2026

NORTH CONCHO RIVER

GREEN INFRASTRUCTURE

assessment & viability

GUIDANCE DOCUMENT

Upper Colorado River Authority

TITLE PAGE

North Concho River Green Infrastructure Guidance Document

FINAL

Contract No. 582-21-10121

Green Infrastructure Assessment & Viability for the North Concho River

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Table 1. *List of Acronyms*

Acronym	Definition
BMP	Best Management Practice
CAC	NPS Contribution Abundance Class
COSA	City of San Angelo
CWA	Clean Water Act
DO	Dissolved Oxygen
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
GPS	Global Positioning System
LID	Low impact development
NPS	Nonpoint Source Program
NWS	National Weather Service
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
TCEQ	Texas Commission on Environmental Quality
UCRA	Upper Colorado River Authority
USGS	United States Geological Survey

DOCUMENT PURPOSE AND BACKGROUND

Watershed Information

The Concho River (Segment 1421) was first listed in 2008 as impaired for depressed dissolved oxygen (DO) in water (Category 5c) in the *2008 Texas Water Quality Inventory and 303(d) List*. The Upper Colorado River Authority (UCRA) has approached this impairment with multiple projects since its first listing in 2008. These projects included constructing various stormwater pollution prevention structures, developing a Water Education Center, and other best management practices (BMPs). The efforts of the UCRA have increased watershed stewardship within the community, resolved annual fish kills, and continued improvement of water quality in the Concho River in San Angelo. However, the river remains impaired and undergoes routine monitoring through the UCRA and TCEQ Clean Rivers Program.

The Concho River, formed in San Angelo by the confluences of its North, Middle, and South Forks, flows 24 miles through Tom Green County, then 29 miles through Concho County where it joins the Colorado River 12 miles northeast of Paint Rock. The river flows predominantly through rolling hills and semi-arid ranch and farmland. The Concho is scenic, containing many small limestone outcroppings and vegetation consisting of mesquite, willow, elm, pecan, yucca, cacti, and grasses.

Three major reservoirs are located on the three upper forks of the Concho. These reservoirs regulate the flow of the main stream. The North Fork of the Concho River from O.C. Fisher Dam to Bell Street City Park in San Angelo is an 8-mile stretch which is suitable for recreational use when the dam is releasing water. The South Concho joins the North Concho at Bell Street Park to form the main stream. Above O.C. Fisher Lake, the North Fork is intermittent. The South Concho River is perennially flowing, spring-fed stream. However, Twin Buttes Reservoir and Lake Nasworthy restrict the natural flow. When Lake Nasworthy Dam is releasing water, the South Concho is sometimes suitable for recreational use from the dam to Bell Street City Park in San Angelo, where it joins the North Fork and forms the main Concho River. The South Fork also is suitable for recreational use a short distance above Twin Buttes Reservoir where "slack water" or still water is created by the lake.

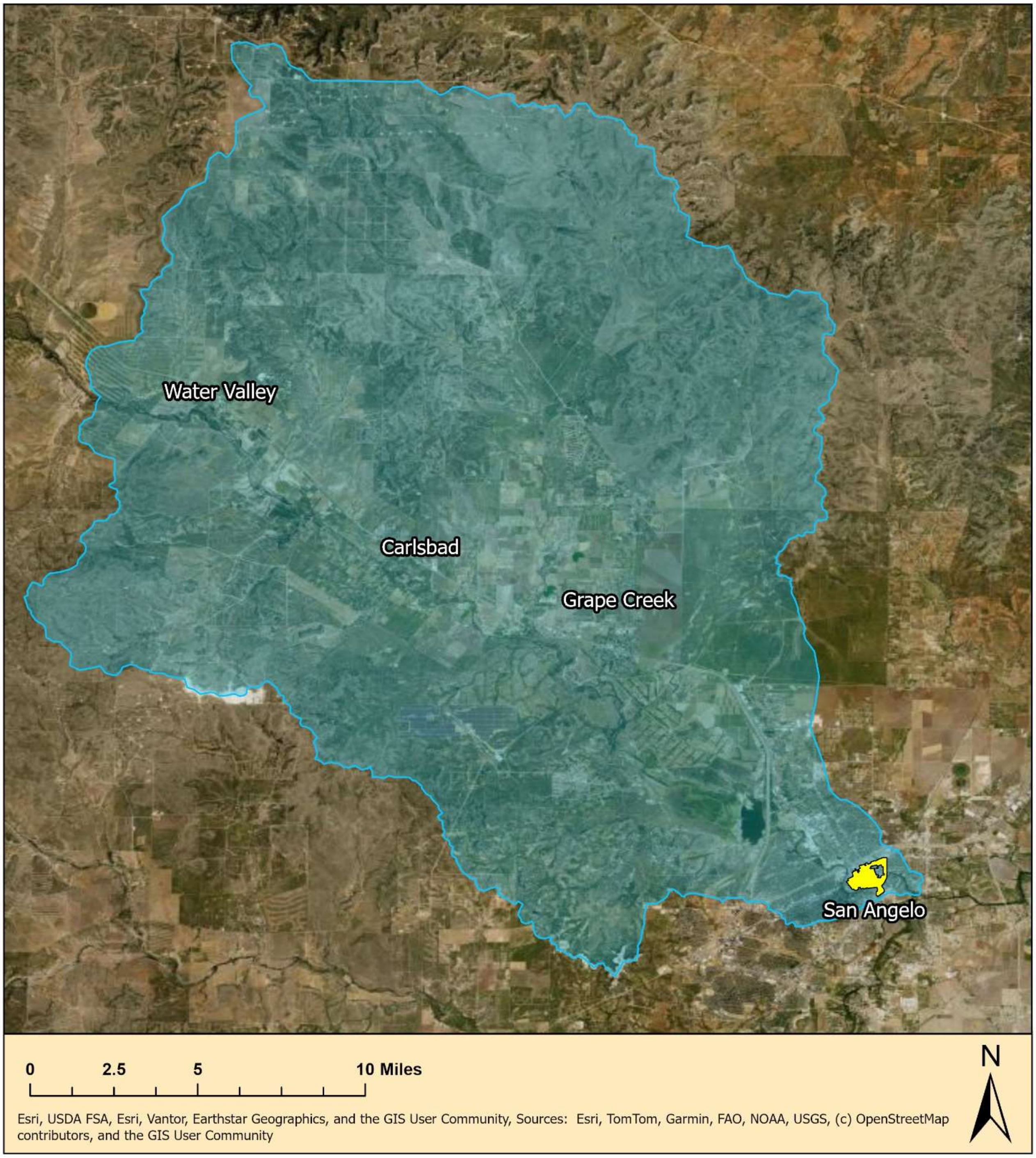

Figure 1. *North Concho river watershed (blue) and project target area (yellow).*

UCRA Green Infrastructure

The City of San Angelo (COSA) Green Infrastructure Project enabled UCRA to develop a plan to implement green infrastructure within the Downtown area of San Angelo. Using ArcGIS mapping software, UCRA created a map of downtown San Angelo that highlights highly trafficked/recreated areas with primarily impervious surfaces and little to no greenery (**Figure 3**).

This green infrastructure project's target area is approximately 0.5mi^2 of surveyable area located between the North Concho River and the West Houston Harte Expressway (see **Figure 2** for map of target area). Along with the creation of maps, the UCRA also performed community and business owner surveys to identify areas with potential nonpoint source (NPS) pollution concerns (flooding, litter, dumping, etc.).

