


|                   |  |   |                 |          |
|-------------------|--|---|-----------------|----------|
| <b>PROJECT :</b>  |  |  | <b>DATE :</b>   |          |
| <b>PROJ. NO.:</b> |  |   | <b>BY :</b>     | S.Rahimi |
| <b>CLIENT :</b>   |  |   | <b>REV :</b>    | 0        |
| <b>UNIT :</b>     |  |   | <b>DOC NO.:</b> |          |


### Evaporation Pond Sizing (Method 1 )

| Input Data                |          |        |
|---------------------------|----------|--------|
| Design Precipitation Rate | mm/month | 25.0   |
| Flow Overdesign           | %        | 0.0    |
| Evaporation Pond Area     | m2       | 250000 |

| Source | Normal Flow (m3/hr) | Design flow (m3/hr) | duration (min/day) | Daily flow (m3/day) | TSS (mg/lit) | TDS (mg/lit) |
|--------|---------------------|---------------------|--------------------|---------------------|--------------|--------------|
| PW     | 66.5                | 66.5                | 1440               | 1596.0              | 0            | 36900        |
|        |                     | 0                   |                    | 0.0                 |              |              |
|        |                     | 0                   |                    | 0.0                 |              |              |
|        |                     | 0                   |                    | 0.0                 |              |              |
|        |                     | 0                   |                    | 0.0                 |              |              |
|        |                     | 0                   |                    | 0.0                 |              |              |

| Salt Accumulation               |           |              |
|---------------------------------|-----------|--------------|
| Normal Flow Rate                | m3/day    | 1596.0       |
| Design Flow Rate                | m3/day    | 1596.0       |
| Salt Loading due to TSS         | kg/day    | 0            |
| Salt loading due to TDS         | kg/day    | 58892        |
| Total salt loading              | kg/day    | 58892        |
| Salt density considered         | kg/m3     | 2165         |
| Salt Loading                    | m3/day    | 27.20        |
| Accumulation duration           | year      | 5.00         |
| <b>Salt Accumulation Volume</b> | <b>m3</b> | <b>49644</b> |
| <b>Salt Accumulation Height</b> | <b>mm</b> | <b>199</b>   |


| Month  | Evaporation in mm/day |      |      |
|--------|-----------------------|------|------|
|        | Max                   | Min  | Mean |
| Jan-86 | 11.6                  | 4.3  | 2.7  |
| Feb-86 | 14.9                  | 8.1  | 3.5  |
| Mar-86 | 16.6                  | 8.7  | 4.6  |
| Apr-86 | 17.9                  | 9.8  | 5.8  |
| May-86 | 20.0                  | 11.0 | 7.1  |
| Jun-86 | 25.4                  | 6.7  | 7.9  |
| Jul-86 | 20.8                  | 7.3  | 8.4  |
| Aug-86 | 23.0                  | 11.0 | 7.6  |
| Sep-86 | 16.04                 | 7.6  | 5.9  |
| Oct-86 | 16.0                  | 8.7  | 4.5  |
| Nov-86 | 15.8                  | 3.2  | 3.2  |
| Dec-86 | 11.7                  | 3.6  | 2.4  |

|                   |  |   |                 |          |
|-------------------|--|---|-----------------|----------|
| <b>PROJECT :</b>  |  |  | <b>DATE :</b>   |          |
| <b>PROJ. NO.:</b> |  |   | <b>BY :</b>     | S.Rahimi |
| <b>CLIENT :</b>   |  |   | <b>REV :</b>    | 0        |
| <b>UNIT :</b>     |  |   | <b>DOC NO.:</b> |          |

