Name:	Aquifer Storage and Recovery (ASR)

Strategy description & assumptions:	ASR is characterized as storage of drinking water from AW's water distribution system in an underground aquifer for recovery and use when supplies are scarce.

Modeling assumptions:	ASR costs and operational assumptions are based on project parameters that have been developed through ASR implementation planning. The yield and storage ranges are used to test the project size against future scenarios. ASR is included in every candidate portfolio for modeling since implementation of the project has started.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	0	0
2040	6,000	60,000	20,000	60,000
2050	6,000	83,000	20,000	120,000
2060	6,000	83,000	20,000	180,000
2070	6,000	83,000	20,000	240,000
2080	6,000	83,000	20,000	300,000
2120	6,000	83,000	20,000	360,000

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
60,000	30,000

Storage assumptions

Does this strategy have a modeled storage element?	Yes

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	No

Cost Estimate Summary
City of Austin - S-1 Aquifer Storage and Recovery (ASR)

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Primary Pump Station (74 MGD)	$59,730,000
Transmission Pipeline (66 in dia., approx. 50 miles)	$520,192,000
Well Fields (72 Wells, Pumps, and approx. 13 miles Well Field Piping)	$197,260,000
Storage Tanks (Other Than at Booster Pump Stations)	
Water Treatment Plant - wellfield (37 MGD)	$86,020,000
Integration Point Infrastructure (10 MG GST, 74 MGD Pump Station, Yard Piping, etc)	$78,352,000
TOTAL COST OF FACILITIES	**$941,554,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$306,407,000
Environmental & Archaeology Studies and Mitigation	$11,881,000
Land Acquisition/Leasing and Surveying	$90,169,000
Interest During Construction (3% for 5 years with a 0.5% ROI)	$176,797,000
TOTAL COST OF PROJECT	**$1,526,808,000**
ANNUAL COST	
Debt Service (6 percent, 20 years)	$132,186,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$7,390,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,914,000
Water Treatment Plant	$4,343,000
Pumping Energy Costs (248,925,076 kW-hr @ 0.08 $/kW-hr)	$19,914,000
TOTAL ANNUAL COST	**$166,747,000**
Available Project Yield (acft/yr)	83,232
Annual Cost of Water ($ per acft), based on PF=	$2,003
Annual Cost of Water After Debt Service ($ per acft), based on PF=	$415
Annual Cost of Water ($ per 1,000 gallons), based on PF=	$6.15
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=	$1.27

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Brackish Groundwater Desalination

Strategy description & assumptions:	Brackish Groundwater Desalination is characterized as withdrawal and desalination of brackish (salty) groundwater for treatment to potable drinking water.

Modeling assumptions:	Brackish Groundwater Desalination costs have been developed based on the 2120 max annual yield, and assume that reverse osmosis would be required to treat the water. The yield ranges below are provided to test project configuration and operations against future scenarios. When this strategy is included in a portfolio, it is modeled as being available with a constant yield.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	N/A	N/A
2040	10,000	20,000	N/A	N/A
2050	10,000	20,000	N/A	N/A
2060	10,000	40,000	N/A	N/A
2070	10,000	40,000	N/A	N/A
2080	10,000	40,000	N/A	N/A
2120	10,000	40,000	N/A	N/A

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
40,000	20,000

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - S-2 Brackish Groundwater Desalination

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Transmission Pipeline (48 in dia., approx. 7 miles)	$31,144,000
Primary Pump Station (38 MGD)	$11,480,000
Pipeline Crossings	$5,361,000
Well Fields (Wells, Pumps, and Piping)	$88,779,000
Storage Tanks (Other Than at Booster Pump Stations)	$29,918,000
Water Treatment Plant (36 MGD)	$262,721,000
TOTAL COST OF FACILITIES	**$429,403,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$189,581,000
Environmental & Archaeology Studies and Mitigation	$33,291,000
Land Acquisition and Surveying	$66,650,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$48,528,000
TOTAL COST OF PROJECT	**$767,453,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$49,924,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,862,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$373,000
Water Treatment Plant	$45,326,000
Pumping Energy Costs (55766058 kW-hr @ 0.1 $/kW-hr)	$10,015,000
TOTAL ANNUAL COST	**$107,500,000**
Available Project Yield (acft/yr)	40,000
Annual Cost of Water ($ per acft), based on PF=1	$2,688
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,439
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$8.25
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$4.42

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Indirect Potable Reuse (IPR) through Lady Bird Lake with local Inflows

Strategy description & assumptions:	IPR through Lady Bird Lake is characterized by pumping highly-treated reclaimed water from new side-stream treatment facilities located near South Austin Regional wastewater treatment plant into Lady Bird Lake (LBL) in a drought emergency. Through a new intake pipe, water would be pulled from LBL into Ullrich water treatment plant and treated for potable use. The IPR strategy would only be used when Highland Lakes combined storage drops below 400,000 acre-feet. Outside of drought emergencies, the intake and pumping components from IPR could be used to capture local spring inflows to LBL when available and the reclaimed transmission infrastructure can be used to support the centralized reclaimed water system.

