

**Plumas Eureka Community Services District**  
**WWTP 6 Preliminary Engineering Report (PER)**

**Description of Alternatives and Construction Costs**

All alternatives include the following items in their construction cost estimates:

- Demolition of WWTP 6
- Site piping and mechanical work
- Electrical work
- Control systems
- SCADA system upgrade to a modern HMI (at a cost of \$42,500 which would not be realized if the water treatment plant were to be constructed)
- A lift station and a 2.5-inch force main to convey WWTP 6 influent to the new treatment site
- Mobilization and demobilization costs for the contractor to complete the work
- Engineering design costs and engineering services during construction
- Permitting and mitigation and right of way cost considerations
- 25% contingency applied to the construction cost subtotal to account for costs that were not directly considered at this level 3 cost planning level

**Alternative 4: Replace WWTP 6 at the tank house site.** Construction costs include: demolition of the tank house, a new building at the tank house site to house the new treatment plant, an estimated cost of acquiring the tank house property, a 235 linear foot 2.5-inch force main with a 0.5 HP lift station to pump wastewater from the existing WWTP 6 site to the tank house.

**Alternative 4B: Replace WWTP 6 with a membrane bioreactor (MBR) package plant.** Best known for their compact small footprint and high-quality effluent, MBRs can meet Title 22 effluent standards without additional treatment. The MBR process uses an aeration basin similar to other activated sludge processes, but it does not use a clarifier. Clarification is achieved through membrane filtration. The membrane filters provide the high-quality effluent but can be tedious to operate and maintain and must be replaced every seven years to remain efficient. Most MBRs have a high aeration requirement resulting in high energy costs. One major advantage with an MBR is that you operate at a much higher mixed liquor concentration (MLSS), which allows for some sludge digestion to occur in the aeration basin. Most smaller MBRs do not require additional treatment to waste sludge other than dewatering. This PER reviewed two preliminary cost estimates provided by Aqua Aerobics and Ovivo. Construction cost estimates for the package plant include fine screening headworks, concrete tankage, and UV disinfection in addition to the cost of the MBR package plant.

**Alternative 4C: Replace WWTP 6 with an extended aeration plant.** The extended aeration process is a modification of the activated sludge process. It is a complete mix system and provides biological treatment for the removal of biodegradable organic wastes under aerobic conditions. Air may be supplied by mechanical or diffused aeration to provide the oxygen required to sustain the aerobic biological process. Mixing is provided by aeration to maintain the microbial organisms in contact with the dissolved organics. Extended aeration plants are typically known to be easier to operate than MBR plants and can have a relatively low sludge yield due to long sludge ages. Additionally, they are typically better at handling organic loading and flow fluctuations. Extended aeration processes are not capable

of meeting Title 22 standards without an additional filtration process. This PER included an Aqua Aerobics Aqua MiniDisk cloth media filter at the end of the extended aeration process to achieve Title 22 effluent standards. This PER reviewed two preliminary cost estimates provided by Aeromod and Purestream. Construction cost estimates for the package plant include screening headworks, concrete tankage, and the cloth media filter in addition to the cost of the MBR package plant.

**Alternative 6: Replace WWTP 6 with a lift station and pump to WWTP 7 for treatment.** This alternative assumes that the entire existing WWTP 6 will be demolished and a new lift station will be installed complete with a 5 HP pump and 5,700 linear foot 2.5-inch force main to convey flows to WWTP 7. If existing WWTP 6 infrastructure were to be retrofitted, then a completely new lift station may not be necessary. Upgrades to the existing WWTP 7 Aeromod plant to handle WWTP 6 flows include a new blowers, VFDs, switching the existing aerators to fine bubble aerators to increase their treatment capacity without increasing the tank size, upgrade the existing dryer system, addition of a new control panel that is timer based, and removal and replacement of the existing air manifold in each first stage aeration basin. To achieve Title 22 standards, this alternative also includes the option of installing an Aqua Aerobics Aqua MiniDisk cloth media filter at the end of the treatment process. Additionally, considerations for traffic control measures implemented during force main installation are included in the construction costs for this alternative.

