Dealing with Disruption: Operationalizing Resilience in the Water Sector

PART 4

Managing Challenges Through Resilience Thinking

Co-hosted by:

Association of Metropolitan Water Agencies

National Association of Clean Water Agencies

June 3, 2020 | 2:00 PM - 3:30 PM EST

ASSOCIATION OF METROPOLITAN WATER AGENCIES

50 | NACWA

Thomas Sigmund

NACWA Secretary
Executive Director
NEW Water
Green Bay, WI

ASSOCIATION OF METROPOLITAN WATER AGENCIES

NACWA

Resilience Webinar: Part 4

PART 4

Managing Challenges Through Resilience Thinking

Moderator

Eileen White

Co-Chair, NACWA Climate & Resiliency Committee
Director, Wastewater
East Bay Municipal Utility District
Oakland, CA

ASSOCIATION OF METROPOLITAN WATER AGENCIES

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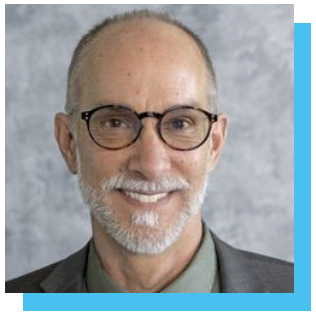
Featured Speakers



Charles Stevens

Water Utility Officer
KC Water
Kansas City, MO

Stephen MacCarthy

Manager
Corporate Security, Risk & Assurance
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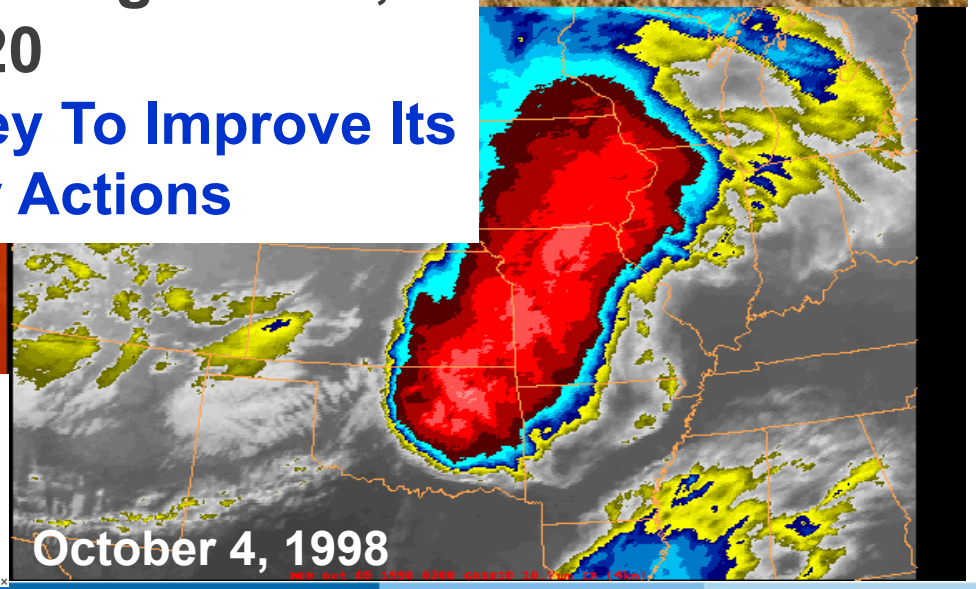
Jim Wollbrinck

Director
Emergency Management
and Business Resiliency
San Jose Water Company
San Jose, CA

NACWA/AMWA Resilience Webinar Series – Webinar 4 – Managing Challenges Through Resilience Thinking June 3, 2020

KC Water's Journey To Improve Its Resiliency Actions



KC WATER SERVICES

KC Water - Resiliency Journey Overview

- ClimateLOOK Customized Report For KC Regional Climate Changes
- Stormwater Utility Weather Station - Soil Moisture Instrumentation
- The Water Research Foundation Multi Funded Research Project #04863 – “Sources and Fate of Taste and Odor Causing Compounds In The Missouri River”
- Source Water Protection Opportunities – 2018 Farm Bill
- Source Water Supply Resiliency – Raw Water Collector Wells
- Water Reuse Feasibility Study

KC Water efforts with ClimateLOOK

- Water Services moved into Climate Resiliency efforts thanks to a Mid-American Regional Council (MARC) Climate Conference and post conference discussion of needs with Dr. Dan Walker with ClimateLOOK and Dr. Chris Anderson from Iowa State University.
- This lead to 6 months of critical Research, discussion and development that evolved into the $799 dollar ClimateLOOK Report for KC Water.
- This has proven very valuable to KC Water as the beta tester for the product and has led to todays presentation on Climate Resiliency as a whole and our need for further development of ClimateLOOK.

The eight National Climate Assessment (NCA) model scenarios are Regionalized into Divisions

We are in Division 1 of Missouri

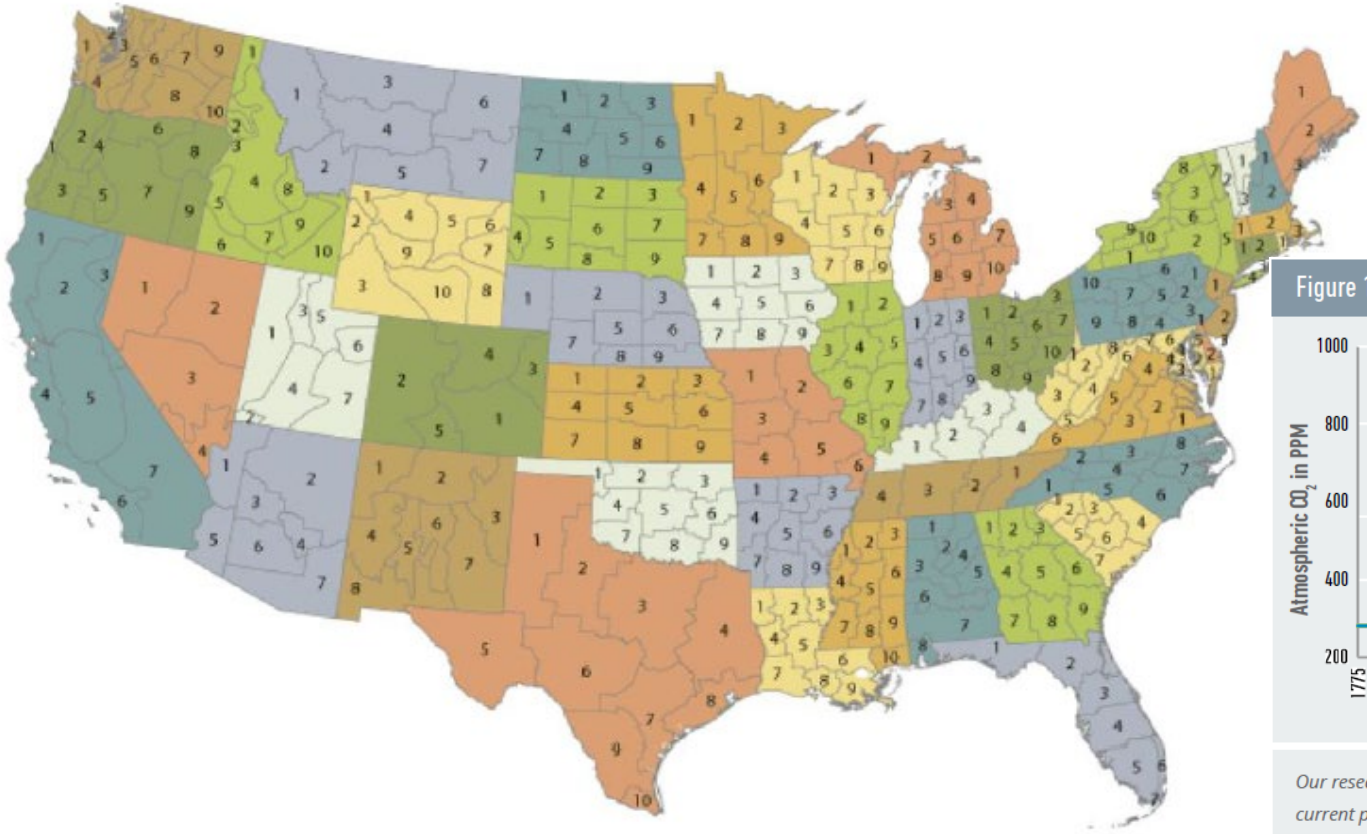
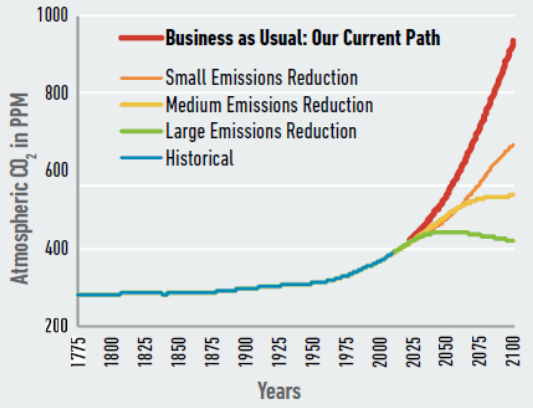


Figure 2: U.S. Climate Divisions (NOAA2016a).

Figure 1: Global Emissions Scenarios



Our research examines the risks of the U.S. continuing on its current path, or "business as usual." Alternate pathways that include investments in adaptation or policy efforts to mitigate climate change through lowering carbon emissions could significantly reduce these risks.

The National Climate Assessment (NCA) Divisions are Too Regional. We need **Local** Climate Impacts.

- Universities have created new Statistical methods to do this using local historic data to calibrate the eight NCA Divisional model scenarios for regional Climate Change impacts to within 25 miles of our local records.
- We used 40 years of Historic Temperature and rain data from the Downtown Wheeler airport to localize Division 1 of Missouri to us.

Climate LOOK
A Better Choice for Climate Analysis

Understanding Long-Term Climate Changes for Kansas City, Missouri

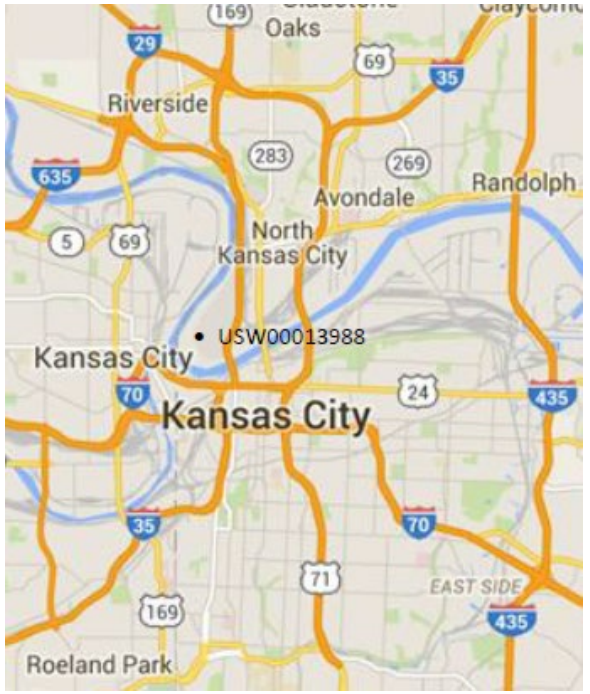


Figure 1: Location of the Global Historical Climatology Network Station [USW00013988] that provided historical observations used in the NCA and reported in this report. (Google Maps)

Statistically localizing two NCA climate model scenarios to historic site data found:

1.) Heat/Temperature is Kansas City, Missouri's most dangerous impact.

2.) Rainfall frequency and severity both increase with negative impacts on infrastructure and public safety throughout the City.

3.) We found more extreme **seasonality**; wetter springs, drier summers/falls

4.) These increased extremes further impact local resources and systems.

5.) A clear trend of increased stress emerges with metro-wide economic and human impacts

6.) This will allow us to further develop and identify the impacts in order to plan and prepare.

Increased Heat drives all other impacts, including rain with significant Human and Economic impacts. Heat = Energy

- Electrical demand may increase 8% to 19% with a 5% chance of increasing over 23%.
- All Labor Productivity in the metro at large could decrease by 2.9% with a 5% chance of a 3.7% decrease in annual productivity just due to heat and humidity.
- An increase in violent crime of up to 5.3% is possible due solely to hotter temperatures.
- 3 to 24 **additional** deaths due to heat per 100,000 people. With higher electrical demand and expenses, more will be unable to afford air conditioning with more days above 95 and 105 with high humidity. For **Kansas City, MO** this is saying we will **increase** deaths by: **17 to 139 more every year from heat.** **Above the losses we already sustain.**
- FEMA's Benefit/Cost Software estimates the lifetime loss to families and community from the death of 17 to 139 persons at: **140 to 1,100 million dollars. - BCA version 5.2.1**

There are levels of heat and humidity that you cannot cool down from. KCMO has **never** seen this but may see it 10 times per year by 2100.

Our Standards, Design and Construction are based on our Historic record.

- If that record is changing and growing more severe and frequent then our standards are being shifted by nature. What once worked now fails in the future.

Rainfall Historic Record

Year	Amount
1889	38.33
1890	31.82
1891	37.05
1892	43.47
1893	32.13
1894	35.4
1895	41.22
1896	33.64
1897	30.21
1898	50.25
1899	32.52
1900	35.78
1901	24.76
1902	40.52
1903	39.22
1904	47.73
1905	42.55

# of Years with Record (1889 to 2006)			118	(Sample Size)
Average (Sample)			36.78	Inches
Standard Deviation (118 records)			7.96	Inches +/-
	Min.	Max.		
95% Certainty	20.86	52.70	Inches	

95.45% of Annual Rainfall will fall within +/- 2σ (Standard Deviations) of the Average above.

Percent of Probable Value Range Covered	
σ	68.2689492137%
2σ	95.4499736104%
3σ	99.7300203937%
4σ	99.9936657516%
5σ	99.9999426697%
6σ	99.9999998027%
7σ	99.9999999997%

Rainfall Depth Table
Kansas City Area

This table contains rainfall depths in inches
(values do not account for gage undercatch)

Duration (HH:MM)	Return Period (T_{PDS}) 1-year	2-year	5-year	10-year	25-year	50-year	100-year	500-year
24:00	2.86	3.55	4.50	5.25	6.28	7.10	7.94	10.0

Drought, expect more and expect worse

- ClimateLOOK shows an increase in Days without rain from 30 to up to 43. It also shows temperatures increase by up to 14% annually. This is a recipe for more frequent drought.
- Without agricultural adaptation the Midwest could see corn and wheat losses of 11% to 69%. - Heat in the Heartland, 2015

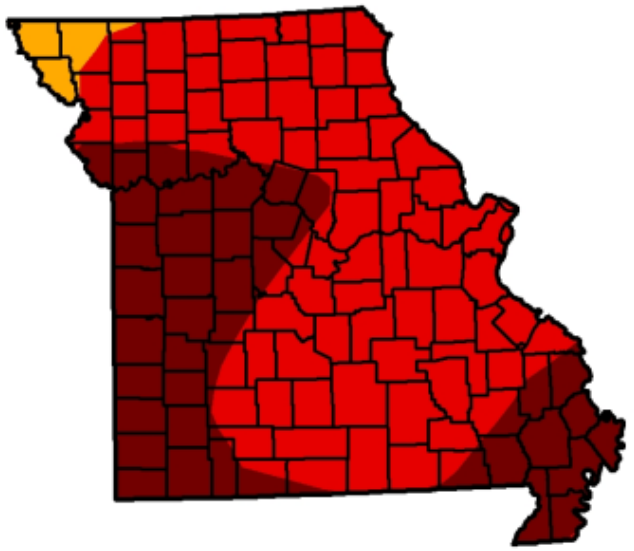
U.S. Drought Monitor

August 28, 2012
Valid 7 a.m. EST

Missouri

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	100.00	97.44	35.29
Last Week (08/21/2012 map)	0.00	100.00	100.00	100.00	99.29	35.72
3 Months Ago (05/29/2012 map)	44.73	55.27	19.40	2.52	0.00	0.00
Start of Calendar Year (12/27/2011 map)	95.48	4.52	0.00	0.00	0.00	0.00
Start of Water Year (09/27/2011 map)	55.19	44.81	22.45	8.65	0.00	0.00
One Year Ago (08/23/2011 map)	44.91	55.09	16.87	4.28	0.00	0.00



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, August 30, 2012
Brian Fuchs, National Drought Mitigation Center

Missouri Drought Monitor - August 28

CLOSE

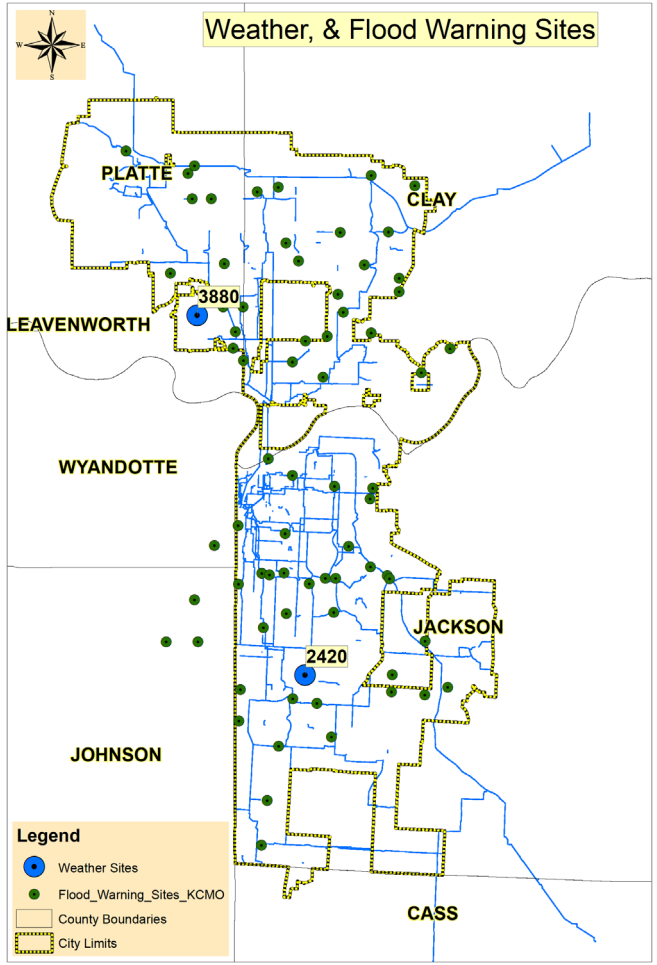
More work on Drought will be done in our future planning efforts

Utility Preparedness vs. Drought

- Let's use Kansas City, MO's Water Utility as an example.
- More droughts create more demand, pressure and shrinking soils which creates an exponential increase in water main breaks.
- Our Water Treatment Plant can treat 240 million gpd. or 7.2 billion per month. July 2012 demanded 5.2 billion. What might a dust bowl demand?
- Can our pipeline system deliver 7.2 billion gallons if drought demands it?

