Attachment A

Betasso Operations Summary

The Betasso Water Treatment Plant (WTP) was originally constructed in 1964. A significant expansion was completed in 1976. There have been numerous modifications to the facility through the years. The attached figure details the current plant process flow schematic.

Raw water is conveyed by pipeline from two watersheds (Silver Lake and Barker) to hydroelectric generators located at the plant site. Provisions are included to bypass the hydros by the utilization of pressure reducing valves. The treatment process includes: rapid mix, flocculation, sedimentation, filtration, and disinfection. Powdered activated carbon can be added upstream of rapid mix for taste and odor control. Aluminum Sulfate or polymer blends can be added at the rapid mix for coagulation. Sodium hypochlorite (bleach) is added for disinfection.

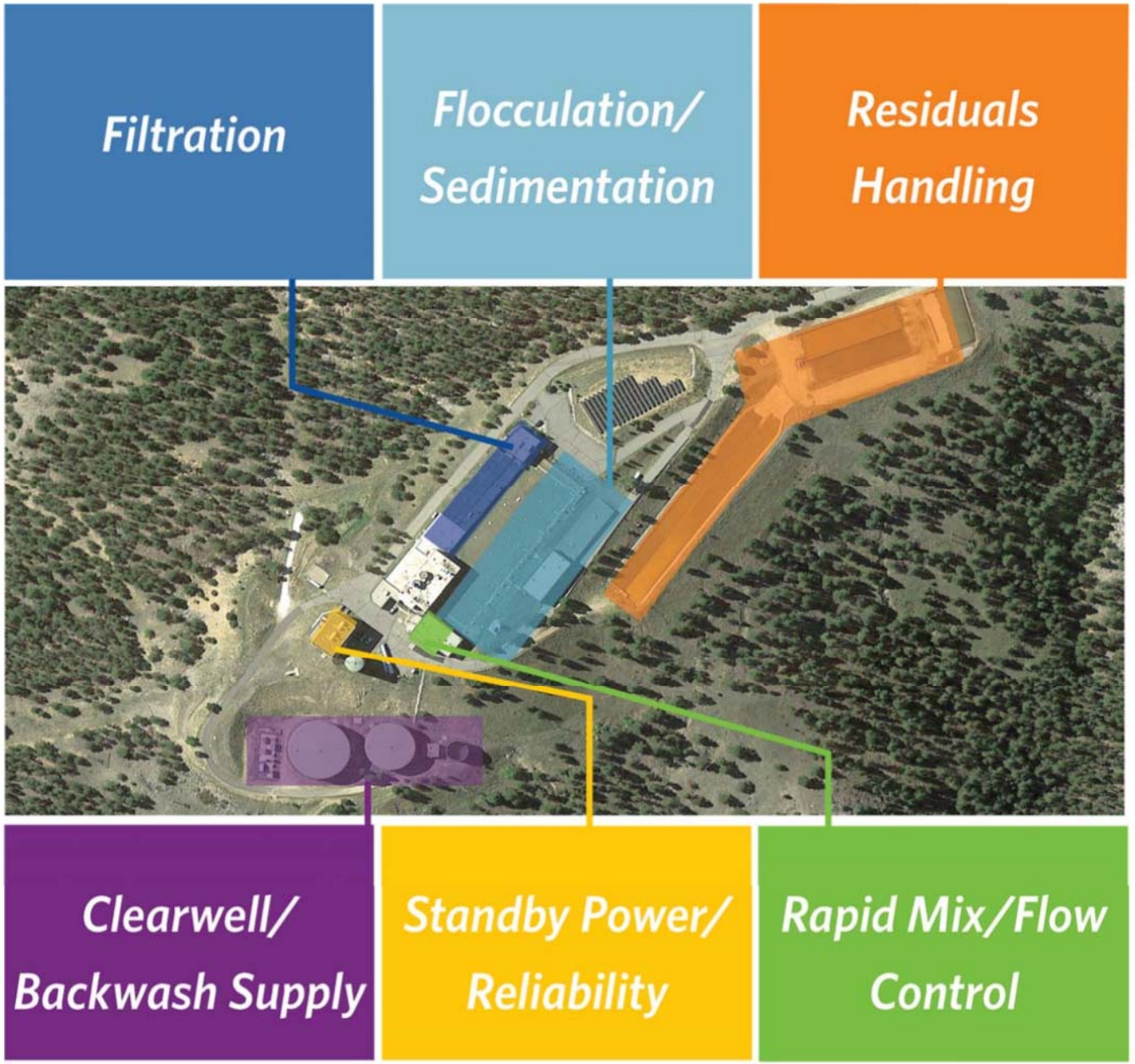
After bleach addition, the flow is split to four flocculation/sedimentation basins. The basins are double deck with flocculation and sedimentation on the lower level and additional sedimentation on the upper level. Three-stage tapered flocculation is accomplished with horizontal paddle wheels and baffling. Settled residuals are removed from the lower level of the basins using a Leopold Clari-Trac® system. The flow exits the basins at the upper level and discharges to the filter influent channel.

The plant includes eight mixed media filters equipped with Leopold clay tile under drains. Flow to individual filters is regulated using effluent flow meters and control valves. Filter backwash is accomplished by gravity flow from the elevated backwash supply tank. Surface wash capabilities are also provided. Backwash waste is directed to the recycle pretreatment facility. Filter to waste provisions are utilized for about 10 minutes when a filter is first put in service. The filter to waste flow is stored in a concrete tank located beneath the filters and recycled upstream of rapid mix. A minimum of two filters is in operation at any given time. Additional filters are placed in service as the plant flow rate increases in approximately 5 MGD increments. Individual and combined filter effluent turbidity is monitored. Combined filter effluent particles are also monitored.

