbing registration fee or administrative fee. The City of Leon Valley will continue to require that all contractors, including plumbers, register with the City of Leon Valley. In 2015 there were 35 Plumber Contractors who registered with the City of Leon Valley; which would reflect a decrease in $3,500.00 in revenue.

A motion was made by Council Member Monica Alcocer and seconded by Council Member Benny Martinez, to amend the Leon Valley Code of Ordinance, Appendix A "General Provisions" to remove the Contractors Registration fee for Plumbers. Upon a unanimous vote, Mayor Riley announced the motion carried.

Consider, discuss and possible action to coordinate with the Office of Representative Joaquin Castro and the United States Post Office to designate 78238 as the only zip code for Leon Valley. M&C #2016-04-05-13 (K. Kuenstler).

This item was postponed to the April 19, 2016 City Council meeting.

Consider, discuss and possible action of a resolution supporting the appointment of a Mayor from the Greater Bexar County Council of Cities to the San Antonio Water Systems (SAWS) Board. M&C #2016-04-05-14 (K. Kuenstler).

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City Manager Kelly Kuenstler presented this item in support of a resolution requesting that the San Antonio Water System Board of Trustees allow the suburban cities to nominate the north and south Board of Trustees members as members of the 26 Greater Bexar County Council of Cities for the area in which they are served. Request that a Mayor from the Greater Bexar County Council of Cities be nominated by and selected by the Coalition. The selected Mayor is afforded all rights and responsibilities as other San Antonio Water System Board of Trustee members. There is no immediate fiscal impact; however, there could be a future fiscal impact for customers of SAWS with representation by a suburban city mayor. Manager Kuenstler concluded the presentation saying it is recommended the City Council consider the resolution supporting the appointment of a Mayor from the Greater Bexar County Council of Cities to the SAWS Board as an attempt to ensure suburban city residents' interests are represented.

A motion was made by Council Member David Jordan and seconded by Council Member Monica Alcocer, to approve resolution supporting the appointment of a Mayor from the Greater Bexar County Council of Cities to the San Antonio Water Systems (SAWS) Board. Upon a unanimous vote, Mayor Riley announced the motion carried.

Consider, discuss and possible action on an amendment to 100-5300-530.09 Travel, increasing City Council travel to $2,400 and City Manager to $7,500. M&C #2016-04-05-15 (K. Kuenstler).

City Manager Kelly Kuenstler presented this item with a potential fiscal impact which would include: $7,200 potential annual increase for City Councilors.; $2,500 potential annual increase for City Manager (which includes City Manager, City Secretary, HR Director and Executive Secretary).

This request is consistent with the City of Leon Valley's Strategic Plan which outlines goals and objectives. These goals and objectives are reached, partially, through interdepartmental and council efforts. A well trained council and staff are essential in addressing a strategic plan and moving a city forward.

A motion was made by Council Member Monica Alcocer and seconded by Council Member David Edwards, to approve the amendment to the travel budget for Council to $2,400 and City Manager to $7,500. Upon a unanimous vote, Mayor Riley announced the motion carried.

City Manager's Report:

a) **Approved Minutes from Boards, Commissions and Committees**
b) **Future Agenda Items:**
   - **Sign Ordinance LED**
   - **Hand Gun Policy**
   - **Total funding cost of New City Hall Complex and Fire Department**
c) **Upcoming Important Events:**
   - **Volunteer Appreciation Dinner, Wednesday, April 6, 2016 at 6:00 p.m.**
   - **VIA Vision, a Community Driven Process, Leon Valley Community Center, April 7, 2016 at 6:00 p.m.**

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- **Coffee with the Mayor and City Council, Saturday, April 23, 2016, 9:00 a.m. to 11:00 a.m. at the Leon Valley Conference Center**
- **Annual Pet Parade, Saturday, May 14, 2016, 9:00 a.m. to 11:00 a.m**.

City Manager Kuenstler updated the City Council regarding the May 20th City Council Orientation; asked for the Council to provide their summer schedules; Joint LVACC, Fire Chief Luis Valdez was named Firefighter of the Year; CoLVEDC and City Council meeting is being scheduled the 1st meeting in June at 5:30 p.m.

Citizens to be heard.

- Pedro Esquivel suggested that Council members speak to Irene Baldridge regarding Item 17.

Announcements by the Mayor and Council Members.

Council Member David Edwards thanked everyone for coming to tonight's meeting.

Council Member Carmen Sanchez announced the completion of her fellowship.

Council Member Monica Alcocer thanked the City Manager and staff for their work and to the Fire Chief for the "non-stop kudos".

Council Member Benny Martinez praised those involved in the recent high school bowling tournament.

Adjournment.

Mayor Riley announced the meeting adjourned at 10:40 p.m.

These minutes approved by the Leon Valley City Council on the 19th of April, 2016.

APPROVED

CHRIS RILEY
MAYOR

ATTEST:
SAUNDRA PASSAILAIGUE, TRMC
CITY SECRETARY

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MAYOR AND COUNCIL COMMUNICATION

DATE: April 19, 2016 **M&C # 2016-04-19-03**

TO: Mayor and Council

FROM: Elizabeth Carol, Director of Development

THROUGH: Kelly Kuenstler, City Manager

SUBJECT: Consider adoption of the San Antonio River Authority's Leon Creek Water Shed Master Plan.

PURPOSE

The San Antonio River Authority (SARA) has adopted a regional approach to addressing flooding concerns in the area. They have created the Leon Creek Water Shed Master Plan, which identifies areas within the Leon Valley Huebner Creek water shed that are at risk of flooding and provides a regional solution. More specifically, the plan identifies:

1. Regional Storm Water Facilities (RSWF)
2. Enhanced channel design
3. Selective cleaning along heavily vegetated channels
4. Bridge and culvert upgrades
5. Flood protection barriers and bypass structures, and
6. Property acquisition and flood proofing.

The plan identifies 26 areas of concentration within the Leon Creek Water Shed and the overall plan is projected to reduce the estimated annual flood damages by 40%. The regional list of projects in the Leon Creek Water Shed Master Plan can be found on page ES4 of their Plan. The following projects will have a direct impact on the City of Leon Valley and their ranking:

1. Huebner Creek at Prue Road (LC-15) # 3.
2. Huebner Creek at Eckhert #6
3. Huebner Creek at Evers Road # 10
4. Huebner Creek at Bandera Road (LC-17) #4

The adoption of the Leon Creek Water Shed Master Plan will assist the City in providing a regional solution to local flooding concerns. In addition, the Leon Creek Water Shed Master Plan will improve the City of Leon Valley's position in preparation for earning a rating through the Community Rating System (CRS) as part of the National Flood Insurance Program (NFIP) survey, which will provide a discounted percentage of flood insurance premiums to property owners of Leon Valley.

S.E.E. LEON VALLEY

Social Equity – Adopting the Plan provides a consistent Water Shed Master Plan for all Property Owners.

Economic Development – Adopting the Plan will assist with lowering insurance premiums for business property owners.

Environmental Stewardship – Provides solutions to downstream pollution from water shed runoff, which reduces toxins to the environment

FISCAL IMPACT

None

RECOMMENDATION

Adopt the San Antonio River Authority's Leon Creek Water Shed Master Plan.

APPROVED: _____ DISAPPROVED: _____

APPROVED WITH THE FOLLOWING AMENDMENTS:

_____

_____

_____

_____

ATTEST:

_____
SAUNDRA PASSAILAIGUE, TRMC
City Secretary

AECOM Water

Prepared for:
San Antonio River Authority
San Antonio, TX

Prepared by:
AECOM Technical Services, Inc.
TBPE Reg. No. F-3580
San Antonio, TX
60156508
January 31, 2011

Leon Creek Watershed Master Plan

AECOM Water

Prepared for:
San Antonio River Authority
San Antonio, TX

Prepared by:
AECOM Technical Services, Inc.
TBPE Reg. No. F-3580
San Antonio, TX
60156508
January 31, 2011

Leon Creek Watershed Master Plan

Jason M. Nelson 1/31/11
Prepared by Jason M. Nelson, PE, CFM

David Parkhill
Reviewed by David Parkhill, PE, D. WRE

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List of Acronyms

ADR	Annual Damage Reduction
ADT	Average Daily Traffic (Count)
BCAD	Bexar County Appraisal District
BMP	Best Management Practices
BRWM	Bexar Regional Watershed Management
CIP	Capital Improvement Projects
CoSA	City of San Antonio
CZP	Contributing Zone Plan
DC	Damage Center
DEM	Digital Elevation Model
DFIRM	Digital Flood Insurance Rate Map
EARZ	Edwards Aquifer Recharge Zone
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
FEMA	Federal Emergency Management Agency
FPB	Flood Protection Barrier
FRR	Flood Reduction Ratio
GCP	General Construction Permit
GIS	Geographic Information System
HEC-HMS	Hydrologic Engineering Center Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center River Analysis System
IP	Individual Permit
JD	Jurisdictional Determination
LC-#	Bexar County Flood Control Project
LCWMP	Leon Creek Watershed Master Plan
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
LOFP	Level of Flood Protection
LOMR	Letter of Map Revision
NRCS	National Resources Conservation Service
NWWC	Natural Waterway Conveyance
NWP	Nationwide Permit
OHWM	Ordinary High Water Mark
PCN	Pre-Construction Notification
RSWF	Regional Storm Water Facility
SARA	San Antonio River Authority
SAWS	San Antonio Water System
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TIN	Triangulated Irregular Network
TMDL	Total Maximum Daily Load
TPDES	Texas Pollutant Discharge Elimination System
TPWD	Texas Parks and Wildlife Department

TXDOT	Texas Department of Transportation
UDC	Unified Development Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WPAP	Water Pollution Abatement Plan
WSEL	Water Surface Elevation

Report Contributors

Contributor	Contribution
Rudy Bazan	Environmental
Bryan A. Blaisdell, EIT	Hydrology and Hydraulics, Project Assessment, Report
Stephanie Blew, PE	Quantities and Cost
Marco Garza	Exhibits
Jeremy Hanzlik, PE	GIS Analysis, Environmental
Brandon H. Hilbrich, EIT, CFM	Hydrology and Hydraulics, Project Assessment, Report
Charles Merritt, EIT	Quantities and Cost
Jason Nelson, PE, CFM	Project Manager
David Parkhill, PE, D. WRE	Project Principal, Quality Assurance
Andrew Rooke, PE, CFM	Hydrology and Hydraulics, Guidance and Review
April Smith, PE	Hydrology and Hydraulics
Erin K. Spinner, PE, CFM, LEED AP	Hydrology and Hydraulics, Project Assessment, Report
Sean Sutton, PE, CFM	Hydrology and Hydraulics
Omar Trevino	Quantities and Exhibits

Executive Summary

The San Antonio River Authority (SARA) authorized AECOM to develop the Leon Creek Watershed Master Plan (LCWMP), a multi-phase study for developing and comparing flood mitigation alternatives, prioritizing capital projects, and evaluating water quality enhancements across the Leon Creek Watershed in Bexar County, Texas. The Leon Creek Watershed is under increased developmental pressures as growth occurs in the City of San Antonio (CoSA) and unincorporated Bexar County. As recently as 1998 and 2002, Leon Creek experienced significant flooding during high rainfall and runoff conditions, which inundated major highways and flooded many structures within the watershed. To reduce the risk of future flood-related damages, the public and stakeholders sought a long-term planning approach that would address the full downstream impacts of potential projects in the watershed, address water quality concerns, and anticipate future land use trends.

This report documents the Leon Creek Watershed Master Plan, which includes:

- The identification of major flooding reaches within the Leon Creek main channel and major tributary channel areas,
- The selection of damage centers based on areas with a high density of at-risk buildings within the watershed,
- The analysis of flooding risks and damage potential along bridges, culvert crossings, and other vital transportation corridors,
- The review of Digital Flood Insurance Rate Map (DFIRM) models to assess potential areas of scour and the evaluation of water quality to identify issues in order to develop potential multi-use mitigation strategies,
- The preliminary assessment of potential alternatives that reduce the risk of future flood losses in each of the damage centers using the following strategies:
    - Regional Storm Water Facilities (RSWF),
    - Enhanced channel design,
    - Selective clearing along heavily vegetated channels,
    - Bridge and culvert upgrades,
    - Flood protection barriers and bypass structures, and
    - Property acquisition and floodproofing.
- The refinement of project alternatives selected by workshop participants and inclusion of selected planned projects from the Bexar County Flood Control Capital Improvement Projects (CIP) Program and CoSA.
- The final development of project alternatives along with planning-level opinions of probable construction cost,
- The preliminary assessment of environmental regulatory requirements and multi-use opportunities for each alternative,
- The development of recommended project combinations to achieve increased optimization along with recommended project construction phasing,
- The preparation of a prioritization matrix for compiling and ranking projects, and

- The evaluation of alternative development methods, such as Best Management Practices (BMPs), to mitigate flooding and address water quality issues associated with storm water runoff.

As an initial activity within this study, floodplain analysis models from the Federal Emergency Management Agency (FEMA) were used to determine the existing Levels of Flood Protection (LOFP) for private property and public infrastructure, which indicate a structure's likelihood of being damaged or rendered ineffective in a flood. Cost estimates were created for expected damages to buildings and residential structures based on the predicted flood frequency models and U.S. Army Corps of Engineers (USACE) depth damage curves. Statistically, the estimated annual damages for the entire watershed were approximately $2,844,000.

Additionally, a classification of roadway crossings in the watershed as "safe" or "unsafe" was developed using approved CoSA criteria and based on the depth of flooding approximations and predicted velocities of flows over the roadways. Also, an analysis was performed to identify the risk and damage potential along vital transportation corridors using DFIRM flood frequency data and average daily traffic counts obtained from Bexar County, CoSA, and the Texas Department of Transportation. This risk and damage potential was expressed in terms of LOFP. A number of stream crossings and several high-risk transportation corridors were identified as representing critical facilities, including:

- Scenic Loop Road at Menchaca Road (Helotes Creek),
- Babcock Road at Camp Bullis Road (Maverick Creek),
- Bandera Road at Ranch Parkway (Los Reyes Creek),
- Culebra Road at Loop 1604 (Culebra Creek),
- Culebra Road at Westover Hills Boulevard (Culebra Creek),
- Grissom Road at Timber Path (Culebra Creek),
- Old Grissom Road at Grissom Road (Culebra Creek),
- Timber Path at Culebra Road (Culebra Creek),
- Galm Road at Culebra Road (Government Canyon Creek), and
- FM 1560 at Braun Road (Culebra Tributary C).

Based on this comprehensive flood level analysis for the entire watershed, twenty-four concentrated areas of major flooding which created clusters of affected buildings and structures were identified as "damage centers" (shown in *Exhibit E1*) for planning and prioritization purposes. Areas at risk for erosion and scour and areas with water quality concerns were also identified in order to develop the multi-use objective potential of projects. The majority of damage centers exhibited potential for scour issues, and lower Leon Creek had water quality concerns in a number of sampling sites.

Through preliminary project assessments and the consensus developed during the 1st and 3rd workshops with study participants (SARA, CoSA, and Bexar County), nineteen damage centers were selected for more detailed project development.

The nineteen selected damage centers identified for additional analysis included the following flood mitigation strategies – RSWFs, selective clearing, enhanced channel design, flood protection barriers, and buyouts. Other previously identified flood mitigation projects, including several from

the Bexar County Flood Control CIP Program, were included in this evaluation as determined by the study participants during workshop discussions:

- Culebra Creek RSWF,
- Government Canyon Creek RSWF,
- Quarry at the Rim RSWF,
- LC-8: Ingram Road Low Water Crossing #58,
- LC-9: Hausman Road Drainage Phase I Project,
- LC-10: Hausman Road Drainage Phase II Project,
- LC-15: Huebner Creek Regional Storm Water Facility,
- LC-17: Huebner Creek Enhanced Conveyance NWWC, and
- LC-19: Whisper Creek Flood Protection Barrier.

Hydrologic and hydraulic analyses were performed for each potential project to determine flood damage reduction estimates, and planning-level construction cost estimates were developed for each project alternative. Additionally, an assessment was made for each project alternative to consider potential multi-use objectives (parks, recreation, open space, wildlife habitat or other public purposes) and to identify potential environmental permitting requirements. The results from these analyses were consolidated into a qualitative evaluation matrix based on the Bexar Regional Watershed Management (BRWM) project prioritization ranking factors. Using the BRWM weighted criteria, rankings were developed according to the total score over the total number of criteria evaluated for each project. Table E.1 summarizes the ranked flood mitigation projects evaluated as part of this study.

Table E.1: Summary of Qualitative Project Rankings

Rank	Project Name	Primary Damage Center
1	Government Canyon Creek RSWF (Culebra Creek)	16
2	Helotes Creek RSWF	12
3	Huebner Creek RSWF at Prue Road (LC-15)	13
4	Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)	14
5	Culebra Creek NWWC with Culebra Road Bridge Improvements	4
6	Huebner Creek at Eckhert Road NWWC	13
7	Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	3
8	Leon Creek at Grissom Road Enhanced Conveyance	15
9	Culebra Creek at FM 1560 Earthen Flood Protection Barrier	16
10	Huebner Creek at Evers Road NWWC	2
11	Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	7B
12	Culebra Creek Tributary A at Tezel Road Enhanced Conveyance	17

Table E.1 (Continued): Summary of Qualitative Project Rankings

Rank	Project Name	Primary Damage Center
13	Easterling RSWF (Culebra Creek)	4
14	Leon Creek at IH-10 NWWC	1
15	Galm RSWF (Culebra Creek)	16
16	French Creek at Guilbeau Road NWWC	6A&B
17	Helotes Creek at Braun Road NWWC	12
18	Hausman Road Drainage Project Phase I (LC-9)	7A
19	UTSA RSWF (Maverick Creek)	7B
20	Braun RSWF (Helotes Creek)	11
21	Mainland RSWF (Leon Creek)	15
22	Eckhert RSWF (Huebner Creek)	2
23	French Creek RSWF	6A&B
24	Quarry at the Rim RSWF (Leon Creek)	6C
25	Havenbrook RSWF (Slick Ranch Creek)	5A
26	Helotes Creek at Bandera Road Enhanced Conveyance	18B

In addition to quantifying the selected individual projects, project combinations along each major tributary were developed to assess the collective impact of projects across a wider scope inside the watershed and identify project optimization opportunities. Single tributary combinations generally included all the individual projects selected for that particular tributary. Additional combinations were developed to analyze the effects of multiple individual projects across multiple tributaries. Table E.2 explains the developed project combinations in further detail and lists their individual project components.

Table E.2: Overview of Project Combinations

Project Combination	Individual Project Components	Description
French Combination	1. French Creek RSWF 2. French Creek at Guilbeau Road NWWC	Combination included all individual projects along French Creek.
Maverick Combination	1. UTSA RSWF 2. Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	Combination included all individual projects along Maverick Creek.
Huebner Combination	1. Huebner Creek at Prue Road (LC-15) 2. Huebner Creek at Evers Road NWWC 3. Huebner Creek at Eckhert Road NWWC 4. Huebner Creek at Bandera Road NWWC(LC-17) and Ingram Road Bridge Improvements (LC-8)	Combination developed to reduce annual flooding damages along Huebner Creek within Damage Centers 2, 13, and 14, without causing any negative downstream impacts. Construction phasing was also examined.
Helotes Combination	1. Helotes Creek RSWF 2. Helotes Creek at Braun Road NWWC	Combination included only projects along Helotes Creek that provided beneficial flood reduction impacts when analyzed individually

Table E.2 (Continued): Overview of Project Combinations

Project Combination	Individual Project Components	Description
Culebra Combination A	1. Government Canyon Creek RSWF 2. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination developed to achieve additional flood reduction along with the implementation of Government Canyon Creek RSWF.
Culebra Combination B	1. Easterling RSWF 2. Culebra Creek at FM 1560 Earthen Flood Protection Barrier 3. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination developed to reduce annual flooding damages along Culebra Creek within Damage Centers 4 and 16 without causing any negative downstream impacts. Additional combination studied as an alternative to Government Canyon Creek RSWF.
Helotes/Culebra Combination A	1. Helotes Creek RSWF 2. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination developed to achieve additional flood reduction along with the implementation of Helotes Creek RSWF.
Helotes/Culebra Combination B	1. Helotes Creek RSWF 2. Government Canyon Creek RSWF 3. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination developed to achieve additional flood reduction along with the implementation of both Helotes Creek RSWF and Government Canyon Creek RSWF.
Leon Combination	1. Quarry at the Rim RSWF 2. Leon Creek at Grissom Road Enhanced Conveyance 3. Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	Combination developed to evaluate impacts on main stem Leon Creek independently of selected projects on contributing creeks.
Helotes/Culebra/Leon Combination A	1. Helotes Creek RSWF 2. Culebra Creek NWWC with Culebra Road Bridge Improvements 3. Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	Combination developed as a continuation of Helotes/Culebra Combination A to identify the necessary flood mitigation projects on Lower Leon Creek downstream of the Culebra Creek confluence.
Helotes/Culebra/Leon Combination B	1. Helotes Creek RSWF 2. Government Canyon Creek RSWF 3. Culebra Creek NWWC with Culebra Road Bridge Improvements 4. Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	Combination developed as a continuation of Helotes/Culebra Combination B to identify the necessary flood mitigation projects on Lower Leon Creek downstream of the Culebra Creek confluence.

The analysis of combined projects was also used to determine recommendations for project phasing. In general, the order of recommended project implementation would begin with RSWFs followed by channel projects from the most downstream project and moving upstream.

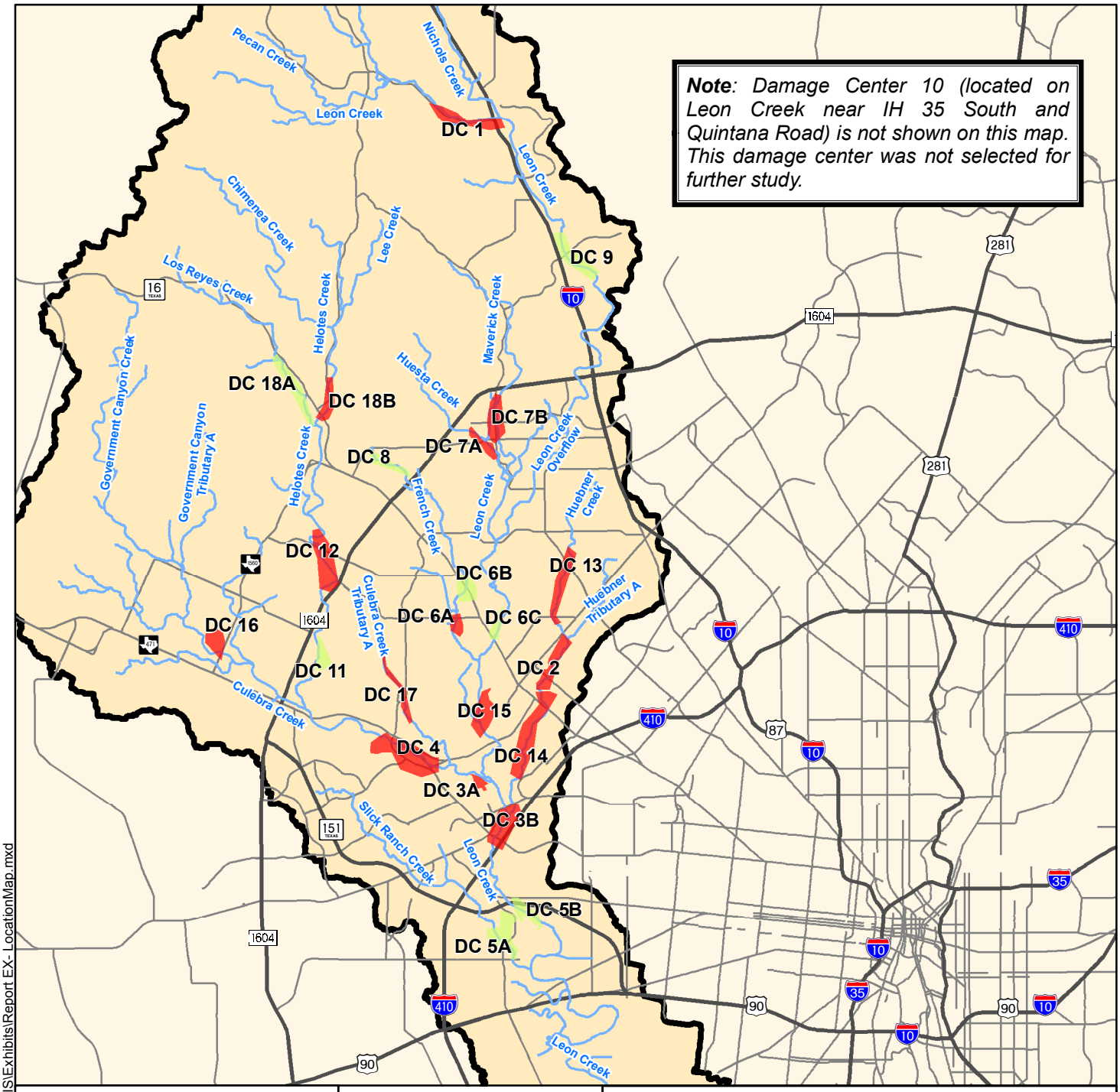
After evaluating each project combination, the most promising individual projects from each major tributary were evaluated together to determine the flood risk reduction potential of all recommended projects combined. The thirteen recommended projects include:

Phasing Required	• Government Canyon Creek RSWF (Damage Center 16) • Helotes Creek RSWF (Damage Center 12) • Culebra Creek at Timber Path Optimized Selective Clearing Program (Damage Center 4)[1] • Leon Creek Optimized Selective Clearing Program with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17) (Damage Center 3)
Phasing Required but Independent of Mainstem Leon Creek	• Huebner Creek RSWF at Prue Road (LC-15) (Damage Center 13) • Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8) (Damage Center 14) • Huebner Creek at Evers Road NWWC (Damage Center 2) • Huebner Creek at Eckhert Road Optimized NWWC (Damage Center 13)
No Phasing Required	• Culebra Creek Tributary A at Tezel Road Enhanced Conveyance (Damage Center 17) • French Creek at Guilbeau Road NWWC (Damage Center 6 A&B) • Hausman Road Drainage Project Phase I LC-9 (Damage Center 7A) • Leon Creek at Grissom Road Enhanced Conveyance (Damage Center 15) • Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10) (Damage Center 7B)

Together, the recommended projects reduced estimated annual flood damages by $1,165,300 (approximately 40 percent).

Alternative development methods were also assessed as a potential flood mitigation strategy. The results from representative areas of the Leon Creek watershed indicated that the use of low impact development, conservation development, and other alternative development methods would reduce future increases in flood risk due to new development compared to traditional development methods. They could also be used in redevelopment projects as an alternative to upgrading storm water infrastructure. In order to increase the rate of use of these methods, agencies should create incentives, facilitate the permitting and review process, and incorporate BMPs in public projects.

[1] This is an optimized version of Culebra Creek NWWC with Culebra Road Bridge Improvements.



SAN ANTONIO RIVER AUTHORITY
Water Brings Us Together

Leon Creek Watershed Master Plan

Damage Center Location Map

AECOM

AECOM Technical Services, Inc.
6800 Park Ten Blvd., Suite 180S
San Antonio, TX 78213-4216
www.aecom.com
TBPE Reg. No. F-3580

Date	January 2011	Job No.	60156508	Exhibit	E.1

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1.0 Introduction

1.1 Purpose

In 2008, the San Antonio River Authority (SARA) authorized AECOM to develop the Leon Creek Watershed Master Plan (LCWMP), a multi-phase study for identifying areas of high flood risk, comparing flood mitigation alternatives, and prioritizing capital projects across the Leon Creek Watershed in Bexar County, Texas. The Leon Creek Watershed is under increased developmental pressures as growth occurs in the City of San Antonio (CoSA) and unincorporated Bexar County. As recently as 1998 and 2002, Leon Creek experienced significant flooding during high rainfall and runoff conditions, which inundated major highways and flooded many structures within the watershed. To reduce the risk of future flood related damages, the public and stakeholders (SARA, CoSA, and Bexar County) sought a long-term planning approach that would address the full downstream impacts of potential projects in the watershed, address multiple-use objectives where possible, and anticipate future land use trends.

This report documents the process used in the development of the Leon Creek Watershed Master Plan, which included:

- The identification of major flooding reaches within the Leon Creek main channel and major tributary channel areas,
- The selection of damage centers based on areas with a high density of at-risk structures within the watershed,
- The analysis of flooding risks and damage potential along bridges, culvert crossings, and other vital transportation corridors,
- The review of Digital Flood Insurance Rate Map (DFIRM) models to assess potential areas of scour and the evaluation of water quality to identify issues in order to develop potential multi-use mitigation strategies,
- The preliminary assessment of potential alternatives that reduce the risk of future flood losses in each of the damage centers using the following strategies:
    - Regional Storm Water Facilities (RSWF),
    - Enhanced channel design,
    - Selective clearing along heavily vegetated channels,
    - Bridge and culvert upgrades,
    - Flood protection barriers and bypass structures, and
    - Property acquisition and floodproofing.
- The refinement of project alternatives selected by workshop participants and inclusion of selected planned projects from the Bexar County Flood Control Capital Improvement Projects (CIP) Program and CoSA.
- The final development of project alternatives along with planning-level opinions of probable construction cost,

- The preliminary assessment of environmental regulatory requirements and multi-use opportunities for each alternative,
- The development of recommended project combinations to achieve increased optimization along with recommended project construction phasing,
- The preparation of a prioritization matrix for compiling and ranking projects, and
- The evaluation of alternative development methods, such as Best Management Practices (BMPs), to mitigate flooding and address water quality issues associated with storm water runoff.

