3

Future Scenarios

The interconnected regional risks and opportunities identified in the previous chapter provide a baseline understanding of trends that may drive future demand for water resources in the region over the coming decades. However, the future is inherently uncertain, and the high degree of interdependence and volatility within each of regional drivers of Civil Works demand only adds to this uncertainty. Addressing the uncertainties of the future requires a planning process that lays the groundwork for identifying and implementing flexible and adaptable response strategies that lead to positive outcomes across a range of potential futures. In doing so, SWD can identify gaps that must be filled to enable positive outcomes regardless of what the future specifically holds. Doing so requires understanding the key uncertainties associated with important drivers of Civil Works (CW) demand and linking them to actions SWD and its Districts can take now to build capacity, update policies and procedures, and improve operations to meet the challenges the region will face in the future.

A scenario planning process was utilized in CWSP development to address these uncertainties and inform the building blocks and strategic actions that will help lead to positive outcomes in 2035 and beyond. While not intended to predict the future, scenario planning provides USACE with a structure to support clear communication and decision making on the possible choices and outcomes for CW in the face of future of uncertainty. USACE has previously utilized this approach successfully as part of its Scenario-based Strategic Planning Process. For the development of the CWSP, future scenario planning provided a crucial link between the external trends and drivers affecting the region and the potential choices SWD can make now to best position the Division to operate effectively under future conditions while maximizing delivery of value to its communities, customers, and the Nation.

For each scenario theme, there are four component scenarios presented in a quadrant format. These scenarios are not explicitly intended to represent a simplified depiction of ideal, non-ideal, or intermediary states. Rather, they explore the nuance, complexities, and opportunities for SWD action that may be present in each scenario and the interaction between SWD response strategies and scenario outcomes.

Three focused scenario themes were selected based on identifying drivers that have substantial potential impact on the SWD Civil Works Program and are also associated with significant uncertainty in future trends. Each theme includes a set of four scenarios capturing the range of future outcomes considering both the uncertainty in the underlying drivers and the potential strategies USACE could take to influence those outcomes. These strategies include direct actions (e.g., through infrastructure development and capacity building) and indirect actions (e.g., working with partners to reduce infrastructure demands). In addition, each scenario set identifies key gaps that could be filled to further enable the Division and Districts to influence optimal outcomes, such as technology advancements and revisions to national policies or authorities. The three focused future scenario themes considered were:

- **Future Population Growth and Water Supply**
- **Future of Energy**
- **Future Extreme Weather Variability**

In addition, a set of overarching scenarios was developed to broadly connect trends in drivers with regional impacts and the potential strategies SWD can take to right-size capacity for the future. This final set of scenarios builds on the focused themes and captures the complex interconnectivity among drivers, uncertainties, direct USACE action, and partner involvement across the landscape of water resource management issues. These scenarios explore the feedbacks between, for example, population growth, increase in impervious surface land cover, changing weather patterns, flood risk, and water supply. In doing so, they illustrate the overarching potential and benefits of Integrated Water Resource Management (IWRM) and the most likely paths to SWD providing maximum value to the Nation through both direct USACE action and partnering opportunities.

3.1 - Focused Future Scenarios 1: Future Population Growth & Water Supply

The Challenge

The region has been experiencing rapid population growth and diversification throughout its jurisdiction. The Dallas-Fort Worth metropolitan area exhibited the largest growth in population in the nation between 2010-2019 and was closely followed by the Houston metropolitan area, which exhibited the second highest increases during this period. This population growth is expected to continue, with Texas projected to have the highest growth rate in the nation through 2040. Other urban areas in the region, such as northwest Arkansas, are also experiencing rapid rates of growth, and the region at large is experiencing an increasing pattern of rural to urban migration. This rapid urban growth and associated expanded development intensifies stormwater runoff, flood risk, and urban heat island impacts, in addition to placing more people and assets in harm's way from the more intense, extreme weather events the region has experienced and is projected to continue to experience in the future.

As these growth trends continue and accelerate, there is an increasing demand for water supply and strain on the region's water resources to meet these needs. In Texas alone, municipal water use as a percentage of overall water use is projected to increase to 41% by 2060, from 9% in 2010. SWD faces significant and growing challenges in balancing water supply demand and allocations to meet the growing demand for other uses. This challenge is further exacerbated as the Division's aging infrastructure is increasingly unable to cope with current climate variability impacts and development-driven increases in flood risk. (See Figure 13). In addition, COVID-19 has introduced new uncertainty into regional population trends and urban/rural migration patterns, and the long-term impacts of the pandemic are difficult to predict.

Key External Drivers and Uncertainties

Population/development growth rates; regional economic conditions; climate variability; funding & authorities.

Key Internal Response Opportunities

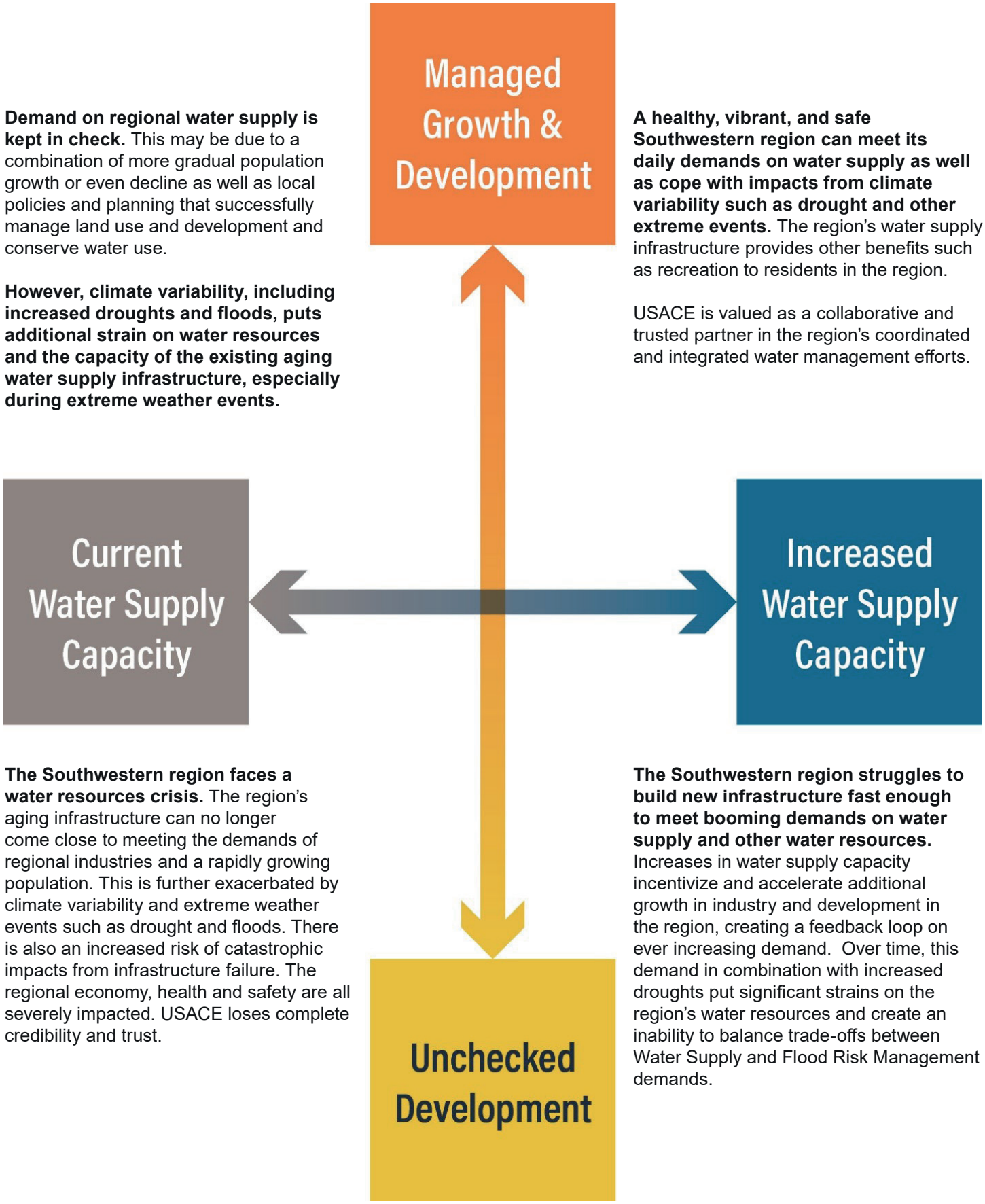
Division-wide policy and guidelines for water supply contracts; water control operations; water supply storage and reallocation studies; regional watershed and climate variability studies; infrastructure and new starts.

