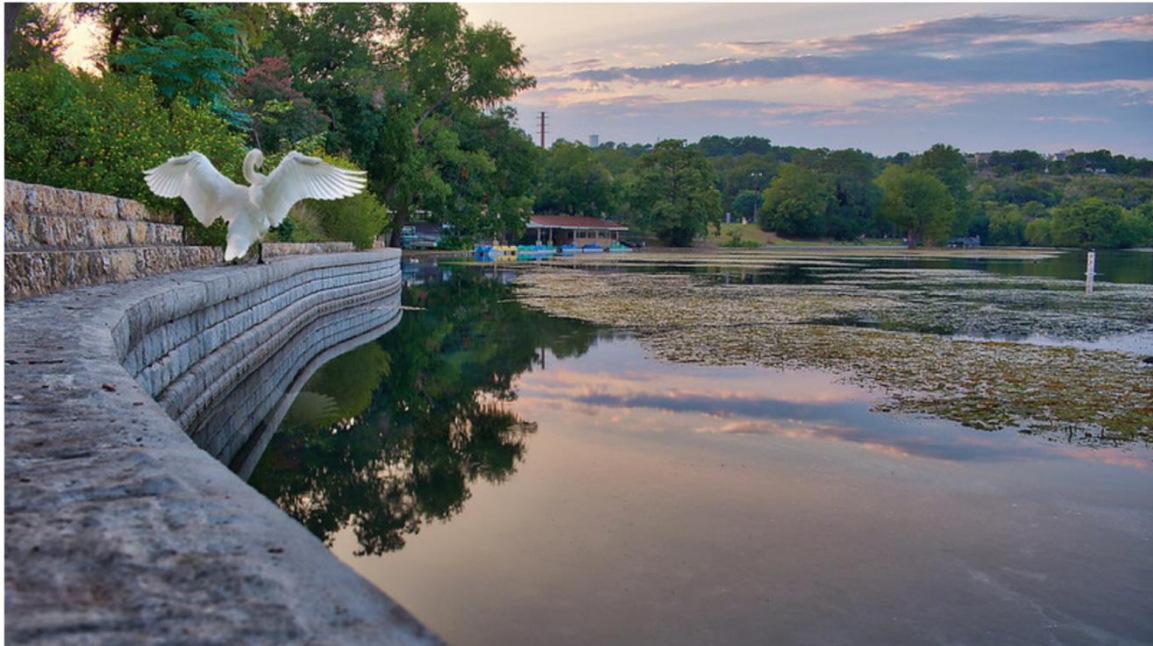


ONE WATER ROADMAP REPORT

DRAFT AS OF JUNE 1, 2021



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A MESSAGE FROM THE NEW BRAUNFELS ONE WATER WORKING GROUP

WATER: Sacred, life-source, necessary, fundamental, the most important resource on the planet, drawing people together, disrespected, undervalued, sustainability...these are some commonly shared thoughts when people come together and talk about water.

Water is something we need to think and talk about in order to protect this most precious resource. This is exactly what a group of people did over an extended period of time as they worked together to create a One Water Strategy for New Braunfels. The group, made up of City of New Braunfels, New Braunfels Utilities and GBRA employees as well as engineers, city planners, and non-profit leaders, came together to create a new approach to how we all go about our work as it relates to water. Instead of compartmentalizing water into its various sectors such as drinking water, wastewater, stormwater, recreational water, decisions made in isolation from each other, and so forth – this vision mandates that we see it is all “one water” and work more collectively as a group when we address water issues. This vision centers around an understanding that any decision, use or impact on water – no matter the type of water - is interconnected for it is ALL one water.

This is a new approach for our community that we are all excited about as it will change the way we go about our work as it pertains to water in this area. The One Water approach is an international movement being adopted and implemented by cities, utilities, urban planners, engineers, politicians and more. New Braunfels is a leader in our region in many areas and we will be the leaders in using this approach. We should all be proud of that.

We hope that this report serves as a beginning and with time the concepts contained in it are shared and expanded upon. We say this as we all agree that as time goes on water will become more valuable and to meet the growing population needs water will become even more important in our work and our daily lives. And for those that don't directly work with water they must become consciously more aware of the water they use in their lives and how important it truly is, whether it be for cooking, cleaning, drinking or just for fun. For those who work in the water realm it is important that we properly manage and protect our water resources, if we are to sustain our quality of life and protect the environment. We all need to realize there is just “One Water” and it is a sacred part of our landscape that should be protected, preserved, and we must set a higher standard on how we view it, use it, manage it and interact with it than what other communities around the nation have maintained.

Thus, water leaders in Comal County bring to you, the reader of this report, the concept of One Water as a means to protect this precious resource while optimizing water planning for today and the future.

Dr. Judith Dykes-Hoffmann

New Braunfels One Water Working Group member

Professor Emeritus of Social Innovation and Social Entrepreneurship, Texas Lutheran University

President, Board of Directors, Headwaters at the Comal

Vice-President, Board of Trustees, New Braunfels Utilities

ACKNOWLEDGEMENTS

We wish to thank all who participated in the New Braunfels One Water Roadmap development process.

We also thank the support staff at New Braunfels Utilities, the City of New Braunfels and Guadalupe-Blanco River Authority who helped facilitate the Roadmap development process and who helped make this report possible, in particular Rocio Gallegos, Stephanie Guerra-Hill and Linda Mendoza. Your work behind the scenes is noticed and appreciated.

The New Braunfels One Water Roadmap development process was facilitated by and this report was developed with assistance from Sarah Richards and Cassandra Harrison with Richards Consulting under contract with New Braunfels Utilities.

ONE WATER WORKING GROUP

A very special thank you to the dedicated members of the Working Group for their time and talent.

NEW BRAUNFELS UTILITIES

Andrew Cummings, TMN LI20059
Conservation and Customer Solutions Manager

Dr. Judith Dykes-Hoffmann
Vice-President, NBU Board of Trustees

David Hubbard
Chief Administrative Officer

Ryan Kelso
Chief Operations Officer

Brent Lundmark
Water Treatment and Compliance Manager

Nancy Pappas
Managing Director, Headwaters at the Comal

Shawn Schorn, P.E.
Chief Water Systems Engineer

Dawn Schriewer
Chief Financial Officer

Mike Short, P.E.
Director of Water Services and Compliance

Lauren Strack
Assistant Manager, Headwaters at the Comal

Ian Taylor
Chief Executive Officer

Jason Theurer
Water Operations Manager

CITY OF NEW BRAUNFELS

Ylda Capriccioso
Park Development Manager

Jean Drew, AICP, CNU-A
Senior Planner

Mark Enders
Watershed Program Director

Garry Ford, Jr., P.E., PTOE
Assistant Public Works Director/City Engineer

Christopher Looney, AICP
Director of Planning & Development Services

Melissa Reynolds, P.E., CFM
Assistant City Engineer

Ken Wilson
Assistant Director, Parks and Recreation

GUADALUPE-BLANCO RIVER AUTHORITY

Nathan Pence
Executive Manager of Environmental Sciences

ADDITIONAL WORKING GROUP MEMBERS

Emily Warren Armitano
Land Conservation and Water Program Officer
Cynthia & George Mitchell Foundation

Jacqueline Ashmore, Ph.D.
Executive Director
Institute for Sustainable Energy, Boston University

Josef Sharif Benzaoui
Institute for Sustainable Energy, Boston University

Adam Conner, PMP
Hydrologist
Freese and Nichols, Inc.

Ashley Evans, P.E.
Project Manager
Arcadis U.S., Inc.

Michael Alex Grinshpun
Institute for Sustainable Energy, Boston University

Tom Hegemier, P.E., D.WRE, CFM
Senior Project Manager
Doucet and Associates, Inc

ADDITIONAL CONTRIBUTORS

Many others supported the Roadmap effort by participating in meetings, interviews and other key activities.

Kristi Aday
Assistant City Manager
City of New Braunfels

Robert Camareno
City Manager
City of New Braunfels

Nacho Campos
Retired Board Trustee
New Braunfels Utilities

Stacey Dicke
Director of Parks & Recreation
City of New Braunfels

Patty Gonzales
Guadalupe-Blanco River Authority

Vanessa Guerrero
Executive Manager, Administration
Guadalupe-Blanco River Authority

Drew Hardin, P.E.
Principal
Freese and Nichols, Inc.

Tyler Hoffman
Webster
City of New Braunfels

Janice Jessen
Retired Executive Director of Strategy and People
New Braunfels Utilities

Melissa Krause
Chief Communications and Strategy Officer
New Braunfels Utilities

Greg Malatek
Public Works Director
City of New Braunfels

Jordan Matney
Assistant City Manager
City of New Braunfels

Linda Mendoza
Management Assistant
City of New Braunfels

Stephanie Neises, P.E.
Freese and Nichols, Inc.

Pam Quidley
Communications and External Affairs Manager
New Braunfels Utilities

Jennifer Walker
Deputy Director, Texas Coast and Water Program
National Wildlife Federation

EXECUTIVE SUMMARY

Water is not just a commodity – it permeates a way of life, especially for those living in New Braunfels, Comal County as well as the Texas Hill Country. It is part of our identity and plays a key role in our quality of life. As Comal County’s and Texas’s population continues to see exceptional growth¹, it is key to protect our water resources as our water supply cannot grow at this same pace. Thus, access to clean, clear, accessible, and abundant water resources is a challenge going forward. In fact, competing demands for water will create incredible challenges for local and regional watersheds and those entities charged with managing water resources. To add to the water challenges is the typical extreme fluctuations in water availability for Central Texans. Times of drought, such as the drought of 2011 in which central Texas witnessed 60 consecutive days of 100-degree weather, are often bookended by extreme incidents of flooding.

To address the above competing challenges which stresses our local and regional watersheds, a dedicated team of professionals across disciplines and agencies came together to address the urgent need for integrated, holistic water planning. The team, including staff and leadership from New Braunfels Utilities, the City of New Braunfels, the Guadalupe Blanco River Authority, guided by a group of industry experts, collaborated to identify an approach to maintain and preserve local water resources for the benefit of current and future generations.

The team used the One Water approach in their work to create a One Water Roadmap. A One Water approach, defined by the Water Research Foundation (WRF) is an integrated planning and implementation approach to managing finite water resources for long-term resilience and reliability, meeting not only the economic needs but also community and ecosystem needs. The One Water methodology requires thinking of water as a single system and recognizes that all water flows - including stormwater, rainwaters, and wastewater – are viable water resources. Successful implementation requires greater collaboration between our community leadership to plan our conservation strategies, water quality efforts, drainage plans, land use plans, etc. for more holistic management of our water resources.

