

SEEING THE IMPACTS OF DATA CENTER DEVELOPMENT, ENVISIONING RESPONSIBLE OUTCOMES, AND DEVISING THE PATH FORWARD.

Michael Repel, September 29th, 2026

MUNICIPAL MODERNIZATION

MICHAEL REPEL: BIO



- 27-year, municipal water and wastewater industry professional with a focus on maintenance and repair operations and their supporting administrative workflows.
- Construction Management Major. Indiana State University. Bailey College of Engineering.
- Founded Municipal Modernization in 2026 to provide workflow process improvements to units of government and public works organizations.
- AI governance, digital maturity assessments, asset management optimization, and AI integration for water and wastewater operations.

MUNICIPAL MODERNIZATION



PART ONE:
SEEING THE IMPACTS OF DATA CENTER DEVELOPMENT

DEFINING THE PROBLEM AND INTRODUCING THE SOLUTION

WATER CONSUMPTION
Data Center Cooling Needs Have Become Concerning

DEMAND
The Global Need for Freshwater Will Soon Exceed Supply By 40%

DATA CENTER DEMAND
For Water Will Continue To Grow

PAIRING WASTEWATER AND DATA CENTER FACILITIES
Will create a circle of sustainability

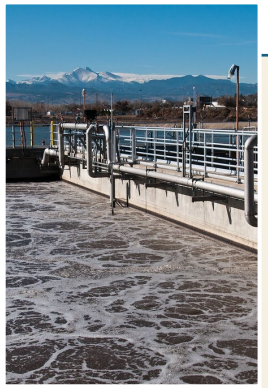


CONSUMPTION METRICS

- **300,000 GALLONS PER DAY** = Volume use for 1,000 residential homes.
- **GOOGLE DATA CENTERS** have used 29% of the total water supply of Dalles Oregon
- **1.8 BILLION GALLONS IN ANNUAL CONSUMPTION** for large scale data centers using up to 5 million GPD
- **ONE BOTTLE OF WATER** is consumed for every AI-prompt using 100 words



EXISTING PRECEDENTS



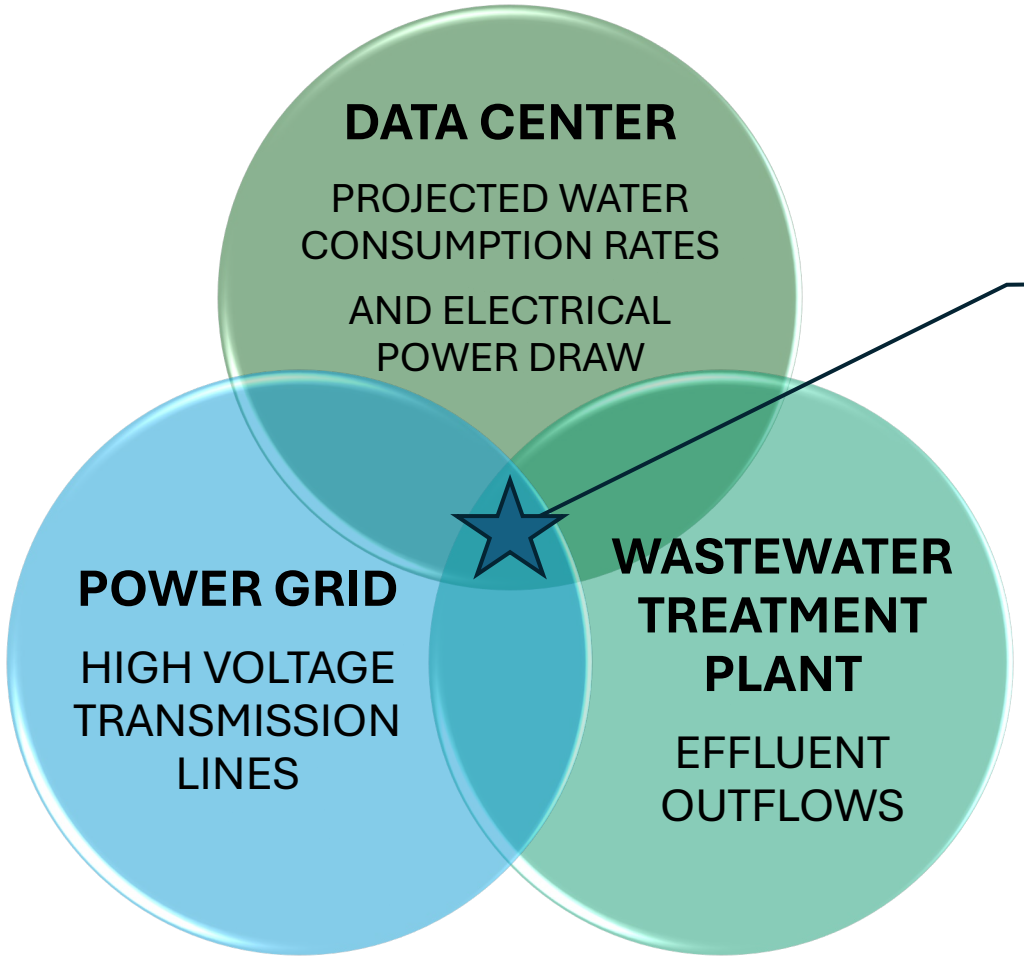
AMAZON AWS:
21 Data Centers are Using Recycled Wastewater