KC Water Stormwater Utility Weather and Flood Warning Sites

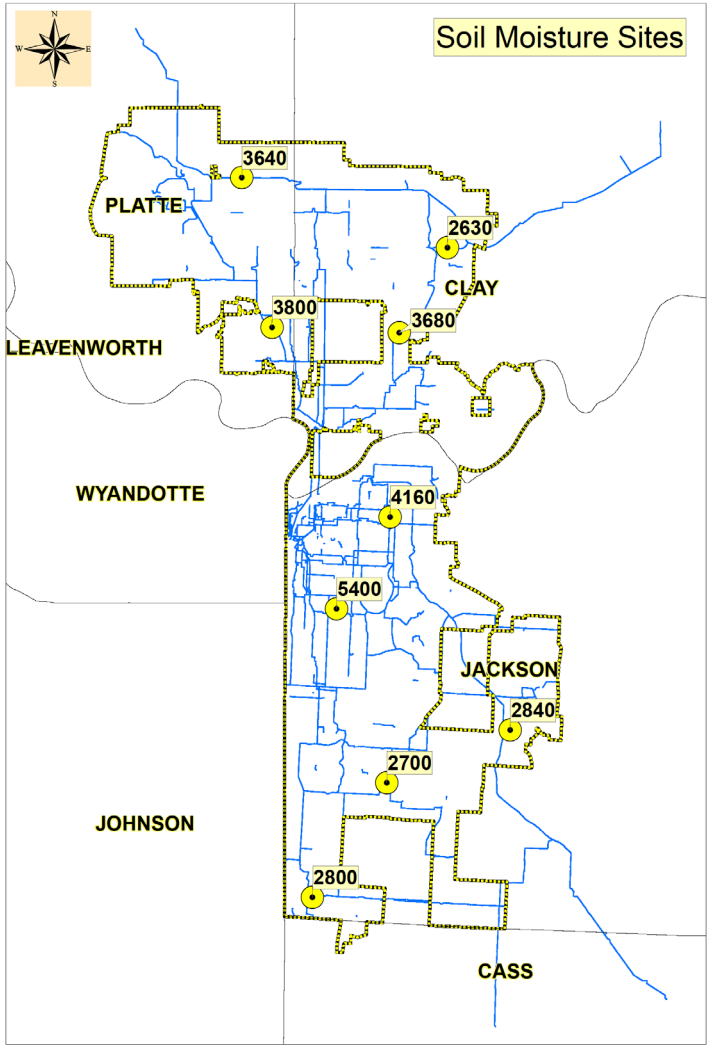
- KC Water service area is 319 square miles
- Weather sites track temperature, wind and relative humidity.
- Flood warning sites track rain and stage.



KC WATER SERVICES

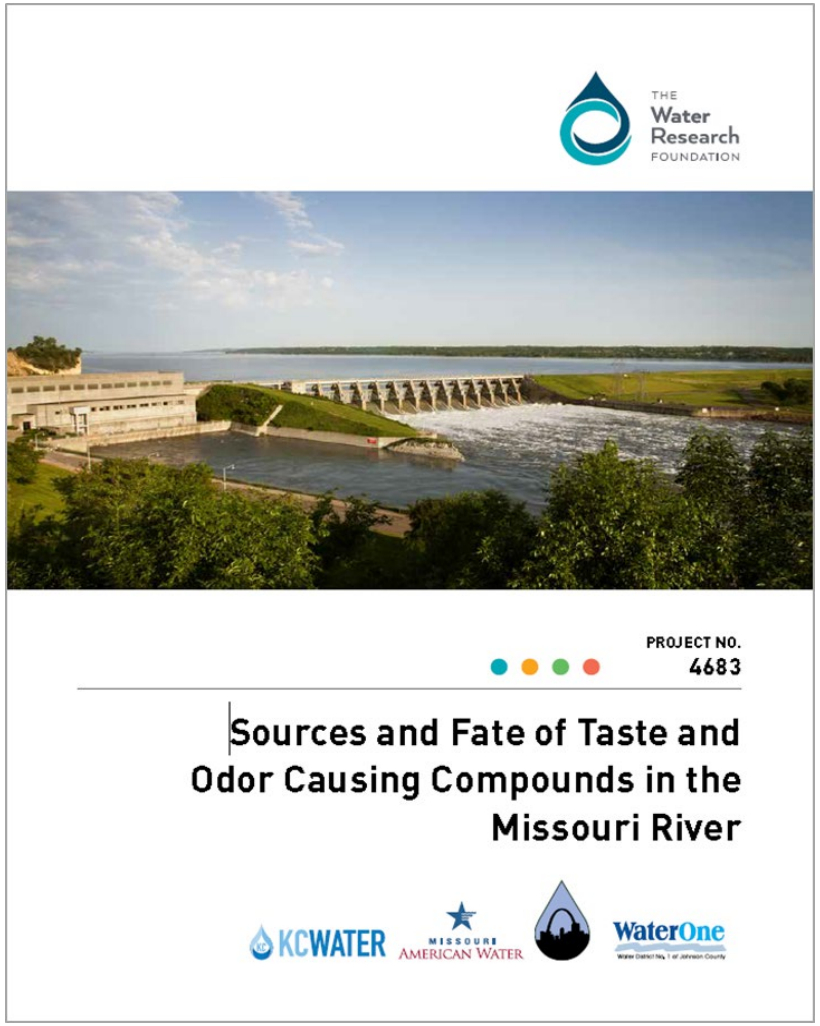
KC Water Stormwater Utility Soil Moisture Sites

- Study of nine (9) KC Water metro weather & flood warning sites that are representative of different parcel types, i.e. forested, residential lawn and tall grass.
- Addition of Soil Moisture sensor's which will monitor soil moisture to a total depth of 1.31 ft. at depths of 2", 4", 8" and 15".
- Enable KC Water to build the data record for weather and soil moisture to correlate water consumption patterns of our customer's based on various parcel types and soil moisture conditions across the KC Water metro.
- Assist in predicting increases and decreases in water main breaks and potential to utilize this data in our current water main replacement program model for determining which water mains to replace first.



KC WATER SERVICES

KC Water - Source Water Resiliency Efforts



The water utilities along the Missouri River have experienced recurring seasonal taste and odor challenges in their source water for many decades. A 1960 investigated the sources of T&O in Missouri River water (Erdei, 1963).

More than 50 years after the publication of that study, it can be argued that the same contributing sources continue to cause T&O issues along the Missouri River.

KC Water Source Water Resiliency Efforts

- One of the most significant T&O episodes in the Missouri River was experienced in early 2014.
- An intense and prolonged T&O event was experienced over a stretch of 400 miles in the lower Missouri River between February and March 2014.

- This event was atypical and extraordinary in multiple ways:
  - Timing: late winter/early spring (February/March) versus summer and fall (July through October)
  - Intensity: recorded raw water threshold odor numbers (TONs) were as high as 25
  - Duration: lasted almost 4 weeks between first detection in the Kansas City area to when high odor was detected in the St. Louis area

KC Water Source Water Resiliency Efforts

- The event triggered four (4) of the largest water utilities along the Missouri River (St. Louis Water Division; Water District No. 1 of Johnson County [WaterOne]; Kansas City, MO Water Department [KC Water]; and Missouri American Water) to co-sponsor this multi-funded WRF research project #04683

- The specific objectives for this study were:
  - To identify and summarize knowledge and information to improve the understanding of the sources, fate, and transport of T&O-causing compounds in the Missouri River between Gavin's Point Dam, Nebraska, and St. Louis, Missouri
  - To develop the foundation for the development of an early warning monitoring system that will help water utilities that draw source water from this target region of the Missouri River to predict the potential for occurrence of T&O events, prepare for T&O challenges, and manage operations to mitigate T&O in the treated water

KC Water Source Water Resiliency Efforts

- The Near-Term Recommendations Are:
  - Early warning system implementation
  - Implement and standardize sensory analyses of T&O at each WTP
  - Optimize PAC treatment for T&O control

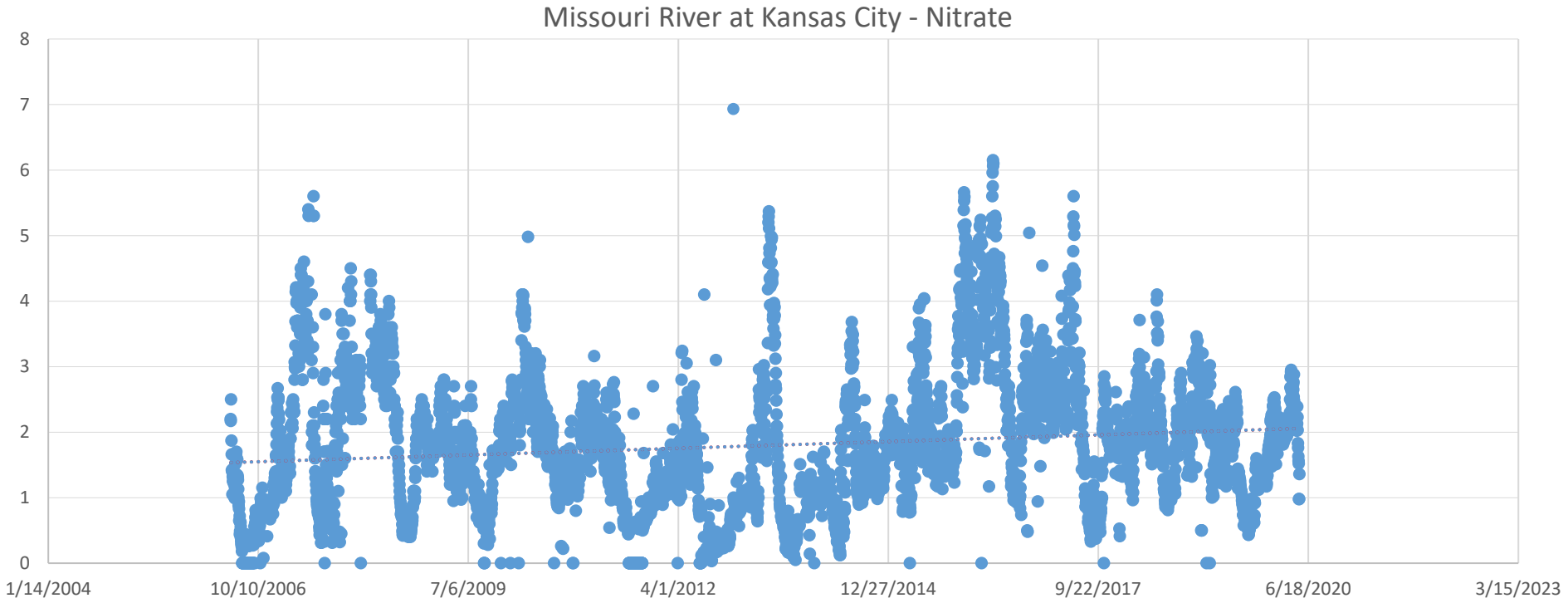
- The Long-Term Recommendations Are:
  - Acquire and train designated lead agency personnel on ICWater model
  - Expand GIS-based database to incorporate publicly available water quantity, water quality, and geospatial data
  - Investigate remote sensing as a T&O early warning tool

2018 Farm Bill – Conservation Programs Focus On Source Water Protection

- Why should a Utility get involved with the agricultural community?
  - Help shape how conservation dollars are spent, focusing them on the greatest benefits to source water protection *(Serve on State NRCS Technical Committee)*.
  - Foster mutual trust and understanding between water systems and producers, encouraging constructive problem-solving.
  - Make progress on specific source water concerns by focusing on practices that will best address them.
  - Save on treatment costs or delay or avoid installing additional treatment.
  - Reduce risks to their water supplies.
  - Increase public confidence in both sectors.
  - Leverage every dollar they contribute (whether cash or in-kind) through NRCS and other partners. For example, in the Beaver Water District case study, about $8.50 is being spent on implementing best management practices (BMPs) for every $1 contributed by the utility.

KC Water - Focus On Source Water Protection

- Make progress on specific source water concerns by focusing on practices that will best address them.
- Save on treatment costs or delay or avoid installing additional treatment.
- Reduce risks to their water supplies.
- Don't forget; in the Beaver Water District case study, about $8.50 is being spent on implementing best management practices (BMPs) for every $1 contributed by the utility.



2018 Farm Bill – Conservation Programs Focus On Source Water Protection

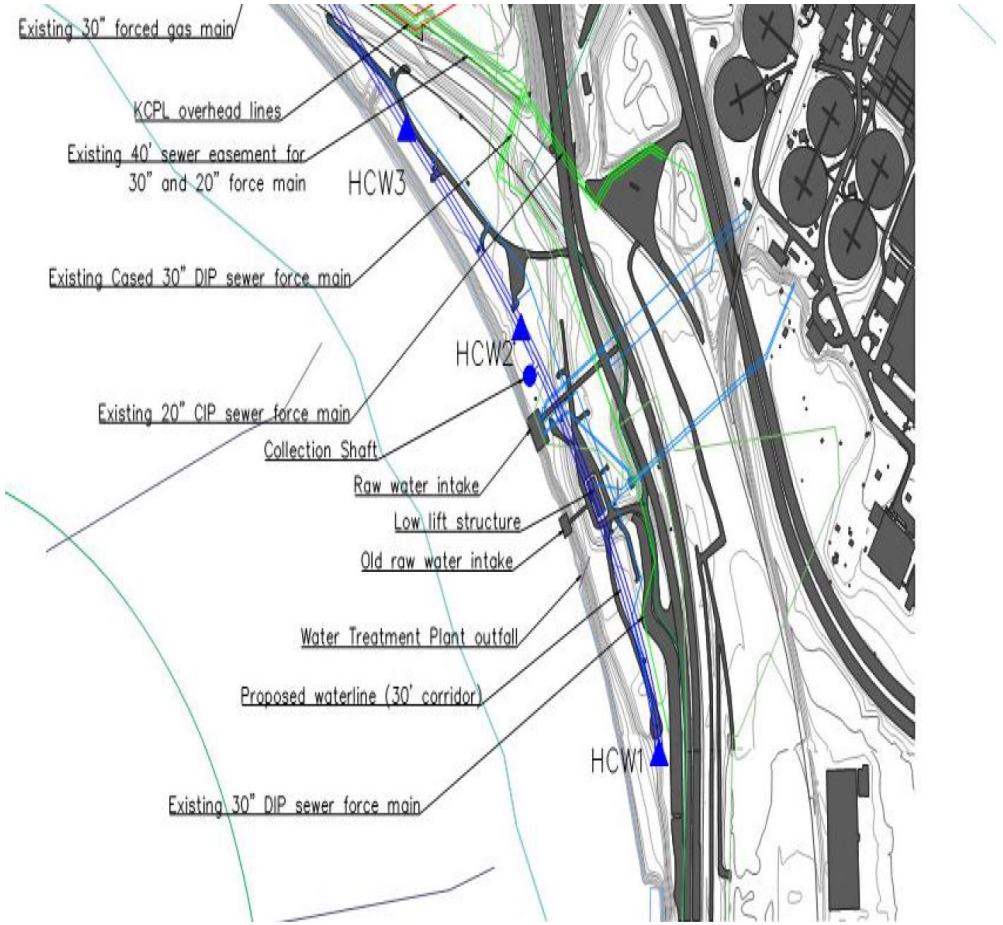
- How do we incentivize producers to adopt source water protection practices?
  - Specifically authorize source water protection as an eligible activity
  - "(B) offer to producers increased incentives and higher payment rates than are otherwise statutorily authorized through conservation programs administered by the Secretary for practices that result in significant environmental benefits that the Secretary determines— "(i) relate to water quality or water quantity; and "(ii) occur primarily outside of the land on which the practices are implemented.
  - Increase mandatory funding for the program

2018 Farm Bill – Conservation Programs Focus On Source Water Protection

- How do we incentivize producers to adopt source water protection practices?
  - 10% of Natural Resources Conservation Service conservation funding directed toward source water protection, an incredible $4 billion over the next ten years;
  - Authorizes water utilities to work with State technical committees in identifying priority areas in each state; and
  - Additional incentives for farmers who employ practices that benefit source waters.
  - Regional Conservation Partnership Program (RCPP) funded at $300 million/yr.

