ENVIRONMENTAL VISITATION CENTER

ALEGRIA WWTP

ENVIRONMENTAL VISITATION CENTER ALEGRIA WWTP

The new CEDAE, offering to the public the Environmental Visitation Center at Alegria WWTP, seals its commitment with the environment and environmental education highlighting the importance of spreading its knowledge and services with absolute transparency in the field of sanitary sewerage.

ENVIRONMENTAL VISITATION CENTER ALEGRIA WWTP

The Environmental Visitation Center at Alegria WWTP presents the technology applied in the plant and its beneficial achievements to the environment, reflecting positively in the population's quality of life.

The Center is prepared to receive researchers, university professors and students interested in environmental issues, especially in improving the water quality conditions of Guanabara Bay.

ENVIRONMENTAL VISITATION CENTER ALEGRIA WWTP

Narrowing the relationship with universities, the Center promotes technical and scientific exchange with the educational institutions and the application of researches. Those are important factors to promote development, innovation and a quality leap of the services provided by the new CEDAE, ensuring sustainability of its main product: good quality water for current and future generations.

ALEGRIA WWTP

CAPACITY

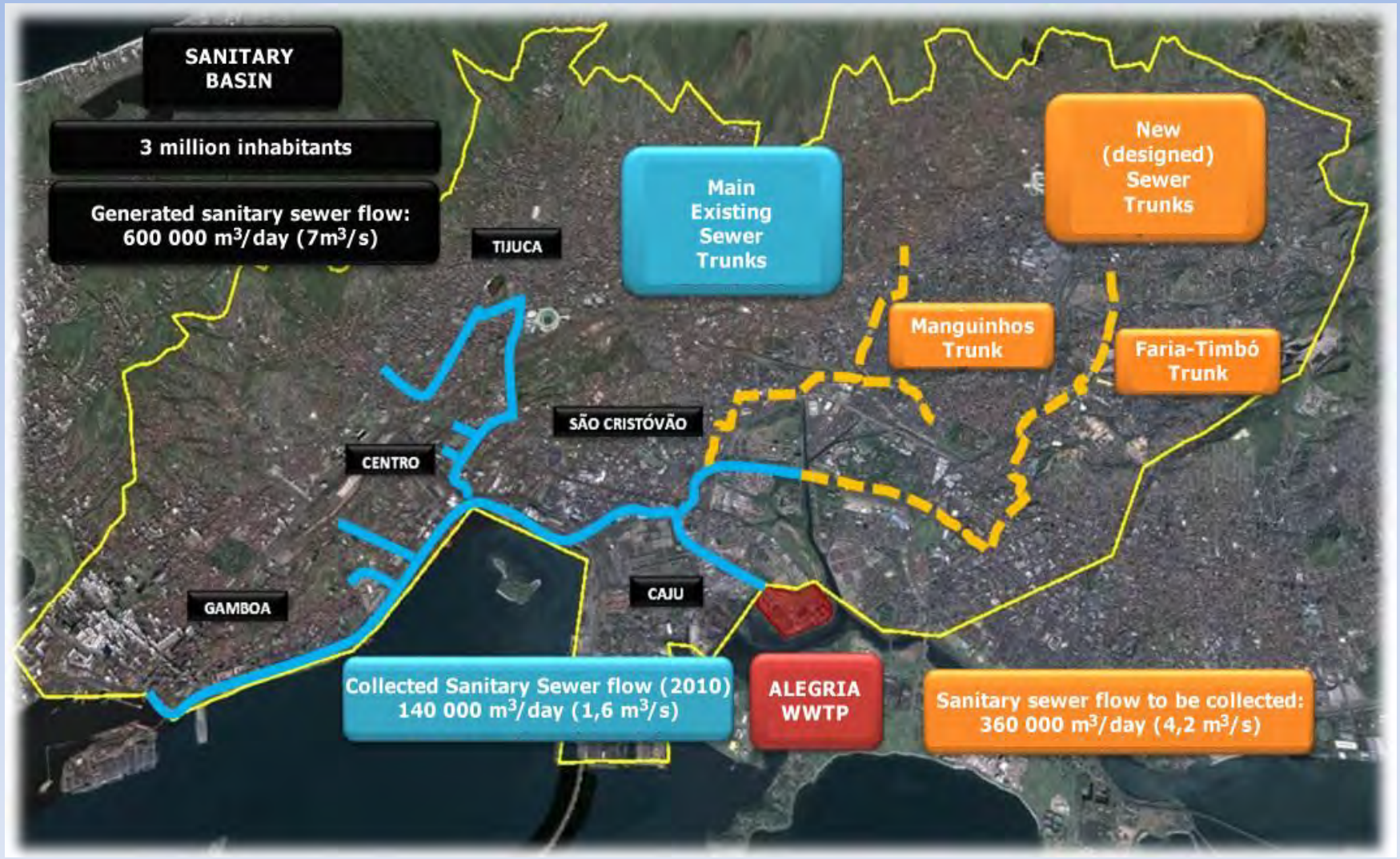
- ACTUAL CAPACITY: 2 500 L/s;
- BASIN POPULATION: 1 500 000 INHABITANTS;
- DESIGN CAPACITY : 5 000 L/s.