Modeling assumptions:	IPR project costs were developed based on preliminary engineering reports done for a 20 MGD IPR project. The yield ranges below are provided to test project configuration and operations against future scenarios.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	N/A	N/A
2040	22,400	22,400	N/A	N/A
2050	22,400	22,400	N/A	N/A
2060	22,400	44,800	N/A	N/A
2070	22,400	44,800	N/A	N/A
2080	22,400	44,800	N/A	N/A
2120	22,400	44,800	N/A	N/A

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
22,400	5,000

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	No

Cost Estimate Summary
City of Austin - S-3 Indirect Potable Reuse through Lady Bird Lake with local Inflows

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Transmission Pipeline (36 in dia., approx. 1 miles)	$2,773,000
Intake Pump Station (21 MGD) From Lady Bird Lake to Ullrich WTP	$61,066,000
Transmission Pipeline (36 in dia., approx. 8 miles)	$33,444,000
Pump Station (18.8 MGD) From SAR WWTP to Lady Bird Lake	$7,488,000
Pipeline Crossings	$4,961,000
Additional Treatment (20 MGD) at the WWTP Prior to Pumping to Lady Bird Lake	$2,186,000
Dechlorination at the WWTP Outfall (20 MGD)	$2,186,000
TOTAL COST OF FACILITIES	**$114,104,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$47,229,000
Environmental & Archaeology Studies and Mitigation	$2,499,000
Land Acquisition and Surveying	$5,241,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$11,413,000
TOTAL COST OF PROJECT	**$180,486,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$11,741,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$494,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,228,000
Water Treatment Plant	$3,808,000
Pumping Energy Costs (14293230 kW-hr @ 0.1 $/kW-hr)	$1,439,000
TOTAL ANNUAL COST	**$19,710,000**
Available Project Yield (acft/yr)	22,400
Annual Cost of Water ($ per acft), based on PF=1	$880
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$356
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$2.70
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$1.09

Notes:
1) Costs have been calculated for maximum project yield in December 2023 dollars.
2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	New Off Channel Reservoir, Colorado River water

Strategy description & assumptions:	This strategy is characterized as construction of a new off-channel reservoir owned and operated by Austin Water and supplied with water from the Colorado River upstream of Austin's wastewater treatment plant outfalls.

Modeling assumptions:	The new off-channel reservoir is assumed to be filled when water is available in the Colorado River and treated at a new water treatment plant. The yield ranges below are provided to test project configuration and operations against various future scenarios.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	0	0
2040	0	0	0	0
2050	0	0	0	0
2060	10,000	25,000	10,000	25,000
2070	10,000	25,000	10,000	25,000
2080	10,000	25,000	10,000	25,000
2120	10,000	25,000	10,000	25,000

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
N/A	N/A

Storage assumptions

Does this strategy have a modeled storage element?	Yes

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	No

Cost Estimate Summary
City of Austin - S-4 New Off Channel Reservoir, Colorado River water

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Off-Channel Storage/Ring Dike (Conservation Pool 25,000 acft)	$38,743,000
Transmission Pipeline (78 in dia., approx. 18 miles)	$129,438,000
Intake Pump Station (105 MGD)	$123,016,000
Transmission Pipeline (48 in dia., approx. 17 miles)	$78,204,000
Intake Pump Station (34 MGD)	$56,729,000
Pipeline Crossings	$13,997,000
Water Treatment Plant (23 MGD)	$103,239,000
Discharge Structure	$474,000
TOTAL COST OF FACILITIES	**$543,840,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$222,564,000
Environmental & Archaeology Studies and Mitigation	$184,759,000
Land Acquisition and Surveying	$92,291,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$70,434,000
TOTAL COST OF PROJECT	**$1,113,888,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$51,176,000
Reservoir Debt Service (5 percent, 30 years)	$21,284,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,665,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,842,000
Dam and Reservoir (1.5% of Cost of Facilities)	$755,000
Water Treatment Plant	$7,227,000
Pumping Energy Costs (17509523 kW-hr @ 0.1 $/kW-hr)	$5,173,000
TOTAL ANNUAL COST	**$94,122,000**
Available Project Yield (acft/yr)	25,000
Annual Cost of Water ($ per acft), based on PF=1.5	$3,765
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$866
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$11.55
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$2.66

Notes:
1) Costs have been calculated for maximum project yield in December 2023 dollars.
2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	New Off Channel Reservoir, Colorado River and reclaimed water

Strategy description & assumptions:	This strategy is characterized as construction of a new off-channel reservoir owned and operated by Austin Water and supplied with water from the Colorado River downstream of Austin's wastewater treatment plant outfalls for augmented project yield.