Source Water Protection - Source Water Diversification

- **Design and Installation of Alluvial Collector Wells**
  - Currently 80% of KC Water Utility's raw water is from the Missouri River and 20% from 14 vertical wells in the MO. River alluvium (Approx. 40 MGD)
  - Missouri River bed has been lowering for several decades which has caused issues' at the KC Water River Intake
  - To provide more reliability and resiliency KC Water has up to three (3) collector wells being designed in FY 22 with construction beginning in FY 23 and FY 24
  - Increase the well capacity to 100+ MGD



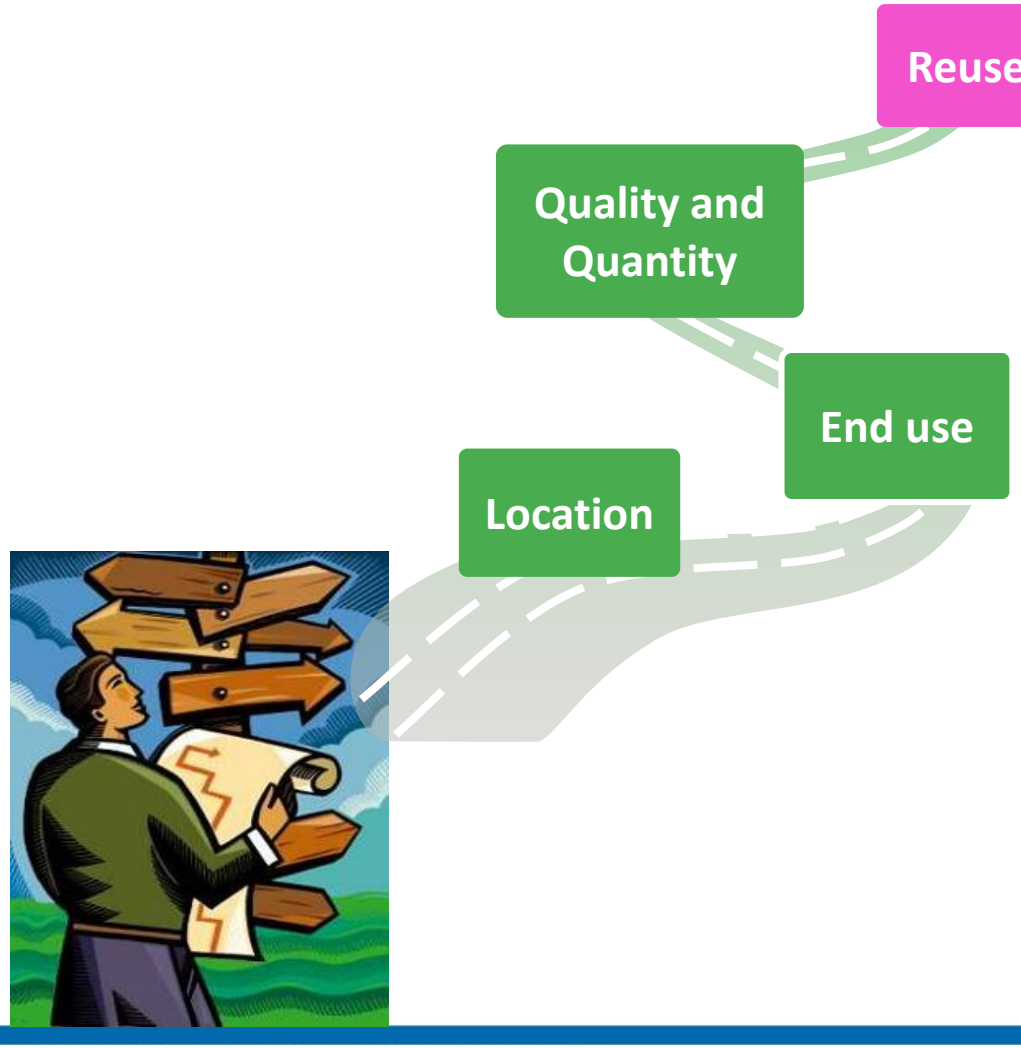
KC WATER SERVICES

Source Water Protection - Source Water Diversification KC Water - Water Reuse Feasibility Study

Project Objectives

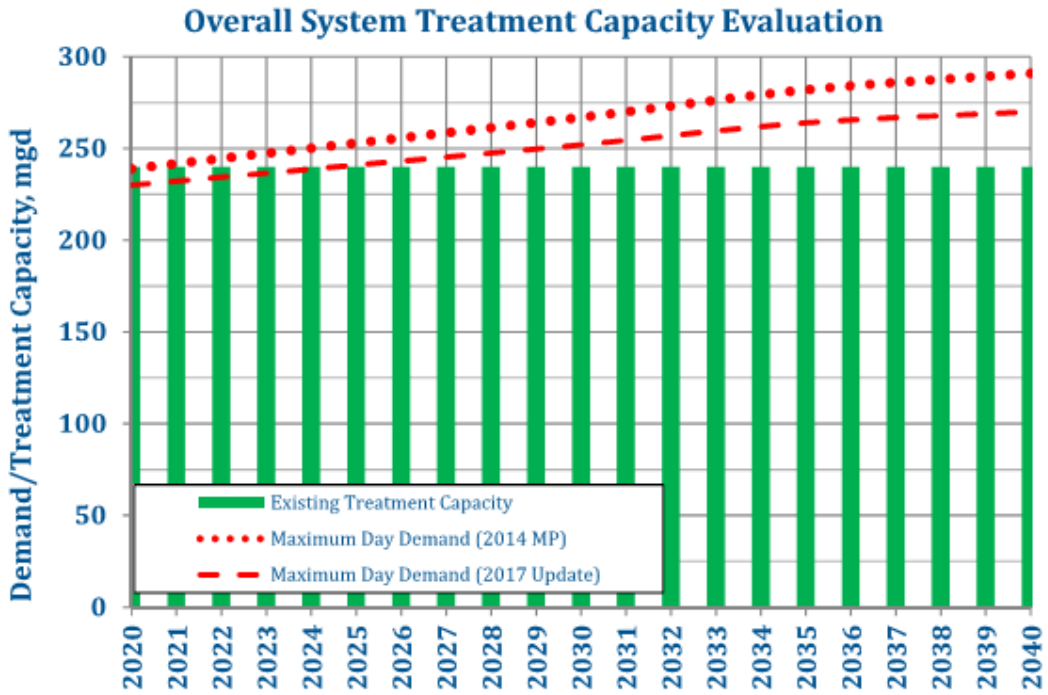
- **Evaluate feasibility of supplying reuse water**
  - **From Six Wastewater Treatment Plants (WWTP)**
- **Evaluate potential customers**
  - **Identify top water users with proximity to WWTPs**
  - **Survey to gauge interest**
- **Estimate project costs**
  - **Various site flows depending on customer needs**

Feasibility of Providing Reuse Water



- ✓ Location of WWTP in relation to prime users
- ✓ End use of reuse water
  - Irrigation
  - Industrial
- ✓ WWTP capacity
- ✓ WWTP effluent water quality
- ✓ Delivering/distribution of the reuse water

Source Water Diversification – Water Reuse



WSD Potable Water Treatment Capacity

- Water Production facility is conventional coagulation plant
- Limited footprint for expansion
- Peak Day Capacity forecast to be 250 to 290 mgd in 2040
- Expansion Peak Day Demand at WTP - $191 million
- Long-Term Source Water Concerns

Source Water Diversification – Water Reuse

KC Water Reuse Drivers

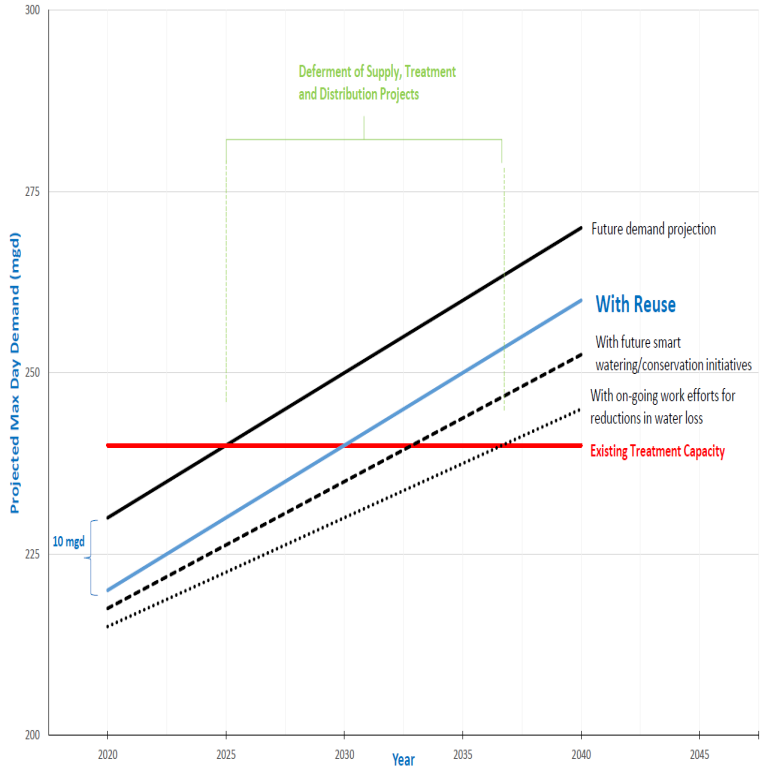
Customer Water Demands

Estimated BNR For WWTP's – Approximately $650M

Water Quality – Can A Reduction In Discharge of Nutrients Be Developed into a Economic Advantage

Effluent Trading

Provides sustainability & resiliency for Water and Wastewater Utilities and the customers' it would serve



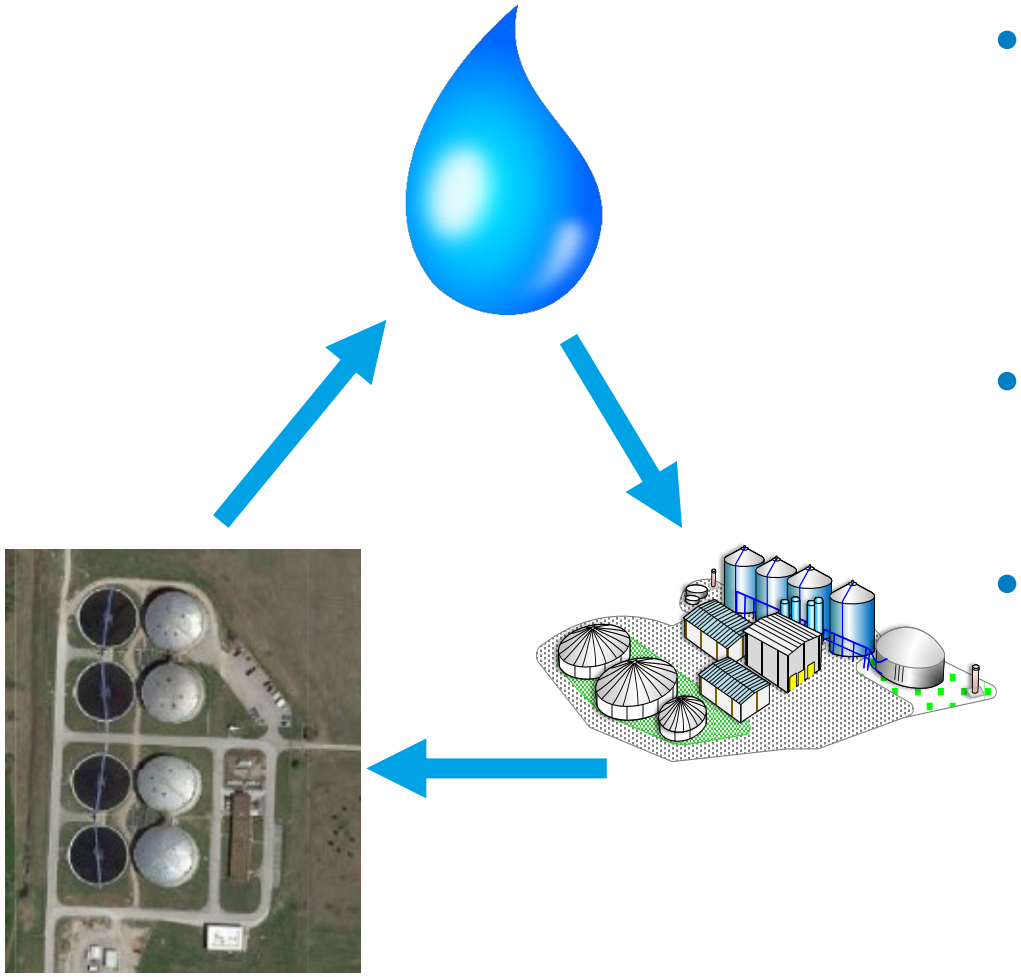
Source Water Diversification – Water Reuse

Water Quality Requirements

- Irrigation
- Process Water
- Cooling and or Steam
- Potable Water

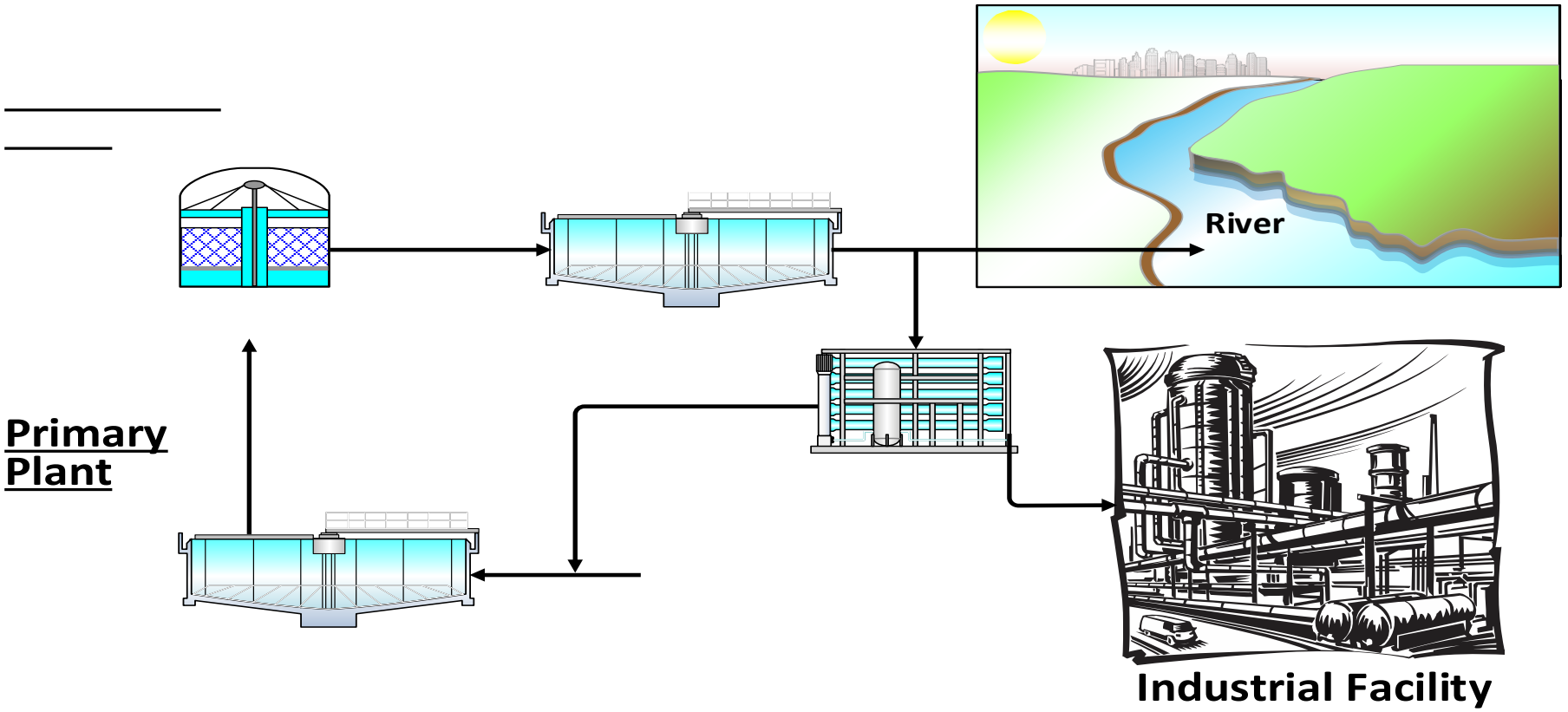
Source Water Diversification – Reuse Water Supply

Examine Water users



- Evaluate large water users to identify reuse opportunities
- WSD provided data
- Drive toward sustainable solution

Source Water Diversification - Distribution of Reuse Water – Force Main Options from BR Secondary WWTP



Source Water Diversification – Water Reuse Treatment Alternatives

Typical Reuse Treatment

Filtration

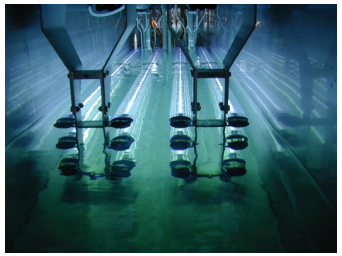
MBR

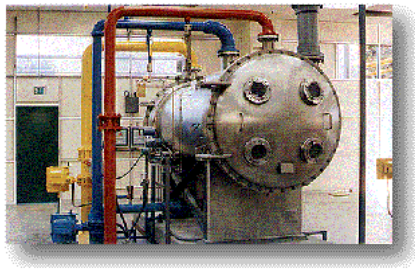
Filtration + MF/RO

MBR + RO

All Alternatives have High Level Disinfection

Chemical: Chlorine
Physical: UV, Ozone





Source Water Diversification – Cost of Service

Reuse Cost of Service Range

Description	Average Cost of Service /Ccf
Blue River Primary – 2.5 MGD	$4.98
Blue River Primary – 5 MGD	$4.63
Blue River Primary – 10 MGD	$4.25
Blue River Secondary – 2.5 MGD	$3.45
Blue River Secondary – 5 MGD	$3.16
Blue River Secondary – 10 MGD	$2.92

Current Average Water Rate is $4.48/ccf

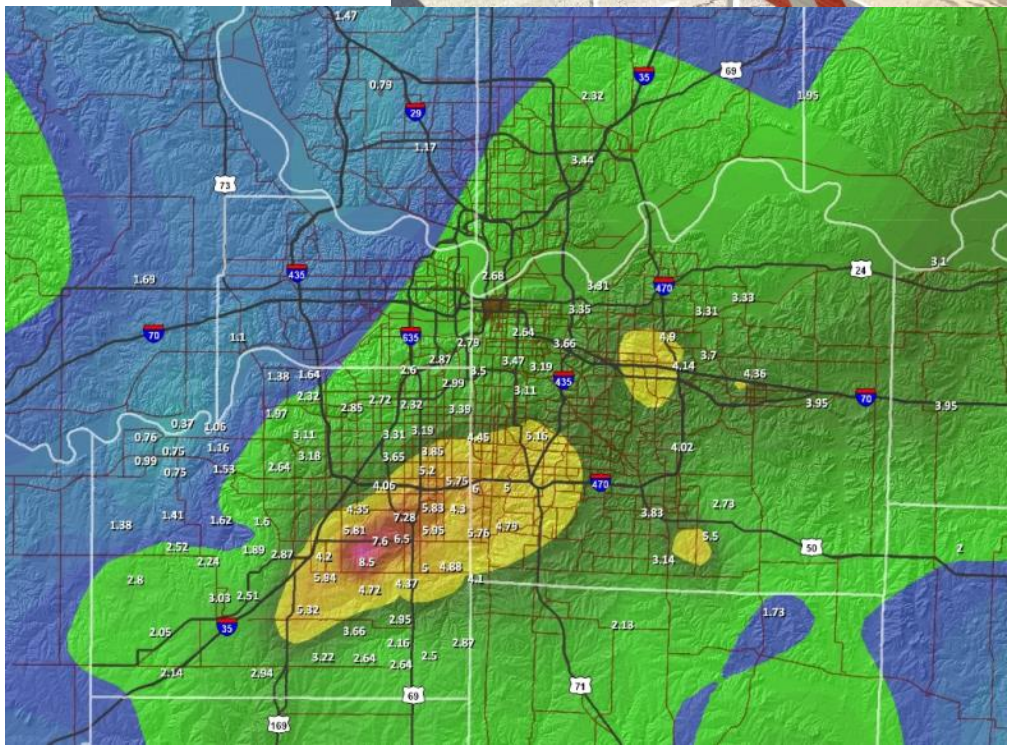
Assumes that all new debt and O&M related to Reuse Facility are recovered in rate annually.