Key Partner and Local Stakeholder Response Opportunities

Land use and development policies; water conservation policies; local sponsorship of USACE Civil Works projects.

Demand on regional water supply is kept in check. This may be due to a combination of more gradual population growth or even decline as well as local policies and planning that successfully manage land use and development and conserve water use.

However, climate variability, including increased droughts and floods, puts additional strain on water resources and the capacity of the existing aging water supply infrastructure, especially during extreme weather events.



A healthy, vibrant, and safe Southwestern region can meet its daily demands on water supply as well as cope with impacts from climate variability such as drought and other extreme events. The region's water supply infrastructure provides other benefits such as recreation to residents in the region.

USACE is valued as a collaborative and trusted partner in the region's coordinated and integrated water management efforts.

The Southwestern region faces a water resources crisis. The region's aging infrastructure can no longer come close to meeting the demands of regional industries and a rapidly growing population. This is further exacerbated by climate variability and extreme weather events such as drought and floods. There is also an increased risk of catastrophic impacts from infrastructure failure. The regional economy, health and safety are all severely impacted. USACE loses complete credibility and trust.

The Southwestern region struggles to build new infrastructure fast enough to meet booming demands on water supply and other water resources. Increases in water supply capacity incentivize and accelerate additional growth in industry and development in the region, creating a feedback loop on ever increasing demand. Over time, this demand in combination with increased droughts put significant strains on the region's water resources and create an inability to balance trade-offs between Water Supply and Flood Risk Management demands.

Figure 13 - Future Population Growth and Water Supply Focused Future Scenario

Strategic Implications

3.1

This set of potential future scenarios highlights the risks of planning for water supply capacity within a vacuum. The drivers of water supply demand include a complex equation of industry and population growth, coupled with the impacts of local policy and planning actions aimed at managing development and conserving water resources. Focusing purely on the first part of the equation risks exacerbating further unchecked development and water use by industrial, commercial, and residential users in the region. While USACE authority in addressing water supply challenges is limited, partner response opportunities may be able to more broadly address issues related to water supply demand. Opportunities for a more comprehensive approach to managing regional capacity may be enabled through partnering, such as coordinating water use across all USACE and non-USACE reservoirs in the state and expanding the distribution of safe potable water to vulnerable areas that will be most impacted by scarcity. As SWD looks at ways to meet increasing demands on water supply within the region over the next 15-30 years while also achieving its primary missions, the USACE CW Program should be planned in close coordination with local, regional, and state entities.

This scenario also exposes the importance of planning holistically for water supply together with flood risk management. With more extreme flooding and drought anticipated in the future, demands on both functions will increase and trade-offs between the two will need to be more closely and dynamically managed. Additionally, efforts like sediment management can maximize reservoir storage capacity during periods of droughts.

While this scenario is focused on the Water Supply Mission Area, a similar set of strategic implications exists for a set of scenarios focused on Flood Risk Management in combination with growth and development. Reducing future flood risk in the region requires a combination of smarter land use practices as well as investments in existing and new Civil Works. As is the case with this set of scenarios related to water supply, there is a need for coordinated management of local, state, and federal tools to address regional flood risk comprehensively.

EXAMPLE GAPS & ENABLERS

Implementation of this Strategic Plan will require a granular identification of the potential roadblocks that may hinder action (gaps) and the potential catalysts or tools to propel action (enablers). Below are example gaps and enablers that have been identified through this scenario planning exercise. This is intended to be illustrative. A more comprehensive approach to identifying gaps and enablers will be taken during implementation planning.

Policies

- **Gap:** USACE Water Supply mission/ authority is limited to selling storage – tools to address challenges are primarily limited to reservoir reallocations
- **Enabler:** opportunity at federal level to redefine USACE role in water supply, such as providing more flexibility in considering water supply as part of an IWRM approach to reservoir management

Processes

- **Gap:** no dedicated funding stream for water supply mission area outside of O&M account creates delay and limitations in USACE ability to provide clear answers to communities looking to buy water storage
- **Enabler:** advanced coordination and awareness-building of USACE reallocation opportunities with local partners so that they can provide input on needs early, giving time for studies and budget modifications

Projects

- **Gap:** no capacity to look at all reservoirs (managed by USACE and others) within a state holistically
- **Enabler:** Planning Assistance to States (PAS) studies to rebalance the purpose of a project, including greater consideration of water supply

Partnerships

- **Gap:** partnerships limited to contracting storage in USACE reservoirs, with limited collaboration beyond this role
- **Enabler:** engagement with state partners that have a large leadership role in water supply planning to identify a broader set of gaps and enablers and identify comprehensive planning approaches

3.2 - Focused Future Scenarios 2: Future of Energy

The Challenge

The future of global energy and demand for oil and gas resources from America's Energy Coast is highly uncertain and potentially volatile over time. Simultaneously, population growth, combined with increases in average temperatures, drive increasing need for energy production. Questions of long-term sustainability of fossil fuel-driven energy production may lead to shifts in global demand for oil and gas resources. Strained natural resources and vulnerability of infrastructure may also limit local supply. (See Figure 14).

Key External Drivers and Uncertainties

- Potential Drivers of Global Demand
  - Transition towards renewable energy sources (increasing global demand and increasing importance of sustainability)
  - Macro-economic trends (local/global recession / boom)
  - Competition with supply / costs elsewhere
- Potential Drivers of Local Supply
  - Domestic policy
  - Damage to local infrastructure (due to catastrophic event)
  - Strained resources (e.g., rapidly depleting groundwater aquifers)

Key Internal Response Opportunities

New starts for navigation channel improvements, process efficiencies to meet current demand/backlog.

