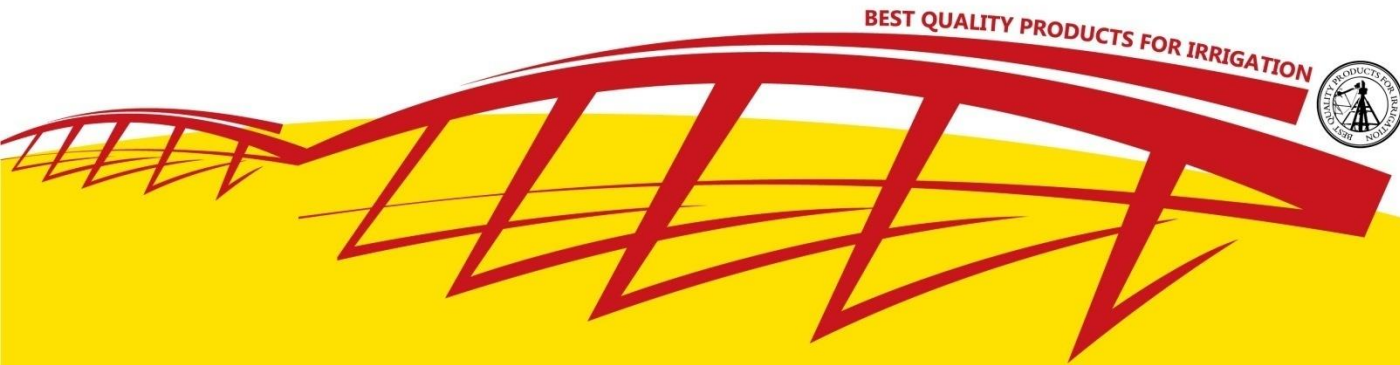




Comment:

Malawi project report

Rainfine (Dalian) Irrigation Co.,Ltd.





21 pivots:
Seven 54.5m spans
One 20.1m overhang

1 pivot:
Six 54.5m spans
One 13.4m overhang

1 pivot:
Three 61.3m spans
One 20.1m overhang

2 pivots:
Eight 54.5m spans
One 20.1m overhang

2 pivots:
Four 61.3m spans
One 6.7m overhang

1 pivot:
Nine 54.5m spans
One 20.1m overhang

1 pivot:
Eight 61.3m spans
One 6.7m overhang

4 pivots:
Six 54.5m spans
One 20.1m overhang

1 pivot:
Five 54.5m spans
One 6.7m overhang

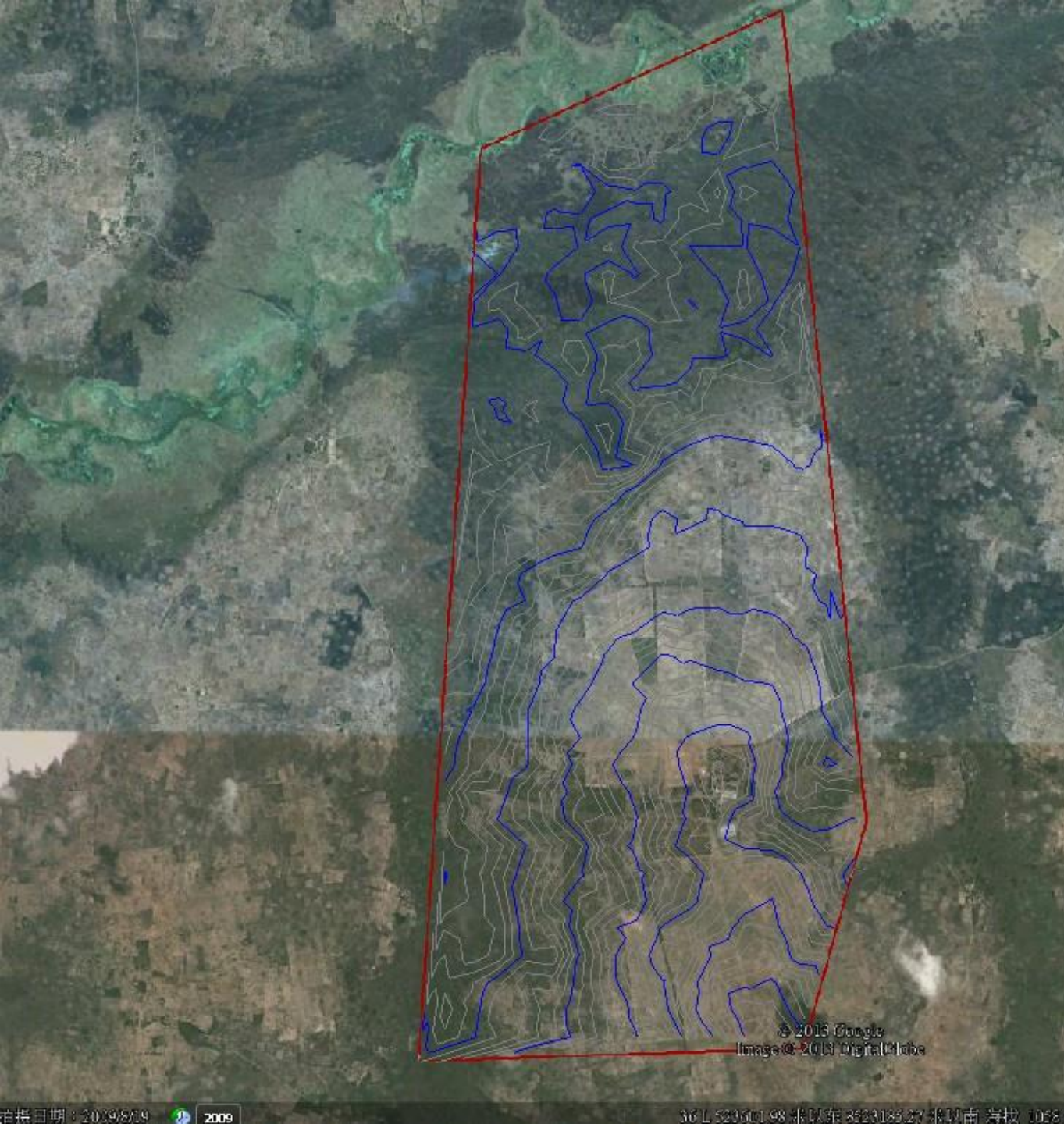
1 pivot:
Ten 54.5m spans
One 6.7m overhang

1 pivot:
Five 61.3m spans
One 6.7m overhang

1 pivot:
Six 61.3m spans
One 6.7m overhang

2 pivots:
Four 54.5m spans
One 13.4m overhang

Total land is covered by 39 pivots.



The elevation of this land, the biggest difference is about **40 meters.**

North is lower, South is higher.

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Image © 2015 DigitalGlobe





Part No.1 of elevation data.



Part No.2 of elevation data.



Part No.3 of elevation data.



3D View.



3D View.



PVC pipeline design change from last report and reason is that now is design complete and working. All hydraulic calculation was done and this design is capable of supply water for all center pivots.