**Evaporation Pond Sizing (Method 1 )**

| Months | No of working days | Inflow Rate | Gross Evap. Rate | Net Evap. Rate | Net Evap. Rate | Water Acc. Volume | Water Acc. Height |
|--------|--------------------|-------------|------------------|----------------|----------------|-------------------|-------------------|
|        |                    | m3/month    | mm/month         | mm/month       | m3/month       | m3                | mm                |
| JAN    | 31                 | 49476       | 84               | 59             | 14845          | 34631             | 139               |
| FEB    | 28                 | 44688       | 98               | 73             | 18372          | 60947             | 244               |
| MAR    | 31                 | 49476       | 143              | 118            | 29567          | 80856             | 323               |
| APR    | 30                 | 47880       | 175              | 150            | 37609          | 91128             | 365               |
| MAY    | 31                 | 49476       | 219              | 194            | 48578          | 92026             | 368               |
| JUNE   | 30                 | 47880       | 237              | 212            | 53117          | 86789             | 347               |
| JULY   | 31                 | 49476       | 261              | 236            | 58970          | 77295             | 309               |
| AUG    | 31                 | 49476       | 236              | 211            | 52711          | 74060             | 296               |
| SEP    | 30                 | 47880       | 176              | 151            | 37661          | 84280             | 337               |
| OCT    | 31                 | 49476       | 138              | 113            | 28312          | 105444            | 422               |
| NOV    | 30                 | 47880       | 95               | 70             | 17380          | 135944            | 544               |
| DEC    | 31                 | 49476       | 76               | 51             | 12642          | 172778            | 691               |
| JAN    | 31                 | 49476       | 84               | 59             | 14845          | 207409            | 830               |
| FEB    | 28                 | 44688       | 98               | 73             | 18372          | 233725            | 935               |
| MAR    | 31                 | 49476       | 143              | 118            | 29567          | 253634            | 1015              |
| APR    | 30                 | 47880       | 175              | 150            | 37609          | 263906            | 1056              |
| MAY    | 31                 | 49476       | 219              | 194            | 48578          | 264803            | 1059              |
| JUNE   | 30                 | 47880       | 237              | 212            | 53117          | 259567            | 1038              |
| JULY   | 31                 | 49476       | 261              | 236            | 58970          | 250073            | 1000              |
| AUG    | 31                 | 49476       | 236              | 211            | 52711          | 246838            | 987               |
| SEP    | 30                 | 47880       | 176              | 151            | 37661          | 257058            | 1028              |
| OCT    | 31                 | 49476       | 138              | 113            | 28312          | 278222            | 1113              |
| NOV    | 30                 | 47880       | 95               | 70             | 17380          | 308722            | 1235              |
| DEC    | 31                 | 49476       | 76               | 51             | 12642          | 345556            | 1382              |
| JAN    | 31                 | 49476       | 84               | 59             | 14845          | 380187            | 1521              |
| FEB    | 28                 | 44688       | 98               | 73             | 18372          | 406503            | 1626              |
| MAR    | 31                 | 49476       | 143              | 118            | 29567          | 426412            | 1706              |
| APR    | 30                 | 47880       | 175              | 150            | 37609          | 436684            | 1747              |
| MAY    | 31                 | 49476       | 219              | 194            | 48578          | 437581            | 1750              |
| JUNE   | 30                 | 47880       | 237              | 212            | 53117          | 432345            | 1729              |
| JULY   | 31                 | 49476       | 261              | 236            | 58970          | 422851            | 1691              |
| AUG    | 31                 | 49476       | 236              | 211            | 52711          | 419616            | 1678              |
| SEP    | 30                 | 47880       | 176              | 151            | 37661          | 429836            | 1719              |
| OCT    | 31                 | 49476       | 138              | 113            | 28312          | 451000            | 1804              |
| NOV    | 30                 | 47880       | 95               | 70             | 17380          | 481499            | 1926              |
| DEC    | 31                 | 49476       | 76               | 51             | 12642          | 518334            | 2073              |

| Calculation Results             |           |             |
|---------------------------------|-----------|-------------|
| Water Accumulation Height (max) | mm        | 2073        |
| Salt Accumulation Height        | mm        | 199         |
| Protective Layer Thickness      | mm        | 75          |
| Sand Accumulation Height        | mm        | 300         |
| Free board for contingency      | mm        | 200         |
| <b>Minimum Pond Depth</b>       | <b>mm</b> | <b>2847</b> |
| <b>Pond Selected depth</b>      | <b>mm</b> | <b>1500</b> |
| <b>Pond Width and Length</b>    | <b>m</b>  | <b>500</b>  |

|                   |  |   |                 |          |
|-------------------|--|---|-----------------|----------|
| <b>PROJECT :</b>  |  |  | <b>DATE :</b>   |          |
| <b>PROJ. NO.:</b> |  |   | <b>BY :</b>     | S.Rahimi |
| <b>CLIENT :</b>   |  |   | <b>REV :</b>    | 0        |
| <b>UNIT :</b>     |  |   | <b>DOC NO.:</b> |          |

