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Stantec

November 23, 2010

Mike Daly
City of Jackson
33 Broadway
Jackson, CA 95642

Subject: Wastewater Treatment, Storage, Disposal and Reclamation Options

Dear Mike:

As a result of questions raised at the last Sewer Rate Committee meeting we have prepared an estimate of the Construction Cost for two supplemental options that were dismissed early on as part of the Options Report.

A brief recap of the basic controls or limitations placed on the City's options is summarized below.

- 1) Regardless of treatment level the amount of effluent discharged cannot exceed 5% of the volume of water in Lake Amador.
- 2) Any discharge to Jackson Creek or to any other "water of the State" must comply with CTR limits.
- 3) Any option that discharges to Jackson Creek or Lake Amador must contain a component that discharges all existing effluent that exceeds the 5% criteria to land or to a different receiving water.

The three options that did not merit a more thorough evaluation are described below. No more effort (and engineering costs) was spent on delineating these options than was necessary to show that they are not economically viable when compare to the recommended Option E.

1) Continued discharge to Jackson Creek. The only treatment method that could accomplish the level of treatment required to reliably meet CTR is Reverse Osmosis. RO is expensive to construct, expensive to operate and produces a hazardous waste that is very expensive to dispose. In addition to the RO treatment system the current chlorine disinfection system would have to be replaced by Ultra Violet Radiation (UV). This is the current most reliable method to eliminate the production of disinfection byproducts caused by chlorine disinfection. The Regional Board has on many occasions determined that RO is not an economically feasible alternative, where other alternatives are available, such as land disposal. In addition, this does not address the Department of Public Health's limit of 5% effluent in Lake Amador.

2) Complete land containment. This option would completely eliminate the discharge to Jackson Creek and Lake Amador. The key component of this option is the sizing of all pumping, piping, storage and disposal facilities to contain the 100-year rainfall event, with no discharge. Savings in cost that are gained with this option include avoidance of the NPDES Permit requirements for monitoring effluent and receiving water and the level of treatment would not have to be increased from the current level.

3) Discharge directly into Lake Amador. The suggested reason for pursuing this option was to avoid the CTR compliance issues surrounding the low flows in Jackson Creek. CTR would still apply in Lake Amador and the documentation of dilution at the point of discharge into the quiescent lake would be required. Besides the expense of a transmission line to handle peak flows to Lake Amador, the higher expense of operating under an NPDES Permit would remain. A system of land application to dispose of effluent during the time when effluent exceeded 5% in Lake Amador would still be required. There would not be an appreciable savings in O&M compared to the viable options.

The attached tables compare the estimated capital and O&M cost for the options from the Options Report and the two supplemental options described above.

Please let us know if we can be of further assistance as the Committee and the City as a whole.

Sincerely,

A handwritten signature in cursive script that reads "Harold Welborn".

Harold Welborn, PE

Enclosures

CITY OF JACKSON - SUPPLEMENTAL OPTIONS COST COMPARISON

Component of Option	Options in Options Report					Non-Viable Options	
	Option E Agricultural Irrigation Reuse & Disposal	Option D Agricultural Irrigation Reuse	Option C Local Unrestricted Reuse	Option B Mokelumne River Discharge	Option Reg Regional Agricultural Reuse & Disposal	Option X Agricultural Reuse & No Discharge to Creek	Option Y Lake Amador (does not include land disposal)
Estimated Capital Costs, \$	\$6,405,500	\$6,710,000	\$12,755,000	\$9,741,000	\$7,741,000	\$15,204,000	\$13,115,000
Construction Increase in SSC, \$ per Month per EDU *	\$19.69	\$20.62	\$39.19	\$29.95	\$23.79	\$46.70	\$40.30
O&M Increase in SSC, \$ per Month per EDU **	\$5.20	\$5.29	\$10.72	\$9.18	\$6.87	\$8.68	\$8.68

* Estimated increase in monthly Sewer Service Charge to implement the option. Value includes planning, environmental, design and construction.

