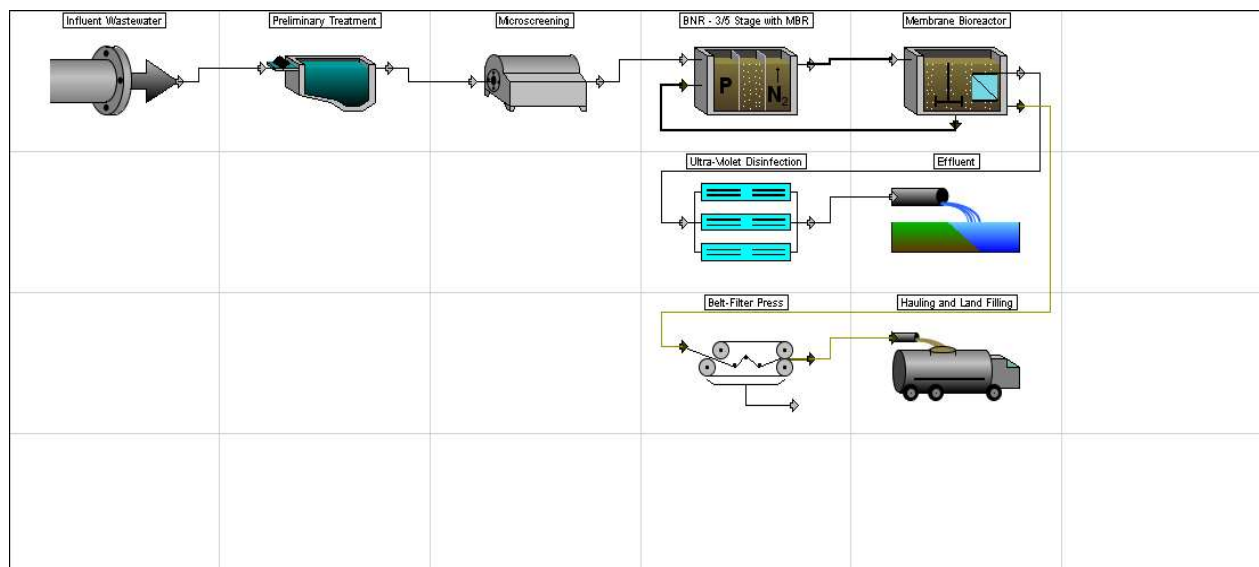


Layout - North Fork



Summary

Equipment Database

Hydromantis 2014,(USA Avg)

Layout Summary

Description	Value	Units
CONSTRUCTION COSTS		
Unit process construction cost	\$4,860,000	\$
Other direct construction costs	\$729,000	\$
Other indirect construction costs	\$4,300,000	\$
Total construction costs	\$9,880,000	\$

ANNUAL COSTS

LABOR COSTS

Administration labor cost	\$5,090	\$/yr
Laboratory labor cost	\$98,900	\$/yr
Unit process operation labor cost	\$291,000	\$/yr
Unit process maintenance labor cost	\$138,000	\$/yr
Total labor costs	\$534,000	\$/yr

MATERIAL COSTS

Total material cost	\$163,000	\$/yr
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CHEMICAL COSTS

Total chemical cost	\$12,000	\$/yr
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ENERGY COSTS

Total energy cost	\$69,200	\$/yr
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Total operation and maintenance	\$778,000	\$/yr
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CONSTRUCTION COST AMC

Amortization cost for total construction	\$963,000	\$/yr
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Total annual project cost	\$1,740,000	\$/yr
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PROJECT SUMMARY

Present worth	\$20,900,000	\$
Total project cost	\$9,880,000	\$
Total operation labor cost	\$395,000	\$/yr
Total maintenance labor cost	\$138,000	\$/yr
Total material cost	\$163,000	\$/yr
Total chemical cost	\$12,000	\$/yr
Total energy cost	\$69,200	\$/yr
Total amortization cost	\$963,000	\$/yr

Process Summary

Process	Construction (\$)	Operation (\$/yr)	Maintenance (\$/yr)	Material (\$/yr)	Chemical (\$/yr)	Energy (\$/yr)	Amortization (\$/yr)
Preliminary Treatment	246000	17900	8450	6140	0	759	20600
Microscreening	307000	1650	823	27800	0	9770	32900
BNR - 3/5 Stage with MBR	630000	112000	55400	18400	0	16600	58800
Ultra-Violet Disinfection	215000	0	2160	2150	747	5360	18200