Using a One Water framework the New Braunfels One Water team, over the past year, convened to identify strategic and actionable ways the entities could work together and with the community, to transition to this water management approach for New Braunfels and surrounding areas. The following key objectives were identified as essential to maintain a high quality of life in the greater New Braunfels community:

- Plan for and manage water resources holistically and sustainably
- Maximize environmental, social, and economic benefits to New Braunfels
- Ensure water remains a celebrated feature of our community
- Build a community of water-conscious citizens
- Provide a sustainable and resilient water supply for people
- Ensure high-quality drinking water & water quality that meets the standards for its intended use
- Improve health of local watersheds, waterways, and groundwater resources

The above objectives are refined into five vision elements which include detailed objectives, strategic directions, success indicators, vision targets and action plans including short-term, mid-term and long-term goals, some being aspirational.

The One Water Roadmap Report should be viewed as a working document, a guide for driving cross agency cooperation and community engagement, and a long-term vision for holistically managing our water resources. As more stakeholders are included in the process, actions may change but the overarching vision needs to remain unchanged: “To ensure [that] water remains a celebrated and protected feature of our community by collaboratively managing our water resources to safeguard watersheds, waterways and groundwater”.

¹ According to a NBEDC benchmark study, Comal County’s population doubled in the past 10 years. Texas’s population will double by 2050 according to the US EPA.

BACKGROUND & PURPOSE

INTRODUCTION

With a strong desire to provide water management that is resilient, sustainable, and in keeping with the values of the New Braunfels community, New Braunfels Utilities is interested in exploring opportunities to advance a One Water approach with the greater New Braunfels community. A shift such as this cannot be achieved with a solitary activity or process that single-handedly results in more sustainable water management; the goal is a real transition approach. Change of this nature takes time, commitment, and meaningful engagement of all entities that play a part in planning for and managing a community's water resources.

In August of 2019, New Braunfels Utilities (NBU) embarked on a One Water Roadmap planning effort and invited the City of New Braunfels (City) and the Guadalupe-Blanco River Authority (GBRA) to join them in identifying ways the three entities could work together to transition the water management approach of New Braunfels. Consultant Sarah Richards was hired to facilitate the planning process and draft the culminating report.



NEW BRAUNFELS UTILITIES, CITY OF NEW BRAUNFELS & GUADALUPE-BLANCO RIVER AUTHORITY

CITY OF NEW BRAUNFELS

The City of New Braunfels is a home-rule city under Texas State Law. The City was founded in 1845 under German charter. The City is governed by a seven-member council and has over 500 employees under the City Manager, Robert Camareno. The City has a number of local advisory committees, boards and commissions who make recommendations to the City Council regarding policies and the operation of several City departments.

Though much has changed from 1845 to today, the core principles set forth by the founders—hard work, progress, civic pride, and family devotion—have remained a steadfast way of life here.

For more information, please visit www.nbtexas.org.

NEW BRAUNFELS UTILITIES

New Braunfels Utilities (NBU) is a community-owned public power utility providing water, wastewater and energy services to over 70,000 customers in the New Braunfels area. NBU is governed by a Board of Trustees made up of local residents appointed by the New Braunfels City Council.

New Braunfels Utilities is committed to improving the quality of life for their customers through excellence in service. By utilizing consistent efficiency improvements and programs like On Line Account Access and Utility Bill Assistance, NBU works to give the community the most valuable service possible. As good stewards of the rivers, streams and community of New Braunfels, NBU practices effective water conservation and environmental protection strategies.

For more information, please visit www.nbutexas.com.

GUADALUPE-BLANCO RIVER AUTHORITY

The Guadalupe-Blanco River Authority provides stewardship for the water resources in its ten-county statutory district, which begins near the headwaters of the Guadalupe and Blanco Rivers, ends at San Antonio Bay, and includes Kendall, Comal, Hays, Caldwell, Guadalupe, Gonzales, DeWitt, Victoria, Calhoun and Refugio counties.

The Guadalupe-Blanco River Authority leads as a regional partner managing watershed resources to protect and support the needs of a growing population, economy and healthy environment. The mission of GBRA is to support responsible watershed protection and stewardship, provide quality operational service, and promote conservation and educational opportunities in order to enhance quality of life for those we serve.

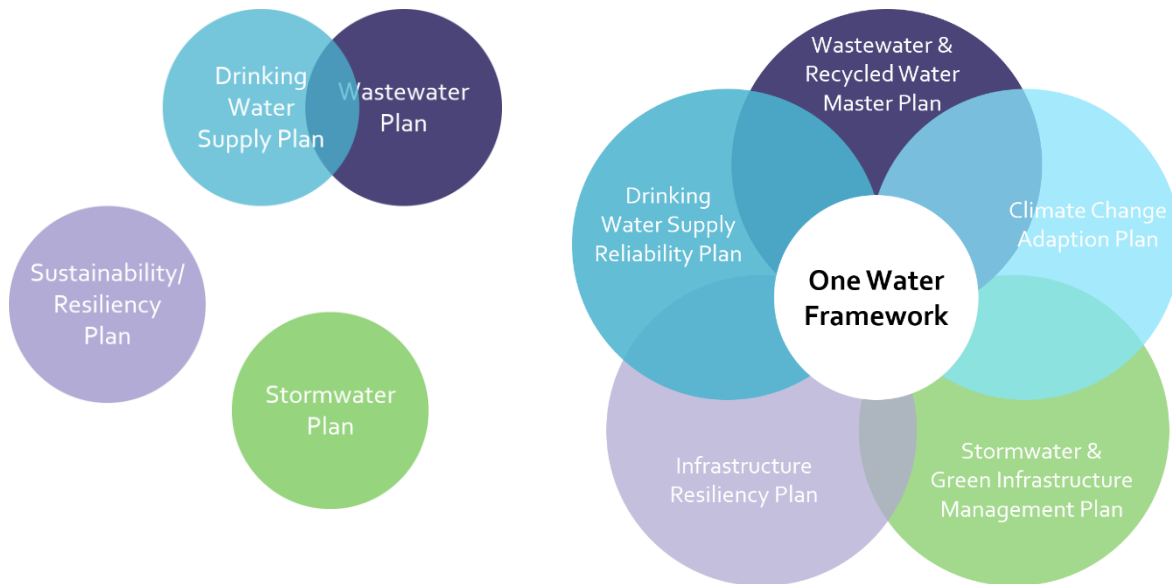
For more information, please visit www.qbra.org.

WHAT IS ONE WATER?

ONE WATER HAS TWO DEFINING FEATURES:

1. It begins with integrated, comprehensive planning. While the initial challenges a community comes together to address will vary (water scarcity, flood resilience, water quality, etc.), the One Water approach recommends that the community's water challenges be assessed and addressed holistically via a coordinated planning effort. The One Water Approach is visualized in Figure 1.

Figure 1. Traditional Versus One Water Approach



Source: Based on Water Research Foundation (2017) - adapted by Richards Consulting (2020).

2. By engaging in an integrated, comprehensive planning effort that considers multiple community benefits and risks, innovative water management solutions are identified and advanced alongside more conventional solutions.

Innovative water management solutions can include:

- Maximizing water conservation and efficiency to decrease overall demand for water
- Maximizing use of greywater, rainwater, stormwater and wastewater to meet water needs
- Green, or natural, infrastructure to improve water quality, increase resiliency, and provide park and open space
- Aquifer storage and recovery (ASR) to store water for times of need
- Best management practices in land management
- Regional partnerships to share, access, and manage assets

In the 2016 publication *One Water Roadmap: The Sustainable Management of Life's Most Essential Resource*, the US Water Alliance recognized that a One Water approach can take many different forms, but outlined seven One Water "hallmarks" or unifying characteristics as can be referenced in Appendix A.

ONE WATER DEFINED

The industry uses several terms, such as integrated urban water management (IUWM), integrated water resource management (IWRM), and One Water to describe an approach to water management that is a departure from the conventional approach. While these terms have been around for several decades, it can be challenging to understand what One Water is and what it means for a community or utility. As defined by the Water Research Foundation (WRF), One Water is an integrated planning and implementation approach to managing finite water resources for long-term resilience and reliability, meeting both community and ecosystem needs. Ultimately, a One Water approach aims to help communities better manage water sustainably and resiliently as demonstrated in Figure 2.

Figure 2. The One Water Cycle



Source: Water Research Foundation (2017).

The figure above conceptualizes how the ONE Water cycle moves beyond the traditional systems of a water, wastewater, stormwater management system to integrate advanced treatment options. The One Water management approach includes consideration for how green infrastructure is an important component of water management, how wastewater reuse can augment surface and groundwater systems, and be used for irrigation or even direct potable systems. Community planning and stakeholder engagement is another important step in the One Water management cycle allowing engagement from new stakeholders such as parks, industry, development and business into the process of creating opportunities for water to move seamlessly and efficiently through the system for a more resilient and healthy community infrastructure.

METHODOLOGY

OVERVIEW

Following efforts within New Braunfels Utilities (NBU) to transition the utility's approach to water management, NBU sought to identify more holistic opportunities to advance a One Water approach for the New Braunfels community. NBU keenly recognized that to achieve this, a coordinated effort between multiple agencies that play important roles in the community's water management, primarily the utility, the City of New Braunfels (City), and the Guadalupe-Blanco River Authority (GBRA), would be required. With this interest in mind, NBU approached colleagues at the City and River Authority and discovered that both entities were willing and interested in exploring opportunities with NBU.

All strategy sessions included participation by at least one representative from the following city departments: Parks and Recreation, Public Works - Engineering, Public Works - Watershed Management, and Planning and Community Development. At least one representative from the following departments at NBU participated in each meeting: Board of Trustees, Executive Team, Water and Wastewater Operations, Energy, and Environmental Affairs. Also included in each meeting was GBRA Environmental Science and Community Affairs leadership, consultants specializing in water resources planning, engineering, and watershed management, and representation from the Headwaters at the Comal. Please see the Acknowledgements for a complete list of participants.

With mutual interest in exploring opportunities together, NBU engaged Richards Consulting in September of 2019 to facilitate the development of an initial New Braunfels One Water strategy and action plan, which we have termed the *New Braunfels One Water Roadmap*, by the three participating entities, NBU, the City of New Braunfels and GBRA.