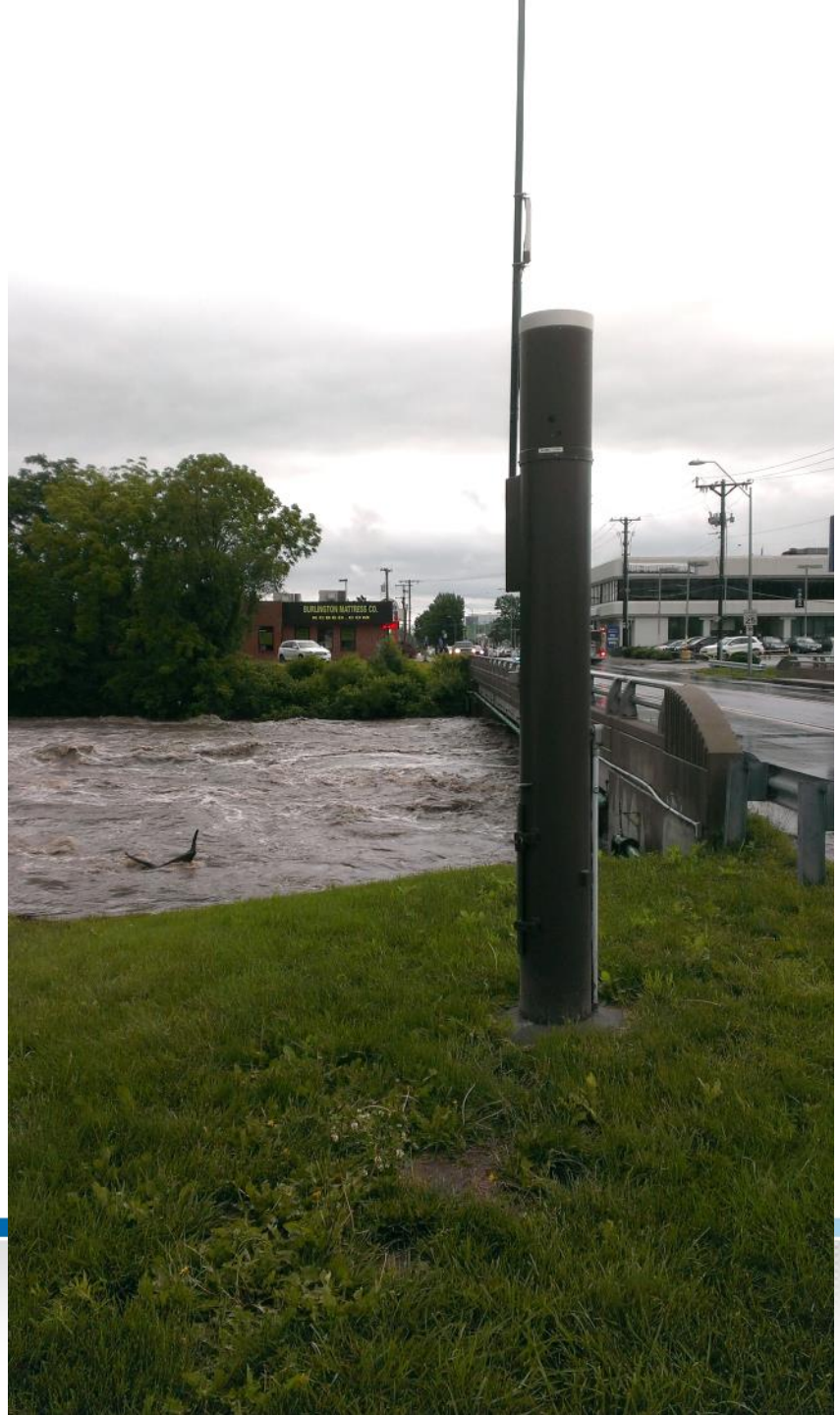
Assumes Reclaimed water sold only to new reuse customers

Source Water Diversification – Water Reuse Status

- Results indicated Economic Cent$ and could provide a sustainable solution
- Presented initial findings to Industrial Users
- Improvement in Envision Score
- Continue to work with Industrial Users and customers
- Examining Pilot testing
- Refining CAPEX/OPEX costs

Questions





KC WATER SERVICES

Organisational Resilience: "*Security through diversity*"
Desalination & Reuse - our journey

Stephen MacCarthy RFD

May 2020

Fresh Water Thinking | WATER CORPORATION

Perspectives - Australia

Western Australia

- **2.6 million kilometers^2**
  (approx. 1.6 million miles$^{2)}$
- **2.6 million people**

Perth: worlds most remote capital city

Fresh Water Thinking | WATER CORPORATION

Water Corporation

- Principal supplier of water, wastewater and drainage services in Western Australia.
- State Government owned - accountable to the *Minister for Water*.

- Purpose is to provide sustainable water services to make Western Australian a great place to live and invest.

- Our Vision:
  - *Water Forever*
  - *Great Place*
  - *Zero Footprint*

Fresh Water Thinking | WATER CORPORATION

Culture

WESTERN AUSTRALIA is remote – unconnected to any other team in Australia
Independent culture born of remoteness & harsh environment

- ".. *if it breaks there is no one else to help us ..*"
- A strong history of engineering with mining, oil, gas and Government infrastructure engineering to span long distances *(roads, railways, harbours*)
- Gold rush .. people came from around the world
- Post WWII immigration and the 1960's-70's Pilbara mining boom, continued into the 1980's with Oil & Gas

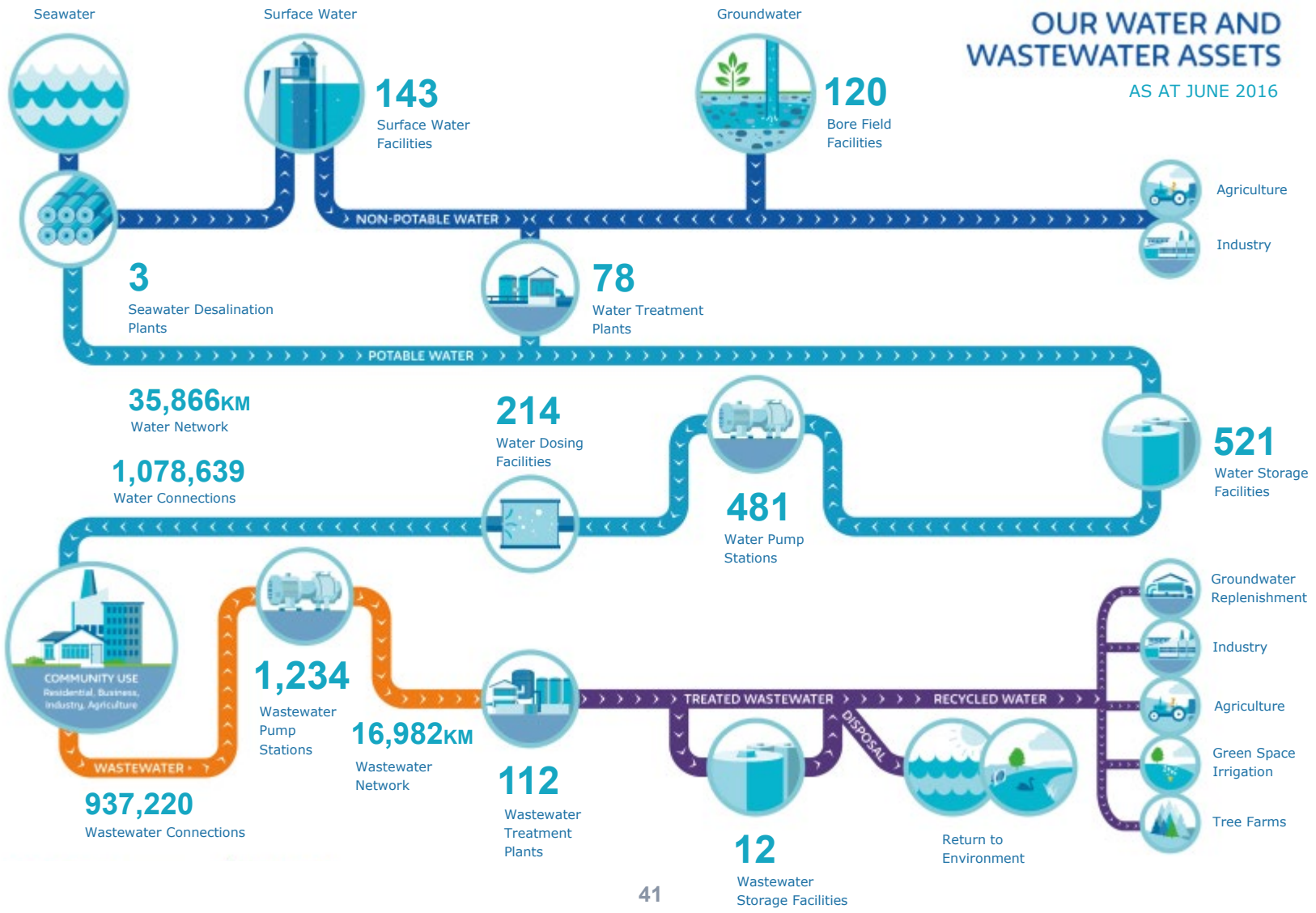
INTERNAL CULTURE:

- Corporatisation(1995) - recruiting a new team
- Single focus challenge .. everyone *knew what was important* and were all working towards project delivery .. a *"sense of urgency"*
- we were *"a builder"*

Our People focus was *"a great place to work" ..*

Fresh Water Thinking | WATER CORPORATION

Water Corporation – Statewide



“Water Forever”

Case study
Our journey to Desalination and Reuse

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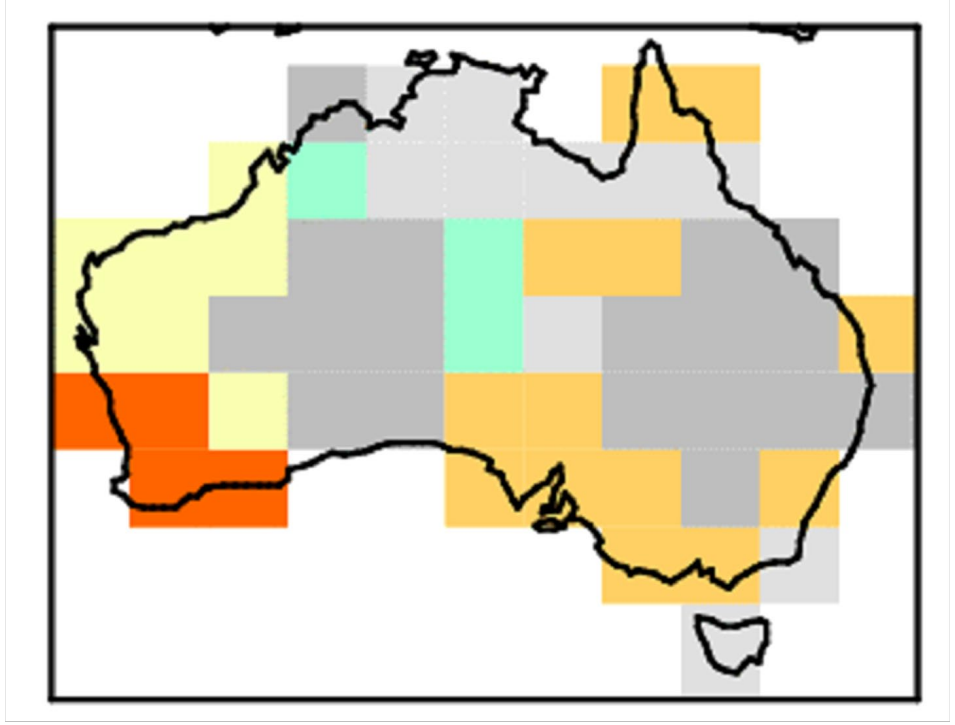
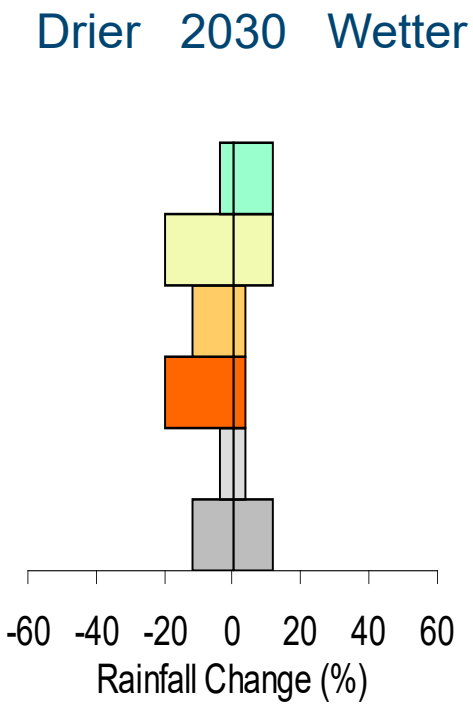
Climate projections – Australia

Warming will change general climatic patterns and there will be greater climatic variability

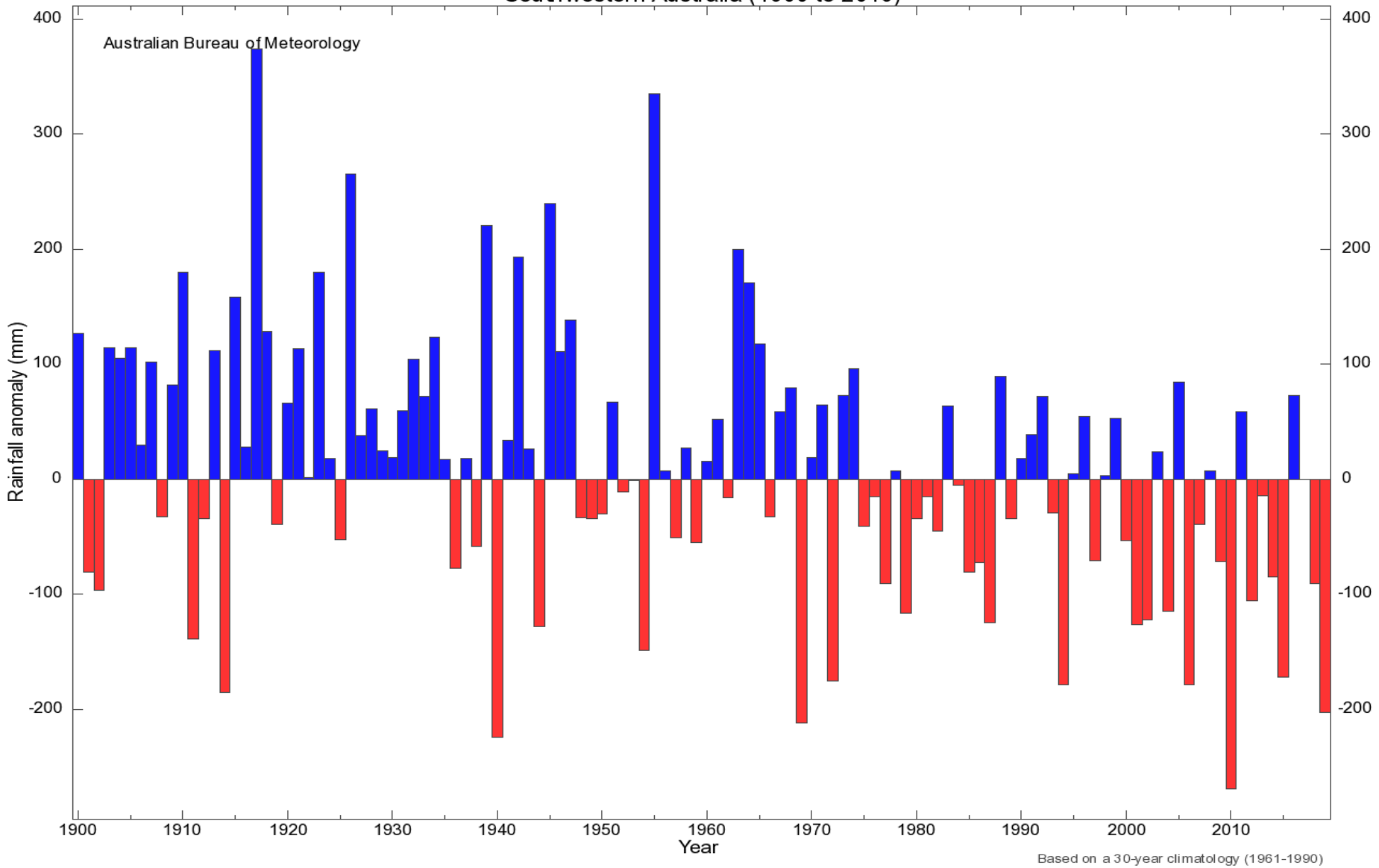




Annual rainfall change (%)