### Summary of Preliminary Cost Estimates

Date: 4/1/2020

| Alternative | Description                                  | Construction Cost Estimate | Life Cycle Cost Estimate | Notes                    |
|-------------|--|----------------------------|--------------------------|--------------------------|
| 4B          | Replace at Tank House with MBR               | \$ 3,390,000               | \$ 8,404,587             |                          |
| 4C          | Replace at Tank House with Extended Aeration | \$ 3,495,000               | \$ 6,517,944             |                          |
| 6 LS        | Replace with Lift Station and pump to WWTP 7 | \$ 2,038,000               | \$ 4,398,907             | Includes Title 22 Filter |
|             |  | \$ 1,717,000               | \$ 3,920,256             | Excludes Title 22 Filter |

**Preliminary Cost Estimate**

Project: PECSD WWTP 6 PER  
 Alternative: 4B                      Replace at Tank House with MBR Technology  
 Calculated By: AMK                      Date: 4/1/2020  
 Cost Estimate Level = 3                      Rounding Factor = 3

| <b>Design Phase Activities</b>       |         |                      |
|--------------------------------------|---------|----------------------|
| Item                                 | Percent | Cost                 |
| Engineering Design                   | 12%     | \$ 354,000           |
| Permitting and Mitigation            | 2%      | \$ 59,000            |
| Right of Way                         | 1%      | \$ 29,000            |
| <b>Total Design Phase Activities</b> |         | <b>\$ 442,000.00</b> |

| <b>Construction Phase Activities</b>              |          |      |            |            |
|---|----------|------|------------|------------|
| Item  | Quantity | Unit | Unit Price | Cost       |
| Mob/Demob   | 1        | LS   | \$ 106,000 | \$ 106,000 |
| Demo  | 1        | LS   | \$ 225,000 | \$ 225,000 |
| Building  | 1440     | SF   | \$ 350     | \$ 504,000 |
| Site Piping & Mechanical (20% Treatment Eq. Cost) | 1        | LS   | \$ 147,961 | \$ 148,000 |
| Electrical (20% Treatment Eq. Cost)               | 1        | LS   | \$ 147,961 | \$ 148,000 |
| Controls + SCADA                                  | 1        | LS   | \$ 93,500  | \$ 94,000  |
| Property Acquisition                              | 4000     | SF   | \$ 3.34    | \$ 13,000  |
| MBR Equipment + Fine Screening + UV Disinfection  | 1        | LS   | \$ 739,806 | \$ 740,000 |
| 2.5" Force Main Piping                            | 235      | LF   | \$ 30      | \$ 7,000   |
| Lift Station                                      | 1        | LS   | \$ 234,505 | \$ 235,000 |

|  |     |                     |
|--|-----|---------------------|
| <b>Construction Cost Subtotal</b>          |     | <b>\$ 2,220,000</b> |
| Contingency                                | 25% | \$ 555,000          |
| <b>Construction Total</b>                  |     | <b>\$ 2,775,000</b> |
| Engineering Services During Construction   |     | \$ 173,000          |
| <b>Total Construction Phase Activities</b> |     | <b>\$ 2,948,000</b> |
| <b>Total Project Cost</b>                  |     | <b>\$ 3,390,000</b> |

**Preliminary Cost Estimate**

Project: PECSD WWTP 6 PER  
 Alternative: 4C Replace at Tank House with Extended Aeration Technology  
 Calculated By: AMK Date: 4/1/2020  
 Cost Estimate Level = 3 Rounding Factor = 3

| <b>Design Phase Activities</b>       |         |                      |
|--------------------------------------|---------|----------------------|
| Item                                 | Percent | Cost                 |
| Engineering Design                   | 12%     | \$ 365,000           |
| Permitting and Mitigation            | 2%      | \$ 61,000            |
| Right of Way                         | 1%      | \$ 30,000            |
| <b>Total Design Phase Activities</b> |         | <b>\$ 456,000.00</b> |