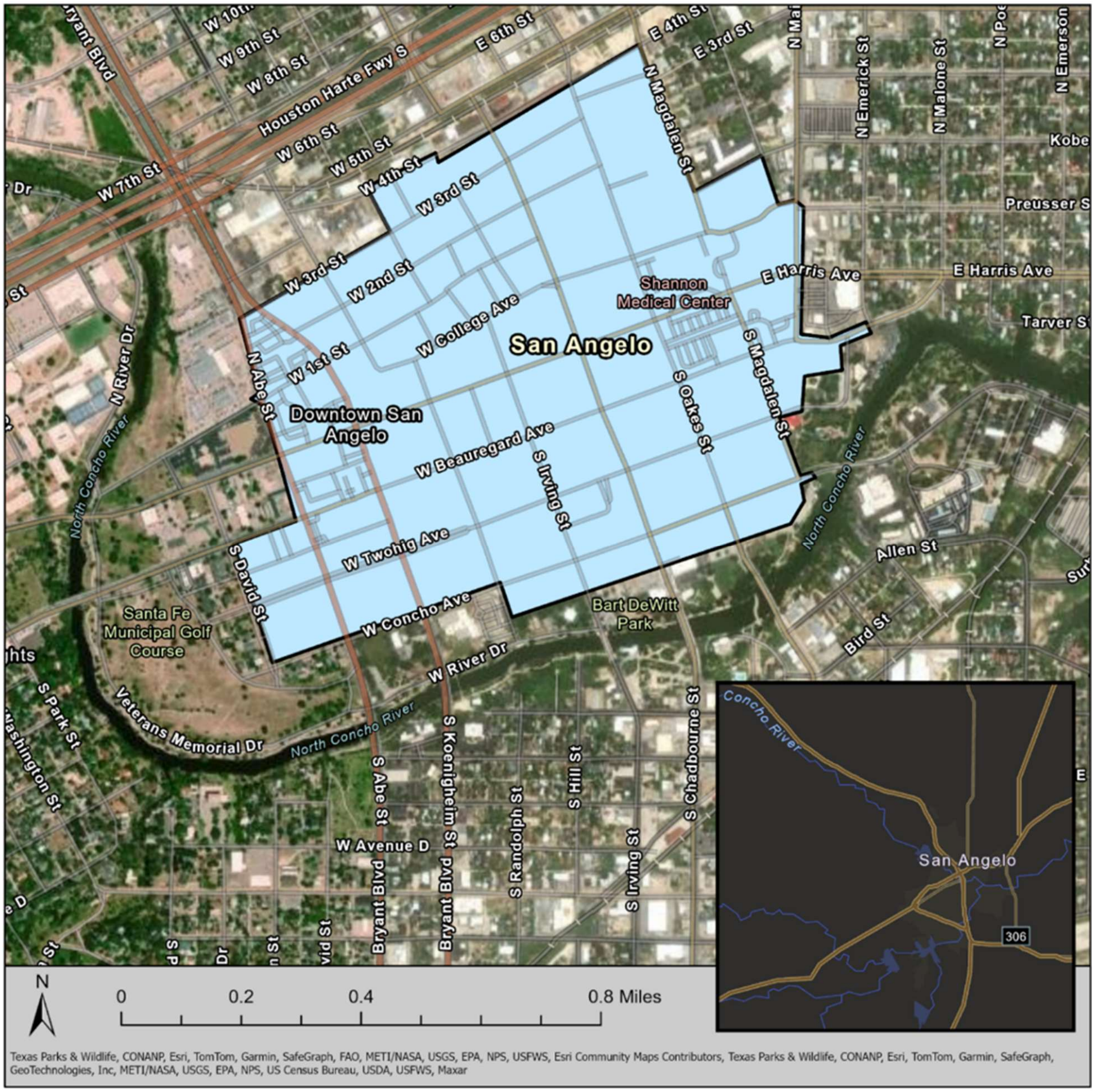

Figure 2. *Map of project target area*

UCRA personnel generated several shapefiles using results from desk, field, and community-based surveys. These files were evaluated on ArcGIS Pro (v. 3.6.2) for the following parameters including (but not limited to): impervious surface to permeable surface ratio, slope, greenery type, total area, runoff volume estimates, and community complaint abundance. The resulting data was classified into potential NPS contribution abundance classes (CAC) 1 to 5 (1 being lowest and 5 being highest). An adaptation of the United States Environmental Protection Agency (EPA) BMP Siting Tool (2014) was employed to identify which green infrastructure BMPs would be most applicable to each NPS CAC within the project area. This document describes project results detailing prioritized green infrastructure project ideas.

This document should be used as a guide to determine which BMPs are of highest priority. Information provided in this document allows UCRA and other water management entities to maximize water quality remediation in the Downtown area while limiting anthropogenic impact to the North Concho River.

BMP SELECTION TOOL

EPA's BMP Siting Tool identifies potential suitable locations/areas for implementing different types of BMPs or low impact development (LID) controls. It supports users with selecting suitable locations that meet the defined site suitability criteria, such as drainage area; slope; hydrological soil group; groundwater table depth; and road, stream, and building buffers. The tool is designed to be used by anyone interested in reducing runoff from a property, including site developers, landscape architects, and urban planners. Unfortunately, support for this tool no longer exists and current software requirements will not run the 2014 program.

To recreate the most relevant segments of the EPA's BMP Siting Tool, UCRA has created a BMP selection tool that identifies areas with little to no greenery in comparison to impervious surface to identify and rank applicable remediation strategies for those areas. The identification and classification are biased toward green infrastructure as a key component. This allows UCRA and other water resource management entities to address water quality concerns such as elevated bacteria and nutrients as well as depressed DO with green infrastructure BMPs in future projects.

BMP Options

Bioretention

Figure a. *A bioretention practice in a suburban road median. Photo credit: U. S. Environmental Protection Agency*

A bioretention area is an engineered sunken area that collects rainwater from rooftops, sidewalks, and streets. Bioretention areas, like rain gardens, are designed to allow water to temporarily pond when it rains and then either soak into the ground or flow through an underdrain. Bioretention practices are well suited to small sites in urbanized settings and can filter stormwater from small to medium storms. Designers generally bypass stormwater discharges from larger storms past a bioretention practice to a larger stormwater control or the storm drain system. Developers can easily install bioretention practices in densely developed urban areas with few pervious surfaces. Bioretention practices can fit into existing parking lot islands, along roads, at intersections or in other landscaped areas as part of a retrofit, redevelopment or new construction.

Cistern/Rain Barrel

Figure b. *A cistern connected to a rainwater collection apparatus and roof. Photo credit: U. S. Environmental Protection Agency*

Rainwater harvesting systems collect rainwater from surfaces like roofs. Captured water can then be used later for irrigation or non-potable water needs. Typical collection methods include backyard rain barrels and larger building cisterns.

Constructed Wetland

Figure c. *A constructed wetland in Minnesota. Photo credit: Minnesota Pollution Control Agency.*

Constructed wetlands combine shallow water level zones and natural processes to remove pollutants through settling and biological uptake. They maintain a pool of water by either intersecting the water table or being designed with an impermeable liner. Design variations of these wetlands allow versatility in multiple regions and in larger urban environments with enough available space.

Dry Detention Pond

Figure d. *A dry detention pond with security fencing. Photo Credit: U. S. Environmental Protection Agency.*

Dry detention ponds (also called dry ponds, extended detention basins, detention ponds and extended detention ponds) are basins that detain stormwater for some minimum time (e.g., 24 hours) to allow particles and pollutants to settle and reduce peak flow rates. They do not have large permanent pools of water—unlike wet ponds—though they often have small pools at the inlet and outlet of the basin. Dry detention ponds have decreased in popularity due to their limited ability to provide water quality treatment.

Grassed Swale

Figure e. *A grassed swale alongside a highway. Photo Credit: U. S. Environmental Protection Agency.*

Bioswales are open channels that use vegetation or mulch to slow, filter and treat stormwater as it flows through a shallow channel or trench. A grassed swale is a type of bioswale that uses grass. Swales are linear practices, well suited for treating stormwater from highways or residential roads. Dense development in urban areas leaves little pervious surface. Grassed swales may not be well-suited to urban areas because they require a relatively large area of pervious surface.

Green Roof

Figure f. *An urban building with planted segments on its rooftop. Photo Credit: U. S. Environmental Protection Agency.*

Green roofs are covered with growing vegetation and a substrate that captures rainwater, then slowly releases it through drains, evaporation, and evapotranspiration. In addition to helping manage stormwater, they can reduce building energy use. Green roofs are ideal for urban areas because they provide stormwater benefits and other valuable ecological services without consuming additional land. To help offset costs and increase adoption of the practice, many highly urban municipalities have incentive programs such as grants or reduced stormwater fees.

Infiltration Basin

Figure g. *Infiltration pond in a natural area. The infiltration portion consists of sand with a high infiltration rate. Photo credit: U. S. Environmental Protection Agency.*

An infiltration basin is a shallow impoundment that infiltrates stormwater into the soil. This control is effective at increasing groundwater recharge (thus increasing baseflow to nearby streams) and can also help remove pollutants from stormwater. Infiltration basins have specific underlying soil requirements, which can preclude them from being feasible on all sites. Infiltration basins are generally not appropriate for dense urban areas largely due to space requirements, the potential of infiltrated water to interfere with existing infrastructure, and the relatively poor infiltration capacity of most urban soils.

Infiltration Trench

Figure h. *Infiltration trenches at Einstein Hospital in East Norriton, Pennsylvania. Photo credit: U. S. Environmental Protection Agency.*

An infiltration trench typically consists of a gravel-filled trench that allows stormwater to soak into the ground. Various infiltration trench designs exist; a design may include an overflow, an underdrain or vegetation. To reduce clogging, design engineers often use settling basins or other pretreatment components in conjunction with the infiltration trench. Infiltration trenches are sometimes suitable for the urban environment, particularly when paired with other stormwater controls. Two site characteristics that can restrict their use are the potential for infiltrated water to interfere with existing infrastructure and the relatively poor infiltration capacity of most urban areas. Additionally, infiltration trenches may need more frequent maintenance in urbanized areas, where they can become clogged with trash and debris.