CSIRO

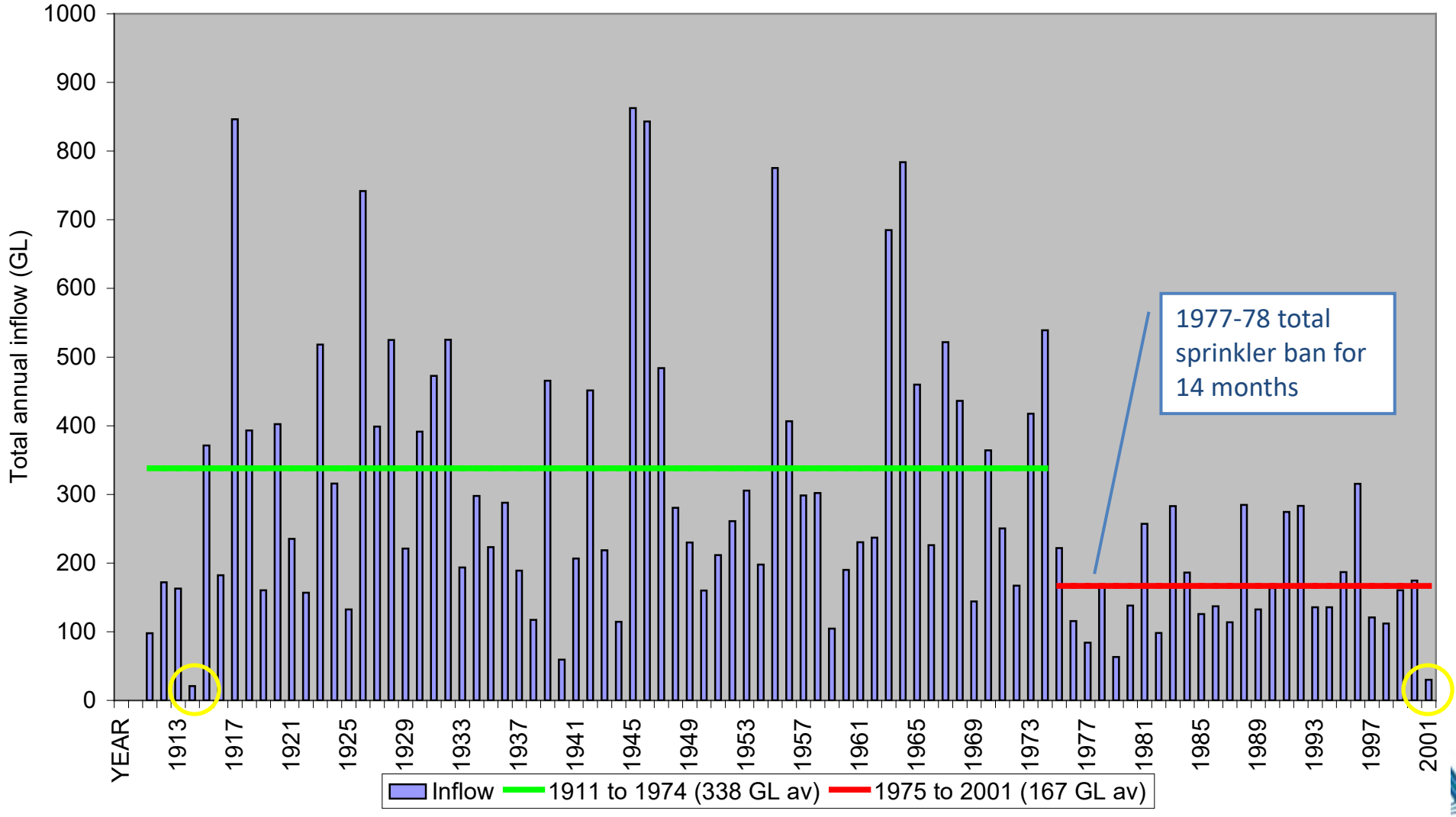
Fresh Water Thinking | WATER CORPORATION



Fresh Water Thinking

WATER CORPORATION

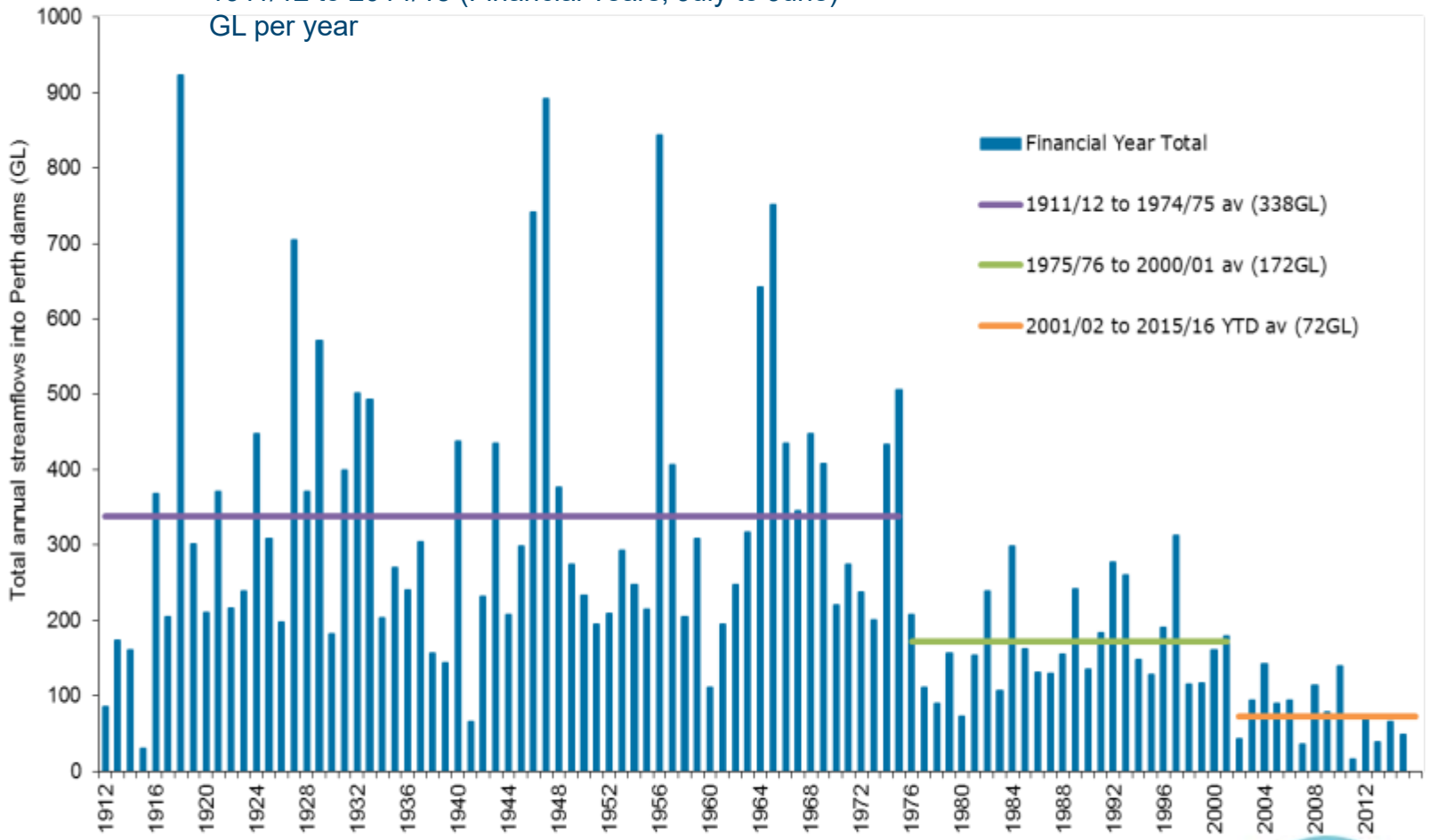
Climate variability: inflow decrease up to 2001



Note: A year is taken as May to April and labelled year is start (winter) of year
Year 2001 inflows are not for a full year

Declining streamflows - below average rainfall

Historical Streamflows into Perth Dams
1911/12 to 2014/15 (Financial Years; July to June)
GL per year



Note: Streamflow is reflect as financial year, July to June.
Inflow is simulated based on Perth dams in 2001 i.e. excluding Stirling, Samson & Wokalup

Fresh Water Thinking

WATER CORPORATION

Influence consumer behaviour Pre-2001

- 1977 - Rising block tariff structure introduced
- 1990 - Mandatory dual flush cisterns introduced
- 1991 - All houses metered

- 1995 - Waterwise schools
- 1996 - Daytime sprinkler ban
- 1999 - Waterwise commercial partners introduced
- 1998 – 2001 Domestic water use study conducted

Fresh Water Thinking | WATER CORPORATION

The 2001 Key Challenge

"to balance supply and demand to achieve a 45GL new source to avoid restrictions"

"Water forever"

- in an even drier climate
- with twice as many people
- with less environmental impact

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Other challenges

Climate change and its impact on supply & demand

Continuing to improve efficiency to deliver savings to the Government

Continuing to meet regulatory requirements

Ageing assets across the State

Understanding changing customer expectations

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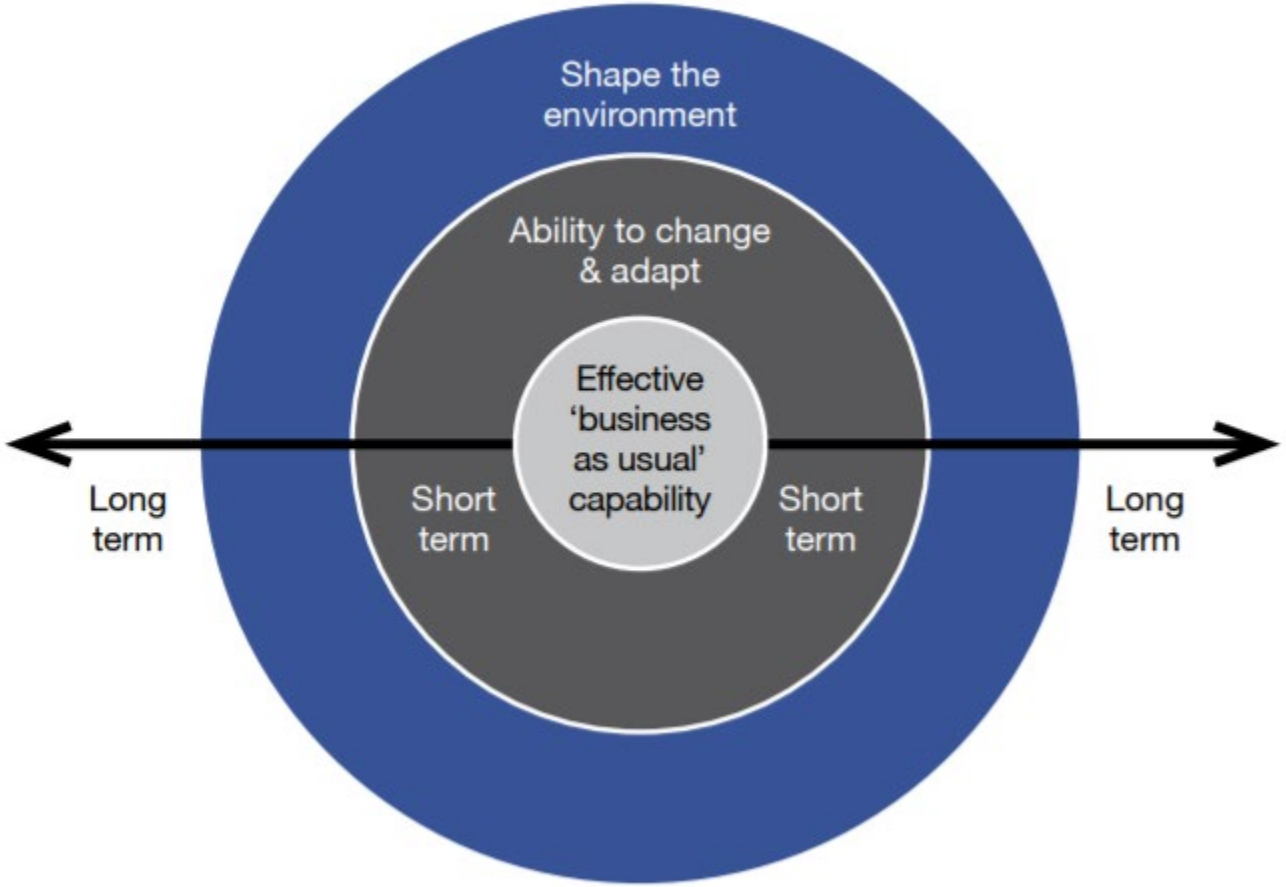
Resilience model



Kay R and Goldspink C, 2012, *CEO Perspectives on Organisational Resilience - — Research Paper 1*, Commonwealth of Australia.

Fresh Water Thinking | WATER CORPORATION

Maintaining our ability to *'Shape the Future"*

Situational awareness

- *Knowledge, Research & Development*

Recognition of vulnerability

- *No action = no future + no trust*
- *No options with just keeping on doing the same thing…*

Agility & Adaptability

- Governance and our relationships with *Community, Industry, Government.*
- Leadership
- *"Water Forever" thinking*

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Shaping the environment

Water Reuse

Smarter Use of Water

Desalination

Security through Diversity

Catchment Management

Water Trading

Surface Water

Groundwater

Desalination

- Climate independent source - 45 GL
- The biggest and most complex water pump station the Water Corporation had built
- Ability to **bank water** in the Dams with flexible operating capability
- Economical & environmentally friendly
- Emission offsets specified (wind farm)

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Leadership

In 2006 Jim Gill was recognised as Australia's Civil Engineer of the Year for his drought response

October 21, 2009 - Water Corporation CEO Jim Gill wins international prize
'*WA Water Corporation chief Jim Gill has become the first Australian to win the world's top prize for water conservation*'.

"*He has had not only the foresight and intellect to articulate problems and solutions at an incredibly challenging time in water management, but also the courage and stakeholder trust required to do actually something about it ….*

*Mr Gill's strategies to deal with climate change … he was touted as saving Perth and parts of WA from running out of water **…** have been recognised as pioneering"*

The south-west corner of WA is thought to have been hit earlier and harder with a drying climate than anywhere else in Australia"

Mr Mollenkopf, Australian Water Association

Fresh Water Thinking | WATER CORPORATION

Timeline to "Water forever"

1995
Corporatisation and Leadership change

- Corporate agility – flexible decision making
- From Govt. procurement process to flexed decision making and procurement

~ 2000 Consideration of data

- Drivers and Indicators on watch
- Rainfall
- Climate change data
- Supply – Demand forecasts
- New source options

2004 Decision to progress with Desalination

2006
Desalination plant commissioned

2020 now +
Water Forever

- **10yr & 50yr plans**
- **Desal 2- P**hase 1 & 2
  - Groundwater Replenishment
  - Reuse - recycling
  - **Desal 3** *Water Forever*

- The Future:
- Digital organisation
- Water Sensitive Cities
- Innovation Centre/s (new technologies)

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Reuse - Replenish - Recycle

- **Recycle & Reuse**:
- 80 recycling schemes – 26 Billion litres of reused wastewater
  - Industrial processing
  - Toilet flushing/clothes washing/garden watering
  - Maintaining wetlands or other environmental purposes
  - Irrigation of non-food crops *(e.g: trees, woodlots, turf, flowers)*
  - Construction/dust suppression
  - Irrigation of sports grounds, golf courses and public open spaces

- **Replenishing** the groundwater - +28 GL/year

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Conclusion

Research showed fundamental elements of **Resilience**

Leadership and Culture

- Underpinned the **organisation's ability to *change, adapt*,** and **"*shape the environment*."**

Trust

- Activities were identified that helped to support the development of the cultural characteristics, including the extensive use of :
  - *scenarios,*
  - *exercises,*
  - *training,*
  - *communication* and
  - *strategic planning*.
- **Trust** was described in terms of ***'patterns of prediction'*** that were **shared across the organisation** and **extended to suppliers and customers.**

Kay R and Goldspink C, 2012, *CEO Perspectives on Organisational Resilience — Research Paper 1*, Commonwealth of Australia.

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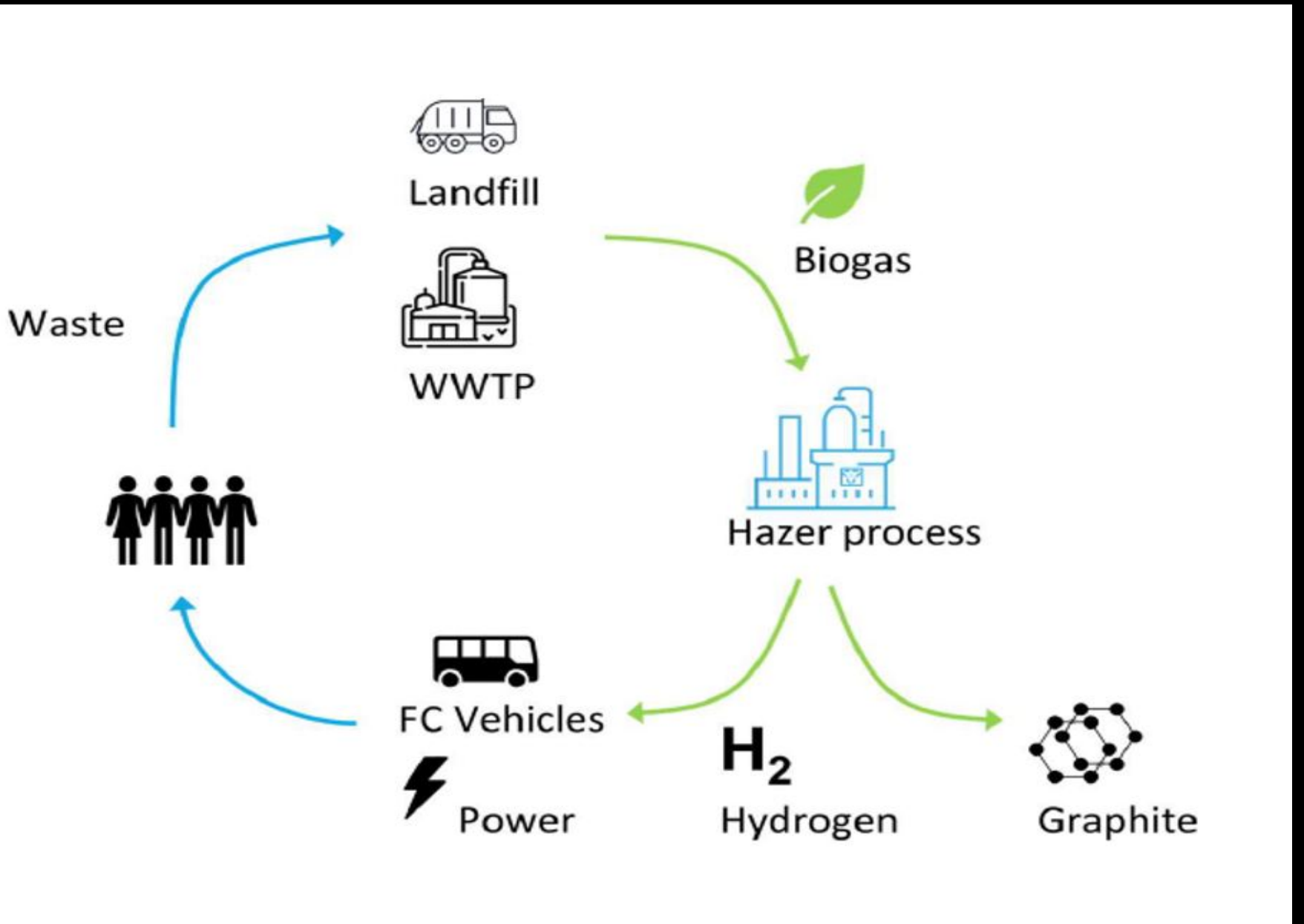
But wait there's more!! …Hydrogen..