SANITARY BASINS COLLECTED

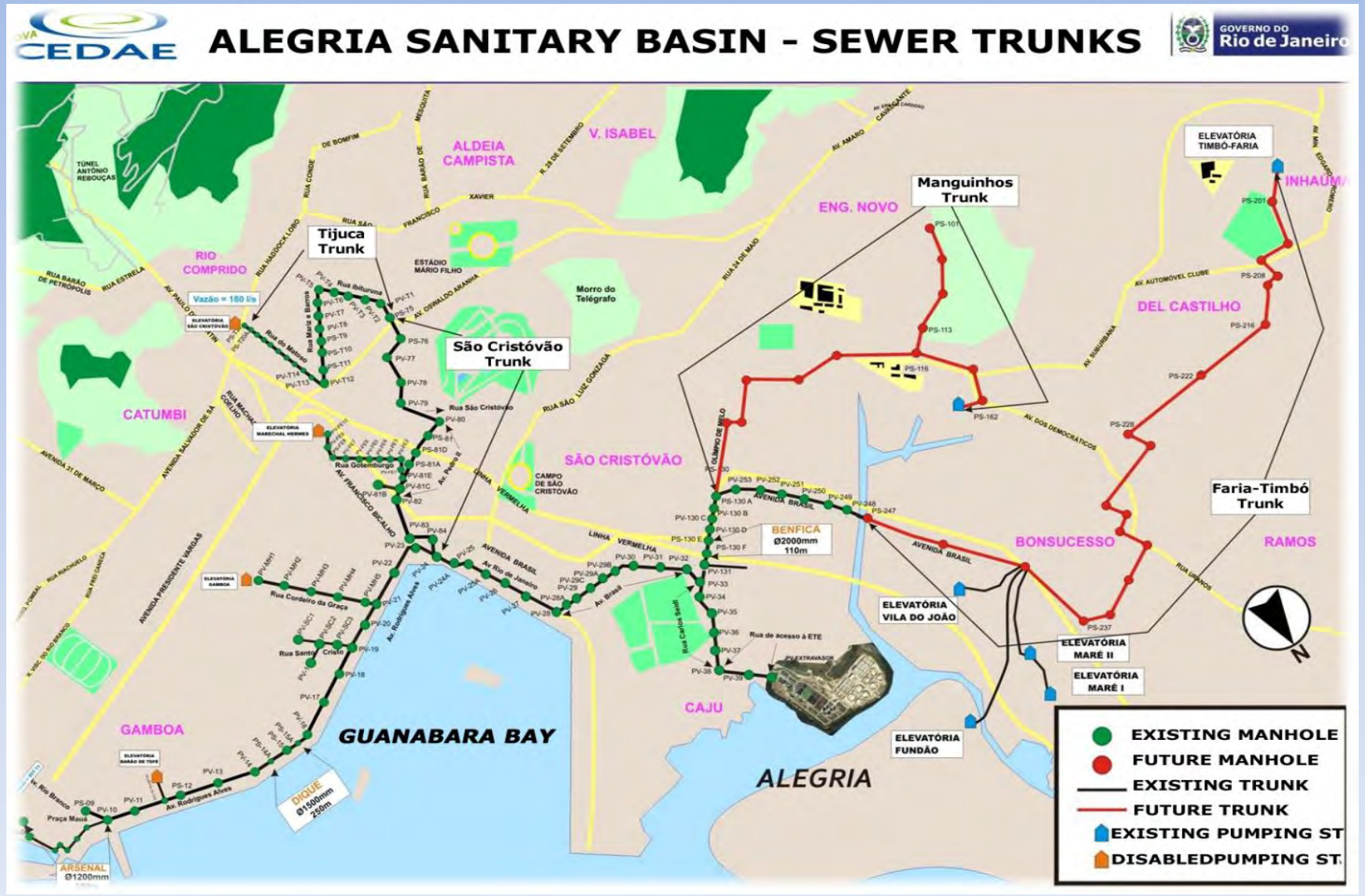
- CENTRO-MANGUE-CATUMBI;
- ALEGRIA;
- FARIA- TIMBÓ;
- SÃO CRISTÓVÃO.