Key Partner and Local Stakeholder Response Opportunities

Investment in port and navigation infrastructure, investments in transition/adaptation of local oil and gas industries.

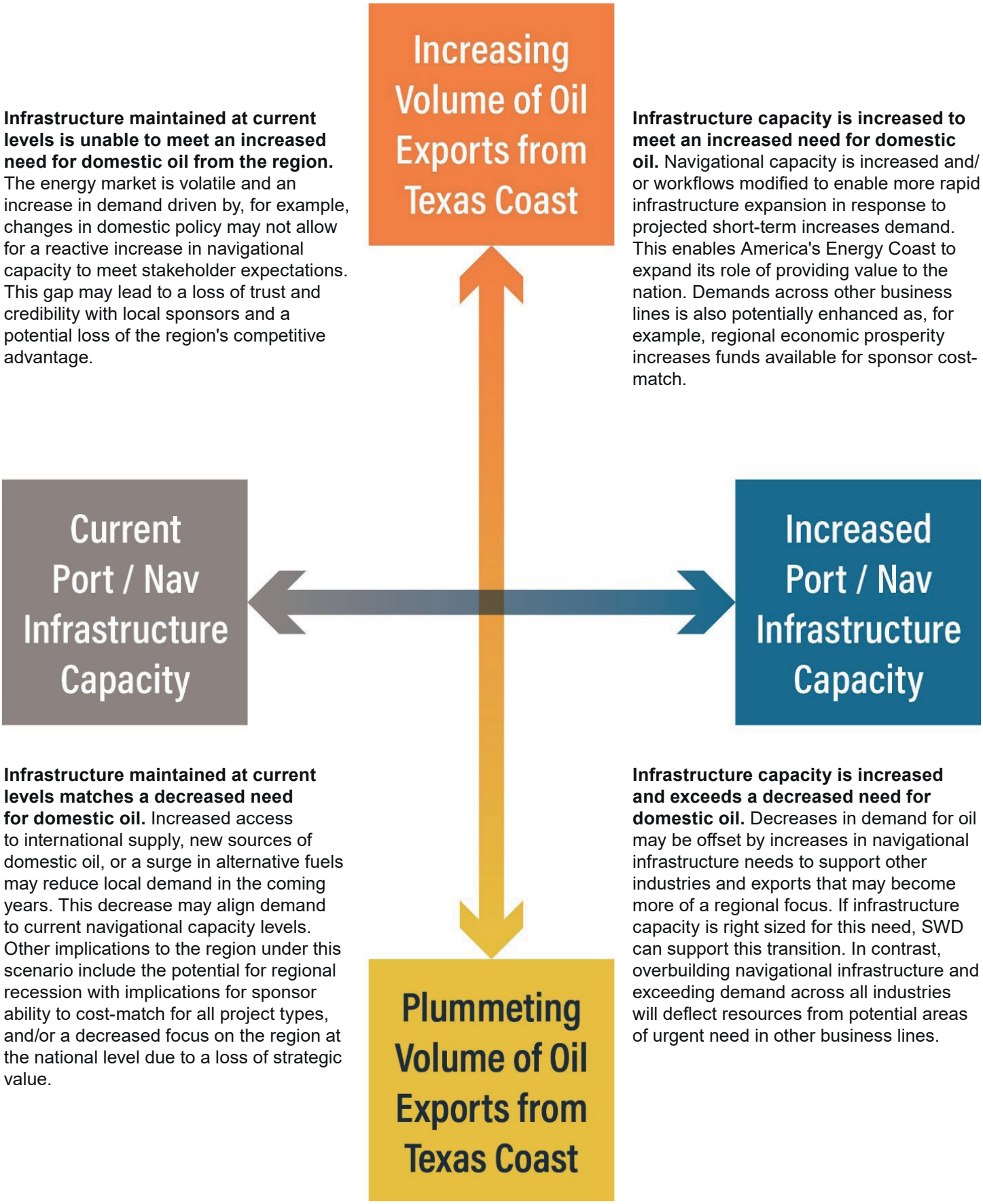


Figure 14 - Future of Energy Focused Future Scenario

Strategic Implications

3.2

The energy sector is key to the strategic importance of the region. The value to the Nation provided by SWD's Navigation projects, especially those along the Texas coast, is closely tied to the oil and gas economy. Volatility or long-term decline in oil exports from the Texas coast—whether due to an economic recession, damage to local infrastructure, or a transition of global demand towards renewable energy sources—not only will have significant impacts on the regional economy, but will also have national impacts.

The lifting of the oil export ban in 2016 led to a boom in oil export that has driven increased demand for Navigation projects along the Texas coast. At the same time, the need for channel deepening and other navigation improvements is also important to maintaining a competitive advantage and ensuring the Texas coast can accommodate the cargo vessels of the future. In periods of declining oil exports, such as the current one driven by the COVID-19 pandemic, investments in navigation infrastructure may become even more important for local ports to maintain a competitive advantage. While there should be consideration of right-sizing of investments to demand, port and navigation improvements could support and enable a transition to other industries and exports and ensure readiness for potential surges in future demand.

Volatility and uncertainty are inherent within the energy economy that drives much of the navigation demand in coastal Texas. Adaptability is key to increasing USACE responsiveness to industry demand to ensure that resources are directed in a timely manner where they are needed most.

Additionally, this area has a potential competitive advantage as a hub for renewable energy production. Parts of the region's geography may be well suited for solar and wind energy, and hydropower supply at SWD reservoirs may see a corresponding increase in importance. This may include exports of materials/machinery for renewable energy production; for example, wind energy materials production has been rising in Texas in recent years.

EXAMPLE GAPS & ENABLERS

Implementation of this Strategic Plan will require a granular identification of the potential roadblocks that may hinder action (gaps) and the potential catalysts or tools to propel action (enablers). Below are example gaps and enablers that have been identified through this scenario planning exercise. This is intended to be illustrative. A more comprehensive approach to identifying gaps and enablers will be taken during implementation planning.

Policies

- **Gap:** no federal funding mechanism to be more proactive or nimbly respond to need

Processes

- **Gap:** time lag between market drivers and modification or initiation of projects to support the industry, in part driven by two-year time delay in USACE receiving updated commodities data
- **Enabler:** inherent adaptability of the navigation maintenance program. O&M dredging of channels can be managed dynamically (driven by where there is the most economic activity) after initial construction with timely data and need projections

Projects

- **Enabler:** rapidly advancing real-time technology for monitoring channel depths and traffic; if USACE is prepared to be responsive to those capabilities, they can be leveraged to improve SWD adaptability and nimbleness to meet changing demands

Partnerships

- **Gap:** partner needs and expectations for timeline of project execution is often out of sync with USACE approval and implementation process
- **Enabler:** more dynamic and flexible cost sharing rules, more partnership engagement, and more public-private partnerships to enable partners to move forward with higher risk projects if they are willing to take on more of that risk

3.3 - Focused Future Scenarios 3: Future Extreme Weather Variability

The Challenge

Recent and projected increases in frequency and intensity of droughts, extreme precipitation and coastal flooding events severely stress aging infrastructure and present Mission Area tradeoffs for Integrated Water Resource Management. Population growth and development trends compound this challenge by driving increasing multi-purpose demand for water, and contribute to increasing flood and drought risk within the region. (See Figure 15).

