

Sequencing Batch Reactor



Economically treating high flows with great efficiency

Project: Jaypee Greens Sports City's F1 Race Track, India

Located in Greater Noida near India's capital city of New Delhi, Jaypee Greens Sports City is the country's first fully-integrated mega-city. Built around a sporting and healthy living lifestyle, the vast 2,500 acres (1101 hectares) development project is also home to India's premier motorsports destination – the Buddh International Circuit, a modern, 40,000-seat stadium and host of the first Indian Grand Prix in 2011. In 2010, SIMA Labs was awarded the contract to build and operate an Ecoprocess™ SBR biological sewage treatment plant designed by Premier Tech Aqua (PTA) – an international leader in onsite wastewater treatment with over 25 years of expertise in SBR technology.

Facts

Phase 1 of the project required a high-performance and fully automated wastewater treatment plant that would be flexible enough to transition from low flow to high flow with higher organic loading rates during the racing season (twice a year for a period of 15 days each). The system would treat up to 3 MLD and as low as 0.5 MLD or even lower at certain times. Three complete sewage treatment plants would be required, with the first module treating 3 MLD and two other modules of 6 MLD each for future implementation.

Phase 2 of Jaypee Greens Sports City planned for the construction of a residential and commercial development project adjacent to the sports complex. The majority of inhabitants would move into their new quarters over a 6 to 7 year period, resulting in an anticipated initial flow of 6 MLD and a total flow projected at 15 MLD.

Challenges

Designed to treat an initial average flow of 3 MLD, the treatment plant of Jaypee Greens Sports City needed to service the Formula1 Sports Complex and non-sports core area for an eventual total flow of 15 MLD.

Effluent quality needed to meet strict effluent requirements to offer the client the economic advantage of reusing the treated water (gardening, flushing, etc.).

Land-use had to be optimized and the final footprint of the system be as small as possible, even for such large flows. The system had to be highly energy-efficient and offer the flexibility of growing as Jaypee Greens Sports City developed.





Solution

Premier Tech Aqua designed an Ecoprocess™ SBR Treatment Plant and provided most of the process equipment including the Supervisory Control and Data Acquisition (SCADA) control system for automation of the complete treatment chain, in addition to pre and post treatment units.

The solution consists of two SBR reactors designed to treat 3 MLD and handle typical municipal sewage with BOD of 350 mg/L during the F1 race season, and cope with the low flow requirements of the non-race periods of the year. Located next to the future cricket stadium, the system consists of a gradual fill-semi true batch SBR. Pre-treatment includes a receiving chamber, coarse screening and grit removal units. Post treatment is comprised of dual media filtration and activated carbon treatment units. At the heart of the treatment is the SwingCanter™, a PTA-designed and non-mechanical, low-maintenance solid-exclusion floating decanter equipped with an integrated scum control system (SCS). The SwingCanter™ removes water from the surface of the basins and drains it by gravity into a receiving stream.

Energy requirements were minimized by using gravity flow whenever possible and integrating reliable and highly efficient equipment such as aeration with membrane fine bubble diffusers. Space requirements were kept to a minimum by providing aeration and settling in the same tank – allowing for up to 30-40% space saving capacity compared to conventional plants requiring an activated sludge return process (CAS). Finally, PTA provided a more flexible scope of supply to SIMA Labs, which allowed the contractor to purchase equipment from a greater number of local Indian suppliers, thus further reducing the overall cost of the project.

The dimension of the complete treatment chain, including primary treatment, secondary and sludge is 2,200 m². The control area housing the SCADA system is a small, one-room, 13 m² building.

Results

Wastewater characteristics and effluent quality from Ecoprocess™ SBR

| Parameters | Influent | Effluent |
|----------------------------------|----------------|----------------|
| Average Flow (design daily flow) | 3 MLD | — |
| BOD ₅ | ≤ 350 mg/L | ≤ 10 mg/L |
| TSS | ≤ 450 mg/L | ≤ 10 mg/L |
| COD | ≤ 700 mg/L | ≤ 100 mg/L |
| Total Nitrogen | ≤ 45 mg/L | ≤ 10 mg/L |
| Total Phosphorus | ≤ 5 mg/L | ≤ 2 mg/L |
| Oil and grease | ≤ 15 mg/L | ≤ 5 mg/L |
| pH | 6.5 - 7.5 mg/L | 6.5 - 8.5 mg/L |

Additional advantages:

- Versatile technology ensuring proven performances and low-cost, simple operations.
- High-performance system offering an effluent of such exceptional quality that water can be reused.
- Integrated, operator-friendly control/monitoring PLC-based automation program resistant to all plant conditions.
- Experienced team of Process Engineers and local Indian technical advisors from PTA providing exceptional support and expert advice throughout the project – before, during and after the start-up of the treatment plant.

“Premier Tech Limited were awarded the work of design, engineering, supply and erection & commissioning of the Jaypee Group’s F1 Race Track Sewage Treatment Plant in Greater Noida, UP, India. The said plant was successfully completed and commissioned in June 2012 and has been delivering satisfactory results since then. We are very pleased and satisfied with the performance of this plant and with the quality of the equipment and services provided by Premier Tech and would not hesitate to recommend Premier Tech to provide SBR technology.”

Sandeep Gupta
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