WW Biogas to Hydrogen & Graphite



Questions?


Existing WWTP
Reverse Osmosis Building
Outfall
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Treatment Tanks
brane
tion Building
Groundwater

Power Resilience and AMWA/NACWA Resilience Webinar

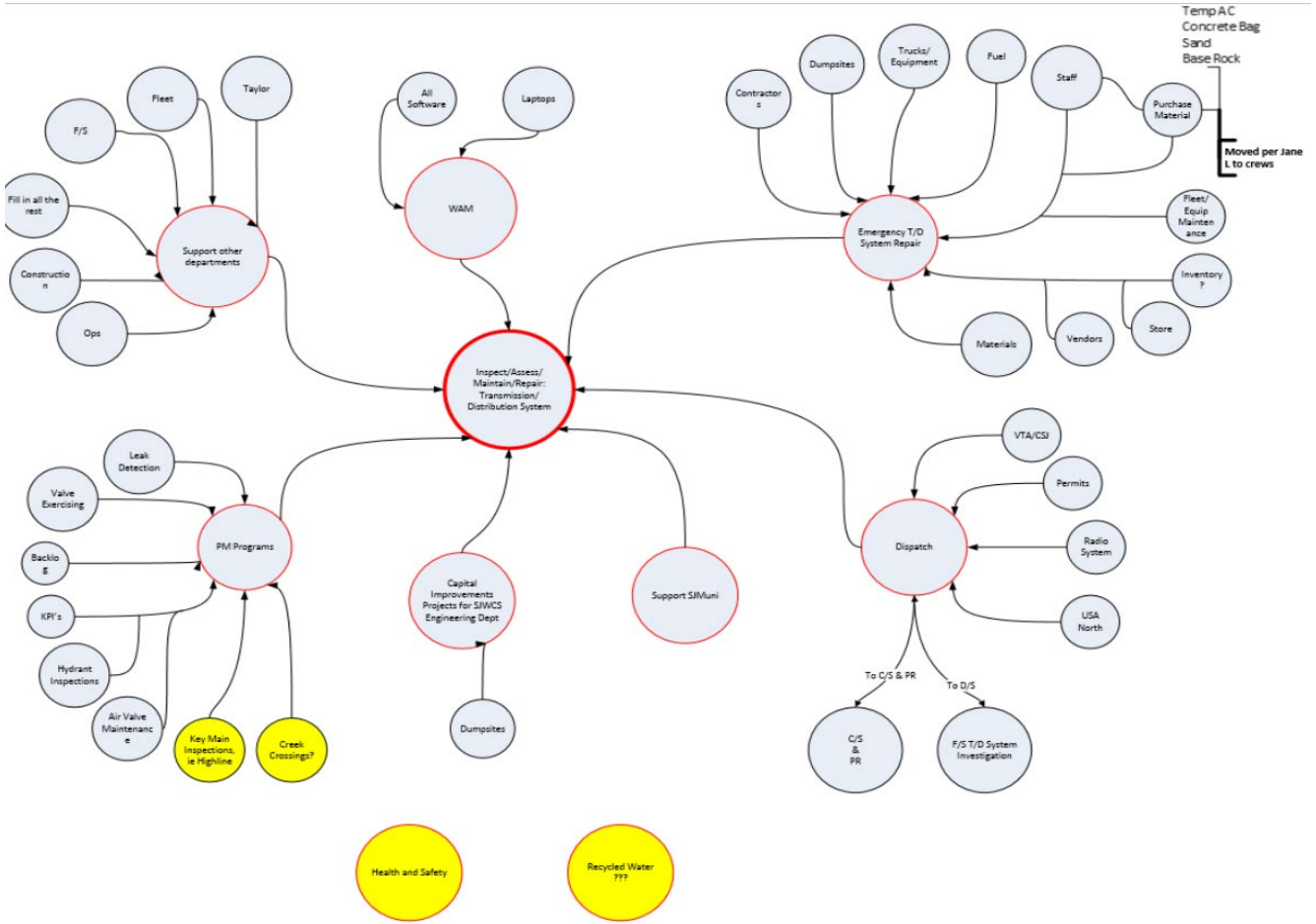
Overall Resilience and Emergency Preparedness Strategies

June 3, 2020

A Presentation by: Jim Wollbrinck

External Risk-Interdependencies

Internal Risk Dependencies & Threats



AWIA: Phase I

Risk and Resilience Assessment Requirements

Each community water system serving a population of greater than 3,300 persons shall assess the risks to, and resilience of, its system. Such an assessment shall include:

1. the risk to the system from malevolent acts and natural hazards;
2. the resilience of the pipes and constructed conveyances, physical barriers, source water, water collection and intake, pretreatment, treatment, storage and distribution facilities, electronic, computer, or other automated systems (including the security of such systems) which are utilized by the system;
3. the monitoring practices of the system;
4. the financial infrastructure of the system;
5. the use, storage, or handling of various chemicals by the system; and
6. the operation and maintenance of the system.

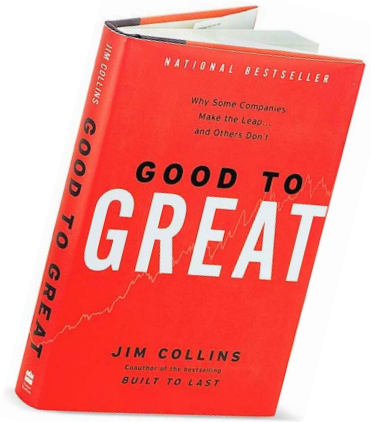
The assessment may include an evaluation of capital and operational needs for risk and resilience management for the system.

No later than August 1, 2019, EPA will release a baseline threat document to provide community water systems with additional information concerning risk assessment requirements.

AWIA Requirements & SJW Response

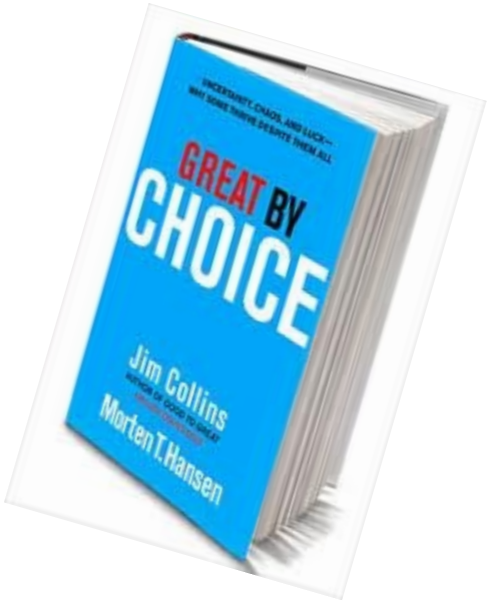
AWIA Requirement	SJW Response
1. Risk & Resilience Assessment (RRA) March 31, 2020	*1. Risk & Resilience Assessment* • Asset inventory & ranking on mission criticality • Identification of internal & external threats that could most damage critical assets • Definition & ranking of most critical, existential threat-asset pairs (TAPs)
2. Risk Reduction Program a. Emergency Response Plan (ERP) September 30, 2020	2.a. *Emergency Response Plan* – near term • Operational enhancements to security • Increase resilience & improve response
b. Risk Mitigation Plan (RMP) TBD	2.b. *Risk Mitigation Plan* – longer term • Current baseline risk, each TAP • Risk with mitigation options • Net benefits & life-cycle costs of options • Options ranked by net benefits for decisions • Implementation/operations plan of accepted options

Good to Great; SJWC Resiliency



Level 5 Leadership

Great by Choice



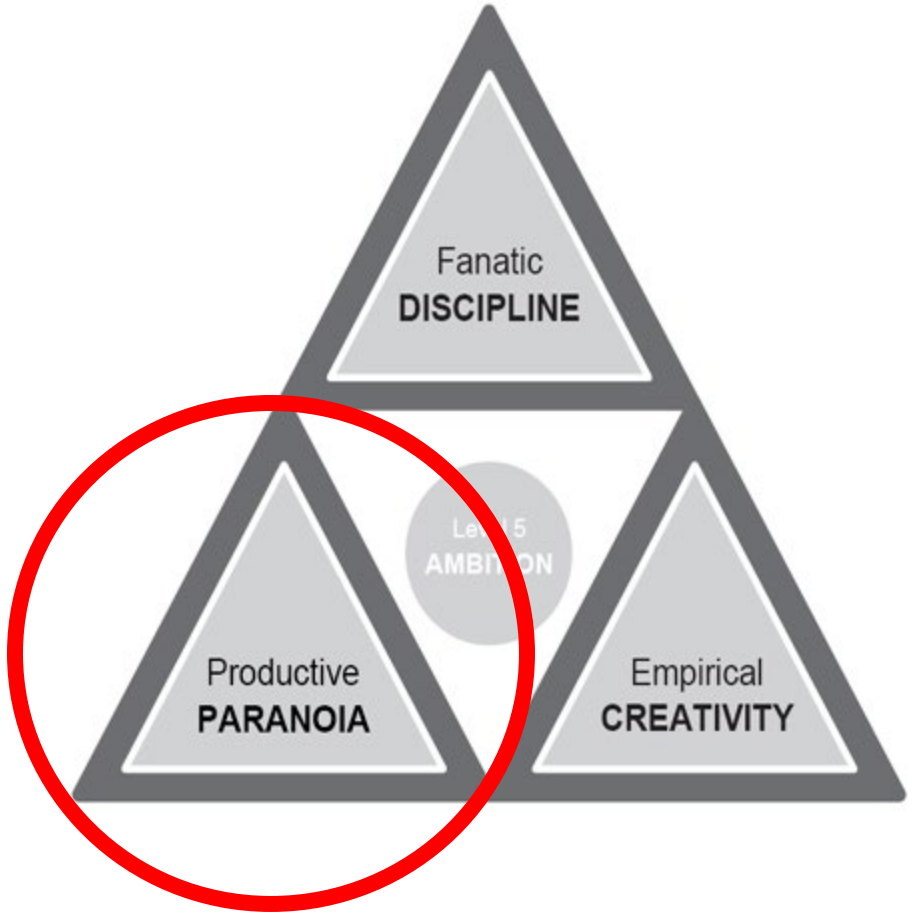
SMaC = Specific, Methodical, and Consistent

20 Mile March!

10X

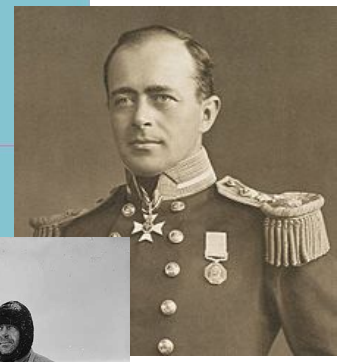
Fire Bullets then Cannon Balls!

The Case for Risk Management



Race to the South Pole

Amundsen



Scott

Ultimately The Difference!!

- Amundsen
  - First to Arrive at South Pole
  - Every Member Returned
  - Ultimate Success
- Scott
  - Second to South Pole
  - **Every Member of the Team Perished**

Productive Paranoia

Productive Paranoia

Paranoid behavior is enormously functional if fear is channeled into extensive **preparation** and **calm**, **clear headed action**. ~Jim Collins, Great by Choice

Productive Paranoia - Collins categorized successful leaders as **"paranoid, neurotic freaks."** They are always **preparing** for **when, not if,** the next big disruption is going to happen. They may be preparing for the worst -- one company he studied prided itself on predicting the majority of the recessions in the past several decades -- but their pessimism pays off.

~ Kathleen Davis is an associate editor at Entrepreneur.com

We are a Cornerstone of GBC Companies!

BCP
Security
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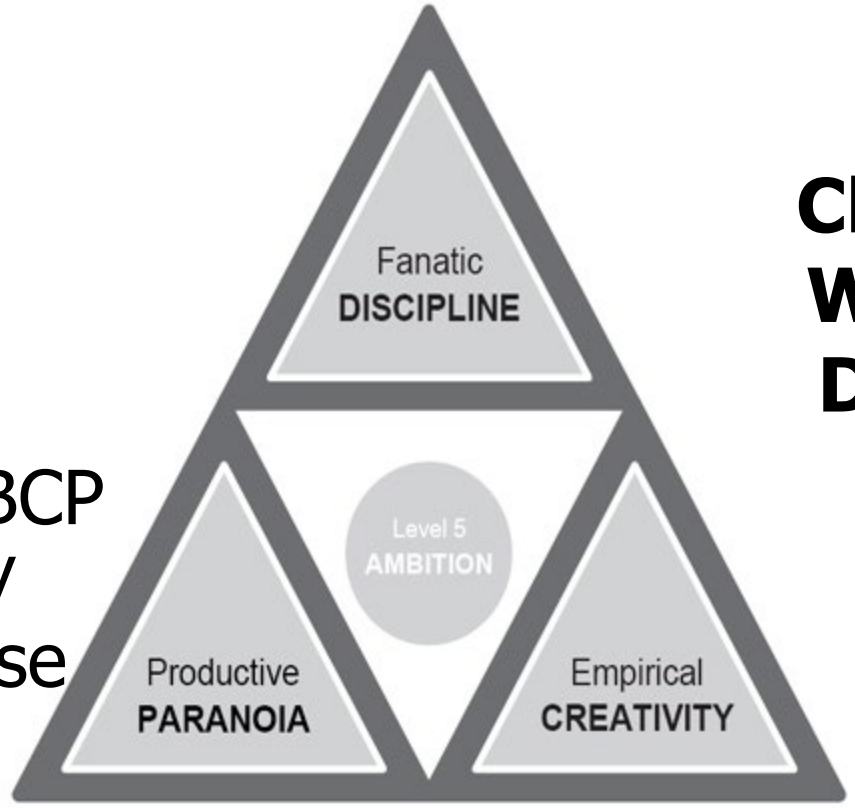
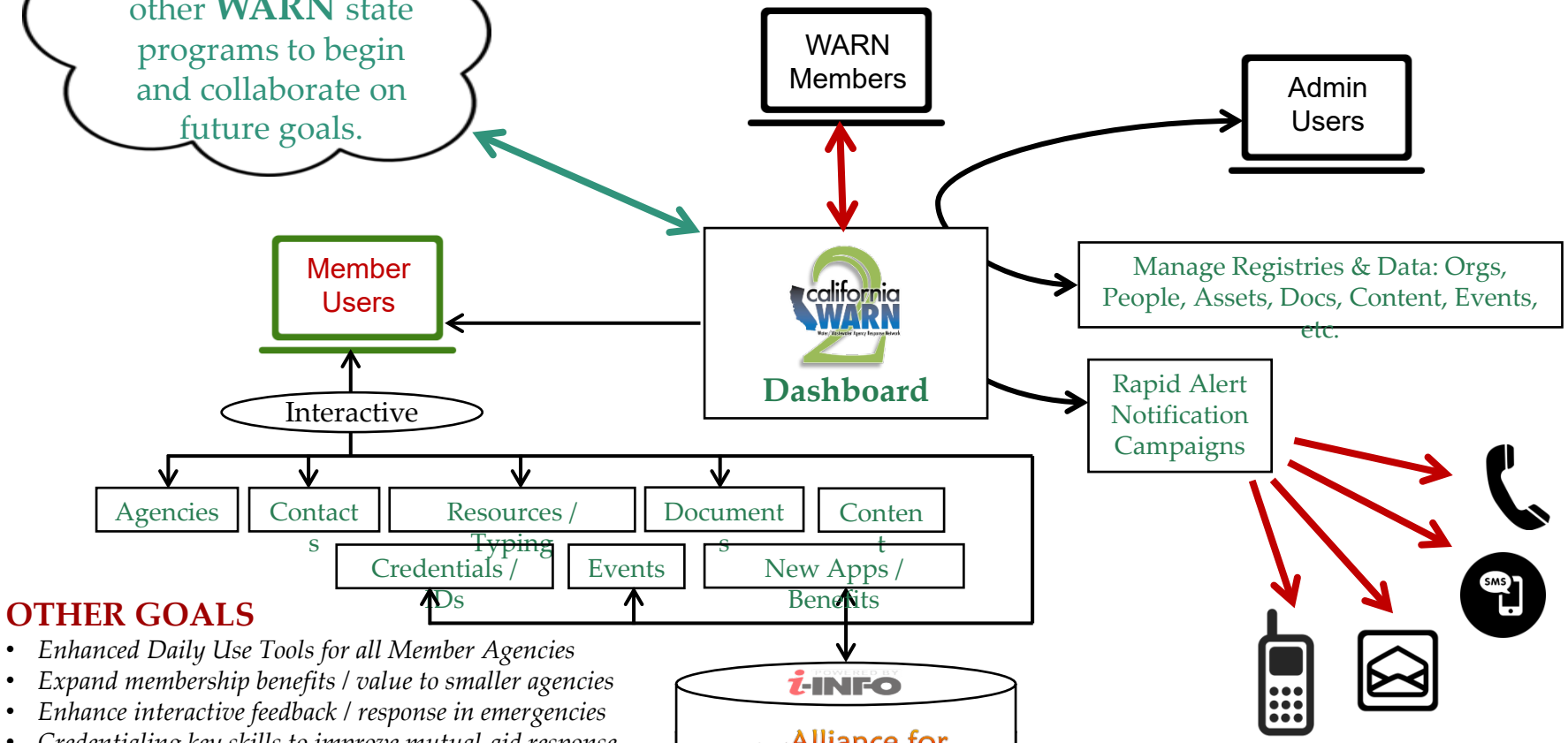
EM



Uncertainty, Chaos, and Luck— Why Some Thrive Despite Them All

CalWARN 3.0 Vision

Create model for other **WARN** state programs to begin and collaborate on future goals.



