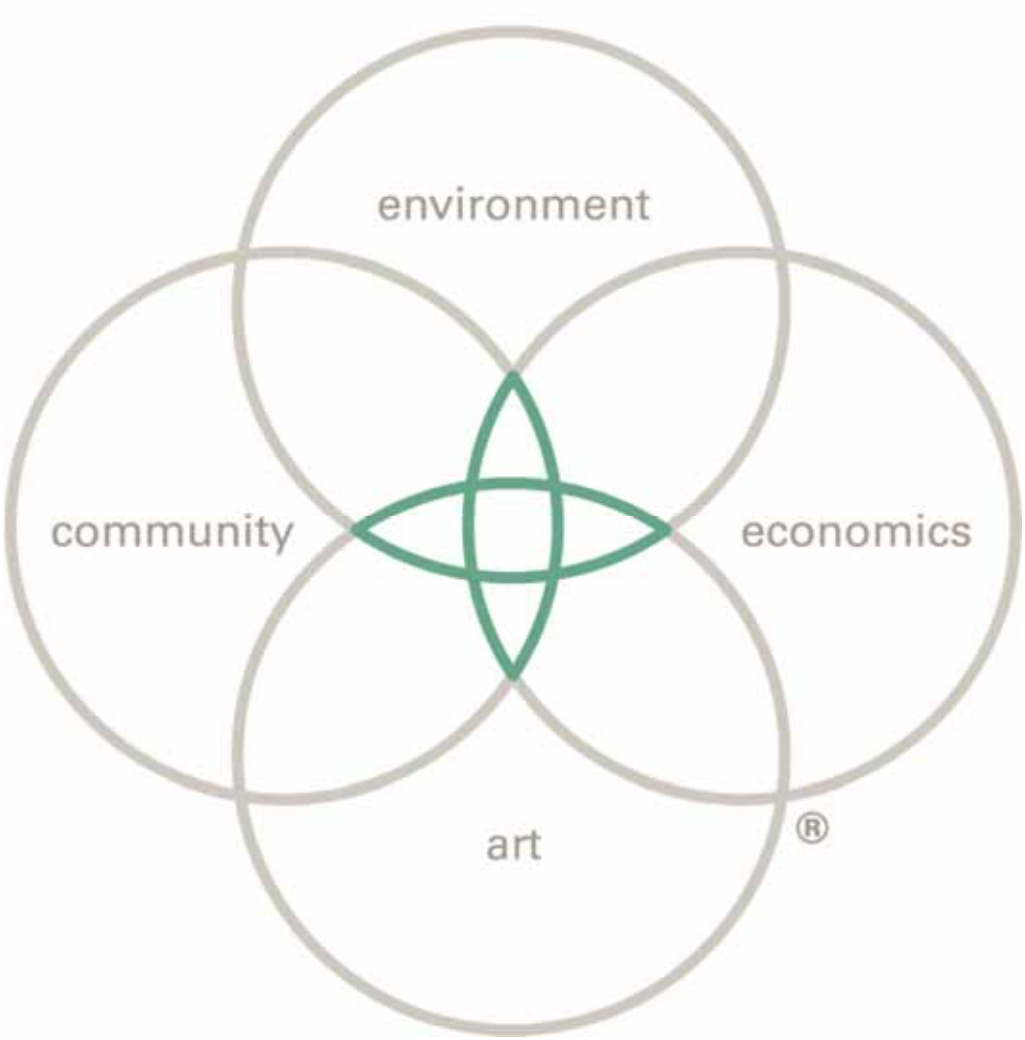

CITY OF NEW BRAUNFELS
Stormwater Management Plan
Stakeholder Meeting
March 6, 2012
DESIGNWORKSHOP
LAN

DESIGNWORKSHOP



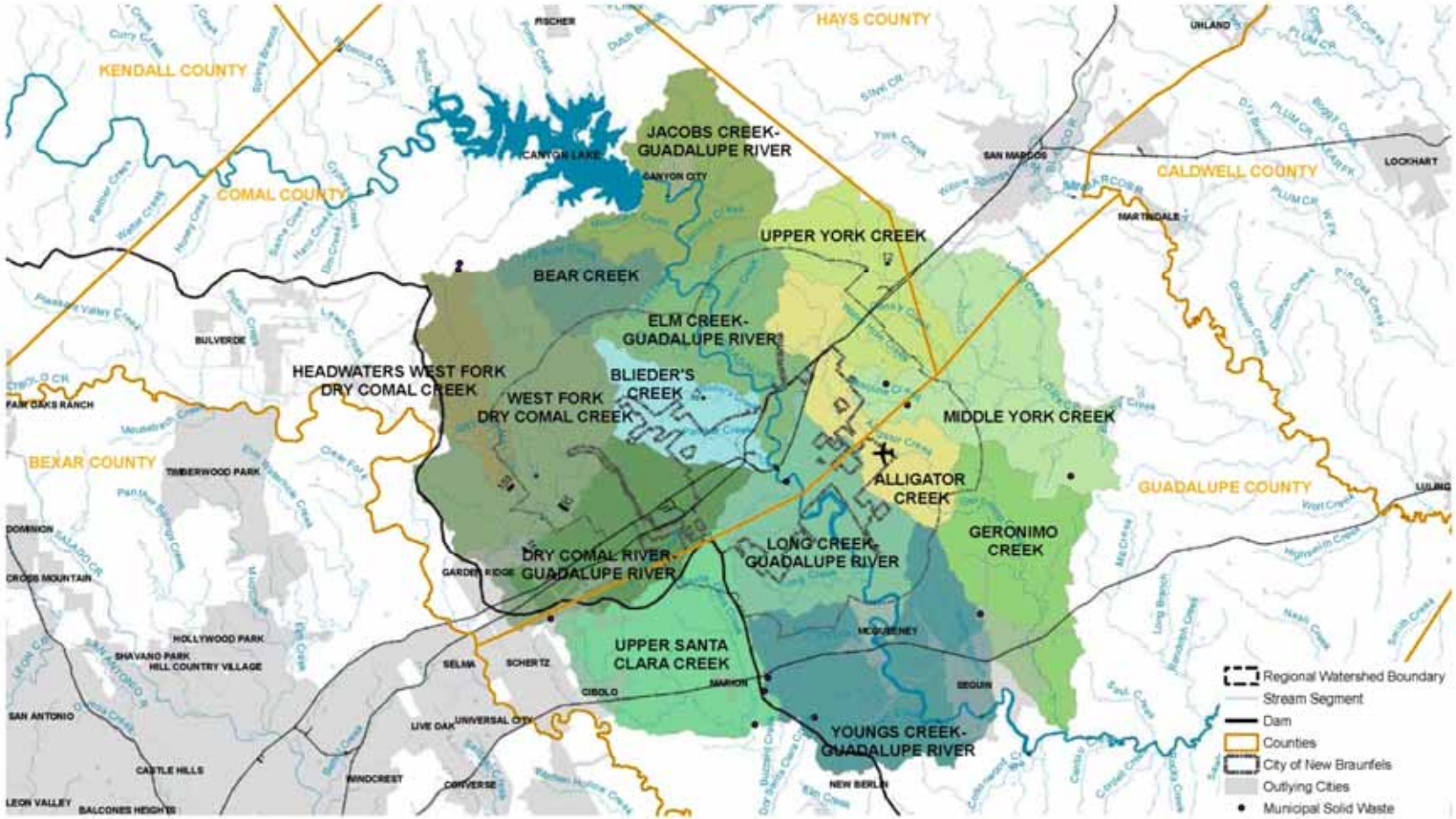
PURPOSE

PURPOSE OF THE STORMWATER MANAGEMENT PROGRAM

The purpose of this meeting is to receive **feedback and insight** from invitees in order to further the New Braunfels Stormwater Management Strategy in a manner that is consistent with a **collective vision.**

1. Provide the public process needed for the MS4 permit and demand from public.
2. Build consensus around stormwater strategies
3. Introduce state-of-the art, innovative stormwater solutions that are appropriate for New Braunfels
4. Integrate regionally specific stormwater management solutions through the drainage control manual and the MS4 permit