Porous Pavement

Figure i. *Two examples of permeable pavements. Photo credit: U. S. Environmental Protection Agency.*

Permeable pavements store and/or infiltrate rainwater where it falls. The permeable surface layer can be made of pervious concrete, porous asphalt, or permeable interlocking pavers. Stormwater soaks in at the surface and is stored in underlying layers of soil and gravel. Permeable pavement systems allow stormwater to flow through the gravel and then either infiltrate into the ground or flow through an underdrain.

Sand Filter

Figure j. *A sand filter under construction. Photo credit: U. S. Environmental Protection Agency.*

Sand and organic filters provide water quality improvements through settling and filtration. A sand filter typically consists of two chambers: a settling chamber and a filter bed with sand or other filtering media. As stormwater flows into the settling chamber, large particles settle out, and the filtering media then remove finer particles and other pollutants. Urban areas are usually densely developed places in which little pervious surface is present. Sand filters are generally good options in these areas because they consume little space, particularly if they are underground.

Vegetated filter strip

Figure k. *A vegetated filter strip can infiltrate and treat stormwater flow from adjacent surfaces using a variety of plants. Photo Credit: Steven Chase for U. S. Environmental Protection Agency, 2019.*

Vegetated filter strips (grassed filter strips, filter strips and grassed filters) are vegetated surfaces that treat sheet flow from adjacent surfaces. Filter strips function by slowing stormwater velocities, filtering out sediment and other pollutants, and providing some infiltration into underlying soils. Urban areas are areas with dense development in which little pervious surface exists. Filter strips are impractical in urban areas because they require a large amount of space.

Wet Detention Pond

Figure l. *A wet pond adjacent to a residential neighborhood. Photo Credit: Aaron Volkening (Creative Commons License).*

Wet detention ponds are storm water control structures providing both retention and treatment of contaminated storm water runoff. A typical wet detention pond design is shown in ***Figure m***. The pond consists of a permanent pool of water into which storm water runoff is directed. Runoff from each rain event is detained and treated in the pond until it is displaced by runoff from the next storm. By capturing and retaining runoff during storm events, wet detention ponds control both storm water quantity and quality. The pond's natural physical, biological, and chemical processes then work to remove pollutants.

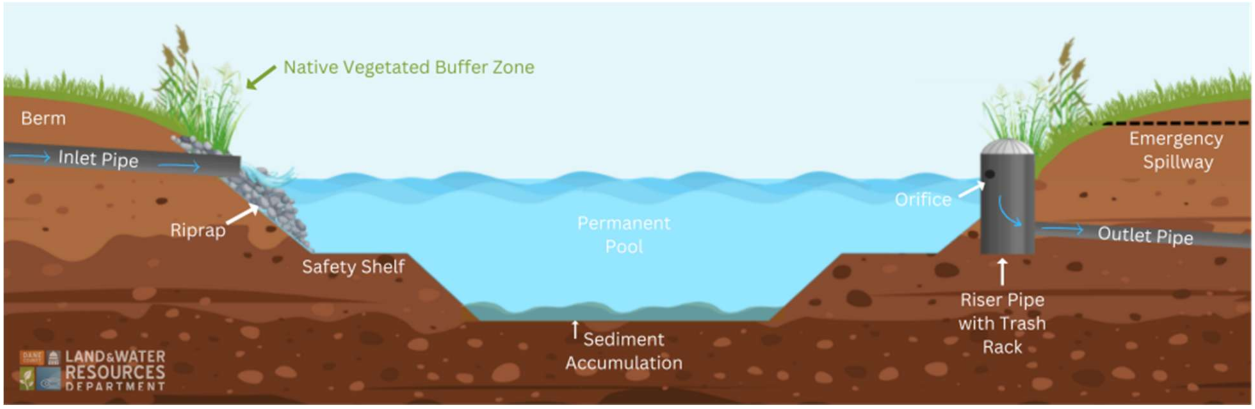

***Figure m**. A general wet pond schematic. Photo Credit: Dane County Land and Water Resources Department, Wisconsin.*

How the tool uses these options

To conceptualize the physical function of BMPs regarding their associated landscape, four categories (or types) of BMPs are presented in the Siting Tool: point LID, point BMP, linear BMP, and area BMP. Point BMPs and LIDs include practices that capture upstream drainage at a specific location and can use a combination of detention, infiltration, evaporation, settling, and transformation to manage flow and remove pollutants. Linear BMPs are narrow, linear shapes adjacent to stream channels that provide filtration of runoff; nutrient uptake; and supplementary benefits of stream shading, wildlife habitat, and aesthetic value. Area BMPs are land-based management practices that affect impervious area, land cover, and pollutant inputs (e.g., fertilizer, pet waste). **Table 2** shows the structural BMP options available in BMP Siting Tool. These distinctions are used to inform which BMP would be most applicable to the project area.

***Table 2.** Structural Green Infrastructure BMP options available in UCRA adapted Siting Tool*

BMP Option	BMP Type
Bioretention	Point LID
Cistern	Point LID
Constructed Wetland	Point BMP
Dry Pond	Point BMP
Grassed Swale	Linear BMP
Green Roof	Area BMP
Infiltration Basin	Point BMP
Infiltration Trench	Linear BMP
Porous Pavement	Area BMP
Rain Barrel	Point LID
Sand Filter (non- surface)	Linear BMP
Sand Filter (surface)	Point BMP
Vegetated Filter Strip	Linear BMP
Wet Pond	Point BMP

Table 3. *GIS Data Requirement for BMP Suitability Analysis*

GIS Layer	Format	Description
DEM	Raster file	The DEM is used to calculate the drainage slope and drainage area that are used to identify suitable locations for BMPs.
NCLD Land Use	Raster file	The USGS Multi-Resolution Land Characteristics Consortium NLCD land use grid is used to eliminate the unsuitable areas for BMPs.
Percent Imperviousness	Raster file	The impervious grid is used to identify suitable locations for BMPs for the given suitability criteria.
Soil	Shape file	The soil data* contain soil properties such as hydrological soil group, which are used to identify suitable locations for BMPs.
Urban Land Use	Shape file	The urban land use data contain the boundaries for the buildings and impervious areas needed to identify suitable locations for BMPs.
Road	Shape file	The road layer is used to identify suitable locations for some BMPs that must be placed within a specific road buffer area.
Stream	Shape file	The stream layer is used to define a buffer so that certain BMP types can be placed outside the buffer to minimize the impact on streams.
Groundwater Table Depth	Shape file	The groundwater table depth layer is used to identify suitable locations for the infiltration BMPs; derived from monitoring data.

**Green-Ampt parameters EPA SUSTAIN report*

DATA COLLECTION AND QUALITY CONTROL

Table 4. *Data sources used for analysis*

Geospatial Data or Data Type	Source	Date(s)	Analysis and/or Processing*	QA Information	Data Use(s)
Construction data (slope, total area, runoff estimates, etc.)	City of San Angelo	For the period of record collected within the project area.	COSA	COSA	EPA BMP Siting Tool, Summary statistics, trend analysis
Monitoring Data (Field measurements: Temperature, dissolved oxygen, pH, etc.)	TCEQ SWQM Program	Most recent water chemistry data will be downloaded from the SWQMIS database.	TCEQ	TCEQ SWQM QAPP; SWQMIS database	Summary statistics, trend analysis
Flow Data	USGS flow data	For the period of record collected by the USGS at stations in or near the project area.	USGS	USGS QAPP; USGS database	Summary statistics, trend analysis
Precipitation Data	National Weather Service (NWS)	Most up-to-date precipitation data will be downloaded from the NWS website following storm events.	NWS	NWS Website	EPA BMP Siting Tool, Summary statistics, illustrative purposes
Income Data	US Census Bureau	Most up-to-date income statistics will be downloaded from the US Census Bureau website.	US Census Bureau	US Census Bureau	Income and Earning Statistics for qualitative purposes.

Quality Control

Quality control measures are described in the Quality Assurance Project Plan (QAPP) approved by the Texas Commission on Environmental Quality (TCEQ). This document is publicly available on the UCRA website under project information: *City of San Angelo (COSA) Green Infrastructure Project Development Quality Assurance Project Plan (QAPP) QTRAK No. 25-325*. The COSA Green Infrastructure Project Development QAPP details information including (but not limited to) data quality objectives, personnel training/certification, assessments and response actions, and management oversight.