1.2 Study Area

The Leon Creek Watershed is located in the western portion of Bexar County, Texas. It spans nearly the length of the county from north to south and includes approximately 237 square miles of contributing drainage area. The watershed drains to the Medina River and into the San Antonio River, which then ultimately drains into the Gulf of Mexico. Current land use in the steeply sloped upper reaches tends to be undeveloped and/or rangeland. Progressing southward, topography becomes less steep, and land use in the watershed transitions to suburban residential and highly urbanized to the west of downtown. Towards the southern portion of the watershed, land use becomes progressively less developed, and topography becomes comparatively flatter (Appendix A.1).

Portions of the watershed lie within the Edwards Aquifer Recharge and Contributing Zones, as defined in Title 30 Texas Administrative Code (TAC) § 213.3 and 30 TAC § 213.22. This region is illustrated in Appendix A.2.

1.3 Project Phases

The LCWMP was organized into three phases. In Phase 1, the study identified twenty-four areas of major flood risk ("Damage Centers") and evaluated both on- and off-channel Regional Storm Water Facility (RSWF) detention alternatives to minimize flooding impacts. Phase 1 was documented in an earlier report (Leon Creek Watershed Master Plan Phase 1 – Final Report, October 2008). In Phase 2, the study analyzed other traditional flood mitigation strategies, including channel design enhancement alternatives, flood protection barriers and bypass structures, selective clearing techniques, property acquisition, and floodproofing measures. Phase 2 was also documented in an earlier report (Leon Creek Watershed Master Plan Phase 2 – Final Report, April 2010). Both previous Phase 1 and Phase 2 reports may be referenced in the DVD data package accompanying the Leon Creek Watershed Master Plan final report.

In addition to refining the analyses performed in Phases 1 and 2, the master plan study conducted during Phase 3 considered non-traditional flood mitigation strategies, including low-impact development, and water quality enhancement opportunities.[2] Furthermore, the study compiled an overview of the most promising projects and project combinations for reducing flood risks and

[2] In order to maintain consistency between phases and to account for recent site developments, work performed during the first two phases was also updated during Phase 3. For a description of these updates, refer to Appendix A.5.

improving overall quality of life within the Leon Creek Watershed. This report summarizes findings developed during all three phases.

Between May 2008 and October 2010, five workshops were held with the stakeholders, the U.S. Army Corps of Engineers (USACE) Fort Worth District, and AECOM. The workshops were utilized by stakeholders and planners as a way to present preliminary methodologies and results throughout the master planning process and to discuss and prioritize various project alternatives. For a detailed description of each workshop, along with a complete set of formal meeting minutes, refer to Appendix A.3.

2.0 Data Collection

2.1 Geographic Data Sources

A variety of spatial data was collected to identify planned projects, existing and planned development, historic flooding, known water quality and erosion concerns, environmental constraints and wildlife habitats, other regulatory constraints, existing parks, and utilities. All collected data was acquired in formats compatible with analysis using geographic information system (GIS) software. A complete list of these data sets and their sources is included in Appendix B.

2.2 Site Reconnaissance

When possible, limited individual site reconnaissance was conducted to collect data pertaining to floor slab elevations and the environmental regulatory analysis, jurisdictional waters of the United States, archaeological resources, and other permitting requirements as described in Section 4.6 (Regulatory Analysis).

2.3 Modeling Sources and Updates

During the study, SARA provided the hydrologic and hydraulic models and all associated data and spreadsheets used to develop the Federal Emergency Management Agency (FEMA) Digital Flood Insurance Rate Maps (DFIRMs) for the Leon Creek Watershed. In both Phase 1 and Phase 2, the study incorporated preliminary DFIRM models, as issued by FEMA on September 28, 2007. Final DFIRM models, which reflect floodplain appeals and protests received between May 9 and August 6 of 2008, were issued by FEMA on March 29, 2010, and modified for use in the final phase of the master plan study.[3]

The final DFIRM models were modified to incorporate Letter of Map Revision (LOMR) updates, plat information, and construction as-builts for recent flood control and development projects, including those completed since 2005 as well as several currently in development (for a list of these modifications, refer to Appendix B). These corrected DFIRM models were used as the basis for all analyses performed in the LCWMP.

[3] The final DFIRM models became effective on September 29, 2010.

3.0 Assessment of Current Conditions

The primary purpose of the LCWMP is to develop projects to reduce the risk of flood-related damages. Before proceeding with project development, the areas of highest risk for incurring flood-related damages were identified. Water quality and scour issues were also assessed in order to identify multi-purpose design opportunities.

3.1 Level of Flood Protection

In order to identify areas at risk of major flooding within the Leon Creek Watershed, it was necessary to calculate existing levels of flood protection for private property and public infrastructure. The level of flood protection (LOFP) for each structure is defined by the maximum storm event frequency at which the structure incurs damages or becomes a public safety hazard. In general, the analysis required the following steps:

1. Identifying which buildings and roadways are inside the mapped DFIRM floodplain,

2. Determining the depth of flooding for each of these structures during the 10-, 50-, 100-, and 500-year storm events under existing conditions as well as during the 100-year storm event under future conditions, and lastly,

3. Estimating the value of damages to each building and classifying each roadway according to its safety hazard risk.

GIS analysis was used to identify areas with high densities of affected structures, which were then designated as damage centers. This designation facilitated the prioritization of the highest risk areas for project planning.

3.1.1 Building Structures

Damages to buildings (residential and commercial structures) were evaluated by first identifying buildings located within the floodplain, and then by calculating the depth of flooding at each building and estimating potential flood damages.

Buildings within the floodplain were identified using the preliminary DFIRM floodplain and 2008 aerial photos. Structures that appeared to be sheds, garages, or similar outbuildings were not included. The ground surface elevations for each point were extracted from the 30-meter 2005 Digital Elevation Model (DEM). Building finished floor elevations were estimated from site reconnaissance and ranged from 0.5 feet to 2 feet above natural ground. Final building elevations were estimated by adding the estimated finished floor elevations to the extracted ground surface elevations.

Water surface elevations were calculated using the Corrected DFIRM HEC-RAS models for each creek and tributary. Using the HEC-GeoRAS tool, each creek's hydraulic model results were imported into GIS to create a set of five Triangulated Irregular Networks (TINs) representing water surface elevations for each of the five studied storm events. The five water surface elevation TINs

were then converted to rasters and used to extract specific water surface elevations at each building point for each frequency storm event.

At the confluences of streams, the Base Flood Elevation data from the DFIRM study was checked against the water surface elevation rasters for both streams to identify the source of flooding. Because water surface elevations could not be determined where hydraulic models were not available, buildings in approximate zones were not included in the LOFP analysis.

After determining the building elevations and water surface elevations at each building point, the depth of flooding was calculated for each storm event by simple subtraction. A LOFP classification was then assigned to each building based on the highest frequency storm event under existing conditions that would cause flooding at that location. This classification system is further explained in Table 3.1a. Under future conditions, a separate LOFP classification was assigned for each building flooded by the 100-year storm event. For visual purposes, exhibits used unique symbols to distinguish between buildings flooded by the 100-year future and 500-year existing storm events.

Table 3.1a: Classification of LOFP

Statistical Frequency of Flooding (Under Existing Conditions)	Building LOFP Classification
10 years (10% Annual Chance)	<10
50 years (2% Annual Chance)	10-50
100 years (1% Annual Chance)	50-100
500 years (0.2% Annual Chance)	100-500
More than 500 years (Less than 0.2% Annual Chance)	>500
100 years, Future Conditions (1% Annual Chance under future conditions)	100 Future

The depth-of-flooding calculations were then used to estimate the value of damages for each storm event. Depth-damage relationships were taken from *Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVR) in Support of the Donaldsonville to the Gulf, Louisiana, Feasibility Study* (USACE Report)[4]. Damage estimates were calculated only for the structure and contents for each parcel; vehicle damage estimates were not included in this study. The depth-damage relationships for both structures and contents as defined in the USACE publication were based on structure values. The 2008 Bexar County Appraisal District (BCAD) parcel improvement values were used as an estimate of the total value of the structures on each property. If a parcel contained more than one building, one was selected at random to provide a representative flood depth value for all other buildings within the parcel. This step was necessary

[4] USACE New Orleans District, 2006. The study area is within the Ft. Worth District; however, at the time of this study, depth-damage curves from the Ft. Worth District were not available for use. Therefore, the New Orleans District curves were the best available.

to prevent overestimating damages, since BCAD parcel improvement values represent the value of all structures within the parcel.

Annual damages were estimated by taking the sum of the damages multiplied by the storm's probability for the 10-, 50-, 100- and 500-year storm events, as shown in the following equation:

$$AD = (0.1 \times D_{10}) + (0.02 \times D_{50}) + (0.01 \times D_{100}) + (0.002 \times D_{500})$$

Where:

AD = the estimated amount of total annual damages, and
D_x = the amount of damages calculated for the "x"-year storm event.

This LOFP analysis is largely dependent on accurate parcel data from the BCAD dataset and will systematically neglect any buildings listed without appraisal values. For example, because mobile home values are not included in the BCAD parcel dataset, the above method was unable to estimate flooding damages to mobile homes. During the analysis, a high concentration of mobile homes was observed along Leon Creek near Quintana Road and New Laredo Highway. In order to estimate the damage value for these buildings, the USACE depth-damage relationship was applied using an assumed structure value of $20,000 for each mobile home. This assumed value fell in the mid-range of a random selection of other mobile home values from the BCAD website.

The results of the Building Structure analysis are summarized in Table 3.1b. Estimated annual damages for the entire watershed total $2,884,000.

Table 3.1b: Building Structure Analysis Summary (Entire Watershed)*

Storm Event	10-year	50-year	100-year	500-year	100-year Future
No. of Buildings in the Floodplain	284	857	1,480	3,359	2,040
Est. Damages from Flooding	$7,756,000	$41,765,000	$82,394,000	$224,478,000	$122,147,000

*Based on Corrected DFIRM floodplain

3.1.2 Damage Centers

In order to prioritize study areas and assess the local impacts of developed project alternatives, buildings inside the DFIRM floodplain were then grouped into damage centers (DC), each representing an area of high building density.[5] These damage centers were established by performing a spatial density analysis in GIS with all residential and commercial buildings identified during the level of flood protection analysis (i.e., those flooded by the 500-year storm event). Eighteen areas with high densities of affected buildings were identified within Leon Creek watershed; each was assigned a unique number identification. Where these areas fell across multiple streams, they were subdivided and assigned a letter identifier in addition to their numbers.

[5] A preliminary DFIRM floodplain (received in 2007) was used to identify damage center locations.

In total, 24 damage centers were identified, as summarized in Table 3.1c. A map illustrating these 24 damage centers and their damage densities is shown in Appendix C.

Table 3.1c: Damage Center Summary

Damage Center ID	Creek Name	Location
1*	Leon Creek	West of IH-10 in Leon Springs, Texas
2*	Huebner Creek	Between Evers Road and Apple Green Road
3A*	Leon Creek	North of Ingram Road
3B*	Leon Creek	South of Ingram Road
4*	Culebra Creek	South of Grissom Road
5A*	Slick Ranch Creek	South of State Highway 151 west of W Military Drive
5B	Leon Creek	South of State Highway 151 at Pinn Road
6A*	French Creek	South of Guilbeau Road
6B*	French Creek	Near Bandera Road at Mystic Park
6C*	Leon Creek	North of Bandera Road
7A*	Huesta Creek	Between W Loop 1604 and Babcock Road
7B*	Maverick Creek	Between UTSA Boulevard and Hausman Road
8	French Creek	Northwest of Bandera Road intersection at W Loop 1604
9	Leon Creek	East of IH-10 at Camp Bullis Road
10	Leon Creek	Near Quintana Road and New Laredo Highway
11*	Helotes Creek	East of W Loop 1604 near Burke Elementary School
12*	Helotes Creek	Near Braun Road
13*	Huebner Creek	Between Eckhert Road and Strathaven Road
14*	Huebner Creek	North of Ingram Road
15*	Leon Creek	North of Grissom Road
16*	Culebra Creek	Northwest of Galm Road intersection at Culebra Road
17*	Culebra Creek Tributary A	West of Tezel Road
18A	Los Reyes Creek	West of Bandera Road in Helotes, Texas
18B*	Helotes Creek	Near Scenic Loop Road in Helotes, Texas

*Damage center selected for detailed project development

While not fully inclusive of all buildings in the Leon Creek watershed, these damage centers provided a method for prioritizing project development to address the most at-risk areas. Damage Centers were also used in preliminary analyses of projects to evaluate flood risk reduction benefits. However, isolated buildings were excluded from the damage centers. Table 3.1d shows the percentage of at-risk building accounted for within damage centers by tributary. Overall, 90 percent of at-risk buildings were located within the 24 damage centers.

Table 3.1d: Percent of At-Risk Buildings Contained in Damage Centers*

Creek Name	Buildings in Damage Centers	Total Buildings	Difference	% Contained in Damage Centers
Culebra Creek	607	672	65	90.3%
Culebra Creek Tributary A	114	124	10	91.9%
French Creek	150	190	40	78.9%
Helotes Creek	230	280	50	82.1%
Huebner Creek	447	460	13	97.2%
Huesta Creek	66	81	15	81.5%
Leon Creek (Mainstem)	1003	1145	142	87.6%
Maverick Creek	69	75	6	92.0%
Slick Ranch Creek	548	565	17	97.0%
Leon Creek watershed	3234	3592	358	90.1%

*Note: The damage centers were developed using a preliminary DFIRM floodplain (received in 2007). In Damage Center 12 (Helotes Creek) and Damage Center 15 (Leon Creek), the effective DFIRM floodplain overlaps approximately 40 additional buildings, which were not included in the initial damage center study or in subsequent impact analyses.

3.1.3 Roadways

Roadway hazards were evaluated by calculating the depth of flooding and the velocity of flow over each roadway in the floodplain and by classifying each roadway according to its safety hazard potential using CoSA's *Unified Development Code*. Due to modeling constraints, two separate methodologies were developed in order to analyze both roadway crossings (perpendicular to the stream centerline) and roadway corridors (parallel to the stream centerline).

Roadway Crossings (Perpendicular)

The roadway crossing analysis was performed for all crossings modeled as bridges or culvert crossings in the DFIRM HEC-RAS models. The analysis did not include low water crossings.

For reference purposes, water surface elevations were calculated at each roadway crossing by adding the depth of overtopping to the baseline elevation. To establish a baseline elevation, the minimum weir flow elevation from the HEC-RAS model was used.[6]

In general, the depth of overtopping data was extracted from the HEC-RAS output variable "Weir Max Depth."[7] However, there were a few cases when these depths were manually set to zero.

[6] Typically, this elevation is the lowest point in the roadway deck above the stream/creek crossing. However, the HEC-RAS model also uses a lower ground point elevation if one exists in the overbanks of the bridge cross-section. In these cases, it is assumed that the roadway deck follows the grade of the ground in the overbanks. The minimum weir flow elevation is also impacted by the presence of ineffective flow areas in the overbanks of the structure cross-section, so it may be different for lower design storm flows than for larger design storm flows. Due to the complexity and variability of the minimum weir flow elevation reported by HEC-RAS, the baseline elevation may not necessarily be equal to the "Min El Weir Flow" elevation reported by the HEC-RAS model.

This was done when the overtopping depth occurred in an overbank area that was modeled as an "effective flow area" (i.e., to eliminate crossing of profiles in the DFIRM multiple profile runs), even though it would typically be considered as ineffective. Depths were also manually set to zero when the energy grade line elevation was calculated to be above the baseline elevation, even though the water surface elevation was calculated to be below the bridge low chord elevation. In these cases, it was assumed that there was no blockage of flow under the bridge which could cause the water surface to rise to the energy grade elevation and, therefore, that no overtopping of the roadway would occur.

The velocity of flow overtopping the roadway structure was calculated by dividing the flow rate over the weir (as calculated by HEC-RAS) by the HEC-RAS calculated weir flow area. In the event that a roadway structure was highly-overtopped (i.e., when the ratio of the depth of water over the minimum weir elevation to the height of the energy grade line over the minimum weir elevation exceeded 0.95), the velocity was reported using HEC-RAS velocity calculations for the upstream internal bridge cross-section.

Using the calculated depth of overtopping and the flow velocity, each crossing was classified according to its safety hazard risk based on Figure 504-2 from CoSA's *Unified Development Code*. LOFP values were defined by the highest frequency storm event that could potentially cause a "dangerous" road hazard at each location. The CoSA road hazard curve and its defining equations have been reprinted in Appendix D.1.

The results of the Roadway Crossings analysis for all tributaries in Leon Creek watershed are summarized in Table 3.1e.

Table 3.1e: Roadway Structure Analysis Results Summary

Storm Event	10-year	50-year	100-year	500-year	100-year Future
No. Unsafe Roadway Crossings	105	154	173	209	189

Roadway Corridors (Parallel)

The roadway corridors analysis was also performed for all roadways excluded from the roadway crossings analysis (i.e., those near existing floodplains and parallel to channels).

Within the Leon Creek watershed, nearly 1,000 roadway segments were identified as being located parallel and in close proximity to an existing floodplain. The selection of roadways for detailed analysis was narrowed down to the most critical corridors connecting neighborhoods with major highways using a "travelshed" analysis of access routes during flood conditions. In the analysis, all roadways that intersect the floodplain were identified on a map of the watershed. Where primary

[7] The "Weir Max Depth" variable in HEC-RAS describes the distance from the energy grade line elevation at the structure to the baseline elevation. The energy grade line elevation is the water surface elevation plus the velocity head and describes the water surface elevation that would result if an obstruction was placed in the flow path of the water overtopping the roadway; therefore, it was deemed appropriate for this analysis.

routes to major highways were blocked by a floodplain, alternative routes were identified. The remaining twenty roadways represent the corridors that could potentially provide the only point of evacuation for residents or access by emergency vehicles.

The identified corridors are mapped in Appendix D and include:

1. Babcock Road near Camp Bullis Road
2. Babcock Road near UTSA Boulevard
3. Babcock Road near W Hausman Road
4. Bandera Road near Ranch Parkway
5. Boerne Stage Road near IH-10
6. Culebra Road (FM 471) near W Loop 1604
7. Culebra Road near Westover Hills Boulevard
8. FM 1560 near Braun Road
9. Galm Road near Culebra Road (FM 471)
10. Grissom Road near Timber Path
11. Military Drive SW near Old Pearsall Road
12. Military Drive W-SW near SH 151
13. Old Grissom Road near Grissom Road
14. Potranco Road near Culebra Road
15. Quintana Road near Plumnear Road
16. Scenic Loop Road near Menchaca Road
17. Scenic Loop Road near Bandera Road
18. Somerset Road near IH-35 S
19. Tezel Road near Timber Ranch
20. Timber Path near Culebra Road

Because the HEC-RAS software cannot be easily used to characterize these roadways, an alternate method was developed to determine the level of flood protection (LOFP) for a length of roadway that adjoins but does not intersect a neighboring channel. For each roadway contained within the identified areas, points were created in GIS at the intersection of the roadway and each cross section. Elevations were assigned to the points based on 2005 aerial topography, and water surface elevations and velocities were extracted from the HEC-RAS output data for the corresponding cross section. The depth of overtopping was calculated for each point by subtracting the roadway elevation from the water surface elevation. The depth of overtopping and the velocity data were then used to assign danger classifications according to CoSA's (CoSA, 2006), as previously discussed in the roadway crossings analysis.

To determine the overall impact of flooding within each roadway area, the twenty roadways were ranked according to average daily traffic (ADT) counts obtained from Bexar County, the City of San Antonio, and TXDOT websites. Traffic count estimates included traffic coming from both directions (multiple lanes). ADT counts used in this study are reported in Appendix D.1 and summarized in Table 3.1f.

Two roadways do not have public traffic count data. The information was estimated as follows:

1. **Somerset Road South of IH-35 South**: ADT count was estimated as roughly equivalent to ADT count north of IH-35 on Quintana Road, while rounding up conservatively.
2. **Timber Path South of Grissom Road**: ADT count was estimated as roughly equivalent to ADT count for north-bound/south-bound traffic on adjacent connecting street, Old Grissom Road.

Each roadway was ranked according to an overall impact rating, as determined by the roadway's peak flooding point (lowest LOFP) and its assumed ADT count at that location according to the following equation:

$$Overall\ Impact\ Rating\ = k_n \times LOFP \times ADT$$

Where:

k_n = a constant used to normalize all results to a 0-1 scale,
LOFP = the annual percent chance of flooding as determined by the roadway's Level of Flood Protection, and
ADT = the roadway's average daily traffic count.

A high overall impact rating indicates a roadway frequently at risk for dangerous road conditions in combination with high traffic volumes.

Table 3.1f summarizes the results of analysis based on the overall impact rating for each segment of roadway. The final data are presented in Appendix D on a per-cross-section basis and are expressed both in terms of LOFP (by symbol color) and ADT (by symbol size). Many of the impacted transportation corridors were located within one of the previously identified damage centers. The following additional high flood-risk areas were identified and assigned to new damage centers:

- Babcock Road at Camp Bullis Road (Maverick Creek), assigned to Damage Center T-1
- Bandera Road at Ranch Parkway (Los Reyes Creek), assigned to Damage Center T-2
- Culebra Road at Loop 1604 (Culebra Creek), assigned to Damage Center T-3
- FM 1560 at Braun Road (Culebra Tributary C), assigned to Damage Center T-4
- Galm Road at Culebra Road (Government Canyon Creek), assigned to Damage Center T-5
- Military Drive SW near Old Pearsall Road (Leon Creek), assigned to Damage Center T-6
- Scenic Loop Road at Menchaca Road (Helotes Creek), assigned to Damage Center T-7

Table 3.1f: Flooding Impact on Transportation Corridors

Roadway	Damage Center	Peak Flooding Location (occurs in between)	LOFP	Approximate ADT Count at this Location	Overall Impact Rating*
Babcock Road near Camp Bullis Road	*T-1*	Camp Bullis Road & Chase Hill Boulevard	<10	0-5,000	0.39
Babcock Road near Camp Bullis Road	*T-1*	Heuermann Road & Camp Bullis Road	<10	0-5,000	0.32
Babcock Road near UTSA Boulevard	7B	W Loop 1604 N & UTSA Boulevard	10-50	10,001-20,000	0.34
Babcock Road near W Hausman Road	7B	UTSA Boulevard & W Hausman Road	10-50	10,001-20,000	0.37
Bandera Road near Ranch Parkway	*T-2*	Chimney Creek Road & Frank Madla Road	50-100	10,001-20,000	0.19
Bandera Road near Ranch Parkway	*T-2*	Ranch Parkway & Reyes Canyons	10-50	10,001-20,000	0.38
Boerne Stage Road near IH-10	1	IH-10 W & Baywater Stage	<10	0-5,000	0.69
Boerne Stage Road near IH-10	1	Scenic Loop Road & Breeze Oak Lane	<10	0-5,000	0.69
Culebra Road (FM 471) near W Loop 1604 N	*T-3*	W Loop 1604 N & Mountain View Drive	10-50	30,001-40,000	1.00
Culebra Road (FM 471) near W Loop 1604 N	*T-3*	Lone Star Parkway & W Loop 1604 N	50-100	10,000-20,000	0.30
Culebra Road near Westover Hills Boulevard	4	Tezel Road & Timber Path	10-50	30,001-40,000	0.98
FM 1560 near Braun Road	*T-4*	Doheny Road & Galm Road	10-50	5,000-10,000	0.23
Galm Road near Culebra Road (FM 471)	*T-5*	Remuda Ranch & Mill Park	<10	0-5,000	0.16
Grissom Road near Timber Path	4	Harvest Meadow & French Meadow	10-50	10,001-20,000	0.53
Grissom Road near Timber Path	4	Northwest Trails & Timber Path	100-500	10,001-20,000	0.05
Grissom Road near Timber Path	15	Heath Road & Timberhill Drive	50-100	20,001-30,000	0.41
Military Drive SW near Old Pearsall Road**	*T-6*	Old Pearsall Road & Quintana Road	10-50	20,001-30,000	0.70
Military Drive W-SW near SH 151	5B	Brownleaf Drive & SW Loop 410	100-500	20,001-30,000	0.06
Old Grissom Road near Grissom Road	4	Grissom Road & Timber Path	10-50	5,001-10,000	0.25
Potranco Road near Culebra Road	3B	Culebra Road & Ingram Road	10-50	5,001-10,000	0.26
Quintana Road near Plumnear Road	10	Military Drive SW & Cassin Road	<10	0-5,000	0.05
Scenic Loop Road near Menchaca Road	*T-7*	Grey Forest Drive & Grey Forest Drive (Loop)	<10	0-5,000	0.25
Scenic Loop Road near Menchaca Road	*T-7*	Menchaca Road & Low Road	<10	0-5,000	0.44
Scenic Loop Road near Bandera Road	18B	Tower View Road & Old Scenic Loop Road	<10	0-5,000	0.44
Somerset Road near IH-35 S	10	IH-35 S & SW Loop 410	<10	0-5,000***	0.08
Tezel Road near Timber Ranch	17	Ridge Run & Timber Ranch	10-50	10,001-20,000	0.53
Timber Path near Culebra Road	4	Grissom Road & Culebra Road	50-100	5,001-10,000***	0.13

* The product of the ADT and the probability of the overtopping storm event, normalized to a 0-1 scale.
** Port of San Antonio Test Cell Area
*** Estimated Values

3.2 Stream Bank Erosion

A scour analysis was performed as described in Appendix E using depth and velocity assumptions from Texas Secondary Evaluation and Analysis for Scour (TXDOT, 1993) and soil data from Natural Resources Conservation Service's Soil Survey Geographic database for Bexar County (NRCS, 2006).

Approximate locations of potential scour within identified damage centers were identified. The majority of damage centers exhibited potential scour problems, with the exception of Damage Centers 4 and 16. Helotes Creek, Huebner Creek, and Leon Creek are extremely vulnerable and have scour issues throughout their entire reach. Due to high flow rates and velocities, lower Leon Creek (downstream of the Culebra Creek confluence) revealed potential scour issues correlated to flow depths of greater than 9.8 feet for the majority of the overbanks. Field investigations of selected damage centers revealed that previous streambed scour has developed bedrock exposure in Damage Centers 1, 3, 7B, 15, and 18.

Many utility service lines were located within potential scour areas throughout the Leon Creek watershed. Most often, utility service lines intersect or cross stream reaches perpendicularly, causing a single point of conflict. However, many San Antonio Water System (SAWS) sanitary sewers and recycled water mains are generally located parallel to and along streambeds within several of the analyzed reaches. Conflicting utility service line locations are included in exhibits found in Appendix E. Available utility information did not include necessary elevation data to determine the risk of exposure that would result from the determined scour potential. However, the field investigations of selected damage centers did reveal existing scour issues. Manholes observed in Damage Center 1 just downstream of IH-10 Frontage Road have become exposed due to degraded trench backfill.

3.3 Water Quality

An analysis was performed to characterize known water quality issues in the Leon Creek watershed. Using environmental regulations and screening criteria as used by the Texas Commission of Environmental Quality (TCEQ) and preliminary water quality sampling data provided by SARA, 33 parameters were evaluated for Leon Creek.[8] These parameters included elemental non-metals, inorganic compounds, metals (in water column and sediment), organic compounds, stream properties, and pathogens. Appendix F describes the process used to evaluate concerns and impairments at major sampling stations throughout the watershed and provides more detailed results of the analysis.

In general, areas of higher concern were identified in lower Leon Creek. They did not reflect any clear overall trends as part of the greater Leon Creek watershed but instead seemed to reflect the influence of riparian conditions and adjacent land use. Based on this trend, it is unlikely that regional flood mitigation projects located far upstream of pollutant sources could address any of the identified water quality concerns. Water quality benefits of individual projects would be local and would potentially include reducing the risk of stream degradation nearby and improving local stream health to support riparian species. These potential benefits were evaluated in Section 4.9.1 for the criteria "Water quality

[8] The 2009 CoSA Discharge Monitoring Report was also provided by SARA; however it was not received in time to be incorporated into this report.

enhancement," "Environmental or habitat enhancement," "Channel instability," and "Natural channel design suitability."

4.0 Project Selection and Development

As a broad-based study, the LCWMP considered a wide range of criteria to develop and prioritize flood mitigation projects for selected damage centers. A preliminary analysis was used initially to evaluate the general feasibility and effectiveness of different flood mitigation strategies and to provide the study participants a foundation for defining the master plan focus. Upon selecting a final set of damage centers, flood mitigation projects were then developed for detailed analysis, assessment, and ranking.