No.1 pivot details. (1pivot)

1 ~ 61.26
2 ~ 61.26
3 ~ 61.26
Total Spans ~ 183.78 ~m
Overhang ~ 20.12 ~m
Endgun ~ 0.00 ~m
Area ~ 130612.3 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 65.28 ~m³/h

Speed of last tower 183.78 ~ 2.366 ~ m/minute
Time to complete full circle ~ 8.13 ~ hour
or ~ 488 ~ minutes

Highest point on outside circle ~1045.67~8526485.77 ~E ~ 523710.43 ~N
Highest point inside pivot area ~1044.09~8526458.15 ~E ~ 523526.47 ~N
Center point ~1043.63
Center coordinates ~-523545.48 ~E ~ -8526605.6 ~N

No.1 pivot details. (1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 1.5 | 65.3

At tower #

1	1.5 59.2
2	1.5 41.5
3	1.5 12.1

End of spans Main pipe pressure
1.46 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	183.8	1045.5	1.3
Lowest	122.5	1043.2	1.6

No.2 pivot details. (2 pivot's)

1 ~ 54.53
2 ~ 54.53
3 ~ 54.53
4 ~ 54.53
Total Spans ~ 218.12 ~m
Overhang ~ 13.41 ~m
Endgun ~ 0.00 ~m
Area ~ 168408.6 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 84.17 ~m³/h

Speed of last tower 218.12 ~ 2.366 ~ m/minute
Time to complete full circle ~ 9.65 ~ hour
or ~ 579 ~ minutes

Highest point on outside circle ~1075.01~8520362.09 ~E ~ 524007.64 ~N
Highest point inside pivot area ~1073.88~8520438.15 ~E ~ 523956.47 ~N
Center point ~1073.02
Center coordinates ~-523891.88 ~E ~ -8520562.6 ~N

No.2 pivot details. (2 pivot's)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 1.6 | 84.2

At tower #

1	1.6 79.4
2	1.5 65.2
3	1.5 41.9
4	1.5 8.9

End of spans Main pipe pressure
1.53 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	218.1	1074.8	1.3
Lowest	218.1	1070.9	1.7

No.3 pivot detail's. (2 pivot's)

1 ~ 61.26
2 ~ 61.26
3 ~ 61.26
4 ~ 61.26
Total Spans ~ 245.04 ~m
Overhang ~ 6.70 ~m
Endgun ~ 0.00 ~m
Area ~ 199092.2 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 99.50 ~m³/h

Speed of last tower 245.04 ~ 2.366 ~ m/minute
Time to complete full circle ~ 10.85 ~ hour
or ~ 651 ~ minutes

Highest point on outside circle ~1047.94~8525011.32 ~E ~ 524411.56 ~N
Highest point inside pivot area ~1047.62~8525168.15 ~E ~ 524386.47 ~N
Center point ~1045.38
Center coordinates ~-524246.41 ~E ~ -8525201.3 ~N

No.3 pivot details. (2 pivot's)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 1.6 | 99.5

At tower #

1	1.6 93.5
2	1.5 75.7
3	1.5 46.3
4	1.5 4.5

End of spans Main pipe pressure
1.49 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

	Distance	Elevation	Pressure
Highest	183.8	1047.7	1.3
Lowest	245.0	1044.2	1.6

No.4 pivot detail's.(1 pivot)

1 ~ 54.53
2 ~ 54.53
3 ~ 54.53
4 ~ 54.53
5 ~ 54.53
Total Spans ~ 272.65 ~m
Overhang ~ 6.70 ~m
Endgun ~ 0.00 ~m
Area ~ 245158.6 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 122.52 ~m³/h

Speed of last tower 272.65 ~ 2.366 ~ m/minute
Time to complete full circle ~ 12.07 ~ hour
or ~ 724 ~ minutes

Highest point on outside circle ~1072.64~8520200.84 ~E ~ 523547.81 ~N
Highest point inside pivot area ~1072.25~8520223.15 ~E ~ 523526.47 ~N
Center point ~1069.88
Center coordinates ~-523269.99 ~E ~ -8520171.6 ~N

No.4 pivot details. (1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 1.7 | 122.5

At tower #

1	1.6 117.8
2	1.6 103.5
3	1.6 80.3
4	1.5 47.2
5	1.5 5.5

End of spans Main pipe pressure
1.53 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	272.6	1072.5	1.2
Lowest	272.6	1064.0	2.1

No.5 pivot details.(1 pivot)

1 ~ 61.26
2 ~ 61.26
3 ~ 61.26
4 ~ 61.26
5 ~ 61.26
Total Spans ~ 306.30 ~m
Overhang ~ 6.70 ~m
Endgun ~ 0.00 ~m
Area ~ 307778.6 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 153.82 ~m³/h

Speed of last tower 306.30 ~ 2.366 ~ m/minute
Time to complete full circle ~ 13.56 ~ hour
or ~ 813 ~ minutes

Highest point on outside circle ~1078.25~8519989.54 ~E ~ 524172.24 ~N
Highest point inside pivot area ~1078.06~8520008.15 ~E ~ 524171.47 ~N
Center point ~1072.65
Center coordinates ~-524373.43 ~E ~ -8520229.3 ~N

No.5 pivot details. (1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 1.8 | 153.8

At tower #

1	1.7 147.8
2	1.6 130.1
3	1.5 100.7
4	1.5 58.8
5	1.5 5.8

End of spans Main pipe pressure
1.50 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	306.3	1078.1	0.9
Lowest	306.3	1068.2	1.9

No.6 pivot details. (1 pivot)

1 ~ 54.53

2 ~ 54.53

3 ~ 54.53

4 ~ 54.53

5 ~ 54.53

6 ~ 54.53

Total Spans ~ 327.18 ~m

Overhang ~ 13.41 ~m

Endgun ~ 0.00 ~m

Area ~ 364429.6 ~m²

Precipitation required ~ 12.00 ~ mm/day

Operating hours per day ~ 24.00

Operating efficiency ~ 100~ %

Required flow ~ 182.13 ~m³/h

Speed of last tower 327.18 ~ 2.366 ~ m/minute

Time to complete full circle ~ 14.48 ~ hour

or ~ 869 ~ minutes

Highest point on outside circle ~1049.35~8524425.79 ~E ~ 524509.96 ~N

Highest point inside pivot area ~1049.09~8524308.15 ~E ~ 524171.47 ~N

Center point ~1046.64

Center coordinates ~-524218.02 ~E ~ -8524601.2 ~N

No.6 pivot details.(1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 1.9 | 182.1

At tower #

1	1.8 177.4
2	1.7 163.1
3	1.6 139.9
4	1.5 106.8
5	1.5 65.1
6	1.5 13.2

End of spans Main pipe pressure
1.46 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	327.2	1049.1	1.3
Lowest	327.2	1044.7	1.7

No.7 pivot details.(4 pivot's)

1 ~ 54.53
2 ~ 54.53
3 ~ 54.53
4 ~ 54.53
5 ~ 54.53
6 ~ 54.53
Total Spans ~ 327.18 ~m
Overhang ~ 20.12 ~m
Endgun ~ 0.00 ~m
Area ~ 378930.3 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 189.38 ~m³/h

Speed of last tower 327.18 ~ 2.366 ~ m/minute
Time to complete full circle ~ 14.48 ~ hour
or ~ 869 ~ minutes

Highest point on outside circle ~1058.99~8519220.30 ~E ~ 521939.04 ~N
Highest point inside pivot area ~1056.77~8519578.15 ~E ~ 522021.47 ~N
Center point ~1054.16
Center coordinates ~-521770.67 ~E ~ -8519524.0 ~N

No.7 pivot details.(4 pivot's)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 2.0 | 189.4

At tower #

1	1.9 184.6
2	1.7 170.4
3	1.6 147.2
4	1.6 114.1
5	1.5 72.4
6	1.5 20.5

End of spans Main pipe pressure
1.52 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	327.2	1058.6	1.0
Lowest	163.6	1052.7	1.8

No.8 pivot details.(1 pivot)