** Estimated increase in monthly O&M cost for each option.

CITY OF JACKSON - SUPPLEMENTAL OPTIONS, ESTIMATE OF INCREASED ANNUAL O&M *

		Options in Options Report					Non-Viable Options	
Ref. No.	Component of Option	Option E Agricultural Irrigation Reuse & Disposal	Option D Agricultural Irrigation Reuse	Option C Local Unrestricted Reuse	Option B Mokelumne River Discharge	Option Reg Regional Agricultural Reuse & Disposal	Option X Agricultural Reuse & No Discharge to Creek	Option Y Lake Amador (does not include land disposal)
1	Storage Maintenance	\$8,000.00	\$10,000.00	\$20,000.00	\$0.00	\$8,000.00	\$20,000.00	\$0.00
2	Air Release Valve Maintenance and Inspections	\$2,560.00	\$2,560.00	\$7,680.00	\$16,000.00	\$7,040.00	\$7,040.00	\$23,040.00
3	Pressure Pipeline Maintenance and Inspections	\$3,760.00	\$3,760.00	\$9,760.00	\$20,400.00	\$9,280.00	\$9,280.00	\$29,400.00
4	Pump Station Maintenance and Inspections	\$31,640.00	\$31,640.00	\$31,640.00	\$31,640.00	\$31,640.00	\$31,640.00	\$31,640.00
5	Pump Station Electrical	\$56,700.00	\$56,700.00	\$75,978.00	\$44,226.00	\$75,978.00	\$154,066.50	\$6,237.00
6	Filter O & M	\$4,133.33	\$4,133.33	\$13,880.00	\$7,973.33	\$4,133.33	\$4,133.33	\$7,973.33
7	DAF O & M	\$0.00	\$0.00	\$33,280.00	\$0.00	\$0.00	\$0.00	\$0.00
8	Chlorine Dinsinfection O & M	\$0.00	\$0.00	\$3,840.00	\$0.00	\$0.00	\$0.00	\$0.00
9	Disinfection Chemicals for tertiary treatment	\$0.00	\$0.00	\$22,830.00	\$0.00	\$0.00	\$0.00	\$0.00
10	NPDES Monitoring	\$0.00	\$0.00	\$0.00	\$50,000.00	\$0.00	-\$50,000.00	\$50,000.00
11	Diffuser O & M	\$500.00	\$500.00	\$500.00	\$1,500.00	\$500.00	\$0.00	\$1,500.00
12	Stream Gauge O & M	\$500.00	\$500.00	\$500.00	\$1,500.00	\$500.00	\$0.00	\$1,500.00
Estimated Increased Annual O&M Costs		\$112,560.33	\$114,563.33	\$232,175.00	\$198,778.33	\$148,755.33	\$187,968.83	\$188,073.33
Estimated Increase, \$ per EDU per month		\$5.20	\$5.29	\$10.72	\$9.18	\$6.87	\$8.68	\$8.68

* Note: Estimates of increased O&M are not intended to be precise but do reflect a reasonable estimate for a comparison of the options using today's cost.

- Ref. No.
- 2 1 ARV per 1000 LF. 8 hours per year per ARV at \$80/hr
 - 3 1 hour per year per 100 LF at \$80/hr
 - 4 4 hours a week at \$80/hr and \$15000 a year for bearing and impeller replacement
 - 5 24/7, 180 days a year for all options except No Discharge Option is 24/7, 365 days a year and Lake Amador Option is 30 peak flow days a year. \$0.15 per kW-hr.
 - 6 Replace media every three years. Additional filters and twice the labor for local unrestricted reuse. No increase in labor for Ag Reuse Options.
 - 7 16 hours a week for 6 months per year, at \$80/hr
 - 8 4 hours per month at \$80/hr. For local unrestricted reuse 8 hours per month due to disinfection of stored effluent before reuse.
 - 9 \$1.5 per gallon of chlorine. At 0.5 MGD and 10 ppm chlorine, 41.7 gallons of chlorine per day.
 - 10 Estimated lab budget and man hours from Eric Z. Double for additional monitoring required at Mokelumne and Lake Amador discharge points.