Modeling assumptions:	The new off-channel reservoir is assumed to be filled when water is available in the Colorado River downstream of AW's wastewater treatment plant outfalls, providing an additional source of supply and reliability. The blended water in the Colorado River would be pumped into the OCR and stored for advanced treatment at a new water treatment plant. The yield ranges below are provided to test project configuration and operations against future scenarios.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	0	0
2040	0	0	0	0
2050	0	0	0	0
2060	10,000	25,000	10,000	25,000
2070	10,000	25,000	10,000	25,000
2080	10,000	25,000	10,000	25,000
2120	10,000	25,000	10,000	25,000

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
N/A	N/A

Storage assumptions

Does this strategy have a modeled storage element?	Yes

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	No

Cost Estimate Summary
City of Austin - S-5 New Off Channel Reservoir, Colorado River and reclaimed water

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Off-Channel Storage/Ring Dike (Conservation Pool 25,000 acft)	$38,743,000
Transmission Pipeline (78 in dia., approx 13 miles)	$97,375,000
Intake Pump Station (105 MGD)	$121,504,000
Transmission Pipeline (48 in dia., approx 17 miles)	$143,178,000
Intake Pump Station (34 MGD)	$56,729,000
Pipeline Crossings	$12,935,000
Water Treatment Plant (23 MGD)	$103,239,000
Advanced Water Treatment Components (22.3 MGD) at New WTP	$106,466,000
Discharge Structure	$474,000
TOTAL COST OF FACILITIES	**$680,643,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$280,941,000
Environmental & Archaeology Studies and Mitigation	$186,828,000
Land Acquisition and Surveying	$90,648,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$83,637,000
TOTAL COST OF PROJECT	**$1,322,697,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$64,759,000
Reservoir Debt Service (5 percent, 50 years)	$21,284,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$3,048,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$5,793,000
Dam and Reservoir (1.5% of Cost of Facilities)	$755,000
Water Treatment Plant	$7,227,000
Advanced Water Treatment Components	$9,985,000
Pumping Energy Costs (17136203 kW-hr @ 0.1 $/kW-hr)	$5,074,000
TOTAL ANNUAL COST	**$117,925,000**
Available Project Yield (acft/yr)	25,000
Annual Cost of Water ($ per acft), based on PF=1.5	$4,717
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$1,275
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$14.47
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$3.91

Notes:
1) Costs have been calculated for maximum project yield in December 2023 dollars.
2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Off-channel storage supplied by Colorado River water (Decker Lake)

Strategy description & assumptions:	This strategy would utilize a portion of Decker Lake's existing capacity for off-channel storage that would be supplied by Colorado River water via the existing intake location.

Modeling assumptions:	Decker lake would be filled when water is available in the Colorado River at the current intake location and maintained between a 2.5-5 foot operating range. Water from this strategy would be treated for potable use via a new water treatment plant with advanced treatment. The yield ranges below are provided to test project configuration and operations against various future scenarios.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	0	0
2040	9,600	18,300	3,200	6,100
2050	9,600	18,300	3,200	6,100
2060	9,600	18,300	3,200	6,100
2070	9,600	18,300	3,200	6,100
2080	9,600	18,300	3,200	6,100
2120	9,600	18,300	3,200	6,100

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
N/A	N/A

Storage assumptions

Does this strategy have a modeled storage element?	Yes

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	No

Cost Estimate Summary
City of Austin - S-6 Off-channel reservoir supplied by Colorado River water (Decker Lake)

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Transmission Pipeline (78 in dia., approx. 2 miles)	$22,880,000
Intake Pump Station (105 MGD)	$103,676,000
Pipeline Crossings	$1,859,000
Transmission Pipeline (36 in dia., approx. 1 mile)	$2,923,000
Intake Pump Station (17 MGD)	$45,886,000
Water Treatment Plant (16 MGD)	$76,485,000
Advanced Water Treatment Components (16.3 MGD) at New WTP	$77,925,000
TOTAL COST OF FACILITIES	**$331,634,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$146,469,000
Environmental & Archaeology Studies and Mitigation	$4,855,000
Land Acquisition and Surveying	$2,397,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$32,762,000
TOTAL COST OF PROJECT	**$518,117,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$33,704,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$332,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$4,861,000
Water Treatment Plant	$5,354,000
Advanced Water Treamtent Components	$7,449,000
Pumping Energy Costs (5342404 kW-hr @ 0.1 $/kW-hr)	$3,807,000
TOTAL ANNUAL COST	**$55,507,000**
Available Project Yield (acft/yr)	18,300
Annual Cost of Water ($ per acft), based on PF=1	$3,033
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,191
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$9.31
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$3.66

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Additional Supply from LCRA, regional Colorado River partnerships, and/or water rights optimization

Strategy description & assumptions:	For the purposes of WF24 modeling, this strategy is characterized as additional supply from the Lower Colorado River Authority through a new or amended contract.