MICROSOFT:
Uses Recycled Wastewater and Rainwater in Multiple Locations.



LOCATION PLANNING



PRIME LOCATION FOR DATA CENTER



ALL REQUIREMENTS ARE PRESENT

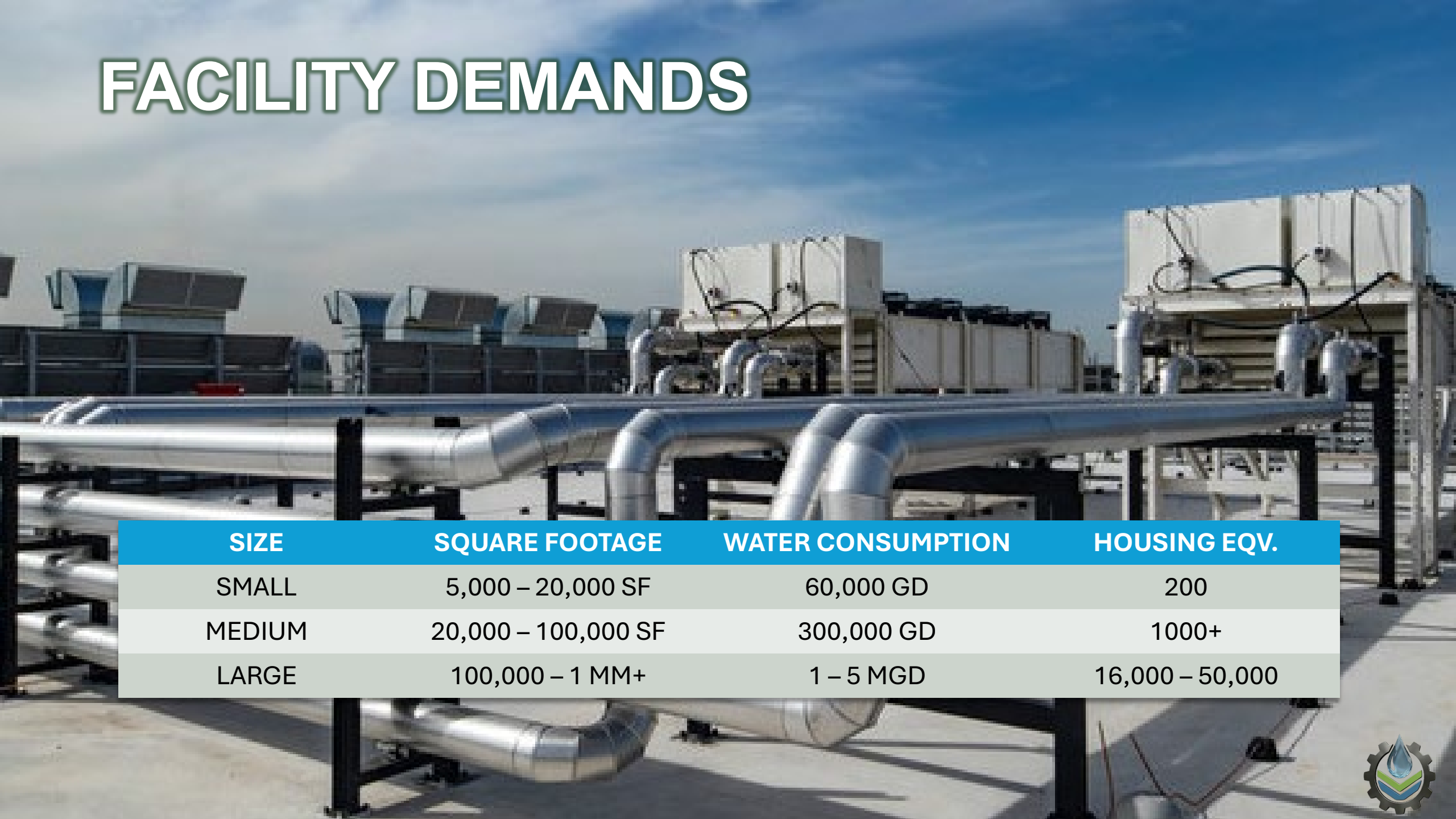

517
Proposed Locations
In areas experiencing drought conditions
SILICON
FRONTIER
CHIP-9000

WASTEWATER SUPPLY CONSIDERATIONS



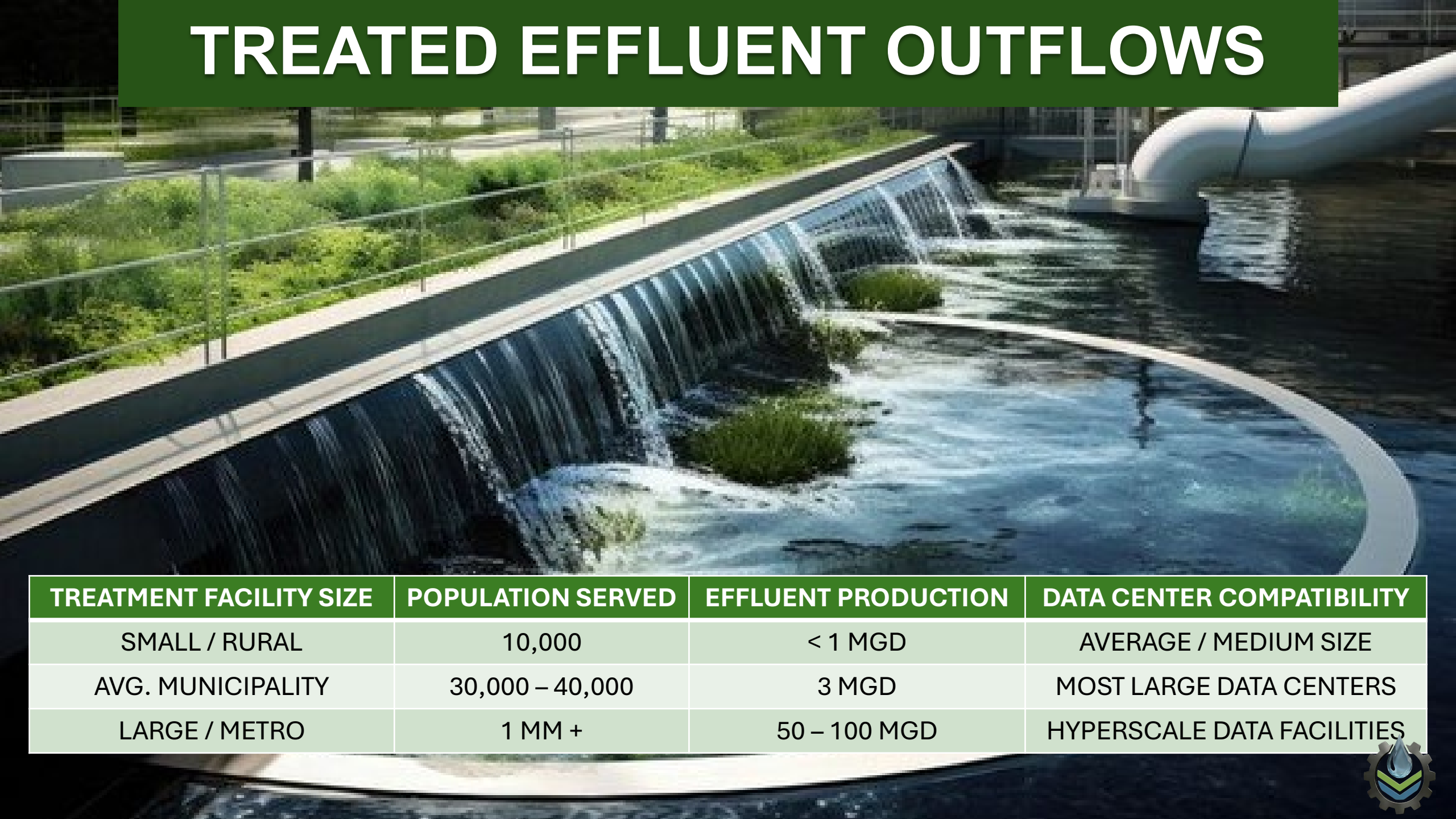
PAIRING DATA CENTER COOLING NEEDS WITH WASTEWATER TREATMENT FACILITY OUTFLOWS

FACILITY DEMANDS



SIZE	SQUARE FOOTAGE	WATER CONSUMPTION	HOUSING EQV.