Belt-Filter Press	812000	293	57	0	966	226	74300
Membrane Bioreactor	1890000	158000	71600	18200	10300	36500	250000
Effluent	0	0	0	0	0	0	0
Hauling and Land Filling	286000	1280	0	90400	0	0	61500
Blower System	475000	0	0	0	0	0	39800
Other Costs	5030000	104000	0	0	0	0	407000

Summary of Other Costs for Layout

Description	Value	Units
Other Costs		
Quantities		
Required land		9 acre
Administration labor hours		98.9 hr/yr
Laboratory labor hours		1920 hr/yr
Costs		
DIRECT COSTS		
Mobilization	60500 \$	
Site preparation	128000 \$	
Site electrical	149000 \$	
Yard piping	106000 \$	
Instrumentation and control	64200 \$	
Lab and administration building	220000 \$	
Total direct construction costs	729000 \$	
INDIRECT COSTS		
Cost of land	180000 \$	
Miscellaneous cost	321000 \$	
Legal cost	128000 \$	
Engineering design fee	963000 \$	
Inspection cost	128000 \$	
Contingency	642000 \$	
Technical	128000 \$	
Interest during construction	969000 \$	
Profit	838000 \$	
Total indirect construction cost	4300000 \$	
Total of other construction costs	5030000 \$	
LABOR COSTS		
Administration labor cost	5090 \$/yr	
Laboratory labor cost	98900 \$/yr	

Summary of Air Supply System

Description	Value	Units
Blower System for Entire Plant		
Design Information		
Minimum air flow capacity	3070	scfm
Safety factor	1.5	
Requested air flow capacity	4600	scfm
Total capacity of blowers	4600	scfm
Number of blowers in use	1	
Total number of blowers	2	
Capacity of individual blowers	4600	scfm
Estimated cost of an installed blower	153000	\$
Blower building area	1110	sqft
Costs		
Construction and equipment cost	475000	\$
Installed Blower Cost	306000	\$
Building Cost	122000	\$
Misc Costs	47100	\$
Operational labor cost	0	\$/yr
Maintenance labor cost	0	\$/yr
Material and supply cost	0	\$/yr
Chemical cost	0	\$/yr
Energy cost	0	\$/yr
Amortization cost	39800	\$/yr

Notes
Energy costs are shown at the individual unit processes that require air

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	0.123 ft
Average channel depth	1 ft
Horizontal Flow Grit Chamber	
Maximum flow	3.08 cuft/s
Average flow	0.308 cuft/s
Minimum flow	0.154 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	1.54 cuft/s
Width of channel	0.257 ft
Depth of channel	4 ft
Length of channel	144 ft
Settling velocity of particle	0.0707 ft/s
Slope of channel bottom	0.0111
Allowance for currents	1.7
Manning coefficient	0.035
Hydraulic retention time	1.6 min
Volume of grit	0.8 cuft/d
Costs	
Construction and equipment cc	246000 \$
Operational labor cost	17900 \$/yr
Maintenance labor cost	8450 \$/yr
Material and supply cost	6140 \$/yr
Chemical cost	0 \$/yr
Energy cost	759 \$/yr
Amortization cost	20600 \$/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	198	sqft
Quantities		
Number of batteries	1	
Number of units/battery	2	
Drum diameter	6	ft
Drum width	6	ft
Area of selected unit	108	sqft
Area of building	155	sqft
Operation labor required	32	pers-hrs/yr
Maintenance labor required	20.6	pers-hrs/yr
Electrical energy required	97700	kWh/yr
Volume of wall concrete requir	2600	cuft
Volume of earthwork required	5850	cuft
Costs		
Construction and equipment cc	307000	\$
Earthwork Cost	1730	\$
Slab Concrete Cost	62500	\$
Building Cost	17000	\$
Installed Equipment Cost	186000	\$
Misc Costs	40000	\$
Operational labor cost	1650	\$/yr
Maintenance labor cost	823	\$/yr
Material and supply cost	27800	\$/yr
Chemical cost	0	\$/yr
Energy cost	9770	\$/yr
Amortization cost	32900	\$/yr