Modeling assumptions:	Additional water from LCRA would be subject to the same pro-rata curtailment as AW's primary contracted water. The yield ranges below are provided to test project configuration and operations against various future scenarios.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	N/A	N/A
2040	5,000	30,000	N/A	N/A
2050	5,000	30,000	N/A	N/A
2060	5,000	30,000	N/A	N/A
2070	5,000	30,000	N/A	N/A
2080	5,000	30,000	N/A	N/A
2120	5,000	30,000	N/A	N/A

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
30,000	25,000

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - S-7 Additional Water Supplies from LCRA

Item	*Estimated Cost For Facilities*
CAPITAL COST	
TOTAL COST OF FACILITIES	**$0**
TOTAL COST OF PROJECT	**$0**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$0
Operation and Maintenance	$0
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$0
Intakes and Pump Stations (2.5% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant	$4,057,000
Advanced Water Treatment Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.1 $/kW-hr)	$0
Purchase of Water (30000 acft/yr @ $155/acft)	$9,750,000
TOTAL ANNUAL COST	**$13,807,000**
Available Project Yield (acft/yr)	30,000
Annual Cost of Water ($ per acft), based on PF=1	$460
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$460
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$1.41
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$1.41

Notes:
1) Costs have been calculated for maximum project yield in December 2023 dollars.
2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Seawater Desalination

Strategy description & assumptions:	Seawater desalination is characterized as sourcing water from the Gulf of Mexico and treating it via a desalination plant on the coast. Dissolved solids are removed by forcing the source water through membranes at high pressure. As characterized, this strategy would be owned and operated by Austin Water, but there may be opportunities to implement this strategy through a regional partnership approach.

Modeling assumptions:	The seawater desalination plant cost estimate is based on a new advanced treatment facility and transmission infrastructure between the Gulf of Mexico and Austin. The yield ranges below are provided to test project configuration and operations against future scenarios. When this strategy is included in a portfolio, it is modeled as being available with a constant yield.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	N/A	N/A
2040	0	0	N/A	N/A
2050	0	0	N/A	N/A
2060	40,000	60,000	N/A	N/A
2070	40,000	60,000	N/A	N/A
2080	40,000	60,000	N/A	N/A
2120	40,000	60,000	N/A	N/A

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
60,000	N/A

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - S-8 Seawater Desalination

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Transmission Pipeline (72 in dia., 250 miles)	$1,105,283,000
Intake Pump Station (94 MGD)	$135,220,000
Transmission Pump Station(s) & Storage Tank(s)	$138,645,000
Pipeline Crossings	$126,982,000
Storage Tanks (Other Than at Booster Pump Stations)	$48,238,000
Water Treatment Plant (75 MGD)	$809,868,000
Concentrate Disposal Outfall in Gulf	$80,987,000
TOTAL COST OF FACILITIES	**$2,445,223,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$977,124,000
Environmental & Archaeology Studies and Mitigation	$68,148,000
Land Acquisition and Surveying	$137,596,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$244,897,000
TOTAL COST OF PROJECT	**$3,872,988,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$251,943,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$16,550,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$8,326,000
Water Treatment Plant	$121,480,000
Pumping Energy Costs (180598532 kW-hr @ 0.1 $/kW-hr)	$18,060,000
TOTAL ANNUAL COST	**$416,359,000**
Available Project Yield (acft/yr)	84,000
Annual Cost of Water ($ per acft), based on PF=1	$4,957
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$1,957
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$15.21
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$6.01

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Direct Potable Reuse (DPR) from Wastewater Treatment Plant

Strategy description & assumptions:	DPR is characterized as using new advanced treatment (similar to desalination treatment) facilities to purify highly-treated reclaimed water to potable levels to supplement drinking water supply.

Modeling assumptions:	Direct potable reuse costs are estimated based on treatment with reverse osmosis and include costs for deep-well injection for disposal of RO concentrate. The yield ranges below are provided to test project configuration and operations against various future scenarios. When this strategy is included in a portfolio, it is modeled as being available with a constant yield.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	N/A	N/A
2040	5,000	11,200	N/A	N/A
2050	5,000	11,200	N/A	N/A
2060	5,000	22,400	N/A	N/A
2070	5,000	22,400	N/A	N/A
2080	5,000	22,400	N/A	N/A
2120	5,000	22,400	N/A	N/A

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
11,200	N/A

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - S-9 Direct Potable Reuse from Wastewater Treatment Plant