Key External Drivers and Uncertainties

- Precipitation rates, temperature increases, sea level rise & subsidence rates (coastal Texas)
- Population growth, development and land use/cover changes, and changes to natural hydrology
- Dipole swings in occurrence, intensity, frequency and duration of drought and extreme precipitation events
- Damage to local infrastructure (due to catastrophic event, e.g., hurricanes)

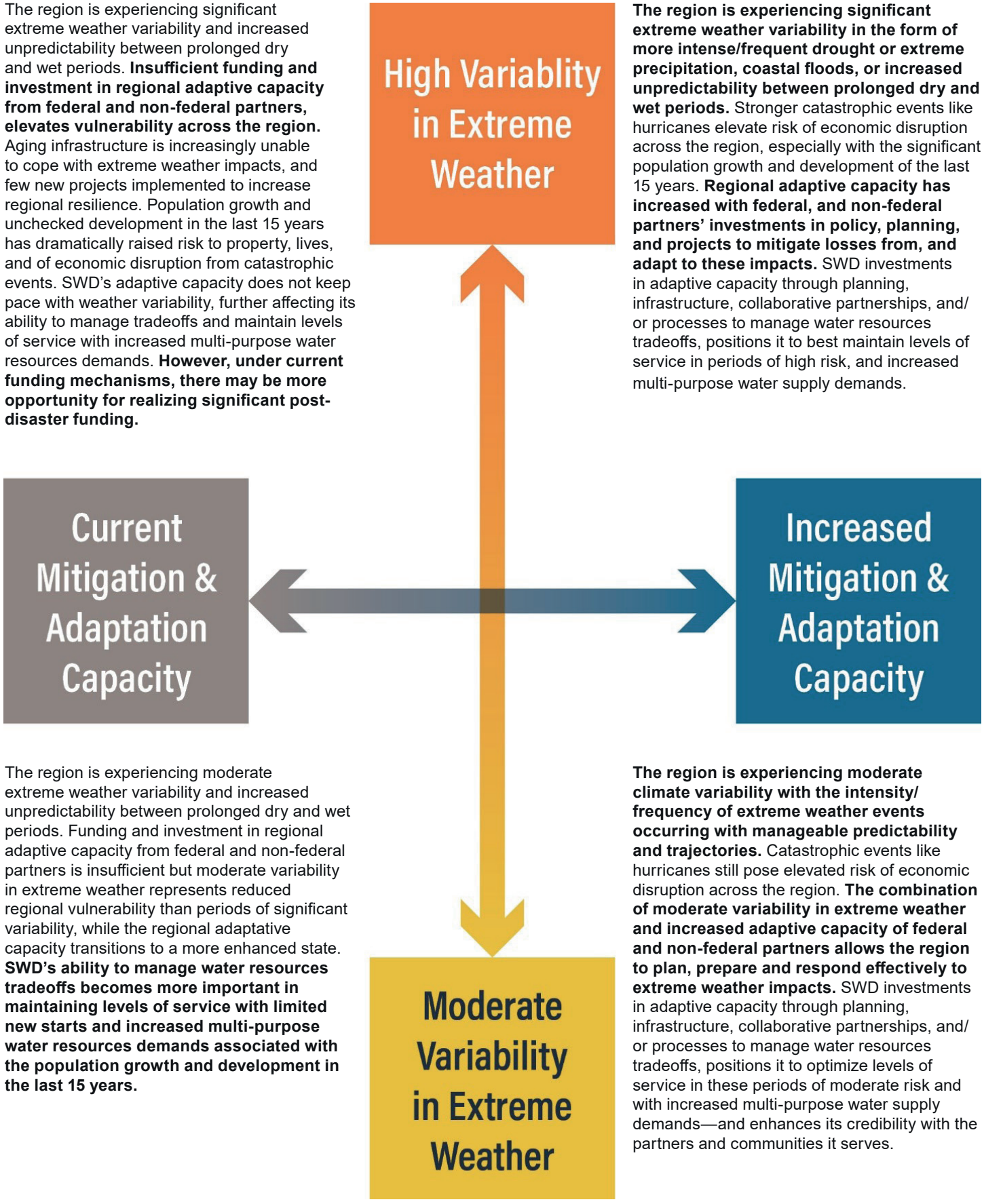
Key Internal Response Opportunities

Water reallocation, water supply, watershed, and adaptation planning studies and policies; new starts for channel and reservoir improvements and storage capacity improvements.

Key Partner and Local Stakeholder Response Opportunities

Regional inter-agency collaboration and planning; enhanced stakeholder engagement; proactive shift in federal disaster funding protocols.

The region is experiencing significant extreme weather variability and increased unpredictability between prolonged dry and wet periods. **Insufficient funding and investment in regional adaptive capacity from federal and non-federal partners, elevates vulnerability across the region.** Aging infrastructure is increasingly unable to cope with extreme weather impacts, and few new projects implemented to increase regional resilience. Population growth and unchecked development in the last 15 years has dramatically raised risk to property, lives, and of economic disruption from catastrophic events. SWD's adaptive capacity does not keep pace with weather variability, further affecting its ability to manage tradeoffs and maintain levels of service with increased multi-purpose water resources demands. **However, under current funding mechanisms, there may be more opportunity for realizing significant post-disaster funding.**



The region is experiencing significant extreme weather variability in the form of more intense/frequent drought or extreme precipitation, coastal floods, or increased unpredictability between prolonged dry and wet periods. Stronger catastrophic events like hurricanes elevate risk of economic disruption across the region, especially with the significant population growth and development of the last 15 years. **Regional adaptive capacity has increased with federal, and non-federal partners' investments in policy, planning, and projects to mitigate losses from, and adapt to these impacts.** SWD investments in adaptive capacity through planning, infrastructure, collaborative partnerships, and/or processes to manage water resources tradeoffs, positions it to best maintain levels of service in periods of high risk, and increased multi-purpose water supply demands.

The region is experiencing moderate extreme weather variability and increased unpredictability between prolonged dry and wet periods. Funding and investment in regional adaptive capacity from federal and non-federal partners is insufficient but moderate variability in extreme weather represents reduced regional vulnerability than periods of significant variability, while the regional adaptative capacity transitions to a more enhanced state. **SWD's ability to manage water resources tradeoffs becomes more important in maintaining levels of service with limited new starts and increased multi-purpose water resources demands associated with the population growth and development in the last 15 years.**

The region is experiencing moderate climate variability with the intensity/frequency of extreme weather events occurring with manageable predictability and trajectories. Catastrophic events like hurricanes still pose elevated risk of economic disruption across the region. **The combination of moderate variability in extreme weather and increased adaptive capacity of federal and non-federal partners allows the region to plan, prepare and respond effectively to extreme weather impacts.** SWD investments in adaptive capacity through planning, infrastructure, collaborative partnerships, and/or processes to manage water resources tradeoffs, positions it to optimize levels of service in these periods of moderate risk and with increased multi-purpose water supply demands—and enhances its credibility with the partners and communities it serves.