BNR - 3/5 Stage with MBR

Design Output Data

Description	Value	Units
BNR System for BIO-P and N Removal		
Design Information		
3-Stage Biological Phosphorus		
Design aerobic SRT for nitrific:	12.5	d
Total reactor SRT	25	d
Design SS	9000	mg/L
Calculated VSS	6490	mg/L
Calculated VSS:TSS ratio	0.721	mg VSS/mg SS
Total volume of anaerobic reac	4.42	m3
Total volume of anoxic reactor:	106	m3
Total volume of aerobic reacto:	111	m3
Total volume of all reactors	221	m3
Width of parallel train	10	m

Sidewater depth	5 m
Number of batteries	1
Number of parallel trains per battery	2
Number of anoxic cells within each battery	1
Number of aerobic cells within each battery	1
Anaerobic hydraulic retention time	0.14 hr
Anoxic hydraulic retention time	3.37 hr
Aerobic hydraulic retention time	3.51 hr
Amount of sludge generated	79.7 kg/d
Sludge recycle ratio	300 %
Sludge recycle rate	2270 m ³ /d
Nitrogen required for biomass	12.9 mg/L
Phosphorus required for biomass	2.58 mg/L
Oxygen required to meet average demand	159 kg/d
Air flow required to meet average demand	264 N m ³ /hr
Design air flow	39.7 N m ³ /min/1000 m ³
Quantities	
Operation labor required	1060 pers-hrs/yr
Maintenance labor required	488 pers-hrs/yr
Electrical energy required	112000 kWh/yr
Volume of earthwork required	20700 cuft
Volume of slab concrete required	4210 cuft
Volume of wall concrete required	4040 cuft
Handrail length	113 ft
Number of diffusers per train	71
Fine bubble diffuser floor coverage	14.6 %
Number of swing arm headers	1
Required mixing power	3.9 kW
Total number of mixers	4
Design mixing power per mixer	1.12 kW
Mixing power for each unaerated tank	0.975 kW
Costs	
Construction and equipment costs	319000 \$
Earthwork Cost	6150 \$
Wall Concrete Cost	97200 \$
Slab Concrete Cost	54600 \$
Handrail Cost	8470 \$
Installed Aerator Equipment	49200 \$
Air Piping Cost	15900 \$
Installed Mixer Equipment Costs	56200 \$
Misc Costs	31600 \$
Operational labor cost	54500 \$/yr
Maintenance labor cost	19500 \$/yr
Material and supply cost	16200 \$/yr
Chemical cost	0 \$/yr
Energy cost	11200 \$/yr
Amortization cost	29400 \$/yr
Internal Recycle Pumping	
Design Information	
Average daily pumping rate	0.3 MGD(US)
Total pumping capacity	0.3 MGD(US)
Design capacity per pump	104 gpm(US)
Number of pumps	6
Number of batteries	1
Firm pumping capacity	0.3 MGD(US)
Quantities	
Operation labor required	377 pers-hrs/yr
Maintenance labor required	301 pers-hrs/yr
Electrical energy required	20200 kWh/yr
Volume of earthwork required	1650 cuft
Area of pump building	206 sqft
Costs	
Construction and equipment costs	123000 \$
Earthwork Cost	976 \$
Pump Building Cost	45300 \$
Installed Pump Cost	57700 \$
Misc Costs	18700 \$
Operational labor cost	19400 \$/yr
Maintenance labor cost	12000 \$/yr
Material and supply cost	859 \$/yr
Chemical cost	0 \$/yr
Energy cost	2020 \$/yr
Amortization cost	11600 \$/yr
Internal Recycle Pumping	
Design Information	
Average daily pumping rate	0.4 MGD(US)
Total pumping capacity	0.4 MGD(US)
Design capacity per pump	139 gpm(US)
Number of pumps	6
Number of batteries	1
Firm pumping capacity	0.4 MGD(US)
Quantities	