SMALL	5,000 – 20,000 SF	60,000 GD	200
MEDIUM	20,000 – 100,000 SF	300,000 GD	1000+
LARGE	100,000 – 1 MM+	1 – 5 MGD	16,000 – 50,000

TREATED EFFLUENT OUTFLOWS



TREATMENT FACILITY SIZE	POPULATION SERVED	EFFLUENT PRODUCTION	DATA CENTER COMPATIBILITY
SMALL / RURAL	10,000	< 1 MGD	AVERAGE / MEDIUM SIZE
AVG. MUNICIPALITY	30,000 – 40,000	3 MGD	MOST LARGE DATA CENTERS
LARGE / METRO	1 MM +	50 – 100 MGD	HYPERSCALE DATA FACILITIES

POWER SUPPLY CONSIDERATIONS



SIZE	SQUARE FOOTAGE	SERVER COUNT	POWER DRAW	HOUSING EQV.
SMALL	5,000 – 20,000 SF	500-2000	1 – 5 MW	800-4,500
MEDIUM	20,000 – 100,000 SF	2,000 – 10,000	5 – 20 MW	4,500-50,000
LARGE	100,000 – 1 MM+	10,000+ to Millions	20 – 500+ MW	Mid-Sized City

2028 PROJECTED DATA CENTER CONSUMPTION RATES





DISCHARGE CONSIDERATIONS

- COMPLIANCE
- CONTAMINANTS
- MONITORING
- PROACTIVITY



DISCHARGE CONSIDERATIONS 1

COMPLIANCE

- CLEAN WATER ACT
- NPDES
- MAXIMUM CONTAMINANT LEVEL GOALS (MCLGs)
- MAXIMUM CONTAMINANT LEVELS (MCLs)