Project rankings were developed using a comprehensive prioritization matrix, which evaluated various aspects of individual project performance, including hydrologic and hydraulic impacts, potential reductions of damages and safety hazards, project costs, regulatory requirements, and opportunities for incorporating multi-use objectives. In addition, projects were evaluated in combination to identify opportunities to reduce project sizing and construction costs, to eliminate any negative downstream impacts caused by individual projects, and to determine required project phasing. Upon evaluating projects individually and in combination, final recommended projects were selected for future implementation.

4.1 Preliminary Analysis

During the preliminary analysis, several flood mitigation strategies were evaluated for each of the 24 damage centers to determine the feasibility and effectiveness of each. The preliminary assessment included evaluation of the following:

- Regional Storm Water Facilities (RSWF),
- Enhanced channel design,
- Selective clearing along heavily vegetated channels,
- Bridge and culvert upgrades,
- Flood protection barriers and bypass structures, and
- Property acquisition and floodproofing.

Potential sites for projects were selected using an environmental constraints map and existing and planned development. The methodology and results for the preliminary assessment were presented in the Phase 1 and Phase 2 Final Reports. Based on this preliminary assessment and the consensus developed during the 1st and 3rd workshops with study participants (SARA, CoSA, and Bexar County), some damage centers were omitted from the detailed project development stage.[9] These damage centers included:

[9] Further information about the project selection process is provided in *Appendix A.3* Workshop Summaries.

- **Damage Center 5B** (Leon Creek): Damages were not significant enough to continue project development or evaluation.
- **Damage Center 8** (French Creek): A pending LOMR potentially removes the majority of buildings in lower portion of damage center from the floodplain, greatly reducing the amount of flood damages if the LOMR is approved. The upper portion of the damage center is a top priority for the City of Helotes. Channel improvements would include extending the channel to FM 1560 at W Hausman Road.
- **Damage Center 9** (Leon Creek): Not selected for further evaluation because a buyout plan is currently in place to mitigate potential flooding damages.
- **Damage Center 10** (Leon Creek): Flood mitigation solutions are impractical due to high flow rates and low elevation structures in this area. The U.S. Army Corps of Engineers is evaluating the prospect of property buyouts in this area. Additionally, there is potential to upgrade IH-35 to improve the roadway level of service.
- **Damage Center 18A** (Los Reyes Creek): A selective clearing program was determined to provide sufficient flood mitigation; therefore, no further evaluation is necessary.

In total, nineteen damage centers were selected for more detailed project development.

4.2 Project Development Methodology

The project designs for the selected damage centers incorporated the following project types:

- On- and off-channel Regional Storm Water Facilities (RSWF),
- Enhanced channel design,
- Selective clearing along heavily vegetated channels,
- Bridge and culvert upgrades,
- Flood protection barriers, and
- Property acquisition[10].

Two project types, bypass structures and floodproofing, which were evaluated during the preliminary analysis were not incorporated in the detailed project development. Bypass structure opportunities were limited, and floodproofing was found not to be a feasible option for the number of at-risk structures in most damage centers.

Project designs were developed with the purposes of:

1. Reducing the risk of flood-related damages to local property and improving the safety of nearby roadway crossings, and
2. Avoiding negative downstream impacts, such as increased risk of flood-related damages or worsened safety ratings for roadway crossings (unless appropriate bridge upgrades are also planned and funded).

[10] Property acquisition was considered in conjunction with other project types in order to provide sufficient ROW. A buyout program was not evaluated as a flood mitigation alternative. A voluntary buyout program would need to be in place in order to request FEMA grant money for buyouts in the aftermath of a flood.

Furthermore, RSWFs were developed to reduce peak flow rates along entire tributaries, improving both local and downstream flood protection.

The following sections present the design methodologies for each type of project in further detail.

4.2.1 Regional Storm Water Facility (RSWF)

Using available 2005 aerial contour data, storage areas for each RSWF were delineated in AutoCad. Volume calculations were based on site topography or by assuming excavation with 3:1 side slopes. Generally, the pond bottom was assumed to have a 0.5 percent cross grade with a 0.5 percent bottom slope to maximize the pond volume. Outlet structures included broad-crested weirs, staged weirs or pipe and weir combination and were optimized for the 100-year existing storm event.

4.2.2 Enhanced Channel Design

Enhanced channel designs were developed for each damage center to remove channel constrictions, increase flow area, and reduce local risk of flood-related damages. The location and size of enhanced channel designs were determined by identifying the cause of flooding in the area during the preliminary analysis.

Enhanced channel designs were developed in accordance with the memorandum “Leon Creek Watershed Master Plan Phase II-A, Natural Waterway Conveyance Methodology, Revised,” dated May 26, 2009. The memorandum was produced during Phase 2 of the LCWMP and accepted by the BRWM partners. It is included in Appendix A.

In summary, enhanced channel designs were developed as a basic trapezoidal channel with 3:1 side slopes, which minimizes channel space requirements and allows for increased channel capacity within confined areas, especially in those reaches where the available right-of-way is insufficient for naturalized waterways. Additionally, benchback sections were considered during the preliminary analysis as described in the Leon Creek Watershed Master Plan Phase 2 Report. The results of the analysis determined that natural channel design techniques could be incorporated in most of the proposed channel cross sections with limited impacts to the flood-risk reduction benefits. The channel improvements used a Manning’s “n” value of 0.04 for the main channel representing a grass lined channel. The Manning’s “n” values for overbank areas were unmodified.

In cases where right-of-way acquisition was limited or channel velocities exceeded 14 feet per second, concrete enhanced conveyance options were developed to reduce WSELs and provide channel erosion protection. These areas were designed as a basic trapezoidal concrete lined channel with 1.5:1 slide slopes, represented by a Manning’s “n” value of 0.015.

Certain constraints, such as the locations of existing structures and major utility lines, were noted during this master planning process. These and other constraints will need to be addressed in further detail during subsequent study and design phases.

4.2.3 Selective Clearing

When optimizing structural channel improvements using selective clearing, a Manning’s “n” roughness coefficient of 0.04 was assumed for the optimized channel. This value corresponds to grass-lined channels with regular maintenance or gravel channels with limited vegetation.

4.2.4 Bridge and Culvert Upgrades

Bridge and culvert upgrades were used to enhance the effect of other flood mitigation strategies or to improve safety along a particular roadway downstream of proposed channel improvements. Bridge structures were modified to provide one foot of freeboard above the 100-year future water surface elevation. Culvert structures were modified by adjusting flow line elevations, culvert sizes, and/or deck elevations to pass the 100-year existing storm event without overtopping the roadway.

4.2.5 Flood Protection Barriers

Flood protection barriers which consisted of levees and floodwalls were designed to meet the levee design criteria from US Army Corps of Engineers Engineering Manual No. 1110-2-1913 "Design and Construction of Levees" (2000). Without project site field investigations, the two guidelines applied were for minimum side slopes of 3:1 and minimum top width of 10 feet. The required height was determined in GIS using 2005 aerial topography and the 100-year future Water Surface Elevation surface, assuming three feet of freeboard.

4.2.6 Property Acquisition

Property acquisition was considered for enhanced conveyance and RSWF projects that required additional right-of-way to be implemented or for projects which could not remove buildings located near the drainage channels from the potential inundation area. Appropriate properties were identified and the estimate cost was included in the corresponding project cost estimate. Cost estimates were based on 2008 Bexar County Appraisal District (BCAD) data for property and building values. Building damages for properties selected for acquisition were not included in the estimated damage calculations.

4.3 Selected Project Descriptions

For each of the nineteen selected damage centers, detailed project alternatives were developed and incorporated into the Corrected DFIRM models. Where current proposed projects were included in the analysis, the corresponding models were updated with project information. The following list provides a brief summary of each selected project alternative.[11] Additional information is included in Appendix G.

- Damage Center 1 – Located along Leon Creek near Boerne Stage Road in between Baywater Stage Road (near Cross Mountain Trail) and IH-10 West in Leon Springs, Texas. One project alternative was developed to reduce flooding near Old Fredericksburg Road, Two Creeks Subdivision, and Walnut Pass at Boerne Stage Subdivision. Model updates incorporated two new LOMRs, one consisting of a bridge and fill related to the Two Creeks Subdivision (Case No. 07-06-0331P, effective 03/23/2007), and the other consisting of a bridge from Stage Run Subdivision (Case No. 07-06-0434P, effective 10/11/2007). New fill information was also obtained for Walnut Pass at Boerne Stage Subdivision (Plat No. 040517) and the Valero at Cross Mountain Trail.
    - **Leon Creek at IH-10 NWWC** – Located downstream of Boerne Stage Road and IH-10 West, this area was selected to reduce water surface elevations upstream of IH-10 West. Per guidance from Workshop 3, a project was developed to widen the

[11] In Phase 2, multiple NWWC alternatives were developed for each damage center. The higher ranking alternative of each damage center was incorporated as part of the final selected projects.

channel. The existing left channel bank was maintained, and the right bank was widened to Old Fredericksburg Road.

- Damage Center 2 – Located along Huebner Creek between Apple Green Road and Evers Road west of Bandera Road in Leon Valley, Texas. Two project alternatives were developed to reduce flooding in adjacent residential neighborhoods and improve the LOFP for Evers Road and Apple Green Road.
    - **Eckhert RSWF** – Designed as an on-channel detention pond and located just upstream of the confluence of Huebner Creek and Huebner Creek Tributary A. The RSWF required a maximum storage capacity of approximately 100 acre-feet with minimum and maximum elevations at 844.3 feet and 856 feet, respectively. The existing culvert system at Eckhert Road was utilized as the outfall structure with flow restricted by closing one of the roadway's twelve existing 10-foot by 6-foot concrete box culverts.
    - **Huebner Creek at Evers Road NWWC** – Designed as a grass-lined channel with minimized upgrades at Evers Road. In order to meet flood mitigation objectives, the channel was widened past existing right-of-way, requiring property acquisition. The project also includes bridge upgrades for Apple Green Road, improving the LOFP at the roadway crossing to handle at least the 100-year storm event. The bridge upgrades developed for Evers Road were designed to improve the LOFP of buildings in the neighborhood just upstream of the crossing. Improving the LOFP of the crossing itself would require roadway improvements which would extend well beyond the limits of the bridge.

- Damage Center 3 – Located along Leon Creek upstream of Ingram Road at the confluence of Leon Creek and Culebra Creek. One project alternative was developed to reduce flooding in adjacent residential neighborhoods located within Damage Centers 3A and 3B.
    - **Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)** – Designed to widen the channel and remove the channel constriction just downstream of Damage Center 3A. The project was combined with proposed Bexar County Flood Control Projects LC-17 (June 2009) and LC-8 (May 2009), including a flood protection barrier along Huebner Creek and bridge upgrades to Ingram Road Low Water Crossing #58 located within Damage Center 3B.

- Damage Center 4 – Located along Culebra Creek between Culebra Road and Old Grissom Road. Two project alternatives were developed to reduce flooding in adjacent residential neighborhoods.
    - **Easterling RSWF** – Designed as an on-channel detention pond and located just downstream of the Culebra Creek RSWF. The RSWF required a maximum storage capacity of approximately 1,140 acre-feet with minimum and maximum elevations at 808 feet and 836 feet, respectively. It has a staged weir outfall structure with two weir openings: the lower opening, spanning 150 feet, was placed from grade level (808 feet) to a height of 25 feet; the upper opening, spanning 1,000 feet, was placed from a height of 25 to 30 feet.
    - **Culebra Creek NWWC with Culebra Road Bridge Improvements** – Designed to maintain existing banks while lowering the flow line throughout the full length of the damage center (Culebra Road to Old Grissom Road). Additionally, bridge upgrades were developed for Culebra Road and involved raising the bridge low chord above the existing 100-year storm water surface elevation to reduce the constriction caused by the bridge opening and improve the bridge LOFP.

- Damage Center 5A – Located along Slick Ranch Creek between Texas State Highway 151 and Marbach Road. One project alternative was developed to reduce flooding in adjacent residential neighborhoods.[12] In addition, an existing channel project was completed in 2008 by CoSA near West Military Drive to reduce flooding.
    - **Havenbrook RSWF** – Designed as an on-channel detention pond and located southeast of Texas State Highway 151 and Loop 410 West. The RSWF required a maximum storage capacity of approximately 210 acre-feet with minimum and maximum elevations at 732 feet and 743 feet, respectively. It had a staged weir outfall structure with two weir openings: the lower opening, spanning 125 feet, was placed from grade level (732 feet) to a height of 9 feet; the upper opening, spanning 400 feet, was placed from a height of 9 to 11 feet.

- Damage Center 6A&B – Located along French Creek near Bandera Road and Guilbeau Road. Two project alternatives were developed to reduce flooding in adjacent residential neighborhoods located within Damage Centers 6A and 6B.
    - **French Creek RSWF** – Designed as an on-channel detention pond and located just upstream of Loop 1604 North. The RSWF required a maximum storage capacity of approximately 150 acre-feet with minimum and maximum elevations at 924.36 feet and 936 feet, respectively. The existing culvert system at Loop 1604 West was utilized as the outfall structure, consisting of fifteen 8-foot by 5-foot concrete box culverts at an elevation of 932 feet.
    - **French Creek at Guilbeau Road NWWC** – Designed to widen the channel and remove the channel constriction downstream of Guilbeau Road. Existing banks were maintained along the left overbank adjacent to residential developments. Land acquisition was required due to the increased channel widths along the right overbank.

- Damage Center 6C – Located along Leon Creek upstream of Bandera Road. One project alternative was developed to reduce flooding in nearby residential and commercial areas.
    - **Quarry at the Rim RSWF** – Previously identified by the City of San Antonio as an off-channel detention pond located northeast of Loop 1604 North and IH-10 West. The potential site is currently part of a long-term operational quarry. The RSWF required a maximum storage capacity of approximately 6,350 acre-feet. Since minimal data was available, a 300-foot-long weir was incorporated to limit spills into the quarry to the maximum capacity as provided by the City of San Antonio.

- Damage Center 7A – Located along Huesta Creek between Hausman Road and Babcock Road. One existing project (developed by the Bexar County Flood Control CIP) was analyzed in order to determine its impacts on the surrounding neighborhood and further downstream.
    - **Hausman Road Drainage Project Phase 1 (LC-9)** – Bexar County Flood Control Project LC-9 project consisted of NWWC immediately upstream and downstream of Hausman Road, in combination with bridge upgrades to Hausman Road, the removal

[12] Damage estimate for the selected RSWF project was developed with the draft DFIRM hydraulic model. The final DFIRM model removed a significant portion of the damage center from the floodplain (buildings along left overbank). Additionally, this portion of the damage center was mapped as an approximate zone with no official model. Therefore, damage estimates were not calculated for the RSWF project. Instead, because there was an insignificant reduction in peak flow rates, it was concluded that the project had no impact to existing conditions.

of Danvers Road, and property acquisition. Bridge upgrades included converting Hausman Road from multiple culverts to a single span bridge.

- Damage Center 7B – Located along Maverick Creek near UTSA Boulevard in between North Loop 1604 and Hausman Road. Two project alternatives were developed to reduce flooding within residential areas and across Babcock Road as well as other roads within the damage center. Model updates incorporated one new LOMR, consisting of a culvert and fill from the Royal Apartments development (Case No. 08-06-1354P, effective 03/19/2009), and one re-plat with fill data pertaining to The Place at Babcock-Hausman subdivision (Plat No. 080022, effective 04/28/2008). The re-plat also included new fill information for the Walgreens at LOT 1 Block 13.
    - **UTSA RSWF** – Designed as an off-channel detention pond and located southeast of Babcock Road and Loop 1604N. The RSWF had a maximum storage capacity of approximately 200 acre-feet with minimum and maximum elevations at 960 feet and 975 feet, respectively. It had a 480-foot long inflow weir with an average height of 11 feet and an outfall structure consisting of a 24-inch pipe.
    - **Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)** – Designed to lower the channel invert and widen the channel along Babcock Road. In addition, this alternative included bridge upgrades to UTSA Boulevard in order to reduce or eliminate overflow between Maverick Creek and Huesta Creek Tributary A and to improve the LOFP of roadway crossings within the damage center. Bridge upgrades to UTSA Boulevard retain the existing roadway profile and lower the existing culvert invert elevation, resulting in a larger culvert structure. The project was combined with proposed Bexar County Flood Control Project LC-10, replacing the W Hausman Road crossing at Maverick Creek.

- Damage Center 11 – Located along Helotes Creek in between W Loop 1604 N and the confluence of Helotes Creek and Culebra Creek. One project alternative was developed to reduce flooding in adjacent residential areas.
    - **Braun RSWF** – Designed as an off-channel detention pond and located west of Braun Road and Loop 1604W. The RSWF had a maximum storage capacity of approximately 200 acre-feet with minimum and maximum elevations at 922.5 feet and 940 feet, respectively. It had a 925-foot long inflow weir with an average height of 17.5 feet and an outfall structure consisting of a 24-inch pipe.

- Damage Center 12 – Located along Helotes Creek downstream of Braun Road. Two project alternatives were developed to reduce flooding in nearby residential and commercial areas. No model updates were required because it was confirmed that recent bridge upgrades to Braun Road were already incorporated into the preliminary DFIRM hydraulic model.
    - **Helotes Creek RSWF** – Designed as an off-channel detention pond and located west of Texas Highway 16 and Loop 1604 North. The potential site, a 48.5 acre pit, is part of a currently operational quarry but is no longer in use. The RSWF had a maximum storage capacity of approximately 3,330 acre-feet with minimum and maximum elevations at 890 feet and 968 feet, respectively. A 300-foot north-facing side flow weir at an elevation of 980 feet diverted high flows into the RSWF. The outfall structure consisted of a 100-foot weir at an elevation of 968 feet.[13]

[13] It should also be noted that without a drainage structure located at the flow line, pumping would be required to drain the RSWF after a flood event has occurred.

- **Helotes Creek at Braun Road NWWC** – Designed to remove the channel constriction downstream of Braun Road by widening the channel while minimizing disruption to the existing channel.

- Damage Center 13 – Located along Huebner Creek between Babcock Road and Eckhert Road. Two project alternatives were developed to reduce flooding in nearby residential areas.
  - **Huebner Creek RSWF at Prue Road (LC-15)** – Previously identified by the Bexar County Flood Control Program as an on-channel detention pond, located upstream of Prue Road. Project data was supplied by Bexar County from a July 2009 report entitled "The Reconstruction of Prue Road from Jade Heights to Woodwater Way."
  - **Huebner Creek at Eckhert Road NWWC** – Designed to widen the channel between Whitby Road and Eckhert Road.

- Damage Center 14 – Located along Huebner Creek between Bandera Road and Timberhill Drive. Two existing projects (developed by the Bexar County Flood Control CIP) were analyzed in order to determine their impacts on the surrounding neighborhood and further downstream. Model updates incorporated bridge upgrades to Timber Hill Road.
  - **Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)** – Bexar County Flood Control Project LC-17 project consisted of a NWWC between Bandera Road and Ingram Road. The proposed naturalized channel contains an earthen pilot channel. Property acquisition was required to implement the enhanced conveyance portion of the project. Additionally, the project included a flood protection barrier, located below Ingram Road at the confluence with Leon Creek (Damage Center 3B), to remove buildings along Loop 410 from the floodplain. The project was combined with proposed Bexar County Flood Control Project LC-8, including bridge upgrades to Ingram Road Low Water Crossing #58.

- Damage Center 15 – Located along Leon Creek upstream of Grissom Road. Two project alternatives were developed to reduce flooding in adjacent residential areas, with consideration for the nearby solid waste disposal site, located at the confluence of Leon Creek and Lower French Creek.
  - **Mainland RSWF** – Designed as an off-channel detention pond, located north of Bandera Road and Ebert Road. The RSWF required a maximum storage capacity of approximately 110 acre-feet with minimum and maximum elevations at 818 feet and 831 feet, respectively. It had a 1310-foot long inflow weir with an average height of 13 feet and an outfall structure consisting of a 24-inch pipe.
  - **Leon Creek at Grissom Road Enhanced Conveyance** – Designed to avoid disturbing the nearby solid waste disposal site. The enhanced conveyance project was designed to widen the channel, reduce the channel constriction, and implement a selective clearing program upstream. Concrete lining was required immediately upstream and downstream of the improved constriction area to prevent erosion.

- Damage Center 16 – Located along Culebra Creek upstream of FM 1560. Three project alternatives were developed to reduce flooding in the nearby Silver Oaks Subdivision. Model updates incorporated one LOMR, consisting of a bridge and fill related to Stillwater Ranch (Case No. 08-06-2311P, effective on 07/30/2009) west of Damage Center 16.
  - **Galm RSWF** – Designed as an on-channel detention pond, located east of Galm Road. The RSWF required a maximum storage capacity of approximately 725 acre-feet with minimum and maximum elevations at 923.75 feet and 939 feet, respectively. It had a staged weir outfall structure with two weir openings: the lower

opening, spanning 150 feet, was placed from grade level (923.75 feet) to a height of 12.75 feet; the upper opening, spanning 1,500 feet, was placed from a height of 12.75 to 15.25 feet.

- **Government Canyon Creek RSWF** – Designed as an on-channel detention pond along Government Canyon Creek and located within the Government Canyon State Natural Area. Data for this RSWF project, including stage-storage-discharge data, was obtained from a preliminary study by the City of San Antonio (CoSA).
- **Culebra Creek at FM 1560 Earthen Flood Protection Barrier** – Consisted of an earthen flood protection barrier located along the southwest side of the Silver Oaks Subdivision, parallel to the road Briarton Wells. The barrier was designed to prevent Culebra Creek flood waters from backing up in to the subdivision through its drainage depression and to meet FEMA design criteria for accredited levees. Runoff drainage from the subdivision was rerouted to an earthen ditch located between the flood barrier and the residential properties along Briarton Wells. If implemented, this alternative would require the development of an operation and maintenance plan in order to receive FEMA certification.

- Damage Center 17 – Located along Culebra Creek Tributary A in between Dover Ridge and Tezel Road. One project alternative was developed to reduce flooding in adjacent residential neighborhoods. Model updates incorporated upgrades and the realignment to Tezel Road according to the TXDOT Improvement Project CSJ 0915-12-299 & 300.
  - **Culebra Creek Tributary A at Tezel Road Enhanced Conveyance** – Increased flow area by widening the channel and increasing its side slope. Segments of the existing channel are concrete-lined and would remain concrete-lined. Additional concrete channel lining was used in combination with bridge upgrades and property acquisition to improve the LOFP for all bridge crossings within Damage Center 17. Bridge upgrades to Dover Ridge, Ridge Path and Timber Ranch included widening and lowering inverts of the culvert structures. Due to the required bridge widening, the project included property acquisition just upstream and downstream of the bridge crossings.

- Damage Center 18B – Located along Helotes Creek between Scenic Loop Road and the confluence of Los Reyes Creek and Helotes Creek. One project alternative was developed to reduce flooding of nearby residential and commercial structures.
  - **Helotes Creek at Bandera Road Enhanced Conveyance** – Increased conveyance by widening the channel and increasing its side slope. Channel excavation near Scenic Loop Road was minimized, while adding a segment of concrete lining between Bandera Road and Old Bandera Road to further improve the LOFP for nearby buildings.

4.4 Analysis of Impacts from Selected Individual Projects

To evaluate individual project impacts, each project was incorporated into the Corrected DFIRM hydrology model to determine its impact on peak flow rates downstream of the project area. The new peak flow rates were then applied to the Corrected DFIRM hydraulics model to calculate changes in water surface elevation, and the resulting floodplain was mapped in GIS in order to repeat the level of flood protection analysis as discussed in Section 3.0 of this report. Each project was assessed to determine its impact on buildings, roadway crossings, and roadway corridors, both locally and throughout the entire watershed. The following section discusses each step of the impact analysis in further detail.

4.4.1 Analysis of Hydrologic and Hydraulic Impacts

The hydrologic and hydraulic analyses were performed differently for each individual project depending on the project type. In most cases, it was necessary to modify the Corrected DFIRM hydrology model to incorporate the project's effects on peak flow rates.

For RSWF sites located at the upstream or downstream end of a sub-basin, a reservoir element was added to the hydrology model along an existing reach without affecting sub-basin elements. However, for RSWF sites located in the middle of sub-basins, it was necessary to divide the sub-basin elements in the model and recalculate the basin areas and times of concentration. Loss parameters (i.e., initial abstraction, runoff curve number, and percent impervious cover) were copied directly from the parent sub-basins. In addition, reach elements were divided, and the new storage-discharge values were calculated as a percentage of the parent reach storage-discharge data based on the relative length of each sub-reach.

Once appropriately positioned in the basin model, each RSWF was assigned stage-storage-discharge properties based on the design described in the previous section. This procedure varied according to whether the RSWF was on-channel or off-channel:

- **On-channel RSWFs:** The on-channel RSWFs were assigned stage-storage and storage-discharge tables based on the geometry of the proposed pond design. Additionally, on-channel reservoir elements in HEC-HMS were configured to receive flow directly from upstream reach or junction elements. For the Huebner Creek RSWF at Prue Road (LC-15), the hydrology model was modified using the stage-storage-discharge information from the LC-15 Updated Evaluation Report.

- **Off-channel RSWFs:** The off-channel RSWFs were assigned stage-storage and storage-discharge tables based on the geometry of the proposed pond design. Additionally, the off-channel reservoirs were each simulated in HEC-RAS using the unsteady state simulation option to determine the reservoir's specific side flow weir diversion function (i.e., relating channel flow rate to side flow weir flow rate).[14] Off-channel reservoir elements in HEC-HMS were configured to receive flow from separate diversion elements, based on the side flow weir design and diversion function.

For non-detention projects, an initial hydraulic analysis was required prior to incorporating storage-discharge tables in the hydrologic model. Upon developing new channel configurations in the Corrected DFIRM HEC-RAS models, routing storage functions were recalculated and assigned to the corresponding HEC-HMS reach element.

Each project was simulated in the modified Corrected HEC-HMS model to generate peak flow rates for the 10-, 50-, 100-, and 500-year existing storm events as well as for the 100-year future storm event. Simulations were also performed using the various rainfall distribution assumptions built into the DFIRM hydrology model. Flow rate results were generated without areal reduction factors as well as with areal reduction factors for storm areas of 10-, 25-, 50-, 100-, 175-, and 300-square miles. By interpolating between the resulting data points, specific areal reductions were then

[14] In order to increase model stability, the Corrected DFIRM HEC-RAS models were truncated to contain only cross sections between the HEC-HMS junctions immediately upstream and downstream of the reservoir. Additional cross sections were interpolated between these points within the HEC-RAS model using a maximum spacing of 150 feet.

applied to flows at each HEC-HMS junction based on the drainage areas at corresponding flow change locations.

Upon determining each project's peak flow rates, the new flows were then evaluated using one-dimensional hydraulic analysis in HEC-RAS.[15,16] For detention projects, hydraulic model flows were adjusted without making any changes to the model geometry. Non-detention projects were analyzed using modified flows in addition to the previously-developed geometry configurations.

Finally, after running the hydraulic analysis in HEC-RAS for each storm event, results were exported to GIS to map the new floodplain and assess building damages and roadway safety using the level of flood protection analysis as discussed in Section 3.0 of this report.

4.4.2 Analysis of Building Damages and Roadway Safety

Using GIS, new water surface elevation raster files were created from the HEC-RAS results, in order to estimate damages for each damage center based on the level of flood protection analysis. Damages were estimated for the primary damage center and all buildings located downstream. A summary of project impacts within primary damage centers for the 100-year existing storm event is shown in Table 4.4a. The table also includes estimated annual damages for the primary damage centers which are based on the estimated damages for each simulated storm event weighted by the probability of its occurrence. Detailed impact analysis summaries are presented in Appendix G.

Additionally, roadway crossings and corridors were re-evaluated using the transportation crossing and corridor analysis methods previously described in order to identify any potential effects from the proposed flood mitigation projects. As measured by LOFP values, impacts associated with roadway crossings and previously defined transportation corridor locations found within the primary damage center are also shown in Table 4.4a.

[15] Due to complex stream bank overflows at Babcock Road (Damage Center 7B) between Maverick Creek and Huesta Creek Tributary A, a two-dimensional hydraulic analysis may be beneficial to produce more accurate project impact results. For the purpose of this study, however, a one-dimensional analysis was used to manually balance overflow between Maverick Creek and Huesta Creek Tributary A. After calculating the direction and magnitude of the overflow, peak flow rates for each stream were manually adjusted to account for contributing spills.

[16] Detailed hydraulic analysis was not performed for Slick Ranch Creek because the majority of the floodplain within Damage Center 5A has been mapped as an approximate zone. Local impacts due to Havenbrook RSWF were assessed using a hydrologic analysis to broadly determine the RSWF's effects on lateral spill from Slick Ranch Creek into the adjacent subdivision.