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Transmission Pipeline (36 in dia., approx. 15 miles)	$59,640,000
Primary Pump Station (21 MGD) from SAR WWTP to ATF/WTP	$17,819,000
Transmission Pipeline (18 in dia., 9 miles)	$12,139,000
Primary Pump Station (5.3 MGD) for Conentrate Disposal	$6,306,000
Pipeline Crossings	$10,472,000
Well Fields (Wells, Pumps, and Piping)	$12,260,000
Storage Tanks (Other Than at Booster Pump Stations)	$29,291,000
Water Treatment Plant (20 MGD)	$91,260,000
Advanced Water Treatment Components (30 MGD)	$220,901,000
TOTAL COST OF FACILITIES	**$460,088,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$198,814,000
Environmental & Archaeology Studies and Mitigation	$57,389,000
Land Acquisition and Surveying	$13,199,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$49,241,000
TOTAL COST OF PROJECT	**$778,731,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$50,657,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,486,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$784,000
Water Treatment Plant	$6,388,000
Advanced Water Treatment Components	$25,739,000
Pumping Energy Costs (15094858 kW-hr @ 0.1 $/kW-hr)	$1,708,000
TOTAL ANNUAL COST	**$86,762,000**
Available Project Yield (acft/yr)	22,400
Annual Cost of Water ($ per acft), based on PF=1.5	$3,873
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$1,612
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$11.88
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$4.95

Notes:
1) Costs have been calculated for maximum project yield in December 2023 dollars.
2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Interbasin Transfer of Surface Water

Strategy description & assumptions:	No specific project opportunity has been identified for the interbasin transfer strategy. For the purposes of Water Forward, this strategy is characterized as a surface water transfer via new intake, transmission, and treatment infrastructure from a neighboring river basin.

Modeling assumptions:	The costs for an interbasin transfer include intake, conveyance, purchase, and additional treatment O&M costs. The yield ranges below are provided to test project configuration and operations against various future scenarios. Yields are modeled as subject to drought restrictions based on Highland Lakes storage.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	N/A	N/A
2040	0	0	N/A	N/A
2050	0	0	N/A	N/A
2060	0	0	N/A	N/A
2070	0	20,000	N/A	N/A
2080	0	20,000	N/A	N/A
2120	0	20,000	N/A	N/A

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
20,000	20,000

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - S-10 Interbasin Transfer (surface water)

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Transmission Pipeline (36 in dia., 60 miles)	$196,553,000
Intake Pump Stations (26.8 MGD)	$61,220,000
Transmission Pump Station(s) & Storage Tank(s)	$20,496,000
Pipeline Crossings	$10,067,000
Water Treatment Plant (17.9 MGD)	$45,990,000
TOTAL COST OF FACILITIES	**$334,326,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$129,784,000
Environmental & Archaeology Studies and Mitigation	$4,185,000
Land Acquisition and Surveying	$24,121,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$33,239,000
TOTAL COST OF PROJECT	**$525,655,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$34,195,000
Reservoir Debt Service (5 percent, 30 years)	$0
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,509,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$2,576,000
Water Treatment Plant	$3,219,000
Purchase of Water (20000 acft/yr @ 93.5 $/acft)	$1,870,000
TOTAL ANNUAL COST	**$45,839,000**
Available Project Yield (acft/yr)	20,000
Annual Cost of Water ($ per acft), based on PF=1.5	$2,292
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$582
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$7.03
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$1.79

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Importation of conventional groundwater

Strategy description & assumptions:	No specific project opportunity has been identified for the conventional groundwater importation strategy. For the purposes of Water Forward, this strategy is characterized as acquisition of groundwater permits through the requisite Groundwater Conservation District(s) and development of wellfields, transmission, treatment, and disposal infrastructure owned by Austin Water.

Modeling assumptions:	Costs for conventional groundwater are based on the 2120 max annual yield. The yield ranges below are provided to test project configuration and operations against various future scenarios. When this strategy is included in a portfolio, it is modeled as being available with a constant yield.

Yield and storage ranges

Year	Min model test annual yield (AFY)	Max model test annual yield (AFY)	Min model test total storage (AF)	Max model test total storage (AF)
2030	0	0	N/A	N/A
2040	5,000	20,000	N/A	N/A
2050	5,000	20,000	N/A	N/A
2060	5,000	20,000	N/A	N/A
2070	5,000	20,000	N/A	N/A
2080	5,000	20,000	N/A	N/A
2120	5,000	20,000	N/A	N/A

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
20,000	10,000

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - S-11 Importation of conventional groundwater

Item	*Estimated Cost For Facilities*
CAPITAL COST	
Transmission Pipeline (36 in dia., approx. 57 miles)	$166,750,000
Primary Pump Station (19 MGD)	$11,913,000
Transmission Pump Station(s) & Storage Tank(s)	$13,949,000
Pipeline Crossings	$9,047,000
Well Fields (Wells, Pumps, and Piping)	$38,711,000
Storage Tanks (Other Than at Booster Pump Stations)	$12,389,000
Chlorine Disinfection and Filtration for New Groundwater Supply (18 MGD)	$8,053,000
TOTAL COST OF FACILITIES	**$260,812,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$99,785,000
Environmental & Archaeology Studies and Mitigation	$7,108,000
Required Land Acquisition and Surveying by the Groundwater Conser. District	$548,304,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$61,831,000
TOTAL COST OF PROJECT	**$977,840,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$63,610,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,747,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$774,000
Groundwater Treatment - Chlorine Disinfection and Filtration	$2,657,000
Pumping Energy Costs (40071630 kW-hr @ 0.1 $/kW-hr)	$4,007,000
TOTAL ANNUAL COST	**$73,795,000**
Available Project Yield (acft/yr)	20,000
Annual Cost of Water ($ per acft), based on PF=1	$3,690
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$509
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$11.32
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$1.56