STUDY AREA BOUNDARY

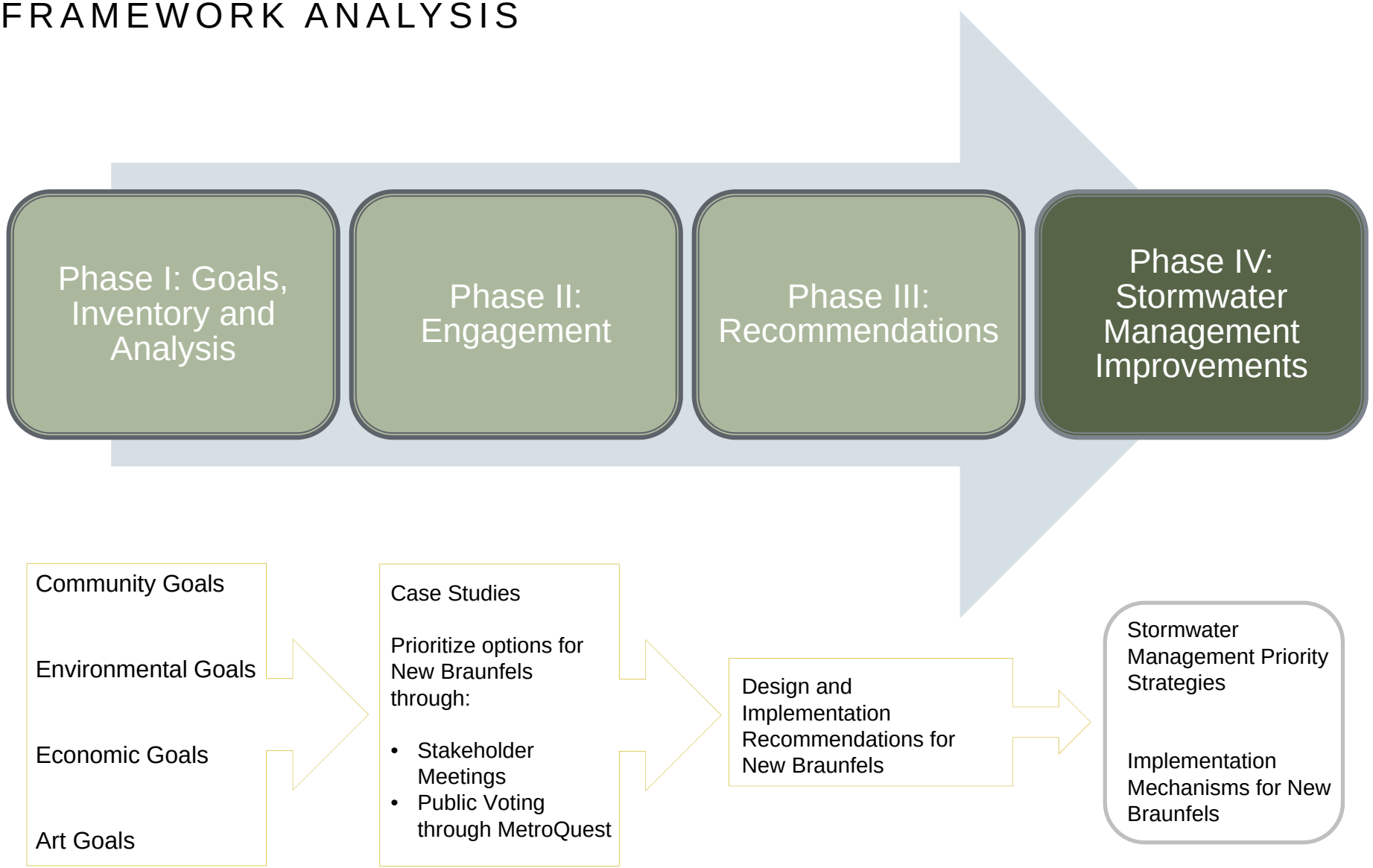


AGENDA

AGENDA

- Review priorities and analysis for stormwater strategies
- Review case studies for priority alternatives
- Discuss implementation alternatives for stormwater strategies
- Prioritize locations for stormwater strategies

FRAMEWORK ANALYSIS



PRIORITY STRATEGY RESULTS AND ANALYSIS

VOTING RESULTS

Strategy	Public Ranking (23 is highest, 1 is lowest)	Stakeholder Ranking (23 is highest, 1 is lowest)	Overall Ranking
Floodway Building Prohibitions	23	15	1
Open Space Conservation	22	18	2
Flood Hazard Mitigation	21	22	3
Stream and River Restoration	20	17	4
Litter Control	18	19	5
Construction Control Measures	16	16	6
Retrofit Stormwater Facilities	20	15	7
Building Runoff Capture	14	10	8
Impervious Coverage Reductions	13	14	9
Stormwater Utility Fee	12	9	10
Maintenance and Monitoring	11	23	11
Detention Basin	10	21	12
Stream Bank Setbacks	8	11	13
City Incentives or Fees	5	13	14
Retention	19	8	15
Density Bonuses	17	2	16
Stormwater Facilities Inventory	3	12	17
Clustering	9	4	18
Wetland Basin	7	3	19
Biofilter	6	5	20
Building Materials	4	1	21
Infiltration Basin	2	6	22
Porous Pavement	--	7	23

TOP 12 STRATEGIES

1. Floodway Building Prohibitions
2. Open Space Conservation
3. Flood Hazard Mitigation
4. Stream and River Restoration
5. Litter Control
6. Construction Control Measures
7. Retrofit Stormwater Facilities
8. Building Runoff Capture
9. Impervious Coverage Reductions
10. Maintenance and Monitoring
11. Detention Basin
12. Implementation Tools

ENVIRONMENT

- Encourage **development patterns** that improve stormwater management **opportunities**
- **Minimize impervious** surfaces
- **Prevent flooding and erosion** caused by stormwater runoff
- **Protect water quality** of receiving waters, particularly the streams and Landa Lake
- Ensure construction **does not create environmental degradation**, even on a temporary basis

COMMUNITY

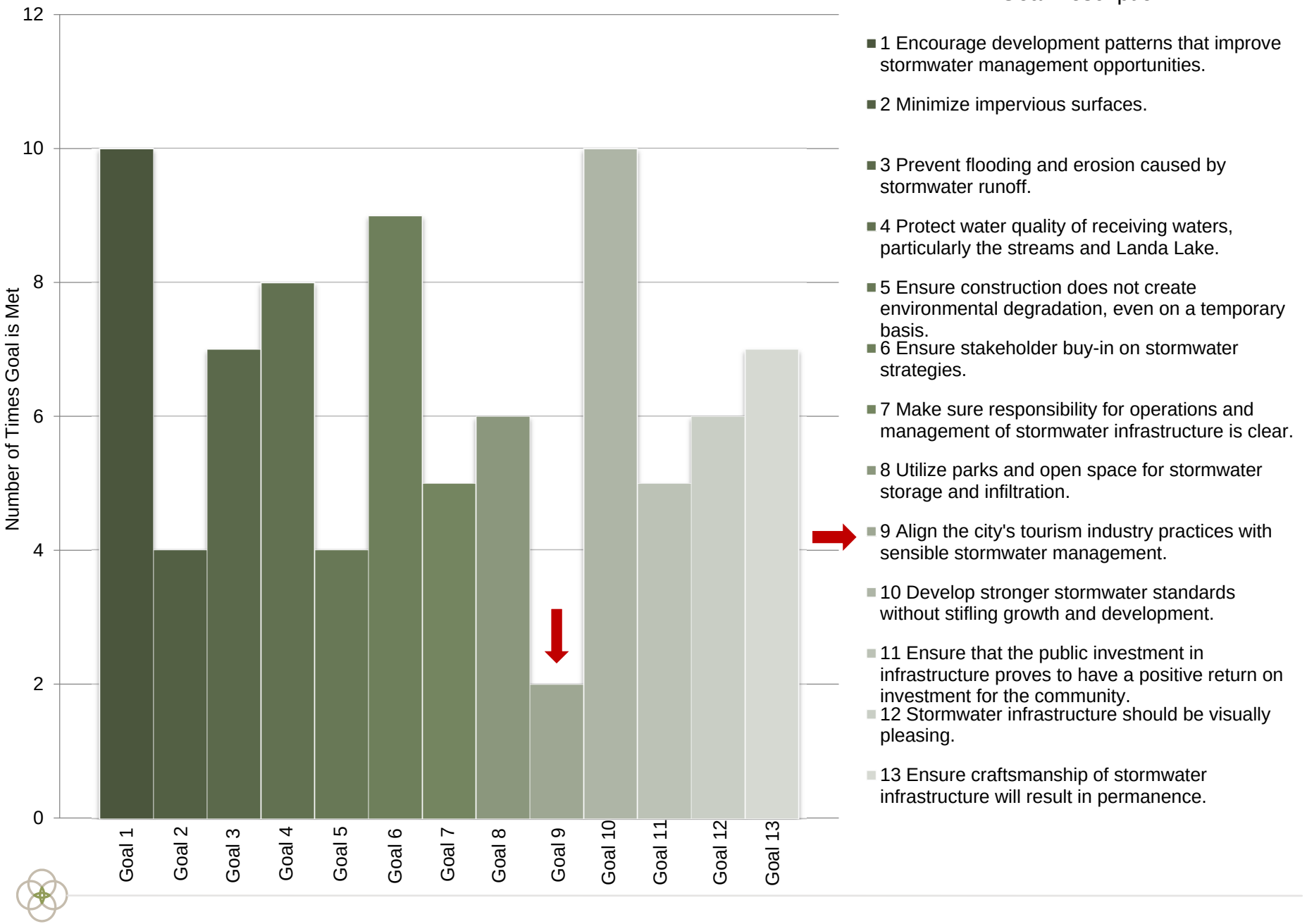
- Ensure **stakeholder buy-in** on stormwater strategies
- Make sure **responsibility** for **operations and management** of stormwater infrastructure is **clear**
- Utilize **parks** and open space for **stormwater storage** and infiltration