Utilizing the frameworks established in the Water Research Foundation's *Blueprint for One Water* and the ICLEI Local Governments for Sustainability's *SWITCH Training Kit: Integrated water management for the City of the Future*, Richards Consulting led a series of key activities in Phase One and Two which included in-depth research and analysis; interviews with NBU, City, and GBRA staff and water industry stakeholders; and strategic work sessions with a Working Group to inform the New Braunfels One Water Roadmap.

PHASE ONE: INFORMATION GATHERING

The goals of the first work phase were to:

- Gather important best practice research to inform the methodology of the project;
- Assess the current knowledge base and interest of stakeholders from each agency;
- Build stakeholder understanding of One Water aspects and principles; and
- Begin identifying goals and objectives that were meaningful to the three agencies.

In September 2019, Richards Consulting conducted approximately twenty hours of desk research and conducted thirty-four stakeholder interviews. Interviewees were primarily mid- or upper-management staff from the three agencies, and project managers from firms engaged in water management efforts of one or more of the agencies. See complete interview protocols, questionnaire, and findings in Appendices B.

PHASE TWO: NEW BRAUNFELS ONE WATER VISION & STRATEGY DEVELOPMENT

ONE WATER WORKING GROUP

Phase Two was the heart of this project, lasting eight months, from October 2019 through June 2020, and involved the sustained commitment of time, energy and enthusiasm by more than thirty staff from NBU, the City, GBRA, and associated consulting firms.

The primary goal of this phase was to bring together key representatives from the three water management entities to collaboratively develop a One Water strategic plan or “Roadmap”. Two kick off meetings were held and were well attended by leadership of all three agencies: NBU and partner agencies, the City of New Braunfels and GBRA. With strong commitments, support and enthusiasm in place, a group of twenty-seven dedicated participants formally referred to as the One Water Working Group (Working Group) was established, and a series of strategy sessions was outlined by Richards Consulting.

In total, the One Water Working Group engaged in six strategy sessions, lasting between two and four hours each, with additional subgroup meetings that worked on specific Roadmap objectives. During these sessions, the Working Group followed an adapted version of a strategy development framework from the ICLEI Local Governments for Sustainability’s *SWITCH Training Kit* (2011). The complete framework used by the working group is described in the Strategic Direction section of this report in text format, and in more detail in table format in Appendix A.

In addition to following the process outlined above, the Working Group spent time considering specific types of strategies most appropriate for individual objectives. The CADCA’s National Coalition Institute *Seven Strategies for Community Change* as seen in Figure 12 in Appendix C, was particularly beneficial to strategy development within objectives.

Highlights of the strategic planning sessions included presentations from outside experts, such as One Water leader and CEO of Clean Water Services Diane Taniguchi-Dennis, and leaders from innovative international firm GHD Ryan Brochti and Chris Benjamin. The Report Foreword brainstorm session led by Dr. Judith Dykes-Hoffmann was particularly inspirational.

PHASE THREE: FINALIZE & DISSEMINATE MATERIALS

In order to finalize and then disseminate the materials, a smaller group comprised of NBU, GBRA, the CoNB and a representative from Arcadis and Freese Nichols, met over the summer and fall of 2020. This group recognized that the work laid out in the Roadmap is urgently needed to protect our water resources. The team also realized that the current strain on existing human resources at all participating agencies caused by both the COVID pandemic as well as strong, sustained growth in the region could be challenges to the forward momentum of the work. As a result, **the transition team worked to complete the Roadmap and recommend adoption of the Roadmap by the main agencies, NBU, GBRA, CoNB.**

It should be noted that the work identified in the One Water Roadmap Report and plan which identify action areas should be viewed as a working document acting as a guide for driving community engagement in holistically managing our water resources. This effort will require on-going commitment from all stakeholders and a mindset for continuous improvement. **Therefore, the team also recommends that upon adoption of the Roadmap Report serious discussion and decision are made on allocation of resources for managing this collaborative effort.**

Figure 13 in Appendix C serves as a logic model of the New Braunfels One Water Roadmap. To reference actual document with all five vision elements, please visit www.headwatersatthecomal.org/OneWater.

VISION, OBJECTIVES AND ACTION AREAS

It is not difficult for a person to feel and see the love and respect for water resources that are cornerstones of our community. With this as a foundation it was easy for Working Group members to recognize why a One Water Roadmap made sense for New Braunfels. Considering the needs of all local community members and the level of stewardship needed to protect our fragile natural resources, the Working Group distilled their vision for One Water New Braunfels into the following vision statement:

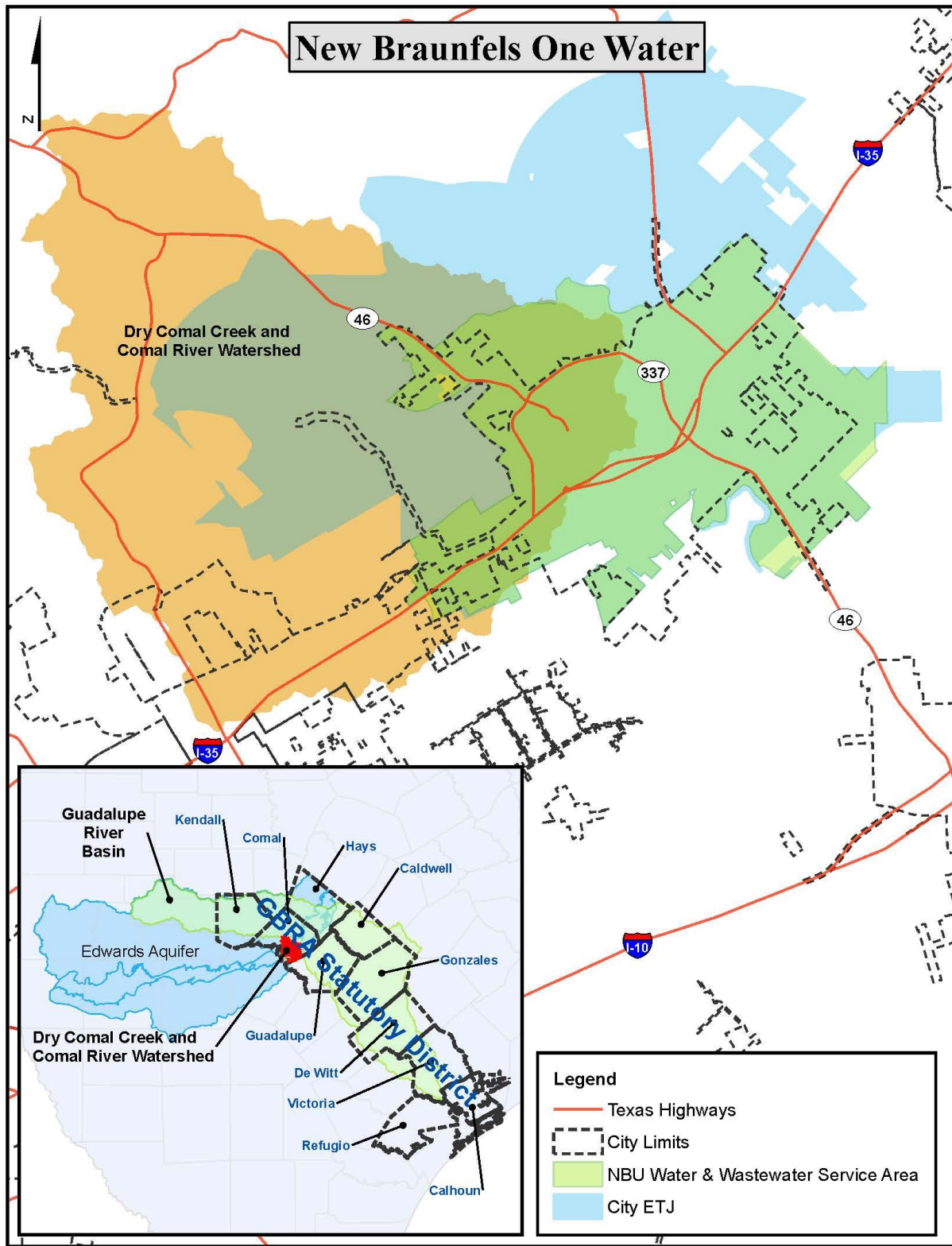
“To ensure water remains a celebrated and protected feature of our community by collaboratively managing our water resources to safeguard watersheds, waterways and groundwater.”

The objectives to accomplish the vision are introduced below and along with a more complete Roadmap plan at www.headwatersatthecomal.org/OneWater. As well, it is understood that this Roadmap is a living document that should be continuously reviewed, revised and updated as the community deepens its One Water understanding, increases engagement and pushes additional coordinating projects forward.

Further, the Working Group recognizes that the efforts must go beyond the New Braunfels community to ensure that a One Water vision is achieved. New Braunfels shares its precious resources with communities upstream and downstream; the activities of upstream communities and other communities utilizing the regional water resources affect the quality and quantity of water. Conversely, the actions of New Braunfels affect the quality and quantity of water enjoyed by downstream communities and communities dependent on the regional resources. Educating and engaging, neighboring communities on One Water efforts will be instrumental for long-term success.

The Area Map as referred to in Figure 3 on the next page shows the enlarged watershed for the greater community of New Braunfels. The map outlines the Dry Comal Creek and Comal River Watershed area, with an inset of the Guadalupe River Basin. The Comal Springs, the largest group of natural springs in Texas, is the water source of the Comal River and flows through New Braunfels. The Comal River, the “heart and soul” of New Braunfels, is certainly an important environmental, economic and community feature of the City. The Guadalupe River flows into New Braunfels and connects with the Comal River and provides an important fresh water source for the bays and estuaries of the Gulf of Mexico. While the majority of the work of the One Water roadmap will focus on the City of New Braunfels and its extra-territorial jurisdictions the map illustrates the interconnectedness of the regions ground and surface water resources. Expanding One Water planning efforts regionally will be important to protect water for long-term healthy, clean, and abundant water resources for all upstream and downstream communities.

Figure 3. Area Map



VISION, OBJECTIVES AND ACTION AREAS

THE VISION OF ONE WATER NEW BRAUNFELS

To ensure water remains a celebrated and protected feature of our community by collaboratively managing our water resources to safeguard watersheds, waterways and groundwater.

The Objectives to Achieve this Vision

- Plan for and manage water resources holistically and sustainably
- Maximize environmental, social and economic benefits to New Braunfels
- Ensure water remains a celebrated feature of our community
- Build a community of water-conscious citizens
- Provide a sustainable and resilient water supply for people
- Ensure high-quality drinking water & water quality that meets the standards for its intended use
- Improve health of local watersheds, waterways, and groundwater resources

The above objectives were ultimately grouped into five areas for action, as detailed below.