DISCHARGE CONSIDERATIONS 2

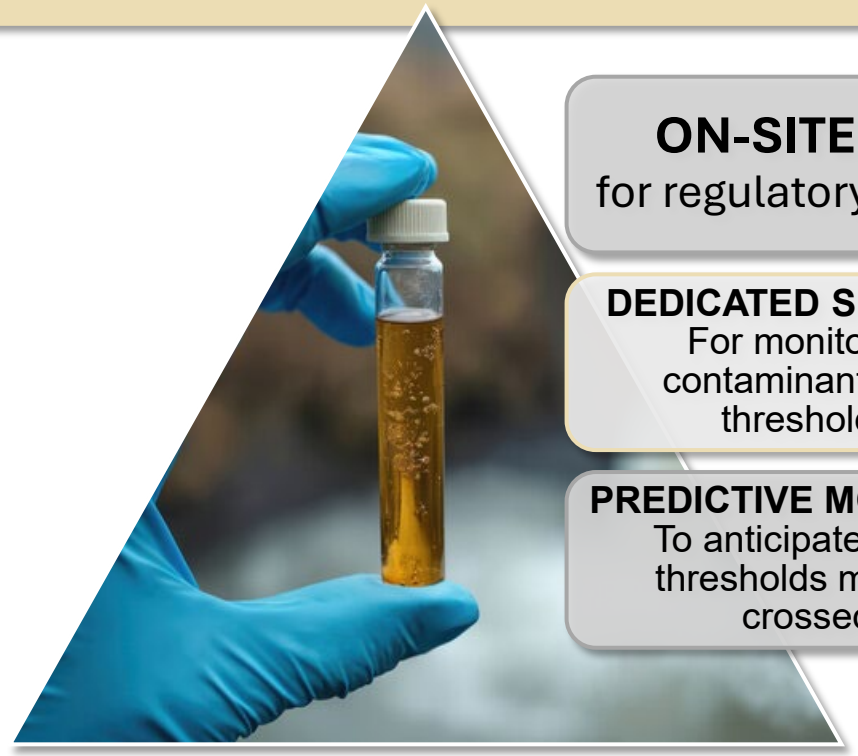
CONTAMINANTS

CATEGORY	CONTAMINANTS	RISK
Biocides	Isothiazolinones and Glutaraldehyde	Allergies and Skin Irritation
Corrosion Inhibitors	Phosphates and Molybdates	Eutrophication
Heavy Metals	Zinc, Copper, and Chromium	Cancer. Also Harmful to Skin, Respiratory System, and Kidneys
Elevated Total Dissolved Solids	Dissolved Minerals and Salts	Kidney Stones and Organ Stress



DISCHARGE CONSIDERATIONS 3

MONITORING



ON-SITE LAB
for regulatory agents

DEDICATED SERVERS
For monitoring contaminant level thresholds

PREDICTIVE MODELING
To anticipate when thresholds may be crossed



DISCHARGE CONSIDERATIONS 4

PROACTIVITY

REQUIRE PUBLIC HEARINGS FOR LAND USE	•PERFORM INDEPENDENT STUDIES •ENSURE RIGHTS UNDER PRIVATE AND PUBLIC NUISANCE LAWS •WILL THE DATA CENTER FIT INTO ITS SURROUNDINGS
MANDATE THE USE OF RECYCLED WASTEWATER	•PROHIBIT USE OF FRESHWATER •REQUIRE USE OF TREATED EFFLUENT
REQUIRE FACILITY TO COVER DEVELOPMENT AND IMPROVEMENT COSTS	•UPGRADE EFFICIENCY MODELING •FACILITY PAYS FOR GRID UPGRADES •FORBID RATE INCREASES TO CONSUMERS
MANDATE CORPORATE TRANSPARENCY	•POWER AND WATER CONSUMPTION •NOISE POLLUTION, CONTAMINANTS AND DISCHARGE •TYPE OF DATA STORED AND ITS INTENDED USE.