ECONOMICS

- Align the City's **tourism industry practices** with sensible stormwater management
- Develop **stronger** stormwater **standards** without stifling growth and development
- Ensure that public investment in infrastructure proves to have a **positive return on investment** for the community

ART

- Stormwater infrastructure should be **visually pleasing**
- Ensure **craftsmanship** of stormwater infrastructure will result in **permanence**


Number of Times Goal is Met
12
10
8
6
4
2
0
Goal 1
Goal 2
Goal 3
Goal 4
Goal 5
Goal 6
Goal 7
Goal 8
Goal 9
Goal 10
Goal 11
Goal 12
Goal 13
Goal Description
1 Encourage development patterns that improve stormwater management opportunities.
2 Minimize impervious surfaces.
3 Prevent flooding and erosion caused by stormwater runoff.
4 Protect water quality of receiving waters, particularly the streams and Landa Lake.
5 Ensure construction does not create environmental degradation, even on a temporary basis.
6 Ensure stakeholder buy-in on stormwater strategies.
7 Make sure responsibility for operations and management of stormwater infrastructure is clear.
8 Utilize parks and open space for stormwater storage and infiltration.
9 Align the city's tourism industry practices with sensible stormwater management.
10 Develop stronger stormwater standards without stifling growth and development.
11 Ensure that the public investment in infrastructure proves to have a positive return on investment for the community.
12 Stormwater infrastructure should be visually pleasing.
13 Ensure craftsmanship of stormwater infrastructure will result in permanence.

SCALE

Strategy	Site	Community	Regional
Floodway Building Prohibitions		X	X
Open Space Conservation			X
Flood Hazard Mitigation		X	X
Stream and River Restoration		X	X
Litter Control	X	X	X
Construction Control Measures	X	X	X
Retrofit Stormwater Facilities	X	X	X
Building Runoff Capture	X		
Impervious Coverage Reductions	X	X	
Stormwater Utility Fee	X	X	X
Maintenance and Monitoring	X	X	X
Detention Basin		X	
Stream Bank Setbacks	X	X	X
City Incentives or Fees	X	X	X

IMPLEMENTATION TYPE

Strategy	Policy	Design and Construction	Operation and Maintenance
Floodway Building Prohibitions	X		
Open Space Conservation	X		
Flood Hazard Mitigation	X		
Stream and River Restoration		X	X
Litter Control	X		
Construction Control Measures	X	X	
Retrofit Stormwater Facilities		X	X
Building Runoff Capture		X	
Impervious Coverage Reductions	X	X	
Stormwater Utility Fee	X		X
Maintenance and Monitoring	X	X	X
Detention Basin		X	
Stream Bank Setbacks	X	X	
City Incentives or Fees	X		

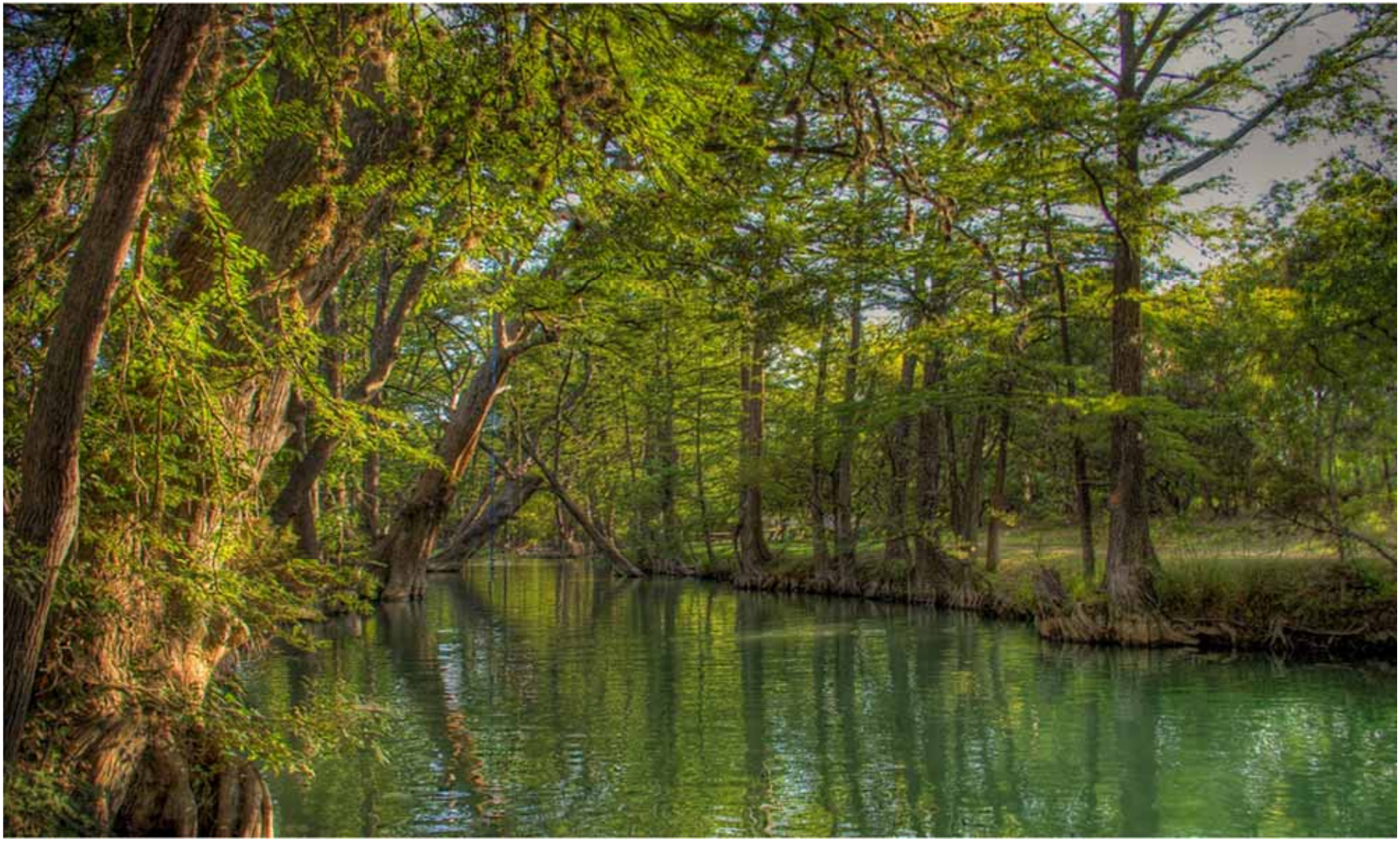
AUTHORITY

Strategy	City Limits	Extraterritorial Jurisdiction
Floodway Building Prohibitions	X	
Open Space Conservation	X	X
Flood Hazard Mitigation	X	X
Stream and River Restoration	X	X
Litter Control	X	X
Construction Control Measures	X	
Retrofit Stormwater Facilities	X	
Building Runoff Capture	X	
Impervious Coverage Reductions	X	X
Stormwater Utility Fee	X	
Maintenance and Monitoring	X	
Detention Basin	X	X
Implementation Tools	X	