SANITARY BASINS COLLECTED

MAIN ("TRUNK") SEWERS



MAIN (“TRUNK”) SEWERS



MAIN (“TRUNK”) SEWERS

- TRUNK CENTRO (D=900 >1 500>2 000 mm);
- TRUNK ALEGRIA (D=900>1 500>2 000 mm);
- TRUNK TIJUCA (D=800>900>1 000 mm);
- TRUNK SÃO CRISTÓVÃO (1 500 mm);
- TRUNK FARIA-TIMBÓ (D=600>1 000>1 500 mm).

TRUNK SEWERS DRILLER

2000 mm PIPE

INFLUENT CHARACTERISTICS

- AVERAGE FLOW: 2 500 L/s (9 000 m^3/h);
- BOD_5 = 283 mg/L;
- TSS = 350 mg/L.

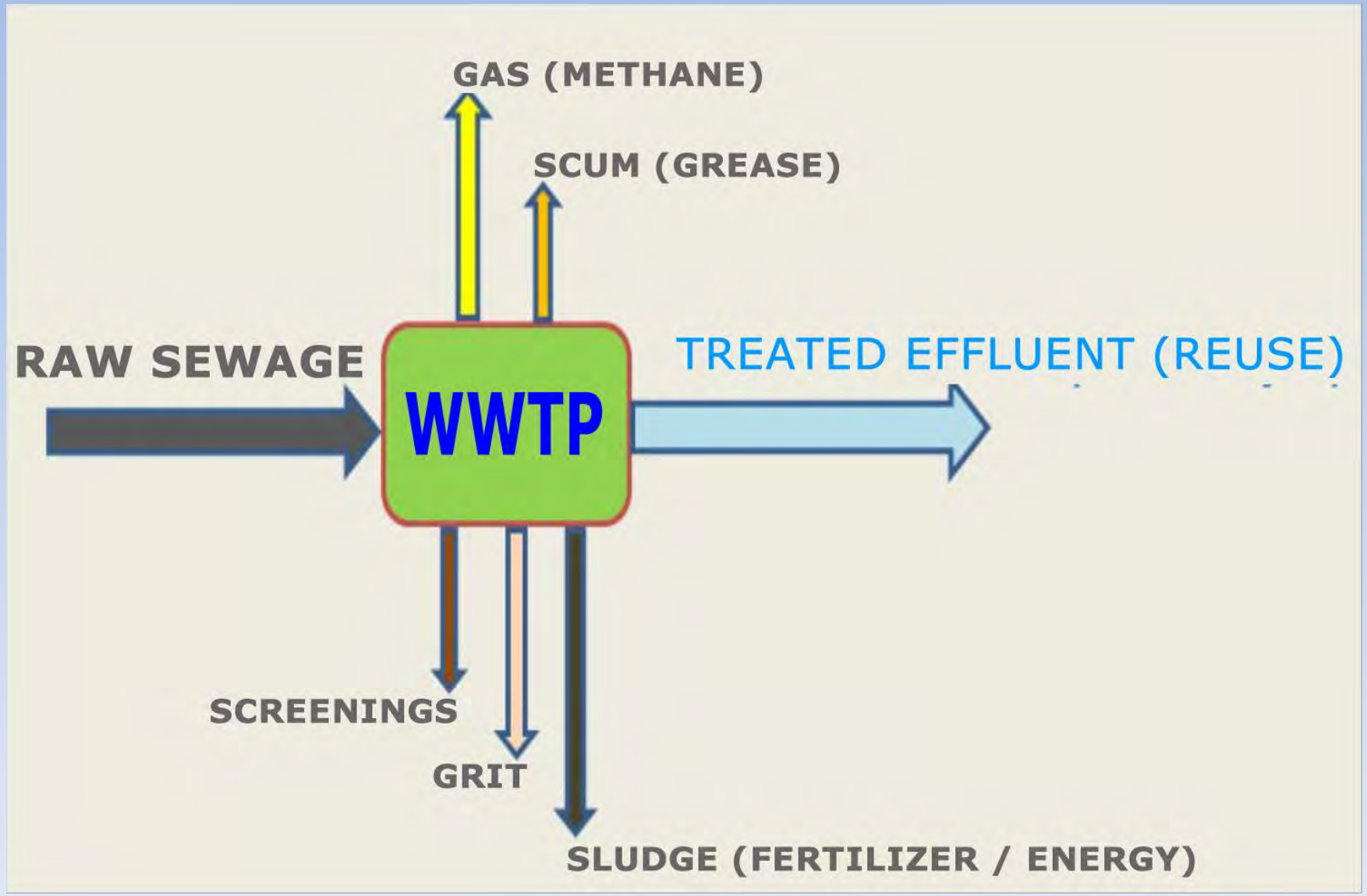
TREATMENT STAGES