| <b>Construction Phase Activities</b>              |          |      |            |            |
|---|----------|------|------------|------------|
| Item  | Quantity | Unit | Unit Price | Cost       |
| Mob/Demob   | 1        | LS   | \$ 109,000 | \$ 109,000 |
| Demo  | 1        | LS   | \$ 225,000 | \$ 225,000 |
| Building  | 1892     | SF   | \$ 350     | \$ 662,000 |
| Site Piping & Mechanical (20% Treatment Eq. Cost) | 1        | LS   | \$ 131,050 | \$ 131,000 |
| Electrical (20% Treatment Eq. Cost)               | 1        | LS   | \$ 131,050 | \$ 131,000 |
| Controls + SCADA                                  | 1        | LS   | \$ 124,500 | \$ 125,000 |
| Property Acquisition                              | 4000     | SF   | \$ 3.34    | \$ 13,000  |
| Extended Aeration + Screening + Disinfection      | 1        | LS   | \$ 655,252 | \$ 655,000 |
| 2.5" Force Main Piping                            | 235      | LF   | \$ 30      | \$ 7,000   |
| Lift Station                                      | 1        | LS   | \$ 234,505 | \$ 235,000 |

|  |     |                     |
|--|-----|---------------------|
| <b>Construction Cost Subtotal</b>          |     | <b>\$ 2,293,000</b> |
| Contingency                                | 25% | \$ 573,000          |
| <b>Construction Total</b>                  |     | <b>\$ 2,866,000</b> |
| Engineering Services During Construction   |     | \$ 173,000          |
| <b>Total Construction Phase Activities</b> |     | <b>\$ 3,039,000</b> |
| <b>Total Project Cost</b>                  |     | <b>\$ 3,495,000</b> |

**Preliminary Cost Estimate**

Project: PECSO WWTP 6 PER  
 Alternative: 6 LS Pump to WWTP 7 w/ Lift Station  
 Calculated By: AMK Date: 4/1/2020  
 Cost Estimate Level = 3 Rounding Factor = 3

| Design Phase Activities              |         |                      |
|--------------------------------------|---------|----------------------|
| Item                                 | Percent | Cost                 |
| Engineering Design                   | 12%     | \$ 211,000           |
| Permitting and Mitigation            | 2%      | \$ 35,000            |
| Right of Way                         | 2%      | \$ 35,000            |
| <b>Total Design Phase Activities</b> |         | <b>\$ 281,000.00</b> |

| Construction Phase Activities                     |          |      |            |            |
|---|----------|------|------------|------------|
| Item  | Quantity | Unit | Unit Price | Cost       |
| Mob/Demob   | 1        | LS   | \$ 63,000  | \$ 63,000  |
| Demo  | 1        | LS   | \$ 150,000 | \$ 150,000 |
| Site Piping & Mechanical (10% Treatment Eq. Cost) | 1        | LS   | \$ 24,465  | \$ 24,000  |
| Electrical (20% Treatment Eq. Cost)               | 1        | LS   | \$ 48,930  | \$ 49,000  |
| Controls + SCADA                                  | 1        | LS   | \$ 85,500  | \$ 86,000  |
| Traffic Control                                   | 1        | LS   | \$ 51,300  | \$ 51,000  |
| Add. Cloth Filter Equipment for Title 22          | 1        | LS   | \$ 244,650 | \$ 245,000 |
| Upgrades to WWTP 7                                | 1        | LS   | \$ 240,000 | \$ 240,000 |
| 2.5" Force Main Piping                            | 5700     | LF   | \$ 30      | \$ 171,000 |
| Lift Station                                      | 1        | LS   | \$ 240,000 | \$ 240,000 |

|   |     |                     |
|---|-----|---------------------|
| <b>Construction Cost Subtotal</b>             |     | <b>\$ 1,319,000</b> |
| Contingency                                   | 25% | \$ 330,000          |
| <b>Construction Total</b>                     |     | <b>\$ 1,649,000</b> |
| Engineering Services During Construction      |     | \$ 108,000          |
| <b>Total Construction Phase Activities</b>    |     | <b>\$ 1,757,000</b> |
| <b>Total Project Cost to Achieve Title 22</b> |     | <b>\$ 2,038,000</b> |

|  |  |                     |
|--|--|---------------------|
| <b>Total Project Cost with No Title 22</b> |  | <b>\$ 1,717,000</b> |
|--|--|---------------------|