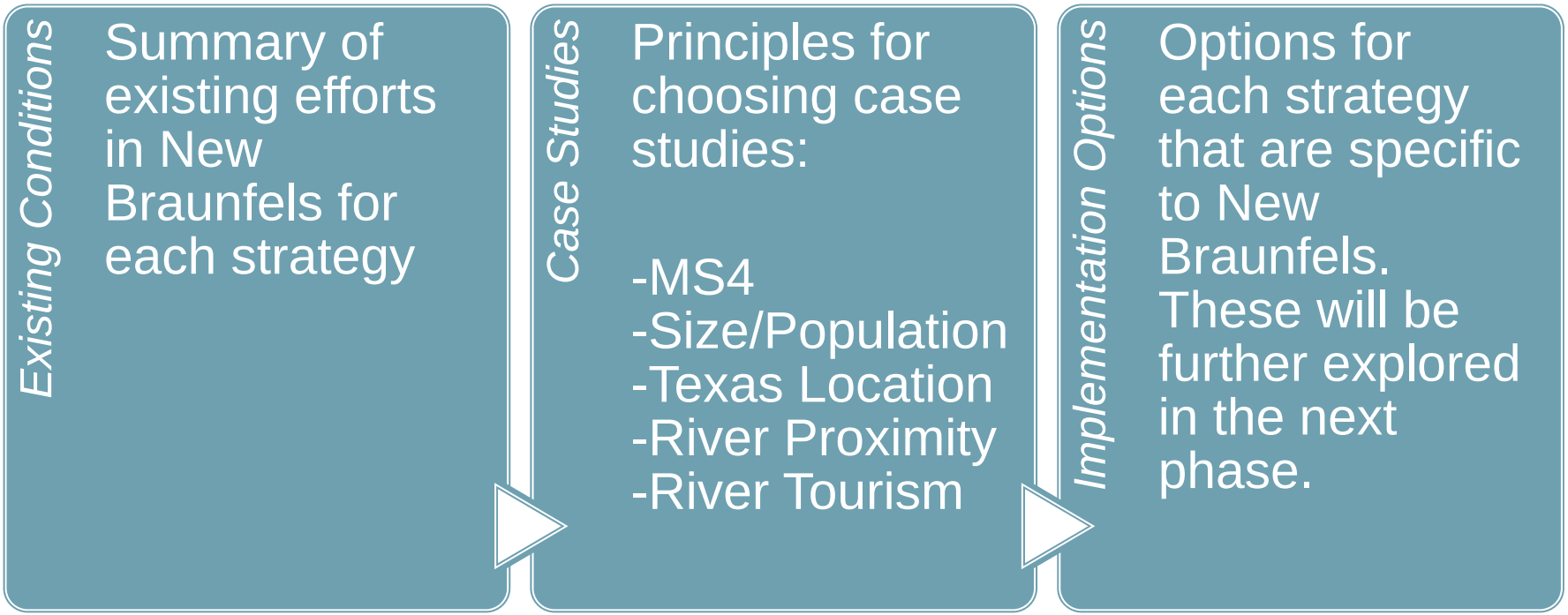
TIMING

Strategy	Past	Future
Floodway Building Prohibitions		X
Open Space Conservation		X
Flood Hazard Mitigation		X
Stream and River Restoration	X	
Litter Control		X
Construction Control Measures		X
Retrofit Stormwater Facilities	X	
Building Runoff Capture		X
Impervious Coverage Reductions		X
Stormwater Utility Fee		X
Maintenance and Monitoring		X
Detention Basin		X
Implementation Tools		X

IMPLEMENTATION CASE STUDIES AND OPTIONS



PROCESS


Existing Conditions
Summary of existing efforts in New Braunfels for each strategy
Case Studies
Principles for choosing case studies:
-MS4
-Size/Population
-Texas Location
-River Proximity
-River Tourism
Implementation Options
Options for each strategy that are specific to New Braunfels. These will be further explored in the next phase.

CASE STUDIES LIST

		Similarity to New Braunfels				
Strategy	**Case Study Location**	**MS4**	**Size/ Population**	**Texas Location**	**River or Water Proximity**	**River Tourism**
Floodway Building Prohibitions	1. King County, Washington					
	2. Houston, Texas					
Open Space Conservation	1. Maricopa County, Arizona					
	2. Roseville, California					
	3. Hays County, Texas					
Flood Hazard Mitigation	1. State of South Carolina					
	2. King County, Washington					
Stream and River Restoration	1. State of Georgia					
	2. Boston, Massachusetts					
	3. Buford, Georgia					
Litter Control	1. Monterey, California					
	2. Wichita Falls, Texas					
Construction Control Measures	1. Douglas County, Colorado					
	2. Eugene, Oregon					
	3. Charlotte, North Carolina					
Retrofit Existing Stormwater Facilities	1. Seattle, Washington					
	2. Montgomery County, Maryland					
Building Runoff Capture	1. Los Angeles, California					
	2. Portland, Oregon					
	3. Lacey, Washington					
Impervious Coverage Reductions	1. Austin, Texas					
	2. Seattle, Washington					
Maintenance and Monitoring	1. Monroe County, New York					
	2. Hillsborough County, Florida					
	3. Central New York					
Detention Basin	1. Arlington Heights, Chicago					
	2. Tucson, Arizona					
Implementation Tools	1. Arlington County, Virginia					
	2. Portland, Oregon					
	3. Centennial, Colorado					

#1 STRATEGY

policy | design & construction | operations, maintenance and monitoring | site | community | regional

1. FLOODWAY BUILDING PROHIBITIONS
CURRENT NEW BRAUNFELS CONDITION

- Fences must not restrict the flow of drainage water.
- New development must not increase the water surface elevation of the base flood level more than one foot.
- The lowest floor of new construction must be elevated to at least two feet above the base flood level.
- Floodway encroachments are prohibited unless it can be demonstrated that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the 25-year and base flood discharge.
- The Federal Emergency Management Agency's Hazard Mitigation Grant Program (HMGP) provided New Braunfels with funds for a buyout program for flood damaged properties following the Flood of 2002.

CONCLUSION: PROPERTIES ARE ALLOWED TO DEVELOP IN THE FLOODWAY WITH SOME REGULATION AND LIMITED FUNDING FOR REMOVAL OF STRUCTURES IN THE FLOODWAY.