PRELIMINARY TREATMENT

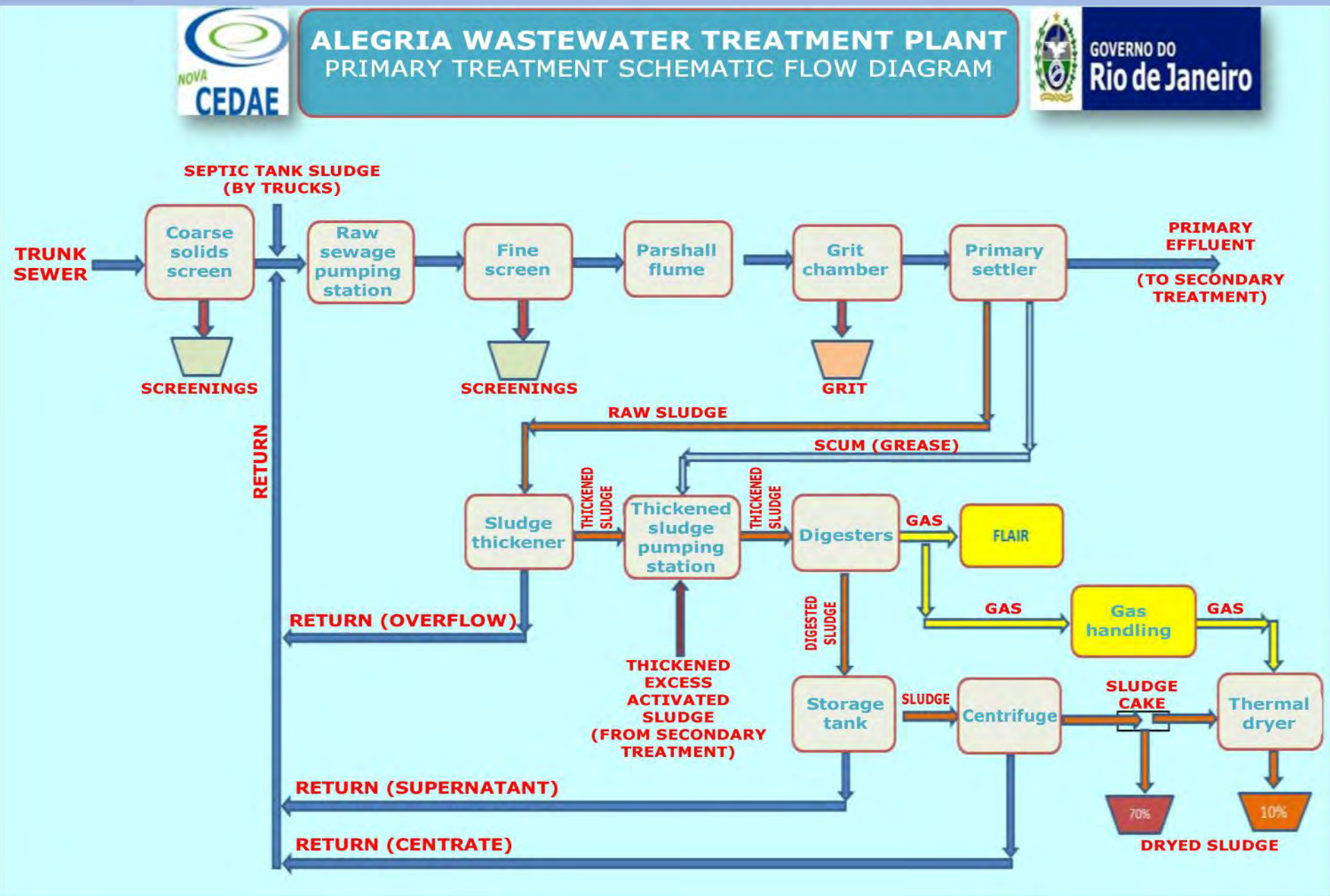
PRIMARY TREATMENT

SECONDARY (BIOLOGICAL) TREATMENT

TREATAMENT X SUSTAINABILITY



PRIMARY TREATMENT SCHEMATIC FLOW DIAGRAM

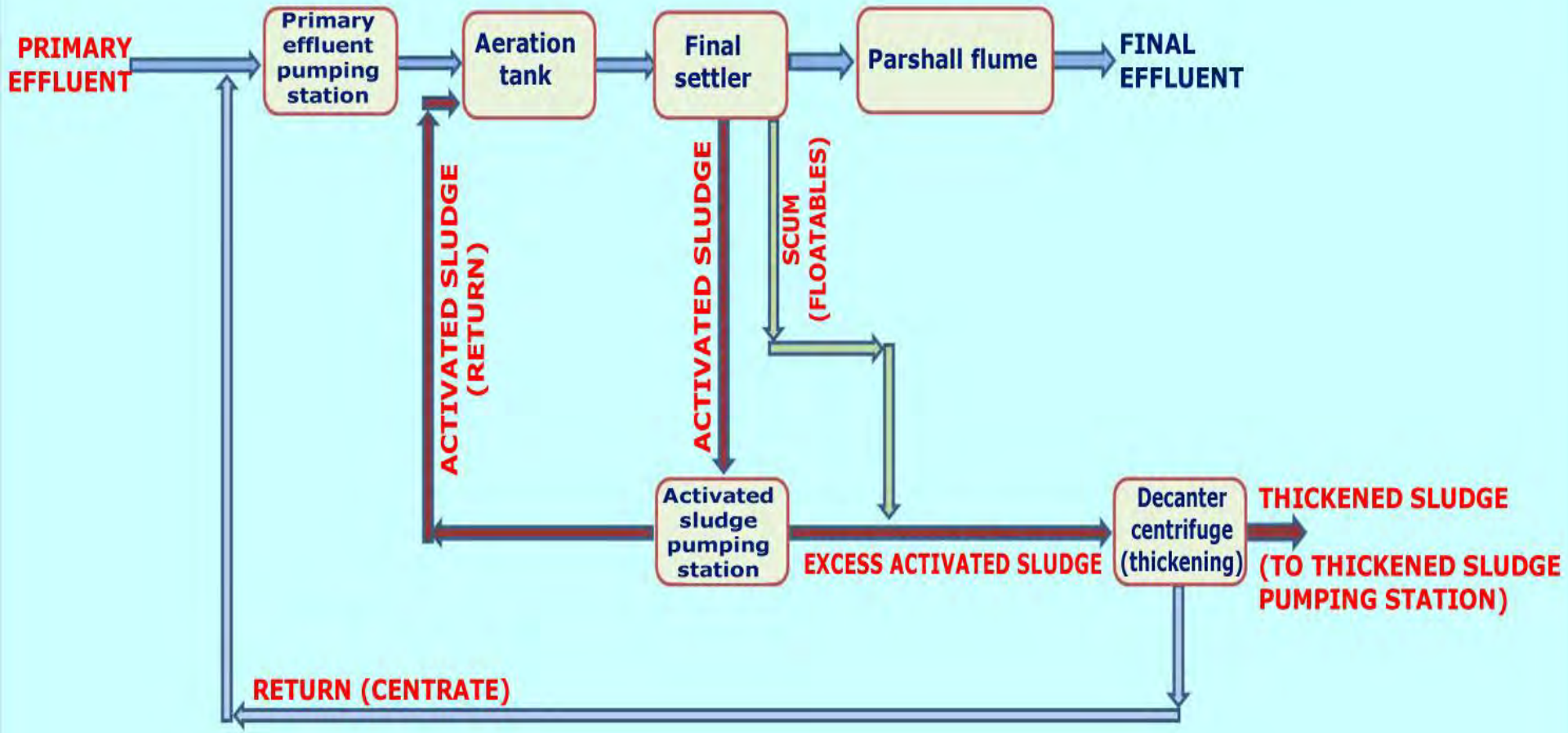


SECONDARY TREATMENT SCHEMATIC FLOW DIAGRAM

NOVA CEDAE

ALEGRIA WASTEWATER TREATMENT PLANT
SECONDARY TREATMENT SCHEMATIC FLOW DIAGRAM

GOVERNO DO Rio de Janeiro



PRELIMINARY TREATMENT

1. – MECHANICALLY CLEANED BAR RACKS (COARSE SOLIDS REMOVAL)

PROTECTION OF THE PUMPS FROM THE RAW SEWAGE PUMPING STATION;

- REMOVAL OF COARSE MATERIAL (PLASTIC BOTTLES, DRIFT WOOD, ETC…);
- THREE UNITS; CLEAR SPACING BETWEEN BARS: 10 cm.

PRELIMINARY TREATMENT

2. - RAW SEWAGE PUMPING STATION

RAISES THE SEWAGE FROM AN ELEVATION OF -17 m TO AN ELEVATION OF +8 m BY CENTRIFUGAL PUMPING (TOTAL PUMPING HEIGHT = 25 m)

- FIVE PUMPS OF 700 HP EACH;
- DESIGN FLOW (EACH PUMP) = 1 850 L/s;
- TOTAL PUMPING CAPACITY = 9 250 L/s;
- TWO FREQUENCY INVERTERS (VARIABLE FLOW).

