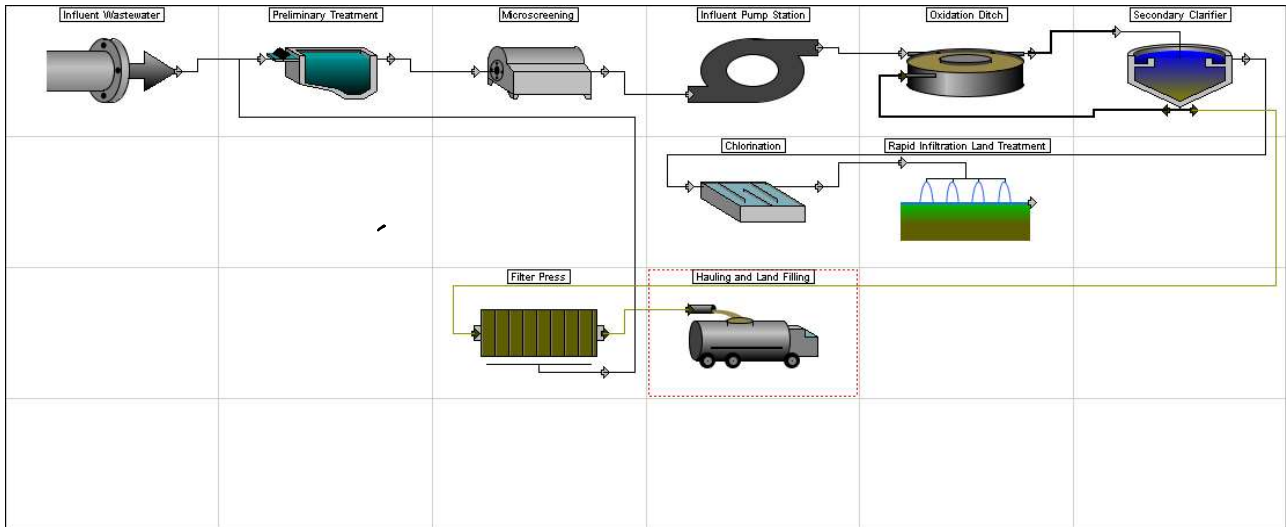


Layout - Eagle Mountain



Summary

Equipment Database

Hydromantis 2014,(USA Avg)

Layout Summary

Description	Value	Units
CONSTRUCTION COSTS		
Unit process construction cost:	\$6,850,000	\$
Other direct construction costs	\$1,500,000	\$
Other indirect construction costs	\$6,350,000	\$
Total construction costs	\$14,700,000	\$

ANNUAL COSTS

LABOR COSTS

Administration labor cost	\$12,000	\$/yr
Laboratory labor cost	\$117,000	\$/yr
Unit process operation labor cost	\$288,000	\$/yr
Unit process maintenance labor cost	\$58,200	\$/yr
Total labor costs	\$475,000	\$/yr

MATERIAL COSTS

Total material cost	\$216,000	\$/yr
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CHEMICAL COSTS

Total chemical cost	\$11,900	\$/yr
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ENERGY COSTS

Total energy cost	\$57,600	\$/yr
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Total operation and maintenance	\$761,000	\$/yr
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CONSTRUCTION COST AMC

Amortization cost for total construction	\$1,350,000	\$/yr
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Total annual project cost	\$2,110,000	\$/yr
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PROJECT SUMMARY

Present worth	\$25,400,000	\$
Total project cost	\$14,700,000	\$
Total operation labor cost	\$417,000	\$/yr
Total maintenance labor cost	\$58,200	\$/yr
Total material cost	\$216,000	\$/yr
Total chemical cost	\$11,900	\$/yr
Total energy cost	\$57,600	\$/yr
Total amortization cost	\$1,350,000	\$/yr

Process Summary

Process	Construction (\$)	Operation (\$/yr)	Maintenance (\$/yr)	Material (\$/yr)	Chemical (\$/yr)	Energy (\$/yr)	Amortization (\$/yr)
Preliminary Treatment	317000	26100	10900	7920	0	1270	26600
Microscreening	619000	4990	2330	64300	0	13900	68500
Filter Press	3250000	103000	0	0	0	0	331000
Influent Pump Station	711000	26100	15800	4980	0	5380	61500