Notes:
1) Costs have been calculated for maximum project yield in December 2023 dollars.
2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Utility-Side Water Loss Reduction

Strategy description:	Utility-Side Water Loss Reduction is a strategy to decrease water loss in the Austin Water distribution system. Current AW programs to address water loss include investments in customer meter accuracy and meter replacement, repair and replacement of waters mains throughout the system, and integration of AMI data into water loss practices. This WF24 strategy would include additional new programs such as improvements to production meters, expanded active leak detection programs, and additional analysis of new data.

Modeling assumptions:	Yield is based on projected water use and reflects reduction of Austin Water's Infrastructure Leak Index (ILI) to 3.0 in 2040 to 2.0 in 2120.

Yield ranges for Demand Reduction (DR) Pathways

Year	DR1 yield (AFY)	DR2 yield (AFY)	DR3 yield (AFY)	DR4 yield (AFY)	DR5 yield (AFY)	DR6 yield (AFY)	DR7 yield (AFY)
2030	2,800	2,800	2,800	2,800	2,800	2,800	2,800
2040	7,500	7,500	7,500	7,500	7,500	7,500	7,500
2050	9,400	9,400	9,400	9,400	9,400	9,400	9,400
2060	11,300	11,300	11,300	11,300	11,300	11,300	11,300
2070	13,200	13,200	13,200	13,200	13,200	13,200	13,200
2080	15,000	15,000	15,000	15,000	15,000	15,000	15,000
2120	26,300	26,300	26,300	26,300	26,300	26,300	26,300

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
2,800	4,700

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - D-12 Utility-Side Water Loss Control

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Replacement Production Meters	$45,000,000
TOTAL COST OF FACILITIES	**$45,000,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$20,250,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$4,405,000
TOTAL COST OF PROJECT	**$69,655,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$4,531,000
Reservoir Debt Service (5 percent, 30 years)	$0
Operation and Maintenance	
Meter O&M	$500,000
Active Leak Detection O&M	$2,000,000
Water Treatment Plant	$0
Advanced Water Treamtent Facility	$0
Pumping Energy Costs (0 kW-hr @ 0.1 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$7,031,000**
Available Project Yield (acft/yr)	26,300
Annual Cost of Water ($ per acft), based on PF=0	$267
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$95
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.82
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.29

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Customer Side Water Use Management

Strategy description:	Austin Water's existing customer-side water use management efforts include requiring new site plans to submit water benchmarking applications, implementation of MyATX Water advanced metering infrastructure, and many customer-facing rebates and incentives. This WF24 strategy includes expanded customer incentives for conservation, use of benchmarking and MyATX Water data to create water use budgets for customers and to expand identification of customer-side water leaks, and savings from customer behavior changes based on real-time water use data.

Modeling assumptions:	Yield is based on total actual water use and is dependent on the level of implementation of other demand reduction strategies included in the demand reduction (DR) pathways.

Yield ranges for Demand Reduction (DR) Pathways

Year	DR1 yield (AFY)	DR2 yield (AFY)	DR3 yield (AFY)	DR4 yield (AFY)	DR5 yield (AFY)	DR6 yield (AFY)	DR7 yield (AFY)
2030	200	200	200	200	200	200	200
2040	1,100	1,100	1,100	1,100	2,100	2,100	2,100
2050	2,000	2,000	2,000	2,000	3,800	3,800	3,800
2060	2,800	2,800	2,800	2,800	5,500	5,500	5,500
2070	3,700	3,700	3,600	3,600	7,200	7,200	7,200
2080	4,500	4,500	4,400	4,400	8,800	8,800	8,800
2120	6,700	6,700	6,600	6,600	13,200	13,300	13,100

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
200	1,900

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - D-13 Customer-Side Water Use Management

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Potential Report/Application Development	$250,000
Other Facilities - Vehicles for program support	$75,000
TOTAL COST OF FACILITIES	**$325,000**
TOTAL COST OF PROJECT	**$325,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$21,000
Operation and Maintenance	
Staffing Costs (6 employees at $100,000/yr)	$600,000
Vehicle Maintenance (2.5 vehicles with 20-yr lifetime)	$10,000
Customer Water Use Management Education	$50,000
TOTAL ANNUAL COST	**$681,000**
Available Project Yield (acft/yr)	13,100
Annual Cost of Water ($ per acft), based on PF=0	$52
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$50
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.16
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.15

Notes:
1) Costs have been calculated for maximum project yield in December 2023 dollars.
2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

Name:	Native and Efficient Landscapes

Strategy description:	Austin Water currently has rebate and incentive programs to help customers transition to native and efficient landscapes. This WF24 strategy includes additional expanded efforts including new landscape transformation ordinances/incentives, irrigation efficiency incentives, and other strategies to promote conversion to native and efficient landscapes.