1 ~ 61.26

2 ~ 61.26

3 ~ 61.26

4 ~ 61.26

5 ~ 61.26

6 ~ 61.26

Total Spans ~ 367.56 ~m

Overhang ~ 6.70 ~m

Endgun ~ 0.00 ~m

Area ~ 440044.6 ~m²

Precipitation required ~ 12.00 ~ mm/day

Operating hours per day ~ 24.00

Operating efficiency ~ 100~ %

Required flow ~ 219.92 ~m³/h

Speed of last tower 367.56 ~ 2.366 ~ m/minute

Time to complete full circle ~ 16.27 ~ hour

or ~ 976 ~ minutes

Highest point on outside circle ~1046.33~8525172.44 ~E ~ 523957.83 ~N

Highest point inside pivot area ~1046.35~8525168.15 ~E ~ 523956.47 ~N

Center point ~1044.75

Center coordinates ~-523618.64 ~E ~ -8525014.2 ~N

No.8 pivot details.(1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 2.2 | 219.9

At tower #
1 2.0 | 213.9
2 1.8 | 196.2
3 1.7 | 166.8
4 1.6 | 124.9
5 1.5 | 71.9
6 1.5 | 7.3

End of spans Main pipe pressure
1.51 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area
Distance Elevation Pressure
Highest 367.6 1046.3 1.4
Lowest 367.6 1043.5 1.6

No.9 pivot details. (21 pivot's)

1 ~ 54.53
2 ~ 54.53
3 ~ 54.53
4 ~ 54.53
5 ~ 54.53
6 ~ 54.53
7 ~ 54.53
Total Spans ~ 381.71 ~m
Overhang ~ 20.12 ~m
Endgun ~ 0.00 ~m
Area ~ 507264.6 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 253.52 ~m³/h

Speed of last tower 381.71 ~ 2.366 ~ m/minute
Time to complete full circle ~ 16.89 ~ hour
or ~ 1014 ~ minutes

Highest point on outside circle ~1045.78~8525634.09 ~E ~ 522054.88 ~N
Highest point inside pivot area ~1045.27~8525813.15 ~E ~ 522451.47 ~N
Center point ~1044.32
Center coordinates ~-522261.83 ~E ~ -8525978.5 ~N

No.9 pivot details.(21 pivot's)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 2.5 | 253.5

At tower #
1 2.3 | 248.8
2 2.0 | 234.5
3 1.9 | 211.3
4 1.7 | 178.2
5 1.6 | 136.5
6 1.6 | 84.6
7 1.5 | 24.4

End of spans Main pipe pressure
1.54 Bars
Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area
Distance Elevation Pressure
Highest 381.7 1045.7 1.2

No.10 pivot details.(2 pivot's)

1 ~ 54.53
2 ~ 54.53
3 ~ 54.53
4 ~ 54.53
5 ~ 54.53
6 ~ 54.53
7 ~ 54.53
8 ~ 54.53
Total Spans ~ 436.24 ~m
Overhang ~ 20.12 ~m
Endgun ~ 0.00 ~m
Area ~ 654282.0 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 327.00 ~m³/h

Speed of last tower 436.24 ~ 2.366 ~ m/minute
Time to complete full circle ~ 19.31 ~ hour
or ~ 1158 ~ minutes

Highest point on outside circle ~1062.63~8522495.96 ~E ~ 524083.37 ~N
Highest point inside pivot area ~1061.90~8522588.15 ~E ~ 524171.47 ~N
Center point ~1057.00
Center coordinates ~-524254.33 ~E ~ -8522919.0 ~N

No.10 pivot details.(2 pivot's)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 2.4 | 327.0

At tower #

1	2.2 322.3
2	2.1 308.0
3	2.0 284.8
4	1.9 251.7
5	1.7 210.0
6	1.5 158.1
7	1.5 97.9
8	1.4 27.2

End of spans Main pipe pressure
1.45 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	0.0	-1000000	10000010
Lowest	0.0	10000000	-9999989

No.11 pivot details.(1 pivot)

1 ~ 61.26
2 ~ 61.26
3 ~ 61.26
4 ~ 61.26
5 ~ 61.26
6 ~ 61.26
7 ~ 61.26
8 ~ 61.26
Total Spans ~ 490.08 ~m
Overhang ~ 6.70 ~m
Endgun ~ 0.00 ~m
Area ~ 775314.8 ~m²
Precipitation required ~ 12.00 ~ mm/day
Operating hours per day ~ 24.00
Operating efficiency ~ 100~ %
Required flow ~ 387.49 ~m³/h

Speed of last tower 490.08 ~ 2.366 ~ m/minute
Time to complete full circle ~ 21.69 ~ hour
or ~ 1301 ~ minutes

Highest point on outside circle ~1071.74~8521582.40 ~E ~ 523955.99 ~N
Highest point inside pivot area ~1070.62~8521728.15 ~E ~ 523956.47 ~N
Center point ~1064.30
Center coordinates ~-524281.91 ~E ~ -8521957.3 ~N

No.11 pivot details.(1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 2.9 | 387.5

At tower #

1	2.7 381.5
2	2.5 363.7
3	2.3 334.3
4	2.1 292.5
5	1.8 239.5
6	1.6 174.9
7	1.5 98.5
8	1.5 9.0

End of spans Main pipe pressure
1.51 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

	Distance	Elevation	Pressure
Highest	0.0	-1000000	10000010
Lowest	0.0	10000000	-9999989

No.12 pivot details.(1 pivot)

1 ~ 54.53

2 ~ 54.53

3 ~ 54.53

4 ~ 54.53

5 ~ 54.53

6 ~ 54.53

7 ~ 54.53

8 ~ 54.53

9 ~ 54.53

Total Spans ~ 490.77 ~m

Overhang ~ 20.12 ~m

Endgun ~ 0.00 ~m

Area ~ 819982.6 ~m²

Precipitation required ~ 12.00 ~ mm/day

Operating hours per day ~ 24.00

Operating efficiency ~ 100~ %

Required flow ~ 409.81 ~m³/h

Speed of last tower 490.77 ~ 2.366 ~ m/minute

Time to complete full circle ~ 21.72 ~ hour

or ~ 1303 ~ minutes

Highest point on outside circle ~1067.38~8519843.20 ~E ~ 523109.40 ~N

Highest point inside pivot area ~1066.90~8519793.15 ~E ~ 523096.47 ~N

Center point ~1060.33

Center coordinates ~-522618.30 ~E ~ -8519702.3 ~N

No.12 pivot details.(1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 3.0 | 409.8

At tower #

1	2.8 405.1
2	2.5 390.8
3	2.4 367.6
4	2.2 334.5
5	2.0 292.8
6	1.8 240.9
7	1.6 180.7
8	1.5 110.0
9	1.5 31.3

End of spans Main pipe pressure
1.48 Bars

Assuming even distribution on level surface
and pressure regulators on outlets.