Table 4.4a: Summary of Local Impacts for 100-Year Existing Storm Event

Project Name	Primary Damage Center	No. Buildings in Floodplain		No. Unsafe Roadway Crossings		No. Unsafe Roadway Corridors		Estimated Damages				Estimated Annual Damages			
		Existing	W. Alt.	Existing	W. Alt.	Existing	W. Alt.	Existing	W. Alt.	Reduction	% Reduction	Existing	W. Alt.	Reduction	% Reduction
Leon Creek at IH-10 NWWC	DC 1	38	36	5	5	1	1	$2,402,000	$2,284,000	-$118,000	-4.9%	$73,500	$70,500	-$3,000	-4.1%
Huebner Creek at Evers Road NWWC*	DC 2	108	26	5	4	0	0	$4,983,000	$1,083,000	-$3,900,000	-78.3%	$178,100	$61,800	-$116,300	-65.3%
Eckhert RSWF (Huebner Creek)		108	102	5	5	0	0	$4,983,000	$4,735,000	-$248,000	-5.0%	$178,100	$173,400	-$4,700	-2.6%
Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	DC 3	126	6	2	1	1	1	$11,443,000	$2,536,000	-$8,907,000	-77.8%	$237,000	$75,800	-$161,200	-68.0%
Culebra Creek NWWC with Culebra Road Bridge Improvements	DC 4	186	12	3	3	5	4	$10,649,000	$637,000	-$10,012,000	-94.0%	$233,300	$37,700	-$195,600	-83.8%
Easterling RSWF (Culebra Creek)		186	154	3	3	5	5	$10,649,000	$9,354,000	-$1,295,000	-12.2%	$233,300	$208,900	-$24,400	-10.5%
French Creek at Guilbeau Road NWWC	DC 6A&B	26	13	2	2	0	0	$1,880,000	$1,076,000	-$804,000	-42.8%	$45,400	$26,100	-$19,300	-42.5%
French Creek RSWF		26	16	2	2	0	0	$1,880,000	$1,394,000	-$486,000	-25.9%	$45,400	$34,700	-$10,700	-23.6%
Quarry at the Rim RSWF (Leon Creek)	DC 6C	28	27	1	1	0	0	$2,790,000	$2,705,000	-$85,000	-3.0%	$60,400	$58,900	-$1,500	-2.5%
Hausman Road Drainage Project Phase 1 (LC-9)*	DC 7A	35	13	2	0	0	0	$690,000	$444,000	-$246,000	-35.7%	$33,500	$19,000	-$14,500	-43.3%
Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	DC 7B	17	6	2	0	1	0	$897,000	$0	-$897,000	-100.0%	$22,600	$100	-$22,500	-99.6%
UTSA RSWF (Maverick Creek)		17	11	2	2	1	1	$897,000	$481,000	-$416,000	-46.4%	$22,600	$14,100	-$8,500	-37.6%
Braun RSWF (Helotes Creek)**	DC 11	0	0	0	0	0	0	0	0	$0	0.0%	$9,600	$9,600	$0	0.0%
Helotes Creek at Braun Road NWWC	DC 12	28	24	1	1	0	0	$448,000	$218,000	-$230,000	-51.3%	$19,200	$13,000	-$6,200	-32.3%
Helotes Creek RSWF		28	9	1	0	0	0	$448,000	$6,000	-$442,000	-98.7%	$19,200	$400	-$18,800	-97.9%
Huebner Creek at Eckhert Road NWWC	DC 13	38	12	2	1	0	0	$2,408,000	$1,398,000	-$1,010,000	-41.9%	$98,600	$64,800	-$33,800	-34.3%
Huebner Creek RSWF at Prue Road (LC-15)		38	19	2	1	0	0	$2,408,000	$1,511,000	-$897,000	-37.3%	$98,600	$57,300	-$41,300	-41.9%
Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)*	DC 14	99	15	1	1	0	0	$4,145,000	$198,000	-$3,947,000	-95.2%	$221,500	$5,600	-$215,900	-97.5%
Leon Creek at Grissom Road Enhanced Conveyance	DC 15	87	0	0	0	1	1	$4,190,000	$0	-$4,190,000	-100.0%	$103,300	$5,000	-$98,300	-95.2%
Mainland RSWF (Leon Creek)		87	84	0	0	1	0	$4,190,000	$3,849,000	-$341,000	-8.1%	$103,300	$100,100	-$3,200	-3.1%
Culebra Creek at FM 1560 Earthen Flood Protection Barrier	DC 16	41	2	1	1	0	0	$3,114,000	$162,000	-$2,952,000	-94.8%	$108,300	$17,000	-$91,300	-84.3%
Galm RSWF (Culebra Creek)		41	38	1	1	0	0	$3,114,000	$2,904,000	-$210,000	-6.7%	$108,300	$103,300	-$5,000	-4.6%
Government Canyon Creek RSWF (Culebra Creek)		41	0	1	1	0	0	$6,806,000	$2,598,000	-$4,208,000	-61.8%	$108,300	$5,200	-$103,100	-95.2%
Culebra Creek Tributary A at Tezel Road Enhanced Conveyance*	DC 17	17	5	3	0	1	0	$1,430,000	$641,000	-$789,000	-55.2%	$38,100	$19,400	-$18,700	-49.1%
Helotes Creek at Bandera Road Enhanced Conveyance	DC 18B	24	16	4	3	1	1	$1,077,000	$928,000	-$149,000	-13.8%	$43,100	$29,600	-$13,500	-31.3%

Note: Havenbrook RSWF was evaluated for downstream impacts only (detailed local impacts not calculated).

*Results account for proposed property acquisition

**Results do not account for flooding associated with 500-year existing and 100-year future storm events.

4.5 Opinion of Probable Construction Costs for Selected Projects

Planning-level opinion of probable construction costs were developed for all flood mitigation projects evaluated in this study. Estimates included detailed construction costs associated with all project types, general construction costs, and property and land acquisition costs. In this study, potential utility relocation costs were not included due to insufficient detailed information. The development of project opinion of probable construction costs is described in Appendix H.

Cost estimate totals are shown in Table 4.5a, and cost summaries are included on typical section exhibits in Appendix G.

The Flood Reduction Ratio (FRR) was calculated by estimating a project's present value of benefits over a 50-year project life, assuming an interest rate equal to the current federal interest rate (2 percent). The FRR is defined by the project's estimate annual damage reductions over the annual payment of the opinion of probable construction costs over the specified project life. The FRR refers to a project's ability to provide future savings in the form of flood damage reductions throughout the entire watershed. The FRR calculation does not ascribe any value to averting the loss of life, vehicle damage, infrastructure damage, or rescue operations, nor does it account for the value of potential environmental benefits, multi-use opportunities, or for the savings generated by improving conditions at existing bridges or roadways.

Table 4.5a: Project Cost Estimates

Damage Center	Project Name	Estimated Cost	Flood Reduction Ratio
1	Leon Creek at IH-10 NWWC	$30,527,000	0.03
2	Eckhert RSWF	$19,402,000	0.01
2	Huebner Creek at Evers Road NWWC	$18,119,000	0.18
3	Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	$27,685,000	0.19
4	Easterling RSWF	$60,645,000	0.04
4	Culebra Creek NWWC with Culebra Road Bridge Improvements	$23,660,000	0.22
5A	Havenbrook RSWF	$34,694,000	n/a[a]
6A&B	French Creek RSWF	$16,955,000	0.09
6A&B	French Creek at Guilbeau Road NWWC	$6,865,000	0.12
6C	Quarry at the Rim RSWF	$2,800,000[b]	0.14
7A	Hausman Road Drainage Project Phase I (LC-9)	$6,143,000[c]	0.09
7B	UTSA RSWF	$29,348,000	0.01
7B	Maverick Creek at W Hausman Road NWWC with W Hausman Road Bridge Improvements (LC-10)	$11,389,000	0.07
11	Braun RSWF	$23,199,000	0.02
12	Helotes Creek RSWF	$4,707,000	1.71
12	Helotes Creek at Braun Road NWWC	$429,000	1.49
13	Huebner Creek at Eckhert Road NWWC	$2,436,000	0.30
13	Huebner Creek RSWF at Prue Road (LC-15)	$1,216,000[d]	2.81
14	Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)	$39,160,000[e]	0.21
15	Mainland RSWF	$17,271,000	0.01
15	Leon Creek at Grissom Road Enhanced Conveyance	$20,215,000	0.17
16	Galm RSWF	$25,644,000	0.07
16	Government Canyon Creek RSWF	$19,559,000	0.53
16	Culebra Creek at FM 1560 Earthen Flood Protection Barrier	$312,000	9.60
17	Culebra Creek Tributary A at Tezel Road Enhanced Conveyance	$6,790,000	0.10
18B	Helotes Creek at Bandera Road Enhanced Conveyance	$2,158,000	-0.46

[a]Damage reductions not calculated for Havenbrook RSWF (detailed local impacts not evaluated).
[b]Based on limited information received from the City of San Antonio (June 2006)
[c]Source: Bexar County Flood Control – Huebner Creek NWWC LC-9 (June 2009)
[d]Source: Bexar County Flood Control – Huebner Creek RSWF at Prue Road LC-15 (July 27, 2009)
[e]Source: Bexar County Flood Control – Huebner Creek NWWC LC-17 (June 5, 2009) and Leon Creek Bridge Improvements LC-8 LWC #58 (May 1, 2009)

4.6 Regulatory Analysis

This section provides a preliminary scoping-level assessment of potential environmental regulatory requirements for the individual projects. More information is provided in Appendix I. Regulatory requirements may change with time as more detailed project designs are produced or as regulations change. During project design phases, environmental planners should be involved to ensure that appropriate regulatory requirements are addressed for each project site.

4.6.1 Regulatory Analysis Methodology

Investigations were completed for each project in order to document existing environmental conditions and applicable regulatory requirements. Field staff conducted a desktop analysis including using GIS software, 2008 aerial photography and the environmental constraints data collected for LCWMP Phase 1 and Phase 2 including:

- U.S. Fish and Wildlife Service (USFWS) karst zone map,
- USFWS National Wetland Inventory maps,
- U.S. Geological Survey (USGS) topographic maps,
- Texas Commission on Environmental Quality (TCEQ) Edwards Aquifer recharge and contributing zone maps,
- Texas Parks and Wildlife Department (TPWD) Natural Diversity Database (NDD), and
- USFWS critical habitat areas.

Upon completion of the desktop analysis, windshield surveys and site visits were conducted for 22 of the 26 projects. Windshield surveys were not performed for Government Canyon Creek RSWF or the Quarry at the Rim RSWF due to site access limitations. Windshield surveys were not performed for Hausman Road Drainage Project Phase 1 (LC-9) or Huebner Creek at Bandera Road NWWC (LC-17) because the information was available in the project data.

Windshield surveys entailed accessing the project sites on foot where possible and estimating the Ordinary High Water Mark (OHWM) using a non-survey grade GPS unit. Photographs with GPS locations were documented for each project along with various reconnaissance data. For each damage center, information was collected regarding site vegetation, adjacent land uses, habitat potential for Golden-cheeked Warblers and Black-capped Vireos, the presence of heritage trees, or the presence of hazardous materials, as related to a Phase 1 Environmental Site Assessment (ESA). Appendix I includes all data sheets and photographs for each damage center and a narrative of each site and its vegetation.

4.6.2 Regulatory Analysis Requirements

Results from the desktop analysis and field investigations were assessed to determine the regulatory requirements needed to implement the selected projects. Table 4.6a presents the applicable regulatory requirements and the agency that authorizes them. Appendix I presents detailed descriptions of the regulatory requirements. Table 4.6b summarizes the results for the selected projects.

Table 4.6a: Regulatory Requirements and Authorizing Agencies

Regulatory Requirements	Comment	Agency
Waters of the US	Jurisdictional Determination (JD) is required to identify Waters of the US.	U.S. Army Corps of Engineers
Section 404 of the Clean Water Act	Depending on the nature of the activity, a project might qualify for a Nationwide Permit (NWP) which would require Pre-Construction Notification (PCN). Otherwise an Individual Permit (IP) is required.	U.S. Army Corps of Engineers
Section 401 of the Clean Water Act	Tier I or Tier II Certification is required depending on the nature of the activity/disturbance.	Texas Commission on Environmental Quality
Endangered Bird Habitat	Threatened and Endangered Species Assessment would be required if potential habitat is observed in the project area.	U.S. Fish and Wildlife Service
Karst Terrain Features Survey	A survey would be required if the project is located within Karst Zone 1, 2, 3, or 4.	U.S. Fish and Wildlife Service
Texas Pollutant Discharge Elimination System	General Construction Permit (GCP) is required for construction activities.	Texas Commission on Environmental Quality
Section 303(d) of the Clean Water Act	List identifies waters for which associated pollutants are suitable for measurement by maximum daily load. This information is typically presented in other regulatory requirements (Section 401 Certification).	Texas Commission on Environmental Quality
Section 106 of the National Historic Preservation Act	Cultural Resources Assessment	U.S. Army Corps of Engineers and Texas Historical Commission
The Antiquities Code of Texas	Archaeology and/or Standing Structures Assessment	Texas Historical Commission
Water Pollution Abatement Plan(WPAP)/Contributing Zone Plan (CZP)	WPAP if located within Edwards Aquifer Recharge Zone/CZP if located within Edwards Aquifer Contributing Zone	Texas Commission on Environmental Quality
Tree Ordinance	Tree Survey	City of San Antonio
Phase 1 Environmental Site Assessment (ESA)	A Phase I ESA includes record search for potential spills, underground storage tanks, hazardous waste sites, and other potential contamination items.	Not applicable – Due Diligence

Table 4.6b: Potential Environmental Regulatory Requirements

Damage Center	Project Location	Waters of the U.S.	Section 404 of CWA	Section 401 Certification, Tier I or II	Endangered Bird Habitat	Karst Terrain Features Survey (Zones 1,2,3 and 4)	TPDES GCP	303(d) Listed Waters	Coordination with THC for Historic Evaluation	Coordination with THC for Archaeological Compliance	WPAP/CZP	CoSA Tree Ordinance	Phase 1 ESA
DC 1	Leon Creek at IH-10 NWWC	JD	IP	Yes – Tier II	Low Potential	Yes – Zone 3	Yes	No	Yes	Yes	CZP	Tree Survey	Yes
DC 2	Huebner Creek at Evers Road NWWC	JD	Potential NWP 27 (IP Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
	Eckhert RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	Segment 1906 Lower Leon Creek	No	Yes	No	Tree Survey	Yes
DC 3	Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	JD	IP	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
DC 4	Culebra Creek NWWC with Culebra Road Bridge Improvements	JD	IP	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
	Easterling RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	No	Yes	No	Tree Survey	Yes
DC 5A	Havenbrook RSWF	JD*	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	No – Zone 5	Yes	Segment 1906 Lower Leon Creek	No	Yes	No	Tree Survey	Yes
DC 6A&B	French Creek RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 2	Yes	No	No	Yes	WPAP	Tree Survey	Yes
	French Creek at Guilbeau Road NWWC	JD	Potential NWP 27 (IP Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
DC 6C	Quarry at the Rim RSWF**	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 2	Yes	No	No	Yes	WPAP	Tree Survey	Yes
DC 7A	Hausman Road Drainage Project Phase 1 (LC-9)**	JD	Potential NWP 27 (IP Required)	Yes – Tier II	Not Likely	Yes – Zone 2	Yes	No	No	Yes	WPAP	Tree Survey	Yes
DC 7B	Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	JD*	IP	Yes – Tier I	Not Likely	Yes – Zone 2	Yes	No	Yes	Yes	WPAP	Tree Survey	Yes
	UTSA RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 2	Yes	No	No	Yes	WPAP	Tree Survey	Yes
DC 11	Braun RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	No	Yes	No	Tree Survey	Yes
DC 12	Helotes Creek at Braun Road NWWC	JD	IP	Yes – Tier I	Low Potential	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
	Helotes Creek RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	No	Yes	WPAP	Tree Survey	Yes
DC 13	Huebner Creek at Eckhert Road NWWC	JD	IP	Yes – Tier I	Not Likely	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
	Huebner Creek RSWF at Prue Road (LC-15)	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Potential – Zone 3	Yes	No	No	Yes	No	Tree Survey	No
DC 14	Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)**	JD	IP	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	Segment 1906 Lower Leon Creek	No	Yes	No	Tree Survey	Yes
DC 15	Leon Creek at Grissom Road Enhanced Conveyance	JD	IP	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	Segment 1906 Lower Leon Creek	Yes	Yes	No	Tree Survey	Yes
	Mainland RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	Segment 1906 Lower Leon Creek	No	Yes	No	Tree Survey	Yes
DC 16	Culebra Creek at FM 1560 Earthen Flood Protection Barrier	JD	IP	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
	Galm RSWF	JD	NWP 43 (PCN Required)	Yes – Tier II	Potential	Yes – Zone 3	Yes	No	No	Yes	No	Tree Survey	Yes
	Government Canyon Creek RSWF**	JD	NWP 43 (PCN Required)	Yes – Tier II	Potential	Yes – Zone 1 & 2	Yes	No	No	Yes	WPAP	Tree Survey	No
DC 17	Culebra Creek Tributary A at Tezel Road Enhanced Conveyance	JD	Potential NWP 27 (IP Required)	Yes – Tier II	Not Likely	Yes – Zone 3	Yes	No	Yes	Yes	No	Tree Survey	Yes
DC 18B	Helotes Creek at Bandera Road Enhanced Conveyance	JD	IP	Yes – Tier I	High Potential	Yes – Zone 3	Yes	No	Yes	Yes	CZP	Tree Survey	Yes

*Potential wetlands area
**These were previously identified projects. The information shown is based on a desktop analysis and existing project information; no site visit was performed.

4.7 Multi-use Objective Analysis

Potential multi-use objectives were identified by coordinating with environmental planners and reviewing example projects, including projects by the Harris County Flood Control District which in the past has actively pursued multi-use projects in highly urbanized watersheds. Based on this coordination, a list of multi-use objectives was created along with qualitative metrics used to evaluate the multi-use potential of each project. The LCWMP examined the applicability of the following multi-uses:

- Mountain Bike and Walking Trails
- Equestrian Trails
- Riparian and Wetland Enhancements
- Outdoor Learning and Interpretive Sites
- Sports Fields
- Picnic Areas
- Nature Preserves
- Fishing Ponds
- Wet Bottom Water Quality Ponds
- Dog Parks
- Temporary Parking

In most cases, a project's suitability for multi-use opportunities depends on its compatibility with the surrounding land use (e.g., a park accessible to nearby residential communities is more suitable than a park surrounded by industrial activity). These spatial factors were assessed using a desktop analysis with GIS. Additionally, multi-use potential is frequently determined based on nearby tree canopy cover and native vegetation; these criteria were assessed by biologists during site reconnaissance.

Multi-use opportunities for each project are summarized in the Individual Project Summaries included in Appendix G. Furthermore, detailed multi-use data sheets in Appendix I present a preliminary suitability evaluation for each project site.

An assessment of the selected projects concluded the majority had some potential for multi-uses such as trails, picnic areas, outdoor learning and interpretive sites, fishing ponds, and dog parks. However, the following projects provided high potential for more than one of the multi-uses evaluated:

- French Creek at Guilbeau Road NWWC
    - Highly suitable for sports fields and could provide connectivity between Nani Falcone Park and a future city park between Guilbeau Road and Mainland Drive.
- Huebner Creek at Bandera Road NWWC(LC-17) and Ingram Road Bridge Improvements (LC-8)
    - Highly suitable for the majority of multi-uses evaluated in this study.

- Leon Creek at Grissom Road Enhanced Conveyance
    - Highly suitable for linear connectivity for Leon Creek Greenway North Park, riparian and wetland enhancement, and natural preserves.
- Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)
    - Highly suitable for linear connectivity between the University of Texas San Antonio (UTSA) and nearby parks.
- UTSA RSWF
    - Highly suitable for the majority of multi-uses evaluated in this study.

4.8 Project Combinations, Optimization, and Phasing

In many cases, one individual project did not produce the necessary flood reduction or caused adverse impacts downstream; therefore, several project combinations were developed to effectively reduce flood risk in all damage centers while eliminating adverse impacts downstream. Additionally, project optimization and phasing were evaluated in order to maximize benefits throughout the Leon Creek watershed.

4.8.1 Methodology

Project combinations were developed to create opportunities to reduce project sizing and construction costs and to eliminate any negative downstream impacts caused by individual projects. From the selected projects described in previous sections, at least one combination was developed for each major tributary within Leon Creek Watershed. In some cases, several combinations were assessed for certain tributaries as well as combinations over multiple tributaries.

Project optimization was determined based on the impact to water surface elevations and downstream peak flow rates of each combination when compared to the impacts of each individual project included in the combination. As a general rule of thumb, if the combined projects resulted in an additional water surface elevation reduction of greater than one foot with no measurable additional flood risk reduction when compared with the individual project impacts, optimization opportunities were evaluated. All projects included in the combination were considered for downsizing to achieve similar LOFP results as the individual projects themselves (i.e., an optimized NWWC project downstream of the RSWF created a similar flood protection as the NWWC project alone). In general, it was more cost effective to optimize NWWC projects than selected RSWF projects.

Construction phasing was also considered during the project combination evaluation. Peak flow rates for each individual project within the combinations, as well as downstream of the combination itself were compared to the corrected DFIRM condition (base condition). Documented changes in peak flow rates at key locations within Leon Creek watershed were used to develop recommended phasing for each major tributary.

4.8.2 Project Combination Descriptions

Table 4.8a provides a description about each developed project combination and its individual project components. These combinations were analyzed to determine Level of Flood Protection (LOFP), annual damage reductions (ADR), cost reductions, and flood reduction ratios (FRR). Results are presented in Table 4.8b, and exhibits can be found in Appendix G.

Table 4.8a: Overview of Project Combinations

Project Combination	Individual Project Components	Description
French Combination	1. French Creek RSWF 2. French Creek at Guilbeau Road NWWC	Combination included all individual projects along French Creek.
Maverick Combination	1. UTSA RSWF 2. Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	Combination included all individual projects along Maverick Creek.
Huebner Combination	1. Huebner Creek at Prue Road (LC-15) 2. Huebner Creek at Evers Road NWWC 3. Huebner Creek at Eckhert Road NWWC 4. Huebner Creek at Bandera Road NWWC(LC-17) and Ingram Road Bridge Improvements (LC-8)	Combination developed to reduce annual flood damages along Huebner Creek within Damage Centers 2, 13, and 14, eliminating negative downstream impacts caused by projects individually. Construction phasing was also examined.
Helotes Combination	1. Helotes Creek RSWF 2. Helotes Creek at Braun Road NWWC	Combination included only projects along Helotes Creek that provided beneficial flood risk reduction impacts when analyzed individually.
Culebra Combination A	1. Government Canyon Creek RSWF 2. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination included two most beneficial projects to provide flood risk reduction and eliminate negative downstream impacts caused by the NWWC project.
Culebra Combination B	1. Easterling RSWF 2. Culebra Creek at FM 1560 Earthen Flood Protection Barrier 3. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination developed to reduce annual flood damages along Culebra Creek within Damage Centers 4 and 16 and eliminate negative downstream impacts caused by the NWWC project as an alternative to implementing Government Canyon Creek RSWF.
Helotes/Culebra Combination A	1. Helotes Creek RSWF 2. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination included most beneficial projects on Helotes and Culebra Creeks, excluding Government Canyon Creek RSWF to provide flood risk reduction and eliminate negative downstream impacts caused by the NWWC project.
Helotes/Culebra Combination B	1. Helotes Creek RSWF 2. Government Canyon Creek RSWF 3. Culebra Creek NWWC with Culebra Road Bridge Improvements	Combination included most beneficial projects on Helotes and Culebra Creeks to provide flood risk reduction and eliminate negative downstream impacts caused by the NWWC project.
Leon Combination	1. Quarry at the Rim RSWF 2. Leon Creek at Grissom Road Enhanced Conveyance 3. Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	Combination developed to evaluate impacts on main stem Leon Creek independently of selected projects on contributing creeks.
Helotes/Culebra/Leon Combination A	1. Helotes Creek RSWF 2. Culebra Creek NWWC with Culebra Road Bridge Improvements 3. Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	Combination developed as a continuation of Helotes/Culebra Combination A to identify the necessary flood mitigation projects on Lower Leon Creek downstream of the Culebra Creek confluence.
Helotes/Culebra/Leon Combination B	1. Helotes Creek RSWF 2. Government Canyon Creek RSWF 3. Culebra Creek NWWC with Culebra Road Bridge Improvements 4. Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	Combination developed as a continuation of Helotes/Culebra Combination B to identify the necessary flood mitigation projects on Lower Leon Creek downstream of the Culebra Creek confluence.
Leon Watershed Combination	All Recommended Projects	Combination developed to determine impacts of implementing all recommended projects and aid in developing the recommended construction phasing.

Table 4.8b: Detailed Summary of Project Combinations

Project Combination	Primary and Downstream DCs	Individual Project Components	Individual Project Costs	Individual Project ADR*	Individual FRR	Total Cost	Combination ADR*	Combination FRR	Reasons for Project Optimization/Removal, Results/Recommendations
French Combination	French(6A&B,8) Leon(15,3,5B,10)	French RSWF French Creek at Guilbeau Road NWWC	$17.0 mil $6.9 mil	-$48,500 -$26,600	0.09 0.12	$23.9 mil	-$67,300	0.09	Combining French RSWF with the NWWC at Guilbeau Road provided additional local benefits. However, the NWWC alone provides the necessary protection through DC 6A and does not have negative downstream impacts.
Maverick Combination	Maverick(7B) Leon(6C,15,3,5B,10)	UTSA RSWF Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	$29.3 mil $11.4 mil	-$9,700 -$26,100	0.01 0.07	$40.7 mil	-$27,100	0.02	Combining UTSA RSWF with Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10) provided minimal additional benefits through DC 6C and DC 15. However, the NWWC project alone provides the necessary protection and does not have negative downstream impacts.
Huebner Combination	Huebner(13,2,14) Leon(3,5B,10)	Huebner Creek RSWF at Prue Road (LC-15) Huebner Creek at Evers Road NWWC *Huebner Creek at Eckhert Road NWWC (Optimized)* Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)	$1.2 mil $18.1 mil *$2.4 mil* $39.2 mil	-$108,800 -$106,000 *-$23,200* -$258,100	2.81 0.18 *0.30* 0.21	$60.9 mil – $0.3 mil $60.6 mil	-$445,300	0.23	When considered individually, Huebner Creek at Evers Road NWWC, Huebner Creek at Eckhert Road NWWC and Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8) each cause negative downstream impacts on Huebner Creek but have no impacts on Leon Creek. Moreover, combining these individual projects with either Eckhert RSWF or Huebner Creek RSWF (LC-15) did not provide adequate reduction to eliminate peak flow increases on Huebner Creek. Negative downstream impacts may be mitigated instead by combining the NWWC projects and implementing them in the correct project phasing order. Additionally, while the combination did not require an RSWF project for mitigating impacts, the addition of Huebner Creek RSWF at Prue Road (LC-15) did allow Huebner Creek at Eckhert Road NWWC to be downsized. The optimized combination enabled the bottom width of Huebner Creek at Eckhert Road NWWC to be shortened from 250 feet to 175 feet between Whitby Road and 300 feet downstream of the crossing. This modification reduced the required excavation volume by nearly 12,000 cubic yards and resulted in a cost reduction of $0.3 million.
Helotes Combination	Helotes(12, 11) Culebra(4) Leon(3,5B,10)	Helotes Creek RSWF *Helotes Creek at Braun Road NWWC (Eliminated)*	$4.7 mil *$0.4 mil*	-$256,200 *-$20,400*	1.71 *1.49*	$5.1 mil – $0.4 mil $4.7 mil	-$256,200	1.71	When implementing both Helotes Creek RSWF and Helotes Creek at Braun Road NWWC in combination, the RSWF must be designed to reduce peak flow rates by at least 400 cfs to eliminate negative downstream impacts. However, Helotes Creek RSWF by itself provided an additional 4.5 feet in WSEL reductions at DC 12, eliminating the need for the NWWC project in combination. In fact, Helotes Creek RSWF also has a significant influence on areas downstream, and limiting the design to satisfy localized issues would not be cost effective.
Culebra Combination A	Culebra(4,16) Leon(3,5B,10)	Government Canyon Creek RSWF *Culebra Creek NWWC with Culebra Road Bridge Improvements (Optimized)*	$19.6 mil *$23.7 mil*	-$330,400 *$169,000*	0.53 *0.22*	$43.3 mil – $10.0 mil $33.3 mil	-$401,800	0.38	Government Canyon Creek RSWF provided an additional 4 feet in WSEL reductions at DC 4, allowing Culebra Creek NWWC with Culebra Road Bridge Improvements to be downsized. The optimized combination eliminated the need for bridge improvements at Culebra Road and for channelization upstream of Culebra Road. These modifications together reduced the channel's required excavation volume by nearly 116,000 cubic yards and resulted in a combined cost reduction of approximately $10.0 million. In addition, Government Canyon Creek RSWF sufficiently reduced the negative downstream impacts produced by Culebra Creek Optimized NWWC. In the event that Culebra Creek NWWC with Culebra Road Bridge Improvements is implemented before Government Canyon Creek RSWF, the RSWF also reduces negative downstream impacts of the non-optimized NWWC. Alternatively, optimizing Government Canyon Creek RSWF to achieve similar cost reductions to Culebra Creek Optimized NWWC would require the removal of a significant amount of concrete spillway and would be less cost effective than optimizing the NWWC.
Culebra Combination B	Culebra(4,16) Leon(3,5B,10)	Culebra Creek at FM 1560 Earthen FPB Easterling RSWF Culebra Creek NWWC with Culebra Road Bridge Improvements	$0.3 mil $60.6 mil $23.7 mil	-$95,200 -$85,400 -$169,000	9.60 0.04 0.22	$84.6 mil	-$333,600	0.12	When considered individually, neither Easterling RSWF nor Galm RSWF provides the necessary level of flood protection along Culebra Creek. However, combining Easterling RSWF with Culebra Creek at FM 1560 Earthen FPB and Culebra Creek NWWC with Culebra Road Bridge Improvements provides the necessary reduction in peak flows to eliminate any negative downstream impacts (except for the 500-year event). Galm RSWF was considered as an alternative to Easterling RSWF in combination, but it did not have sufficient peak flow reductions to mitigate downstream impacts along Culebra Creek for any storm event.
Helotes/Culebra Combination A	Helotes(12, 11) Culebra(4) Leon(3,5B,10)	Helotes Creek RSWF *Culebra Creek NWWC with Culebra Road Bridge Improvements (Optimized)*	$4.7 mil *$23.7 mil*	-$256,200 *-$169,000*	1.71 *0.22*	$28.4 mil – $10.0 mil $18.4 mil	-$328,300	0.57	Helotes Creek RSWF provided an additional 4 feet in WSEL reductions at DC 4, allowing Culebra Creek NWWC with Culebra Road Bridge Improvements to be downsized. The optimized combination eliminated the need for bridge improvements at Culebra Road and for channelization upstream of Culebra Road. These modifications together reduced the channel's required excavation volume by nearly 116,000 cubic yards and resulted in a combined cost reduction of approximately $10.0 million. In addition, Helotes Creek RSWF sufficiently reduced the negative downstream impacts produced by Culebra Creek Optimized NWWC. In the event that Culebra Creek NWWC with Culebra Road Bridge Improvements is implemented before Helotes Creek RSWF, the RSWF also reduces negative downstream impacts of the non-optimized NWWC. Furthermore, because the cost savings of Culebra Creek Optimized NWWC exceed the total cost of Helotes Creek RSWF, it is impossible to produce similar cost reductions by optimizing the RSWF project alone.
Helotes/Culebra Combination B	Helotes(12, 11) Culebra(4,16) Leon(3,5B,10)	Government Canyon Creek RSWF Helotes Creek RSWF *Culebra Creek NWWC with Culebra Road Bridge Improvements (Replaced with Selective Clearing)*	$19.6 mil $4.7 mil *$23.7 mil*	-$330,400 -$256,200 *-$169,000*	0.53 1.71 *0.22*	$48.0 mil – $23.6 mil $24.4 mil	-$523,300	0.67	Combining Government Canyon Creek RSWF and Helotes Creek RSWF provided WSEL reductions similar to the effects of implementing Culebra Creek NWWC with Culebra Road Bridge Improvements individually. Utilizing both RSWFs eliminated the need for Culebra Creek NWWC with Culebra Road Bridge Improvements, which was replaced instead with Culebra Creek at Timber Path Optimized Selective Clearing Program. This modification resulted in a cost reduction of $23.6 million.