Modeling assumptions:	Yield is based on total actual water use and is dependent on the level of implementation of other demand reduction strategies included in the demand reduction (DR) pathways.

Yield ranges for Demand Reduction (DR) Pathways

Year	DR1 yield (AFY)	DR2 yield (AFY)	DR3 yield (AFY)	DR4 yield (AFY)	DR5 yield (AFY)	DR6 yield (AFY)	DR7 yield (AFY)
2030	300	300	300	300	600	600	600
2040	900	900	900	900	1,800	1,800	1,800
2050	1,500	1,500	1,500	1,500	2,900	2,900	2,900
2060	2,000	2,000	2,000	2,000	4,000	4,000	3,900
2070	2,600	2,600	2,500	2,600	5,100	5,100	5,000
2080	3,100	3,100	3,000	3,100	6,100	6,100	6,000
2120	5,600	5,600	5,500	5,500	10,900	11,000	10,900

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
600	1,200

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - D-14 Native and Efficient Landscapes

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Other Facilities - Vehicles for Program Support	$75,000
TOTAL COST OF FACILITIES	**$75,000**
Cost to Convert to Native Landscaping (4600 acres)	$832,740,000
TOTAL COST OF PROJECT	**$832,815,000**
ANNUAL COST	
Land Conversion Debt Service	$55,516,000
Operation and Maintenance	
Staffing Costs (2 employees at $100,000/yr)	$200,000
Vehicle Maintenance (2.5 vehicles with 20-yr lifetime)	$10,000
TOTAL ANNUAL COST	**$55,726,000**
Available Project Yield (acft/yr)	10,900
Annual Cost of Water ($ per acft), based on PF=0	$5,112
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$511
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$15.69
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.06

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

3) One or more cost element has been calculated externally

Name:	Centralized Reclaimed

Strategy description:	Austin's centralized reclaimed water system, or "purple pipe" system, currently provides highly-treated wastewater effluent for non-potable uses such as irrigation, cooling, manufacturing, and toilet flushing to customers. This WF24 strategy represents expansion existing centralized reclaimed water use, including codes and incentives to require or encourage connection to the centralized reclaimed water system.

Modeling assumptions:	Modeling of the centralized reclaimed pathways includes modeling of the existing reclaimed ordinance (DR1), an expanded network of reclaimed water pipes (DR2 and DR3), a larger connection area ordinance requirement (DR4 and DR5), or both an expanded pipe network and ordinance requirement (DR6 and DR7).

Yield ranges for Demand Reduction (DR) Pathways

Year	DR1 yield (AFY)	DR2 yield (AFY)	DR3 yield (AFY)	DR4 yield (AFY)	DR5 yield (AFY)	DR6 yield (AFY)	DR7 yield (AFY)
2030	1,100	1,100	1,100	1,100	1,100	1,100	1,100
2040	7,200	7,300	7,300	8,100	8,100	8,200	8,200
2050	10,600	10,900	10,900	12,700	12,700	12,900	12,900
2060	14,000	14,500	14,500	17,300	17,200	17,600	17,600
2070	17,400	18,100	18,100	21,900	21,800	22,300	22,300
2080	20,800	21,600	21,600	26,400	26,300	26,900	26,900
2120	32,200	33,700	33,600	40,900	40,800	41,700	41,700

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
1,100	7,100

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - D-15 Centralized Reclaimed

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Conveyance	$899,162,000
TOTAL COST OF FACILITIES	**$899,162,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$314,707,000
Cost to Customer for Reuse Connection (Including Dual Plumbing, Yard Line, and Connection)	$104,202,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$88,970,000
TOTAL COST OF PROJECT	**$1,407,041,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$91,530,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,000,000
TOTAL ANNUAL COST	**$93,530,000**
Available Project Yield (acft/yr)	41,700
Annual Cost of Water ($ per acft), based on PF=0	$2,243
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$48
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$6.88
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.15

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

3) One or more cost element has been calculated externally

Name:	Decentralized Reclaimed

Strategy description:	This strategy was included as "Distributed Wastewater Reuse" in the Council-approved Water Forward 2018 Plan. Decentralized Reclaimed is defined for WF24 as the collection of wastewater from sewer systems separate from the Austin's centralized wastewater system, treatment of that wastewater, and reuse at the local/community scale. These facilities would be completely separate from the centralized wastewater collection system. Reuse of the treated water via a dual (purple) pipe system would supply irrigation, landscaping, toilet, laundry (clothes washing), and cooling demands.

