

Practical performance of the Simplified Fiber Filtration (SFF) for CSO control

合流式下水道改善のための 簡易型繊維ろ過性能

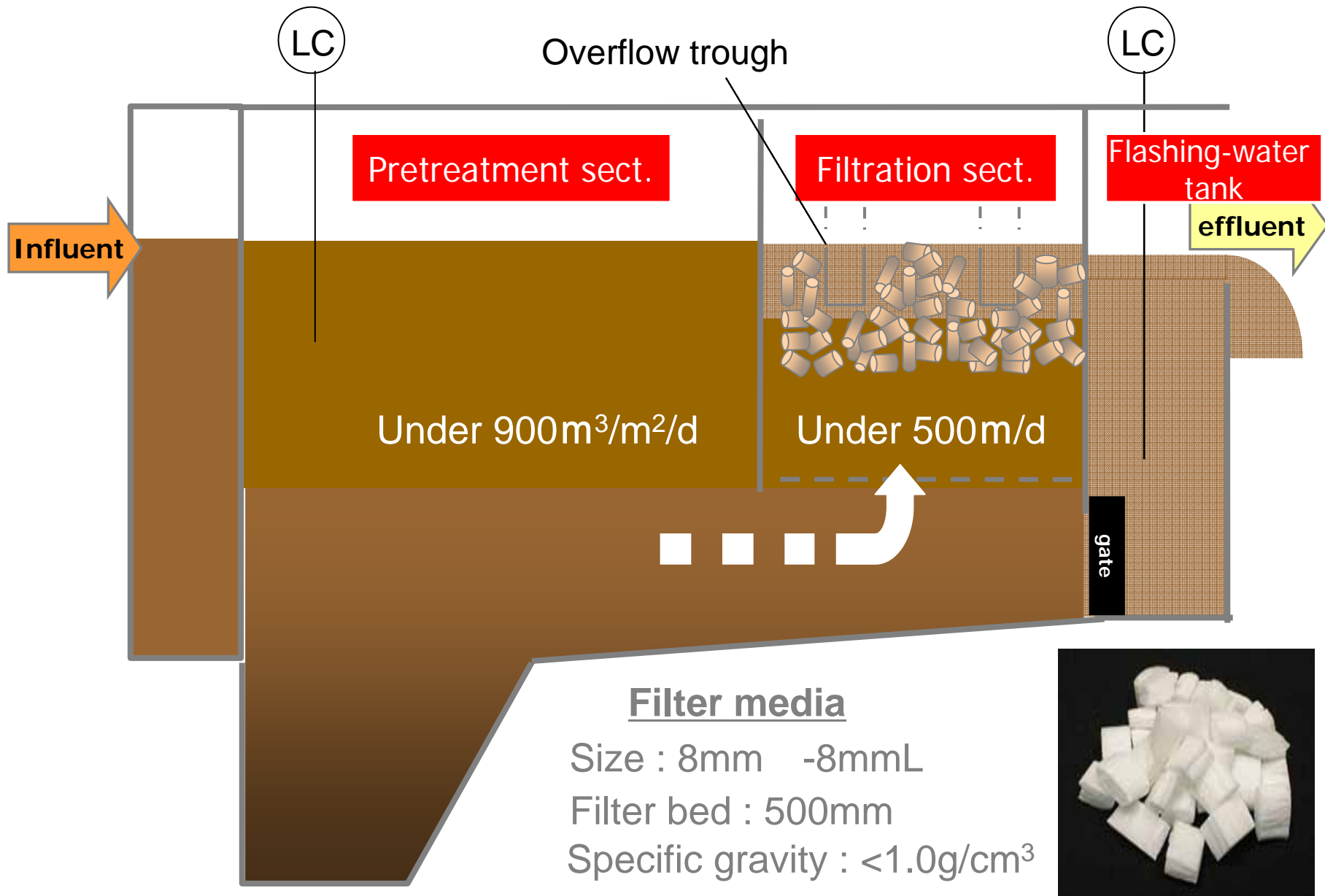
 アタカ大機株式会社

Daiki Ataka Engineering Co., Ltd

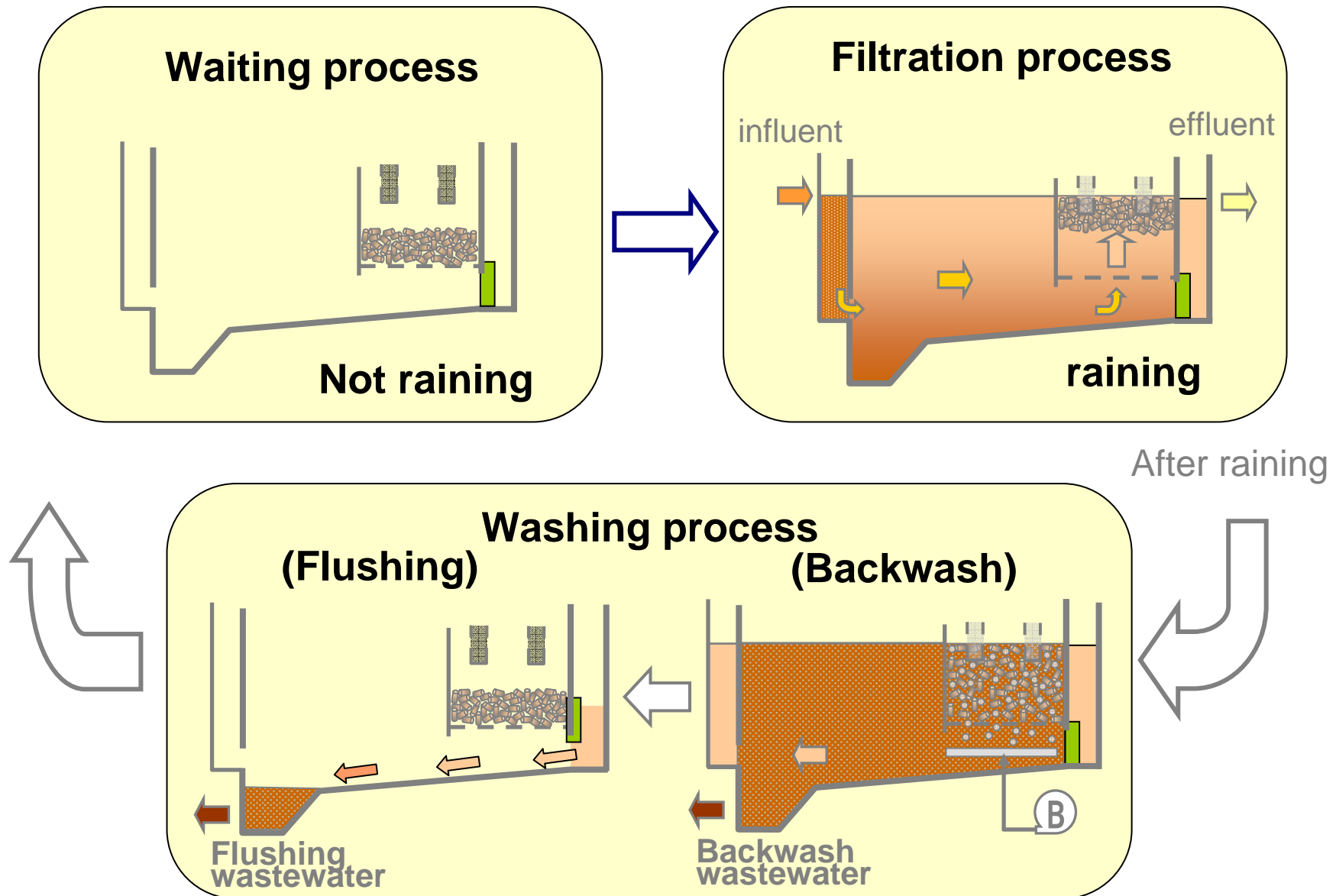
The concept of the SFF System

- SS and BOD₅ removal ratio is **more than 60%**.
- Maximum filtration head loss should be **less than 5 kPa**.
- The tank keeps **vacant** after washing-process, not in use .
- The backwash should be done after raining by aeration.
- Sediments could be flushed-out by treated water.
- Debris and sand should not affect filtration.
- **Simplified construction**