RAW SEWAGE PUMPING STATION

PRELIMINARY TREATMENT

3. – FINE SOLIDS SCREENING

REMOVAL OF FINE SOLIDS TO PROTECT TREATMENT PROCESS EQUIPMENT

- FOUR MECHANICALLY CLEANED UNITS;
- CLEAR SPACING BETWEEN BARS: 1,3 cm;
- REMOVAL OF CA. 1,5 m^3/day OF SCREENINGS.

FINE SOLIDS SCREENING

PRELIMINARY TREATMENT

4. – GRIT REMOVAL (GRIT CHAMBERS)

REMOVAL OF GRIT AND SAND TO AVOID SILTATION OF TANKS AND PREVENT OPERATIONAL PROBLEMS.

- FIVE UNITS;
- CAPACITY: 1 000 L/s EACH;
- REMOVAL: 3,4 ton/day OF GRIT.

GRIT CHAMBERS

PRIMARY TREATMENT

5. – PRIMARY SETTLERS

SEPARATION OF WATER, SETTLEABLE AND FLOATABLE SOLIDS AND REMOVAL OF SLUDGE AND SCUM

- RECTANGULAR TANKS; WATER SURFACE: 7 560 m^3 EACH; SCUM AND SLUDGE REMOVAL BY CHAIN AND FLIGHT COLLECTOR;
- 5 UNITS WITH CAPACITY OF 1 000 L/s EACH;
- TOTAL SUSPENDED SOLIDS IN THE INFLUENT: 2OO mg/L; SOLIDS CONTENT OF THE SLUDGE: 1% (10 000 mg/L);
- HYDRAULIC DETENTION TIME: 2 h;
- SUSPENDED SOLIDS REMOVAL: 50%;
- BOD REMOVAL: 35%;

PRIMARY SETTLER

PRIMARY SETTLER

PRIMARY TREATMENT

6. – SLUDGE THICKENERS

INCREASES THE SOLIDS CONTENT OF THE SLUDGE REMOVED FROM PRIMARY SETTLERS FROM 1% TO 5%

- 5 UNITS; EFFICIENCY: 90%;
- EACH UNIT RECEIVES 1 663 m^3/day;
- PRODUCTION OF THICKENED SLUDGE: 294 m^3/day (EACH UNIT);
- THE THICKENED SLUDGE IS TRANSFERRED TO DIGESTERS BY THE THICKENED SLUDGE PUMPING STATION.

PRIMARY TREATMENT

7. - THICKENED SLUDGE PUMPING STATION

TRANSFERS TO DIGESTERS: THICKENED SLUDGE, SCUM COLLECTED IN THE PRIMARY SETTLERS AND EXCESS ACTIVATED SLUDGE FROM THE BIOLOGICAL TREATMENT

- 2 POSITIVE DISPLACEMENT PUMPS;
- CAPACITY: 17 L/s;
- PUMPING HEIGHT: 32 m.

PRIMARY TREATMENT

8. – ANAEROBIC DIGESTERS

DIGESTS RAW SLUDGE ANAEROBICALLY, GENERATING STABILIZED SLUDGE, GAS AND WATER

- 5 UNITS;
- SLUDGE CAPACITY: 7 400 m^3 EACH;
- HYDRAULIC DETENTION TIME: 25 days;
- ORGANIC (VOLATILE) SOLIDS REMOVAL: 50%;
- MIXING BY EXTERNAL SLUDGE RECIRCULATION THROUGH CENTRIFUGAL PUMPS.

ANAEROBIC DIGESTERS

PRIMARY TREATMENT

9. - CENTRIFUGES

INCREASES THE SOLIDS CONTENT OF DIGESTED SLUDGE FROM 5% TO 30% BY CENTRIFUGATION

- 3 UNITS;
- EACH UNIT RECEIVES 15 m^3/h OF DIGESTED SLUDGE AND PRODUCES 3 000 kg/h OF SLUDGE CAKE WITH 70% OF WATER;
- WHEN THE WWTP RECEIVES AN INFLUENT FLOW OF 2 500 L/s OF RAW SEWAGE, 78 ton/day OF CAKE ARE PRODUCED;
- THE CAKE IS TRANSFERRED TO A SANITARY LANDFILL; SOON WILL BE PROCESSED IN THE THERMAL DRYER INSTEAD.