DATA ANALYSIS

NPS Potential Contribution Abundance Classification (NPS CAC)

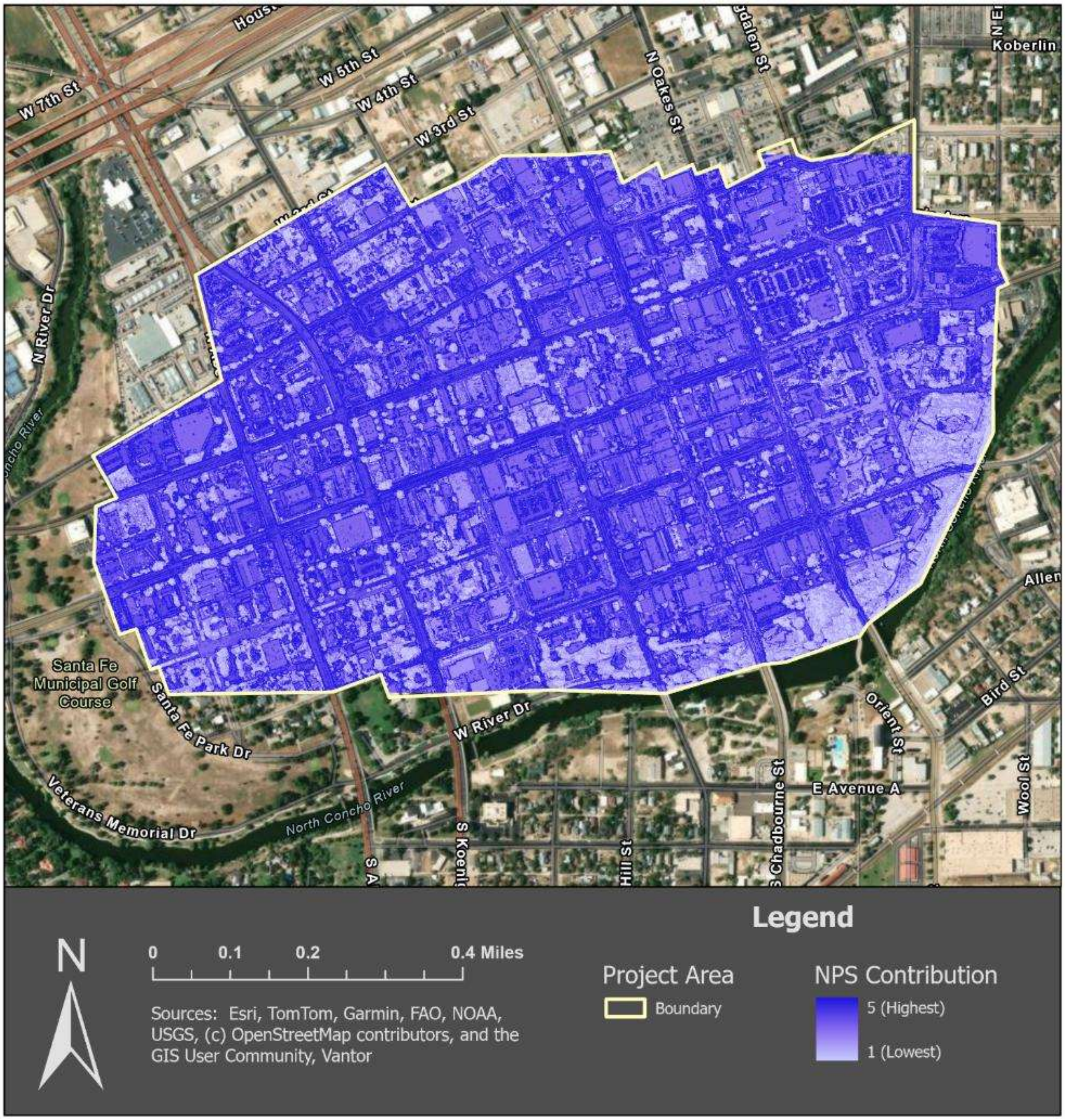

Figure 3. *Potential NPS Contribution within Downtown San Angelo, where areas of dark purple (roadways, parking lots, etc.) have high potential to contribute to NPS pollution relative to areas of light purple (green spaces, permeable surface, etc.), which have low potential to contribute.*

It is important to note that areas targeted in this analysis are not definitively contributing to NPS pollution. This model shows the potential for contribution based on the input criteria and is in no way attempting to identify any specific location as a contributor. During this project, no monitoring has been done to collect nutrient loading, stormwater quality, or bacteria source tracking data. This is for informational purposes only.

A statistical suitability model within ArcGIS Pro was used to classify segments of the project area relative to their potential to contribute to NPS pollution. This classification ranged from 1 (least potential for NPS contribution) to 5 (most potential for NPS contribution). Potential contribution was based on slope and land use: permeable surface vs. impervious surface.

The model (**Figure 3**) displays the highest potential for NPS contribution along roadways and parking lots (*dark purple*) and the lowest potential within green spaces with trees and permeable surface (*light purple*).

Considerations for land use criteria were based on aerial imagery and door-to-door surveying of the project area. See Appendix A for the survey template and tabular results. This data includes type of structure (residential or commercial), hazardous waste, and whether GI was already present. There were no surveyed locations that reported improper handling of hazardous waste, so the data was not used for analysis. Community complaints such as heavy flooding or pooling water during storm events were noted as well.

Figure 4 shows the successful community survey distribution throughout the project area. Some locations within the project area were unable to be successfully surveyed due to limited access to buildings, community members declining participation, or hours of operation outside of standard survey time. These instances were deemed “unsuccessful” and consequently removed from the dataset.

Figure 4. *Distribution of successful community surveys (red circle) within project area (black line).*

GI BMP Suitability Assessment

Table 5. *Criteria for BMP suitability assessment used in adapted BMP Siting Tool*

BMP Type	Drainage area (acre)	Drainage slope (degree)	Impervious (%)	Road buffer (ft)	River buffer (ft)	Building buffer (ft)	Area Req. (sqft)
Bioretention	<2	<5	>0	<100	>100		>2
Cistern/Rain Barrel	-	-	-	-	-	<30	<50
Constructed wetland	>25	<15	>0	-	>100	-	>500
Dry Pond	>10	<15	>0	-	>100	-	>500
Grassed Swale	<5	<4	>0	<100	-	-	>500
Green Roof	-	-	-	-	-	-	>5
Infiltration Basin	<10	>0	>0	-	>100	-	>2
Infiltration Trench	<5	>0	>0	-	>100	-	>2
Porous Pavement	<3	>0	>0	-	-	-	>1
Sand Filter	<2	>0	>0	-	>100	-	>50
Vegetated Filter Strip	-	>0	>0	<100	>100	-	>500
Wet Pond	>25	>0	>0	-	>100	-	>500

Based on the results of the NPS CAC, roads and parking lots are of high priority to assign BMPs. There are few open spaces within the project area that are not being used for parking; therefore, to mitigate the loss of parking structures, any BMPs with criteria that require ample space (>500 sqft) were removed from the BMP selection analysis. The following BMPs were not included due to space requirements: vegetated filter strips, constructed wetlands, grassed swales, and ponds (red text in Table 5).

Because the project area encompasses less than 1 square mile of San Angelo, the same annual precipitation estimate of 20.93 in (NOAA 2026) was applied to all BMP selection analyses regardless of site location. This value was used as a criterion to rule out any GI BMP that would require annual precipitation over this average value. No GI BMPs required higher annual precipitation to realistically maintain function. Therefore, none were ruled out based on this criterion.

BMP SELECTIONS FOR PROJECT AREA

Three most suitable locations were located for each BMP type using criteria relevant to each BMP's requirements. The model assesses the region for the highest suitability "score" and is then prompted to select three regions within the top 5% of all data assessed. **Figure 5** is an example of a suitability map, which is helpful to see overall trends in the data. However, to get clear guidance on best locations, we narrowed the display to the top 5% of the data. This ensures the best locations are easily visible. Each following map is a portrayal of top 5% most suitable locations for each BMP type.