Option E		Unit Cost		
Irrigation Reuse and Disposal		Unit	(\$/unit)	Total Cost (\$)
Effluent Infrastructure	Quantity			
1.0 Mgal./d Effluent Pump station (expandable to 1.5 Mgal/d)	1	LS	\$400,000	\$400,000
10-inch Effluent Force main	4700	LF	\$120	\$564,000
17 MG Effluent Storage Reservoir	52.2	AF	\$22,000	\$1,148,000
New Effluent Diffuser/Stream Gauge & Effluent force main creek crossing	1	LS	\$125,000	\$125,000
Effluent Infrastructure Subtotal				\$2,237,000
Engineering and Administration Costs		25	%	\$559,250
Contingency		25	%	\$559,250
Effluent Infrastructure Total				\$3,355,500
Treatment Improvements				
Filter Improvements (1)	1	LS	\$1,500,000	\$1,500,000
Disinfection and controls upgrades	1	LS	\$50,000	\$50,000
Treatment Improvements				\$1,550,000
Engineering and Administration Costs		25	%	\$387,500
Contingency		25	%	\$387,500
Treatment Improvements Total				\$2,325,000
Permitting and Environmental Documentation				
Permit Studies: Anti-deg. Dilution Study, RWD Jackson Creek	1	LS	\$300,000	\$300,000
CEQA Removal of Effluent	1	LS	\$80,000	\$80,000
CEQA Effluent & Treatment Improvements, RWD	1	LS	\$75,000	\$75,000
Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.)	1	LS	\$75,000	\$75,000
Environmental Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.) (3)	1	LS	\$50,000	\$50,000
Permitting and Environmental Documentation				\$580,000
Contingency		25	%	\$145,000
Permitting and Environmental Documentation Total				\$725,000
Irrigation & Disposal Capital Cost Total				\$6,405,500

ENR = 8672
February 2010, 20-Cities CCI

Cost per EDU \$3,550.00
Cost per mo. \$19.69
20 years, 3% int.

- Notes:
- (1) Includes expansion for peak flows associated with existing users only and improvements to address existing problems associated with backwashing cycles.
 - (2) City WWTP property accomodates expanded filter and disinfection facility improvements.
 - (3) Estimate may be higher, or lower, depending on actual impacts.

Option D		Unit Cost		
Irrigation Reuse	Quantity	Unit	(\$/unit)	Total Cost (\$)
Effluent Infrastructure				
1.0 Mgal./d Effluent Pump station (expandable to 1.5 Mgal/d)	1	LS	\$400,000	\$400,000
10-inch Effluent Force main	4700	LF	\$120	\$564,000
20 MG Effluent Storage Reservoir	61.4	AF	\$22,000	\$1,351,000
New Effluent Diffuser/Stream Gauge & Effluent force main creek crossing	1	LS	\$125,000	\$125,000
Effluent Infrastructure Subtotal				\$2,440,000
Engineering and Administration Costs		25	%	\$610,000
Contingency		25	%	\$610,000
Effluent Infrastructure Total				\$3,660,000
Treatment Improvements				
Filter Improvements (1)	1	LS	\$1,500,000	\$1,500,000
Disinfection and controls upgrades	1	LS	\$50,000	\$50,000
Treatment Improvements				\$1,550,000
Engineering and Administration Costs		25	%	\$387,500
Contingency		25	%	\$387,500
Treatment Improvements Total				\$2,325,000
Permitting and Environmental Documentation				
Permit Studies: Anti-deg, Dilution Study, RWD Jackson Creek	1	LS	\$300,000	\$300,000
CEQA Removal of Effluent	1	LS	\$80,000	\$80,000
CEQA Effluent & Treatment Improvements, RWD	1	LS	\$75,000	\$75,000
Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.)	1	LS	\$75,000	\$75,000
Environmental Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.) (3)	1	LS	\$50,000	\$50,000
Permitting and Environmental Documentation				\$580,000
Contingency		25	%	\$145,000
Permitting and Environmental Documentation Total				\$725,000
Irrigation Capital Cost Total				\$6,710,000

ENR = 8672
February 2010, 20-Cities CCI

Cost per EDU \$3,717.45
Cost per mo. \$20.62
20 years, 3% int.