Operation labor required	391 pers-hrs/yr
Maintenance labor required	314 pers-hrs/yr
Electrical energy required	26900 kWh/yr
Volume of earthwork required	1660 cuft
Area of pump building	208 sqft
Costs	
Construction and equipment cost	132000 \$
Earthwork Cost	986 \$
Pump Building Cost	45700 \$
Installed Pump Cost	65500 \$
Misc Costs	20200 \$
Operational labor cost	20100 \$/yr
Maintenance labor cost	12600 \$/yr
Material and supply cost	927 \$/yr
Chemical cost	0 \$/yr
Energy cost	2690 \$/yr
Amortization cost	12500 \$/yr
Sludge Recycle Pumping	
Design Information	
Average daily pumping rate	0.2 MGD(US)
Total pumping capacity	0.2 MGD(US)
Design capacity per pump	69.4 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	0.2 MGD(US)
Quantities	
Operation labor required	358 pers-hrs/yr
Maintenance labor required	284 pers-hrs/yr
Electrical energy required	6730 kWh/yr
Volume of earthwork required	1630 cuft
Area of pump building	204 sqft
Costs	
Construction and equipment cost	55500 \$
Earthwork Cost	483 \$
Pump Building Cost	22400 \$
Installed Pump Cost	24100 \$
Misc Costs	8470 \$
Operational labor cost	18400 \$/yr
Maintenance labor cost	11300 \$/yr
Material and supply cost	389 \$/yr
Chemical cost	0 \$/yr
Energy cost	673 \$/yr
Amortization cost	5250 \$/yr

Ultra-Violet Disinfection

Design Output Data

Description	Value	Units
Ultra-Violet Disinfection		
Design Information		
Design based on a model calculation	2.12	gal(US)/(min·W)
Total number of lamps needed	49	
Number of spare channels	1	
Total number of lamps used in design	72	
Number of excess lamps	23	
Number of lamps/modules	2	
Number of modules/bank	3	
Number of banks/channel	3	
Number of channels	4	
Calculated headloss	10.8	in
Costs		
Construction and equipment cost	215000	\$
Cost of installation	129000	\$
Total cost of UV lamps	85900	\$
Operational labor cost	0	\$/yr
Maintenance labor cost	2160	\$/yr
Material and supply cost	2150	\$/yr
Chemical cost	747	\$/yr
Energy cost	5360	\$/yr
Amortization cost	18200	\$/yr

Belt-Filter Press

Design Output Data

Description	Value	Units
Belt-Filter Press		
Design Information		
Belt filter width	1	m
Number of units	1	
Hydraulic loading per unit per hour	70	gpm(US)
Hydraulic loading required per unit	4.97	gpm(US)
Final solids content	19	%
Solids capture fraction	0.992	
Quantities		

Operation labor required	5.69 pers-hrs/yr
Maintenance labor required	1.42 pers-hrs/yr
Power	2260 kWh/yr
Polymer required	743 lb/yr
Dry solids produced	204 lb/d
Belt filter(s)	275000 \$
Building	279000 \$
Installation	68800 \$
Polymer system	82500 \$
Feed pumps	30300 \$
Conveyor system	77000 \$
Costs	
Construction and equipment cost	812000 \$
Building Cost	279000 \$
Polymer System Cost	82500 \$
Feed Pumps Cost	30300 \$
Conveyor System Cost	77000 \$
Installed Belt Filter	344000 \$
Operational labor cost	293 \$/yr
Maintenance labor cost	57 \$/yr
Material and supply cost	0 \$/yr
Chemical cost	966 \$/yr
Energy cost	226 \$/yr
Amortization cost	74300 \$/yr