	Distance	Elevation	Pressure
Highest	490.8	1067.1	0.9
Lowest	381.7	1055.4	2.2

No.13 pivot details.(1 pivot)

1 ~ 54.53

2 ~ 54.53

3 ~ 54.53

4 ~ 54.53

5 ~ 54.53

6 ~ 54.53

7 ~ 54.53

8 ~ 54.53

9 ~ 54.53

10 ~ 54.53

Total Spans ~ 545.30 ~m

Overhang ~ 6.70 ~m

Endgun ~ 0.00 ~m

Area ~ 957255.8 ~m²

Precipitation required ~ 12.00 ~ mm/day

Operating hours per day ~ 24.00

Operating efficiency ~ 100~ %

Required flow ~ 478.42 ~m³/h

Speed of last tower 545.30 ~ 2.366 ~ m/minute

Time to complete full circle ~ 24.14 ~ hour

or ~ 1448 ~ minutes

Highest point on outside circle ~1046.18~8525369.36 ~E ~ 523956.79 ~N

Highest point inside pivot area ~1046.40~8526028.15 ~E ~ 523956.47 ~N

Center point ~1045.05

Center coordinates ~-523851.47 ~E ~ -8525911.2 ~N

No.13 pivot details.(1 pivot)

Press Bar| Flow m3/h
Pivot Center
Top of pipe 3.8 | 478.4

At tower #

1	3.5 473.7
2	3.2 459.4
3	2.9 436.2
4	2.7 403.1
5	2.5 361.4
6	2.1 309.5
7	1.8 249.3
8	1.6 178.6
9	1.5 99.9
10	1.5 10.3

End of spans Main pipe pressure
1.51 Bars

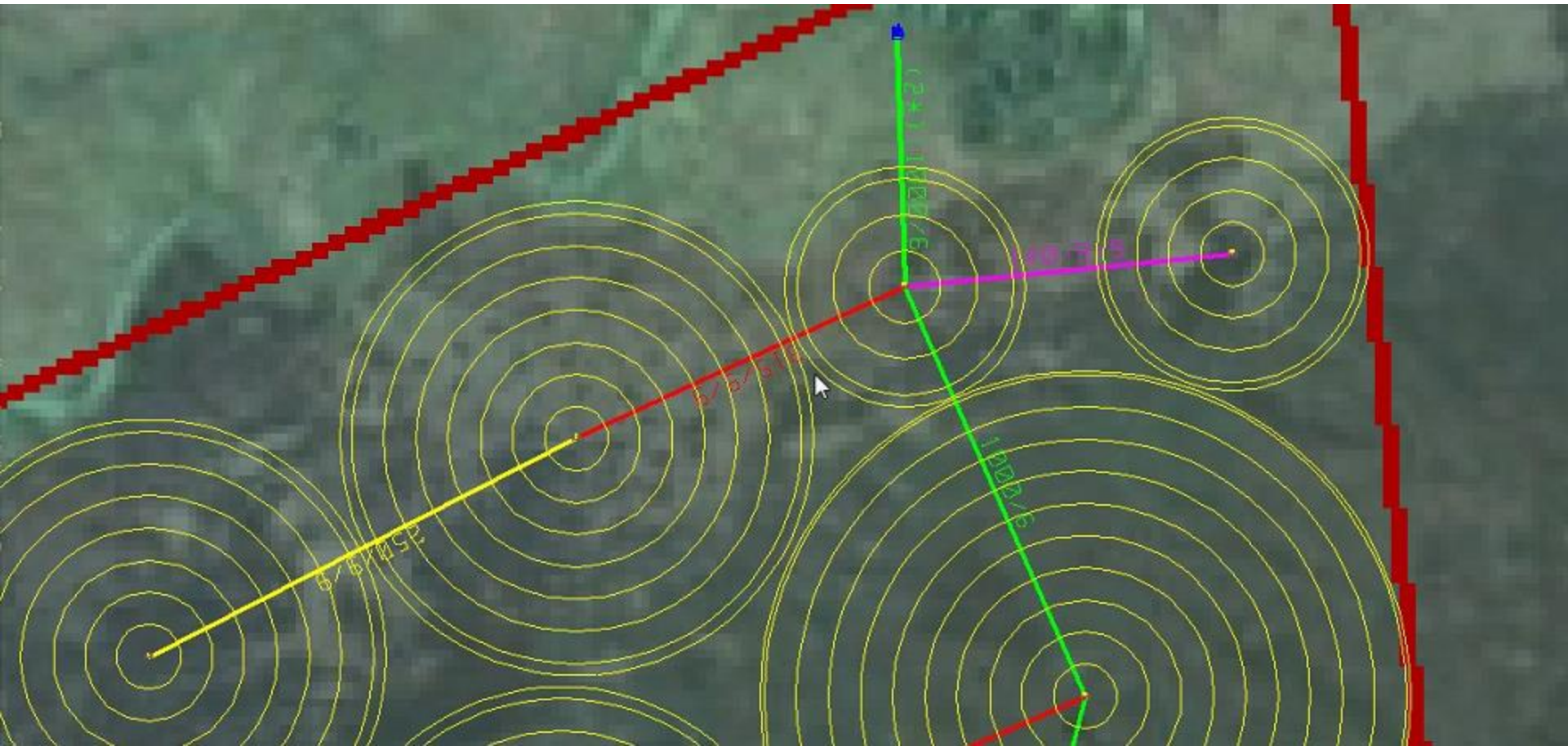
Assuming even distribution on level surface
and pressure regulators on outlets.

Critical elevations in pivot area

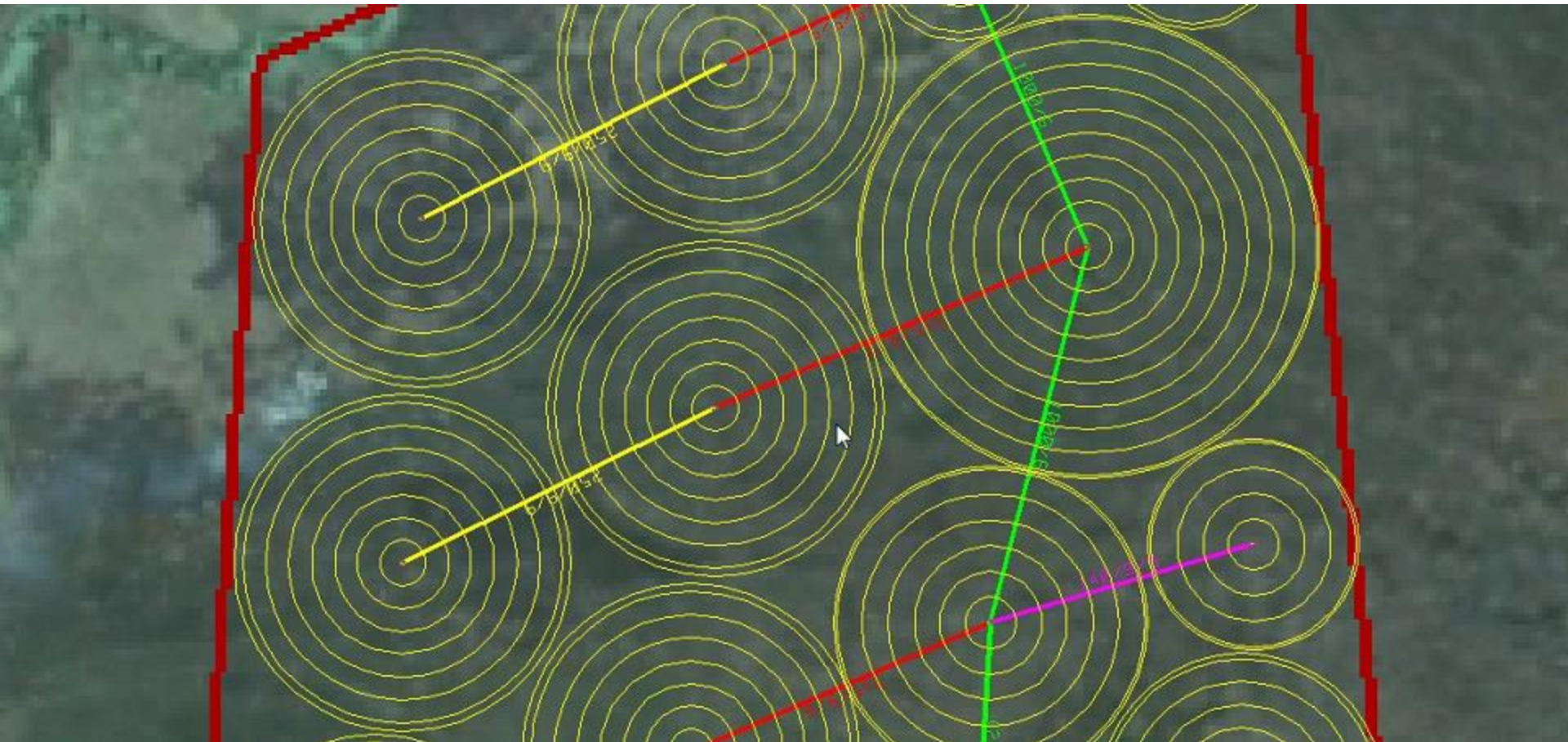
	Distance	Elevation	Pressure
Highest	163.6	1046.4	5.0
Lowest	163.6	1042.8	5.3