Table 4.8b (Continued): Detailed Summary of Project Combinations

Project Combination	Primary and Downstream DCs	Individual Project Components	Individual Project Costs	Individual Project ADR*	Individual FRR	Total Cost	Combination ADR*	Combination FRR	Reasons for Project Optimization/Removal, Results/Recommendations
Leon Combination	Leon(6C,15,3,5B,10)	Quarry at the Rim RSWF	$2.8 mil	-$12,000	0.14	$50.7 mil	-$267,900	0.17	The Quarry at the Rim RSWF causes an increase in peak flow rates at the confluence with French Creek and provides insufficient peak flow rate reductions at the confluence with Culebra Creek to eliminate increases caused by implementing Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17). Therefore, the Quarry at the Rim RSWF provides no benefit in combination, and implementing Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17) will require additional projects in combination to eliminate negative downstream impacts.
		Leon Creek at Grissom Road Enhanced Conveyance	$20.2 mil	-$107,500	0.17				
		Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17)	$27.7 mil	-$164,200	0.19				
Helotes/Culebra/ Leon Combination A	Helotes(12, 11) Culebra(4) Leon(3,5B,10)	Helotes Creek RSWF	$4.7 mil	-$256,200	1.71	$56.1 mil – $10.0 mil $46.1 mil	-$440,200	0.30	Helotes Creek RSWF provided an additional 4 feet in WSEL reductions at DC 4, allowing Culebra Creek NWWC with Culebra Road Bridge Improvements to be downsized. The optimized combination eliminated the need for bridge improvements at Culebra Road and for channelization upstream of Culebra Road. These modifications together reduced the channel's required excavation volume by nearly 116,000 cubic yards and resulted in a combined cost reduction of approximately $10.0 million. In addition, Helotes Creek RSWF sufficiently reduced the negative downstream impacts produced by Culebra Creek Optimized NWWC as well as Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17), although the impacts of the RSWF were insufficient to allow for LC-8 or LC-17 to be optimized. Furthermore, because the cost savings of Culebra Creek Optimized NWWC exceed the total cost of Helotes Creek RSWF, it is impossible to produce similar cost reductions by optimizing the RSWF project alone.
		Culebra Creek NWWC with Culebra Road Bridge Improvements (Optimized)	*$23.7 mil*	*-$169,000*	*0.22*				
		Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17)	$27.7 mil	-$164,200	0.19				
Helotes/Culebra/ Leon Combination B	Helotes(12, 11) Culebra(4,16) Leon(3,5B,10)	Government Canyon Creek RSWF	$19.6 mil	-$330,400	0.53	$75.7 mil – $38.2 mil $37.5 mil	-$576,500	0.48	Combining Government Canyon Creek RSWF and Helotes Creek RSWF provided WSEL reductions similar to the effects of implementing Culebra Creek NWWC with Culebra Road Bridge Improvements individually, along with Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17). Utilizing both RSWFs eliminated the need for Culebra Creek NWWC with Culebra Road Bridge Improvements, which was replaced instead with Culebra Creek at Timber Path Optimized Selective Clearing Program. This modification resulted in a cost reduction of $23.6 million. In addition, the combination eliminated the need for Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17), which was replaced instead with Leon Creek Optimized Selective Clearing Program with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17). This modification resulted in a cost reduction of $14.6 million (for a total cost reduction of $38.2 million).
		Helotes Creek RSWF	$4.7 mil	-$249,600	1.71				
		Culebra Creek NWWC with Culebra Road Bridge Improvements (Replaced with Selective Clearing)	*$23.7 mil*	*-$169,000*	*0.22*				
		Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek FPB (LC-17) (Replaced with Selective Clearing)	*$27.7 mil*	*-$164,200*	*0.19*				
Leon Watershed Combination	All Damage Centers	Various**	-	-	-	$140 mil	-$1,165,300	0.26	All recommended individual projects were combined to be included in the Leon Creek Watershed Master Plan. Recommended projects will be discussed further in Section 4.9 (Recommended Project Configurations). See Leon Creek Watershed Summary Sheet in Appendix G for additional information.

Italicized Projects: Project optimized, replaced, or eliminated during the project combination analysis.

*NOTE: Existing Total Annual Damages estimated at **$2,884,000**

**Projects included in Leon Creek watershed:

- Culebra Creek at Timber Path Optimized Selective Clearing Program
- Culebra Creek Tributary A at Tezel Road Enhanced Conveyance
- French Creek at Guilbeau Road NWWC
- Government Canyon Creek RSWF
- Hausman Road Drainage Project Phase I LC-9
- Helotes Creek RSWF
- Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)
- Huebner Creek at Eckhert Road Optimized NWWC
- Huebner Creek at Evers Road NWWC
- Huebner Creek at Prue Road RSWF LC-15
- Leon Creek at Grissom Road Enhanced Conveyance
- Leon Creek at Optimized Selective Clearing Program with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)
- Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)

Table 4.8b Abbreviation Key:
ADR: Annual Damage Reductions
DC: Damage Center
FPB: Flood Protection Barrier
NWWC: Natural Waterway Conveyance
RSWF: Regional Storm Water Facility
LC-#: Bexar County Flood Control Project
WSEL: Water Surface Elevations

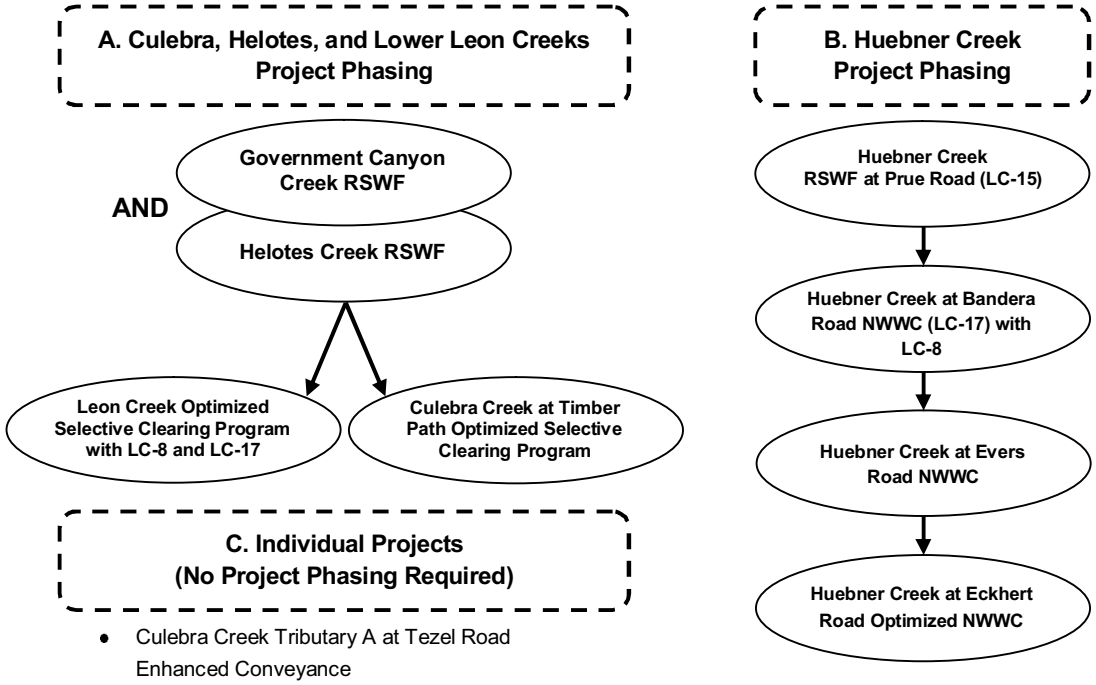
4.8.3 Project Phasing

Select projects required a specific construction phasing order to be used effectively. In order to mitigate negative downstream impacts due to Culebra Creek NWWC with Culebra Road Bridge Improvements, one of three detention projects – Government Canyon Creek RSWF, Helotes Creek RSWF, or Easterling RSWF if Government Canyon Creek RSWF and Helotes Creek RSWF are not selected – must first be implemented. Alternatively, both Government Canyon Creek RSWF and Helotes Creek RSWF are requisite both to optimize Culebra Creek NWWC at Culebra Road or Leon Creek NWWC at Ingram Road using selective clearing and to minimize downstream project impacts (Figure 4.8a).

Huebner Creek has negligible impacts on lower Leon Creek but is driven by local impacts and not adjacent tributaries. Projects implemented on Huebner Creek should be phased for construction to avoid any local negative impacts, starting with Huebner Creek RSWF at Prue Road (LC-15) and then the project furthest downstream, working gradually upstream (Figure 4.8b).

Several projects have no impact on Lower Leon Creek below the confluence of Culebra and Leon Creeks and may be implemented independently of all other projects. These projects include French Creek at Guilbeau Road NWWC, Hausman Road Drainage Project Phase I (LC-9) on Huesta Creek, Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10), Leon Creek at Grissom Road Enhanced Conveyance and Culebra Creek Tributary A at Tezel Road Enhanced Conveyance (Figure 4.8c).

Figure 4.8a-4.8c: Recommended Project Phasing



4.9 Recommended Project Configurations

4.9.1 Evaluation of Projects

The final evaluation of the project alternatives followed the Bexar Regional Watershed Management (BRWM) standardized priority ranking matrix (shown in Table 4.9a) to consolidate and rank all analysis results. Individual projects were scored qualitatively as "High," "Medium," or "Low" according to the following criteria:

- Hydraulic significance or impact – Determined both by the number of buildings removed from the 100-year floodplain and the reduction in annual damages across the entire Leon Creek Watershed.[17]
    - Low – Removed fewer than 25 buildings from the 100-year floodplain. Estimated Annual Damage reductions less than 0.65 percent (25th percentile) also ranked "Low".
    - Medium – Removed 25 to 50 buildings from the 100-year floodplain. Estimated Annual Damage reductions between 0.65 percent (25th percentile) and 3.70 percent (75th percentile) also ranked "Medium".
    - High – Removed more than 50 buildings from the 100-year floodplain. Estimated Annual Damage reductions greater 3.70 percent (75th percentile) also ranked "High".
- Public safety – Determined by the overall extent to which a project improved the safety classification of roadway crossings and parallel roadway sections. Roads were classified according to Figure 35-504 of the CoSA *Unified Development Code* for all storm events. Any safety classifications that worsened as a result of the project were used to offset the number of improvements.
    - Low – No roadway crossings or parallel roadway sections improved classification as a result of the project alternative.
    - Medium – One or two roadway crossings or parallel roadway sections improved classification as a result of the project alternative.
    - High – More than two roadway crossings or parallel roadway sections improved classification as a result of the project alternative.
- Benefit/cost ratio – Determined by a project's Flood Reduction Ratio.[18] For Flood Reduction Ratios less than 0.05, projects were ranked "Low." For Flood Reduction Ratios between 0.05 and 0.3, projects were ranked "Medium," and for Flood Reduction Ratios greater than 0.3, projects were ranked "High."
- Element of a comprehensive watershed plan – Determined by the coverage of a project's benefits. The projects were ranked "Low" if they provided only local benefits and provided no additional benefits when in combination, "Medium" if they provided benefits along the primary stream reach or could be used in combination to resolve downstream impact problems, and "High" if they provided benefits along multiple stream reaches or created opportunities for downstream project optimization when used in combination.
- Dependency on other projects – Determined by a project's individual effectiveness. The projects were ranked "Low" if they depended on two or more additional projects to make the base project effective or to mitigate downstream impacts, "Medium" if they depended on one additional project to make the base project effective or to mitigate downstream impacts, and "High" if they depended on no additional projects.

[17] For all BRWM matrix criteria that depend on flooding severity, the 100-year storm event was used to evaluate criteria scores.
[18] The Flood Reduction Ratio is discussed in further detail in Section 4.5.

- Mobility or effects on transportation system – Determined by the length of time roadways may be rendered unusable due to flooding (not evaluated as part of this study).
- Sustainability or low operations and maintenance cost – Determined by a project's required operations and maintenance cost. "High" ranked projects, such as concrete-lined channels, would have negligible maintenance requirements. "Medium" ranked projects would require some routine maintenance (e.g., mowing grass-lined enhanced conveyance channels, structure clean-out for off-line detention ponds). "Low" ranked projects would require substantial operation and maintenance costs (e.g. on-line detention ponds).
- Level of protection provided – Determined by a project's ability to protect nearby buildings from flooding. A project was ranked "Low" if few buildings in the primary damage center improved LOFP and ranked "Medium" if most buildings in the primary damage center improved LOFP by one level. A project was ranked "High" if most buildings in the primary damage center improved LOFP by two or more levels.
- Funding sources – Not evaluated as part of this study.
- Promote orderly development or improve economic development/redevelopment potential – Determined by the size of development impacted by a project. The projects were ranked according to the areas removed from the 100-year floodplain and whether the areas classify as developed or undeveloped land.
    - Low – Removed the majority of developed area from the 100-year floodplain.
    - Medium – Removed the majority of developed area and additional undeveloped area with the potential for development from the 100-year floodplain.
    - High – Removed the majority of developed area and additional undeveloped area with a high potential for development from the 100-year floodplain.
- Beneficial neighborhood impacts – Determined by a project's construction impacts or appeal to neighboring residences/businesses.
    - Low – Adjacent to neighborhoods on more than one side ***and*** provided no beneficial enhancements.
    - Medium – Adjacent to a neighborhood on one side ***or*** adjacent to neighborhoods on more than one side and would provide beautification or a connection to a park/trail.
    - High – Not located near a neighborhood (and would not cause disruptions during construction) ***or*** adjacent to a neighborhood on one side and would provide beautification or a connection to a park/trail.
- Water quality enhancement – Determined by a project's proximity to 303(d) impaired water bodies and its suitability for water quality enhancement techniques using vegetation, wet bottom water quality ponds, or other BMPs. A project was ranked "Low" if conditions were highly constrained and would make these techniques difficult (e.g., no upstream flow to help support a wet bottom pond and/or vegetation). "Medium" represented average suitability (with minor constraints) and "High" represented exceptional suitability (no constraints).
- Time to implement or construct – Not evaluated as part of this study.
- Permitting resistance or difficulty – Determined by a project's ease of permitting. Projects were ranked "Low" if they required more permits or more time to permit than average. If a project appeared to be less difficult or time-consuming to permit than average, it received a higher score.
- Environmental or habitat enhancement – Determined by a project's potential for habitat enhancement and connectivity to existing habitats. Projects were ranked "Low" if they were highly constrained and unsuitable as potential habitats due to existing development. Projects ranked "Medium" would be partially suitable as a habitat or a connecting habitat (e.g., not enough available land to establish riparian buffers but still suitable for native grasses), and

projects ranked "High" would be ideally suited for habitat enhancement and connectivity (e.g., suitable to establish riparian buffers and wildlife corridors with connectivity to existing habitats).

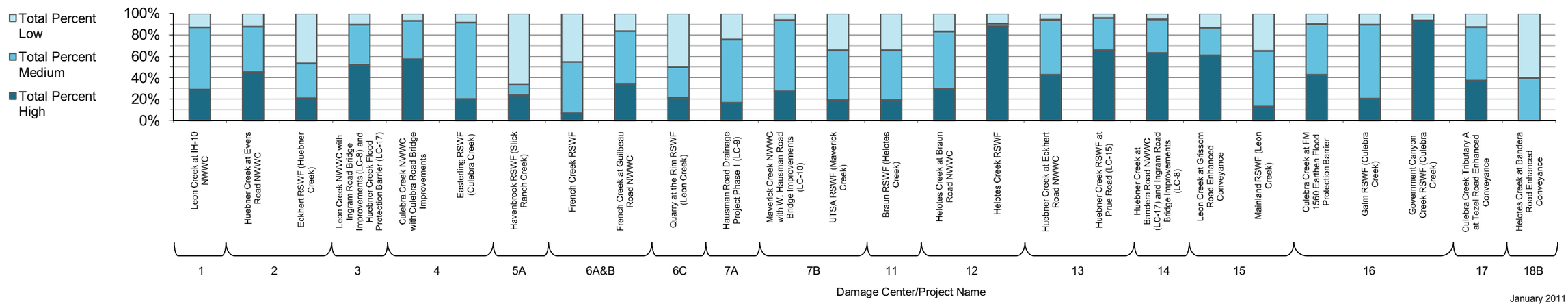
- Potential for recreation/open space/connectivity for linear parks – Determined by a project's potential for developing or connecting to recreational park space. Projects were ranked "Low" if they were unsuitable for parks, trails, or paths, or if they were located far from any residential areas, schools, public spaces, roadways, or other parks. Projects were ranked "Medium" if they partially met the criteria (e.g., located near existing parks but far from residential areas or roadways). Projects were ranked "High" if they were centrally located and would easily connect to adjacent parks, green space, or active neighborhoods.
- Channel Instability – Determined by a project's susceptibility to disequilibrium in sediment transport, incision and bank erosion. For this study, criteria evaluation and ranking were provided by SARA.
- Natural Channel Design Suitability – Determined by a project's Rosgen Priority Rating which included suitability for restoration of natural channel function in terms of balanced sediment transport, bed form diversity, bank stabilization, floodplain connectivity, water quality and aquatic habitat while remaining within the project constraints. Projects were ranked "Low" if only Priority 4 restoration (stabilizing the channel in place) was applicable. Projects were ranked "Medium" if constraints limited restoration to Priority 3, consisting of stream type alterations and the use of in-stream habitat enhancement. Projects that allowed for floodplain re-establishment including meandering bends and habitat enhancement were labeled at Priority 1 or 2 and ranked "High".

Upon completing the matrix, each project was scored and ranked using criteria weights developed by the BRWM. Two criteria were evaluated for channel projects only (i.e., Channel Instability and Natural Channel Design Suitability)[19]. In order to make the BRWM prioritization assessment uniform for all project types, each project's total weighted score was divided by the total possible score for its project type to produce a normalized score for ranking purposes.

[19] Criteria evaluations were provided by SARA.

Table 4.9a: Prioritization Matrix

Project Name and Primary Damage Center	Leon Creek at IH-10 NWWC	Huebner Creek at Evers Road NWWC	Eckhert RSWF (Huebner Creek)	Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)	Culebra Creek NWWC with Culebra Road Bridge Improvements	Easterling RSWF (Culebra Creek)	Havenbrook RSWF (Slick Ranch Creek)	French Creek RSWF	French Creek at Guilbeau Road NWWC	Quarry at the Rim RSWF (Leon Creek)	Hausman Road Drainage Project Phase 1 (LC-9)	Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	UTSA RSWF (Maverick Creek)	Braun RSWF (Helotes Creek)	Helotes Creek at Braun Road NWWC	Helotes Creek RSWF	Huebner Creek at Eckhert Road NWWC	Huebner Creek RSWF at Prue Road (LC-15)	Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)	Leon Creek at Grissom Road Enhanced Conveyance	Mainland RSWF (Leon Creek)	Culebra Creek at FM 1560 Earthen Flood Protection Barrier	Galm RSWF (Culebra Creek)	Government Canyon Creek RSWF (Culebra Creek)	Culebra Creek Tributary A at Tezel Road Enhanced Conveyance	Helotes Creek at Bandera Road Enhanced Conveyance
Matrix Criteria	**1**	**2**		**3**	**4**		**5A**	**6A&B**		**6C**	**7A**	**7B**		**11**	**12**		**13**		**14**	**15**		**16**			**17**	**18B**
Hydraulic significance or impact	M	H	L	H	H	M	L	M	M	L	L	M	L	L	M	H	M	H	H	H	L	M	M	H	M	L
Public Safety	M	M	L	M	H	M	L	L	L	L	M	M	M	M	L	H	M	H	M	L	M	M	M	H	H	L
Benefit/Cost Ratio	L	M	M	M	M	M	L	L	M	M	M	M	L	L	H	H	H	H	H	M	L	H	M	H	M	L
Element of comprehensive watershed plan	H	L	M	L	L	H	L	L	L	L	L	L	L	L	M	H	L	M	L	L	L	L	H	H	L	L
Dependency on other projects	H	H	H	L	M	H	H	L	H	H	H	M	H	H	H	H	H	M	H	H	H	H	H	H	H	L
Mobility or effects on transportation system	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sustainability or low operations & maintenance cost	M	M	L	L	M	L	L	M	M	M	L	M	M	M	M	L	M	M	M	M	M	L	L	L	M	M
Level of protection provided	L	H	L	H	H	L	L	L	H	L	M	H	M	L	M	H	H	M	H	H	L	H	L	H	M	M
Funding sources	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Promote orderly development or improve economic development/redevelopment potential	H	L	L	M	L	L	L	L	L	L	L	H	L	L	L	L	H	L	H	H	L	L	L	H	L	L
Beneficial neighborhood impacts	M	L	L	H	L	M	M	M	L	H	M	M	M	M	M	M	L	L	L	M	M	M	M	H	L	M
Water quality enhancement	H	L	L	H	M	M	L	L	H	L	M	H	L	L	M	L	L	L	M	H	L	L	M	L	L	L
Time to implement or construct	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Permitting resistance or difficulty	L	M	M	M	M	M	M	L	M	L	L	L	L	M	L	L	M	M	M	M	M	H	L	L	M	L
Environmental or habitat enhancement	M	L	L	H	M	M	L	M	H	L	H	H	L	M	M	L	M	M	M	H	M	M	M	L	L	M
Potential for Recreation/Open Space/Connectivity for linear parks	M	L	H	H	M	M	H	H	H	L	M	H	H	H	L	L	H	M	H	H	M	M	M	H	L	M
Channel Instability	L	L	-	L	L	-	-	-	M	-	L	L	-	-	M	-	M	-	L	L	-	-	-	-	L	L
Natural Channel Design Suitability	M	M	-	M	M	-	-	-	M	-	M	M	-	-	L	-	M	-	M	M	-	-	-	-	M	M
Normalized Total Weighted Score	0.646	0.688	0.478	0.719	0.760	0.656	0.422	0.467	0.635	0.467	0.563	0.688	0.522	0.589	0.625	0.833	0.729	0.811	0.792	0.719	0.511	0.700	0.644	0.889	0.667	0.417
RANK	14	10	22	7	5	13	25	23	16	24	18	11	19	20	17	2	6	3	4	8	21	9	15	1	12	26



January 2011

4.9.2 Discussion of Results

Based on the results of the prioritization matrix, individual projects and project combinations were assessed by stream. A summary of the priority rankings is presented in Table 4.9b.

Table 4.9b: Prioritization Matrix Rankings for Individual Projects

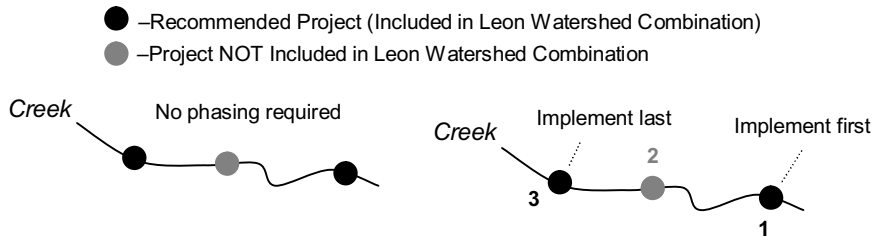
Rank	Project Name	*Primary Damage Center*
1	**Government Canyon Creek RSWF (Culebra Creek)**	**16**
2	**Helotes Creek RSWF**	**12**
3	**Huebner Creek RSWF at Prue Road (LC-15)**	**13**
4	**Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)**	**14**
5	**Culebra Creek NWWC with Culebra Road Bridge Improvements**	**4**
6	**Huebner Creek at Eckhert Road NWWC**	**13**
7	**Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)**	**3**
8	**Leon Creek at Grissom Road Enhanced Conveyance**	**15**
9	Culebra Creek at FM 1560 Earthen Flood Protection Barrier	16
10	**Huebner Creek at Evers Road NWWC**	**2**
11	**Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)**	**7B**
12	**Culebra Creek Tributary A at Tezel Road Enhanced Conveyance**	**17**
13	Easterling RSWF (Culebra Creek)	4
14	*Leon Creek at IH-10 NWWC*	*1*
15	*Galm RSWF (Culebra Creek)*	*16*
16	**French Creek at Guilbeau Road NWWC**	**6A&B**
17	Helotes Creek at Braun Road NWWC	12
18	**Hausman Road Drainage Project Phase I (LC-9)**	**7A**
19	UTSA RSWF (Maverick Creek)	7B
20	*Braun RSWF (Helotes Creek)*	*11*
21	*Mainland RSWF (Leon Creek)*	*15*
22	*Eckhert RSWF (Huebner Creek)*	*2*
23	French Creek RSWF	6A&B
24	Quarry at the Rim RSWF (Leon Creek)	6C
25	*Havenbrook RSWF (Slick Ranch Creek)*	*5A*
26	*Helotes Creek at Bandera Road Enhanced Conveyance*	*18B*

Bold: Recommended project

Italicized: Project not analyzed in combinations

The following section provides a detailed summary of individual project rankings, as determined by project assessments, along with the results of combining projects. The results are presented by stream. Project combination diagrams are provided to illustrate general project locations, project phasing requirements (projects are drawn in numerical order, where applicable), and recommended projects (projects drawn in gray are not included in the final recommended Leon Watershed Combination). An example project phasing diagram is shown in Figure 4.9a.

Figure 4.9a: Example Project Phasing Diagram



Slick Ranch Creek
(Damage Center 5A)

Havenbrook RSWF *(Individual Rank: 25th)*	This project had a high potential for recreational uses and habitat enhancement, although the remaining criteria ranked below average. Although detailed local impacts were not calculated, a hydrologic analysis determined that Havenbrook RSWF had minimal effects on reducing lateral spill from Slick Ranch Creek into the adjacent neighborhood.[20] Existing channel modifications recently completed at Slick Ranch Creek near West Military Drive may contribute to flood mitigation.

Culebra Creek Tributary A
(Damage Center 17)

Culebra Creek Tributary A at Tezel Road Enhanced Conveyance *(Individual Rank: 12th)*	This project had average local flood mitigation effects. Due to the surrounding area's dense urbanization, it had poor potential for multi-use objectives. This project provided the necessary bridge upgrades (at the cost of property acquisition) to remove several roadways from the 100-year floodplain, which earned it a "High" score in the "Public Safety" category. It also improved the transportation corridor along Tezel Road between Ridge Run and Timber Ranch, increasing its LOFP above the 100-year storm event.

[20] Refer to Havenbrook RSWF Information Sheet (Appendix G) for more detailed information regarding the results of this hydrologic analysis.