Membrane Bioreactor

Design Output Data

Description	Value	Units
Membrane Bioreactor		
Design Information		
Total volume of reactors	12400	cuft
Length of parallel train	22.4	ft
Width of parallel train	11.2	ft
Sidewater depth	16.4	ft
Number of batteries	1	
Number of parallel trains per battery	3	
Total Membrane Area	15800	m2
Total Scour Air Requirement	3150	N m3/hr
Quantities		
Operation labor required	2380	pers-hrs/yr
Maintenance labor required	1250	pers-hrs/yr
Electrical energy required	359000	kWh/yr
Volume of earthwork required	15800	cuft
Volume of slab concrete required	3170	cuft
Volume of wall concrete required	4400	cuft
Handrail length	253	ft
Number of diffusers per train	78	
Number of swing arm headers	1	
Costs		
Construction and equipment cost	1680000	\$
Earthwork Cost	4680	\$
Wall Concrete Cost	106000	\$
Slab Concrete Cost	41100	\$
Handrail Cost	19000	\$
Membrane Cost	1360000	\$
Installed Aerator Equipment	69000	\$
Air Piping Cost	43000	\$
Misc Cost	38700	\$
Operational labor cost	123000	\$/yr
Maintenance labor cost	49800	\$/yr
Material and supply cost	16800	\$/yr
Chemical cost	10300	\$/yr
Energy cost	35900	\$/yr
Amortization cost	231000	\$/yr
Permeate Pumping		
Design Information		
Average daily pumping rate	0.1	MGD(US)
Total pumping capacity	1	MGD(US)
Design capacity per pump	386	gpm(US)
Number of pumps	6	
Number of batteries	1	
Firm pumping capacity	2.22	MGD(US)
Quantities		
Operation labor required	488	pers-hrs/yr
Maintenance labor required	405	pers-hrs/yr
Electrical energy required	6060	kWh/yr
Volume of earthwork required	1780	cuft
Area of pump building	222	sqft
Costs		
Construction and equipment cost	180000	\$
Earthwork Cost	1050	\$
Pump Building Cost	48800	\$

Installed Pump Cost	103000 \$
Misc Costs	27500 \$
Operational labor cost	25100 \$/yr
Maintenance labor cost	16200 \$/yr
Material and supply cost	1260 \$/yr
Chemical cost	0 \$/yr
Energy cost	606 \$/yr
Amortization cost	17000 \$/yr
Waste Sludge Pumping Design Information	
Average daily pumping rate	0.0017 MGD(US)
Total pumping capacity	0.0017 MGD(US)
Design capacity per pump	0.592 gpm(US)
Number of pumps	3
Number of batteries	1
Firm pumping capacity	0.0017 MGD(US)
Quantities	
Operation labor required	194 pers-hrs/yr
Maintenance labor required	140 pers-hrs/yr
Electrical energy required	58 kWh/yr
Volume of earthwork required	1600 cuft
Area of pump building	200 sqft
Costs	
Construction and equipment cost	30000 \$
Earthwork Cost	474 \$
Pump Building Cost	22000 \$
Installed Pump Cost	2960 \$
Misc Costs	4580 \$
Operational labor cost	9990 \$/yr
Maintenance labor cost	5610 \$/yr
Material and supply cost	210 \$/yr
Chemical cost	0 \$/yr
Energy cost	6 \$/yr
Amortization cost	2840 \$/yr

Effluent

Design Output Data

Description	Value	Units
Costs		
Construction and equipment cost	0 \$	
Operational labor cost	0 \$/yr	
Maintenance labor cost	0 \$/yr	
Material and supply cost	0 \$/yr	
Chemical cost	0 \$/yr	
Energy cost	0 \$/yr	
Amortization cost	0 \$/yr	

Hauling and Land Filling

Design Output Data

Description	Value	Units
Sludge Hauling and Land Filling Design Information		
Volume of sludge hauled	0.529	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	30	miles
Quantities		
Total sludge volume hauled	0.529	cuyd/d
Maximum anticipated landfill depth	30	d
Anticipated sludge storage height	8	ft
Sludge storage shed area	53.6	sqft
Width of sludge storage shed	5.17	ft
Length of sludge storage shed	10.3	ft
Volume of earthwork required	251	cuft
Volume of slab concrete required	125	cuft
Surface area of canopy roof	53.6	sqft
Round trip haul distance	60	miles
Round trips per day per truck	1	
Distance traveled per year per truck	15000	miles
Sludge hauled	0.468	ton(short)/d
Operation labor required	24.8	pers-hrs/yr
LandFilling cost	35200	\$/yr
Costs		
Construction and equipment cost	286000 \$	
Earthwork Cost	74 \$	
Slab Concrete Cost	1620 \$	
Canopy Roof Cost	1070 \$	
Vehicle Cost	283000 \$	
Operational labor cost	1280	\$/yr

Maintenance labor cost	0 \$/yr
Material and supply cost	90400 \$/yr
Chemical cost	0 \$/yr
Energy cost	0 \$/yr
Amortization cost	61500 \$/yr