Figure 15 - Future Extreme Weather Variability Focused Future Scenario

Strategic Implications

Investing in mitigation and adaptation in advance of an extreme weather event saves lives, protects important community assets, and saves money in the long run. It can also create additional benefits in the short term, such as local economic development and jobs.

3.3 The region has experienced major extreme weather events, both droughts and floods, in the past decade. While the science on climate trends points towards more frequent and intense floods and droughts in the future, the next decade may not be as extreme as the last for the region. There will always be periods of surge and of wane. A proactive response mode is key.

However, the USACE role has historically been to respond to disasters as they occur. This role is reflected throughout the organization, including in the emphasis on economic benefit in project prioritization (vs. risk mitigation) and a funding model where resources often do not flow until after a disaster occurs. While this approach may be relatively successful in supporting communities in responding to isolated storms or droughts, it will leave SWD unprepared to support the region under scenarios where the frequency and severity of major extreme weather events increases. In those cases, the cumulative value of pre-disaster investment to mitigate the economic impact of future events increases considerably. In addition, failure to adequately account for risk to human life and other social impacts can result in significant loss in the region under increasing frequency or severity of extreme weather.

It is important to understand, through investments in advanced modeling and science, what is likely to happen, who and what may be impacted and how (including disproportionate impacts to vulnerable communities), then prepare and subsequently respond. Grounded in the science of multi-hazard risk and working with regional partners, a regional approach to the prioritization of projects can help SWD pivot from a reactive response mode to a proactive one. Similarly, it is helpful to have mitigation projects and plans on the shelf and ready to go for when funding is available, such as through post-disaster supplementals. By having these plans prepared, funds can be nimbly directed towards vetted projects that will reduce risk in the future. The unpredictability and potential for high variability in extreme weather and the impacts of droughts and floods across CW Mission Areas requires an integrated approach to water resources management. Further operationalizing IWRM as a central approach will position SWD to manage impacts and tradeoffs across Mission Areas, projects, and regions.

As highlighted in the water supply and development scenarios, a comprehensive approach to hazard mitigation and adaptation in coordination with local, state, and federal partners is also key. There is a complex interplay of extreme weather trends and population and land use trends, such as the feedback loop between impervious surfaces and their impacts on flood risk and extreme heat. The tools and actions of partners must be coordinated closely with those of USACE.

EXAMPLE GAPS & ENABLERS

Implementation of this Strategic Plan will require a granular identification of the potential roadblocks that may hinder action (gaps) and the potential catalysts or tools to propel action (enablers). Below are example gaps and enablers that have been identified through this scenario planning exercise. This is intended to be illustrative. A more comprehensive approach to identifying gaps and enablers will be taken during implementation planning.

Policies

- **Gap:** need for a clearer vision of being proactive (disaster mitigation role) vs reactive (purely disaster response role) as an agency

Processes

- **Gap:** lack of risk-based mentality to planning and prioritization that comprehensively addresses the benefits of IWRM projects in future disaster mitigation
- **Enabler:** science, data, and tools to identify the biggest multi-hazard risks across different weather drivers and identify national/regional priorities that inform a prioritized portfolio of federal involvement as part of comprehensive portfolio of IWRM projects

Projects

- **Gap:** limited flexibility for planning projects to account for benefits and impacts across business lines, such as reservoir capacity to contribute to regional drought resilience as well as flood risk management
- **Enabler:** mitigation projects that are planned and ready for implementation so that, as funds become available, they can be quickly directed towards vetted risk reduction projects

Partnerships

- **Gap:** mechanisms for coordinating and funding risk mitigation projects across local, regional, state, and federal partners
- **Enabler:** increased SWD involvement in and technical support for regional mitigation planning exercises and initiatives led by partners

3.4 - Overarching Future Scenarios

A rapidly changing world means several possible futures for SWD in 2035. Analysis of the key trends, drivers, and external uncertainties allow for identification of more likely eventualities, inform the choices SWD can make to influence these futures, and facilitate the development of response opportunities to ensure the Division and Districts can meet future conditions and pivot quickly as needed. SWD's ability to continually analyze and, when possible, right-size capacity is critical to meeting future conditions and changing demand. Moreover, its ability to monitor and analyze changing data is vital to ensuring the Division can proactively realign the CW Program with the most probable emerging future(s) and acute risks that may cause rapid change.

This section presents an illustrative depiction of four possible overarching futures/themes (see Figure 16) for the Southwestern region and lays the groundwork for how SWD can: identify current gaps to function effectively in specific future scenarios; address those gaps to enable positive outcomes; and begin to implement nimble and adaptable strategies for meeting these futures. These themes were informed by the combined findings of the three focused scenarios and the underlying trends, drivers, uncertainties, and priorities that fed into them. The four future scenarios (see Figure 17) also explore the feedbacks between drivers and the pressures they can exert on the region to fluctuate the demand for Civil Works across Mission Areas, including the challenges of short-term demand volatility (for example, following a shock such as a flooding event or a global recession). These **demand pressures (y-axis)** are juxtaposed against SWD **capacity** to meet them and **adapt** to volatile and changing needs **(x-axis)**. The four future scenarios for 2035 are presented here as:

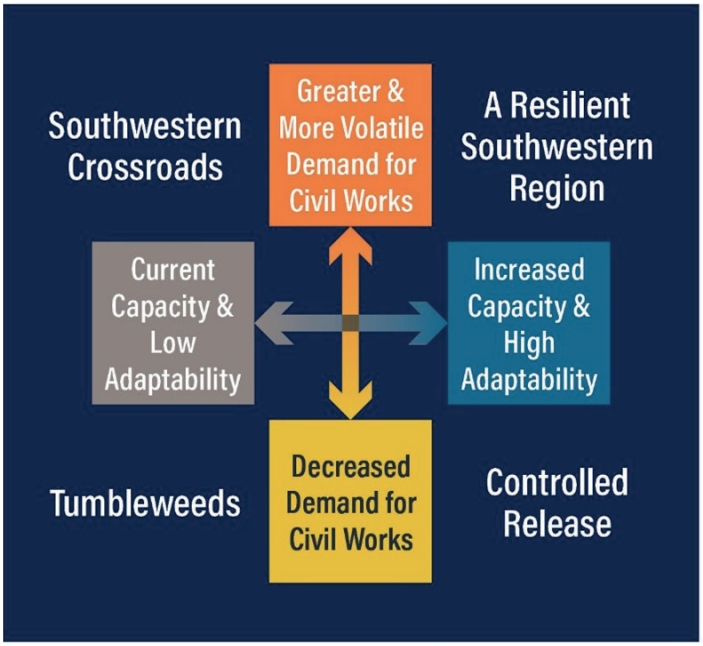


Figure 16 - Future Scenarios for 2035

3.4.1 - Tumbleweeds

Lower Demand + Current Capacity & Low Adaptability
In this future (see Figure 18), external drivers have combined to reduce demand for Civil Works and existing capacity is appropriately scaled for this period of reduced need. However, this capacity is maintained with limited flexibility and adaptability to significant changes in trends and conditions that may affect Civil Works. This leaves SWD unable to adequately and effectively meet surges in demand or shifts in need and with limited options for responding to change in the absence of significant investment to increase capacity.