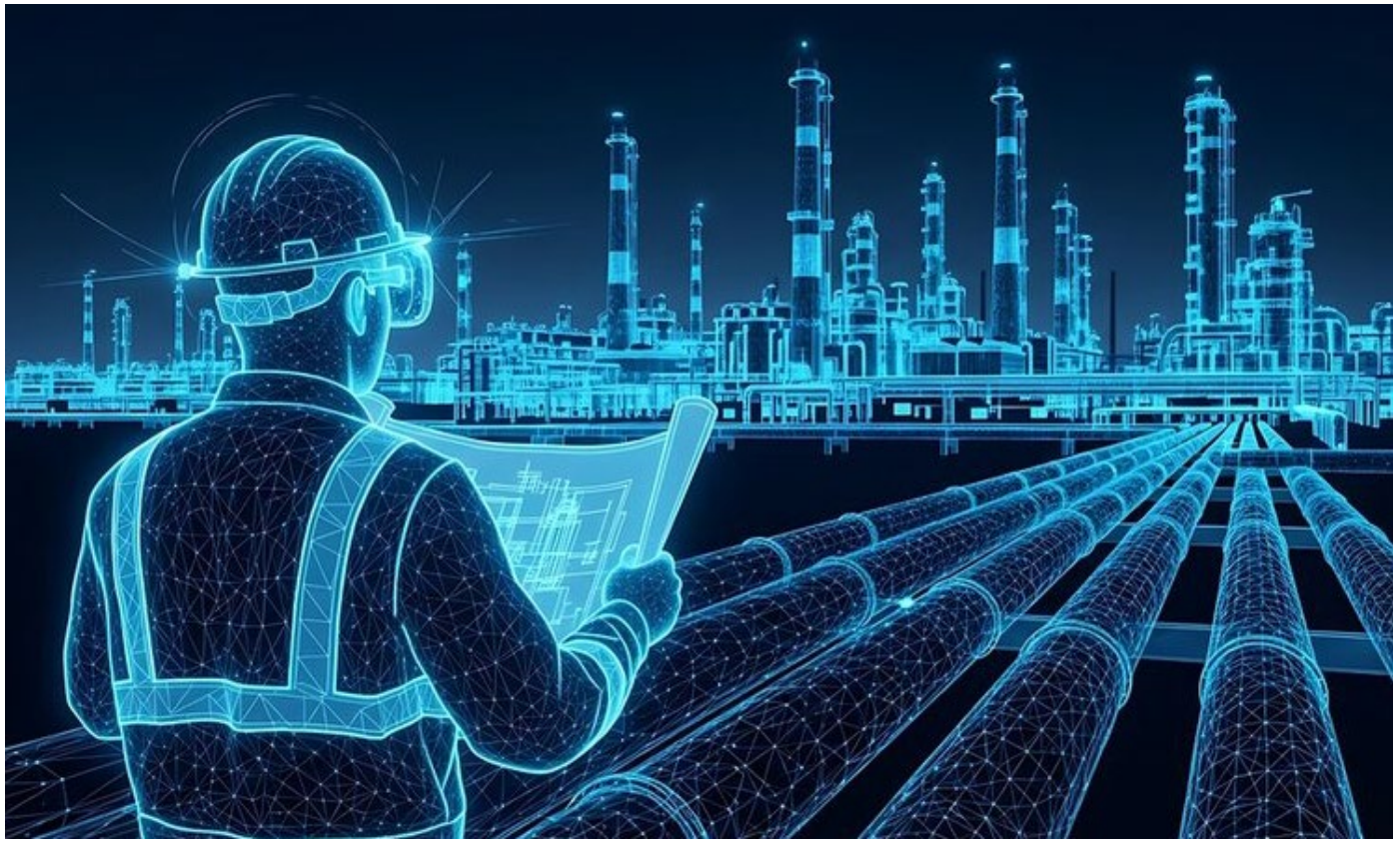




PART TWO
ENVISIONING RESPONSIBLE OUTCOMES AND DEVISING THE PATH FORWARD

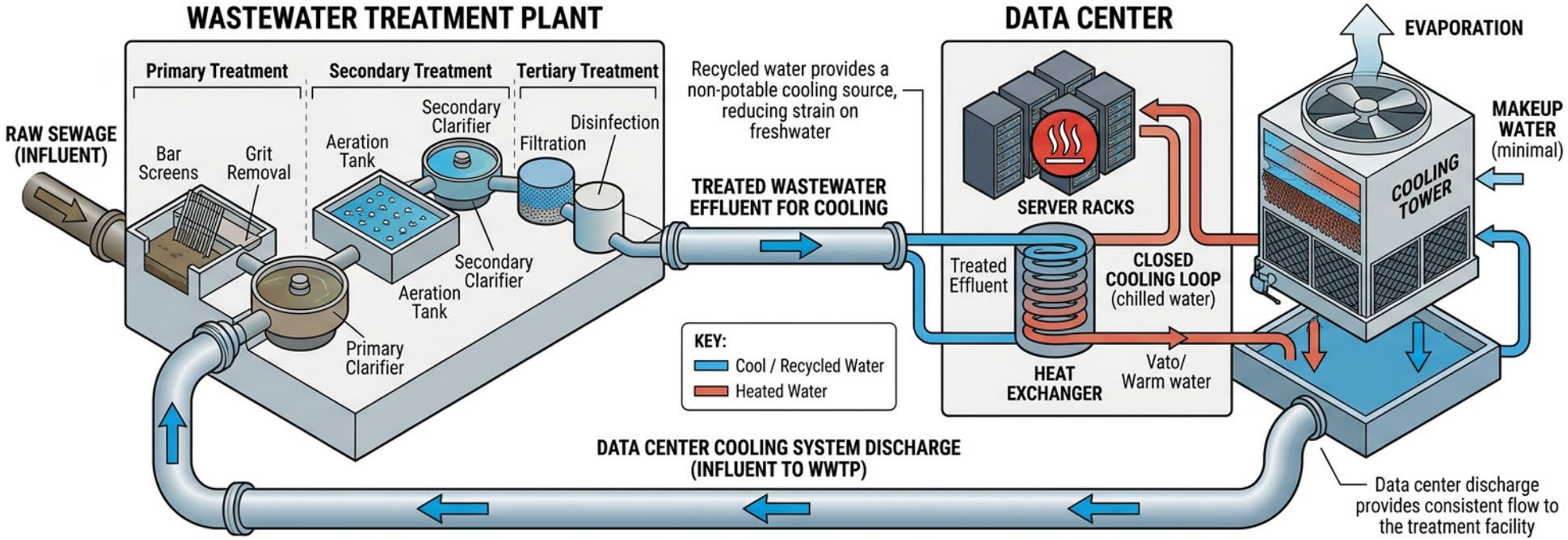
ADDITIONAL CONSIDERATIONS FOR CHOOSING NEW DATA CENTER SITES

- Site Assessment
- Minimize Supply Distances
- Determine Who Will Maintain The Supply System
- Municipal Responsibility **Is Not** an Economically Feasible Option