Huesta Creek
(Damage Center 7A)

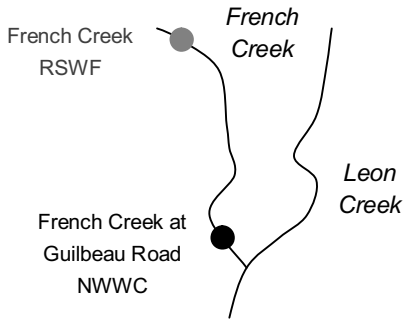
Hausman Road Drainage Project Phase I LC-9 *(Individual Rank: 18th)*	This Bexar County Flood Control Project was moderately suitable for riparian and wetland enhancements and recreational uses such as mountain bike, walking, and equestrian trails. It had average localized flood mitigation benefits but would require extensive property acquisition.[21] Areas removed from the floodplain had low potential for future development or redevelopment.

French Creek
(Damage Centers 6A&B and 8)

French Creek at Guilbeau Road NWWC *(Individual Rank: 16th)*	This project had a high potential for recreational uses, but its flood mitigation benefits were slightly below average. The LOFP improved significantly for nearby buildings within Damage Center 6A (nearly all were removed from the 500-year floodplain), although buildings in Damage Center 6B remained unaffected.
French Creek RSWF *(Individual Rank: 23rd)*	This project had a high potential for recreational uses, but its flood mitigation benefits were extremely low. Additionally, this project provided no additional benefit when implemented in combination with the NWWC described above.

The French Combination – including French Creek at Guilbeau Road NWWC and French Creek RSWF – did not create any optimization opportunities. However, the combination did reduce estimated annual damages and eliminate the negative downstream impacts of the RSWF. In order to achieve these benefits, the combination required both projects to be implemented at maximum capacity. As a result, the combination was unable to provide any initial cost savings. By itself, the NWWC project provided sufficient flood protection in Damage Centers 6A&B.

French Combination



Maverick Creek
(Damage Center 7B)

Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10) *(Individual Rank: 11th)*	This project received medium to high scores overall. It eliminated overflow between Maverick Creek and Huesta Creek Tributary A, and because it included the Bexar County Flood Control Project LC-10, this project also improved the Hausman Road LOFP. It also removed areas from the floodplain that would have high-potential as future development

[21] This project is currently underway. The property acquisition component has occurred.

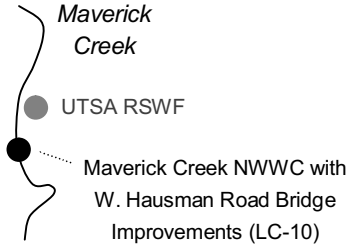
or redevelopment. Finally, this project could incorporate riparian and wetland enhancements and could be used to connect the University of Texas at San Antonio campus to the linear parks along Leon Creek with hike and bike trails.

UTSA RSWF
(Individual Rank: 19th)

This project had a high potential for recreational uses, but its flood mitigation benefits were below average. Additionally, this project provided no additional benefit when implemented in combination with the NWWC described above. These limited benefits would be at the expense of encroaching on the UTSA campus.

The Maverick Combination – including Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10) and UTSA RSWF – did not create any optimization opportunities or provide any additional local benefits over the individual projects. UTSA RSWF provided some benefit in downstream damage centers along Leon Creek, although the benefit was significantly less than benefits derived from other recommended projects on Leon Creek. The NWWC project alone provided sufficient flood protection in Damage Center 7B.

Maverick Combination



Huebner Creek
(Damage Centers 2, 13, and 14)

Huebner Creek RSWF at Prue Road LC-15
(Individual Rank: 3rd)

This project was the third highest-ranking project analyzed. The project had high flood mitigation benefits and relatively low project costs, which contributed to its high flood reduction ratio of 2.81. Due to the presence of neighborhoods adjacent to both sides of the project area, it received a "Low" score in the "Beneficial Neighborhood Impacts" category. Multi-use opportunities may exist for habitat connectivity and recreational uses, such as fishing ponds, picnic areas, and a dog park.

Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)
(Individual Rank: 4th)

This project was the fourth highest-ranking project analyzed. The project had high flood mitigation benefits and received high scores overall. It received a "Low" score for "Beneficial Neighborhood Impacts" based on the assumption that construction activities in the neighborhood would encounter firm resistance from residents. However, this score might be higher if the neighborhood residents support the project. The multi-use analysis of this project site indicated high potential for future development or redevelopment and recreation/open space opportunities. In the hydrologic and hydraulic analysis, this project caused an increase in peak flow rates along Huebner Creek; however, the increased peak flow rates did not translate into increased flood risk.

Huebner Creek at Eckhert Road NWWC
(Individual Rank: 6th)

This project ranked well for multi-use potential and had average flood mitigation benefits. It reduced flooding and improved safety along Eckhert Road, while completely eliminating flooding at Whitby Road. Despite causing some negative impacts downstream on Huebner Creek, the relatively low project costs contributed to a higher-than-average flood

reduction ratio of 0.30. Due to the presence of neighborhoods adjacent to both sides of the project area, it received a "Low" score in the "Beneficial Neighborhood Impacts" category. Multi-use opportunities may exist for riparian and wetland enhancement and recreational uses, such as mountain bike and walking trails. In the hydrologic and hydraulic analysis, this project caused an increase in peak flow rates along Huebner Creek but decreased the peak flow rate on Leon Creek downstream of the Huebner Creek confluence.

Huebner Creek at Evers Road NWWC *(Individual Rank: 10th)*

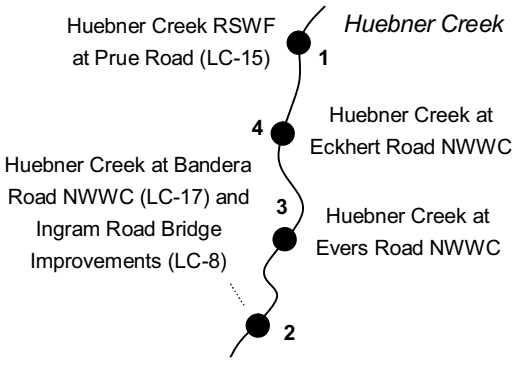
This project had high flood mitigation benefits locally and might be suitable for riparian and wetland enhancements. The proposed channel expansion and property acquisition pose a significant challenge to this project but provide an alternative to major bridge upgrades to Evers Road and a concrete-lined channel. Although the project had a modest flood reduction ratio of 0.18, it may create negative downstream impacts along Huebner Creek. In the hydrologic and hydraulic analysis, this project caused an increase in peak flow rates along Huebner Creek but decreased the peak flow rate on Leon Creek downstream of the Huebner Creek confluence.

Eckhert RSWF *(Individual Rank: 22nd)*

This project had a high potential for recreational uses, but its flood mitigation benefits were below average. This project provided no additional benefit when implemented in combination with other projects analyzed for Huebner Creek.

The Huebner Combination – including Huebner Creek RSWF at Prue Road (LC-15), Huebner Creek at Eckhert Road NWWC, Huebner Creek at Evers Road NWWC, and Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8) – provided the necessary flood reductions within Damage Centers 2, 13, and 14. Although individually the NWWC projects produced negative downstream impacts on Huebner Creek, the negative impacts may be prevented with correct project phasing. Additionally, while the combination did not require an RSWF project for mitigating impacts, the addition of Huebner Creek RSWF at Prue Road LC-15 did allow Huebner Creek at Eckhert Road NWWC to be downsized.

Huebner Combination



Helotes Creek

(Damage Centers 11, 12, and 18B)

Helotes Creek RSWF *(Individual Rank: 2nd)*

This project was the second highest-ranking project analyzed. It ranked 'high' for the majority of the criteria with low potential for habitat enhancement or recreational uses. This project removed all but 2 buildings from the 500-year floodplain within Damage Center 12. It also provided significant benefits downstream on Helotes Creek, Culebra Creek, and Leon Creek and reduced peak flow rates at the confluence of Helotes Creek and Culebra Creek by 11,000 cfs for the 100-year storm

event. From a regional standpoint, this project has high potential to reduce flood risk along three streams and create opportunities for cost savings when implemented in combination with other projects.

Braun RSWF
(Individual Rank: 20th)

This project had a high potential for recreational uses, but its flood mitigation benefits were below average.

Helotes Creek at Braun Road NWWC
(Individual Rank: 17th)

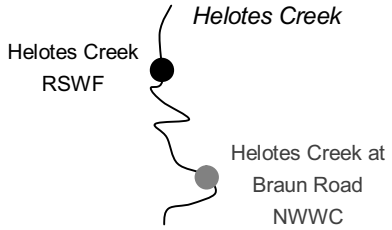
This project ranked "medium" for most criteria. It removed all buildings but two buildings from the 100-year floodplain and had a high flood reduction ratio of 1.49. From a local benefit standpoint, this project is adequate for meeting flood mitigation objectives through Damage Center 12. However, this project provided no additional benefit downstream on Helotes, Culebra, or Leon Creeks.

Helotes Creek at Bandera Road Enhanced Conveyance
(Individual Rank: 26th)

While it reduced flood risk in the immediate area, this project increased peak flow rates downstream on Helotes Creek and further downstream on Culebra Creek and Leon Creek, resulting in negative impacts on the LOFP of buildings downstream, primarily on Helotes Creek. It received a "Low" score for "Permitting Resistance or Difficulty" because of the high potential for endangered bird habitats nearby and the site's position within the Edwards Aquifer Contributing Zone (which necessitates a TCEQ Contributing Zone Plan).

The Helotes Combination – including Helotes Creek RSWF and Helotes Creek at Braun Road NWWC – did not create any optimization opportunities. Although the NWWC project provided local benefits at Damage Center 12, Helotes Creek RSWF reduced flood risk at Damage Center 12 and all downstream damage centers.

Helotes Combination



<u>Culebra Creek</u>
(Damage Centers 4 and 16)

Government Canyon Creek RSWF
(Individual Rank: 1st)

This project was the highest-ranking project analyzed. It ranked high for all criteria with the exception of two. It had a low rating for "Environmental and Habitat Enhancement" due to the existing high quality environmental/habitat characteristics of surrounding area and "Permitting Resistance or Difficulty" due to its proximity to Edwards Aquifer Recharge Zone and the Endangered Bird Habitat potential. This project significantly reduced flood risk along Culebra Creek and reduced peak flow rates at the confluence of Culebra Creek and Leon Creek by 8,100 cfs for the 100-year storm event. This project had high potential to reduce flood risk along two tributaries and create opportunities for cost savings when implemented in combination with other projects.

Culebra Creek NWWC with Culebra Road Bridge Improvements
(Individual Rank: 5th)

This project was the fifth highest-ranking project analyzed. It provided high flood mitigation benefits and demonstrated potential for riparian and wetland enhancements. The project included bridge improvements to Culebra Bridge and increased the crossing's LOFP to greater than the 100-year future storm event. For all other criteria, its results were

average, with low beneficial neighborhood impacts and low potential for future development. This project had only localized benefits with some measurable negative impacts downstream. It also improved the transportation corridor along Grissom Road between Northwest Trails and Timber Path, increasing its LOFP above the 100-year future storm event and along Culebra Road from Grissom Road to Timber Path, increasing its LOFP above the 100-year storm event. In combination with Government Canyon Creek RSWF or Helotes Creek RSWF, the cost savings for the optimized project changed its ranking to fourth. In combination with both Government Canyon Creek RSWF and Helotes Creek RSWF, the project is reduced to selective clearing and ranked third.

Culebra Creek at FM 1560 Earthen Flood Protection Barrier
(Individual Rank: 9th)

This project was designed solely for local flood risk reduction and has medium multi-use potential. Using the prioritization matrix, it was ranked as an average project, although it has an exceptionally low cost and a high flood reduction ratio of 9.60. It should be noted that levee certification and maintenance costs as required by FEMA were not included in the cost estimate and flood reduction ratio. Levee certification would be required in order to remove the property protected by the project from the floodplain.

Easterling RSWF Improvements
(Individual Rank: 13th)

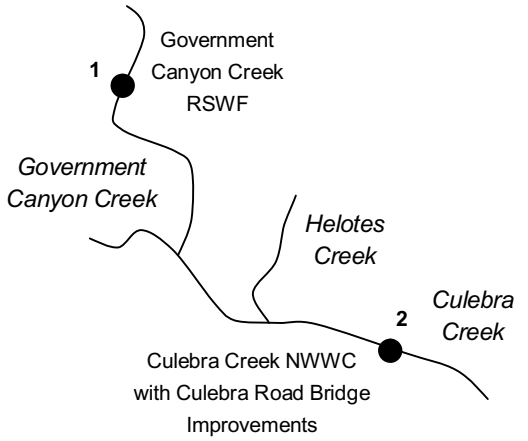
This project ranked medium with low potential for creating future development opportunities. It was suitable for recreational uses and had some potential for riparian enhancement and natural channel design techniques. Although the RSWF project provided only average local flood risk reduction potential, peak flow rates on Leon Creek were moderately reduced except for the 500-year storm event, making it suitable for combining with NWWC projects along Culebra Creek to mitigate their negative downstream impacts on Leon Creek.

Galm RSWF
(Individual Rank: 15th)

This project ranked medium for the majority of the criteria with the possibility of permitting difficulties due to potential endangered bird habitat.

The Culebra Combination A – including Culebra Creek NWWC with Culebra Road Bridge Improvements and Government Canyon Creek RSWF – created opportunities for downsizing Culebra Creek NWWC and eliminated the need for Culebra Road Bridge Improvements and the Culebra Creek at FM 1560 Earthen Flood Protection Barrier. In addition, combining the NWWC with Government Canyon Creek RSWF resulted in a higher FRR than combining the NWWC with either Galm RSWF or Easterling RSWF.

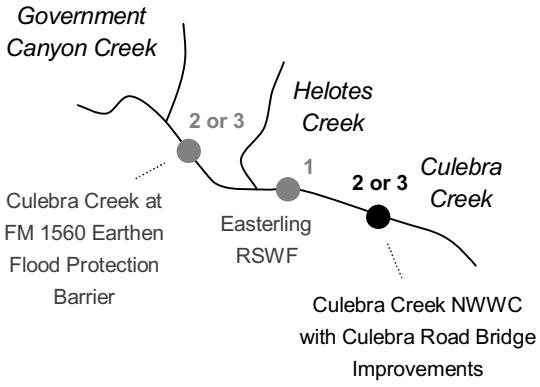
Culebra Combination A



January 2011

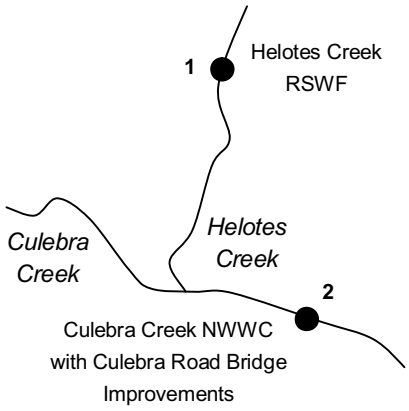
The Culebra Combination B – including Culebra Creek NWWC with Culebra Road Bridge Improvements, Culebra Creek at FM 1560 Earthen Flood Protection Barrier, and Easterling RSWF – did not create any opportunities for optimization but sufficiently reduced the overall flood risk along Culebra Creek and provided adequate peak flow rate reductions to eliminate negative downstream impacts on Leon Creek except for the 500-year storm event. Galm RSWF was also evaluated in place of Easterling RSWF, but it did not provide sufficient reductions in peak flow rates to be implemented in combination.

Culebra Combination B



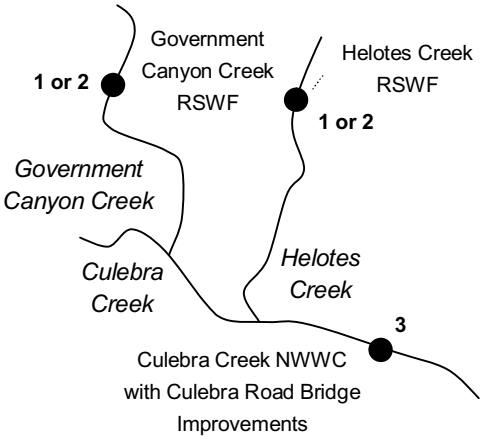
The Helotes/Culebra Combination A – including Culebra Creek NWWC with Culebra Road Bridge Improvements and Helotes Creek RSWF – created opportunities for downsizing Culebra Creek NWWC, thereby reducing its cost of implementation. The optimized combination produced results similar to Culebra Combination A, making either combination a valid solution to reduce flood risk at Damage Center 4 and to mitigate the negative downstream impacts of the NWWC project.

Helotes/Culebra Combination A



The Helotes/Culebra Combination B – including Culebra Creek NWWC with Culebra Road Bridge Improvements, Government Canyon Creek RSWF, and Helotes Creek RSWF – created opportunities to eliminate the need for channel modifications and bridge upgrades within Damage Center 4. The Culebra Creek NWWC with Culebra Road Bridge Improvements project was replaced with a Selective Clearing program along the downstream portion of Damage Center 4, significantly reducing construction costs. When in combination, the two RSWF projects nearly eliminated the need for any additional projects along Culebra and Helotes Creek. The combination also reduced downstream peak flow rates on Leon Creek by 18,100 cfs for the 100-year storm event.

Helotes/Culebra Combination B



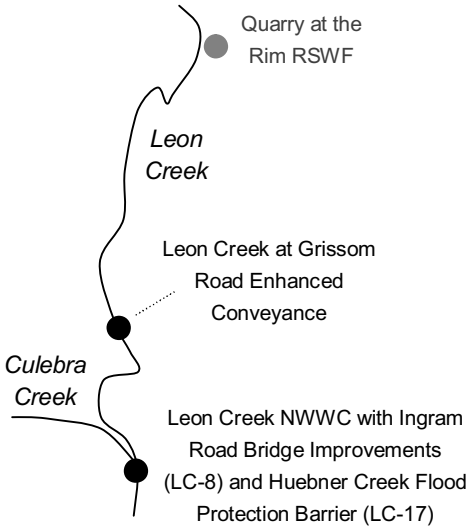
Leon Creek

(Damage Centers 1, 3, 5B, 6C, 9, 10, and 15)

Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17) *(Individual Rank: 7th)*	This project had high flood risk reduction effects with a moderate flood reduction ratio and high potential for riparian and wetland enhancements. In addition, because the proposed project would be built away from existing neighborhoods, it would cause minimal disturbance to neighborhoods. The project removes both developed and undeveloped land from the 100-year floodplain, including land that has a high potential for future development.
Leon Creek at Grissom Road Enhanced Conveyance *(Individual Rank: 8th)*	This project ranked well with high flood risk reduction benefits and high potential for riparian and wetland enhancement and recreational uses, such as mountain bike trails. It also removed areas from the floodplain that would have high potential as future development or redevelopment sites.
Leon Creek at IH-10 NWWC *(Individual Rank: 14th)*	This project had an average ranking with beneficial impacts downstream despite negligible impacts within the primary damage center. The site also had moderate potential for recreational uses, including mountain bike and walking trails. However, the project required a large excavation volume, and it received a "Low" score for "Permitting Resistance or Difficulty" because of the site's position within the Edwards Aquifer Contributing Zone (which necessitates a TCEQ Contributing Zone Plan).
Mainland RSWF *(Individual Rank: 21st)*	This project had a high potential for recreational uses and habitat enhancement, although the remaining criteria ranked below average.
Quarry at the Rim RSWF *(Individual Rank: 24th)*	This project had mostly below average rankings but would be built away from existing neighborhoods.

The Leon Combination – including Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17), Leon Creek at Grissom Road Enhanced Conveyance, and the Quarry at the Rim RSWF – did not create any opportunities for optimization or provide any additional local benefits over the individual projects. The NWWC projects provided the necessary local flood risk reductions at their respective damage centers and were selected for combination due to high individual performance. Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17) required at least one RSWF project in combination to mitigate negative downstream impacts. However, the Quarry at the Rim RSWF provided negligible benefits downstream at Damage Centers 3 and 15 due to its distance

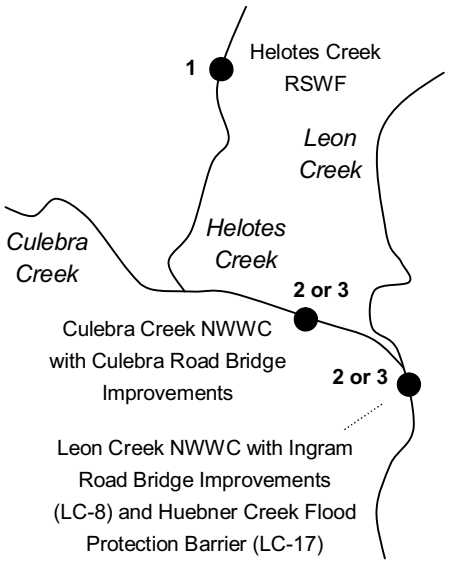
Leon Combination



upstream and intervening peak flows along Leon Creek.

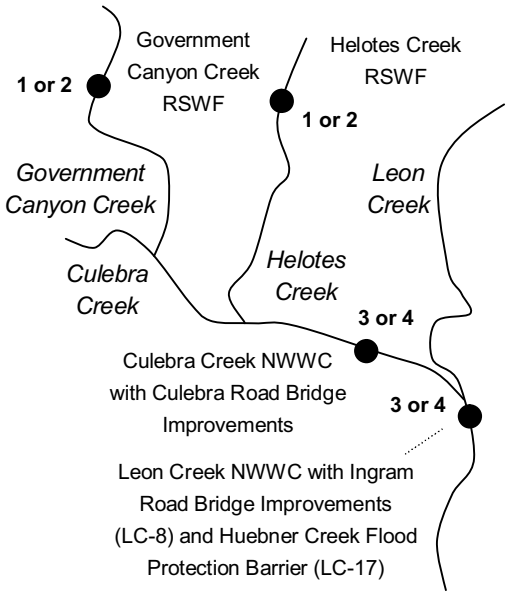
The Helotes/Culebra/Leon Combination A – including the projects in Helotes/Culebra Combination A as well as Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17) – created opportunities for downsizing Culebra Creek NWWC, thereby reducing its cost of implementation (the same effect, however, may also be produced with Helotes/Culebra Combination A by itself). Although Helotes Creek RSWF reduced peak flow rates on Leon Creek and mitigated negative downstream impacts caused by both NWWC projects, its impact was insufficient to allow for the downsizing of Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17).

Helotes/Culebra/Leon Combination A



The Helotes/Culebra/Leon Combination B – including the projects in Helotes/Culebra Combination B and Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17) – created opportunities to eliminate the need for channel modifications and bridge upgrades within Damage Centers 3 and 4. The combination of Government Canyon Creek RSWF and Helotes Creek RSWF sufficiently mitigated the negative downstream impacts of both NWWC projects, reducing peak flow rates on Leon Creek by 18,100 cfs for the 100-year storm event. The Culebra Creek NWWC with Culebra Road Bridge Improvements project was replaced with a Selective Clearing program along the downstream portion of Damage Center 4, significantly reducing construction costs (the same effect, however, may also be produced with Helotes/Culebra Combination B by itself). Additionally, the Leon Creek NWWC at Ingram Road was also replaced with a Selective Clearing program.

Helotes/Culebra/Leon Combination B



4.9.3 Recommended Projects

Among the projects evaluated for mitigating flood damages within the Leon Creek watershed, thirteen projects are recommended for implementation. Together, these thirteen projects address

flooding concerns along each major tributary with the exception of Slick Ranch Creek and comprise the Leon Watershed Combination, as summarized in Table 4.9c.

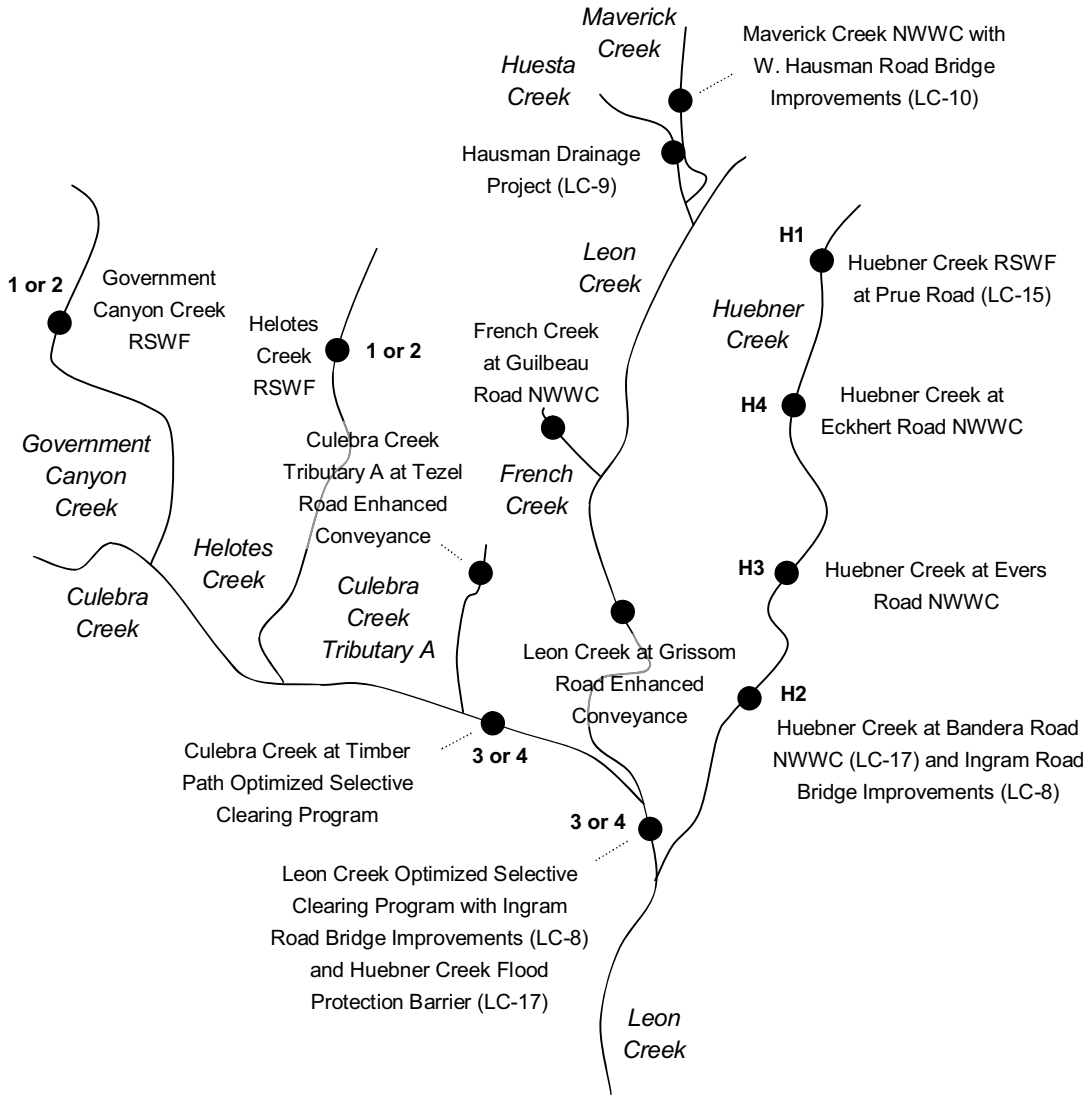
Table 4.9c: Leon Watershed Combination (Recommended Projects)

Primary Tributary	Project Name	Primary Damage Center
Culebra Creek	Culebra Creek at Timber Path Optimized Selective Clearing Program[1]	4
	Government Canyon Creek RSWF	16
	Culebra Creek Tributary A at Tezel Road Enhanced Conveyance	17
French Creek	French Creek at Guilbeau Road NWWC	6A&B
Helotes Creek	Helotes Creek RSWF	12
Huebner Creek	Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)	14
	Huebner Creek at Eckhert Road Optimized NWWC	13
	Huebner Creek at Evers Road NWWC	2
	Huebner Creek RSWF at Prue Road (LC-15)	13
Huesta Creek	Hausman Road Drainage Project Phase I LC-9	7A
Leon Creek	Leon Creek at Grissom Road Enhanced Conveyance	15
	Leon Creek Optimized Selective Clearing Program with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)[2]	3
Maverick Creek	Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)	7B

[1]This it an optimized version of Culebra Creek NWWC with Culebra Road Bridge Improvements.
[2]This is an optimized version of Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)

Implementing the recommended projects together reduced annual flood damages within the watershed by a total of $1,165,300 with an overall Flood Reduction Ratio of 0.26. The Leon Watershed Combination includes three optimized projects.

Leon Watershed Combination



5.0 Alternative Development Methods as a Flood Mitigation Strategy

5.1 Purpose

Although the LCWMP study focused primarily on traditional structural methods for reducing flood risk including enhanced conveyance and RSWF projects, the study also examined the use of alternative development methods. Traditional land development with its related changes to the drainage characteristics of the watershed is generally considered a contributing factor to the increased frequency of flooding. Various alternative land development practices are capable of achieving the storm water and pollutant attenuation characteristics of undeveloped land, thereby reducing the need for large structural storm water control projects as mitigation for the effects of future development.