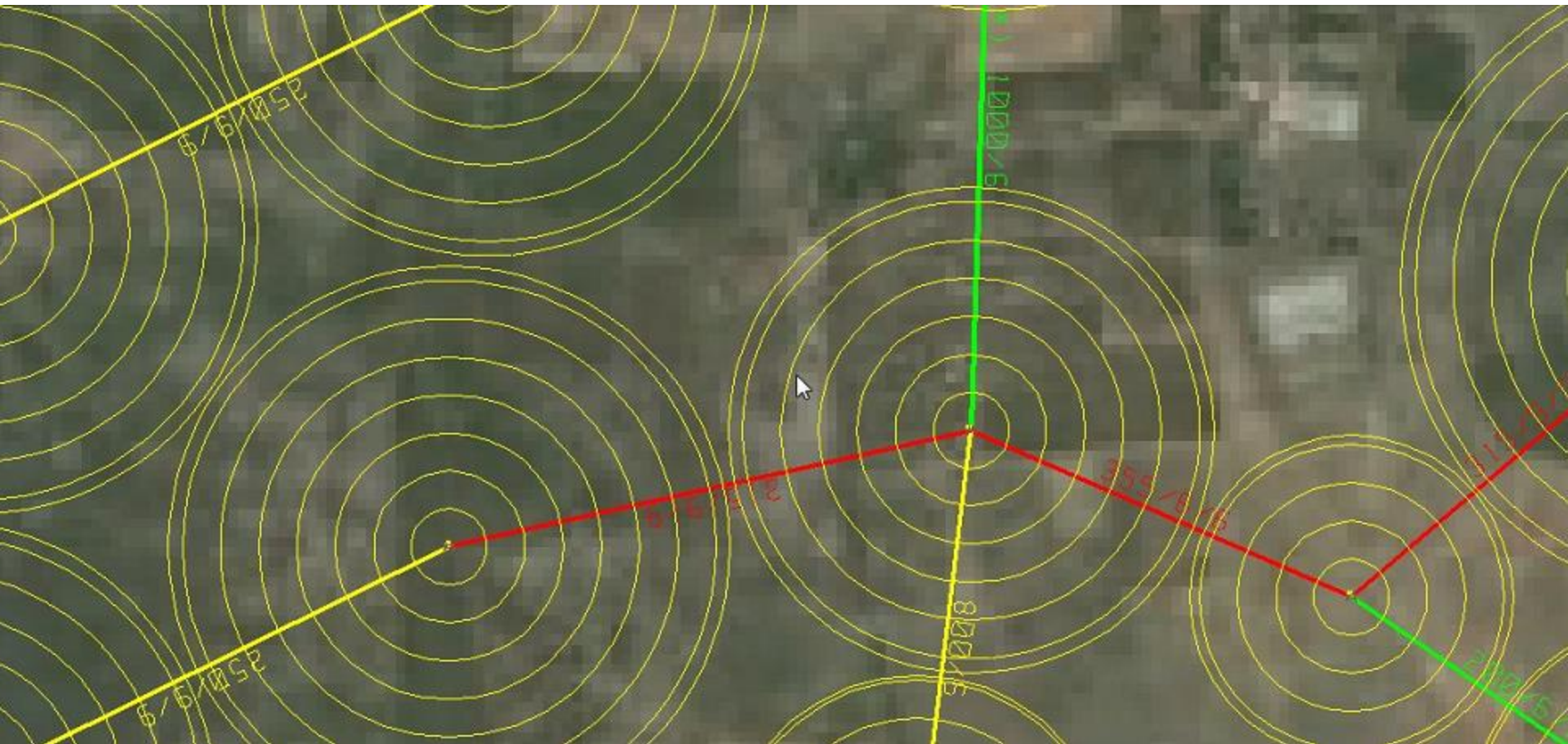
Total pipes and pivot's design leaving space where are farm's buildings and tree's.



Pump station is placed close to river and PVC main line pipes are 2 x 1000mm outside diameter (green pipes). This two PVC pipes are placed next to each other to supply enough water for all system. The main supply pipes was design to get water to higher point of land and then we can use also gravity flow to help pumps.



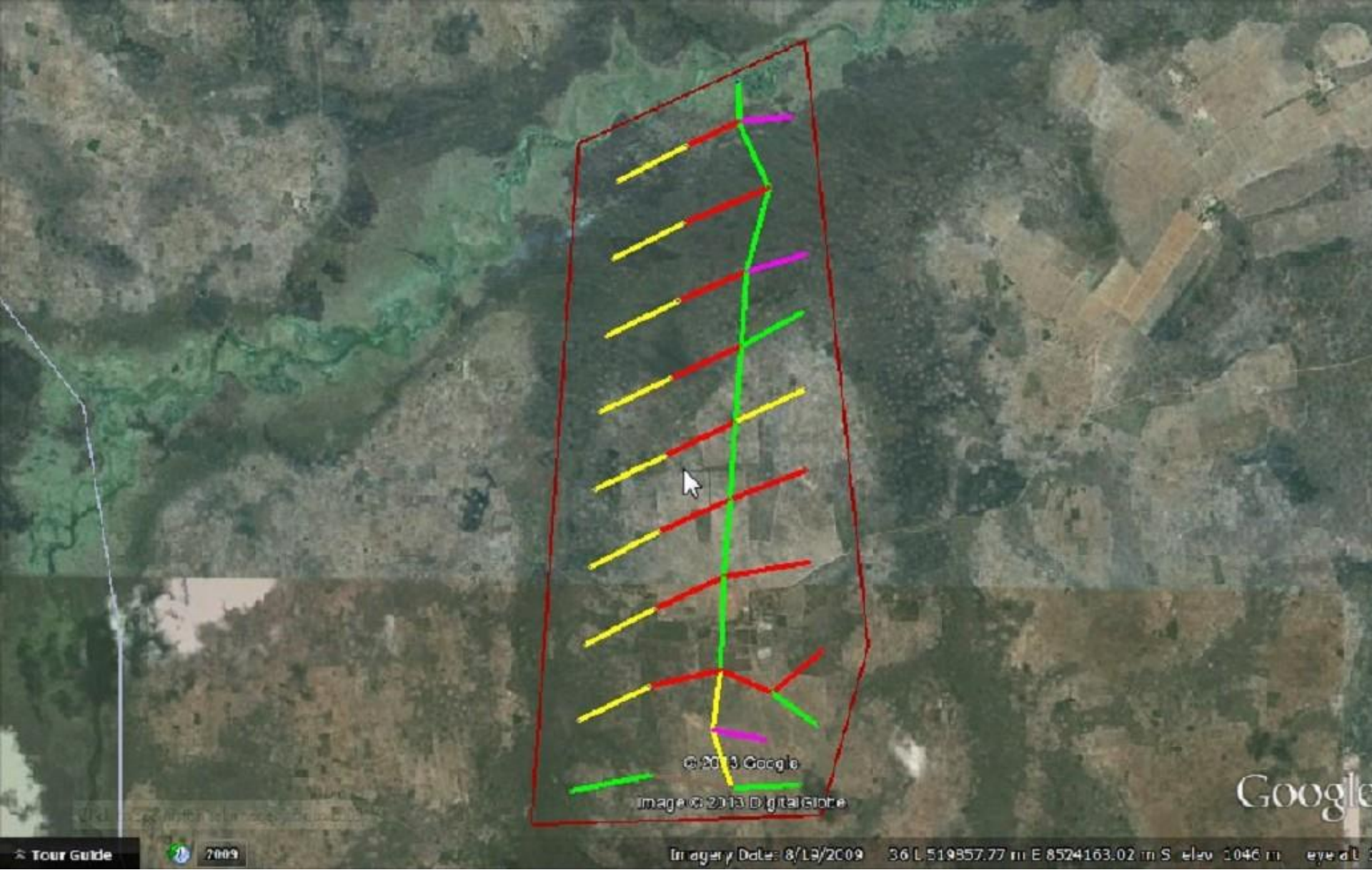
Pipes have different colors on design so we can easy see different sizes. Same color mean same diameter of PVC pipe. Program always use outside diameter of pipes.