ACTION AREA 1: PLAN FOR AND MANAGE WATER RESOURCES HOLISTICALLY AND SUSTAINABLY

The New Braunfels community can take major strides to plan for and manage their water resources holistically and sustainably, so long as there is deep buy-in and engagement of the major agencies charged with water resource management. Collaborative, holistic and sustainable management is no easy feat and will require increased understanding, communication, shared goals, and better coordinated efforts within and between the agencies. Further, shared goals and coordination is required throughout the Guadalupe River watershed and Edwards Aquifer watershed.

To achieve this, the Working Group identified two complementary strategies to be advanced, with thoughts on how to advance these locally as well as regionally. First, actions must be taken to increase the understanding of holistic water challenges and opportunities within the agencies charged with management. Second, actions must be taken to increase coordination and cooperation within and between public agencies.

The Working Group identified a number of actions that could be taken in the near term to increase understanding and coordination. To increase understanding, the group recommends conducting polling to determine baseline knowledge of agency staff and developing and delivering One Water training to all staff. To increase the number of cross-agency projects that meet the goals of multiple agencies and departments, the Working Group recommends building a library of current and recent model projects. Finally, it is imperative to assemble a future working group tasked with identifying and advancing cross-agency projects and analyzing any water projects that are not cross-agency to determine if they could be One Water-aligned.



Increase knowledge of One Water approach



Build library of model projects



Identify & advance Cross-agency projects

ACTION AREA 2: MAXIMIZE ENVIRONMENTAL, SOCIAL, AND ECONOMIC BENEFITS TO THE GREATER NEW BRAUNFELS AREA

The Working Group recognizes both the triple-bottom-line (environmental, social and economic) benefits achievable when advancing a One Water approach and knows that the New Braunfels community deserves thoughtful, holistic decision-making. These benefits can be difficult to discern, quantify, and highlight under the currently utilized cost benefit analysis framework used by water management agencies and other governing bodies. Due to the very nature of One Water, at times One Water-aligned projects may not pencil out when you apply traditional cost benefit analysis approach, but that same One Water-aligned project might deliver a number of benefits to the community that make it “the right” project to advance.



Develop triple-bottom-line scoring matrix



Evaluate projects using matrix

To help the community and governing bodies move to a holistic decision-making framework, the Working Group developed an objective explicitly calling out the goal of maximizing environmental, social, and economic benefits to the greater New Braunfels area. First, the Working Group recommends that a triple-bottom-line project scoring matrix be developed in partnership with the

community. This matrix will then be utilized to evaluate current projects underway and set a baseline in how future progress will be evaluated. This matrix should also be utilized early on in project development to ensure projects are well-aligned. The Working Group recommends building a library of successful One Water projects in other communities as a reference model and case studies to use when for evaluating projects.

ACTION AREA 3: ENSURE WATER REMAINS A CELEBRATED FEATURE OF NEW BRAUNFELS



Increase Education around value of water



Engage a diverse One Water stakeholder group



Increase visibility of water-smart projects

The Working Group individuals are dedicated public servants who serve the community through their work. They are also community members themselves, who have grown up with (and in!) the celebrated water resources of New Braunfels. Each Working Group member can share countless happy memories of time spent with friends and family enjoying local water resources, such as Landa Lake and the Comal River. The Working Group knows that the lives of future generations of this community will be brighter if the treasured water resources remain accessible, safe and abundant. The Working Group also recognizes that actions in multiple areas must be taken to ensure these

resources are protected for future generations.

Those in leadership positions across the region must demonstrate and model One Water best practices. An increase in the number of public and private infrastructure projects including One Water elements will ensure that water remains a celebrated feature of the community. Steps must also be taken to engage a diverse group of stakeholders, with attention to social and economic inclusion, in One Water dialogue, project identification, and definition of community planning standards including green infrastructure. In order to do this, the Working Group recommends a number of action steps, including but not limited to the development of a cohesive and collaborative water education program, convening a regular, active, and diverse One Water Stakeholder group, and increase visibility of water-smart projects. Additionally, it is recommended to utilize arts and culture as strategies to advance sustainable, integrated, and inclusive management of our water resources.

ACTION AREA 4: PROVIDE SUSTAINABLE & HIGH-QUALITY WATER

New Braunfels is one of the fastest growing communities in the United States. Exemplary surface and groundwater quality have always been and continue to be central to the community’s identity and well-being. Sustainable and high-quality water supplies are vital to our human, economical, and ecological health.

However, climate change, urbanization and population growth challenge our existing water supplies. Hotter and drier conditions are predicted over the next several decades as well as more frequent large storm events. Water supplies are also becoming more challenging to treat as contamination of our water supplies increases (e.g., due to urbanization), aquatic ecosystems change (e.g., resulting in more frequent algal blooms), and we look to alternative water sources (e.g., reuse and desalination) to overcome water shortages. Diverse and resilient water supply portfolios as well as source, supply, and demand management strategies are essential to overcoming these challenges. Additionally, as communities blend an increased number of water supplies to meet demand, robust monitoring programs are necessary to maintain superior drinking water quality. Region-wide planning and collaboration is critical to protecting our community’s water resources. A list of these plans are detailed in Appendix D.



**Increased Integration
of One Water**



**Diverse Water
Portfolio**



**Superior Drinking
Water Quality**

To achieve this, the Working Group identified three complementary strategies to be advanced within the New Braunfels Utilities’ service area and at a larger geographic scale. First, actions must be taken to provide a sustainable and resilient water supply. Second, actions must be taken to diversify the water portfolios of all participating entities. Third, actions must be taken to ensure water quality meets the standards for its intended use.

The Working Group identified a number of immediate actions that could be taken in the near term to ensure a sustainable, resilient, and high-quality water supply. One Water strategies and objectives will be incorporated in New Braunfels Utilities’ existing plans, programs, and processes, and New Braunfels Utilities will continue to support initiatives that support One Water, including water resources planning, aquifer storage and recovery, asset management, and optimization of non-revenue water. Additionally, New Braunfels Utilities will continue to take actions to ensure their system maintains the Texas Commission on Environmental Quality’s “Superior Drinking Water” rating. The Working Group also recommends taking immediate steps to identify and engage other stakeholders in the region in implementing region-wide water management strategies.

ACTION AREA 5: ENSURE HEALTHY WATERSHEDS, WATERWAYS & GROUNDWATER RESOURCES



Communicate efforts clearly



State community desired future conditions



Create Water Taskforce

The One Water Working Group recognizes the value and importance of our local rivers and groundwater resources to the economy and vitality of the greater New Braunfels area. The group also recognizes that failure to take appropriate action to protect our surface and groundwater resources can lead to unintended consequences such as degradation of water quality, harm to aquatic ecosystems and reductions in baseflow. Urbanization, surface/ groundwater withdrawals and stormwater/ wastewater discharges all have the potential to negatively impact our local water resources if not managed properly. This is especially true as the population of the greater New Braunfels areas continues to rapidly increase and demand for development, potable water and wastewater services increase. There are opportunities to utilize the One

Water framework to help mitigate negative impacts to our local rivers and groundwater supplies and protect them for the enjoyment of future generations.

First, it is imperative that our leadership and citizens understand the efforts currently underway to protect and preserve our area rivers and groundwater supplies. Fortunately, there is already a great deal of momentum in working to protect our rivers and groundwater supplies. The Working Group recommends that all efforts currently being undertaken to monitor and maintain our water resources are compiled and presented to leadership and residents to increase their comprehensive awareness of these efforts.

Secondly, the group recommends that leadership and stakeholders develop “desired future conditions” for the rivers and waterways in the greater New Braunfels area. Once these desired conditions are envisioned, the group can work towards determining planning efforts, regulations, mitigation activities required to ensure that desired goals/ conditions are met.

DELIVERING THE PLAN: RECOMMENDED NEXT STEPS

The One Water Working Group recommends that a One Water Advisory Council be assembled, along with a dedicated One Water Coordinator, to consider and make important decisions regarding factors that have the potential to either directly or indirectly impact our local rivers and groundwater supplies. This Council would be able to consider water quality and groundwater monitoring data and be able to develop strategies for mitigating impacts to our river and groundwater supplies. The One Water Coordinator is recommended to be funded through multiple agencies' participation in One Water. This position would act as liaison to the One Water Advisory Council and the One Water Working Group. The Coordinator will be dedicated to advancing the multi-agency coordination of the One Water Roadmap.

The Advisory Council may also make recommendations for how to best incorporate One Water concepts into NBU, GBRA and City capital projects that will benefit the health of our local waterways. The Council can also develop policy recommendations needed to protect our local waterways for the enjoyment and safety of future generations. It is recommended that this Council meet on a regular basis to make decisions regarding items that may impact surface and groundwater resources.

RECOMMENDATIONS

1. Hire and onboard One Water Coordinator to advance One Water plan and coordinate activities across multiple agencies
2. Adopt the One Water Roadmap plan
3. Advance “no regrets” and easy-to-execute activities from each Roadmap objective
4. Develop a formal agreement between three agencies (NBU, City of New Braunfels and GBRA) to collaboratively advance the roadmap
5. Leadership from the participating agencies will be responsible for successful implementation, such as:
 - Appointment of Advisory Council members - including employees from participating agencies, key stakeholders, industry advisors, and the community
 - Hiring a One Water New Braunfels Coordinator, and
 - Establishing a One Water New Braunfels Working Group

APPENDIX A: ONE WATER CONCEPTS

A One Water approach requires thinking of water as a single system and recognizing that all urban water flows – including stormwater, rainwater, and wastewater – are potentially useful resources. For industry professionals, identifying water as a single system requires a shift in mindset from thinking about one’s individual area of expertise (e.g. water conservation, drinking water quality, or street drainage) to how his/her area of expertise is connected to the broader system of water management.

ONE WATER ATTRIBUTES

The *SWITCH Training Kit*, produced by the ICLEI – Local Governments for Sustainability, outlines seven key dimensions of urban water management and compares a conventional approach with that of a One Water approach. It is important to note that most communities are in some state of transition from the more conventional approach to a more holistic approach on at least a few of the aspects described.