- Notes:
- (1) Includes expansion for peak flows associated with existing users only and improvements to address existing problems associated with backwashing cycles.
 - (2) City WWTP property accomodates expanded filter and disinfection facility improvements.
 - (3) Estimate may be higher, or lower, depending on actual impacts.

Option C		Unit Cost		
Local Unrestricted Reuse	Unit	(\$/unit)	Total Cost (\$)	
Effluent Infrastructure		Quantity		
1.0 Mgal./d Effluent Pump station (expandable to 1.5 Mgal/d)	1	LS	\$400,000	\$400,000
10-inch Effluent Force main	12200	LF	\$120	\$1,464,000
20 MG Effluent Storage Reservoir	61.4	AF	\$22,000	\$1,351,000
0.5 MG Day Tank	1	LS	\$750,000	\$750,000
0.5 MGD DAF for Stored effluent	1	LS	\$1,000,000	\$1,000,000
0.5 MGD Filters for stored effluent	1	LS	\$700,000	\$700,000
Disinfection system for stored effluent	1	LS	\$630,000	\$630,000
Engineering Report, etc. for conversion of existing irrigation areas to effluent	1	LS	\$50,000	\$50,000
New Effluent Diffuser/Stream Gauge & Effluent force main creek crossing	1	LS	\$125,000	\$125,000
Effluent Infrastructure Subtotal				\$6,470,000
Engineering and Administration Costs	25	%		\$1,617,500
Contingency	25	%		\$1,617,500
Effluent Infrastructure Total				\$9,705,000
Treatment Improvements				
Filter Improvements (1)	1	LS	\$1,500,000	\$1,500,000
Disinfection and controls upgrades	1	LS	\$50,000	\$50,000
Treatment Improvements				\$1,550,000
Engineering and Administration Costs	25	%		\$387,500
Contingency	25	%		\$387,500
Treatment Improvements Total				\$2,325,000
Permitting and Environmental Documentation				
Permit Studies: Anti-deg, Dilution Study, RWD Jackson Creek	1	LS	\$300,000	\$300,000
CEQA Removal of Effluent	1	LS	\$80,000	\$80,000
CEQA Effluent & Treatment Improvements, RWD	1	LS	\$75,000	\$75,000
Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.)	1	LS	\$75,000	\$75,000
Environmental Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.) (3)	1	LS	\$50,000	\$50,000
Permitting and Environmental Documentation				\$580,000
Contingency	25	%		\$145,000
Permitting and Environmental Documentation Total				\$725,000
Unrestricted Reuse Capital Cost Total				\$12,755,000

ENR = 8672
February 2010, 20-Cities CCI

Cost per EDU \$7,066.48

Cost per mo. \$39.19
20 years, 3% int.

Notes:

- (1) Includes expansion for peak flows associated with existing users only and improvements to address existing problems associated with backwashing cycles.
- (2) City WWTP property accommodates expanded filter and disinfection facility improvements.
- (3) Estimate may be higher, or lower, depending on actual impacts.

Option B		Unit Cost		
Mokelumne River Discharge		Unit	(\$/unit)	Total Cost (\$)
Effluent Infrastructure	Quantity			
1.0 Mgal./d Effluent Pump station (expandable to 1.5 Mgal/d)	1	LS	\$400,000	\$400,000
10-inch Effluent Force main	25500	LF	\$130	\$3,315,000
New Effluent Diffuser/Stream Gauge & Effluent force main creek crossing	1	LS	\$125,000	\$125,000
New Effluent Diffuser/Stream Gauge Mokelumne River	1	LS	\$175,000	\$175,000
Effluent Infrastructure Subtotal				\$4,015,000
Engineering and Administration Costs	25	%		\$1,003,750
Contingency	25	%		\$1,003,750
Effluent Infrastructure Total				\$6,022,500
Treatment Improvements				
Filter Improvements (1)	1	LS	\$1,500,000	\$1,500,000
Disinfection and controls upgrades	1	LS	\$50,000	\$50,000
Treatment Improvements				\$1,550,000
Engineering and Administration Costs	25	%		\$387,500
Contingency	25	%		\$387,500
Treatment Improvements Total				\$2,325,000
Permitting and Environmental Documentation				
Permit Studies: Anti-deg, Dilution Study, RWD Jackson Creek (3)	1	LS	\$300,000	\$300,000
Permit Studies: Anti-deg, Dilution Study, RWD Mokelumne R., CTR sampling for RWD	1	LS	\$360,000	\$360,000
CEQA Removal of Effluent	1	LS	\$80,000	\$80,000
CEQA Effluent & Treatment Improvements, RWD for Mokelumne R. (4)	1	LS	\$350,000	\$350,000
Environmental Permitting (ACOE, USFWS, SHPO, CDFG, Regional Water Board 401 Cert.)	1	LS	\$125,000	\$125,000
Environmental Mitigation (5)	1	LS	\$200,000	\$200,000
Permitting and Environmental Documentation				\$1,115,000
Contingency	25	%		\$278,750
Permitting and Environmental Documentation Total				\$1,393,750
Mokelumne Capital Cost Total				\$9,741,000