A qualitative assessment of some of these non-traditional land development techniques was conducted based on a literature review. This assessment indicated that these management practices, although originally developed for water quality enhancement, could also potentially have storm water quantity management benefits. The management practices in the assessment included the creation of conservation areas, stream restoration, low-impact development (LID) design, conservation development and other land-use planning options, including Leadership in Energy and Environmental Design (LEED). The assessment was earlier presented in a report "Alternative Development Techniques: Potential in Leon Creek Watershed" (April 2010). A quantitative assessment of the potential benefits of these techniques in the Leon Creek watershed was desired as part of the LCWMP.

5.2 Study Areas and Methodology

Six subbasins were selected to represent a variety of development and soil characteristics within the Leon Creek watershed (see Figure 5.2). Models were developed in EPA-SWMM 5.0 for each subbasin for three conditions: 1) current conditions, 2) the implementation of best management practices (BMPs) as shown in Table 5.2a, and 3) an ultimate development case assuming traditional development in cases where the current conditions of the subbasin were primarily undeveloped. Each model was simulated using the 100-year, 24-hour design storm hyetograph from the DFIRM hydrology.

Parameters for the current conditions models were developed using NRCS soil survey, 2005 aerial topography, and 2008 aerial photography.

BMPs were selected for each subbasin based on its development type (residential, commercial or mixed), hydrologic soil group classifications, and potential for containing karst features. They were modeled implicitly by accounting for the additional storage, increased infiltration capacity, and decreased impervious cover anticipated with 100 percent uptake of the proposed BMPs. The BMPs used in the analysis are listed below with a description of the assumptions used for modeling.

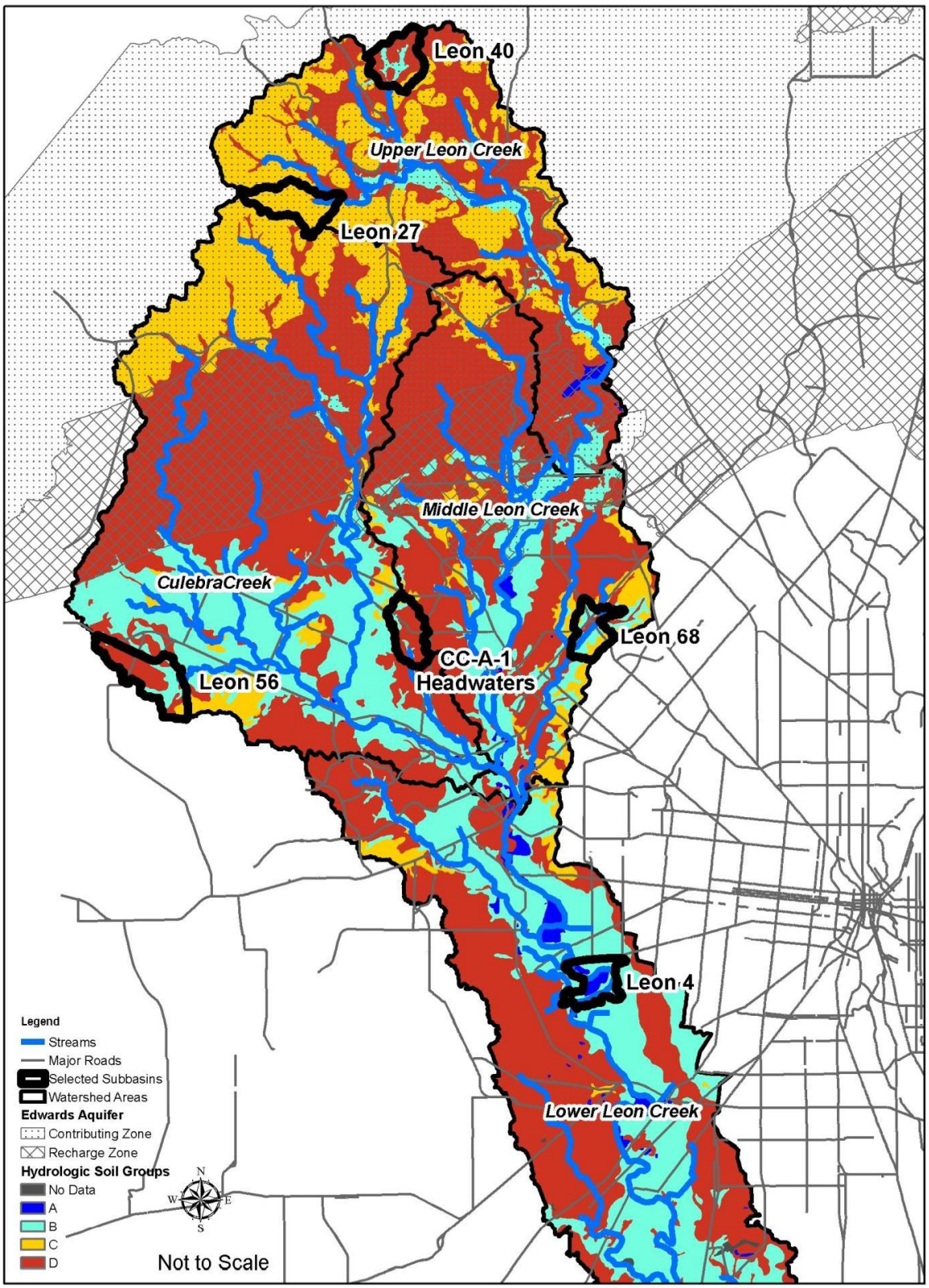


Figure 5.2: Alternative Development AnalysisSelected Subbasins

- Low Impact Development BMPs – These BMPs are frequently associated with LID design. They can also be used toward LEED credits for Sustainable Sites for Storm Water Design Quantity Control, Storm Water Design Quality Control, and Heat Island Effect.
    - **Rain barrels** (used in urban/small lot residential areas) – It was assumed that a 60 gallon rain barrel would be located at each of four downspouts on each residential lot. The total volume for the lot was divided by the average lot size to determine the additional depression storage due to rain barrels.
    - **Cisterns** (used in rural/large lot residential areas) – The additional depression storage for cisterns was estimated using the same methodology as rain barrels, substituting a 1500-gallon cistern per lot instead of four 60-gallon rain barrels.
    - **Rain gardens** (used in residential areas) – Rain gardens were assumed to have an average depth of 3 feet and an average surface area of 200 square feet. The storage volume was divided by the average lot size to determine the additional depression storage if each lot contained one rain garden.
    - **Bioretention** (used in commercial, industrial, and multi-family residential areas) – The methodology for estimating the additional depression storage for bioretention was similar to the methodology used for rain gardens. A bioretention pond with a surface area of 200 square feet and a depth of 3 feet was assumed for every 4,000 square feet of impervious cover. In practice, this would reflect a typical parking lot with the islands and other landscaping areas designed to serve as bioretention.
    - **Green roofs** (used in commercial and industrial buildings) – Reduced impervious cover assuming 50 percent of commercial lot impervious cover is the roof, and that 80 percent of the roof is green (40 percent of the total impervious area).
    - **Pervious pavement** (used in commercial, industrial, and multi-family residential areas) – In *Low Impact Development (LID) and Other Green Design Strategies* (EPA, 2008), pervious pavements of various types were reported to retain 25 percent to 100 percent of inflow for 2- to 10-year recurrence interval events. For this study, it was assumed that the pavement would retain 25 percent of the 10-year event. Additionally, 50 percent of the impervious area for commercial lots and apartment complexes was assumed to be rooftop, and 20 percent was assumed to be high/heavy traffic pavement. Therefore, only 30 percent of the impervious area would be pervious pavement.
- Land Use Planning BMPs – For the areas selected, these conservation development techniques were used. These BMPs can also be used toward LEED credits for Sustainable Sites for Site Selection and Site Development.
    - **Floodplain buffer/riparian corridor** – Primary conservation areas were delineated to provide buffers around creeks and major drainage pathways as well as to protect areas with slopes greater than 20 percent. Protecting a riparian buffer preserves the benefits of a natural stream corridor including storm water runoff attenuation, potential for recharge, erosion protection, and water quality enhancement.
    - **Minimize impervious cover** – The remaining area was divided between developable area and secondary conservation area so that the conservation area (primary and secondary) made up 50 percent of the total area. Roadway widths were limited to 15 feet, and it was assumed that development would include management practices that would limit the effective impervious cover to 20 percent.

For subbasins with minimal development under current conditions, a second case was evaluated using assumptions reflecting traditional development to provide a basis for comparison. In these cases, only highly constrained areas were set aside for conservation, and typical impervious cover values were assigned to developable areas based on the assumed future land use.

Appendix J includes subbasin exhibits and more information about site specific assumptions.

Table 5.2a: Subbasin Characteristics and Selected BMPs

Subbasin	Characteristics	Selected BMPs
CC-A-1 Headwaters	• 95% medium to high density residential development • Outside of the recharge and contributing zones • Hydrologic Soil Group: 74% D, 22% B and 4% C • Average slope: <5%	Rain barrels and rain gardens for urban residential development.
Leon 4	• 80% undeveloped with the remaining area commercial/industrial. Riparian area is wooded. • Outside of the recharge and contributing zones • Hydrologic Soil Group: 69% B and 28% A • Average slope: 5%	Bioretention, green roofs, and pervious pavement for commercial/industrial development.
Leon 27	• Undeveloped • In the contributing zone • Hydrologic Soil Group: 94% C and 6% D • Average slope: 10-15%	Conservation development using non-infiltration BMPs.*
Leon 40	• Large lot residential with some commercial • In the contributing zone • Hydrologic Soil Group: 68% D, 18% B, and 14% C. • Average slope: 5-10%	Cisterns for rural residential development and green roofs for commercial development.
Leon 56	• 97% undeveloped • Outside of the recharge and contributing zones • Hydrologic Soil Group: 64% D, 30% B, and 6% C. • Average slope: <5%	Conservation development using infiltration BMPs.
Leon 68	• Mixed commercial and residential • Outside of the recharge and contributing zones • Hydrologic Soil Group: 48% B, 26% C, and 26% D • Average slope: <5%	Pervious pavements and bioretention for commercial developments and multi-family residential.

*Non-infiltration BMPs are necessary in karst regions. Recommended BMPs include rain barrels, cisterns, downspout disconnections, reduced road widths, curb and gutter elimination, and green roofs. Infiltration BMPs would include bioretention, rain gardens, swales, and pervious pavement. Infiltration BMPs can be implemented in karst regions if they are constructed with lining and underdrains.

5.3 Analysis Results

The peak flow rates and runoff volumes from each simulation are shown in Table 5.3a and 5.3b, respectively. For all six subbasins, development with BMPs produced lower 100-year peak flow rates than traditional development. The retrofitted BMPs did not perform as well as the BMPs used in new development, and the BMPs implemented over soils with lower infiltration capacities did not perform as well as those implemented in areas with higher infiltration capacities. These results reinforce the importance of understanding the hydrologic benefits of the existing landscape and planning development around key features.

Table 5.3a: Peak Flow Rate[22] Summary for Varied Development Methodology

Subbasin		Current Conditions	Case 1 (BMP)		Case 2 (Traditional)	
Name	Area (ac)	Peak Flow (cfs)	Peak Flow (cfs)	Change	Peak Flow (cfs)	Change
CC-A-1 Headwaters	691	3,629	3,476	-4%	N/A	N/A
Leon 4	687	397	878	+121%	1,540	+288%
Leon 27	942	1,310	1,889	+44%	3,118	+138%
Leon 40	838	2,149	2,084	-3%	3,141	+46%
Leon 56	1,146	1,014	1,009	0%	2,380	+135%
Leon 68	637	2,778	2,466	-11%	N/A	N/A

Table 5.3b: Runoff Volume Summary for Varied Development Methodology

Subbasin		Current Conditions	Case 1 (BMP)		Case 2 (Traditional)	
Name	Area (ac)	Volume (ac-ft)	Volume (ac-ft)	Change	Volume (ac-ft)	Change
CC-A-1 Headwaters	691	511	464	-9%	N/A	N/A
Leon 4	687	256	272	+6%	430	+68%
Leon 27	942	519	558	+8%	619	+19%
Leon 40	838	521	516	-1%	556	+7%
Leon 56	1,146	603	616	+2%	729	+21%
Leon 68	637	420	378	-10%	N/A	N/A

5.4 Cost Considerations

While a more thorough design would be necessary in order to produce detailed cost comparisons between LID, traditional development, and large structural flood control projects, there are case studies and project-derived rules of thumb to aid decision makers. Table 5.4a shows cost estimates for the selected BMPs used in this study from LID Urban Design Tools, a web-based resource run by the Low Impact Development Center (2007).

[22] Assumed condition with 100-year frequency storm event.

Table 5.4a: Selected BMP Cost Guidelines (Low Impact Development Center, 2007)

BMP	Cost
Rain Barrels	$216 per barrel including accessories
Cisterns	$1,100 for pre-manufactured polyethylene
Rain Gardens	$3,790 per unit for a subdivision-wide installation project*
Bioretention	$12,355 per commercial property for retrofit project
Green Roofs	$20 per square foot
Pervious Pavement	$5 per square foot

*An individual homeowner undertaking the installation of a rain garden as a landscaping project could expect costs to run closer to $1,000. The higher cost shown for a subdivision project include professional costs, plan approval, permits, etc.

Urban Design Tools also gives examples from case studies of implemented projects. For new development, bioretention and rain gardens have been shown to result in a net savings when considering the reduction in storm drain pipe requirements and detention ponds. Pervious pavement is considered to have similar benefits in new construction.

For retrofitting situations, the cost would need to be weighed against the cost of upgrading the existing infrastructure. In this study three subbasins were retrofitted with BMPs. The unit costs shown in Table 5.4a were used to estimate the total cost for each subbasin to implement the selected BMPs. To outfit the approximately 3,760 existing residences in Subbasin CC-A-1 Headwaters with rain barrels and rain gardens would cost approximately $17.5 million. In Subbasin Leon 40, installing cisterns for the 455 residences and green roofs for the 15 commercial buildings would cost approximately $0.5 million and $10.5 million, respectively. In Subbasin Leon 68, installing pervious pavement and bioretention for 62 commercial properties would cost approximately $14.9 million and $0.8 million, respectively.

5.5 Integrating Alternative Development into the Leon Creek Watershed Master Plan

The results of the analysis indicate alternative development would be an effective method to mitigate future increases in flood risk due to new development. These alternative development BMPs could also be used in redevelopment projects as an alternative to upgrading storm water infrastructure. Alternative development BMPs have the added benefit of reducing the pollutant load in runoff. In addition to implementing these BMPs in public projects, local government agencies can encourage their use in private projects by providing a system of incentives and by facilitating their use in the permitting and review process.

Where alternative development BMPs were analyzed as part of new development, the new development increased runoff by a minimal amount compared with traditional development, and the alternative development methods are expected to result in a net savings when compared with traditional storm water controls.

As an option for addressing existing flood hazard for the most at-risk areas in the watershed, significant peak flow rate and runoff volume reductions would require wide-scale retrofitting of residential, commercial, and industrial properties as well as public right-of-way. Even with wide-scale retrofitting, the layout of current development and infrastructure was not necessarily planned

around environmental features, so the retrofitted elements would not perform to their fullest capacities. In the analysis of retrofitted projects, the anticipated costs were high with only local benefits. Retrofitting existing development with BMPs is not expected to be cost effective as a regional approach for reducing existing flood risk, but BMPs are recommended for redevelopment as an alternative to upgrading storm water infrastructure.

BMPs would have the additional benefit of water quality enhancement. The water quality assessment of Leon Creek (Appendix F) indicated that water quality concerns were specific to local areas rather than following watershed- or stream-level trends. The BMPs evaluated in this study were developed to improve the water quality of general runoff. As with flood hazard, the implementation of BMPs in new development and redevelopment projects would not necessarily reduce the current level of contamination, but it would reduce the potential for further degradation. The water quality concerns identified in the Leon Creek watershed during the water quality assessment included *Escherichia coli*, heavy metals, ammonia, total dissolved solids, sulfate, chloride, phosphorus, and nitrate. As presented in the April 2010 report, bioretention, rain gardens, and riparian buffer zones have high removal rates for these pollutants. Though not included in the flood mitigation assessment, bioswales also have high pollutant removal rates. Pollutant removal in these BMPs occurs through runoff volume reduction, filtration, and vegetative uptake.

As stated in Section 3.3, the water quality concerns in Leon Creek reflected the influence of riparian corridors and adjacent land use. Potential BMPs that could address the specific areas of concern shown in Exhibit F.1 in Appendix F are listed in Table 5.5. The BMP recommendations are based on assuming the contamination source is general runoff. Further investigation should be performed using first flush monitoring or other techniques.

This analysis assumed 100 percent uptake (or utilization rate) by owners and developers; however, 25 percent uptake is more common in practice. The rate of uptake can be increased by providing incentives for implementation and maintenance of BMPs. One common approach is to award credits towards the storm water utility fee which are renewed periodically with proof of maintenance. Another approach used where there is a maximum lot density is an allowance for higher density lots in combination with conservation areas to encourage conservation development.

The participation of government agencies is necessary for increasing the rate of uptake in two additional ways. The public right-of-way is included in the 100 percent uptake assumption, so capital improvement projects would need to include BMPs such as bioswales and riparian buffer zones. Also, acceptable modeling standards for BMPs would need to be developed in order to facilitate the review process and to produce reliable estimates of flood risk. In the development of the modeling standards, the possibility of back-to-back events should be considered since the infiltration rates and storage capacities of the BMPs will be affected by the length between storm periods. With modeling standards in place, the BMPs could be used to meet no adverse impact requirements while enhancing the water quality of runoff and reducing development infrastructure costs.

Table 5.5 Recommended Alternative Development BMPs for Water Quality Concerns

Contaminant	Location	Adjacent Land Use	Potential BMP	Comments
Escherichia coli	**Station 12836** (Leon Creek at State Highway 16 S. near Applewhite Road)	Range, cultivated, and undeveloped land	Bioretention, riparian buffer zones, filter strips	The source of contamination needs to be identified. If it is of human origin, it could signal a leaking, cracked, or malfunctioning wastewater collection system. If it is of animal origin, potential BMPs to address water quality issues could include the following: • Storm drain outfall – bioretention could be implemented on the inflow side of the storm drain systems. • Agricultural runoff – filter strips and riparian buffer zones could be used between the fields and the stream. • Wildlife in undeveloped areas or under bridges – other solutions should be explored.
	Station 12840 (Leon Creek at Quintana Road)	Industrial, commercial, residential, cultivated, and undeveloped land		
	Station 12846 (Leon Creek upstream of State Highway 151 at W. Commerce Street)	Industrial, cultivated, and undeveloped land		
Low concentrations of dissolved oxygen	**Station 12842** (Leon Creek downstream of W. Military Drive near Citrus Road)	Industrial , range, and undeveloped land		The cause of low dissolved oxygen concentrations should be determined. If it is a result of high levels of bacteria or nutrients, the recommendations for *Escherichia coli* and/or Nitrates would apply.
Lead, cadmium, and arsenic	**Station 12838** (Leon Creek at IH-35 S. near Cassin Road)	Industrial, commercial, residential,range, and undeveloped land	Bioretention or filter strips	These contaminants could be attributed to current or past land use. Because these contaminants adsorb to soils, bioretention ponds are recommended rather than filter strips or buffer zones. Bioretention ponds can be designed for particular contaminants by selecting the appropriate filter media and vegetation. The design could allow for easier containment and removal of contaminants if uptake by vegetation does not occur. Redevelopment or clean up in these areas could incorporate specially selected vegetation in bioretention or filter strips to promote uptake or degradation of contaminants.
	Station 12841 (Leon Creek downstream of W. Military Drive near Quintana Road)	Industrial, range, and undeveloped land		
Ammonia	**Station 12845** (Leon Creek at U.S. Highway 90)	Industrial, commercial, and residential with some undeveloped land	Bioretention, buffer zones, filter strips	Due to the diversity of land use in this area, the source of contamination should be identified.
Chloride, phosphorus and nitrates	**Station 14195** (Leon Creek at confluence with Comanche Creek near Mauermann Road)	Range, cultivated, and undeveloped land	Riparian buffer, filter strips	Riparian buffers and filter strips are better suited for application along agricultural fields than bioretention ponds. However, in this case, the riparian corridor has been preserved, yet the contamination persists. It could be related to an upstream break in the riparian buffer or underdrain systems bypassing the buffer zone.
Total dissolved solids and sulfates	**Station 14198** (Leon Creek downstream of Applewhite Road near Mauermann Road)	Industrial (WWTP), and undeveloped land	Bioretention, buffer zones, filter strips	Capturing, filtering, and/or infiltration solids before they reach the stream system would contribute to reducing the concentration of dissolved solids.

6.0 Conclusions and Recommendations

The LCWMP provides an overview of various flood mitigation options across the Leon Creek watershed.

The LCWMP identified twenty-four "Damage Centers," each representing an area of dense development within the floodplain. Buildings located within damage centers are considered to be at high risk for incurring significant flood-related damages. Overall, 90 percent of at-risk buildings within the Leon Creek watershed were located within the twenty-four damage centers. The study characterized the Level of Flood Protection (LOFP) for buildings and roadways within each damage center, based on the smallest storm event to cause property damage or create dangerous roadway conditions. Additional high-risk roadway corridors were also identified outside the damage centers at the following locations:

- Babcock Road at Camp Bullis Road (Maverick Creek)
- Bandera Road at Ranch Parkway (Los Reyes Creek)
- Culebra Road at Loop 1604 (Culebra Creek)
- FM 1560 at Braun Road (Culebra Tributary C)
- Galm Road at Culebra Road (Government Canyon Creek)
- Military Drive SW near Old Pearsall Road (Leon Creek)
- Scenic Loop Road at Menchaca Road (Helotes Creek)

The LCWMP study also included an analysis of scour risks based on existing conditions within the full watershed area. Due to soil types, high flow rates, and velocities, most of the watershed is at high risk of scour, so scour mitigation and erosion protection techniques should be considered for all potential flood mitigation projects.

An assessment of available water quality data did not indicate any watershed-wide concerns that could be addressed in combination with flood control. Environmental enhancement, the preservation of riparian corridors, natural channel design potential, and water quality enhancement were considered as multi-use objective opportunities for the flood mitigation projects which could reduce the threat of future stream quality degradation.

Through a series of workshop discussions, the Study Participants (SARA, CoSA, and Bexar County) selected nineteen damage centers, for which potential flood mitigation projects were then developed. Flood mitigation strategies included regional storm water facilities (RSWF), enhanced channel design, selective clearing, flood protection barriers and property acquisition. All flood mitigation projects included recent developments and approved LOMRs not incorporated in the Bexar County DFIRM Remapping Study (See Appendix B).

These projects, in addition to five current planned projects from the Bexar County Flood Control Capital Improvement Program (CIP) and the City of San Antonio (CoSA), were evaluated in terms of flood mitigation effectiveness, local and downstream impacts, environmental considerations, permitting requirements, construction costs, and multi-use objective opportunities. The study evaluated these projects individually and in combination and ranked them according to a qualitative

prioritization matrix developed by the Bexar Regional Watershed Management (BRWM) partners. Based on the qualitative matrix, the projects identified with the most benefits were, in ranking order:

- Government Canyon Creek RSWF (Culebra Creek) – *FRR = 0.53*,
- Helotes Creek RSWF – *FRR = 1.71*,
- Huebner Creek RSWF at Prue Road (LC-15) – *FRR = 2.81*,
- Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8) – *FRR = 0.21*,
- Culebra Creek NWWC with Culebra Road Bridge Improvements – *FRR = 0.22*,
- Huebner Creek at Eckhert Road NWWC – *FRR = 0.30*,
- Leon Creek NWWC with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17) – *FRR = 0.19*,
- Leon Creek at Grissom Road Enhanced Conveyance – *FRR = 0.17,*
- Culebra Creek at FM 1560 Earthen Flood Protection Barrier – *FRR = 9.60*, and
- Huebner Creek at Evers Road NWWC – *FRR = 0.18*.

While these projects ranked high individually, they would provide duplicate coverage if combined while leaving some high-risk areas unaddressed. Among all the individual projects evaluated for mitigating flood damages within the Leon Creek Watershed, thirteen projects are recommended for implementation based on ranking and location. These thirteen projects were evaluated together to determine potential flood damage reductions and the required order of construction phasing. Implementing the recommended projects together reduced annual flood damages within the watershed by a total of $1,165,300 with an overall Flood Reduction Ratio of 0.26.

Of all the recommended projects, the following two projects have the most significant, wide-ranging flood reduction impacts and should be considered highest priority:

- Helotes Creek RSWF
- Government Creek RSWF

The four recommended projects along Huebner Creek have significant local impacts and should be constructed with phasing in mind, starting with the RSWF followed by the most downstream project and working upstream. Phasing for the Huebner Creek projects is independent of the other recommended projects. The recommended order is:

- Huebner Creek RSWF at Prue Road (LC-15)
- Huebner Creek at Bandera Road NWWC (LC-17) and Ingram Road Bridge Improvements (LC-8)
- Huebner Creek at Evers Road NWWC
- Huebner Creek at Eckhert Road Optimized NWWC

Next, the following optimized projects may be implemented at a relatively low cost with minimal downstream impacts after the completion of both Helotes Creek RSWF and Government Canyon Creek RSWF:

- Culebra Creek at Timber Path Optimized Selective Clearing Program
- Leon Creek Optimized Selective Clearing Program with Ingram Road Bridge Improvements (LC-8) and Huebner Creek Flood Protection Barrier (LC-17)

Alternatively, Culebra Creek NWWC with Culebra Road Bridge Improvements may be implemented with minimal downstream impacts after the completion of at least one of three upstream detention projects – Government Canyon Creek RSWF, Helotes Creek RSWF, or Easterling RSWF if Government Canyon Creek RSWF and Helotes Creek RSWF are not selected.

Finally, the following projects have localized impacts and may be implemented independently or simultaneously with other projects:

- Culebra Creek Tributary A at Tezel Road Enhanced Conveyance
- Maverick Creek NWWC with W. Hausman Road Bridge Improvements (LC-10)
- French Creek at Guilbeau Road NWWC
- Leon Creek at Grissom Road Enhanced Conveyance
- Hausman Road Drainage Project Phase I (LC-9)

Alternative development methods were also assessed as a potential flood mitigation strategy. The results from representative areas of the Leon Creek watershed indicated that the use of low impact development, conservation development, and other alternative development methods would reduce future increases in flood risk due to new development compared to traditional development methods. They could also be used in redevelopment projects as an alternative to upgrading storm water infrastructure. Based on a qualitative assessment of performance in reported studies, riparian buffer zones, bioretention, and filter strips would be appropriate BMPs for the kinds of water quality concerns identified in the Leon Creek watershed, assuming the sources of contamination are related to current land use. In order to increase the rate of use of alternative development methods, agencies should create incentives, facilitate the permitting and review process, and incorporate BMPs into public projects. With agency facilitation, the BMPs could be used in future projects to meet no adverse impact requirements while enhancing the water quality of runoff and reducing development infrastructure costs.

7.0 Works Cited

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City of Leon Valley
City Council

Leon Creek Water Shed Master Plan

M&C #2016-4-19-03

April 19, 2016

Purpose

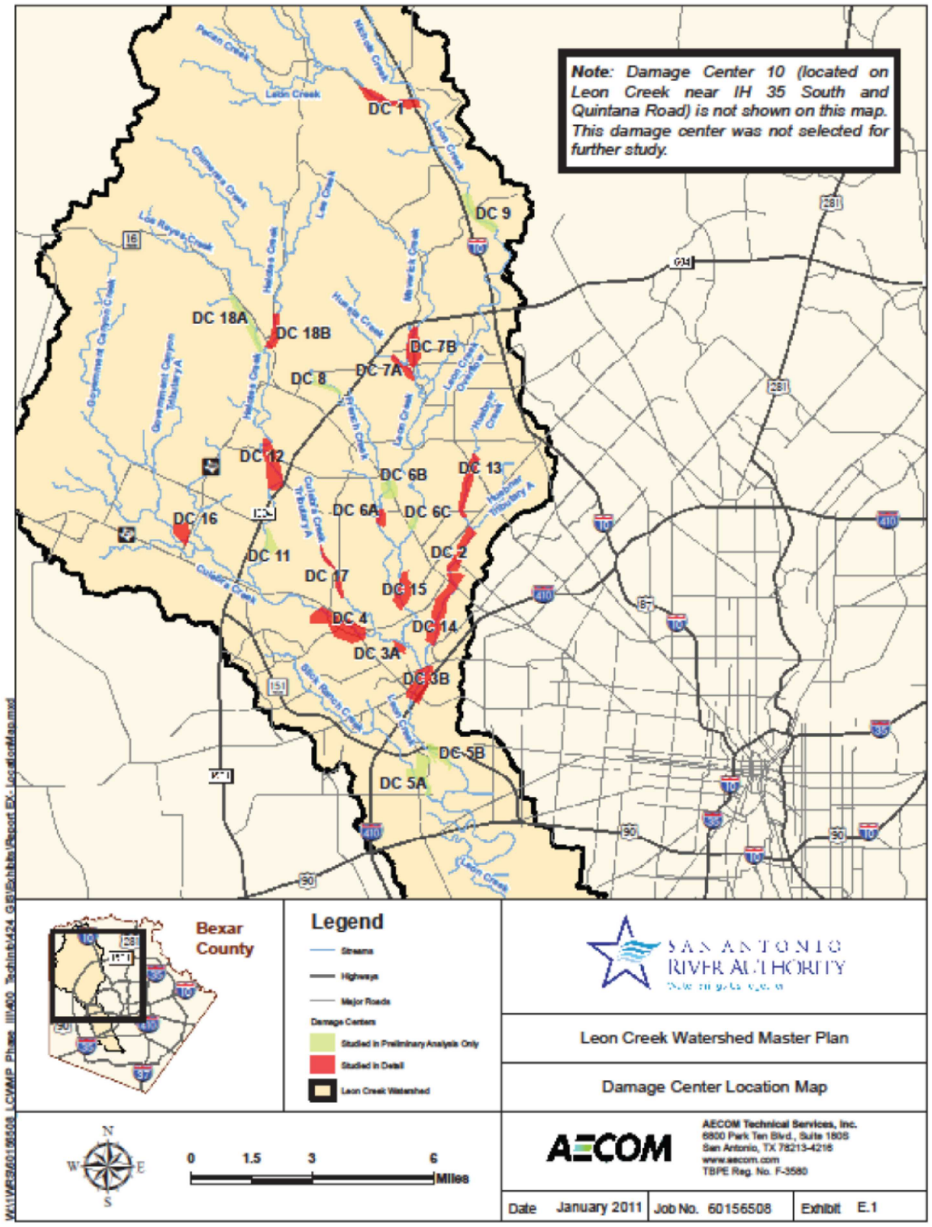
- SARA adopted Leon Creek Water Shed Master Plan.
- Provides a regional drainage solution to drainage in the watershed.
- Comprehensive approach that identifies multiple strategies:
  - Regional Storm Water Facilities (RSWF)
  - Enhanced channel design
  - Selective cleaning along heavily vegetated channels
  - Bridge and culvert upgrades
  - Flood protection barriers and bypass structures, and
  - Property acquisition and flood proofing.