OTHER GOALS

- *Enhanced Daily Use Tools for all Member Agencies*
- *Expand membership benefits / value to smaller agencies*
- *Enhance interactive feedback / response in emergencies*
- *Credentialing key skills to improve mutual-aid response*
- *Right to Travel Program*
- *CPOD: Order, Schedule, Load Level*
- *Real-time Situation Awareness via Mobile & Maps*

Mass Notify by:

- *Email = (HTML and Plain Text)*
- *Text = (SMS Text & True Text)*
- *Voice Broadcast = (Landline, VOIP & Cell)*
- *Voice Response = (Q&A Survey)*
- *Pager = (SMS/Email Page & Dial Service)*
- *Fax = (Agency Fax via Phone Service)*
- *Mobile App = (text, email and voice files)*

Right-To-Travel (RTT)

California Water / Wastewater Agency Response Network

Verifiable Right-to-Travel (RTT) Authorization Letter

Tier 2 Essential Staff / Contractors

California Water / Wastewater Utilities

This document certifies that **San Jose Water** has been granted permission to issue this authorization letter to **James Wollbrinck, Director - Emergency Mgmt & Bus. Resiliency**. This person is listed as essential personnel requiring travel on behalf of **San Jose Water** as defined in the **San Jose Water** Emergency Response Plan. This letter is based solely on the list of recognized critical and essential staff or contractors submitted and approved by **San Jose Water**.

In addition to possession of the RTT letter, the person this letter as shown below, as issued to, is required to have and may be required to provide appropriate agency identification and/or a valid driver's license corresponding to the number referenced below. All personnel are expected to abide by all applicable laws, rules and curfews as they are established for specific restricted areas as directed by local, state and federal officials.

San Jose Water - Emergency Operations
Issued to: **James Wollbrinck**

DL/ID#: **010638**
EXPIRES AFTER: **05/11/2020**

Org Contact: **James L Wollbrinck**

Mobile #: **(408) 314-3775**
Date Activated: **05/11/2020**

To Verify: Use any QR reader to scan the code to the left. Open the URL address with any browser. The database info returned should match the information in the box shown on the left. Compare the DL/ID# to the ID provided and compare the photo to the person presenting the ID.

This RTT certificate (letter and/or placard) allows the valid bearer to travel to/from work, as well as to conduct travel on behalf of **San Jose Water. Participation** by **San Jose Water** in this CalWARN Right-to-Travel (RTT) program requires that any misuse of this RTT certificate by any person, will result in immediate confiscation by the issuing company or local authorities. Furthermore, any illegal action, deemed as a result of said misuse, may also result in further actions, as deemed appropriate by the authority having jurisdiction.

Travel Authorization Tools provided through The Alliance for Community Solutions. To participate in CalWARN or learn more about this Travel Authorization Program, contact us at CalWarn@i-INFO.com

Right-to-Travel Vehicle Placard

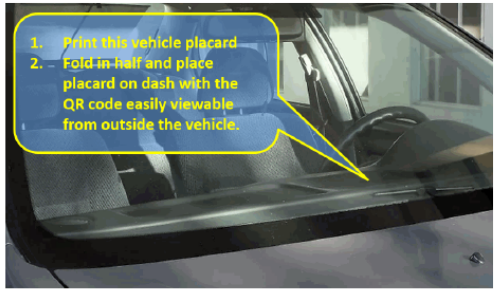
Emergency Service Worker

Expires After: **05/11/2020**
CalWARN Region II

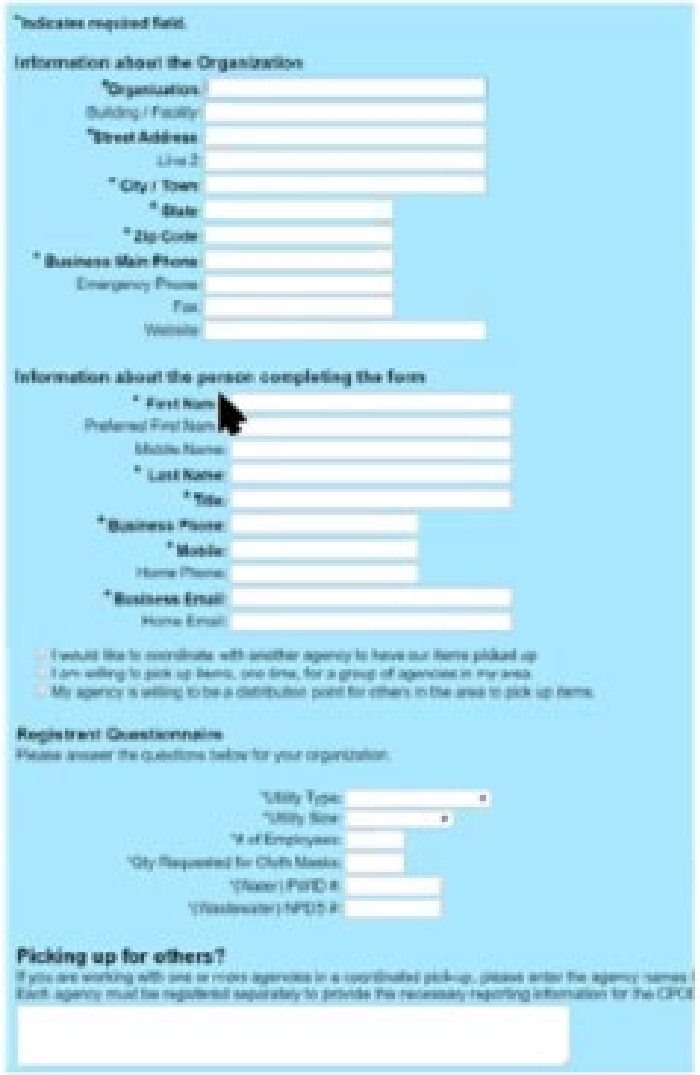
San Jose Water - Emergency Operations

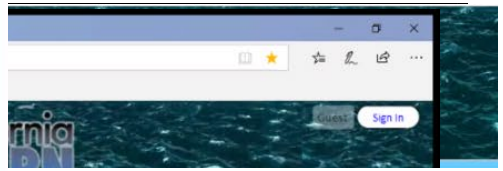
James L Wollbrinck | (408) 314-3775

Tier 2 Water / Wastewater Utility



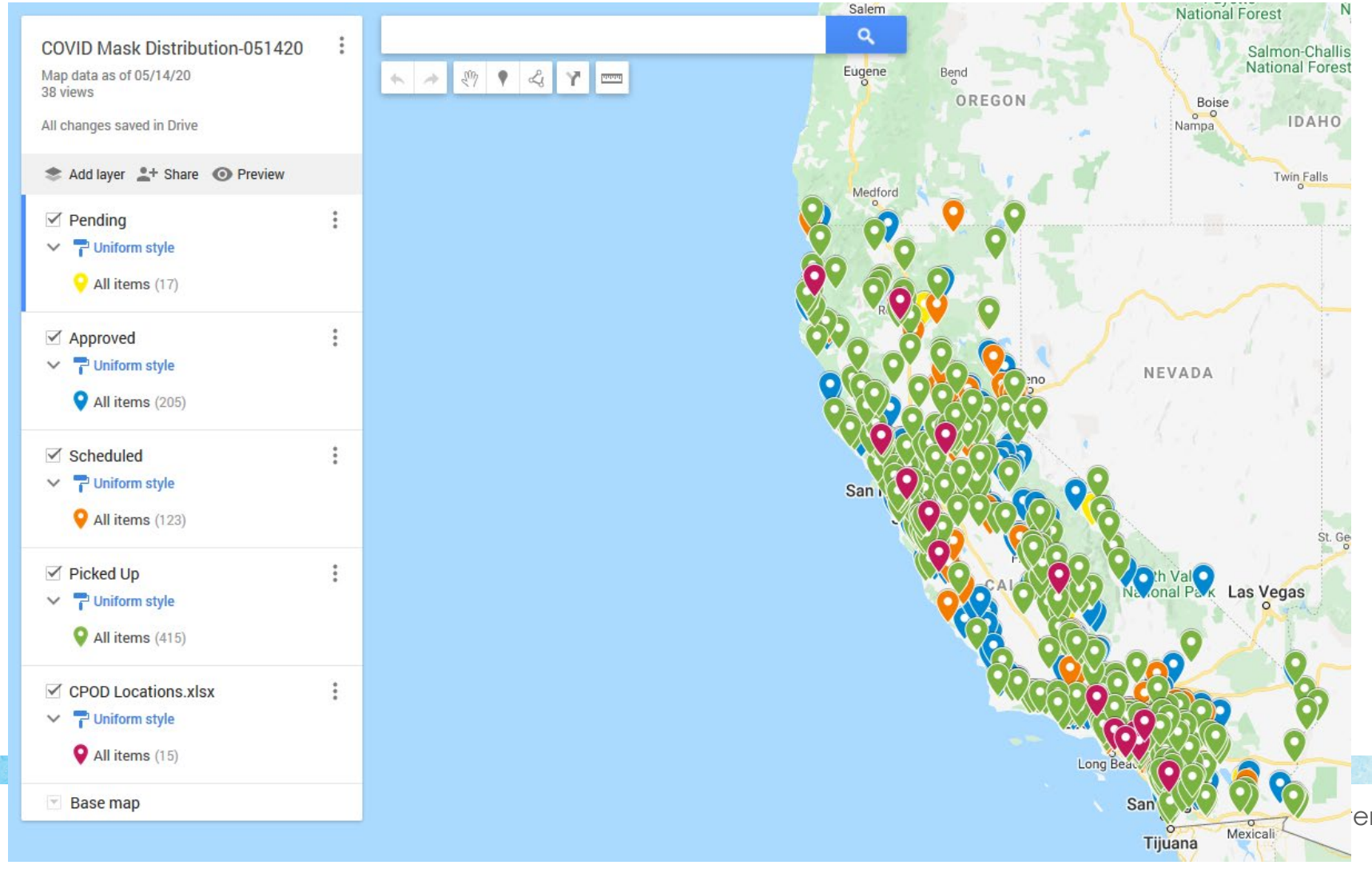
CPOD Order - Operations



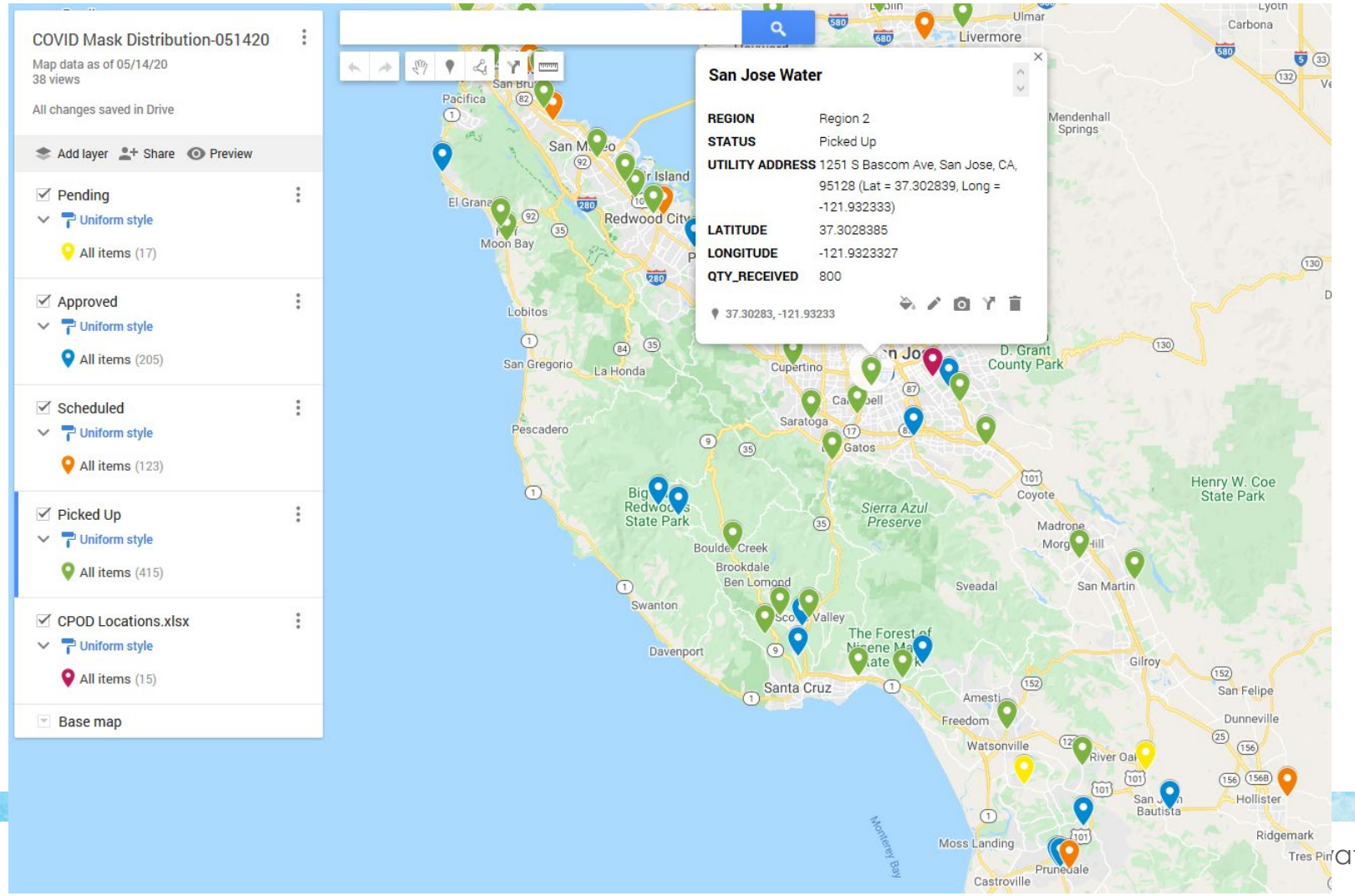


San Mateo	Go to registry	Region 2
Santa Barbara	Go to registry	Region 1
Santa Clara	Go to registry	Region 2
Santa Cruz	Go to registry	Region 2
Shasta	Go to registry	Region 3
Sierra	Go to registry	Region 3
Siskiyou	Go to registry	Region 3
Solano	Go to registry	Region 2
Sonoma	Go to registry	Region 2
Stanislaus	Go to registry	Region 4
Sutter	Go to registry	Region 3
Tehama	Go to registry	Region 3
Trinity	Go to registry	Region 3
Tulare	Go to registry	Region 5
Tuolumne	Go to registry	Region 4
Ventura	Go to registry	Region 1
Yolo	Go to registry	Region 4
Yuba	Go to registry	Region 3

Data in Spatial View



Underlying Data



Actions (Up/Down) The Curve

San Jose Water Group
Recommended Actions to Prepare for Pandemic Response by Pandemic Phase

Pandemic recommended actions for San Jose Water Group – Management

INTERPANDEMIC PERIOD	ACTIONS
WHO Phase 1- With Local Modifications • No new virus causing illness in humans	1. Review information available from CDC on pandemic situation 2. Educate staff on how they can stop the spread of germs 3. Post 'respiratory etiquette' posters and signs in work areas 4. Assess supplies needed for infection control 5. Provide boxes of facial tissues and trash receptacles 6. Provide alcohol-based hand washing gel in all vehicles
WHO Phase 2- With Local Modifications • No new virus causing illness in humans • Circulating animal virus subtype poses a substantial risk of human disease	
PANDEMIC ALERT PERIOD	**ACTIONS**
WHO Phase 3- With Local Modifications • Human cases from the new virus • No human to human transmission • No cases in the United States	1. Review and update internal emergency response plans 2. Consider EOC Action Planning Session for Operational Modifications 3. Plan for infrastructure disruptions 4. Consider placing masks on all subjects with flu-like symptoms 5. Educate staff on infection control supplies and the current situation 6. For updated information, review: • US CDC, https://caresiliency.org/quick-links/2019-novel-coronavirus/ • SCC Public Health, https://www.sccgov.org/sites/phd/DiseaseInformation/novel-coronavirus/Pages/home.aspx
WHO Phase 4- With Local Modifications • Small clusters with limited human-to-human transmission • No cases in the United States	
WHO Phase 5- With Local Modifications • Large clusters of illness • Localized human-to-human transmission • Little to no cases in the United States	1. Activate SJWG's Department Operations Center (EOC), ERP and educate staff 2. Encourage safe work practices and social distancing 3. Develop plan to conduct health screening of all staff 4. Begin creating adjusted staffing patterns and virtual meetings 5. Conserve usage of supplies needed for infection control 6. Educate staff on the current situation 7. Educate staff on staffing and procedures changes
PANDEMIC PERIOD	**ACTIONS**
WHO Phase 6- With Local Modifications • Widespread illness in the population throughout the world • Sustained human to human transmission	1. Implement SJWG's Emergency Response Plan (ERP) 2. Implement adjusted staffing patterns 3. Implement essential staffing and services only 4. Perform health screenings of all staff 5. Ensure employees maintain 3 foot separation between subjects 6. Reassess staffing and consider redistribution of resources 7. Follow PH guidelines for personal protection, vaccine, and antivirals 8. Consider "Work at Home" where possible and as necessary
POST PANDEMIC PERIOD	**ACTIONS**
Return to WHO Interpandemic Period • End of first pandemic wave • Next wave may occur within several months	Prepare for a possible next wave: 1. Conduct staff debriefings 2. Participate in city and community debriefings 3. Implement appropriate changes based on debriefings 4. Replenish supplies 5. Continue to monitor the health of staff

Animations Slide Show Review View Developer ACROBAT Format Tell me what you want to do... Naci Ozgur Share