ENR = 8672
February 2010, 20-Cities CCI

Cost per EDU \$5,400.00

Cost per mo. \$29.95
20 years, 3% int.

Notes:

- (1) Includes expansion for peak flows associated with existing users only and improvements to address existing problems associated with backwashing cycles.
- (2) City WWTP property accomodates expanded filter and disinfection facility improvements.
- (3) Assumes the City retains a Jackson Creek discharge and minimizes what must be sent to the Mokelumne.
- (4) Assumes significant public interest in the proposal of a new effluent discharge to the Upper Mokelumne River.
- (5) Estimate may be higher, or lower, depending on actual impacts.

Option Regional			Unit Cost	
Regional Irrigation Reuse & Disposal		Unit	(\$/unit)	Total Cost (\$)
Effluent Infrastructure	Quantity			
1.0 Mgal./d Effluent Pump station (expandable to 1.5 Mgal/d)	1	LS	\$400,000	\$400,000
10-inch Effluent Force main	11600	LF	\$120	\$1,392,000
17 MG Effluent Storage Reservoir	52.2	AF	\$22,000	\$1,148,000
New Effluent Diffuser/Stream Gauge & Effluent force main creek crossing	1	LS	\$125,000	\$125,000
Effluent Infrastructure Subtotal				\$3,065,000
Engineering and Administration Costs		25	%	\$766,250
Contingency		25	%	\$766,250
Effluent Infrastructure Total				\$4,597,500
Treatment Improvements				
Filter Improvements (1)	1	LS	\$1,500,000	\$1,500,000
Disinfection and controls upgrades	1	LS	\$50,000	\$50,000
Treatment Improvements Subtotal				\$1,550,000
Engineering and Administration Costs		25	%	\$387,500
Contingency		25	%	\$387,500
Treatment Improvements Total				\$2,325,000
Permitting and Environmental Documentation				
Permit Studies: Anti-deg, Dilution Study, RWD Jackson Creek	1	LS	\$300,000	\$300,000
CEQA Removal of Effluent	1	LS	\$80,000	\$80,000
CEQA Effluent & Treatment Improvements, RWD (3)	1	LS	\$150,000	\$150,000
Environmental Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.)	1	LS	\$75,000	\$75,000
Environmental Mitigation (4)	1	LS	\$50,000	\$50,000
Permitting and Environmental Documentation Subtotal				\$655,000
Contingency		25	%	\$163,750
Permitting and Environmental Documentation Total				\$818,750
Regional Irrigation Reuse and Disposal Capital Cost Total				\$7,741,000

ENR = 8672
February 2010, 20-Cities CC

Cost per EDU \$4,290.00
Cost per mo. \$23.79
20 years, 3% int.

Notes:

- (1) Includes expansion for peak flows associated with existing users only and improvements to address existing problems associated with backwashing cycles.
- (2) City WWTP property accomodates expanded filter and disinfection facility improvements.
- (3) Includes identifying a complete regional project (including WWTP? Other regional facilities?) to avoid challenges based on charges of piece-mealing CEQA.
- (4) Estimate may be higher, or lower, depending on actual impacts.