LEONVALLEY

Purpose

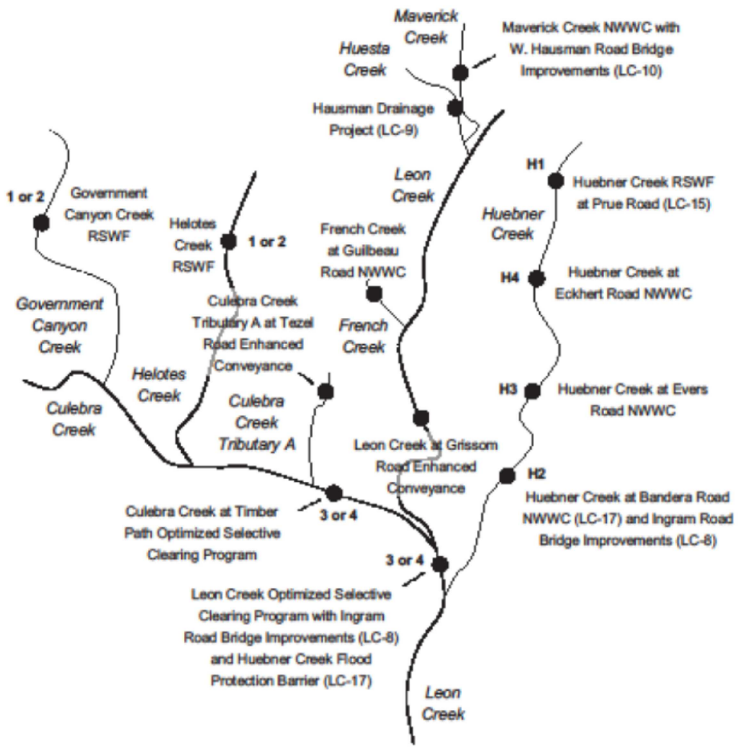
- Plan identifies 26 areas of concentration.
- 40% estimated reduction in annual flood damages.
- Projects within Leon Valley's area:
  - Huebner Creek at Prue Road (LC-15) # 3.
  - Huebner Creek at Eckhert #6
  - Huebner Creek at Evers Road # 10
  - Huebner Creek at Bandera Road (LC-17) #4

LEONVALLEY


Note: Damage Center 10 (located on Leon Creek near IH 35 South and Quintana Road) is not shown on this map. This damage center was not selected for further study.
DC 1
DC 9
DC 18A
DC 18B
DC 7B
DC 7A
DC 8
DC 12
DC 13
DC 6B
DC 6A
DC 6C
DC 16
DC 11
DC 2
DC 17
DC 15
DC 4
DC 14
DC 3A
DC 3B
DC 5B
DC 5A
Bexar County
Legend
Streams
Highways
Major Roads
Damage Centers
Studied in Preliminary Analysis Only
Studied in Detail
Leon Creek Watershed
SAN ANTONIO RIVER AUTHORITY
Leon Creek Watershed Master Plan
Damage Center Location Map
AECOM
AECOM Technical Services, Inc.
8800 Park Ten Blvd., Suite 1805
San Antonio, TX 78213-4216
www.aecom.com
TBPE Reg. No. F-3580
0 1.5 3 6 Miles
Date January 2011
Job No. 60156508
Exhibit E.1

LEONVALLEY

Leon Watershed Combination



January 2011

Purpose

- Adoption identifies Leon Valley support of the Leon Creek Water Shed Master Plan

- Will improve the City of Leon Valley's position rating through the Community Rating System (CRS)
- Provides for lower flood insurance premium costs to floodprone properties

S.E.E. Impact

- Social Equity – Adopting the Plan provides a consistent Water Shed Master Plan for all Property Owners
- Economic Development – Adopting the plan will assist with lowering insurance premiums for business property owners.
- Environmental Stewardship – Provides solutions to downstream pollution from water shed runoff, which reduces toxins to the environment.

LEONVALLEY

Fiscal Impact

- None.

Recommendation

To adopt the San Antonio River Authority's Leon Creek Water Shed Master Plan

Questions?

City of Leon Valley
City Council

Leon Creek Water Shed Master Plan

M&C #2016-4-19-03

April 19, 2016

MAYOR AND COUNCIL COMMUNICATION

DATE: April 19, 2016 **M&C # 2016-04-19-04**

TO: Mayor and Council

FROM: Elizabeth Carol, Director of Development

THROUGH: Kelly Kuenstler, City Manager

SUBJECT: Consider and possible discussion adopting Freeboarding provisions to Chapter 3, "Building Regulations," Article 3.03, "Flood Damage Prevention".

The City of Leon Valley's current Flood Damage Prevention Article was reviewed and compared to the best practice standards provided by the Federal Emergency Management Agency (FEMA) Community Rating Systems Coordinator's manual. Freeboarding provides additional protection for property owners by requiring all finish floor elevation to be one foot above the Base Flood Elevation and eight inches above adjacent grade.

This update works to improve the City of Leon Valley's position in preparation for earning a higher rating through the National Flood Insurance Program survey, which will provide a discounted percentage of flood insurance premiums to Property Owners of Leon Valley.

S.E.E. LEON VALLEY

Social Equity – Adopting this update provides a consistent flood damage prevention set of codes for all Property Owners.

Economic Development – Adopting this update will work to lower insurance premiums for Property Owners.

Environmental Stewardship – Maintains good management of the city's floodplain

FISCAL IMPACT

None

RECOMMENDATION

Amend Chapter 3, "Building Regulations," Article 3.03, "Flood Damage Prevention" to include Freeboarding.

APPROVED: _____ DISAPPROVED: _____

APPROVED WITH THE FOLLOWING AMENDMENTS:

_____

_____

_____

_____

ATTEST:

_____
SAUNDRA PASSAILAIGUE, TRMC
City Secretary

“ARTICLE 3.03 FLOOD DAMAGE PREVENTION*

Sec. 3.03.006 Provisions for flood hazard reduction

a) General standards. In all areas of special flood hazards, the following provisions are required for all new construction and substantial improvements:

(1) All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;

(2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;

(3) All new construction or substantial improvements shall be constructed with materials that resist flood damage;

(4) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding;

(5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system;

(6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters; and

(7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(8) All new construction or addition shall have a finished floor elevation of minimum one (1) foot above base flood elevation and minimum of eight (8) inches above adjacent grade.

ORDINANCE NO. 16-015

AN ORDINANCE AMENDING THE CITY OF LEON VALLEY CODE OF ORDINANCES AMENDING CHAPTER 3, "BUILDING REGULATIONS," ARTICLE 3.03, "FLOOD DAMAGE PREVENTION 3.03.006, PROVISIONS FOR FLOOD HAZARD REDUCTION.

WHEREAS, the City of Leon Valley is authorized to adopt ordinances for the purpose of good government, peace, or order of the municipality pursuant to Chapter 51 of the Local Government Code; and

WHEREAS, the City of Leon Valley has determined it is necessary to update the existing Flood Plain Development regulations for the good government of the city, to assist in obtaining certifications with various agencies and to conform to best practices.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LEON VALLEY, TEXAS THAT:

1. Chapter 3, "Building Regulations," Article 3.03.006, "Flood Damage Prevention," Provision for Flood Hazard Reduction is hereby amended to read as follows:

"ARTICLE 3.03 FLOOD DAMAGE PREVENTION*

Sec. 3.03.006 Provisions for flood hazard reduction

a) General standards. In all areas of special flood hazards, the following provisions are required for all new construction and substantial improvements:

(1) All new construction or substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy;

(2) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage;

(3) All new construction or substantial improvements shall be constructed with materials that resist flood damage;

(4) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air-conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding;

Proposed

(5) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system;

(6) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharge from the systems into floodwaters; and

(7) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(8) All new construction or addition shall have a finished floor elevation of minimum one (1) foot above base flood elevation and minimum of eight (8) inches above adjacent grade.

This ordinance shall become effective on and after its passage, approval and publication, as prescribed by law.

PASSED, ADOPTED AND APPROVED by the City Council of the City of Leon Valley this the 19th day of April, 2016.

APPROVED

_____
CHRIS RILEY
MAYOR

Attest: _____
SAUNDRA PASSAILAIGUE, TRMC
City Secretary

Approved as to Form: _____
ROXANN PAIS COTRONEO
City Attorney

Proposed

City of Leon Valley
City Council

Flood Damage Prevention Ordinance

M&C #2016-4-19-04

April 19, 2016

Subject

- The current Flood Damage Prevention article was reviewed and compared to the best practice by the Federal Emergency Management Agency (FEMA)

- Community Rating Systems Coordinators Manual.

LEONVALLEY

Purpose

- Provides Free boarding Provision
  - Finished floor one foot above Base Flood Elevation
  - Finished floor eight inches above adjacent grade
- National Flood Insurance Program survey
- Discounted percentage of flood insurance premiums to Property Owners of Leon Valley.

LEONVALLEY

S.E.E Impact

- Social Equity – Adopting this update provides a consistent flood damage prevention set of codes for all Property Owners.
- Economic Development – Adopting this update will work to lower insurance premiums for Property Owners.
- Environmental Stewardship – Maintains good management of the city's floodplain

LEONVALLEY

Fiscal Impact

- None.

Recommendation

Adding Freeboard provision to Chapter 3, “Building Regulations,” Article 3.03, “Flood Damage Prevention” Ordinance.

Questions?

City of Leon Valley
City Council

Flood Damage Prevention Ordinance

M&C #2016-4-19-04

April 19, 2016

MAYOR AND COUNCIL COMMUNICATION

M&C #2016-04-19-05

DATE: April 19, 2016

TO: Mayor and Council

FROM: David Dimaline, Public Works Assistant Director

THROUGH: Kelly Kuenstler, City Manager

SUBJECT: Consider, discuss and possible action setting forth the Leon Valley Community Pool Operating Policy for the 2016 Swimming Season

Purpose

The City of Leon Valley owns and operates the community pool located at 6600 Strawflower. Currently, the City contracts with San Antonio Pool Management to oversee operations of the pool, which includes the staffing of adequate life guards, maintaining water quality, and monitoring user activity. Maintenance of the grounds and any repairs are performed by the Public Works Department.

During the past two swimming seasons, the City of Leon Valley has not received any complaints regarding water quality or safety issues; however the City did receive complaints last season regarding groups from outside Leon Valley using the pool, some crowding during weekends, and vandalism to vending machines occurred.

Fiscal Impact

The operating budget for the Community Pool for FY 16 is $60,052. This was included in the General Fund portion of the adopted FY 16 budget.

Recommendation

Staff recommends for the FY 16 swimming season: (1) the City continues to contract with San Antonio Pool Management, (2) Operate with the same schedule as last season with the pool opening at 12:00 p.m., closing at 8:00 p.m., and closed Mondays unless of a holiday, (3) Operate the community pool free for Leon Valley residents, the Marlins swim team, and City employees only.

Recommendation #3 will require Leon Valley residents to show proof of address by driver's license or utility bill. This will be verified by SA Pool Management at the gate entrance. Residents would be allowed up to eight guests per visit. The community's

swim team, the Marlins, would continue their practices at the pool before noon, during the week.

S.E.E Statement

Social Equity – Adds to general quality of life for all citizens by improving neighborhoods.

Economic – Improving neighborhoods and service delivery to target areas helps to maintain property values and may encourage relocation to Leon Valley.

Environmental – Residents are provided an opportunity to discard brush and debris reducing the amount of waste and ensuring proper delivery to the landfill.

APPROVED: _____DISAPPROVED: _____

APPROVED WITH THE FOLLOWING AMENDMENTS: _____

_____

ATTEST:

_____
SAUNDRA PASSAILAIGUE, TRMC
City Secretary

Item #13 – Swimming Pool – FY 16 Operations

City Council Meeting

April 19, 2016

LEONVALLEY

Background

- SA Pool Management provides management and oversees operations of the City Pool.
- Memorial Day – Labor Day
  - Staffing of Lifeguards
  - Responsible for maintaining water quality, logging 3x daily; and monitoring membership

LEONVALLEY

2016 Schedule

Monday:	Closed
Tuesday:	12:00 p.m. – 8:00 p.m.
Wednesday:	12:00 p.m. – 8:00 p.m.
Thursday:	12:00 p.m. – 8:00 p.m.
Friday:	12:00 p.m. – 8:00 p.m.
Saturday:	12:00 p.m. – 8:00 p.m.
Sunday:	12:00 p.m. – 8:00 p.m.

Pool will be closed Monday, unless holiday (Memorial Day, Fourth of July, and Labor Day)

Background

- During the past two years, we have not received any complaints regarding water quality or safety issues.
- Last year, we received complaints regarding groups from outside Leon Valley using the pool, some crowding during weekends, and vandalism to vending machines occurred.

LEONVALLEY

Recommendation

- Recommend operating pool free for Leon Valley Residents
  - Residents to show proof of Address (Drivers license, utility bill) at entrance. This will be verified by SA Pool Mgt.
  - Residents will be allowed up to 8 guests per visit
  - Continue to allow community swim team (Marlins) to practice at the pool before noon

Strategic Goals Statement

- Item 2 (g) Make Improvements/Investments to Rimkus Park
  - The pool is considered to be a part of the park system.

S.E.E. Statement

- *Social Equity* – Adds to general quality of life for all citizens.
- *Environmental Stewardship* – Reduces the amount of automobile pollutants, as residents within that area typically walk to the pool.
- *Economic Development* – The pool enhances the amenities offered by the City to its residents, which may encourage relocation.

LEONVALLEY

Item #13 – Swimming Pool – FY 16 Operations

City Council Meeting

April 19, 2016

LEONVALLEY

MAYOR AND COUNCIL COMMUNICATION

DATE: April 19, 2016 **M&C #2016-04-19-06**

TO: Mayor and Council

FROM: Kelly Kuenstler, City Manager

SUBJECT: Consider, discuss and possible action to coordinate with the Office of Representative Joaquin Castro and the United States Post Office to designate 78238 as the only zip code for Leon Valley.

PURPOSE

The purpose of this item is to discuss and consider moving forward with a process to designate 78238 as the only zip code in Leon Valley. There have been ongoing issues for the residents of Leon Valley that have a 78240 Zip code, dealing with mail not being delivered, mail not being delivered timely and driving to IH10 to DeZavala to retrieve packages.

The US Postal Service outlined the process in a letter dated March 14, 2016 (See Attached). The process is as follows:

1. Submit a request in writing with any rationale and justification to the Rio Grande District Manager
2. After the request is received the following will occur:
    a. An operational review will be conducted to determine if the request is feasible (no cost and/or operationally prohibitive).
    b. If the operational review deems the request to be feasible, a customer survey will be conducted for those customers, both residential and business, that would be impacted by the proposed change.
    c. If the customer survey is positive (a simple majority of the responses received in favor of the request), the request would be implemented as soon as operationally feasible.
    d. If the customer survey is negative (a simple majority of the responses received opposed to the change), the request would be denied and the City of Leon Valley would be prohibited from requesting a review for 10 years.

S.E.E. STATEMENT

Social Equity – Changing the Zip code from 78240 to 78238 will allow all residents the same timely delivery service and the ability to pick up their packages locally.

Economic Development – Changing the Zip code will assist in promoting the City of Leon Valley community identity.

Environmental Stewardship - With residents being able to pick up their packages locally this will assist in lower fuel emissions, preserving natural resources and promoting earth friendly practices.

FISCAL IMPACT

None indicated in the letter. It does not seem that the City would have to contribute monetarily to the cost of the survey.

RECOMMENDATION

The recommendation is to submit a request for the Post Office to amend the zip code of the Leon Valley residents that have a 78240 Zip Code to 78238.

APPROVED: _____ DISAPPROVED: _____

APPROVED WITH THE FOLLOWING AMENDMENTS:

_____

_____

_____

ATTEST:

_____
SAUNDRA PASSAILAIGUE, TRMC
City Secretary

MANAGER, CONSUMER AND INDUSTRY CONTACT
RIO GRANDE DISTRICT

MAR 1 5 2016

UNITED STATES POSTAL SERVICE

March 14, 2016

The Honorable Joaquin Castro
Member of Congress
Attn: Toni Hernandez-Serna
727 E Cesar E Chavez Blvd Rm B-128
San Antonio, TX 78206-1217

Dear Congressman Castro:

This is in response to your most recent inquiry on behalf of Mr. Benny Martinez, a City of Leon Valley Councilman in San Antonio, TX 78238, concerning his request for their own ZIP Code.

I apologize for the inconvenience Mr. Martinez has experienced and have forwarded his correspondence with the District Address Management Systems Manager Larry Lindsey.

Mr. Lindsey has informed us that per the USPS Postal Operations Manual, section 439.21 *Delivery ZIP Code,* the Postal Service will not assign ZIP Codes solely to provide community identity.

Mr. Lindsey stated that currently, the municipal limits cross the following two ZIP Codes: 78238 (Leon Valley Branch) and 78240 (Cedar Elm Station). Should the municipality of Leon Valley wish to request an adjustment to a postal ZIP Code boundary, documented endorsement of the request by the local government is strongly recommended to ensure that the non-postal interests of all customers are represented fairly and are in concert with long-term municipal planning.

Requests to amend postal ZIP Code boundaries must receive careful, thorough and balanced evaluations. The unique situations pertinent to each ZIP Code boundary must be considered.

All specific changes desired, must be submitted in writing with any rationale and justification to the Rio Grande District Manager and addressed to:

Mary Sullivan
District Manager
USPS Rio Grande District
1 Post Office Dr
San Antonio TX 78284-9998

Enclosed is the outline policy detailing the process and requirements. Upon receipt of the request the following will occur:

1. An operational review will be conducted to determine if the request is feasible (no cost and/or operationally prohibitive).

2. If the operational review deems the request to be feasible, a customer survey will be conducted for those customers, both residential and business, that would be impacted by the proposed change.

3. If the customer survey is positive (a simple majority of the responses received in favor of the request), the request would be implemented as soon as operationally feasible.

1 POST OFFICE DR
SAN ANTONIO, TX 78284-8401
210-368-8498
FAX: 210-368-8313

4. If the customer survey is negative (a simple majority of the responses received opposed to the change), the request would be denied and the City of Leon Valley would be prohibited from requesting a review for 10 years.

However, as a courtesy to the citizens of Leon Valley and only if this municipal request is strictly about community identity, Mr. Lindsey has informed us that every reasonable effort will be made to accommodate the request which would assign a last line city name of "Leon Valley" to all streets / block ranges which are within the municipal limits of Leon Valley in both ZIP Codes 78240 and 78238. Once approved, this would allow customers to use Leon Valley TX 78238 or Leon Valley TX 78240 on their mail.

Once again, I apologize for the difficulties Mr. Martinez has encountered and thank you for the opportunity to address your constituent's concern.

Sincerely,

Cathy Carmona

Cathy Carmona

Re: LA CA127563842

DESIGNATION OF 78238 AS THE ONLY ZIP CODE FOR LEON VALLEY

Regular City Council Meeting

April 19 ,2016

LEONVALLEY

Purpose

- To discuss and consider moving forward with a process to designate 78238 as the only zip code in Leon Valley
- There has been ongoing issues for the residents that have a 78240 Zip code
  - dealing with mail not being delivered
  - mail not being delivered timely
  - driving to IH10 to DeZavala to retrieve packages.

LEONVALLEY

Process to Change the Zip Code

- Submit a request in writing with any rationale and justification to the Rio Grande District Manager
- After the request is received the following will occur:
  - An operational review will be conducted to determine if the request is feasible (no cost and/or operationally prohibitive).
  - If the operational review deems the request to be feasible, a customer survey will be conducted for those customers, both residential and business, that would be impacted by the proposed change.
  - If the customer survey is positive (a simple majority of the responses received in favor of the request), the request would be implemented as soon as operationally feasible.
  - If the customer survey is negative (a simple majority of the responses received opposed to the change), the request would be denied and the City of Leon Valley would be prohibited from requesting a review for 10 years.

LEONVALLEY

S.E.E. Statement

- Social Equity – Changing the Zip code from 78240 to 78238 will allow all residents the same timely delivery service and the ability to pick up their packages locally.
- Economic Development – Changing the Zip code will assist in promoting the City of Leon Valley community identity.
- Environmental Stewardship - With residents being able to pick up their packages locally this will assist in lower fuel emissions, preserving natural resources and promoting earth friendly practices.

LEONVALLEY

Fiscal Impact

- None indicated in the letter. It does not seem that the City would have to contribute monetarily to the cost of the survey.

LEONVALLEY

Recommendations

- The recommendation is to submit a request for the Post Office to amend the zip code of the Leon Valley residents that have a 78240 Zip Code to 78238.

DESIGNATION OF 78238 AS THE ONLY ZIP CODE FOR LEON VALLEY

Regular City Council Meeting

April 19 ,2016

Leon Valley Library Board of Trustees Minutes

March 8, 2016

Those present at the meeting were Library Director Sandy Underwood, Board President Katie Gawltney, Vice Chair Jill Crane, Secretary Peggy Proffitt, and Board members Heather Haskin and Barbara Owens. Also present were Brigid Cooley, Teen Advisor and Carol Poss with the Friends of the Leon Valley Library. Dr. Staph was unable to attend because of ongoing illness. The meeting was called to order at 6.32 pm.

There were no citizens to be heard.

After a motion from Jill and seconded by Carol, the group approved the minutes from the February 9, 2016 Board Meeting.

Brigid announced plans for making a photo album as a gift to former Library Directory Joyce Trent. It will be presented to her at the May dedication of the Children's Wing and the Peggy Bissett Meeting Room. The teens are also planning a poetry event for April.

The Board members discussed the idea of having our Teen Advisor become a voting member of the group. Sandy will take this suggestion to the city for their approval.

All Board members were asked to update their information to include email addresses when possible. This will help Sandy if needs to communicate with Board members between scheduled meeting dates.

The following policy update was approved:

Under the conduct policy one change was implemented:

In Section 3, paragraph "d" the word "action" was changed to "actions."

Also in question in Section 3 paragraph "e" was who would hear patrons' requests regarding violation of library policy.

Under the reference policy two changes were implemented:

i) In the second paragraph, delete the first sentence.
ii) Add the word "reference" before the question.
iii) A fee schedule will be added.

A motion to approve the changes was made by Jill and seconded by Heather. The motion was passed.

The planning for the dedication of the Children's Wing and the Meeting room is under way. The date of the dedication is May 7, 2016 at 2:30 pm. Jill and Barbara are working on ordering plaques to be given at the event. Sandy is looking for appropriate signage for the Children's Wing and Peggy Bissett Meeting room. Refreshments will be served. Carol will be checking with the San Antonio Food Bank and The Leon Valley Café. Sandy is working on the list of those to be invited to include families of the honorees, Leon Valley staff and Council Members. The public is also invited to attend.

A change has been made to our Strategic Plan mission statement. The following is our statement: "Our mission is to provide quality resources, information and programs to the residents of the greater Leon Valley."

The Library will hold its annual Volunteer Appreciation on April 9, 2016 at 2:30 here in the building. The theme is "Celebrate Service – Celebrate You!" Beverages and snacks will be available for the volunteers to enjoy.

Sandy gave us an update on the new budget. She is requesting $18,000.00 for a new air conditioning unit as well as $7,000.00 for security cameras. A copy of the library ~~statics~~ statistics will be attached to these minutes.

Carol reported that the Spring Book sale made $765.00. An additional amount of $80.00 was received for Friends of the Library memberships. She also announced that the group would meet at the annex on March 10, 2016 to weed out the collection in the annex. Books which have been on the shelves the longest will be

pulled and given to charity.

There being no further business, the meeting was adjourned at 7:15 pm.

Respectfully Submitted,

Peggy Proffitt

Mary F Sees

LEON VALLEY
DEEP ROOTS. BIG IDEAS.

6400 El Verde Road, Leon Valley, TX 78238

MINUTES OF THE MEETING OF THE LEON VALLEY TREE ADVISORY BOARD

Meeting of the Leon Valley Tree Advisory Board (TAB) at 6:00 PM, on Monday, March 21, 2016, in the Leon Valley City Hall Conference Room, at 6400 El Verde Road, Leon Valley, Texas.

I. Poll for Attendance and Determination of a Quorum.

- Staff Liaison: Elizabeth Carol (Present)
- TAB Forester: Mark Kroeze, Alamo Region Urban Forester (Absent)
- Members Present: Irene Baldridge, Thomas Benavides, Denise Berger, Diana Sarfin, and Rich Sarfin
- Members Absent: Melinda Dawson and Mary Key

II. Approval of Minutes - January 25, 2016.

- Minutes were approved as written.

III. Review Leon Valley Wildfire Protection Plan.

- Plan items discussed below will be sent to the Fire Department for evaluation:
  - -- Page 5 -> Confirm Point of Contact for City Public Service on chart.
  - -- Page 7 -> Leon Valley just added a new brush truck. Confirm Truck "Type" under Leon Valley's "Resource" section.
  - -- Page 9 -> Name the schools in the Schools section.
    - --- John Marshall High School.
    - --- Leon Valley Elementary School.
    - --- Rita Kay Driggers Elementary School.
    - --- School of Science and Technology.
  - -- Page 13 -> Confirm/update values in "Estimated Values at Risk" section.
  - -- Page 13 -> Add the LC-17 Project area to the "Hazardous Fuels Reduction Projects" section.
  - -- Page 19 -> Remove the 1st & 2nd paragraphs in the "Emergency Facilities/Equipment Enhancements" section since Leon Valley now has a new fire station as well as a new brush truck.
  - -- Pages 14-18 -> Identify Color Legend for the different colors on the pictures.
  - -- There are areas in Leon Valley that have standing live oak trees that have died from oak wilt. Would it be appropriate to list those areas/trees in this plan since they present a fire hazard?

IV. Arbor Day Polo Shirts.

- Ms. Carol had already e-mailed the information on the polo shirts to the TAB prior to this meeting. They will be green with Leon Valley's blue logo. TAB members will now e-mail their shirt size to Ms. Carol.

V. Continuation of plans to plant trees in Leon Valley Park system.

- TAB currently has a general set of "Tree Planting Plan Outline Notes", however, a specific plan cannot be developed without objectives/requirements.
- Ms. Carol will develop a basic plan that will be include two areas that have already been identified by the Park Commission. Those areas includes outside of the out-field fence of the ball park and along the walking path at Raymond Rimkus Park.
  - -- Ms. Carol will work with Ms. Melinda Moritz (Park Commission LV Liaison) on the plan that will be presented to the Park Commission for evaluation.

VI. Review Earth Wise Living Event.

- A total of 250 trees (Bur Oak, Mexican Oak, Arizona Cypress, Texas Ebony, Mountain Laurel, and Eve's Necklace) were adopted out by 1100 AM.

VII. **Future Agenda Items.**

- **How to improve tree focus.**
  -- This topic will be revisited in 2016.
- **Website updates.**
  -- This topic will be revisited in 2016.
- **Neighborwood program.**
  -- This topic will be revisited in 2016.
- **Strategic Tree planting goals.**
  -- TAB is currently evaluating cost effective planting strategies at Raymond Rimkus Park.
- **Other Topics.**
  - N/A

VIII. **Adjourn.**

- Meeting adjourned at 7:25 PM.
- The next meeting of the TAB is scheduled for Monday, April 4, 2016, at 6:00 PM, at the Leon Valley City Hall Conference Room.

Denise A Bleeze
Chairperson