Chlorination	452000	16700	2020	20700	11900	11800	48600
Hauling and Land Filling	286000	1960	0	109000	0	0	61500
Oxidation Ditch	561000	39200	0	2390	0	22500	50200
Rapid Infiltration Land Treatme	394000	38100	12500	4900	0	2040	38100
Secondary Clarifier	263000	32200	14600	2530	0	769	24800
Other Costs	7860000	129000	0	0	0	0	642000

Summary of Other Costs for Layout

Description	Value	Units
Other Costs		
Quantities		
Required land	10	acre
Administration labor hours	234	hr/yr
Laboratory labor hours	2270	hr/yr
Costs		
DIRECT COSTS		
Mobilization	129000	\$
Site preparation	240000	\$
Site electrical	333000	\$
Yard piping	232000	\$
Instrumentation and control	151000	\$
Lab and administration building	416000	\$
Total direct construction costs	1500000	\$
INDIRECT COSTS		
Cost of land	200000	\$
Miscellaneous cost	480000	\$
Legal cost	192000	\$
Engineering design fee	1440000	\$
Inspection cost	192000	\$
Contingency	961000	\$
Technical	192000	\$
Interest during construction	1440000	\$
Profit	1250000	\$
Total indirect construction cost	6350000	\$
Total of other construction costs	7860000	\$
LABOR COSTS		
Administration labor cost	12000	\$/yr
Laboratory labor cost	117000	\$/yr

Influent Wastewater

Preliminary Treatment

Design Output Data

Description	Value	Units
Preliminary Treatment		
Design Information		
Mechanically Cleaned Bar Screen		
Bar size	0.25	in
Bar spacing	1.5	in
Slope of bars from horizontal	30	degrees
Head loss through screen	0.0206	ft
Approach velocity	2.5	ft/s
Average flow through velocity (2.5	ft/s
Maximum flow through velocity	3	ft/s
Screen channel width	0.373	ft
Average channel depth	1	ft
Horizontal Flow Grit Chamber		
Maximum flow	4.63	cuft/s
Average flow	0.932	cuft/s
Minimum flow	0.624	cuft/s
Temperature	10	deg C
Maximum flow through velocity	1.5	ft/s
Average flow through velocity (1	ft/s
Size of smallest particle 100%	0.2	mm
Specific gravity of particle	2.65	
Number of units	2	
Maximum flow/unit	2.31	cuft/s
Width of channel	0.386	ft
Depth of channel	4	ft
Length of channel	144	ft
Settling velocity of particle	0.0707	ft/s
Slope of channel bottom	0.00604	
Allowance for currents	1.7	
Manning coefficient	0.035	
Hydraulic retention time	1.6	min
Volume of grit	2.42	cuft/d
Costs		
Construction and equipment cost	317000	\$
Operational labor cost	26100	\$/yr
Maintenance labor cost	10900	\$/yr

Material and supply cost	7920 \$/yr
Chemical cost	0 \$/yr
Energy cost	1270 \$/yr
Amortization cost	26600 \$/yr

Microscreening

Design Output Data

Description	Value	Units
Microscreening		
Design Information		
Microscreen loading rate	7	gal(US)/(sqft·min)
Quantity of wash water require	4	%
Area of microscreens required	298	sqft
Quantities		
Number of batteries	1	
Number of units/battery	2	
Drum diameter	10	ft
Drum width	10	ft
Area of selected unit	315	sqft
Area of building	223	sqft
Operation labor required	96.9	pers-hrs/yr
Maintenance labor required	62.4	pers-hrs/yr
Electrical energy required	139000	kWh/yr
Volume of wall concrete requir	3440	cuft
Volume of earthwork required	8540	cuft
Costs		
Construction and equipment cc	619000	\$
Earthwork Cost	2530	\$
Slab Concrete Cost	82800	\$
Building Cost	24500	\$
Installed Equipment Cost	429000	\$
Misc Costs	80800	\$
Operational labor cost	4990	\$/yr
Maintenance labor cost	2330	\$/yr
Material and supply cost	64300	\$/yr
Chemical cost	0	\$/yr
Energy cost	13900	\$/yr
Amortization cost	68500	\$/yr