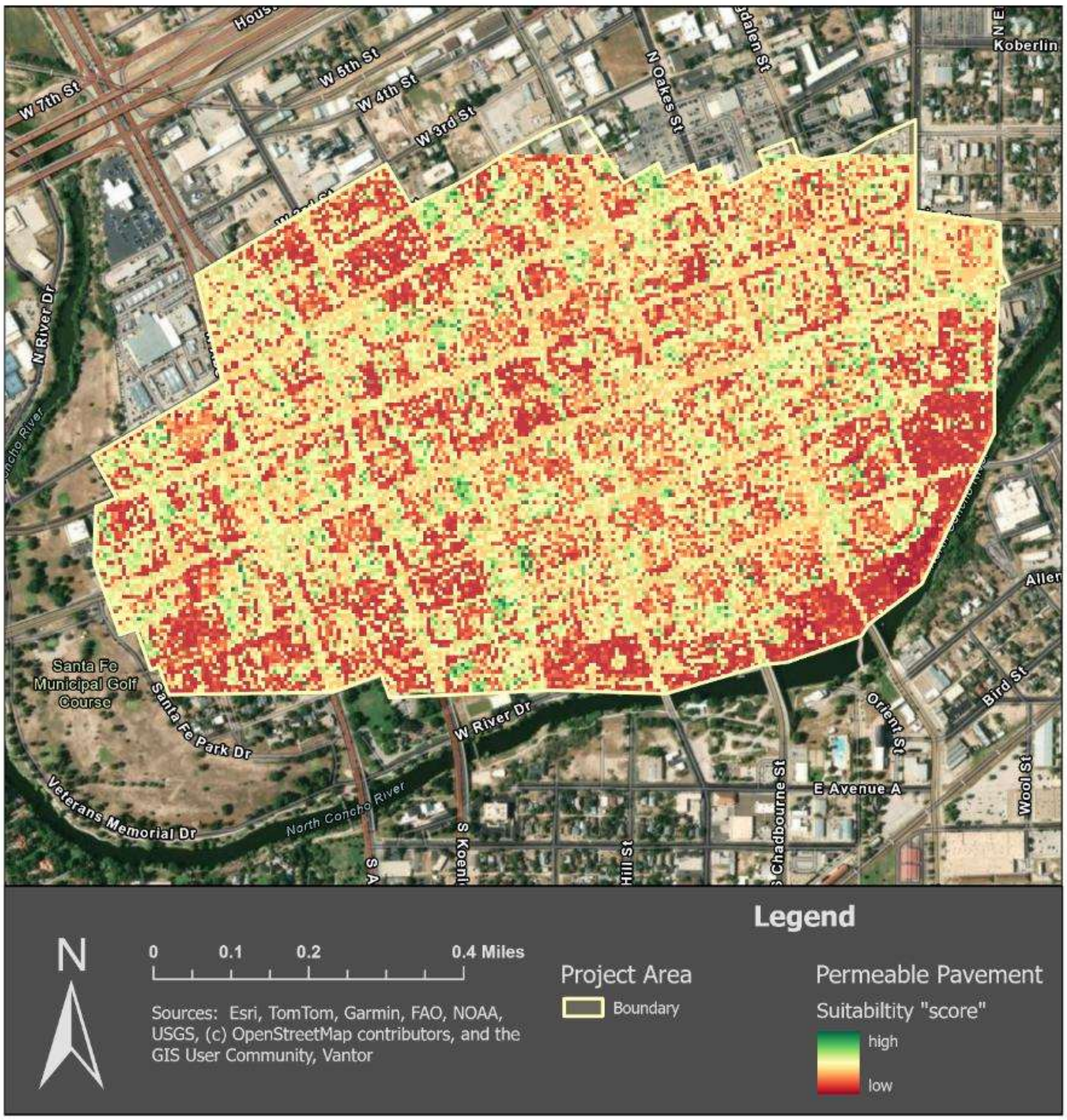

Figure 5. *Overall suitability map for permeable pavement site selection.*

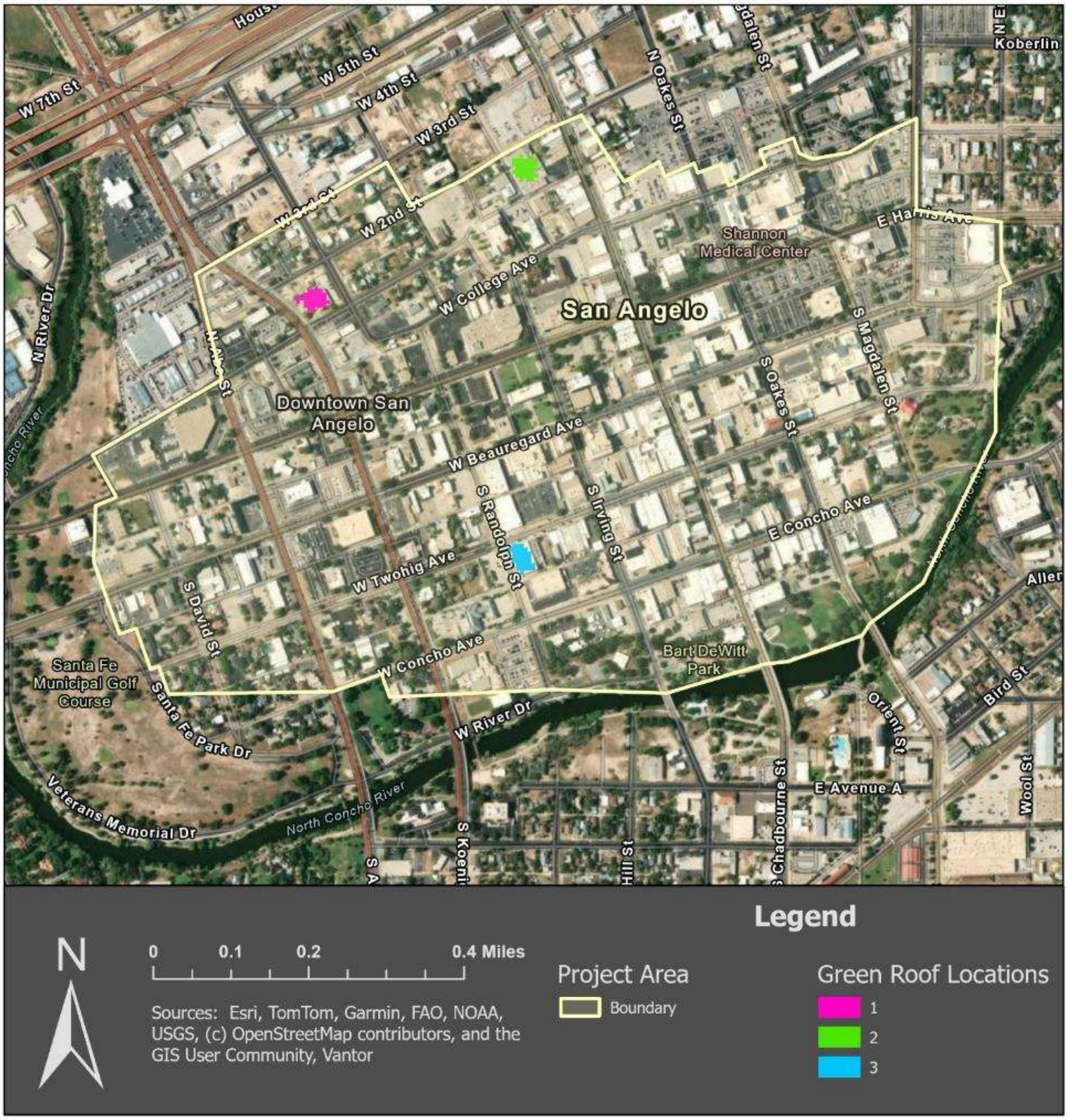

***Figure 6.** Adapted BMP Selection Tool: most suitable locations for green roof implementations*

Three most suitable locations were identified for green roof BMPs. Location criteria were slope (degrees) and roof area (sqft). The model assigned higher suitability values to areas with both flatter slope and larger square footage than those with steeper slope and/or smaller square footage. This aligns with NPS contribution potential in that more planted square footage would result in higher nutrient and stormwater runoff reduction capability.