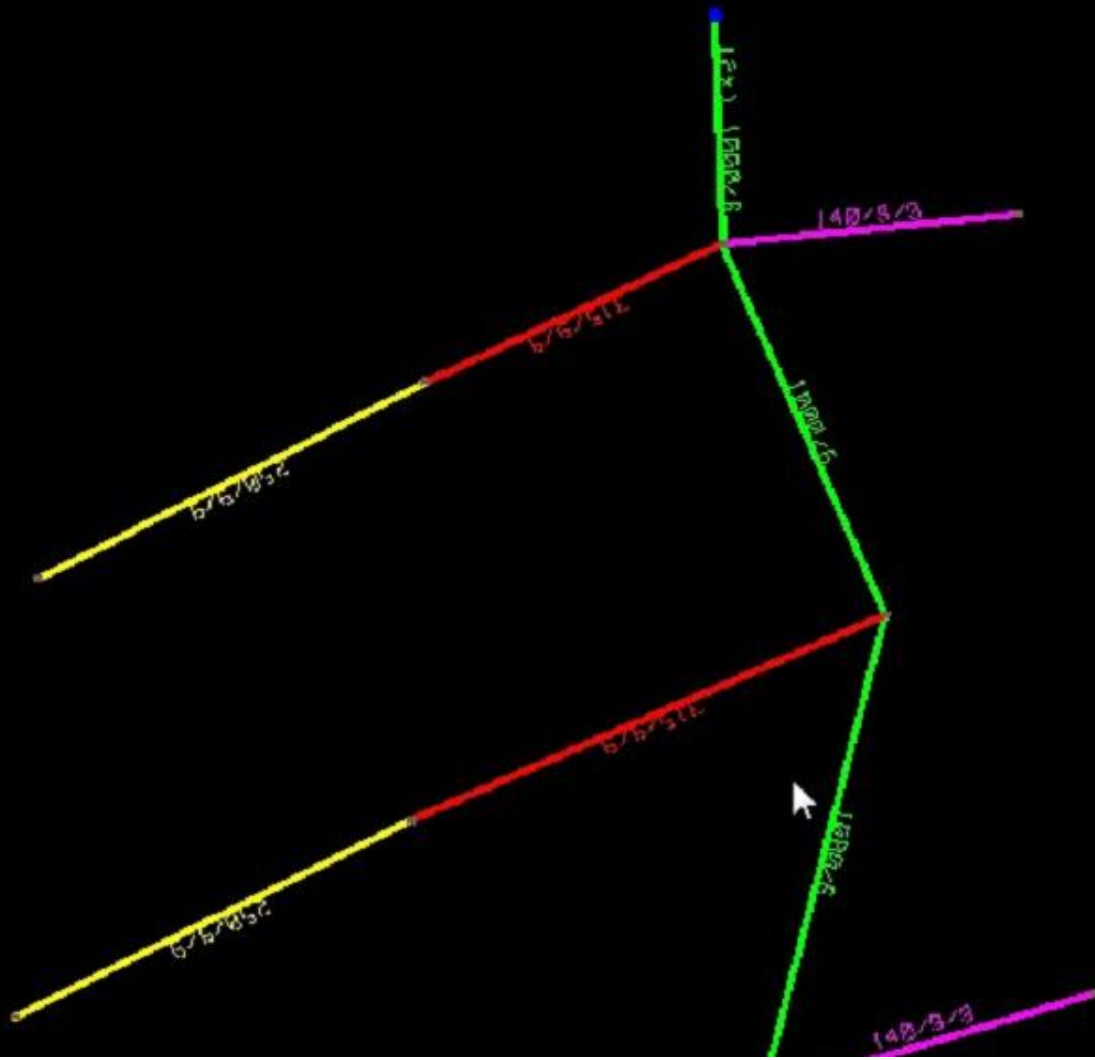
More pictures of different diameters. Here is also one red pipe with:
355mm OD diameter



Each pipe have number on top which represent size of pipe required.



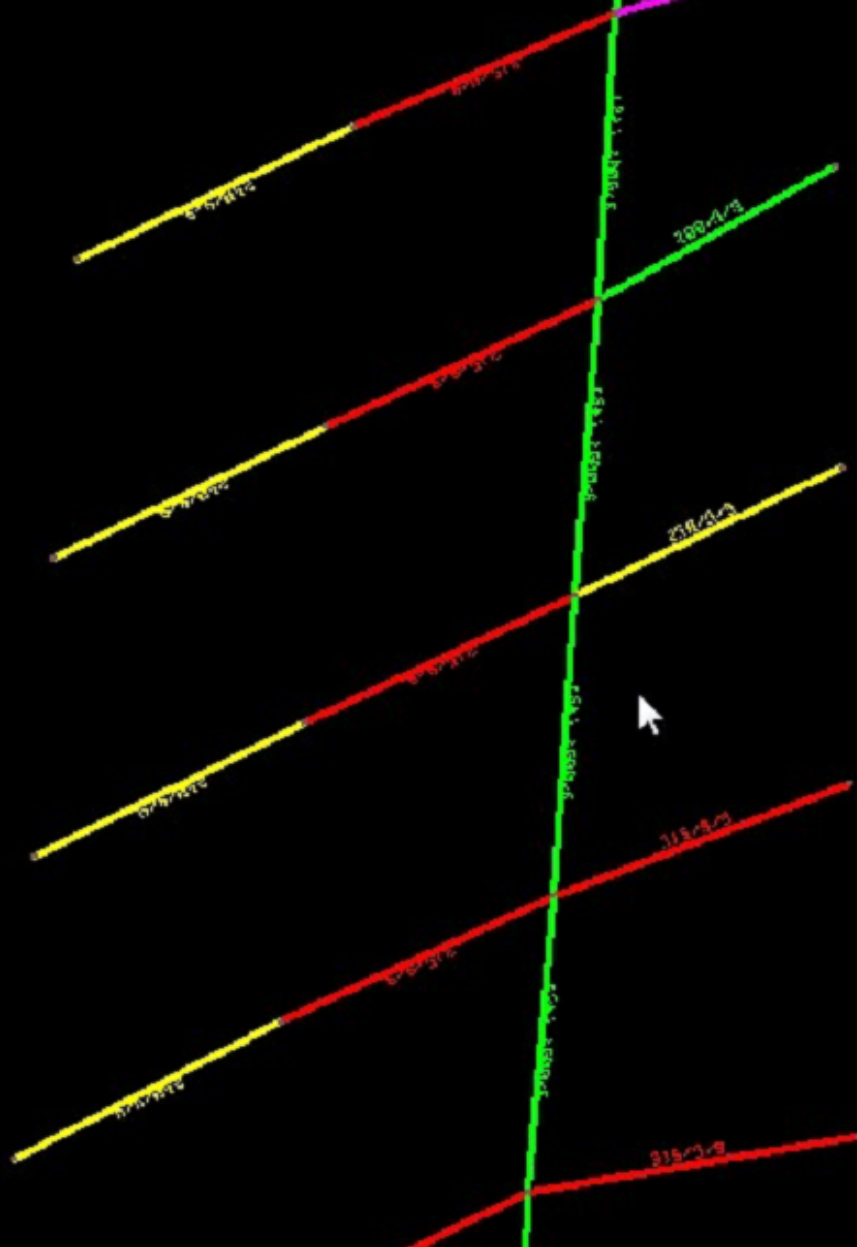
Complete pipeline design on the ground in google earth without center pivot's placed on the design.