1. FLOODWAY BUILDING PROHIBITIONS
CASE STUDY #1 | KING COUNTY, WASHINGTON

"Zero-Rise" Floodway

- Prohibits "flood fringe" development and floodway development
- Floodway increased to encompass nearly all of the floodplain

STRATEGIES:

•PROHIBIT FLOODWAY DEVELOPMENT

•INCREASE BOUNDARY OF THE FLOODWAY TO INCLUDE MORE OF THE FLOODPLAIN

1. FLOODWAY BUILDING PROHIBITIONS
CASE STUDY #2 | CITY OF HOUSTON, TEXAS

In 2006, City Council voted no construction on unimproved property located in the floodway

- Lower flood insurance premiums

STRATEGIES:
•PROHIBIT FLOODWAY DEVELOPMENT

CHOOSE THE FLOODWAY BUILDING PROHIBITIONS OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Prohibit (versus regulation of) new structures from being constructed in the floodway.
0%	2. Establish a funding source for removal of structures damaged in the 2010 floods from the floodway.
0%	3. Re-evaluate the floodway boundaries to include more of the floodplain
0%	4. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#2 STRATEGY

policy | design & construction | operations, maintenance and monitoring | site | community | regional

2. OPEN SPACE CONSERVATION
CURRENT NEW BRAUNFELS CONDITION

- The recommended level of service for Open Space park land is 10 to 15 acres per 1,000 residents. The year 2015 need is 777-1,166 acres and the 2020 need is 992-1,488 acres.
- New Braunfels has three existing Open Space parks including portions of Cypress Bend park, Solms Park and Fischer Park.
- The 2010 New Braunfels Strategic Parks and Recreation Master Plan recommends that land banking should be considered crucial and a program to be put in place to ensure the acquisition of parkland through the City's Parkland Dedication Ordinance.

CONCLUSION: OPEN SPACE CONSERVATION IS ENCOURAGED BUT HAS NO/LITTLE DEDICATED FUNDING.

2. OPEN SPACE CONSERVATION
CASE STUDY #1 | MARICOPA COUNTY, ARIZONA

Flood Control District

- Natural drainage channel expanded to include a wide greenbelt floodplain that increases floodwater conveyance capability while having multiple uses included in it.
    - Golf courses, multi-use paths, ball fields, wildlife habitat, groundwater recharge

STRATEGIES:

- NATURAL DRAINAGE CHANNEL CONSERVATION INCLUDES RECREATION USES WHILE INCREASING FLOODWATER CONVEYANCE

2. OPEN SPACE CONSERVATION
CASE STUDY #2 | ROSEVILLE, CALIFORNIA

Miner's Ravine

- 26 acre flood control property that permanently protects the site and guarantees the site will always be used for flood control, wetland habitat and public recreation
- Funded via development mitigation fees and agency grants

STRATEGIES:

•PERMANENTLY PROTECT SITES BY PARTNERSHIPS AND USE OF MULTIPLE FUNDING SOURCES

2. OPEN SPACE CONSERVATION
CASE STUDY #3 | HAYS COUNTY, TEXAS

Regional Habitat Conservation Plan

- Phased conservation banking approach
- Goal is to assemble 10,000-15,000 acres of preserve land over 30 years

STRATEGIES:

- WORK WITH MULTIPLE PARTNERS INSIDE AND BEYOND THE ETJ TO IDENTIFY COMPREHENSIVE APPROACH TO WATERSHED CONSERVATION

CHOOSE THE OPEN SPACE CONSERVATION OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Permanently protect floodway and floodplain sites as use for flood control and recreational open space
0%	2. Phased conservation banking
0%	3. Partner with ETJ for conservation land acquisition
0%	4. Fund conservation programs with mitigation fees and agency grants
0%	5. Increase floodwater conveyance capability through land conservation
0%	6. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#3 STRATEGY


flood hazard mitigation
prepare to minimize, expedite communication during and swiftly recover after a flood hazard event
policy
design & construction
operations, maintenance and monitoring
site
community
regional

3. FLOOD HAZARD MITIGATION
CURRENT NEW BRAUNFELS CONDITION

- Alamo Area Council of Governments Regional Mitigation Action Plan:
  - Remove trees and debris from Dry Comal Creek and the Guadalupe River to allow for better creek drainage.
  - Acquire flood-damaged structures along the Guadalupe River to remediate repetitive flood losses and convert those areas to open space.
- Current or completed flood mitigation projects:
  - North Tributary Regional Flood Control Project
  - South Tributary Regional Flood Control Project
  - Dry Comal Flood Control Project
  - Landa Dam culvert repair
- In April 2011, eight sirens were installed along the Comal and Guadalupe Rivers.
- In January 2011, Guadalupe-Blanco River Authority's application for flood protection planning grant assistance filed with the Texas Water Development Board.
- In June 2011, New Braunfels adopted a flood damage prevention ordinance, which seeks to minimize losses due to flood conditions.

CONCLUSION: MAJOR STEPS HAVE BEEN TAKEN SINCE 2010 TO IMPROVE WARNINGS AND REDUCE REPETITIVE LOSSES.

3. FLOOD HAZARD MITIGATION
CASE STUDY #1 | STATE OF SOUTH CAROLINA

Flood Hazard Mitigation Plan

- Prevention measures
- Property protection
- Natural resource protection
- Emergency service
- Structural projects
- Public information activities

STRATEGIES:

•INCLUDE MULTIPLE OBJECTIVES IN COMPREHENSIVE FLOOD HAZARD MITIGATION PLAN

3. FLOOD HAZARD MITIGATION
CASE STUDY #2 | KING COUNTY, WASHINGTON

Flood Hazard Mitigation Plan

- Aims to reduce risk to structures and critical facilities
- Support emergency services
- Promote public awareness
- Leverage partnering opportunities
- Encourage environmentally-sound flood risk reduction projects

STRATEGIES:

•INCLUDE MULTIPLE OBJECTIVES IN COMPREHENSIVE FLOOD HAZARD MITIGATION PLAN

CHOOSE THE FLOOD HAZARD MITIGATION OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Implement life and property protections through a land acquisition program
0%	2. Enhance public information to both visitors and property owners about hazards
0%	3. Improve prevention measures through more stringent building elevation and floodproofing requirements
0%	4. Encourage environmentally-sound risk reduction projects such as regional detention and channel improvements.
0%	5. Other

#4 STRATEGY


stream and river restoration
restore hydrology to original functions and can restore channel and waterway ecosystem
policy
design & construction
operations, maintenance and monitoring
site
community
regional

4. STREAM AND RIVER RESTORATION
CURRENT NEW BRAUNFELS CONDITION

- New Braunfels is affiliated with the Geronimo and Alligator Creeks Watershed Partnership. They provide outreach materials and programs related to how bacteria and nutrients affect water quality.
- The Partnership seeks:
  - To provide nutrient management training to appropriate parties regarding proper nutrient application and soil testing.
  - To provide educational programs for homeowners who have septic systems.
  - To repair, replacement or upgrading of failing septic systems.
  - To expand sanitary sewer system to areas currently served by septic.
  - Funding for more frequent and expanded household hazardous waste and bulk waste cleanups in the watershed.

CONCLUSION: NO FUNDING OR SPECIFIC POLICY ON RIVER AND CREEK RESTORATION IN THE CITY.

4. STREAM AND RIVER RESTORATION
CASE STUDY #1 | STATE OF GEORGIA

Adopt-A-Stream Program

- Funded by Section 319(h) grant
- Goals:
  - Increase pollution awareness
  - Provide citizens with opportunity to monitor waterways
  - Encourage relationships between citizens and government
  - Collect quality water data

STRATEGIES:

•INCREASE PUBLIC AWARENESS

•PROVIDE CITIZENS WITH MONITORING TOOLS

•COLLECT WATER QUALITY DATA THROUGH VOLUNTEERS

4. STREAM AND RIVER RESTORATION
CASE STUDY #2 | BOSTON, MASSACHUSETTS

Muddy River Restoration Project

- Removal of built-up sediment to restore original depth and width of river
- Daylighting and installation of larger culverts
- Invasive vegetation removal

STRATEGIES:

•REMOVE BUILD UP IN STREAMS, RIVERS AND LAKES
•REMOVE INVASIVE VEGETATION
•DAYLIGHT ANY CULVERTED STREAMS

4. STREAM AND RIVER RESTORATION
CASE STUDY #3 | BUFORD, GEORGIA

Stream Buffer Ordinance

- Protects naturally vegetated riparian buffers through enforcement of a 50-foot undisturbed buffer with an additional 25-foot impervious surface buffer along intermittent streams

STRATEGIES:

- STABILIZE STREAMBANKS
- ESTABLISH BUFFER FOR STORMWATER TREATMENTS AND REDUCTION OF ENCROACHMENTS

CHOOSE THE STREAM AND RIVER RESTORATION OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Partner with local groups and universities to implement ecological and habitat restoration projects, research and studies.
0%	2. Establish an Adopt-a-Stream program via grants.
0%	3. Establish a funding source for sedimentation and invasive vegetation removal.
0%	4. Fund long-term projects that restore sections of streams that have degraded or have been diverted through underground pipes.
0%	5. Create a stream and riparian corridor setback requirement.
0%	6. Add an additional buffer for impervious surfaces along intermittent streams.
0%	7. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#5 STRATEGY


litter control
clean up or minimization of litter in rivers, stormdrain facilities and along streets to reduce the amount of debris in the rivers, creeks and detention basins
policy
design & construction
operations, maintenance and monitoring
site
community
regional

5. LITTER CONTROL
CURRENT NEW BRAUNFELS CONDITION

- It is illegal in the City of New Braunfels to dump any type of debris into a canal, stream, river or drainage ditch with an associated fine and clean up.
- In November of 2010, the City Council voted unanimously to support the Edwards Aquifer Recovery Implementation Program, which is a collaborative, stakeholder process involving stakeholders to formulate a plan to protect species affected by management of the Edwards Aquifer.
- The City passed Ordinance 86-14 in November 2011 to prohibit all disposable containers on certain public waterways, including the Guadalupe River. The ordinance went into effect in January 2012.
- In December 2011, City Council considered a proposal to charge visitors a fee to access the river. The proceeds from the fee will help to offset the $1 million per year that goes towards cleanup and river management.

CONCLUSION: LITTER AND TRASH ARE A HUGE PROBLEM AND THE CITY HAS RECENTLY IMPLEMENTED ACTIONS TO HELP REDUCE THE BUILD UP OF TRASH.

5. LITTER CONTROL
CASE STUDY #1 | MONTEREY, CALIFORNIA

Stormwater Ordinance

- City of Monterey was part of a Model Urban Runoff Program designed for small municipalities under 100,000 in population
- Includes “Stormwater Discharge Management Ordinance”
    - Provides legal authority to regulate illicit discharges

STRATEGIES:

•ESTABLISH FUNDING AND MONITORING TO REGULATE ILLICIT DISCHARGES FROM URBAN RUN-OFF

5. LITTER CONTROL
CASE STUDY #2 | WICHITA FALLS, TEXAS

Municipal Litter Control

- Windblown litter is a problem at the city's waste transfer station and near the entrance to the landfill
  - Ordinance enacted that requires tarping loads to waste transfer station and landfill
  - Annual operator awareness training

STRATEGIES:
•ESTABLISH REGULATIONS FOR WASTE TRANSFERS
•ESTABLISH ANNUAL OPERATOR AWARENESS TRAINING

CHOOSE THE LITTER CONTROL OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Fund a city-wide regular cleanup program.
0%	2. Enact an ordinance that limits disposable items, such as bags and cups.
0%	3. Enact a Stormwater Discharge Management Ordinance to regulate illicit discharges.
0%	4. Establish a Pet Waste Ordinance.
0%	5. Require Stormwater Pollution Prevention Plans that produce outcome-based performance measures specific to each project.
0%	6. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#6 STRATEGY


construction control measures
enhanced seeding, mulching, sediment traps, silt fencing, erosion control plan beyond existing requirements
policy
design & construction
operations, maintenance and monitoring
site
community
regional

6. CONSTRUCTION CONTROL MEASURES CURRENT NEW BRAUNFELS CONDITION

- New Braunfels requires a soil erosion and sediment control plan submittal for commercial permits.

CONCLUSION: CONSTRUCTION CONTROL MEASURES ARE PART OF REQUIREMENTS FOR NEW COMMERCIAL CONSTRUCTION BUT THEY COULD BE STRENGTHENED AND HAVE BROADER APPLICATION.

6. CONSTRUCTION CONTROL MEASURES
CASE STUDY #1 | DOUGLAS COUNTY, COLORADO

Comprehensive Erosion Control Permit Program

- Prior to SWPPP development, pre-submittal meetings are encouraged
- Several types of inspections
- Reduction in review and plan-approval times

STRATEGIES:

•REQUIRE PRE-SUBMITTAL MEETINGS TO ENHANCE SWPPP

•CONDUCT SITE INSPECTIONS THROUGHOUT THE PROCESS

6. CONSTRUCTION CONTROL MEASURES
CASE STUDY #2 | EUGENE, OREGON

Outcome-based Erosion Control Program

- Promotes flexibility by considering site-specific conditions and cost-effectiveness
- All construction activity, regardless of size, must meet minimum standards
- Funded through permit fees, enforcement and stormwater utility funds

STRATEGIES:
•CREATE OUTCOME-BASED EROSION CONTROL PROGRAM

6. CONSTRUCTION CONTROL MEASURES
CASE STUDY #3 | CHARLOTTE, NORTH CAROLINA

Cooperative Erosion Control Enforcement and Compliance

- Frequent inspections, once every 2 weeks
- Notices of violation and fines, up to $3,000/day
- Appeal process to fairly require compliance

STRATEGIES:

•CREATE MONITORING AND FEE VIOLATION PROGRAM WITH CONSTRUCTION CONTROL PLANS

CHOOSE THE CONSTRUCTION CONTROL MEASURES OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%
1. Require Storm Water Pollution Prevention Plans that produce outcome-based performance measures specific to each project.

0%
2. Fund and staff a greater frequency of construction site inspections through permit fees, enforcement and stormwater utility funds.

0%
3. Provide benefits for exceeding minimum requirements, such as expedited review time or reduced fee costs.

0%
4. Update the Drainage and Erosion Control Design Manual to be more specific regarding the use of sediment fencing.

0%
5. Update the Drainage and Erosion Control Design Manual to exceed EPA standards.

0%
6. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#7 STRATEGY


retrofit existing stormwater facilities
upgrade existing facilities in need of repair to current standards and low impact development techniques
policy
design & construction
operations, maintenance and monitoring
site
community
regional

7. RETROFIT EXISTING STORMWATER FACILITIES
CURRENT NEW BRAUNFELS CONDITION

- New Braunfels created a Watershed Advisory Committee (WAC) due to a federally-mandated stormwater requirement.
- In February 2011 the committee advised on a list of potential stormwater improvement projects, including channel lining, road reconstructions, culvert construction and detention ponds.
- In June 2011, New Braunfels approved a budget adjustment for the Stormwater Development Fund. This funds operations and maintenance expenses for personnel and equipment that provides upkeep to drainage facilities and easements.

CONCLUSION: RECENT PROJECTS HAVE BEEN IDENTIFIED FOR REPAIR BY THE WAC BUT MANY SMALLER FACILITIES THAT ARE PRIVATELY OWNED HAVE NO PLAN OF ACTION FOR RETROFITTING.

7. RETROFIT EXISTING STORMWATER FACILITIES
CASE STUDY #1 | SEATTLE, WASHINGTON

Private Stormwater Facility Maintenance and Inspection

- City regularly inspects all privately-owned stormwater detention, treatment and conveyance systems
- Owners are responsible for maintaining the systems to ensure long-term functionality
- Constantly updated database

STRATEGIES:

- ESTABLISH A DIGITAL DATABASE OF ALL STORMWATER FACILITIES
- ESTABLISH FUNDING PROGRAM FOR PRIVATE FACILITY UPGRADES

7. RETROFIT EXISTING STORMWATER FACILITIES
CASE STUDY #2 | MONTGOMERY COUNTY, MARYLAND

Stormwater Facility Retrofit Techniques

- Increase volume of pond
- Modify outflow
- Use bypass weirs/structures
- Add wetlands or retention
- Increase time of travel
- Dredge

STRATEGIES:

- ESTABLISH A DIGITAL DATABASE OF ALL STORMWATER FACILITIES
- PLAN UPGRADES TO FACILITIES ON A CASE BY CASE BASIS

CHOOSE THE RETROFIT EXISTING STORMWATER FACILITIES THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Fund and staff an on-going facilities and upgrades needs database.
0%	2. Enact an ordinance that requires the incorporation of Low Impact Design techniques in new and retrofitted construction projects.
0%	3. Fund and staff City inspections of privately-owned stormwater detention, treatment and conveyance systems.
0%	4. Limit future private systems and gradually acquire existing private systems.
0%	5. Update the Drainage and Erosion Control Design Manual to define the minimum slope and velocity to avoid sedimentation accumulation in culverts. Require the minimum size of pipes to be 18 inches.
0%	6. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#8 STRATEGY

policy | **design & construction** | operations, maintenance and monitoring | **site** | community | regional

8. BUILDING RUNOFF CAPTURE
CURRENT NEW BRAUNFELS CONDITION

- New Braunfels Utilities (separate from the City) offers a rebate toward the purchase of rain barrels or cisterns to help offset the cost of rainwater harvesting systems. The rebate reimburses $0.50 per gallon of water storage installed and is for residential only.