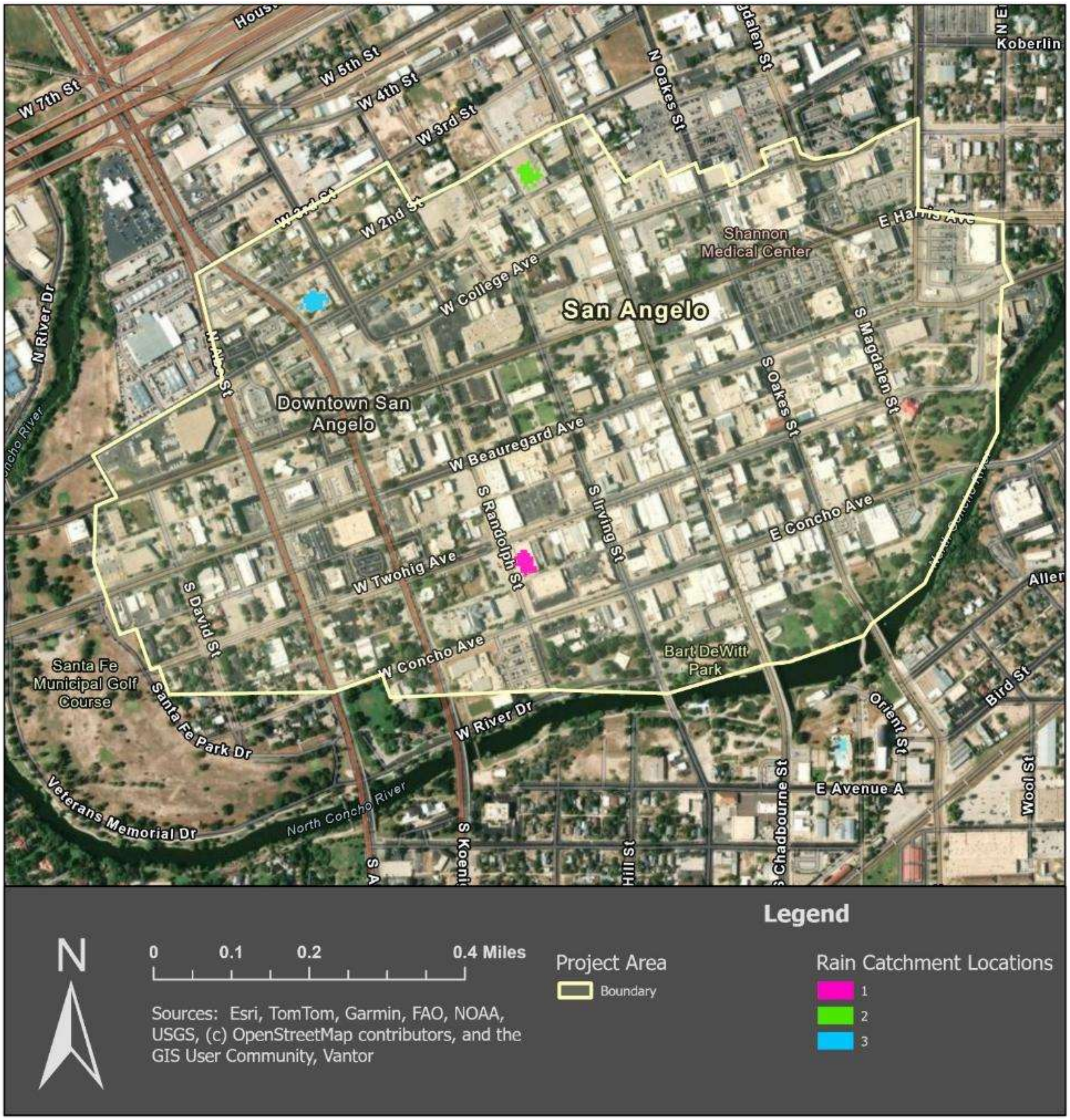

***Figure 7.** Adapted BMP Selection Tool: most suitable locations for rain catchment implementations*

Three most suitable rain catchment BMPs (cisterns/rain barrels) were calculated to be very similar locations to the best green roof BMP locations. The criteria used for rain catchment is nearly identical to that of green roof assessment, so this is expected. The selected are locations with both the lowest slope and lowest proximity to buildings, as well as largest square footage among the buildings.

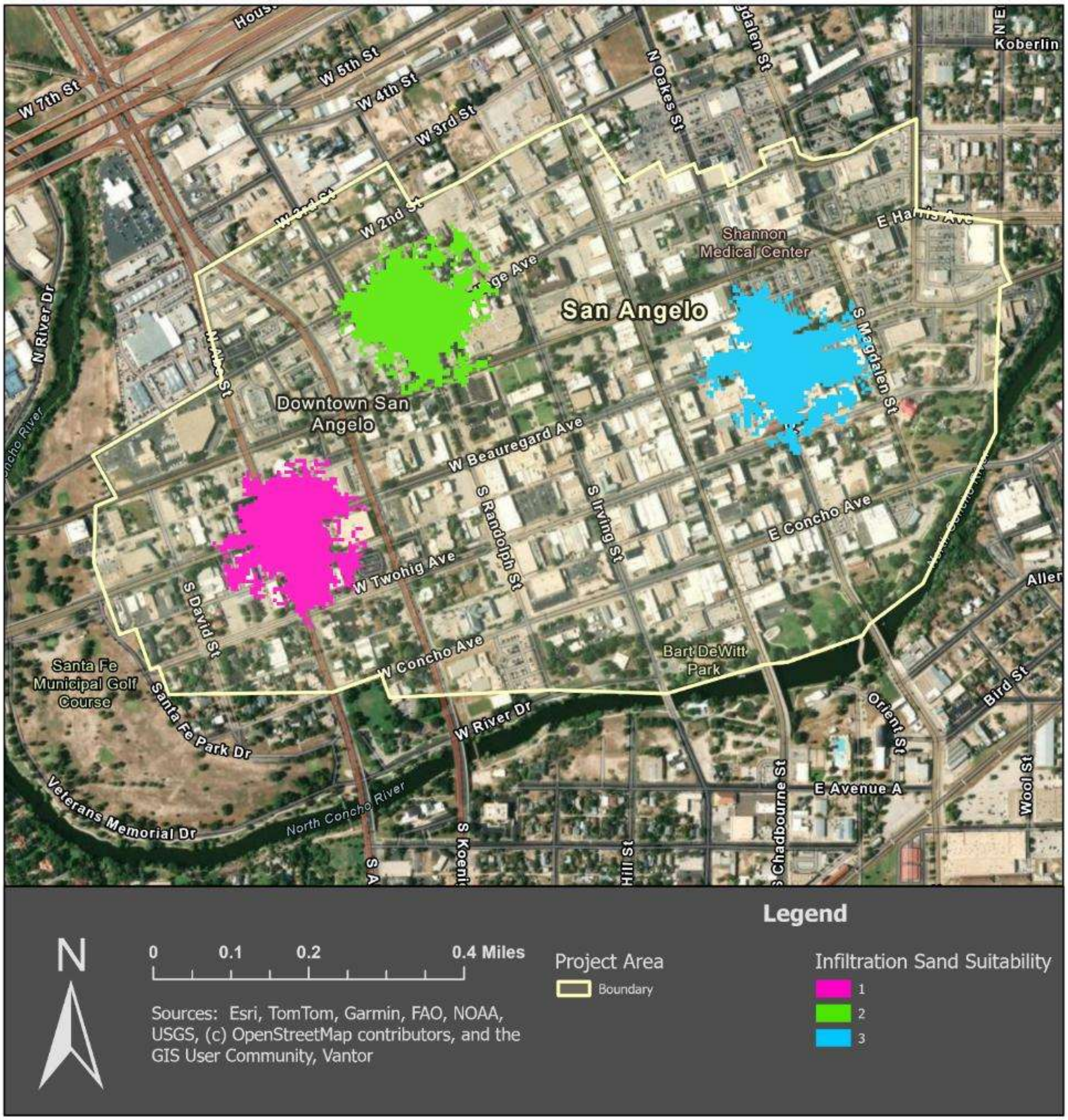

Figure 8. *Adapted BMP Selection Tool: most suitable locations for infiltration basin, trench, and sand filter implementations*

Three most suitable locations were identified for BMP types: infiltration basin, infiltration trench, and sand filter. Location criteria were slope, land use, and proximity to roads. The model assigned higher suitability values to areas with flatter slope, lower proximity to roads, and areas of impervious surfaces (excluding buildings).