Modeling assumptions:	Modeling of the decentralized reclaimed pathways includes modeling of yield based on our existing decentralized wastewater systems (DR1, DR2, DR3, DR4, DR5, and DR6) and yield based on addition of new decentralized wastewater systems to Austin Water's management (DR7).

Yield ranges for Demand Reduction (DR) Pathways

Year	DR1 yield (AFY)	DR2 yield (AFY)	DR3 yield (AFY)	DR4 yield (AFY)	DR5 yield (AFY)	DR6 yield (AFY)	DR7 yield (AFY)
2030	0	0	0	0	0	0	0
2040	100	100	100	100	100	100	200
2050	300	300	300	300	300	300	500
2060	400	400	400	400	400	400	800
2070	500	500	500	500	500	500	1,100
2080	600	600	600	600	600	600	1,300
2120	1,300	1,300	1,300	1,300	1,300	1,300	3,100

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
0	200

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - D-16 Decentralized Reclaimed

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Treatment Facilities ($50/gpd cost factor)	$138,375,000
TOTAL COST OF FACILITIES	**$138,375,000**
Cost to Customer for Reuse Connection (Including Dual Plumbing, Yard Line, and Connection)	$7,746,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$13,600,000
TOTAL COST OF PROJECT	**$215,071,000**
ANNUAL COST	
Debt Service (5 percent, 30 years)	$13,991,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$2,000,000
TOTAL ANNUAL COST	**$15,991,000**
Available Project Yield (acft/yr)	3,100
Annual Cost of Water ($ per acft), based on PF=0	$5,158
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$645
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$15.83
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$1.98

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

3) One or more cost element has been calculated externally

Name:	Onsite Reuse

Strategy description:	Austin currently has ordinances requiring onsite reuse of rainwater and AC condensate for new developments over 250,000 sqft. The WF24 strategy includes implementation of these existing ordinances as well as future phases of onsite reuse implementation. Onsite reuse water can be sourced from rainwater, stormwater, AC condensate, graywater, or black water. AC condensate and rainwater were used as a representative case for characterization.

Modeling assumptions:	Modeling of the onsite reuse pathways includes modeling of the existing onsite reuse ordinance (DR1 and DR2), adjusting the ordinance to have a smaller building size threshold requirement (DR2 and DR4), increasing required benchmarks for onsite reuse (DR3 and DR5), and both the adjusted ordinance and increased benchmarks (DR6 and DR7).

Yield ranges for Demand Reduction (DR) Pathways

Year	DR1 yield (AFY)	DR2 yield (AFY)	DR3 yield (AFY)	DR4 yield (AFY)	DR5 yield (AFY)	DR6 yield (AFY)	DR7 yield (AFY)
2030	1,100	1,100	1,100	1,100	1,100	1,100	1,100
2040	3,100	3,200	4,500	2,800	3,900	2,700	4,000
2050	4,800	4,800	6,900	4,000	5,700	3,900	5,700
2060	6,500	6,400	9,300	5,200	7,500	5,000	7,300
2070	8,200	8,000	11,700	6,400	9,300	6,200	9,000
2080	9,800	9,600	14,100	7,600	11,000	7,300	10,600
2120	15,300	15,000	22,100	11,900	17,400	11,600	16,300

Scalability assumptions

Max start volume (AF)	Max decadal yield increase (AFY)
1,100	3,400

Storage assumptions

Does this strategy have a modeled storage element?	No

Other assumptions

Can this strategy meet needs above existing COA run-of-river water rights and LCRA backup contract?	Yes

Cost Estimate Summary
City of Austin - D-17 Onsite Reuse

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Storage - Reuse Harvesting Cistern Storage (409 MG)	$841,418,000
TOTAL COST OF FACILITIES	**$841,418,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (35% for pipes & 45% for all other facilities)	$8,414,000
Cost to Customer for Reuse Connection (Including Dual Plumbing, Yard Line, and Connection)	$40,682,000
Interest During Construction (3% for 3 years with a 1.5% ROI)	$60,110,000
TOTAL COST OF PROJECT	**$950,624,000**
COA Incentives from 2030 to 2120	$180,000,000
TOTAL COST OF PROJECT (excluding COA incentives)	**$770,624,000**
ANNUAL COST	
Debt Service (5 percent, 20 years)	$76,281,000
Annual staffing costs (4 FTEs at $100k)	$400,000
Costomer O&M Cost (8% of capital cost)	$67,313,000
Annual COA incentive costs	$2,000,000
Pumping Energy Costs (0 kW-hr @ 0.1 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$145,994,000**
Available Project Yield (acft/yr)	16,300
Annual Cost of Water ($ per acft), based on PF=0	$8,957
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$4,277
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$27.48
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$13.12

Notes:

1) Costs have been calculated for maximum project yield in December 2023 dollars.

2) Costs are preliminary and subject to change based on optimization modeling and portfolio tradeoff analysis results.

3) One or more cost element has been calculated externally