**Evaporation Pond Sizing (Method 1 - Evaporation Rate Calculated)**

| <b>Input Data</b>         |                |        |
|---------------------------|----------------|--------|
| Design Precipitation Rate | mm/month       | 25.0   |
| Flow Overdesign           | %              | 0.0    |
| Evaporation Pond Area     | m <sup>2</sup> | 302500 |

| Source | Normal Flow (m <sup>3</sup> /hr) | Design flow (m <sup>3</sup> /hr) | duration (min/day) | Daily flow (m <sup>3</sup> /day) | TSS (mg/lit) | TDS (mg/lit) |
|--------|----------------------------------|----------------------------------|--------------------|----------------------------------|--------------|--------------|
| PW     | 66.5                             | 66.5                             | 1440               | 1596.0                           | 0            | 36900        |
|        |                                  | 0                                |                    | 0.0                              |              |              |
|        |                                  | 0                                |                    | 0.0                              |              |              |
|        |                                  | 0                                |                    | 0.0                              |              |              |
|        |                                  | 0                                |                    | 0.0                              |              |              |
|        |                                  | 0                                |                    | 0.0                              |              |              |

| <b>Salt Accumulation</b>        |                      |              |
|---------------------------------|----------------------|--------------|
| Normal Flow Rate                | m <sup>3</sup> /day  | 1596.0       |
| Design Flow Rate                | m <sup>3</sup> /day  | 1596.0       |
| Salt Loading due to TSS         | kg/day               | 0            |
| Salt loading due to TDS         | kg/day               | 58892        |
| Total salt loading              | kg/day               | 58892        |
| Salt density considered         | kg/m <sup>3</sup>    | 2165         |
| Salt Loading                    | m <sup>3</sup> /day  | 27.20        |
| Accumulation duration           | year                 | 5.00         |
| <b>Salt Accumulation Volume</b> | <b>m<sup>3</sup></b> | <b>49644</b> |
| <b>Salt Accumulation Height</b> | <b>mm</b>            | <b>164</b>   |

| <b>Evaporation Rate Input Data</b> |     |       |
|------------------------------------|-----|-------|
| Plant Latitude                     | °   | 38.2  |
| Water Surface Reflection Coe.      | --- | 0.080 |
| Plant Latitude                     | rad | 0.666 |


| Month | Ambient Temp (°C) |      | RH   | Wind speed | Sunshine | Mean Amb. | Evap. Rate |
|-------|-------------------|------|------|------------|----------|-----------|------------|
|       | Max               | Min  | %    | m/sec      | hours    | Temp (°C) | mm/day     |
| Jan   | 11.0              | 11.0 | 60.0 | 3.4        | 10.0     | 11.0      | 2.92       |
| Feb   | 13.0              | 13.0 | 59.0 | 3.7        | 11.0     | 13.0      | 4.08       |
| Mar   | 14.0              | 14.0 | 60.0 | 3.8        | 12.0     | 14.0      | 5.37       |
| Apr   | 17.0              | 17.0 | 62.0 | 4          | 13.0     | 17.0      | 7.05       |
| May   | 20.0              | 20.0 | 64.0 | 4.1        | 14.0     | 20.0      | 8.45       |
| Jun   | 23.0              | 23.0 | 67.0 | 4.3        | 15.0     | 23.0      | 9.34       |
| Jul   | 26.0              | 26.0 | 62.0 | 4          | 14.0     | 26.0      | 9.69       |
| Aug   | 27.0              | 27.0 | 64.0 | 3.8        | 14.0     | 27.0      | 8.78       |
| Sep   | 25.0              | 25.0 | 66.0 | 3.7        | 12.0     | 25.0      | 6.80       |
| Oct   | 21.0              | 21.0 | 62.0 | 3.1        | 11.0     | 21.0      | 4.87       |
| Nov   | 16.0              | 16.0 | 60.0 | 3.2        | 10.0     | 16.0      | 3.50       |
| Dec   | 12.0              | 12.0 | 62.0 | 3.6        | 10.0     | 12.0      | 2.81       |

|                   |  |   |                 |          |
|-------------------|--|---|-----------------|----------|
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| <b>PROJ. NO.:</b> |  |   | <b>BY :</b>     | S.Rahimi |
| <b>CLIENT :</b>   |  |   | <b>REV :</b>    | 0        |
| <b>UNIT :</b>     |  |   | <b>DOC NO.:</b> |          |