CENTRIFUGES

THICKENING

PRIMARY TREATMENT

10. – THERMAL DRYER

INCREASES THE SLUDGE CAKE SOLIDS CONTENT FROM 30% TO 80% USING AS ENERGY SOURCE THE GAS GENERATED IN THE ANAEROBIC DIGESTERS

- THE UNIT HAS A CAPACITY OF PROCESSING UP TO 206,64 ton/day OF CAKE, PRODUCING 62 ton/day OF DRIED SLUDGE;
- THE DRYING PROCESS REDUCES 65% OF THE CAKE MASS;
- THE DRYING PROCESS PROMOTES A DRASTIC REDUCTION OF THE CONTAMINATION POTENTIAL OF THE SLUDGE;
- GAS CONSUMPTION: 989 Nm^3/h.

THERMAL DRYER

THERMAL DRYER

SECONDARY TREATMENT

11. – PRIMARY EFFLUENT PUMPING STATION

TRANSFERS THE EFFLUENT FROM PRIMARY TREATMENT TO THE AERATION TANKS

- 4 PUMPS; 197 HP EACH;
- CAPACITY: 4 450 m^3/h EACH.

SECONDARY TREATMENT

12. – AERATION TANKS

PROMOTES AERATION OF THE PRIMARY EFFLUENT BY MEANS OF AIR BUBBLES ORIGINATED FROM DIFFUSERS LOCATED AT THE BOTTOM OF THE TANKS

- 4 TANKS; VOLUME: 11 500 m^3 EACH;
- TREATMENT CAPACITY: 2 250 m^3/h EACH;
- DETENTION TIME: 5 h;
- SLUDGE AGE: 8 days;
- 4 ADDITIONAL TANKS FOR FUTURE OPERATION.

AERATION TANK

AERATION TANK

BLOWERS

PRODUCES THE AIR FLOW TO SUPPLY THE OXYGEN NEEDS OF THE AERATION TANKS

- 6 UNITS OF 800 HP EACH;
- FLOW CAPACITY: 21 800 Nm^3/h OF AIR EACH.