INDUSTRIAL SYMBIOSIS

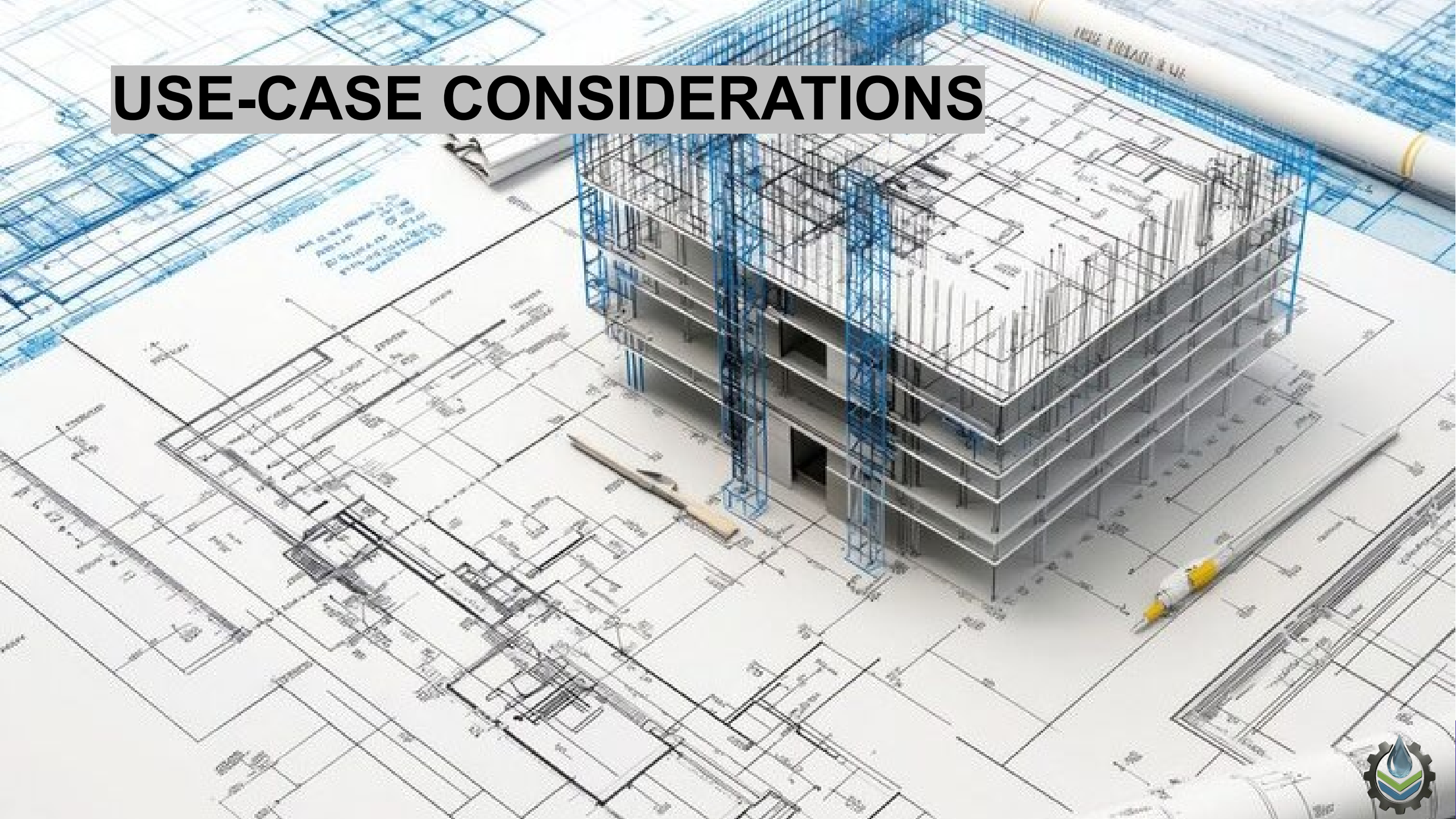
SYMBIOTIC WATER CYCLE: WASTEWATER TREATMENT & DATA CENTER COOLING



OVERHEAD DESIGN



USE-CASE CONSIDERATIONS



MIXED USE FACILITY DESIGN



DATA USAGE IN WATER AND WASTEWATER



CONCLUSION



CONTACT INFORMATION



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Scan here to access our website.