Filter Press

Design Output Data

Description	Value	Units
Filter Press		
Design Information		
Total dry solids produced	465	lb/d
Weight of filter cake produced	1030	lb/d
Cake volume	15.9	cuft/d
Number of chambers per day	7.95	
Number of cycles per day	4	
Number of chambers required	1.99	
Costs		
Construction and equipment cc	3250000	\$
Operational labor cost	103000	\$/yr
Maintenance labor cost	0	\$/yr
Material and supply cost	0	\$/yr
Chemical cost	0	\$/yr
Energy cost	0	\$/yr
Amortization cost	331000	\$/yr

Influent Pump Station

Design Output Data

Description	Value	Units
Pump Station		
Design Information		
Volume of wet well	6680	cuft
Width of wet well	64.2	ft
Depth of the pumping station	25.5	ft
Length of the pumping station	17.2	ft
Width of the pumping station	90.5	ft
Minimum depth of water in wet	4.52	ft
Area of pump building	476	sqft
Peak capacity of pumps	3.01	MGD(US)
Firm pumping capacity	3.01	MGD(US)
Total dynamic head - average	44.7	ft
Quantities		
Operation labor required	507	pers-hrs/yr
Maintenance labor required	424	pers-hrs/yr
Electrical energy required	53800	kWh/yr
Volume of earthwork required	218000	cuft
Volume of slab concrete requir	11800	cuft
Volume of wall concrete requir	7680	cuft
Capacity per pump	2090	gpm(US)

Number of constant speed pur	2
Number of variable speed pur	0
Diameter of discharge header	10.3 in
Total dynamic head	79.7 ft
Size of selected pump	10 in
Specific speed of pump	3080
Pump rotating speed	2330 rpm
Motor size required	61.7 HP
Size of selected motor	75 HP
Width of pump system	2.6 ft
Length of pump system	17.4 ft
Length of the dry well	17.2 ft
Width of the dry well	26.4 ft
Costs	
Construction and equipment cc	711000 \$
Earthwork Cost	64600 \$
Wall Concrete Cost	185000 \$
Slab Concrete Cost	153000 \$
Building Cost	52400 \$
Installed Pump Equipment C	148000 \$
Misc Costs	108000 \$
Operational labor cost	26100 \$/yr
Maintenance labor cost	15800 \$/yr
Material and supply cost	4980 \$/yr
Chemical cost	0 \$/yr
Energy cost	5380 \$/yr
Amortization cost	61500 \$/yr

Chlorination

Design Output Data

Description	Value	Units
Chlorination		
Design Information		
Volume of tank	62500	gal(US)
Average chlorine required	50	lb/d
Peak chlorine required	250	lb/d
Influent coliform count	10000000	/100ml
Effluent coliform count	29.2	/100ml
Quantities		
Operational labor required	324	pers-hrs/yr
Maintenance labor required	54.1	pers-hrs/yr
Electrical energy required	118000	kWh/yr
Volume of earthwork required	3570	cuft
Volume of slab concrete requir	837	cuft
Volume of wall concrete requir	2750	cuft
Number of chlorinators and ev:	1	
Chlorination building area	220	sqft
Number of chlorine cylinders	2	
Area of chlorine storage buildir	280	sqft
Costs		
Construction and equipment cc	452000	\$
Earthwork Cost	1060	\$
Wall Concrete Cost	66300	\$
Slab Concrete Cost	10900	\$
Installed Equipment Cost	320000	\$
Building Cost	24200	\$
Storage Building Cost	15400	\$
Misc Costs	14100	\$
Operational labor cost	16700	\$/yr
Maintenance labor cost	2020	\$/yr
Material and supply cost	20700	\$/yr
Chemical cost	11900	\$/yr
Energy cost	11800	\$/yr
Amortization cost	48600	\$/yr

Hauling and Land Filling

Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling		
Design Information		
Volume of sludge hauled	0.608	cuyd/d
Truck capacity	19	cuyd
Round trip time to disposal site	1	hr
Truck loading time	0.75	hr
Operational hours per day	8	hr
Number of trucks required	1	
Distance to disposal site	40	miles
Quantities		
Total sludge volume hauled	0.608	cuyd/d
Maximum anticipated landfill dc	30	d
Anticipated sludge storage hei	8	ft
Sludge storage shed area	61.5	sqft