BLOWERS

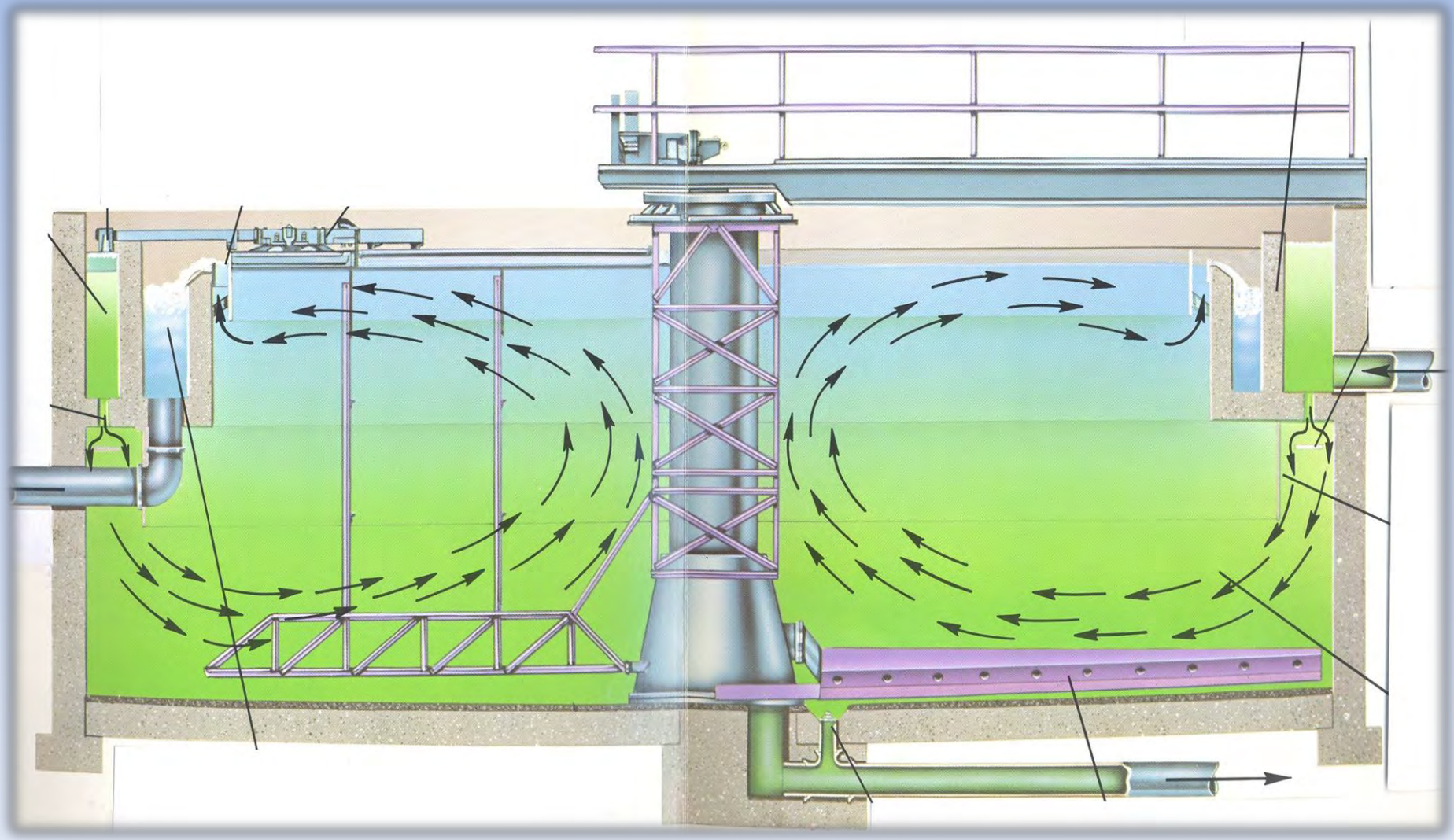
SECONDARY TREATMENT

13. – FINAL SETTLERS

RECEIVES THE MIXED LIQUOR FROM THE AERATION TANKS AND PROMOTES THE SETTLING OF THE ACTIVATED SLUDGE, RELEASING AN EFFLUENT THAT COMPLIES WITH THE DISCHARGE STANDARDS SET TO THE RECEIVING WATERS

- 04 UNITS;
- DIAMETER: 50 m;
- VOLUME: 8 830 m^3 EACH;
- DETENTION TIME: 3:50 h;
- 4 ADDITIONAL TANKS FOR FUTURE OPERATION.

FINAL SETTLERS



SECONDARY TREATMENT

14. – ACTIVATED SLUDGE PUMPING STATION

PROMOTES THE RETURN TO THE AERATION TANKS OF THE ACTIVATED SLUDGE SETTLED IN THE FINAL SETTLERS

- 4 PUMPS OF 49 HP EACH;
- FLOW CAPACITY: 1 575 m^3/h EACH;
- RECIRCULATION RATE: 0,6;
- THE EXCESS ACTIVATED SLUDGE IS TRANSFERRED TO MECHANICAL THICKENERS FROM WHICH THE THICKENED SLUDGE IS SENT TO THE DIGESTERS.

FINAL EFFLUENT

THE FINAL EFFLUENT IS DISCHARGED IN THE RECEIVING WATERS WITH THE FOLLOWING CHARACTERISTICS:

	INFLUENT (mg/L)	EFFLUENT (mg/L)	EFFICIENCY (%)
BOD_5	283	≤ 8	98,0
TSS	350	≤ 10	98,0
COD	500	≤ 30	94,0

CONTROL

The operation of the plant is totally monitored and controlled to meet the design process parameters and environmental standards through:

- Operational Control Center;
- Systematic analysis in laboratory units.

To demonstrate the quality of the treatment, the Center keeps an aquarium of 18,000 liters fed with WWTP treated effluent (water reuse).

ASSOCIATED ALTERNATIVE ENERGY AND ENVIRONMENTAL PROJECTS

- Processing and utilization of the **gas** generated in the WWTP processes to be used in the sludge thermal dryer and as fuel in part of the fleet of vehicles of CEDAE;
  - This project, which could generate carbon credits, will reduce the generation of greenhouse effect gas, collaborating in the worldwide effort to minimize the causes of global warming;
- **Biodiesel** production from the scum removed from the primary settling tanks, with prospects for implementation on industrial scale;
- **Pyrodiesel** production from the pyrolysis of the sludge generated in the WWTP.
- Production of **organic compost** from the sludge, to be used on agriculture, complying with the standards set by the environmental control agencies.

ENERGY PRODUCTION

SEEDLING NURSERY OF ATLANTIC FOREST SPECIES

To minimize the causes of water bodies pollution, CEDAE keeps in the Center the "Incubator of the Atlantic Forest Seedling **Arthur Sendas**", with capacity to produce 35 000 seedlings per year. The seedlings are used by CEDAE in the reforestation of public areas and riparian vegetation of rivers that flows to Guanabara Bay.

The work at the incubator is made by inmates of the open and semi-open prison schemes from the prisional system of the State of Rio de Janeiro, aiming at their rehabilitation according to the Social Responsibility Program of the Company.