**Evaporation Pond Sizing (Method 1 - Evaporation Rate Calculated)**

| Months | No of working days | Inflow Rate | Gross Evap. Rate | Net Evap. Rate | Net Evap. Rate | Water Acc. Volume | Water Acc. Height |
|--------|--------------------|-------------|------------------|----------------|----------------|-------------------|-------------------|
|        |                    | m3/month    | mm/month         | mm/month       | m3/month       | m3                | mm                |
| JAN    | 31                 | 49476       | 91               | 66             | 19843          | 29633             | 98                |
| FEB    | 28                 | 44688       | 114              | 89             | 26987          | 47334             | 156               |
| MAR    | 31                 | 49476       | 166              | 141            | 42756          | 54054             | 179               |
| APR    | 30                 | 47880       | 212              | 187            | 56432          | 45502             | 150               |
| MAY    | 31                 | 49476       | 262              | 237            | 71660          | 23318             | 77                |
| JUNE   | 30                 | 47880       | 280              | 255            | 77183          | 0                 | 0                 |
| JULY   | 31                 | 49476       | 300              | 275            | 83286          | 0                 | 0                 |
| AUG    | 31                 | 49476       | 272              | 247            | 74726          | 0                 | 0                 |
| SEP    | 30                 | 47880       | 204              | 179            | 54124          | 0                 | 0                 |
| OCT    | 31                 | 49476       | 151              | 126            | 38088          | 11388             | 38                |
| NOV    | 30                 | 47880       | 105              | 80             | 24193          | 35075             | 116               |
| DEC    | 31                 | 49476       | 87               | 62             | 18826          | 65725             | 217               |
| JAN    | 31                 | 49476       | 91               | 66             | 19843          | 95358             | 315               |
| FEB    | 28                 | 44688       | 114              | 89             | 26987          | 113059            | 374               |
| MAR    | 31                 | 49476       | 166              | 141            | 42756          | 119779            | 396               |
| APR    | 30                 | 47880       | 212              | 187            | 56432          | 111227            | 368               |
| MAY    | 31                 | 49476       | 262              | 237            | 71660          | 89042             | 294               |
| JUNE   | 30                 | 47880       | 280              | 255            | 77183          | 59739             | 197               |
| JULY   | 31                 | 49476       | 300              | 275            | 83286          | 25929             | 86                |
| AUG    | 31                 | 49476       | 272              | 247            | 74726          | 679               | 2                 |
| SEP    | 30                 | 47880       | 204              | 179            | 54124          | 0                 | 0                 |
| OCT    | 31                 | 49476       | 151              | 126            | 38088          | 11388             | 38                |
| NOV    | 30                 | 47880       | 105              | 80             | 24193          | 35075             | 116               |
| DEC    | 31                 | 49476       | 87               | 62             | 18826          | 65725             | 217               |
| JAN    | 31                 | 49476       | 91               | 66             | 19843          | 95358             | 315               |
| FEB    | 28                 | 44688       | 114              | 89             | 26987          | 113059            | 374               |
| MAR    | 31                 | 49476       | 166              | 141            | 42756          | 119779            | 396               |
| APR    | 30                 | 47880       | 212              | 187            | 56432          | 111227            | 368               |
| MAY    | 31                 | 49476       | 262              | 237            | 71660          | 89042             | 294               |
| JUNE   | 30                 | 47880       | 280              | 255            | 77183          | 59739             | 197               |
| JULY   | 31                 | 49476       | 300              | 275            | 83286          | 25929             | 86                |
| AUG    | 31                 | 49476       | 272              | 247            | 74726          | 679               | 2                 |
| SEP    | 30                 | 47880       | 204              | 179            | 54124          | 0                 | 0                 |
| OCT    | 31                 | 49476       | 151              | 126            | 38088          | 11388             | 38                |
| NOV    | 30                 | 47880       | 105              | 80             | 24193          | 35075             | 116               |
| DEC    | 31                 | 49476       | 87               | 62             | 18826          | 65725             | 217               |

| Calculation Results             |           |             |
|---------------------------------|-----------|-------------|
| Water Accumulation Height (max) | mm        | 396         |
| Salt Accumulation Height        | mm        | 164         |
| Protective Layer Thickness      | mm        | 75          |
| Sand Accumulation Height        | mm        | 300         |
| Free board for contingency      | mm        | 300         |
| <b>Minimum Pond Depth</b>       | <b>mm</b> | <b>1235</b> |
| <b>Pond Selected depth</b>      | <b>mm</b> | <b>1300</b> |
| <b>Pond Width and Length</b>    | <b>m</b>  | <b>550</b>  |

|                   |  |   |                 |          |
|-------------------|--|---|-----------------|----------|
| <b>PROJECT :</b>  |  |  | <b>DATE :</b>   |          |
| <b>PROJ. NO.:</b> |  |   | <b>BY :</b>     | S.Rahimi |
| <b>CLIENT :</b>   |  |   | <b>REV :</b>    | 0        |
| <b>UNIT :</b>     |  |   | <b>DOC NO.:</b> |          |