Figure 4. Transitioning to a One Water Approach: Seven Key Urban Water Management Aspects

URBAN WATER MANAGEMENT ASPECT	CONVENTIONAL APPROACH	ONE WATER APPROACH
Overall Approach	Integration by accident	Integration by design
Collaboration with stakeholders	Public relations – public are approached to approve pre-approved solution	Engagement – agencies and public search together for solutions
Infrastructure choice	Concrete, metal or plastic	+ green including soils and natural systems
Stormwater management	Convey away as rapidly as possible	Harvest as resource or retain to support aquifers, waterways & biodiversity
Human waste management	Collect, treat and dispose	Use as resource for nutrients or energy
Water demand management	Meet demand through investment in new supply sources & infrastructure	Portfolio - reduce demand, harvest rainwater and recycle wastewater
Technological solution choices	Standard engineering solutions to individual water cycle components	Diverse solutions (tech & ecological) Coordinated water, urban design and other service solutions

Source: Based on Pinkham (1999) – adapted by Cardone (2018) - adapted by Richards Consulting (2020).

The One Water Hallmarks are:

A mindset that all water has value. One Water starts with the recognition that all water has an intrinsic value—the water in our reservoirs, rivers, lakes, seas, streams, and aquifers; the water we drink; the water used for food or energy production or for industrial needs; the water we waste or turn into waste flow; and the water that runs off from our lands and farms. All water can and must be managed carefully to maximize its benefit.

A focus on achieving multiple benefits. One Water leaders design and implement projects and programs with a focus on achieving multiple benefits—economic, environmental, and social. The One Water approach recognizes that the resources we have do not match the level of investment needed to achieve a sustainable water future. One Water leaders therefore design and implement projects that seek an optimal balance among programmatic costs, benefits, and priorities—looking across economic, social, and ecosystem needs.

A systems approach. One Water embraces water’s complexity and interdependence, the multiple actors that affect water resources, and the ecosystem’s reliance on those resources. One Water recognizes that if we tackle problems based on the complete life cycle of water and larger infrastructure systems—rather than limiting ourselves to one piece of the equation—we can identify and advance more effective and lasting solutions.

Watershed-scale thinking and action. The One Water approach recognizes that water must be managed in ways that respect and respond to the natural flows of water sheds and the natural ecosystem, geology, and hydrology of an area. It is within the context of a watershed that communities either have too much water, too little water, or poor-quality water. It is within the watershed context that communities must reconcile their water demands with the imperative to sustain the resource for future generations. Watershed level management brings together regional partners from within and beyond the water sector in joint planning and collaborative action to protect the shared natural resource that is essential for health, agriculture, industry, aquatic species, forests, wildlife, recreation, and life itself.

Right-sized solutions. One Water solutions require a focus on the appropriate scale of intervention to achieve the desired outcome. For example, focusing green infrastructure projects in a few square blocks of an urban neighborhood may be the best investment for addressing flooding that affects that community. Or watershed scale planning and action might be necessary to harness the natural geology and hydrology of an area to achieve water quality goals.

Partnerships for progress. One Water recognizes that all sectors are part of the solution to a water secure future. No one stakeholder group—whether it’s water utilities, agriculture, businesses, community organizations, environmental advocates, or policymakers—has the control, responsibility, expertise, political support, or legal authority to manage the sources of pollution, the impacts of climate activity, or even the consumption rates of water. Partnerships and collaboration are the cornerstone to progress.

Inclusion and engagement of all. One Water recognizes that when all people have a stake in ensuring a water secure future, we achieve the best results. Low income people and communities of color are often disproportionately impacted by environmental justice and equity issues, and that includes clean, safe, reliable water. One Water leaders are committed to robust community engagement in planning, decision making, and water stewardship. One Water strives to achieve equitable outcomes and leverages investments in water systems and water resources to build stronger communities, a clean environment, and thriving local economies for all.

COMMUNITY BENEFITS OF A ONE WATER APPROACH

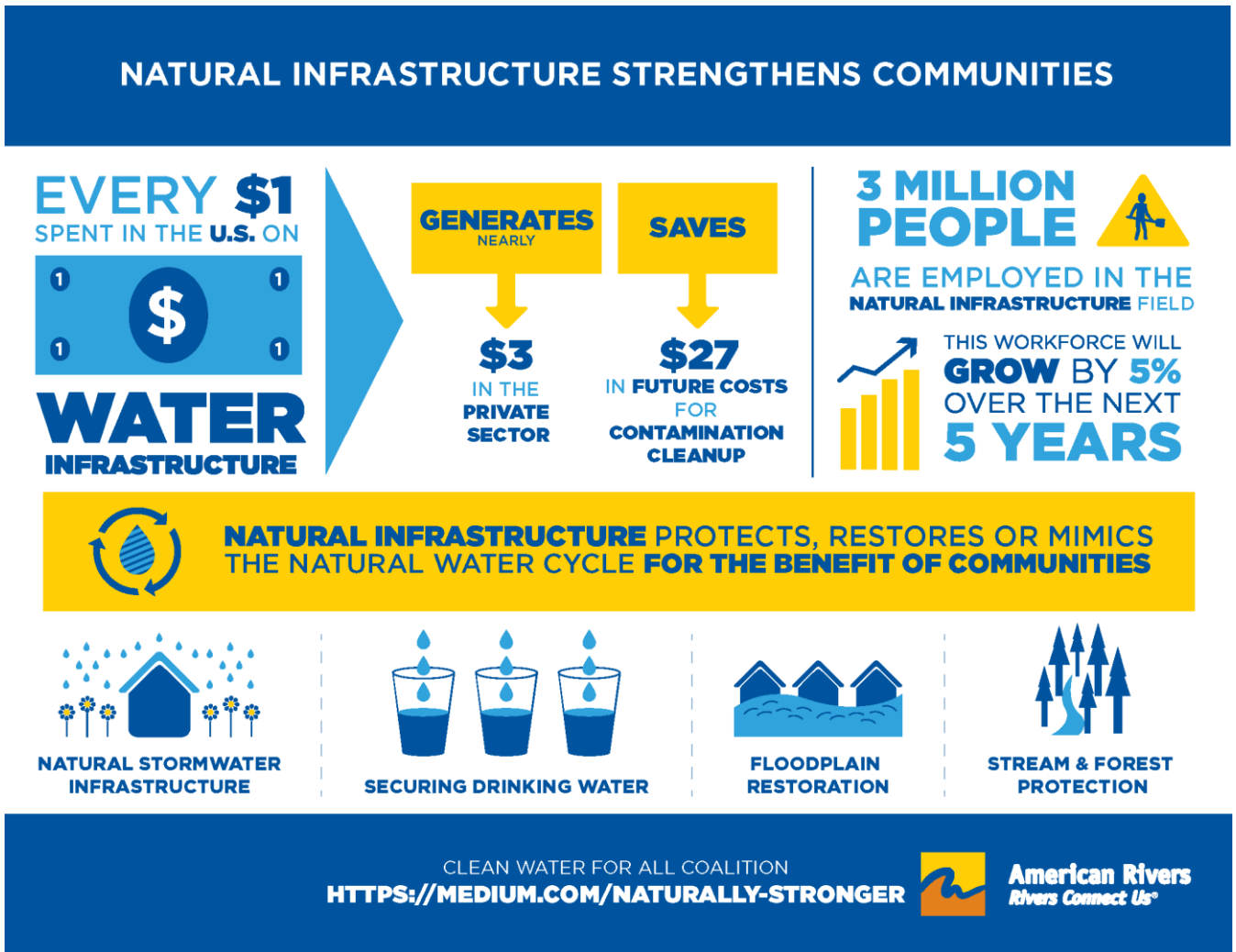
When a community adopts a more holistic water planning approach, water management can deliver basic services and additional triple-bottom-line benefits to a community. Many utilities are already realizing a number of benefits by implementing a One Water approach. The Water Research Foundation research survey and interviews identified the top reasons communities apply a One Water approach:

1. Greater resilience and reliability
2. Opportunities to optimize regional infrastructure
3. Sustainable community development
4. New regulatory flexibility or opportunity
5. Economic growth opportunity
6. Increased coordination among agencies/departments

In the 2017 report *Naturally Stronger: How natural water infrastructure can save money and improve lives*, American Rivers (AR) Figure 5, explains that communities investing in natural or green infrastructure, a key component of a One Water approach, experience substantial economic and social benefits. AR sites a Brookings Institute report which found that from 2008 to 2010, natural infrastructure job growth outpaced traditional job growth at a rate of nearly 2-to-1 in the nation's 100 largest metropolitan centers, providing diverse, career-starting opportunities in growth industries for communities that need them most. Further, these types of jobs are often local jobs since natural solutions utilize local workers for installation and long-term maintenance. This is in contrast with traditional gray infrastructure projects, which often rely on larger companies that have existing, trained labor pools outside of the communities where the infrastructure is being built or maintained. This increased engagement of local workers has a greater positive and long-lasting impact on local economies.

Studies also demonstrate that people with access to parks and green space live healthier, lower-stress lives. They have an easier time living active outdoor lifestyles, reducing medical expenses. And, of course, clean local waterways, improved by reductions in polluted runoff, mean higher-quality drinking water and safer places to recreate.