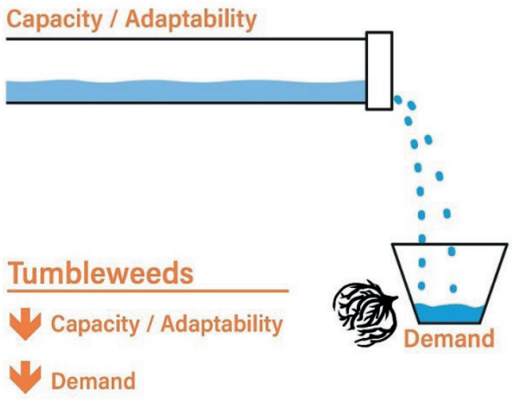


Figure 18 - Future Scenario: Tumbleweeds

Potential factors driving reduced demand could include declining populations and economic contraction over time, major shifts in energy sectors that may alter the regional economic landscape and associated funding for civil works for SWD and regional partners, or prolonged periods of reduced extremes in weather variability and catastrophic natural disasters. Moreover, the limited investment in Civil Works capacity is perpetuated by reductions in available funding, and capacity may start to further decline as a result. In this future scenario, SWD is in a reactive mode and is less prepared to adapt to shifts in demand or need, leaving the region is increasingly vulnerable to catastrophic events and the emerging threats of an uncertain and likely volatile future.

3.4.2 - Southwestern Crossroads

Greater Demand + Current Capacity & Low Adaptability
In this future (see Figure 19), the region continues to experience economic and population growth, and high demand for Civil Works. However, while demand has grown, SWD has seen limited growth in Civil Works investments, with few new starts and limited resources for ongoing operations and maintenance. As a result, the Division faces ever-increasing challenges to maintain level of service while managing tradeoffs in water resources uses and allocations to meet the demands of a growing region. Furthermore, aging SWD infrastructure is increasingly vulnerable to elevated risks from natural hazards and extreme weather variability, and the region as a whole is extremely vulnerable to widespread economic disruption from catastrophic events (e.g. hurricanes) as capacity to meet changing conditions is stagnant or in decline. In addition, limited investment in water resources infrastructure means SWD is not adequately positioned to proactively and efficiently adapt operations to changing trends or respond to rapid change—resulting in a Division that is ill-prepared to execute the USACE Mission and risks losing credibility in the region.

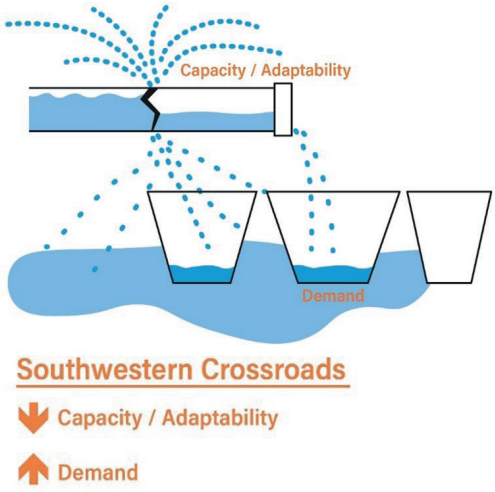


Figure 19 - Future Scenario: Southwestern Crossroad

However, the growing demand for Civil Works in the region due to continued growth and/or catastrophic hazards combined with the clear gap in capacity to meet that demand may attract a surge of resources to SWD (for example, in the form of post-disaster grants). In this scenario, short-term solutions may allow the Division to temporarily cope with conditions in the future, potentially masking a long-term trend of a gap between Civil Works demand and capacity. A threshold may also exist where lack of effective capitalization on these short-term investments may compromise the SWD's ability to execute the USACE Mission in the region. Insufficient USACE capacity can negatively impact the region's resilience in a future of elevated risks and uncertainties, thereby threatening the economic prosperity that is a major driver of demand for Civil Works in the region and reducing the pool of potential local sponsors for projects.

3.4.3 - Controlled Release

Lower Demand + Greater Capacity & High Adaptability

In this future (see Figure 20), SWD has invested in increasing Civil Works capacity to meet and adapt to changes in risk, trends, and drivers and to prepare for an uncertain future. The region and its stakeholders have invested in capacity to mitigate and adapt to risk from natural hazards and extreme weather variability through advancements in planning, land use, infrastructure, and partnerships. Regional drivers and trends have combined to lower demand for Civil Works with possible factors including population and economic contraction, major shifts in energy sectors affecting the regional economic landscape, prolonged periods of reduced extremes in weather variability/catastrophic natural disasters, or restoration of natural systems and advancements in land use and water management practices.

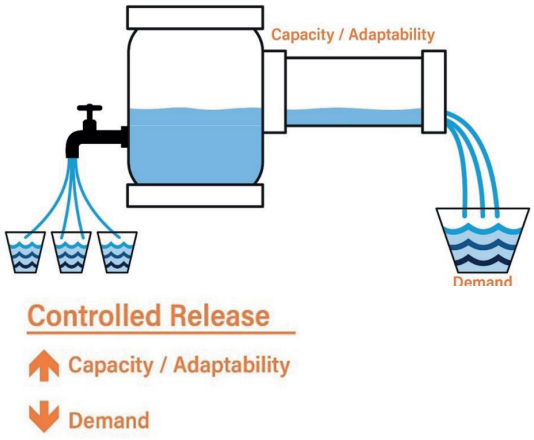


Figure 20 - Future Scenario: Controlled Release

Adaptability is a key component to a successful future under this scenario, wherein a nimble and proactive SWD is: prepared to effectively manage tradeoffs for water resources uses and allocations; well positioned to analyze trends and drivers and use that information to prepare for changes in demand; and enabled with a broader range of future responses to potential surges in demand. Prolonged periods of reduced Civil Works demand may result in the potential for SWD to be over-built and over-resourced. However, as the Division is highly adaptable to changing conditions and shifts in need, it allows SWD to proactively right-size resources and, in a controlled manner during times of surge, redirect them appropriately within the region and potentially beyond as conditions change. This future presents a potential feedback loop where SWD is positioned as a center of expertise and innovation that supports Integrated Water Resources Management at the national level.