CONCLUSION: THE CITY CURRENTLY OFFERS NO INCENTIVE FOR BUILDING RUN-OFF CAPTURE.

8. BUILDING RUNOFF CAPTURE
CASE STUDY #1 | LOS ANGELES, CALIFORNIA

- Trans-Agency Resources for Environmental and Economic Sustainability (T.R.E.E.S.)
- Inexpensive methods to reduce runoff
    - Strategic planting and maintenance, cistern installation, dry well installation, graywater system installation, pavement removal

STRATEGIES:

•CREATE FUNDING AND PROGRAM FOR CISTERN AND GRAYWATER SYSTEMS

•ENSURE CODE ALLOWS FOR INNOVATION

8. BUILDING RUNOFF CAPTURE
CASE STUDY #2 | PORTLAND, OREGON

Portland Bureau of Environmental Services – Willamette Stormwater Control Program

- Disconnect roof downspouts and direct runoff to swales, planters
- Remove or replace pavement with porous materials
- Re-grade paved areas so they drain into new or existing landscaping

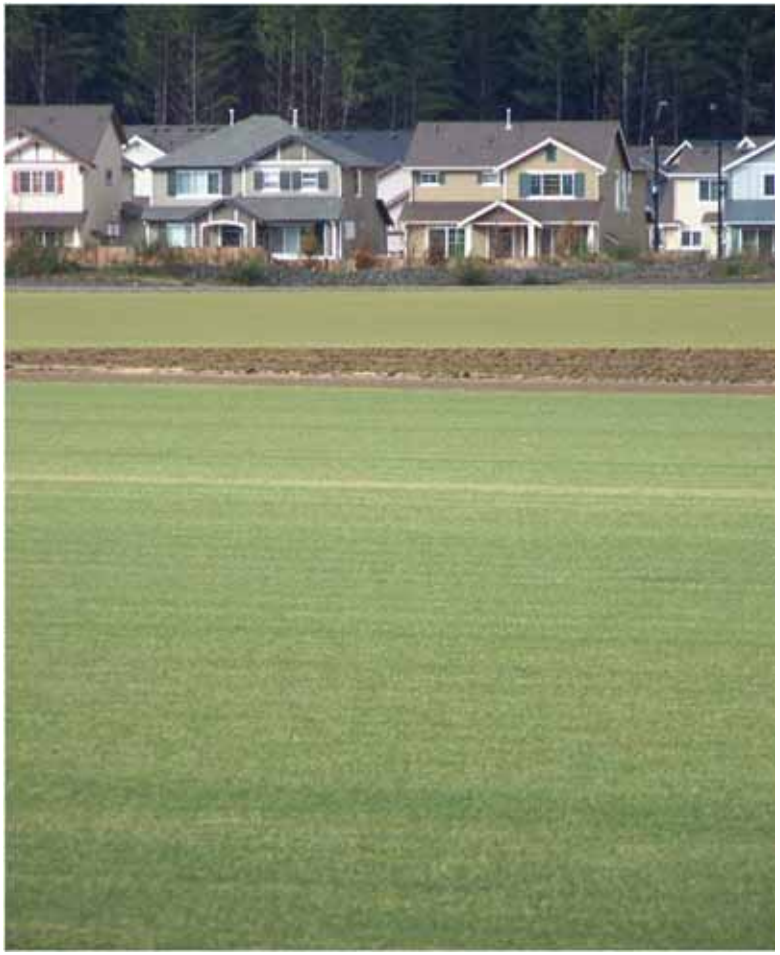
STRATEGIES:

•CREATE PROGRAM THAT ENCOURAGES USE OF PLANT FILTRATION FOR STORMWATER RUN-OFF

8. BUILDING RUNOFF CAPTURE
CASE STUDY #3 | LACEY, WASHINGTON

Zero Impact Development Ordinance

- Retain hydrologic function of site after it is developed
  - “Zero effective impervious surface”
- LID is legal alternative to conventional site design



STRATEGIES:

•CREATE ORDINANCE THAT ALLOWS LOW IMPACT DESIGN AS LEGAL ALTERNATIVE TO CONVENTIONAL SITE DESIGN

CHOOSE THE BUILDING RUNOFF CAPTURE OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1.	Expand current City-sponsored cistern program through grants to provide no-cost cisterns or rain barrels.
0%	2.	Provide permitting or fee incentives for new or retrofitted construction that directs downspouts to rain gardens.
0%	3.	Enact a voluntary zero impact development ordinance, with incentives.
0%	4.	Provide permitting or fee incentives for retrofitted construction that re-grades paved areas to direct stormwater to detention.
0%	5.	Provide permitting or fee incentives for new or retrofitted construction that removes pavement and replaces it with porous materials.
0%	6.	Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#9 STRATEGY


impervious coverage reductions or limits
increased densities, decreased road sections, reduced parking requirements; City can establish limits to impervious cover in city limits or ETJ
policy
design & construction
operations, maintenance and monitoring
site
community
regional

9. IMPERVIOUS COVERAGE REDUCTIONS
CURRENT NEW BRAUNFELS CONDITION

- New Braunfels existing impervious coverage restrictions currently focus on landscape.
- Landscaping is required of new development, except landscaping is not required for single-family and two-family, and agricultural uses.

CONCLUSION: THE CITY CURRENTLY HAS NO IMPERVIOUS COVER REDUCTIONS.

9. IMPERVIOUS COVERAGE REDUCTIONS
CASE STUDY #1 | AUSTIN, TEXAS

Edwards Aquifer Recharge Zone
Building Limitations

- Impervious cover
- Density
- Transfer of impervious cover or development rights
- Stormwater treatment and detention requirements
- Construction site management and stream setbacks or buffer zones

STRATEGIES:

•APPLY EDWARDS AQUIFER RECHARGE ZONE COVERAGE LIMITATIONS TO ALL AQUIFER RECHARGE ZONES

9. IMPERVIOUS COVERAGE REDUCTIONS
CASE STUDY #2 | SEATTLE, WASHINGTON

Stormwater Low Impact Development Practices in the High Point Redevelopment Project

- Each block has an “Allowable Percent Impervious Surface Coverage”
- Street widths reduced from 32 to 25 feet
- Database for future redevelopment thresholds

STRATEGIES:

- ESTABLISH IMPERVIOUS SURFACE LIMITS
- REDUCE ROAD WIDTH REQUIREMENTS
- MAINTAIN A FUTURE REDEVELOPMENT THRESHOLD DATABASE

CHOOSE THE IMPERVIOUS COVERAGE REDUCTION OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Require a parking maximum in addition to a parking minimum.
0%	2. Reduce street lane width requirement.
0%	3. Evaluate, determine and regulate areas of the city that limit the density and amount of impervious cover. Consider developer transfer rights within this zone.
0%	4. Incorporate Low Impact Design techniques into building requirements.
0%	5. Incentivize the use of pervious paving options with expedited review processes or reduction of permitting fees.
0%	6. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#10 STRATEGY


maintenance and monitoring
outlines responsibilities for ensuring maintenance and monitoring is not only completed and operating correctly, but also requires regular city maintenance practices to incorporate BMPs
policy
design & construction
operations, maintenance and monitoring
site
community
regional

10. MAINTENANCE AND MONITORING
CURRENT NEW BRAUNFELS CONDITION

- New Braunfels Utilities periodically contracts outside sources to test the water quality in water bodies throughout the New Braunfels area.
- The Guadalupe-Blanco River Authority (GBRA) partners with the Texas Commission on Environmental Quality (TCEQ) and has several Comal County water quality monitoring sites located in New Braunfels. They are funded entirely by fees assessed to wastewater discharge and water rights permit holders. The sites are monitored on a monthly or quarterly basis for bacteria and water flow.