Option X			Unit Cost	
Agricultural Irrigation Reuse & No Discharge to Creek	Unit		(\$/unit)	Total Cost (\$)
Effluent Infrastructure		Quantity		
2.0 Mgal./d Effluent Pump Station (expandable to 3.0 Mgal/d)	1	LS	\$600,000	\$600,000
15-inch Effluent Force main	11600	LF	\$150	\$1,740,000
142 MG Effluent Storage Reservoir	400	AF	\$18,000	\$7,200,000
Effluent Infrastructure Subtotal				\$9,540,000
Engineering and Administration Costs	25	%		\$2,385,000
Contingency	25	%		\$2,385,000
Effluent Infrastructure Total				\$14,310,000
Treatment Improvements				
Filter Improvements (1)	1	LS	\$150,000	\$150,000
Disinfection ² and controls upgrades	1	LS	\$50,000	\$50,000
Treatment Improvements Subtotal				\$200,000
Engineering and Administration Costs	25	%		\$50,000
Contingency	25	%		\$50,000
Treatment Improvements Total				\$300,000
Permitting and Environmental Documentation				
Permit Studies: Anti-deg, Groundwater evaluation	1	LS	\$100,000	\$100,000
CEQA Removal of Effluent and WWTP Improvements	1	LS	\$150,000	\$150,000
SHPO, USFWS, Regional Water Board 401 Cert.)	1	LS	\$75,000	\$75,000
Environmental Mitigation (3)	1	LS	\$150,000	\$150,000
Permitting and Environmental Documentation Subtotal				\$475,000
Contingency	25	%		\$118,750
Permitting and Environmental Documentation Total				\$593,750
Agricultural Irrigation Reuse & No Discharge to Creek Cost Total				\$15,204,000

ENR = 8672
February 2010
20-Cities CCI

Cost per EDU \$8,420.00

Cost per mo. \$46.70
20 years, 3% int.

Notes:

- (1) Includes improvements to address existing problems.
- (2) City WWTP property accomodates expanded filter and disinfection facility improvements.
- (3) Estimate may be higher, or lower, depending on actual impacts.

Option Y		Unit Cost		
Effluent Discharge to Lake Amador		Unit	(\$/unit)	Total Cost (\$)
Effluent Infrastructure	Quantity			
3.0 Mgal./d Effluent Pump station	1	LS	\$600,000	\$600,000
10-inch Effluent Force main	34000	LF	\$140	\$4,760,000
Lake Diffuser	1	LS	\$500,000	\$500,000
Effluent Sampling and Lake Monitoring Facilities	1	LS	\$200,000	\$200,000
Effluent Infrastructure Subtotal				\$6,060,000
Engineering and Administration Costs		25	%	\$1,515,000
Contingency		25	%	\$1,515,000
Effluent Infrastructure Total				\$9,090,000
Treatment Improvements				
Filter Improvements (1)	1	LS	\$1,500,000	\$1,500,000
Disinfection Upgrades	1	LS	\$100,000	\$100,000
Treatment Improvements Subtotal				\$1,600,000
Engineering and Administration Costs		25	%	\$400,000
Contingency		25	%	\$400,000
Treatment Improvements Total				\$2,400,000
Permitting and Environmental Documentation				
Discharge Permit Studies: Anti-deg, Dilution Study, RWD Lake Amador	1	LS	\$500,000	\$500,000
CEQA Removal of Effluent and WWTP Improvements	1	LS	\$150,000	\$150,000
Environmental Permitting (ACOE, CDFG, SHPO, USFWS, Regional Water Board 401 Cert.) (2)	1	LS	\$300,000	\$300,000
Environmental Mitigation (2)	1	LS	\$350,000	\$350,000
Permitting and Environmental Documentation Subtotal				\$1,300,000
Contingency		25	%	\$325,000
Permitting and Environmental Documentation Total				\$1,625,000
Effluent Discharge to Lake Amador Cost Total				\$13,115,000

ENR = 8672
February 2010
20-Cities CCI

Cost per EDU \$7,265.93
Cost per mo. \$40.30
20 years, 3% int.

Notes:
(1) Includes expansion for peak flows associated with existing users only and improvements to address existing problems associated with backwashing cycles.
(2) Estimate may be higher, or lower, depending on actual impacts.