Font Paragraph Drawing Editing

Text Direction Align Text Convert to SmartArt

Arrange Quick Styles Shape Fill Shape Outline Shape Effects

Find Replace Select

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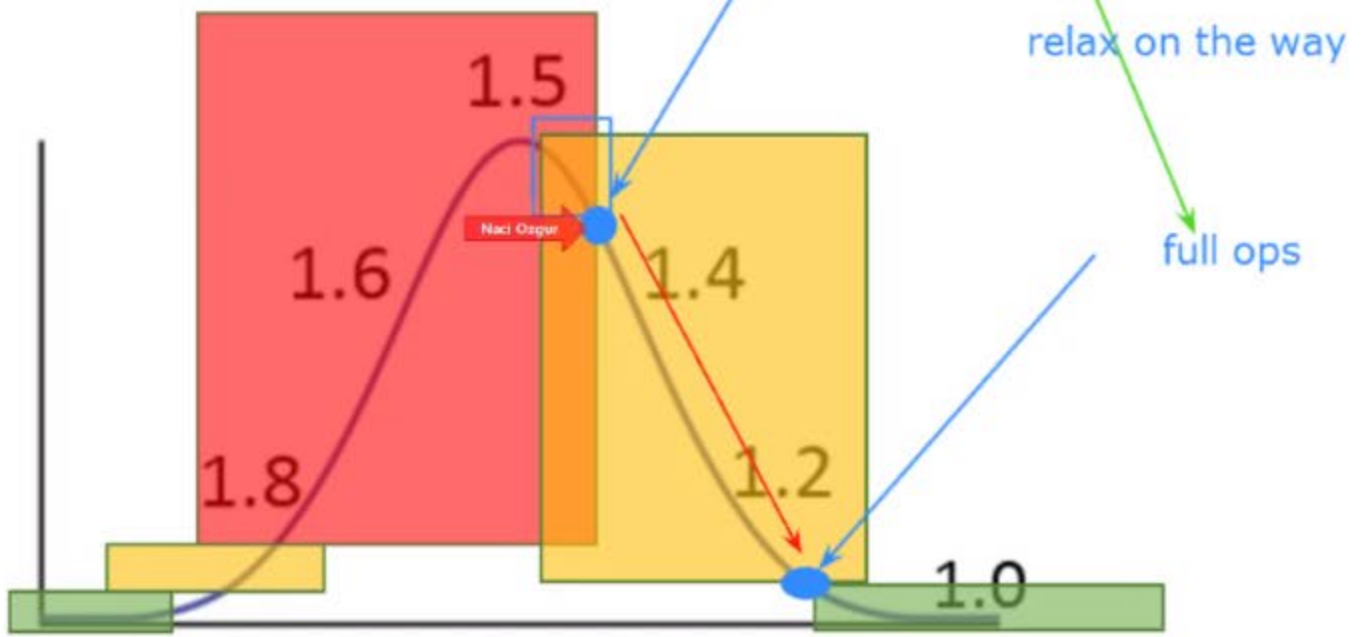


SJW Group	Weekly Risk Assessment for:	Task name	Our vision is to serve customers, communities, employees, shareholders, and the environment at world class levels							
	Protect Employees	Protect Public Health				Protect Our Brand				
Consequence of Threat (CoT)	Employee and Contractor Health & Safety (1)*	Number of people adversely impacted*	Water Service	Critical Customers Affected	Environmental Health	Financial Impact (3)	Social / Customer Perception (4)	Legal and Compliance (5)	CoT	SJWG ENTERPRISE RISK MATRIX Risk = CoT x LoT
1	No impact	No impact	Can provide safe water service with minimal effort or coordination	No impact	Low environmental impact. Impact localized, not widespread	Minimal impact on business operations related to financial plan, on brand, and on shareholders <3% State net income	No impact	Minimal issues/concerns with compliance with contracts, laws, regulations, and regulatory requirements	1	1 2 3 4 5
2	Lost Time, hospitalized less than 3-days	Spreading infection to an individual; customer, contractor, co-worker 1-person	Can provide safe water service, but requires concerted effort and coordination	Small businesses	Localized but moderate environmental impact	Low impact on business operations related to financial plan, on brand, and on shareholders >3% State net income	Social Media Buzz or slight increase in customer complaints or impact on customers satisfaction	Threat level between 1-3	2	2 4 6 8 10
3	Permanent partial disability, temporary total disability, hospitalized more than 3-days	Spreading infection to an isolated number of individuals; customers, contractors, co-workers 2 - 10 persons	Generally able to provide safe water service, but requires difficult operations and puts notable strain on resources	High density apartments / HOA common meter customers	Moderately widespread environmental impact (e.g. widespread in local creeks/fish kill)	Moderate impact on business operations related on financial plan, on brand, and on shareholders >5% State net income	Local coverage and moderate increase in customer complaints or impact on customers satisfaction	Moderate issues/concerns with compliance with contracts, laws, regulations and regulatory requirements in the short or long-term	3	3 6 9 12 15
4	Permanent disability	Spreading infection to a large number of individuals >10 persons	Difficult to provide safe water service, and high strain on resources	High water use customers, schools, large social gathering spaces	Widespread environmental impact	Notable impact on business operations related to financial plan, on brand, and on shareholders >7% State net income	State coverage and significant increase in customer complaints or impact on customers satisfaction	Threat level between 3-5	4	4 8 12 16 20
5	Loss of life	Spreading widespread Infection to the public, super spreading	Unable to provide safe water service	Essential businesses (2), hospitals, health clinics	Severe environmental impact (e.g. uncontained wildfire to the extent of national coverage, like PG&E Camp Fire)	Severe impact on business operations related to local and group financial plan, on brand, and on shareholders >10% State net income	National coverage or major increase in customer complaints or impact on customers satisfaction	Major litigation or prosecution, violation of laws, regulations, contracts or regulatory requirements	5	5 10 15 20 25

Date:	Employee Health & Safety				Adversely impacted public			Water Service			Critical Customers			Environmental Health			Financial Impact			Customer Perception			Legal and Compliance		
5/12/2020	CoT	LoT		Risk incl. Vulnerabilities	CoT	LoT		CoT	LoT		CoT	LoT		CoT	LoT		CoT	LoT		CoT	LoT		CoT	LoT	
NOT TO DO	4	2	8	12	2	2	4	2	1	2	0	0	0	0	0	0	4	3	12	3	2	6	3	3	9
TO DO Inherent	2		2	3	2	1	2	1	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	1	1
TO DO Residual	2	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0

Individuals' Health (1):	Not at high-risk	1
Public Health Indicators:	Peak and Plateau	1.5

Highest Risk(s)

Scatter Chart Zone: Zone 1 EOC Review

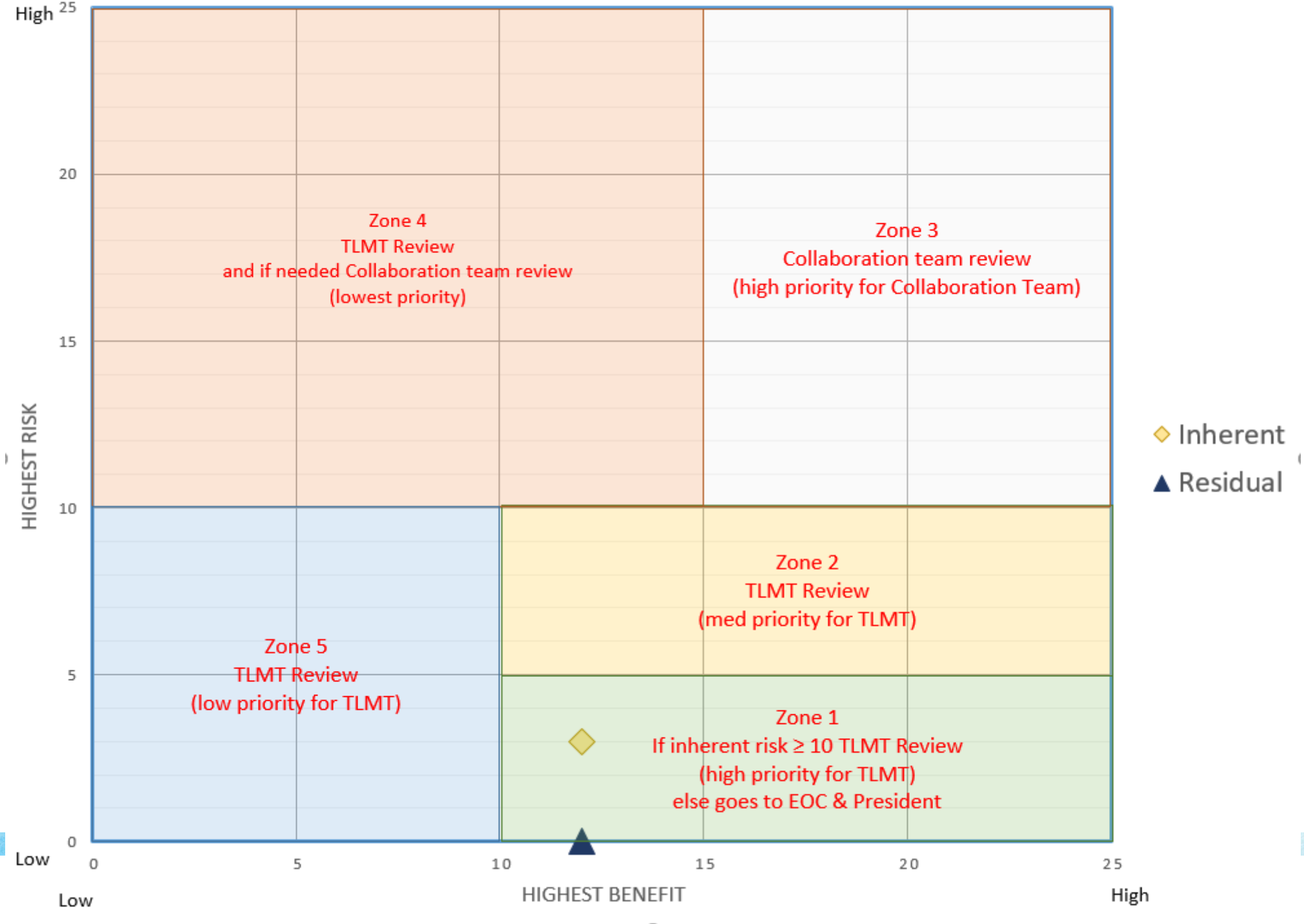
Likelihood	1	2	3	4	5
	Very Low Likelihood	Low Likelihood	Moderate Likelihood	High Likelihood	Very High Likelihood
Frequency	Improbable (not an annual event) very unlikely	Remote (a few times a year) not likely to occur	Occasional (monthly) likely occur sometime	Probable (weekly) likely to occur several times	Frequent (daily) likely to occur repeatedly
COVID-19 Specific Likelihood (Contact Intensity)†	No contact with customers / public / contractors / other workers	Rare contact with customers / public / other workers but social distancing is possible	Moderate contact with customers / public / other workers but social distancing is possible	High contact intensity, working within arm's length is required but social distancing is generally possible	High contact intensity, working within arm's length is required and social distancing is not possible

Likelihood of Threat (LoT)

*First two "Consequence" columns correspond to the bottom "Likelihood" row

Inherent = Risk in the absence of any actions taken to alter either the consequence or likelihood

Residual = Risk remaining after controls implemented


High
25
20
15
10
5
0
Low
HIGHEST RISK
Zone 4
TLMT Review
and if needed Collaboration team review
(lowest priority)
Zone 3
Collaboration team review
(high priority for Collaboration Team)
Zone 2
TLMT Review
(med priority for TLMT)
Zone 5
TLMT Review
(low priority for TLMT)
Zone 1
If inherent risk ≥ 10 TLMT Review
(high priority for TLMT)
else goes to EOC & President
Inherent
Residual
0
5
10
15
20
25
Low
HIGHEST BENEFIT
High

Generator Resource Typing: US-EPA and Water Sector at It's Best!

EPA

Incident Action Checklist – Power Outages

For on-the-go convenience, the actions in this checklist are divided into three "rip & run" sections and are examples of activities that drinking water and wastewater utilities can take to prepare for, respond to and recover from power outages. You can also populate the "My Contacts" sections with critical information that your utility may need during a power outage.

Power Outages and Water Utilities

The loss of electric power can have profound impacts on drinking water and wastewater utilities. Sometimes the loss of power can be caused by events that can be predicted in advance such as hurricanes or ice storms. Other power outages, such as those caused by earthquakes, cyber incidents or space weather may occur with little or no notice. In California, the Public Safety Power Shutoff program allows electric companies to proactively shut off grid power to customers, including water utilities, to reduce fire ignition potential in high fire risk areas when extreme fire risk conditions present a clear and imminent danger to public safety.

The impacts of losing grid power at drinking water and wastewater utilities could result in pressure losses and boil water advisories, a reduction or cessation of water treatment, sewage back up and the discharge of untreated sewage into public right of ways, rivers and streams. The impacts on the community could be devastating:

- The loss of water pressure or service means firefighters cannot access water from hydrants.
- The loss of drinking water and wastewater services could cause local health care facilities and hospitals to evacuate patients or close.
- The loss of water services may cause restaurants and businesses to close, resulting in economic losses.
- The loss of wastewater services could create unsanitary conditions, rendering homes, businesses and healthcare facilities uninhabitable.
- Critical manufacturing and industrial plants and businesses may be forced to shut their doors, creating additional cascading impacts and economic hardships during a prolonged outage.
- There could be significant public health concerns and environmental damages.

PSPS: Generators

- Updated EPA Power Resiliency PDF: https://www.epa.gov/communitywaterresilience/power-resilience-guide-water-and-wastewater-utilities

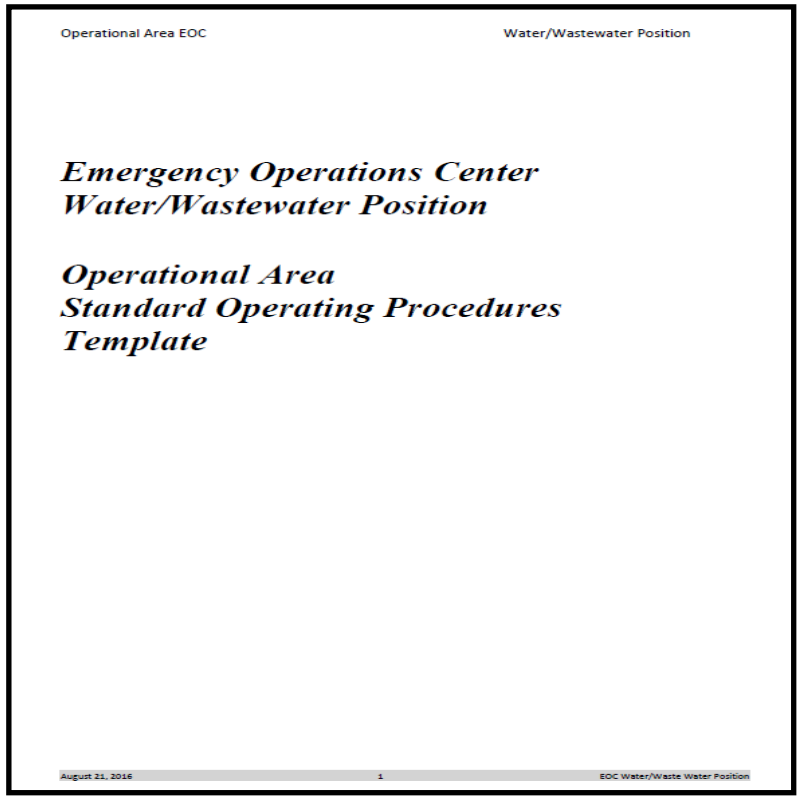
- Updated EPA Power Resiliency PDF Checklist: https://www.epa.gov/waterutilityresponse/incident-action-checklists-water-utilities

California Water Association

WSSP – The Concept

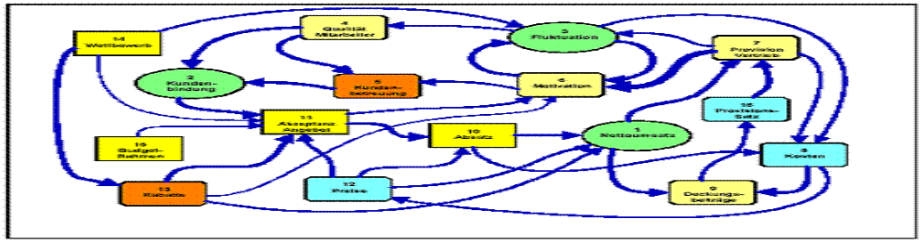
- Emergency Management Success for Water Issues Relies on
  - Representation at State
  - Representation at Region
  - Representation at County (Op Area)
- Liaison for all impacted water and wastewater utilities within the affected area
- Communicate and Coordinate all types of water infrastructure
  - Potable water, wastewater, recycled water, dams, and levees
- Guiding Principle
  - No longer represents their own utility
  - Standard Operating Guidance
  - Recommended priorities for response

Utilities Helping Utilities



WSSP - The Process

- Collect and verify situational awareness
- Monitor, track, and coordinate resource needs
- Assess and recommend alternate drinking water resources
- Recommend priorities in concert with the water utilities, local government or Counties
- Coordinate and resolve issues arising from events
- Coordinate with State agencies as needed



Utilities Helping Utilities

Contact

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Q & A

Moderator

Eileen White

Co-Chair, NACWA Climate & Resiliency Committee
Director, Wastewater
East Bay Municipal Utility District
Oakland, CA

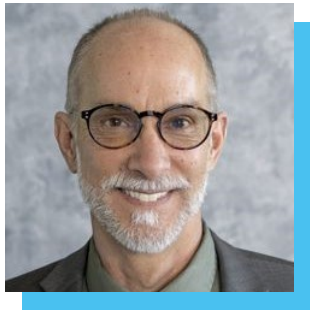
Featured Speakers

Thomas Sigmund

NACWA Secretary
Executive Director
NEW Water
Green Bay, WI

Jim Wollbrinck

Director
Emergency Management
and Business Resiliency
San Jose Water Company
San Jose, CA



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Stephen MacCarthy

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Water Corporation
Australia

ASSOCIATION OF METROPOLITAN WATER AGENCIES

NACWA