3.4.4 - A Resilient Southwestern Region

Greater Demand + Greater Capacity & Adaptability

A prosperous region and growing population drives increased regional demand for water resource infrastructure, which is efficiently met by a robust SWD providing maximum value to the Nation (see Figure 21). While development and growth continue across the region in urban and suburban centers especially, the region and its stakeholders—benefiting from streamlined processes that strengthen collaboration with USACE—have invested in their capacity to mitigate and adapt to growing risk from natural hazards through advancements in planning, land use, infrastructure, and partnerships. SWD has increased Civil Works capacity to: meet growing demand; nimbly and proactively adjust to changes in regional drivers and trends; better manage tradeoffs for water resources uses and allocations; and better withstand and respond to elevated risk from natural hazards and extreme whether variability. As a result, the region's collective resilience to heightened risk and volatility provides a potential feedback loop that contributes to investor and public confidence and desirability, that in-turn continues driving regional economic growth and ultimately increasing demand for IWRM.

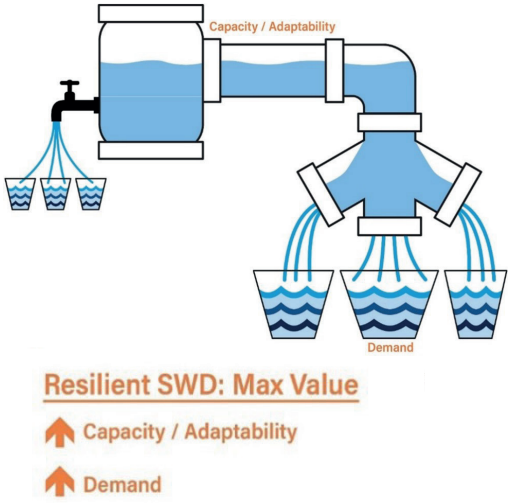


Figure 21 - Future Scenario: A Resilient Southwestern Region

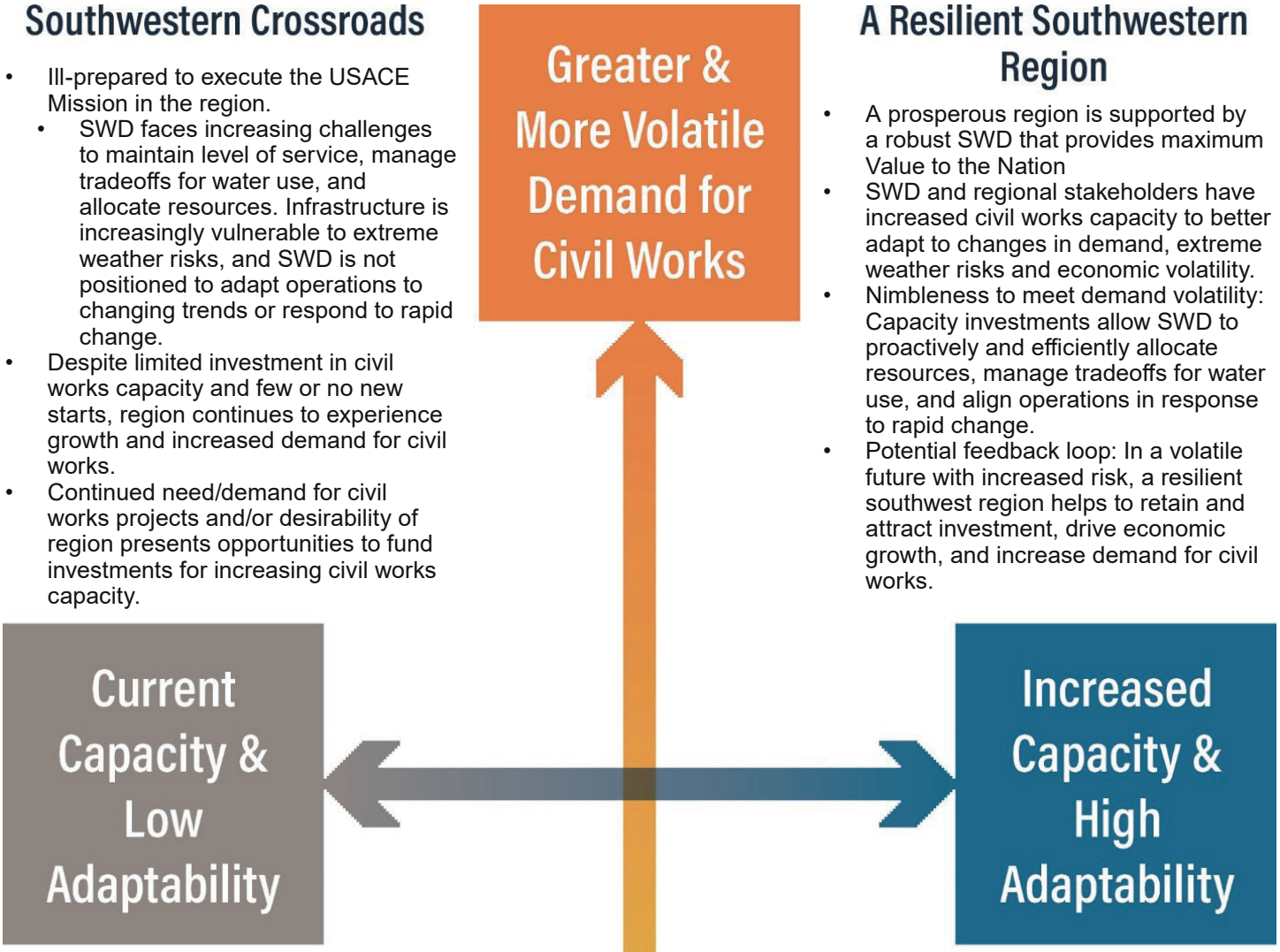
SWD's capacity and adaptability to future volatility require proactive planning and continuous evaluation to ensure appropriate capacity exists to maintain level of service as conditions and demand change. As risks grow in this future, the region and SWD are better prepared and more resilient yet remain vulnerable to impacts from catastrophic hazard events, economic volatility and changing macroeconomic conditions, and other possible threats associated with a volatile future. For example, while risks from extreme weather variability are projected to grow, the region may experience prolonged periods of drought and periods of increased precipitation and flooding, or it may experience accelerated or volatile shifts between these extreme weather events. To address this uncertainty, SWD balances the development of core internal capacity with flexible use of external resources so that it is right-sized for both surges and lulls. The Division must also be prepared under this scenario to be more proactive in times of reduced volatility while shifting to response mode as needed during intense increases in demand.

Southwestern Crossroads

- Ill-prepared to execute the USACE Mission in the region.
  - SWD faces increasing challenges to maintain level of service, manage tradeoffs for water use, and allocate resources. Infrastructure is increasingly vulnerable to extreme weather risks, and SWD is not positioned to adapt operations to changing trends or respond to rapid change.
- Despite limited investment in civil works capacity and few or no new starts, region continues to experience growth and increased demand for civil works.
- Continued need/demand for civil works projects and/or desirability of region presents opportunities to fund investments for increasing civil works capacity.