### Evaporation Pond Sizing (Method 2)

| Source                  | Normal Flow (m3/hr) | Design Flow (m3/hr) | Flow Duration (min/day) | Daily flow (m3/day) | TSS (mg/lit) | TDS (mg/lit) |
|-------------------------|---------------------|---------------------|-------------------------|---------------------|--------------|--------------|
| Filter A back wash      | 66.5                | 66.5                | 1440                    | 1596.0              | 0            | 36900        |
| Rinsing with feed water | 0                   | 0                   | 5                       | 0.0                 | 1.2          | 1533         |
| Filter B back wash      | 0                   | 0                   | 10                      | 0.0                 | 450          | 1533         |
| Rinsing with feed water | 0                   | 0                   | 5                       | 0.0                 | 1.2          | 1533         |
| Iron filter back wash   | 0                   | 0                   | 10                      | 0.0                 | 310          | 1533         |
| Iron filter rinsing     | 0                   | 0                   | 5                       | 0.0                 | 0            | 1533         |
| First Stage RO rejects  | 0                   | 0                   | 1440                    | 0.0                 | 0            | 6770         |

| Salt Calculation         |           |              |
|--------------------------|-----------|--------------|
| Flow Overdesign          | %         | 0.0          |
| Normal Flow Rate         | m3/day    | 1596.0       |
| Design Flow Rate         | m3/day    | 1596.0       |
| Salt Loading due to TSS  | kg/day    | 0            |
| Salt loading due to TDS  | kg/day    | 58892        |
| Total salt loading       | kg/day    | 58892        |
| Salt density considered  | kg/m3     | 1500         |
| Salt Loading             | m3/day    | 39.26        |
| Accumulation duration    | year      | 5.00         |
| <b>Salt Accumulation</b> | <b>m3</b> | <b>71652</b> |

| Month  | Evaporation in mm/day |      |      |
|--------|-----------------------|------|------|
|        | Max                   | Min  | Mean |
| Jan-86 | 11.6                  | 4.3  | 7.0  |
| Feb-86 | 14.9                  | 8.1  | 8.5  |
| Mar-86 | 16.6                  | 8.7  | 12.6 |
| Apr-86 | 17.9                  | 9.8  | 14.0 |
| May-86 | 20.0                  | 11.0 | 15.2 |
| Jun-86 | 25.4                  | 6.7  | 14.0 |
| Jul-86 | 20.8                  | 7.3  | 15.9 |
| Aug-86 | 23.0                  | 11.0 | 15.7 |
| Sep-86 | 16.04                 | 7.6  | 11.7 |
| Oct-86 | 16.0                  | 8.7  | 12.0 |
| Nov-86 | 15.8                  | 3.2  | 9.6  |
| Dec-86 | 11.7                  | 3.6  | 7.1  |
| Jan-87 | 11.7                  | 3.6  | 7.1  |
| Feb-87 | 11.7                  | 3.6  | 7.8  |
| Mar-87 | 11.7                  | 3.6  | 9.1  |
| Apr-87 | 11.7                  | 3.6  | 11.7 |
| May-87 | 11.7                  | 3.6  | 12.5 |
| Jun-87 | 11.7                  | 3.6  | 14.3 |
| Jul-87 | 11.7                  | 3.6  | 14.7 |

| Calculation Results           |           |             |
|-------------------------------|-----------|-------------|
| Annual Ave. Evaporation Rate  | mm/day    | 11.6        |
| Winter Ave. Evaporation Rate  | mm/day    | 7.3         |
| Evaporation Pond Area         | m2        | 137642      |
| Salt Accumulation Height      | mm        | 521         |
| Not Evap. Water During Winter | mm/day    | 4.3         |
| Number of Winter Days         | day       | 90          |
| Water Accumulation Height     | mm        | 384         |
| Protective Layer Thickness    | mm        | 75          |
| Sand Accumulation Height      | mm        | 300         |
| Free board for contingency    | mm        | 200         |
| <b>Minimum Pond Depth</b>     | <b>mm</b> | <b>1479</b> |
| <b>Pond Selected depth</b>    | <b>mm</b> | <b>1500</b> |
| <b>Pond Width and Length</b>  | <b>m</b>  | <b>371</b>  |