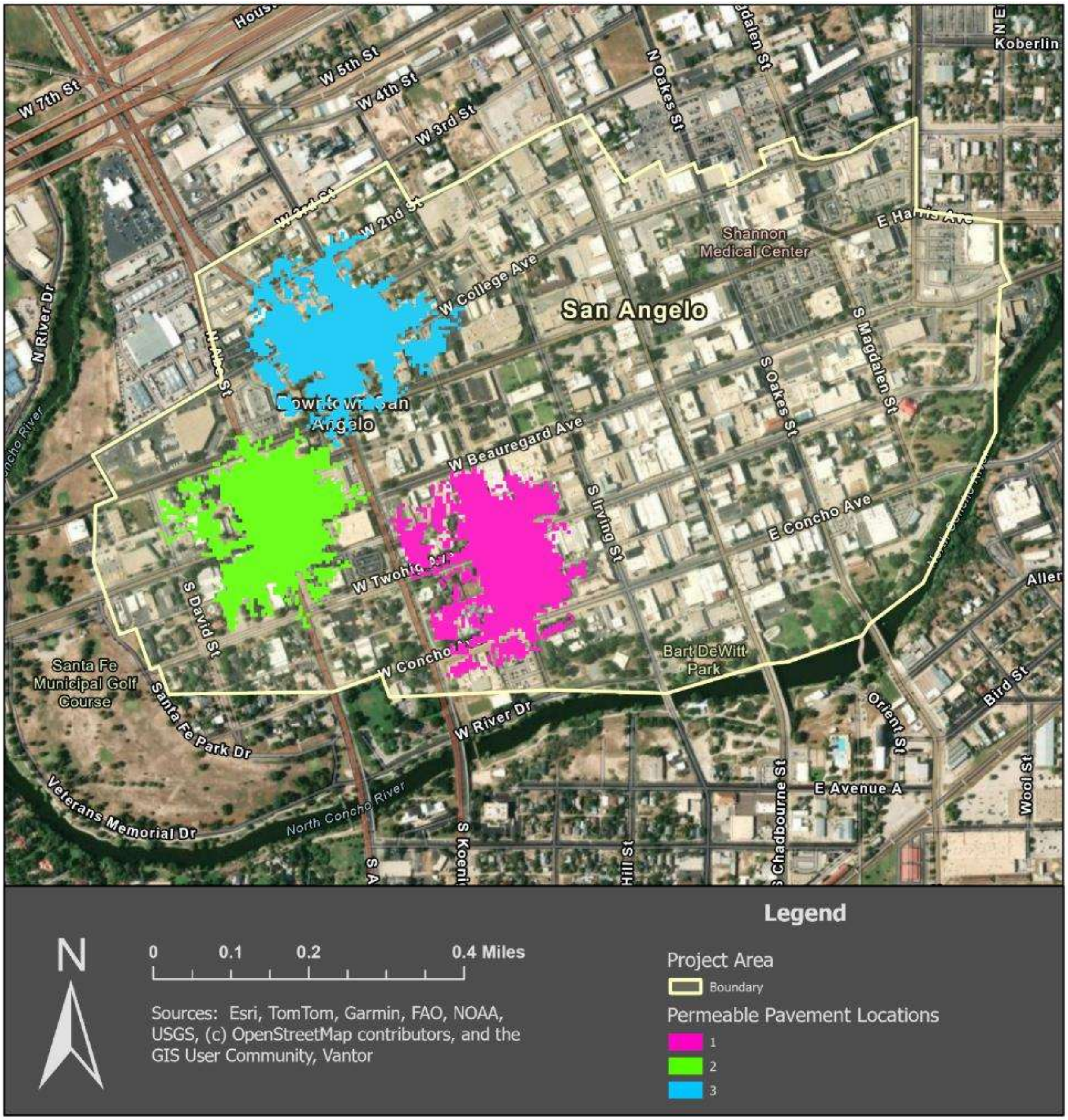

Figure 9. *Adapted BMP Selection Tool: most suitable locations for permeable pavement implementations*

Three most suitable locations were identified for permeable pavement BMPs. Location criteria were slope, land use, and proximity to roads. The model assigned higher suitability values to areas with flatter slope, lower proximity to roads, and areas of impervious surfaces (excluding buildings) with parking lots and non-road paved surfaces being highest priority.

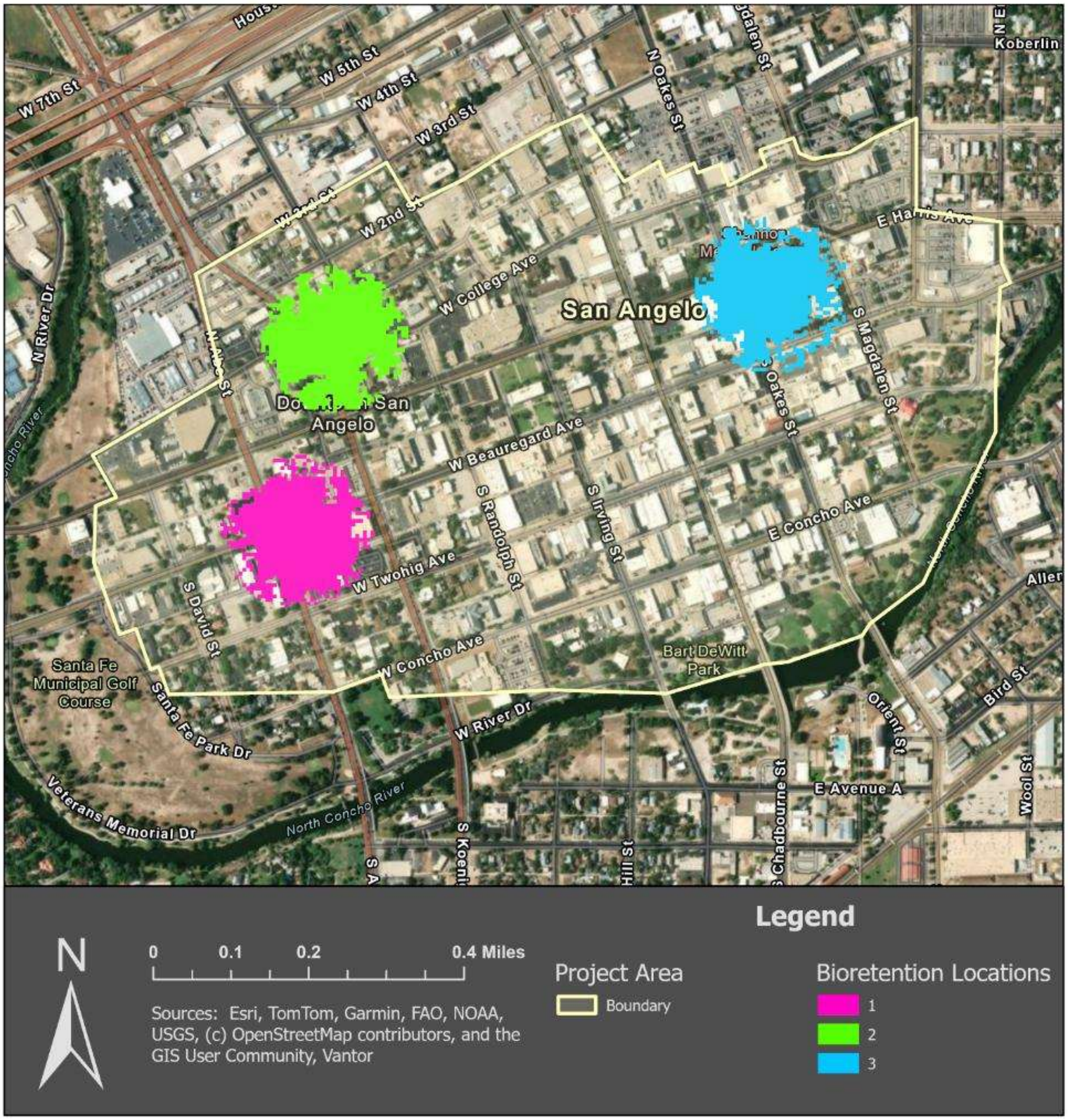

Figure 10. *Adapted BMP Selection Tool: most suitable locations for bioretention implementations (rain gardens, etc.)*

Three most suitable locations were identified for bioretention BMPs such as rain gardens and planted strips along roadways. Location criteria were slope, land use, and proximity to roads. The model assigned higher suitability values to areas with steeper slope, lower proximity to roads, and areas of impervious surfaces (excluding buildings) with road-adjacent paved surfaces being highest priority.

FUTURE CONSIDERATIONS

As a continuation of this project, a cost assessment analysis can be done to determine which BMPs are most feasible within the project area. This cost assessment would include factors such as financial cost, available space, construction resources, etc. At this time the UCRA has no funding to perform a feasibility study as a continuation, though that may change in the future.

Cost considerations and effectiveness of certain BMPs are well-researched and documented topics for which information is readily available, including BMPs used in the UCRA BMP selection tool. Therefore, an extensive cost analysis and/or feasibility study is not a necessity for this document to be useful. Further, each BMP implementation will have different needs and resources so predicting costs may have little value.

Based on the results of this project, green infrastructure can be implemented within the downtown San Angelo region. The locations generated in this model provide insight into where each BMP would be most effective regarding each relevant criterion.

Funding Statement

This project is funded by EPA and managed by the TCEQ.