Figure 5. Natural Infrastructure Strengthens Communities



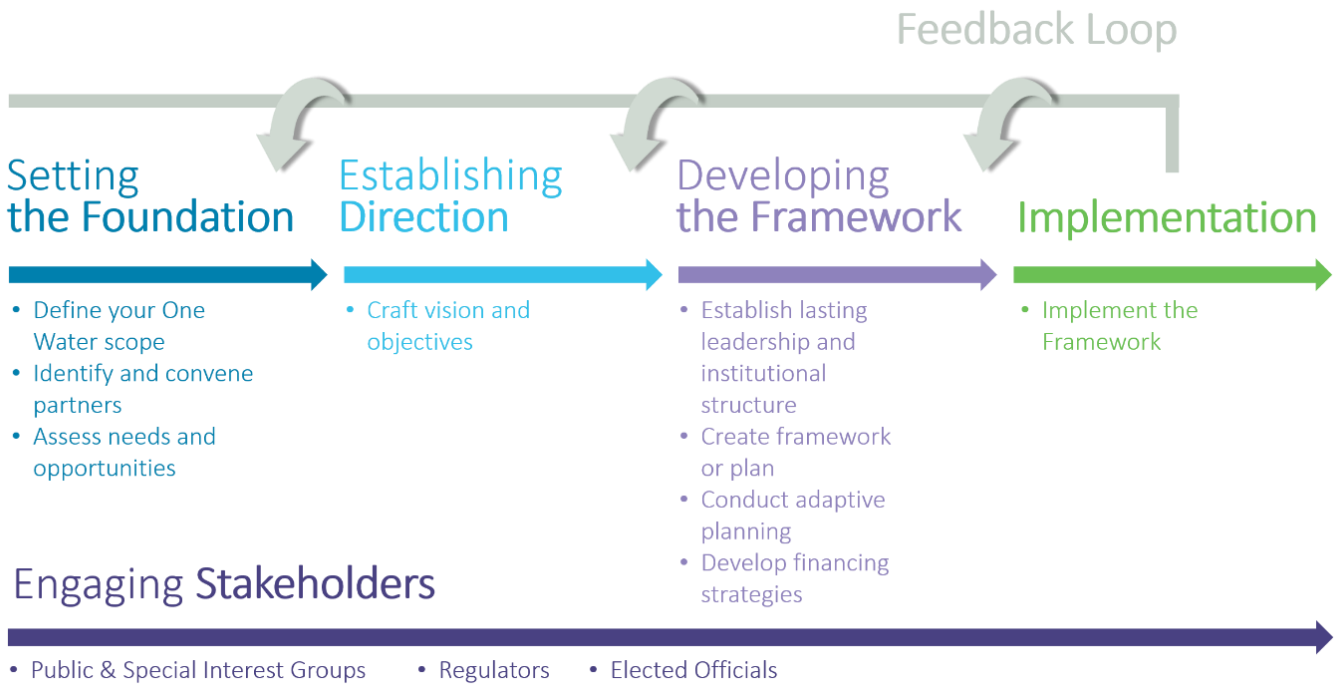
Source: American Rivers (2017).

Figure 6. Elements of a One Water Approach



Source: Pathways to One Water: A guide to institutional innovation (2015).

Figure 7. Water Research Foundation Development Process



Source: Water Research Foundation (2017) - adapted by Richards Consulting (2020).

APPENDIX B: PHASE ONE INTERVIEW PROTOCOLS, QUESTIONNAIRE, FINDINGS

ONE WATER READINESS ASSESSMENT INTERVIEW QUESTIONS

1. In your own words, what is One Water? What is the goal of One Water?
2. On a scale of one to five (one being “not familiar at all”, five being “expert”), how well do you feel you understand One Water? How well do others at NBU and at the city understand One Water?
3. What are the primary water challenges that New Braunfels and the surrounding region face currently and in the coming decades?
4. Refer to the Transitioning to a One Water Approach: Seven Key Urban Water Management Aspects scale in the attached document. Considering New Braunfels, how would you rate the community across each of these dimensions, one being “very conventional in approach” and ten being “fully advancing a One Water approach”.
5. Refer to the Elements of a One Water Approach scale in the attached document. Considering New Braunfels, how would you rate the community across each of these traits, one being “nascent” and five being “extremely well established”?
6. Are there clear champions of One Water in New Braunfels/at the utility? Are there naysayers? If there are naysayers, what do you think the primary concerns and/or hesitations are?
7. In an upcoming One Water work session NBU staff will develop a New Braunfels One Water vision statement and associated objectives. What do you think the vision and objectives should include?
8. What interests you most about One Water and the Roadmap process NBU is engaging in? What concerns you most?
9. What will ensure that the Roadmap we develop is useful to you, personally, and to the utility and community, more broadly?
10. What else should we know?

ONE WATER READINESS SCALES

Before entering into a process of change, a city needs to know its starting point. The baseline assessment provides an overview of the current water management situation, identifies key issues and collects the information that will help inform realistic near- and long-term goals in addition to informing the subsequent phases of the planning process.

Transitioning to a One Water Approach: Seven key urban water management aspects

In *SWITCH*, the ICLEI – Local Governments for Sustainability outline seven key dimensions of urban water management and compare a conventional approach with that of a One Water approach. Considering New Braunfels, how would you rate the community across each of these dimensions, one being *very conventional in approach* and ten being *fully advancing a One Water approach*.

Figure 8. Urban Water Management Scale

URBAN WATER MANAGEMENT ASPECT	SCALE: TRANSITIONING TO ONE WATER APPROACH									
	On a scale of one to ten, where is New Braunfels currently?									
	CONVENTIONAL APPROACH			TRANSITIONING				ONE WATER APPROACH		
1. Overall Approach	Integration by accident Water supply, wastewater and stormwater may be managed by the same agency as a matter of historical happenstance but physically the three systems are separated						Integration by design Linkages are made between water supply, wastewater and stormwater, as well as other areas of urban development, through highly coordinated management			
	1	2	3	4	5	6	7	8	9	10
COMMENTS:										
2. Collaboration with stakeholders	Public relations Public are approached to approve pre-approved solution						Engagement Agencies and public search together for solutions			
	1	2	3	4	5	6	7	8	9	10
COMMENTS:										
3. Infrastructure choice	Concrete, metal or plastic						+ green including soils and natural systems			
	1	2	3	4	5	6	7	8	9	10
COMMENTS:										
4. Stormwater management	Convey away as rapidly as possible						Harvest as resource or retain to support aquifers, waterways & biodiversity			
	1	2	3	4	5	6	7	8	9	10
COMMENTS:										
5. Human waste management	Collect, treat and dispose						Use as resource for nutrients or energy			
	1	2	3	4	5	6	7	8	9	10
COMMENTS:										
6. Water demand management	Meet demand through investment in new supply sources & infrastructure						Portfolio approach Options to reduce demand, harvest rainwater & recycle wastewater are given priority over developing new resources			
	1	2	3	4	5	6	7	8	9	10
COMMENTS:										
7. Technological solution choices	Standard engineering solutions to individual water cycle components						Diverse solutions (tech & ecological) Coordinated water, urban design and other service solutions			
	1	2	3	4	5	6	7	8	9	10
COMMENTS:										

Elements of a One Water Approach

The WRF study *Pathways to One Water: A Guide to Institutional Innovation*, visualized in Figure 6 in Appendix A, identified six key elements that contribute positively to a One Water approach. Considering New Braunfels, how would you rate the community across each of these traits, one being *nascent* and five being *extremely well established*?

Figure 9. One Water Element Scale

ONE WATER ELEMENT	Nascent					Well Established				
Bold Leadership Strong leadership & vision from senior positions, at both political and institutional levels	1	2	3	4	5					
COMMENTS:										
Planning & Collaboration Integrated planning requires flexible, adaptive approaches and collaboration with a wide range of players including urban planners, other service providers and the community. Changing our approach requires tackling silos and politics, short-term thinking, inflexible processes, unclear roles and responsibilities and access and sharing of data.	1	2	3	4	5					
COMMENTS:										
Culture, Knowledge & Capacity Achieving culture change within organizations can be challenging and time-consuming. It requires changing mindsets at all levels. Changing our approach requires tackling issues of technical capacity, staff motivation, organizational receptivity and learning mechanisms, as well as freeing up staff time to collaborate across organizational boundaries.	1	2	3	4	5					
COMMENTS:										
Citizen & Stakeholder Engagement Engagement is about more than just providing information. Gaining community support requires trust, a long-term commitment and a willingness to be open minded. Changing our approach requires meaningful processes at the right scale, better use of social media and learning to speak in ways that resonate with the public.	1	2	3	4	5					
COMMENTS:										
Economics & Finance An integrated approach requires new economic methods that go beyond traditional cost-benefit analysis to more holistic evaluations. Consider access to new forms of funding, different allocations of costs and new methods of cost recovery.	1	2	3	4	5					
COMMENTS:										
Regulation & Legislation Legislation and regulations have been designed for centralized water systems, not the current movement to multi-scale, hybrid (grey/green) systems. Changing our approach requires tackling inconsistent and overlapping regulations, a lack of regulatory frameworks, prescriptive versus performance-based regulations, the assessment of risk and the role of private and public operators	1	2	3	4	5					
COMMENTS:										

INTERVIEW FINDINGS

In general, interviews revealed that most participants had a strong working knowledge of the One Water concept and its distinction from a traditional approach to water management, though most everyone recognized that they and others have much more to learn on the subject.

When asked about the community's primary water challenge(s), there was a diversity of opinion that appeared to be related to the role and agency each interviewee represented, which is not surprising given the siloed nature of water management currently practiced. The most common challenge identified was around balancing needs of new growth: the ability of the local utilities to deliver added capacity and the impacts this new development would have on fragile water resources. Additional challenges identified by multiple interviewees included issues in water management during times of drought and flood, as well as challenges in maintaining high water quality for the environment.

Interview participants were asked to rate New Braunfels's current practices and approach across multiple dimensions as identified in two industry One Water frameworks, Pinkham's (1999) *Transitioning to a One Water Approach: Seven Key Urban Water Management Aspects*, as seen in Figure 12 in Appendix C, and Howe and Mukhebeir's (2015) *Elements of a One Water Approach*, as seen in Figure 6 in Appendix A.

Richards Consulting converted each framework with associated dimensions/aspects into a series of scales, with each attribute being considered on a spectrum from least to most accurate in representing any given community. For example, aspect one of the Seven Key Aspects framework "Overall Management Approach" can be rated on a scale from one to ten, one indicating the most extreme case of "integration by accident", and ten indicating the most extreme case of "integration by design". Complete interview protocols including the scales developed can be found in Appendix B.

The average of interviewee responses was then charted on a radar chart for each framework, as seen in Figures 10 and 11 on the following page. The Radar Chart plot lines demonstrate how interviewees scored the community's current approach low across all aspects/elements in both frameworks. The lowest scored aspect of the Transitioning to a One Water Approach framework was Waste Management with an average score of 1.82 and the highest scored aspect was Stakeholder Engagement with an average score of 4.12 (out of a maximum of 10). The lowest scored element of the Elements of a One Water Approach framework was Economics and Finance with an average score of 2.24 and the highest scored aspect was Bold Leadership with an average score of 3.53 (out of a maximum of 5).

The initial round of interviews helped to identify appropriate stakeholders to include in the Working Group charged with developing the New Braunfels One Water Roadmap and to focus the Working Group on areas of greatest important and interest to the community.