The pipe size:

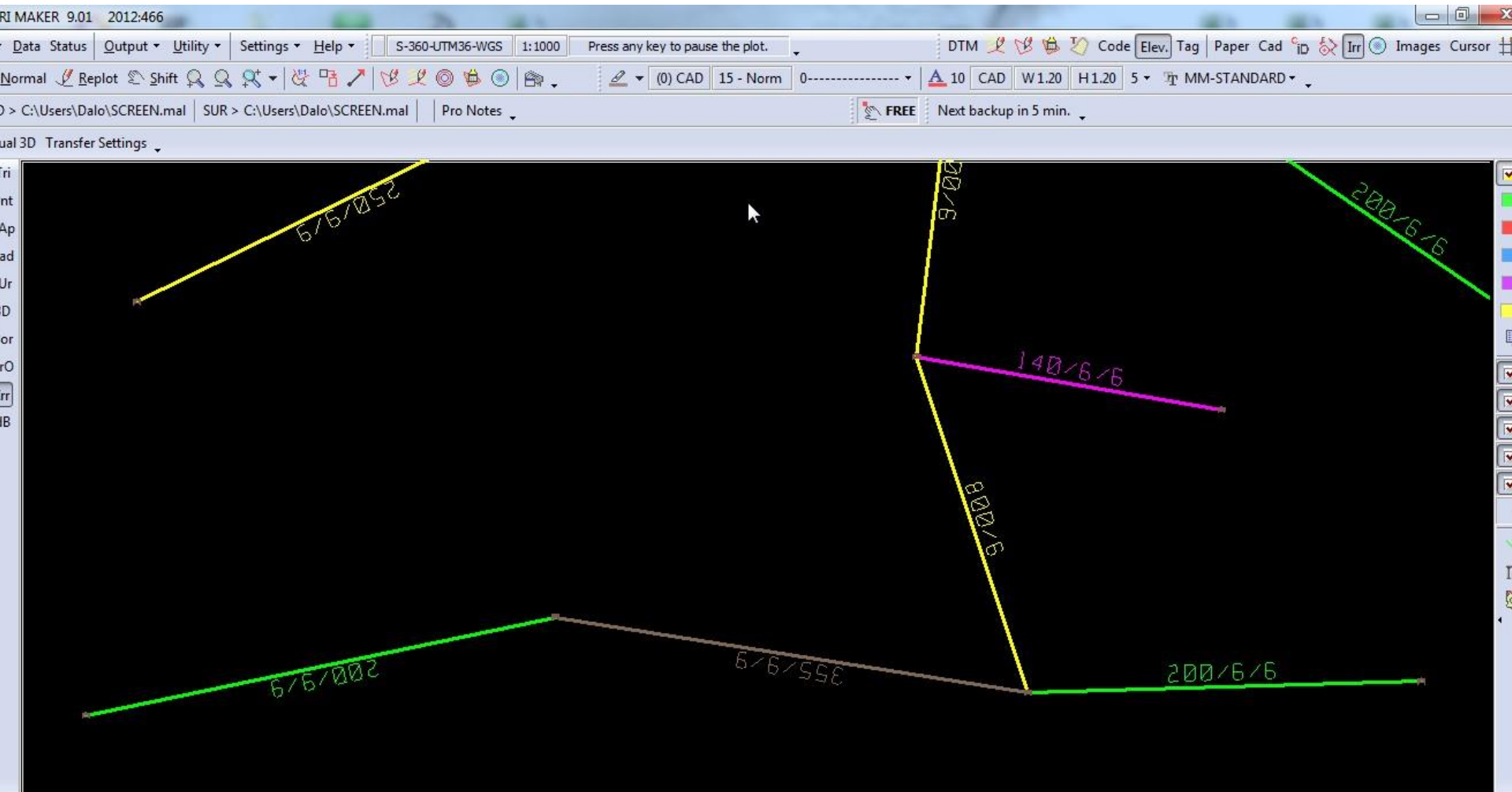
Green pipe(main line): 2 x 1000mm outside diameter(OD) **Red pipe:** 315mm OD **Yellow pipe:** 250mm OD **Purple pipe:** 140mm OD





The pipe size:

Green pipe(main line): 2 x 1000mm outside diameter(OD) **Red pipe:** 315mm OD **Yellow pipe:** 250mm OD **Purple pipe:** 140mm OD



The pipe size:

Green pipe(on the bottom of design): 200mm OD , Yellow pipe
 (bottom of design): 800mm OD , Brown pipe: 355mm OD

Main line design

Flow in pipe / shift

Pipe #	Max. flow m3/h		Shift1	Shift2		
1	9122.17 (1.6)	1	9122.17			
2	84.17	1	84.17			
3	8465.68 (3.0)	1	8465.68			
4	7480.22 (2.6)	1	7480.22			

Pipes Sizes (Actual / proposed)

Pipe #	Current	Proposed
Cost	4828569.89	4828569.88
1 #	1000.000	1000.000
2	133.000	133.000
3 #	1000.000	1000.000
4 #	1000.000	1000.000
5	299.600	299.600
6	237.800	237.800

Calculate proposed pump pressure

Pressure @ pump 8.3

Calculate pipe sizes for this pressure

Current system over 20 years
 Capital - Pump 0.00
 Capital - Pipes 12928860.9
 Operating cost 113707301.
Total 126636161.