Width of sludge storage shed	5.55 ft
Length of sludge storage shed	11.1 ft
Volume of earthwork required	278 cuft
Volume of slab concrete required	138 cuft
Surface area of canopy roof	61.5 sqft
Round trip haul distance	80 miles
Round trips per day per truck	1
Distance traveled per year per	20000 miles
Sludge hauled	0.538 ton(short)/d
Operation labor required	38 pers-hrs/yr
Landfilling cost	35200 \$/yr
Costs	
Construction and equipment cost	286000 \$
Earthwork Cost	82 \$
Slab Concrete Cost	1790 \$
Canopy Roof Cost	1230 \$
Vehicle Cost	283000 \$
Operational labor cost	1960 \$/yr
Maintenance labor cost	0 \$/yr
Material and supply cost	109000 \$/yr
Chemical cost	0 \$/yr
Energy cost	0 \$/yr
Amortization cost	61500 \$/yr

Oxidation Ditch

Design Output Data

Description	Value	Units
Oxidation Ditch		
Design Information		
Carbon & Nitrification Design		
Design SRT for design at winter	24	d
Design SS	2500	mg/L
Calculated VSS	1920	mg/L
Calculated VSS:TSS ratio	0.769	mg VSS/mg SS
Total volume of reactors	2090	m ³
Ditch length	113	m
Ditch width	13.2	m
Sidewater depth	1.83	m
Number of batteries	1	
Number of parallel ditches per	1	
Number of rotors per ditch	2	
Rotor length for aeration	5.13	m
Rotor length for mixing	8	m
Installed rotor length per rotor	4	m
Rotor horsepower	20	HP
Total installed horsepower per	40	HP
Assumed surface velocity	0.46	m/s
Hydraulic retention time	21.8	hr
F/M ratio	0.0623	lb BOD/lb MLSS/d
Volumetric BOD loading	0.12	kg BOD/m ³ /d
Observed yield (VSS basis)	0.427	g VSS/g BOD
Observed yield (TSS basis)	0.555	g TSS/g BOD
Amount of alkalinity required	125	gCaCO ₃ /m ³
Amount of sludge generated	217	kg/d
Sludge recycle rate	764	m ³ /d
Nitrogen requirement for biomass	7.29	mg/L
Phosphorus requirement for biomass	1.46	mg/L
Oxygen requirement to meet a	686	kg/d
Quantities		
Ditch bottom width	14.1	ft
Length of straight section	329	ft
Volume of excavation required	109000	cuft
Volume of backfill required per	0	cuft
Volume of wall concrete required	8460	cuft
Volume of slab concrete required	11200	cuft
Length of adjustable weir	19.1	ft
Volume of concrete required per	96.3	cuft
Total handrail length	793	ft
Operation labor required	761	pers-hrs/yr
Electrical energy required	225000	kWh/yr
Costs		
Construction and equipment cost	561000	\$
Earthwork Cost	32300	\$
Wall Concrete Cost	206000	\$
Slab Concrete Cost	145000	\$
Handrail Cost	59500	\$
Installed Equipment Cost	89600	\$
Misc Costs	27700	\$
Operational labor cost	39200	\$/yr
Maintenance labor cost	0	\$/yr
Material and supply cost	2390	\$/yr
Chemical cost	0	\$/yr