Figure 10. Radar Chart of Average Score of Interview Responses: Elements of One Water Approach

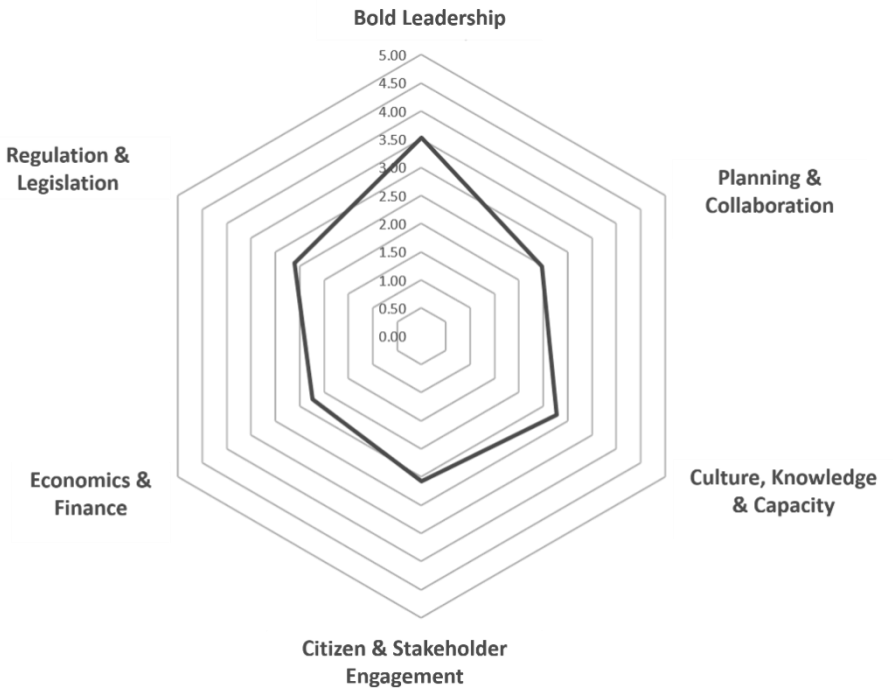
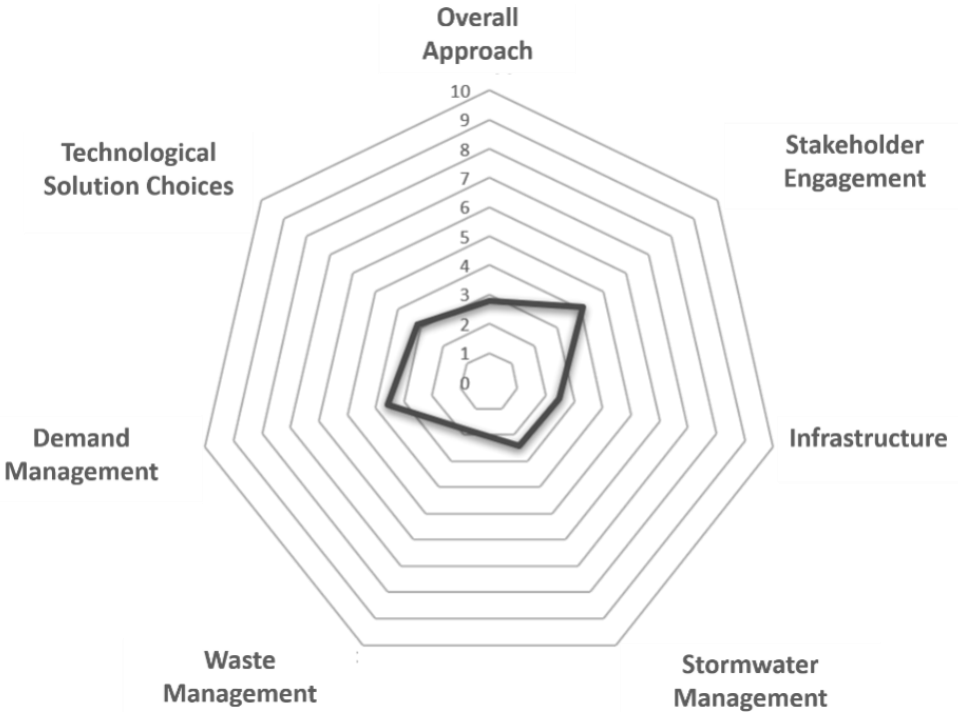


Figure 11. Radar Chart of Average Score of Interview Responses: Transitioning to a One Water Approach



APPENDIX C: PHASE TWO VISION & STRATEGY DEVELOPMENT

Figure 12. Seven Strategies for Community Change



Source: *Community Anti-Drug Coalitions of America (2012) – adapted by Richards Consulting (2020).*

ADDITIONAL PHASE TWO ACTIVITIES

During this phase of work, Working Group members contributed additional time outside of the formal strategy sessions to work on a number of Roadmap components. The mapping out of Objectives Four and Five, which are highly complex and relate very directly to responsibilities and mandates of existing governmental bodies, required the significant commitment of time by a number of members.

Further, a number of NBU team members met to discuss water conservation, efficiency, and reuse with the intent of formalizing a robust planning process and plan that would feed into the One Water Roadmap. A stakeholder engagement subcommittee, which included some Working Group members and additional communications staff from NBU, the City, and GBRA, also met to learn more about the One Water effort and to discuss how to best coordinate in sharing the effort with key stakeholder groups and the public.

Figure 13. Roadmap Framework

	VISION	VISION ELEMENT	OBJECTIVE	STRATEGIC DIRECTION	INDICATORS	TARGETS	ACTION PLAN
DEFINED	A concise description of a desired future state, containing the broad goals that give the overall direction for the planning process.	Individual goals within the vision that require specific objectives and/or strategies	<p>What you want to achieve</p> <p>Detailed and concrete breakdown of a vision into sub-goals</p>	<p>How you will get there</p> <p>Will it require multiple strategies to achieve?</p>	Tools to measure and/or visualize progress towards objectives	<p>Aspired indicator values (numbers of units, percentage, costs, etc.)</p> <p>Consider multiple time horizons, e.g. 10-, 5- & 1- year</p>	<p>An action plan is a way to make sure your vision is made concrete. It outlines a number of action steps we will use to execute strategies to meet objectives.</p> <p>Include details such as what, who, by when, and what resources might be required.</p>
EXAMPLES	Vision 2050 (extract) ...Water resources are protected through the actions of all of our citizens enabling a healthy environment where aquatic landscapes are ubiquitous and a reliable supply of water is available for all without environmental consequences.	Water resources protected through actions of all citizens	To improve the quality of stormwater flows into water bodies	by enforced regulation of stormwater standards	Number of pollution incidents caused by public discharges to drains.	Pollution incidents caused by public discharges to drains reduced by XX by year XXXX.	
		Reliable supply of water for all without environmental consequences	To replace environmentally damaging abstractions with alternative solutions for satisfying water demand	by prioritizing water demand management and reuse options	Groundwater levels in environmentally sensitive aquifer.	Groundwater levels maintained at natural recharge levels from year XXXX.	

Source: ICLEI (2011) – adapted by Richards Consulting (2020).

APPENDIX D: ASSOCIATED PLANS

Envision New Braunfels

Submitted by Chris Looney, City of New Braunfels

www.envisionnewbraunfels.org

Current Stage: Implementation (Start: 08/2018 - 09/30/2028)

Participating Agencies/Organizations: All city departments, all non-profits, school districts, Chamber of Commerce, utility providers and local businesses.

Description: Long range, over-arching community-wide plan that informs all other plans. Implementation is achieved through relationships and collaboration with a variety of entities, businesses and organizations.

Additional Note: Comprehensive plans are updated every 5 years; Envision New Braunfels will be due for an update in 2023.

Parks and Recreation Strategic Master Plan

Submitted by Stacey Dicke, City of New Braunfels

www.nbtexas.org/2148/Parks-Recreation-Strategic-Master-Plan (submitted link, no longer live)

www.nbtexas.org/2546/Parks-Recreation-Strategic-Master-Plan (current plan online)

Current Stage: Implementation (Start: 01/2018 – 11/2019)

Participating Agencies/Organizations: New Braunfels Parks and Recreation, City of New Braunfels Planning, Engineering and City Manager office

Description: This document is the culmination of an extensive planning process involving the elected officials, staff, Parks and Recreation Steering Committee, and most importantly the citizens of New Braunfels. Our purpose is to create a timeless document that represents the vision for the parks system over the next ten years. This document is intended to guide the parks system, but also incorporates flexibility in responding to unique opportunities as they arise.

Additional Note: Implementation of plan is dependent on capital funding.

2019 Bond Program

Submitted by Jennifer Cain, City of New Braunfels

www.nbtexas.org/2190/2019-Bond-Program

Current Stage: Implementation (Start: 01/2018 – 11/2019)

Participating Agencies/Organizations: City of New Braunfels Capital Projects; City of New Braunfels Capital Projects Department; City of New Braunfels, CoNB Planning and CoNB Engineering

Description: The 2019 Bond Program outlines City of New Braunfels capital & infrastructure projects.

Additional Note: Implementation of plan is dependent on capital funding.

Edwards Aquifer Habitat Conservation Plan

Submitted by Mark Enders, City of New Braunfels

<https://www.edwardsaquifer.org/habitat-conservation-plan/>

www.nbtexas.org/eahcp

Current Stage: Implementation (Start: 01/2013 – 12/2027)

Participating Agencies/Organizations: City of New Braunfels Watershed Management, City of New Braunfels Parks & Recreation Department, New Braunfels Utilities, San Antonio Water System, Edwards Aquifer Authority, City of San Marcos,

Texas State University, Texas Parks and Wildlife Department, U.S. Fish and Wildlife Service, Guadalupe Blanco River Authority

Description: The EAHCP is a plan to protect endangered species within the Comal and San Marcos spring and river systems. The plan includes both spring flow and habitat protection measures. The EAHCP includes minimum spring flow objectives for Comal Springs. The spring flow protection measures are to be implemented during prolonged drought periods to achieve minimum spring flow standards at Comal Springs. Habitat protection measures in New Braunfels include riparian restoration, LID/ green stormwater infrastructure project, aquatic vegetation restoration and non-native animal and fish species removal.

Dry Comal Creek and Comal River Watershed Protection Plan

Submitted by Mark Enders, City of New Braunfels

www.nbtexas.org/wpp

Current Stage: Implementation (Start: 08/2018 – 09/2028)

Participating Agencies/Organizations: City of New Braunfels Watershed Management, Comal County, New Braunfels Utilities, Texas Parks and Wildlife Department, Headwaters of the Comal, Guadalupe Blanco River Authority

Description: The Dry Comal Creek and Comal River Watershed Protection Plan (WPP) is a plan that was developed by local stakeholders and technical advisors to address bacteria levels in the Dry Comal Creek and Comal River and reduce bacteria loading. The plan includes the bacteria load reductions needed to achieve state water quality standards and bacteria management measures that include urban wildlife management, stormwater management and education/ outreach.