Bleach, lime, and fluoride are added in the finished water flume downstream of the filters. The flow is then directed to Clearwater Reservoir No. 1 where carbon dioxide is added. The reservoir is baffled to provide disinfection contact time. Following Clearwater Reservoir No. 1, the finished water is discharged to Clearwater Reservoir No. 2. It is then discharged to the distribution system utilizing either the Sunshine or Orodell pipelines. Backwash supply water is pumped to the elevated storage tank from downstream of Clearwater Reservoir No. 2.

Suspended solids are removed at three points in the treatment process; the sedimentation basins, the spent backwash equalization (SBE) basin, and by the dissolved air flotation system (DAF). Each sedimentation basin has a Clari-Trac® collection system. Plant staff cycles the valve operation to remove residuals in a manner intended to optimize the percent solids concentration. The filter backwash waste is discharged to the SBE basin. The backwash waste is then treated using the DAF system.

The residuals from these three sources are combined and sent to the North Sludge Drying Beds. The beds are cleaned periodically and the residuals disposed of offsite. Residuals can also be directed to the Sludge Lagoons. The Lagoons are equipped with decant facilities and are typically utilized during winter sedimentation basin draining. The decant from the lagoons, and the DAF is recycled upstream of rapid mix and blended with raw water.


Filtration
Flocculation/
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Residuals
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Clearwell/
Backwash Supply
Standby Power/
Reliability
Rapid Mix/Flow
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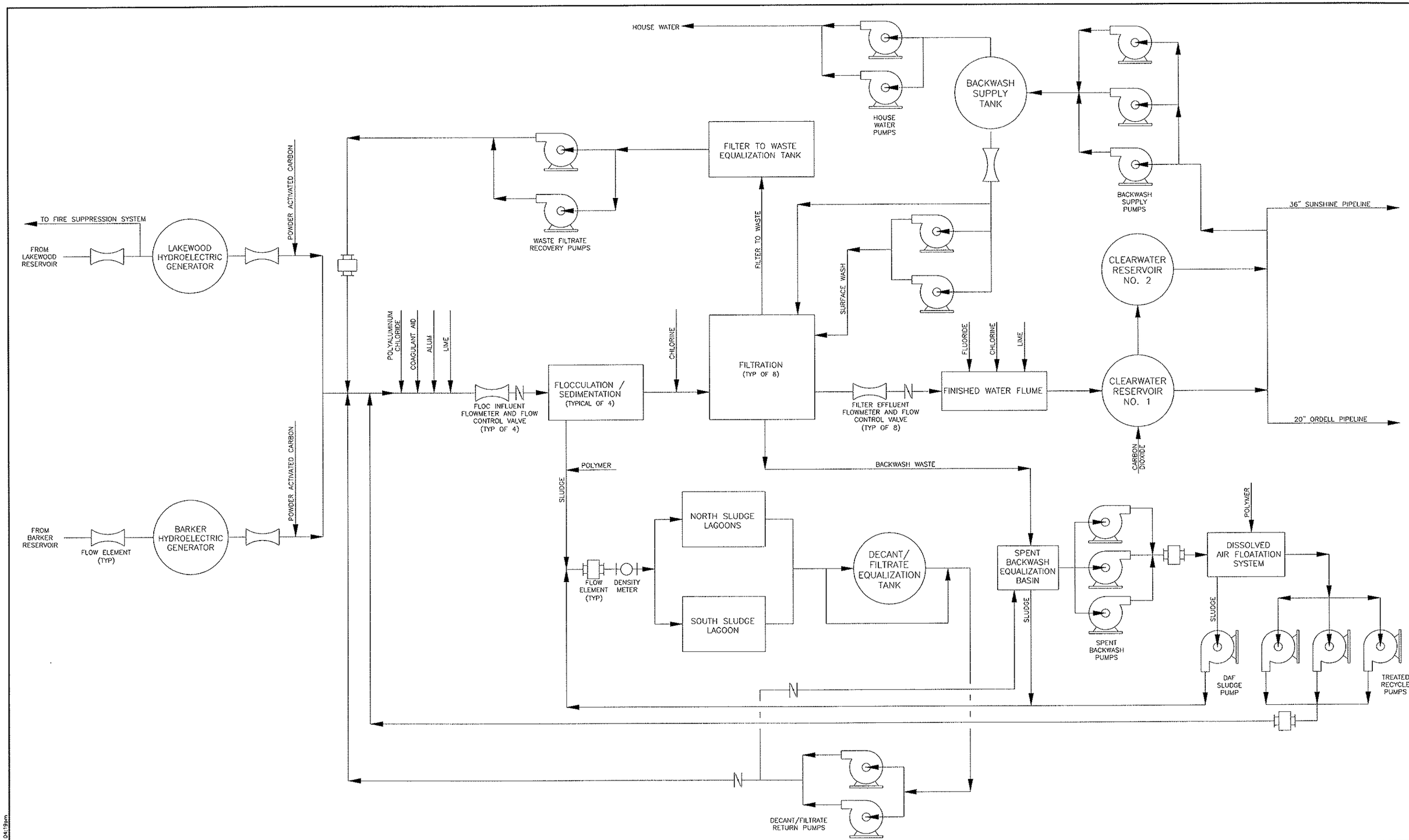

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			PRELIMINARY DRAWINGS – NOT FOR CONSTRUCTION

DESIGNED KM
DRAWN MJS
CHECKED JMP
DATE OCT 2005

PROJECT ENGINEER
PARTNER

carollo engineers

CITY OF BOULDER

BETASSO WATER TREATMENT PLANT
SETTLING & RESIDUALS IMPROVEMENTS PROJECT
PROCESS FLOW DIAGRAM

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

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DRAWING NO. FIG. 3.1
SHEET NO.

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