Change pipe sizes to:

← Proposed

Print report

Capital Cost Pumping Cost Best Cost

Capital Cost

COC NAM 4 X 100/250/90KW | Model

Cost of pump unit (as defined in data base):

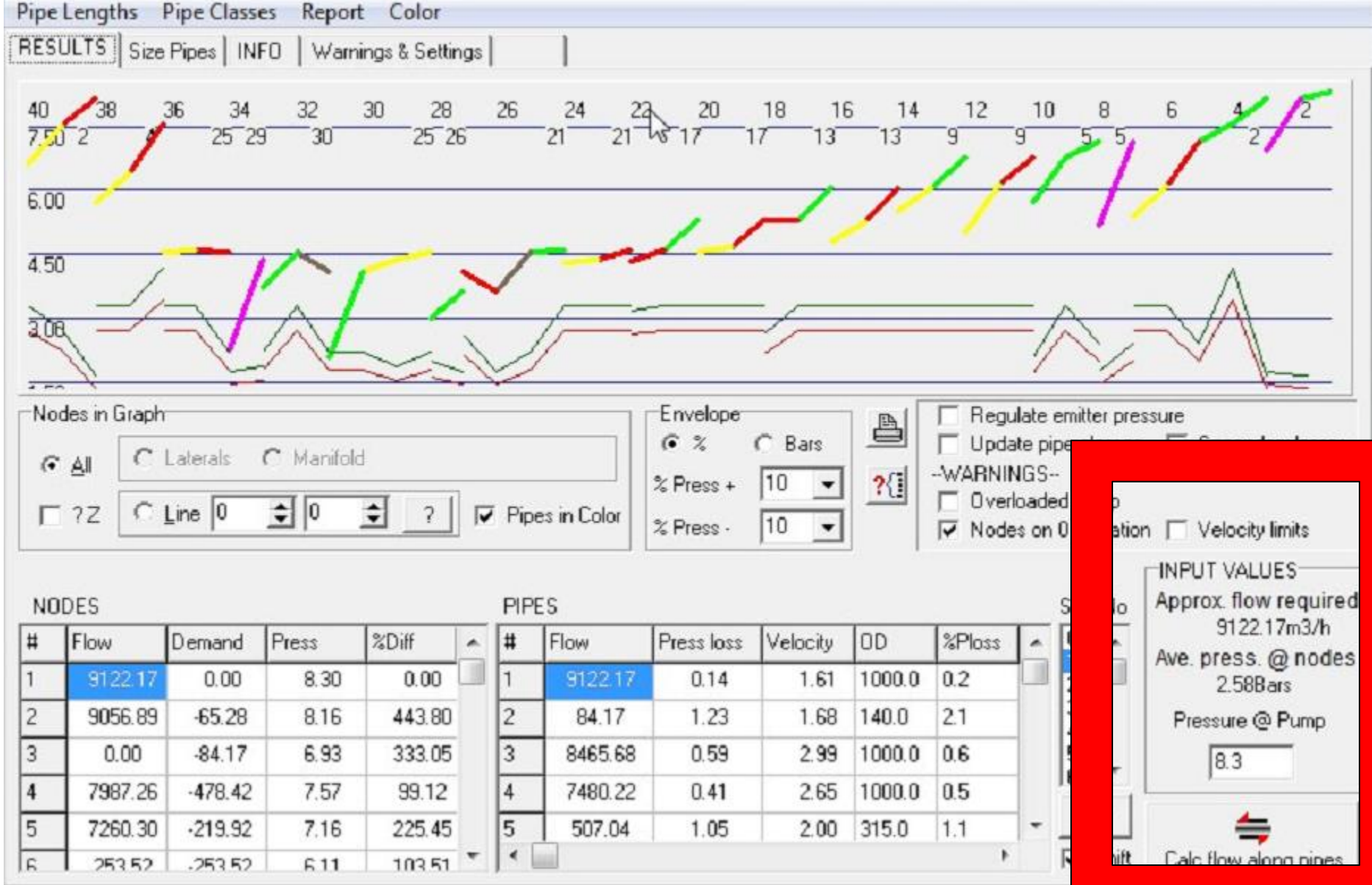
0

Pressure, flow table

	Pressure Bars	Flow m3/h
1	9.60	200.00
2	9.60	400.00
3	9.50	600.00
4	9.40	800.00
5	9.00	1000.00
6	0.00	0.00
7	0.00	0.00
8	0.00	0.00

Select new pump

Pipe size calculations with program



The pump station details:

Flow required: 9122.17m3/h
 pressure@ Nodes : 2.58 Bar

Water pressure: 8.3bar

NODES -----Summary of total nodes-----

COC NAM 4 X 100/250/90KW Model Pump # 1
 STD VALVE Model Valve # 39

 NODES ----- Detail of node sizes with OD pipe sizes -----

COC NAM 4 X 100/250/90KW Model Pump	#	1 >	End piece	1000.00		
STD VALVE Model Valve	#	2 >	+ Piece	140.00	315.00	1000.00
1000.00						
STD VALVE Model Valve	#	3 >	End piece	140.00		
STD VALVE Model Valve	#	1 >	T Piece	315.00	1000.00	1000.00
STD VALVE Model Valve	#	8 >	Reducer	250.00	315.00	
STD VALVE Model Valve	#	9 >	End piece	250.00		
STD VALVE Model Valve	#	1 >	+ Piece	200.00	315.00	1000.00
1000.00						
STD VALVE Model Valve	#	4 >	End piece	200.00		
STD VALVE Model Valve	#	1 >	+ Piece	250.00	315.00	1000.00
1000.00						
STD VALVE Model Valve	#	2 >	+ Piece	315.00	315.00	1000.00
1000.00						
STD VALVE Model Valve	#	3 >	End piece	315.00		
STD VALVE Model Valve	#	1 >	+ Piece	315.00	355.00	800.00
1000.00						
STD VALVE Model Valve	#	1 >	T Piece	200.00	315.00	355.00
STD VALVE Model Valve	#	1 >	T Piece	140.00	800.00	800.00
STD VALVE Model Valve	#	1 >	T Piece	200.00	355.00	800.00
STD VALVE Model Valve	#	1 >	Reducer	200.00	355.00	

Valves sizes, types and quantity required

PIPES	OD	Total length m (Slope Length)
MAIN PVC MAIN 140/9	140.00	# 1213.24
MAIN PVC MAIN 140/6	140.00	# 558.17
MAIN PVC MAIN 200/9	200.00	# 1609.10
MAIN PVC MAIN 200/6	200.00	# 1295.98
MAIN PVC MAIN 250/9	250.00	# 7402.95
MAIN PVC MAIN 315/9	315.00	# 8848.32
MAIN PVC MAIN 355/9	355.00	# 863.82
MAIN PVC MAIN 355/6	355.00	# 594.75
MAIN PVC MAIN 800	800.00	# 1273.47
MAIN PVC MAIN 1000	1000.0	# 10975.87
	Total	34635.68

Total number of End Pieces	20
Total number of T Pieces	4
Total number of Reducers	9
Total number of + Pieces	7

Diameters and Lengths of pipes required in total

The suggestions in this report are based on many assumptions and cannot be used as a final project design document. Before commencing with the actual construction of a scheme of this magnitude, a comprehensive design must be done and thoroughly checked.

The following assumptions were made to produce this report.

- 1) Elevation differences of the terrain were derived from Google Earth. A complete on site survey must be done to verify the topography.
- 2) Pipe diameters for the pivots spans were used : **For longer pivot like 6 spans are used two diameters of pipes 203mm and 168mm.**
- 3) The pivot starting pressures were calculated by assuming the pivot end pressure must be 1.4 bar.
- 4) Actual plugging and nozzling for each pivot was not done.
- 5) The pivot center point was assumed to be 3m height.
- 6) The proposed mainline pipe diameters are just nominal sizes. Before a final design can be done, we need to know specifically what type of pipe will be used and what diameters are available for the project.
- 7) Pipe pressure classes were not calculated.
- 8) Pressure relief valves were not calculated.
- 9) The actual pump (or array of pumps) were not calculated. It is only approximated what the required flow and pressure at the pump station should be.

If we were to perform a complete design of the system, many specific questions would have to be answered, design parameters, available material on site and design criteria would first have to be provided to us.



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