Stormwater Management Plan

Submitted by Mark Enders, City of New Braunfels

www.nbtexas.org/ms4

Current Stage: Implementation (Start: 12/2019 – 10/2024)

Participating Agencies/Organizations: City of New Braunfels Watershed Management, City of New Braunfels Engineering Division, City of New Braunfels Parks & Recreation Department, City of New Braunfels Street and Drainage Division

Description: The purpose of the City of New Braunfels Stormwater Management Plan (SWMP) is to minimize stormwater pollution and pollutant loading to the City's storm drain system and surface waters. The SWMP is designed to meet requirements of the TCEQs Small MS4 program. The most pertinent part of the SWMP is MCM 4 pertaining to how stormwater pollution is to be managed in areas of new development.

Drainage Area Master Plan

Submitted by Melissa Reynolds, City of New Braunfels

www.nbtexas.org/1866/MS4-Stormwater-Management-Program

Current Stage: Planning/Development Research (Start: 10/2019 – 10/2019) The actual project or Drainage Master Plan has not commenced yet; we are currently still in the planning phase. We do not have a defined timeline. The future and timeline of the project will be dependent on funding and approval from management and council.

Participating Agencies/Organizations: Various City of New Braunfels Departments (Engineering, Planning, Parks, Watershed, Public Works, etc.), City of Seguin, Guadalupe County, Comal County, Guadalupe-Blanco River Authority, Federal Emergency Management Agency, New Braunfels Utilities

Description: In May 2019 a task order was issued for a work plan to update the 2003 New Braunfels Drainage Area Masterplan. The intent is to develop a holistic drainage program with consideration for drainage needs, safety of existing and future residents, floodplain management and protection, water quality impairments, and regional watershed protections and improvements; while providing a phased approach to the update based on funding opportunities, resources, and need. The actual project or Drainage Master Plan has not commenced yet, we are currently still in the planning phase. We do not have a defined timeline.

Water/Wastewater Capital Improvement Plan (NBU Capital Improvement Plan)

Submitted by Ashley Zimmerman, NBU Water Engineering

www.nbtexas.org/1866/MS4-Stormwater-Management-Program

Current Stage: Implementation Final (Start: 08/2019 – 07/2020)

Participating Agencies/Organizations: New Braunfels Utilities departments including Water Engineering, Water Operations, Treatment and Compliance and Accounting

Description: New Braunfels Utilities (NBU) creates a 5-year Capital Improvement Plan ("CIP") based on the NBU Water and Wastewater Master Plan, the Impact Fee Study, and Water Operations and Treatment and Compliance needs. The 5-year CIP is updated annually and approved by the NBU Board. The CIP includes approximately 66 projects which are detailed in an Authorization for Expenditure ("AFE"). Each AFE includes a detailed project description, the basis for the requested project, adverse impact if the project is not completed, a critical rating, and proposed expenditures for the project. The 5-year CIP is used as a planning document and request for funding from the NBU Board of Trustees.

Water and Wastewater Master Plans

Submitted by Ashley Zimmerman, NBU Water Engineering

Website: N/A

Current Stage: Final (Start: 08/2019 – 05/2021) (or started 11/2019 per Ashley's note??)

Participating Agencies/Organizations: New Braunfels Utilities departments including Water Operations and Treatment and Compliance

Description: The Water and Wastewater Master Plans include a prioritized list of capital improvement projects, with cost estimates and recommendation to ensure New Braunfels Utilities (NBU) remains in Texas Commission on Environmental Quality (TCEQ) compliance while providing the desired level of service to the NBU customers.

The prioritized lists and recommendations are compiled from evaluations of the water and wastewater systems, creating of system projections, and analysis of the hydraulic model. NBU is updating the Water and Wastewater Master Plans in fiscal year 2020. The project kicked off 11/01/2019 and is expected to be complete 05/31/2021. Water distribution system proposed system improvements that will allow NBU to serve projected growth through 2038.

Water and Wastewater Master Plans

Submitted by Adam Conner, Freese and Nichols, Inc.

Website: N/A

Current Stage: Planning/Development (Start: 06/2021 –12/2025)

Participating Agencies/Organizations: New Braunfels Utilities and Freese and Nichols, Inc.

Description: Freese and Nichols, Inc. was retained to conduct a full update to the Water and Wastewater Master Plans. The intent of this study is to develop a capital improvements plan (CIP) for the water and wastewater systems. Projected water demands and wastewater flows will be developed within the New Braunfels Utilities (NBU) service area and hydraulic modeling will be conducted to identify system improvements needed to maintain NBU's desired level of service.

Water Resources Plan

Submitted by Ashley Evans, Arcadis

www.nbutexas.com/About-Us/Planning

Current Stage: Implementation is a continuous process. Dates for the 2018 full Water Resources Plan (WRP) development were 09/2017-06/2018, but the WRP is scheduled to be updated annually. The 2019 update is scheduled for completion by the end of the 2019 calendar year.

Participating Agencies/Organizations: New Braunfels Utilities departments (Water Services and Conservation), Arcadis

Description: This 2018 Water Resources Plan (WRP) is a guide to how NBU will address its future water needs. It is a strategic water supply plan looking at New Braunfels Utilities (NBU) water needs on an annual basis. The WRP projects demand through 2040 and compares demand to NBU's current and planned future water sources. The WRP also evaluates potential additional water source options and recommends demand management strategies, such as conservation programs, to allow NBU to meet the projected demand through 2040. Updates to the WRP are scheduled annually.

Wastewater System Vulnerability

Submitted by Adam Conner, Freese and Nichols, Inc.

Website: N/A

Current Stage: Planning/Development (Start: 04/2020 – 12/2024)

Participating Agencies/Organizations: Freese and Nichols, Inc. and New Braunfels Utilities

Description: Freese and Nichols, Inc was retained to evaluate the condition of critical wastewater facilities. A risk-based assessment will then be performed to identify critical assets in need of repair.

Peak Water Demand Management

Submitted by Adam Conner, Freese and Nichols

Website: N/A

Current Stage: Planning/Development (Start: 07/2019 – 12/2023)

Participating Agencies/Organizations: Freese and Nichols, Inc. and New Braunfels Utilities

Description: Phase 1 of work began in the summer of 2019 with the updating of NBU's operations manual, performance standards, and reporting tools, and through a process of interviews and workshops with NBU staff, FNI developed criteria to define the desired level of service. FNI also developed recommendations for parameters that can be monitored to help assess water system health.

FNI also worked to standardize NBU's service request process. In collaboration with NBU staff, FNI documented the current workflow for water and wastewater service requests and developed a desired workflow for future acceptance, evaluation, and approval of requests. FNI reviewed and documented all existing water and wastewater service agreements to reserve capacity for already approved developments, and created a database tool that allows NBU to track and account for all existing customers and proposed developments (by pressure zone), which will aid NBU in the decision-making process for approving or denying potential development.

Phase 2 efforts began in 2020, with a focus on empowering water conservation staff. FNI will develop a water demand forecasting tool, to help NBU staff prepare for expected demands. FNI will conduct a water loss evaluation, to determine the amount of non-revenue water in each pressure zone. FNI will assess the effectiveness of NBU's existing watering restrictions, to determine if the watering restrictions are producing the desired effect.

FNI will also update NBU's existing water model to include all recently completed projects. FNI will conduct three model calibration exercises to observe seasonal variations in system operations and adjust model parameters to accurately reflect real-world conditions.

Headwaters at the Comal Education Center Build Out

Submitted by Nancy Pappas, Headwaters at the Comal

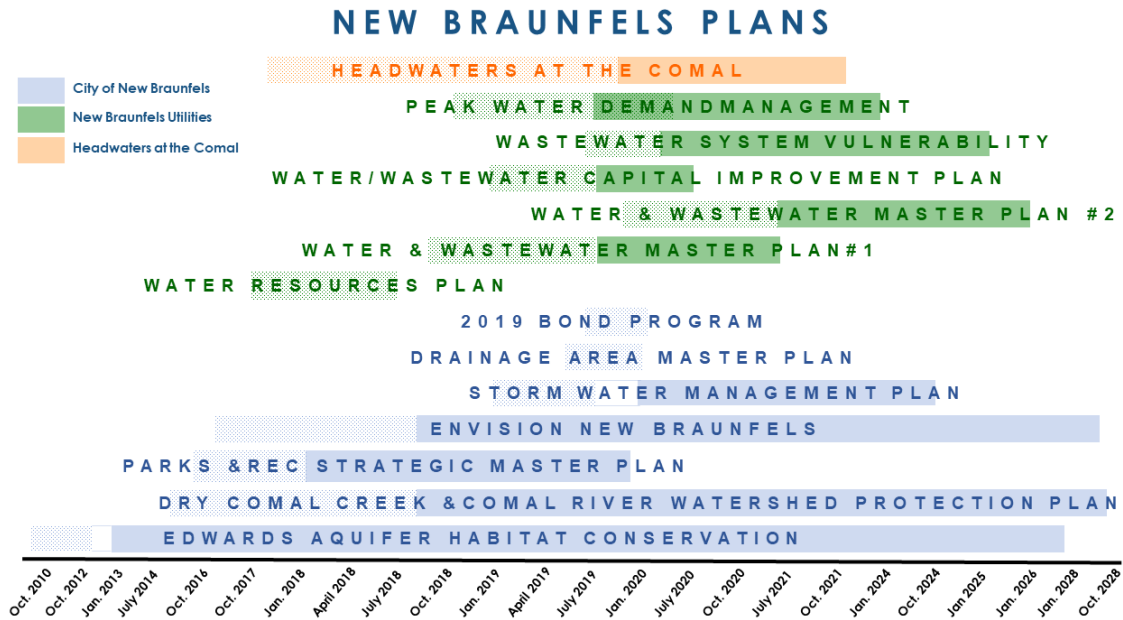
www.headwatersatthecomal.com

Current Stage: Planning/Development (Start: 11/2019 – 11/2021)

Participating Agencies/Organizations: Headwaters at the Comal, New Braunfels Utilities

Description: Develop a premier education center inspiring hearts and minds on the importance of conservation to community. Be a "living" demonstration of ONE Water principles. Actively educate the greater regional community on One Water triple bottom line opportunities and the opportunity to expand the workforce in innovative and natural technologies and strategies for honoring all our water sources.

Figure 14. Agency Plan Timelines



RESOURCES

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