A Resilient Southwestern Region

- A prosperous region is supported by a robust SWD that provides maximum Value to the Nation
- SWD and regional stakeholders have increased civil works capacity to better adapt to changes in demand, extreme weather risks and economic volatility.
- Nimbleness to meet demand volatility: Capacity investments allow SWD to proactively and efficiently allocate resources, manage tradeoffs for water use, and align operations in response to rapid change.
- Potential feedback loop: In a volatile future with increased risk, a resilient southwest region helps to retain and attract investment, drive economic growth, and increase demand for civil works.



- Right sized for a period of reduced need
  - Drivers combined to reduce demand on civil works and current capacity is maintained with limited flexibility and adaptability
- Stuck in response mode: risk of being unable to adequately and efficiently meet surges in demand or shifts in need. SWD is acutely vulnerable to rapid change and has limited options for responding.
- Declining populations, reduced revenues and major shifts in energy alter the regional economic landscape and reduce funding and demand for civil works
- Potential feedback loop: Already limited investment in civil works capacity is perpetuated by less available funding, and capacity may start to decline as a result.

Tumbleweeds

- Potential to be overbuilt in time of reduced need
  - Drivers combined to reduce demand on civil works, but capacity is expanded and adaptability improved
- Able to nimbly redirect capacity and resources to needs within and beyond the region
- Proactive mode: investment enables broader range of future responses to potential surges in demand
  - SWD analyzes trends and drivers and uses that information to prepare for changes in demand
- Potential feedback loop: SWD is a center of expertise that supports IWRM at the National level

Controlled Release

Figure 17 - Detailed Future Scenarios for 2035

3.4.5 - Overarching Scenarios: Strategic Implications

Nimbleness and adaptability will be key to SWD's future success in continuing to provide value to the Nation. This overarching set of scenarios highlights some of the risks of overly focusing on right-sizing capacity to demand, without also investing in adaptive capacity and dynamic preparedness. SWD is planning not only for an uncertain future, but also potentially volatile demand for Civil Works over the coming decades. The Division needs to be ready to accommodate surges and able to redirect resources during times of less need. Maintaining capacity in core capabilities that exceeds local demand during times when that demands wanes is not inherently negative if managed correctly. This capacity can become a strong asset to partners within the region if resources and expertise can be nimbly redirected to where they are needed most. Maintaining adaptable capabilities in core strengths supporting SWD Mission Areas also positions the Division to serve as a leading resource on Integrated Water Resource Management for the Nation.

SWD will focus on building up key competencies the Division and its Districts can utilize to provide the necessary additional capacity for demand surges within the USACE Mission, while also building adaptability to redirect these core capabilities in times of waning demand. For capacity identified as necessary during surges in demand that are outside of key competency areas, SWD will leverage partner relationships within and beyond USACE to help fill those gaps in resources and expertise.

This final set of scenarios further highlights the important role IWRM will play for SWD in the future, enabling the Division to comprehensively and efficiently manage resources while considering tradeoffs across Mission Areas. The need for this holistic approach is especially high when surges in demand create further strain on limited water resources. Further putting IWRM into practice and increasing SWD's adaptability and nimbleness will require holistic implementation across all levels of operations, including changes to projects, processes, and approaches to partnerships. It will require a cultural shift and an operational shift, both of which will enabled through comprehensive implementation planning.

EXAMPLE GAPS & ENABLERS

Implementation of this Strategic Plan will require a granular identification of the potential roadblocks that may hinder action (gaps) and the potential catalysts or tools to propel action (enablers). Below are example gaps and enablers that have been identified through this scenario planning exercise. This is intended to be illustrative. A more comprehensive approach to identifying gaps and enablers will be taken during implementation planning.

Policies

- **Gap:** policies that enhance the flexibility and nimbleness of USACE, such as increased delegation of authority to the District and Division level
- **Enabler:** more flexibility in developing contingency plans during the budgeting process that allow SWD to be prepared for effective action across potential funding levels and priorities

Processes

- **Gap:** consistency in maintaining experienced staff at all levels of planning and implementation, particularly during surges in demand
- **Enabler:** identification of core competencies and capacity that SWD will develop and maintain in-house, vs. capacity that can is drawn as needed from other sources in or outside of USACE

Projects

- **Gap:** lack of sufficient funding and data to quantitatively prioritize infrastructure repair and enhancement based on current condition and value, despite policies being in place to support comprehensive asset management
- **Enabler:** increased flexibility and associated funding to implement adaptive management from the ground up in planning and implementing projects

Partnerships

- **Enabler:** coordination of key partners to support comprehensive and holistic approaches to IWRM within the region, including leveraging of varied authorities and funding streams

3.4.6 - Application of Scenario Planning in Practice

The future scenario planning exercises synthesized above enable SWD to plan within the context of an uncertain and rapidly changing future. The strategic implications identified for each set of scenarios serve as a basis for the strategies for action outlined in the next chapter—the Vision, Goals, and Objectives that set the framework for how SWD will respond over the next 15 years.

The future scenarios are also intended to serve as an ongoing and living reference for SWD throughout implementation of the Strategic Plan. The Division and its Districts will continue to use the scenarios to identify specific gaps and enablers to outline detailed actions and critical pathways. The scenarios will also support the benchmarking of success in achieving the Strategic Plan over time. Specific tactics, projects, and partnerships can be tracked against how they help to enable a more positive future, either moving SWD and the region in a more positive direction along an axis within the set of scenarios and/or supporting a more positive outcome within a given scenario. This more dynamic approach to benchmarking measures success as advancing positive outcomes for the region, while adapting to changes over time. This can be paired with a more USACE-focused benchmarking of progress towards implementation of identified strategies and actions.

4

A Framework for Action

Meeting the increasing challenges of today and planning for an uncertain future requires a paradigm shift in how the Southwestern Division approaches its work. The following Vision, cross-cutting Goals, and strategic Objectives lay a framework for how SWD will continue to meet the USACE Civil Works Mission and provide value to the Nation over the next decades (see Figure 22).

This strategy map builds on the action opportunities identified in the scenario planning exercises to address the key drivers of future risk and demand for Civil Works in the region, as well as the inherent uncertainties within them. The Goals and Objectives were developed by pairing the analysis on future trends with strengths, weaknesses, opportunities, and threats identified through a series of interviews with USACE staff and leadership at SWD, SWG, SWF, SWT, and SWL as well as meetings with local partners and stakeholders at each District

Central to this vision and framework for action is a focus on Integrated Water Resources Management (IWRM). IWRM is a holistic, coordinated, and cross-sectoral approach to the development and management of water, land, and related resources to maximize economic benefits, ecosystem quality, and health and public safety. Operationalizing IWRM requires an integrated approach to project development, organizational processes and procedures, and partnership building.

To advance the SWD Civil Works Vision, the Goals outlined here are intentionally cross-cutting across Mission Areas and Business Lines. Each Goal includes specific strategic Objectives towards achieving that Goal (see Figure 23, Figure 24, Figure 25, and Figure 26, respectively). These Objectives are organized by those relating to projects, processes, and partnerships, providing a framework for future implementation plans that align with these three areas.