CONCLUSION: THERE IS MAINTENANCE ON CITY OWNED FACILITIES IN THE CITY. THE CITY HAS NO FORMAL PROCESS FOR MAINTAINING AND MONITORING ALL STORMWATER FACILITIES THROUGHOUT THE CITY.

10. MAINTENANCE AND MONITORING
CASE STUDY #1 | MONROE COUNTY, NEW YORK

Enlisting Citizens to Monitor Water Quality

- Citizen stream monitoring program
- Stormwater outfall adoption pilot program
- Citizens have adopted and monitored more than 100 miles of streams

STRATEGIES:

- CREATE A CITIZEN BASE MONITORING PROGRAM
- ESTABLISH A STORMWATER OUTFALL ADOPTION PROGRAM

10. MAINTENANCE AND MONITORING
CASE STUDY #2 | HILLSBOROUGH COUNTY, FLORIDA

Volunteer Adopt-a-Pond Maintenance Program

- Reduce neighborhood pollution
- Reduce litter
- Mark storm drains
- Increase citizen awareness of stormwater impacts
- Improve pond treatment functions

STRATEGIES:

•ESTABLISH ADOPT-A-POND PROGRAM FOR MAINTENANCE OF FACILITIES

10. MAINTENANCE AND MONITORING
CASE STUDY #3 | CENTRAL NEW YORK

Project Watershed

- Environmental education and community outreach program
  - Engages high school, middle school, college students and adult volunteers
  - Collects scientifically valid data for water quality

STRATEGIES:

•ESTABLISH EDUCATION AND MONITORING PROGRAM THROUGH LOCAL SCHOOLS TO COLLECT WATER QUALITY DATA

CHOOSE THE MAINTENANCE AND MONITORING OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%
1. Support a citizen-based monitoring program through grants.

0%
2. Create a Home Owners Association maintenance education program through online materials and brochures.

0%
3. Fund and staff expansion of city monitoring and maintenance programs.

0%
4. Create a school-based monitoring program and curriculum that teaches children about stormwater issues and provides scientifically-valid data to the city for water quality monitoring purposes.

0%
5. Update the Drainage and Erosion Control Design Manual to identify maintenance standards.

0%
6. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#11 STRATEGY

policy | **design & construction** | operations, maintenance and monitoring | site | **community** | regional

11. DETENTION BASIN
CURRENT NEW BRAUNFELS CONDITION

- The Drainage and Erosion Control Design Manual requires that most development types include post-development discharge mitigation through detention or some other technique. Participation in neighborhood or regional mitigation is also an option.

- New Braunfels 2010 Open Space Master plan prioritizes detention over other areas.

CONCLUSION: MOST DETENTION FACILITIES IN THE CITY ARE CURRENTLY SINGLE PURPOSE.

11. DETENTION BASIN
CASE STUDY #1 | ARLINGTON HEIGHTS, CHICAGO

- On-site stormwater detention
- Park district maintains as park or open space
- Park district has agreement with community that they will only take over and maintain stormwater detention facilities that have a recreational use
    - Golf courses, ball diamonds, tennis courts, ice skating rinks, sledding hills and nature areas

STRATEGIES:

•COLLECT STORMWATER ONSITE THROUGH A MULTI-USE DETENTION FACILITY MAINTAINED BY THE PARKS DEPARTMENT

11. DETENTION BASIN
CASE STUDY #2 | TUCSON, ARIZONA

Arroyo Chico Multi-Use Project

- Joint project between Pima County Regional Flood Control District, City of Tucson and U.S. Army Corps of Engineers
- 6 miles of ephemeral drainage area
- Opportunity for environmental restoration of degraded riparian ecosystem and recreational improvements for the neighboring communities.

STRATEGIES:

•CREATE DETENTION BASINS ALONG RIVER AND STREAM CORRIDORS FOR MULTI USE FACILITIES

CHOOSE THE DETENTION BASIN OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%
1. In conjunction with the 2010 Open Space Master Plan, prioritize park improvements based upon the possible use as a detention facility.

0%
2. Update building code to designate the use of detention basin water for irrigation and provide incentives for developers that implement graywater systems.

0%
3. Update the Drainage and Erosion Control Design Manual to allow for fee-in-lieu (rather than detention) in lower portions of the watershed, where detention may be counterproductive.

0%
4. Require or provide incentives for specific design enhancements to detention basins to also improve their water quality functionality.

0%
5. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

#12 STRATEGY

implementation tools

opportunities for variance from code for a fee for developments that achieve a higher standard than required. examples: buy into watersheds to pay in lieu of expedited permitting process

policy | design & construction | operations, maintenance and monitoring | site | community | regional

12. IMPLEMENTATION TOOLS
CURRENT NEW BRAUNFELS CONDITION

- New Braunfels approved stormwater utility fees in July 2011. This fee would potentially raise $2.3 million per year to fund drainage maintenance in New Braunfels. The fee would amount to $4.60 per month for a 2,000-3,000 square foot home. Smaller homes would receive a $3.00 fee and larger homes could pay up to $6.60. Commercial properties would pay approximately $4.60 per month.

- The City also provides incentives regarding the drainage facility criteria. A fee may be utilized in place of a detention or retention system. Collected fees will be used to construct public flood control improvements.

CONCLUSION: THE RECENTLY APPROVED FEE FUNDS MAINTENANCE. THERE IS CURRENTLY NO DEDICATED FEE FOR STORMWATER CAPITAL PROJECTS.

12. IMPLEMENTATION TOOLS
CASE STUDY #1 | ARLINGTON COUNTY, VIRGINIA

Innovative Stormwater Management Standards and Mitigations

- Pollutant removal requirements for development sites based on the amount of existing and proposed impervious cover
- Compliance options include additional on-site or off-site treatment or monetary contribution to Watershed Management Fund

STRATEGIES:

- ESTABLISH WATERSHED MANAGEMENT FUND FOR DEVELOPERS TO CONTRIBUTE TO FOR REGIONAL STORMWATER MANAGEMENT

12. IMPLEMENTATION TOOLS
CASE STUDY #2 | PORTLAND, OREGON

Clean River Rewards Incentive and Discount Program

- Property owners who manage stormwater on-site or on the public right of way that serves property are eligible for discounts at 35% of the stormwater charge for on-site and 65% for public right of way

STRATEGIES:

•CREATE INCENTIVE PROGRAM FOR INNOVATIVE APPROACHES TO STORMWATER MANAGEMENT

12. IMPLEMENTATION TOOLS
CASE STUDY #3 | CENTENNIAL, COLORADO

Stormwater Fee Discounts

- Stormwater fees for improved land are based on impervious area
- Annual stormwater fee charged to property owner is based on the impact the property will have on the drainage system
    - Determined via aerial photography

STRATEGIES:

•ESTABLISH STORMWATER IMPACT FEE BASED UPON PERCENTAGE OF IMPERVIOUS COVERAGE PER SITE

CHOOSE THE IMPLEMENTATION TOOL OPTIONS THAT ARE MOST APPROPRIATE FOR NEW BRAUNFELS:

0%	1. Base stormwater fees associated with improved land or impervious area.
0%	2. Allow compliance options, such as contribution to a fund or additional on-site or off-site treatment.
0%	3. Update the Drainage and Erosion Control Design Manual to require detention or fee-in-lieu for Types 1 and 2 Development.
0%	4. Update the Drainage and Erosion Control Design Manual to include a section delineating Low Impact Design methods.
0%	5. Other

MAPPING EXERCISE

Place stickers for this strategy on any area of the map that you feel needs to have that strategy addressed.

NEXT STEPS

1. Recommendations on implementation options for these strategies in New Braunfels
2. Creation of implementation design and language to be incorporated into Stormwater Management Strategy
3. Presentation to the WAC and stakeholders.
4. Incorporation of these into the Drainage Criteria Manual and MS4 Permits.