Energy cost	22500 \$/yr
Amortization cost	50200 \$/yr

Rapid Infiltration Land Treatment

Design Output Data

Description	Value	Units
Rapid Infiltration Land Treatment		
Design Information		
Soil uptake of phosphorus	83.7	lb/(acre-yr)
Volume of percolate	0.609	MGD(US)
Quality of percolate		
Percolate suspended solids	0.2	mg/L
Percolate % volatile solids	76.9	%
Percolate BOD	0.0353	mg/L
Percolate soluble BOD	0.0146	mg/L
Percolate COD	10.9	mg/L
Percolate soluble COD	0.38	mg/L
Percolate TKN	7.24	mg/L
Percolate total phosphorus	0.103	mg/L
Percolate ammonia	4.22	mg/L
Percolate nitrite	0	mg/L
Percolate nitrate	4.83	mg/L
Percolate oil and grease	0	mg/L
Fencing required	1960	ft
Treatment area required	4.43	acre
Land area for buffer zones	0	acre
Total land area	6.53	acre
Quantities		
Generated flow	0.609	MGD(US)
Number of infiltration basins	4	
Area of individual infiltration basin	1.11	acre
Length of individual infiltration basin	220	ft
Volume of earthwork required	357000	cuft
Header pipe diameter	8	in
Length of header pipe required	879	ft
Lateral pipe diameter	6	in
Number of valves required	4	
Length of lateral pipe required	400	ft
Operational labor for monitoring	109	pers-hrs/yr
Operational labor for distribution	328	pers-hrs/yr
Costs		
Construction and equipment cost	319000	\$
Earthwork Cost	106000	\$
Distribution System Cost	116000	\$
Monitoring Wells Cost	3270	\$
Installed Fence Cost	44800	\$
Misc Costs	48700	\$
Operational labor cost	16900	\$/yr
Maintenance labor cost	0	\$/yr
Material and supply cost	4370	\$/yr
Chemical cost	0	\$/yr
Energy cost	0	\$/yr
Amortization cost	31100	\$/yr
Intermediate Pumping		
Design Information		
Average daily pumping rate	0.609	MGD(US)
Total pumping capacity	0.609	MGD(US)
Design capacity per pump	211	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.609	MGD(US)
Quantities		
Operation labor required	413	pers-hrs/yr
Maintenance labor required	335	pers-hrs/yr
Electrical energy required	20400	kWh/yr
Volume of earthwork required	1700	cuft
Area of pump building	212	sqft
Costs		
Construction and equipment cost	74600	\$
Earthwork Cost	503	\$
Pump Building Cost	23300	\$
Installed Pump Cost	39400	\$
Misc Costs	11400	\$
Operational labor cost	21300	\$/yr
Maintenance labor cost	12500	\$/yr
Material and supply cost	522	\$/yr
Chemical cost	0	\$/yr
Energy cost	2040	\$/yr
Amortization cost	7050	\$/yr

Secondary Clarifier

Design Output Data

Description	Value	Units
Secondary Clarification		
Design Information		
Surface area	1510	sqft
Surface area per circular clarifi	757	sqft
Diameter of each circular clarif	32	ft
Number of clarifiers per batter	2	
Number of batteries	1	
Solids loading rate	11.1	lb/(sqft-d)
Hydraulic retention time	4.04	hr
Designed surface overflow rate	400	gal(US)/(sqft-d)
Weir length	301	ft
Volume of wasted sludge	5580	gpd(US)
Quantities		
Operation labor required	400	pers-hrs/yr
Maintenance labor required	224	pers-hrs/yr
Electrical energy required	7500	kWh/yr
Volume of earthwork required	20600	cuft
Slab thickness	10.2	in
Volume of slab concrete requir	1810	cuft
Wall thickness	11.5	in
Volume of wall concrete requir	2240	cuft
Costs		
Construction and equipment cc	231000	\$
Earthwork Cost	6100	\$
Wall Concrete Cost	54000	\$
Slab Concrete Cost	23400	\$
Installed Equipment Cost	112000	\$
Misc Costs	35200	\$
Operational labor cost	20600	\$/yr
Maintenance labor cost	8370	\$/yr
Material and supply cost	2310	\$/yr
Chemical cost	0	\$/yr
Energy cost	750	\$/yr
Amortization cost	21700	\$/yr
Waste Sludge Pumping		
Design Information		
Average daily pumping rate	0.00558	MGD(US)
Total pumping capacity	0.00558	MGD(US)
Design capacity per pump	1.94	gpm(US)
Number of pumps	3	
Number of batteries	1	
Firm pumping capacity	0.00558	MGD(US)
Quantities		
Operation labor required	226	pers-hrs/yr
Maintenance labor required	167	pers-hrs/yr
Electrical energy required	189	kWh/yr
Volume of earthwork required	1600	cuft
Area of pump building	200	sqft
Costs		
Construction and equipment cc	32400	\$
Earthwork Cost	474	\$
Pump Building Cost	22000	\$
Installed Pump Cost	4990	\$
Misc Costs	4950	\$
Operational labor cost	11600	\$/yr
Maintenance labor cost	6240	\$/yr
Material and supply cost	227	\$/yr
Chemical cost	0	\$/yr
Energy cost	19	\$/yr
Amortization cost	3070	\$/yr