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APPENDIX A: Community Survey Template and Results

Template

Table S1. *Community survey template*

UCRA GI Project Community Survey					
Location					
Address					
Date					
Time					
1	Is this establishment commercial or residential?				
	Commercial	*Residential*			
2	How much foot traffic do you observe?				
	None	*Low*	*Moderate*	*High*	
3	Do you notice any pooling/flooding around the building when it rains?				
	None	*One small pool*	*A few small pools*	*Moderate*	*Lots of pools*
4	How do you feel about the curb appeal of the building?				
	Greatly dislike	*Dislike*	*Neutral/Don't care*	*Like*	*Greatly like*
5	Would you be open to future projects adding green areas?				
	Yes	*No*			
6	How much do you know about Green Infrastructure?				
	Nothing/Never heard of it	*A little*	*Familiar*	*Experienced*	
7	Does your building have any of the following structures (select all that apply): ___ *gutters, extended downspouts, etc. (reduces speed of runoff)* ___ *drainage, sloped lot, etc. (reduces risk of flooding)* ___ *filters, locking trash receptacles, hazard waste disposal receptacles, etc. (reduces pollution/trash build-up)* ___ *other:*				
8	How do you think green infrastructure could impact your place of business/residence?				
	Negative change	*Neutral/no change*	*Positive change*		

Results

Table S2. *Results of successful community surveys within project area*

Address	Foot_ Traffic	GI_ Perception	Pooling_ Flooding	Drainage_ Features	Water_ Filtration
217 S Chadbourne St, San Angelo, TX 76903	high	positive	None	TRUE	FALSE
131 W Twohig Ave, San Angelo, TX 76903	moderate	neutral	None	FALSE	FALSE
1 W Concho Ave, San Angelo, TX 76903	high	positive	A few small pools	FALSE	FALSE
213 W Beauregard Ave # 2, San Angelo, TX 76903	high	positive	None	TRUE	FALSE
28 W Concho Ave, San Angelo, TX 76903	high	positive	None	FALSE	FALSE
13 E Harris Ave, San Angelo, TX 76903	high	positive	One small pool	FALSE	FALSE
69 N Chadbourne St, San Angelo, TX 76903	moderate	positive	none	FALSE	FALSE
4 E Concho Ave, San Angelo, TX 76903	moderate	negative	None	TRUE	FALSE
39 W Concho Ave, San Angelo, TX 76903	high	positive	Lots of pools	TRUE	TRUE
20 E Beauregard Ave, San Angelo, TX 76903	high	positive	None	TRUE	TRUE
42 E Concho Ave, San Angelo, TX 76903	moderate	positive	None	TRUE	FALSE
133 W Concho Ave Suite 301, San Angelo, TX 76903	moderate	neutral	None	FALSE	FALSE
124 W Beauregard Ave Second Floor, San Angelo, TX 76903	high	positive	None	FALSE	FALSE
113 W Beauregard Ave 2, San Angelo, TX 76903	high	positive	One small pool	FALSE	FALSE
31 W Twohig Ave B, San Angelo, TX 76903	high	positive	None	FALSE	FALSE
6 E Concho Ave, San Angelo, TX 76903	high	positive	None	FALSE	FALSE
123 N Chadbourne St, San Angelo, TX 76903	high	positive	none	FALSE	FALSE
108 E Concho Ave, San Angelo, TX 76903	moderate	positive	One small pool	TRUE	FALSE
24 W Concho Ave, San Angelo, TX 76903	moderate	positive	A few small pools	TRUE	FALSE
35 E Concho Ave, San Angelo, TX 76903	high	positive	Moderate	FALSE	FALSE
230 W Twohig Ave, San Angelo, TX 76903	moderate	neutral	None	TRUE	TRUE
17 W Beauregard Ave, San Angelo, TX 76903	moderate	positive	none	FALSE	FALSE
116 W Concho Ave, San Angelo, TX 76903	moderate	positive	None	TRUE	FALSE
206 W College Ave, San Angelo, TX 76903	moderate	neutral	A few small pools	FALSE	TRUE
120 E Harris Ave, San Angelo, TX 76903	high	positive	One small pool	TRUE	TRUE
230 S Chadbourne St, San Angelo, TX 76903	high	positive	None	FALSE	FALSE
109 S Chadbourne St, San Angelo, TX 76903	moderate	positive	None	FALSE	FALSE
20 E Concho Ave #5958, San Angelo, TX 76903	high	neutral	None	FALSE	FALSE
214B W College Ave, San Angelo, TX 76903	moderate	positive	none	FALSE	FALSE
37b W Concho Ave, San Angelo, TX 76903	high	positive	None	FALSE	FALSE
18 E Concho Ave, San Angelo, TX 76903	moderate	negative	None	TRUE	FALSE
225 S Chadbourne St, San Angelo, TX 76903	moderate	positive	Lots of pools	FALSE	FALSE
10 E Concho Ave, San Angelo, TX 76903	high	positive	Lots of pools	FALSE	FALSE
129 S Chadbourne St, San Angelo, TX 76903	high	positive	A few small pools	FALSE	FALSE
113 E Concho Ave Suite 200, San Angelo, TX 76903	moderate	positive	Lots of pools	FALSE	FALSE
26 E Concho Ave, San Angelo, TX 76903	high	neutral	Lots of pools	FALSE	TRUE

12 E Twohig Ave Suite 101, San Angelo, TX 76903	moderate	positive	Lots of pools	FALSE	FALSE
226 W Twohig Ave, San Angelo, TX 76903	low	neutral	Lots of pools	FALSE	FALSE
30 W Beauregard Ave Suite 100, San Angelo, TX 76903	moderate	positive	None	TRUE	TRUE
113 E Concho Ave Suite 100, San Angelo, TX 76903	high	positive	Lots of pools	FALSE	FALSE
214 S Chadbourne St, San Angelo, TX 76903	low	positive	None	FALSE	FALSE
113 E Twohig Ave, San Angelo, TX 76903	low	neutral	Lots of pools	FALSE	FALSE
8 E Concho Ave, San Angelo, TX 76903	moderate	positive	None	FALSE	FALSE
301 W 1st St, San Angelo, TX 76903	moderate	positive	A few small pools	TRUE	FALSE
235 W 1st St, San Angelo, TX 76903	moderate	positive	A few small pools	TRUE	TRUE
12 E Twohig Ave, San Angelo, TX 76903	low	positive	Moderate	FALSE	FALSE
9 W Concho Ave, San Angelo, TX 76903	high	negative	none	FALSE	TRUE
34 E Concho Ave, San Angelo, TX 76903	high	positive	Lots of pools	FALSE	FALSE
115 W Twohig Ave, San Angelo, TX 76903	moderate	negative	none	FALSE	TRUE
131 E Beauregard Ave, San Angelo, TX 76903	high	positive	One small pool	FALSE	TRUE
120 E Harris Ave, San Angelo, TX 76903	high	positive	Moderate	FALSE	FALSE
202 W Twohig Ave Suite 200, San Angelo, TX 76903	high	positive	A few small pools	FALSE	FALSE
301 S Irving St, San Angelo, TX 76903	moderate	positive	None	FALSE	FALSE
135 W Twohig Ave E, San Angelo, TX 76903	low	positive	None	FALSE	FALSE
136 W Twohig Ave, San Angelo, TX 76903	high	positive	None	FALSE	FALSE
221 S Chadbourne St, San Angelo, TX 76903	moderate	neutral	None	TRUE	FALSE
106 S Chadbourne St, San Angelo, TX 76903	moderate	positive	Moderate	TRUE	TRUE
36 E Twohig Ave 208, San Angelo, TX 76903	moderate	positive	None	TRUE	FALSE
113 W Beauregard Ave # 2, San Angelo, TX 76903	moderate	positive	A few small pools	FALSE	TRUE
15 W Concho Ave, San Angelo, TX 76903	moderate	positive	A few small pools	FALSE	FALSE
201 S Chadbourne St, San Angelo, TX 76903	low	neutral	None	TRUE	TRUE
115 S Chadbourne St, San Angelo, TX 76903	high	positive	One small pool	FALSE	TRUE
25 W Beauregard Ave, San Angelo, TX 76903	moderate	neutral	none	FALSE	FALSE
224 S Chadbourne St, San Angelo, TX 76903	moderate	positive	none	FALSE	FALSE
11 W Beauregard Ave, San Angelo, TX 76903	moderate	positive	One small pool	TRUE	FALSE
228 S Chadbourne St, San Angelo, TX 76903	moderate	neutral	None	FALSE	FALSE
138 W Concho Ave, San Angelo, TX 76903	moderate	positive	A few small pools	TRUE	FALSE
119A W Twohig Ave, San Angelo, TX 76903	high	positive	none	TRUE	FALSE

File Download: Community Survey DataTEXTFILE.csv

APPENDIX B: Supplemental Data

All data used in these analyses are publicly available. For the package of supplemental data used for this project, contact Lexi Blackwood at lexiw@ucratx.org.

***Table S3**. List of supplemental data used in this project*

Item ID	**Data Name**	**File Type**
1	Annual average precipitation within project area	*Online access*
2	BMP criteria	*.xlsx*
3	Community survey data	*.csv*
4	CBD_Building_Footprints	*.shp*
5	Central_Business_District	*.shp*
6	NAIP Public Access, clip & extract to TIFF	*.tif*
7	NorthConchoRiver_Segment polygon	*.shp*
8	Project_Area_Roads multipolygon	*.shp*
9	Storm_discharge_points	*.shp*
10	Slope_NAIP_P1	*.gdb*