A schematic diagram of the SFF system

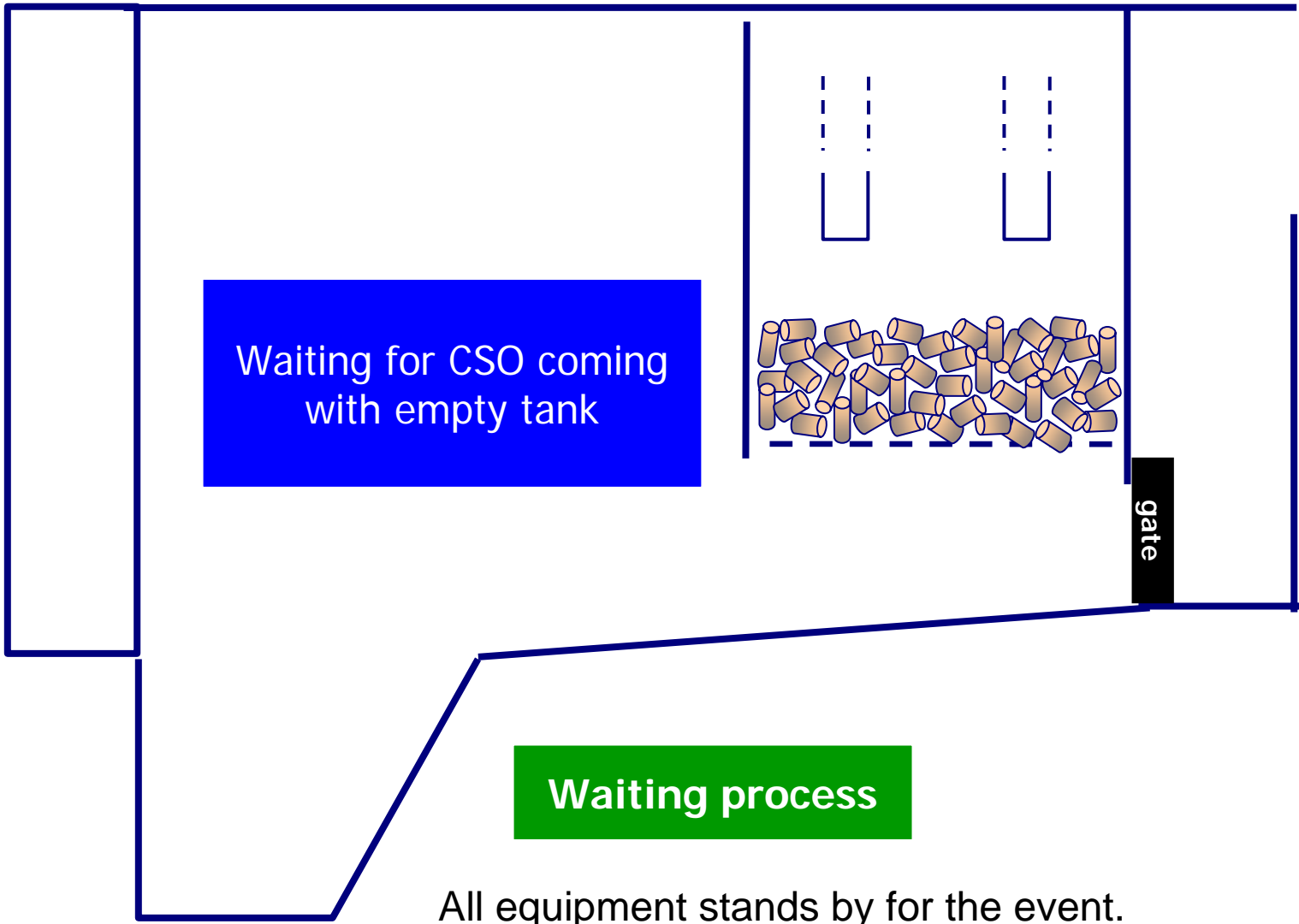


The cycle of the system operation

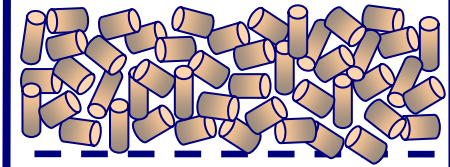




not raining



Waiting for CSO coming
with empty tank

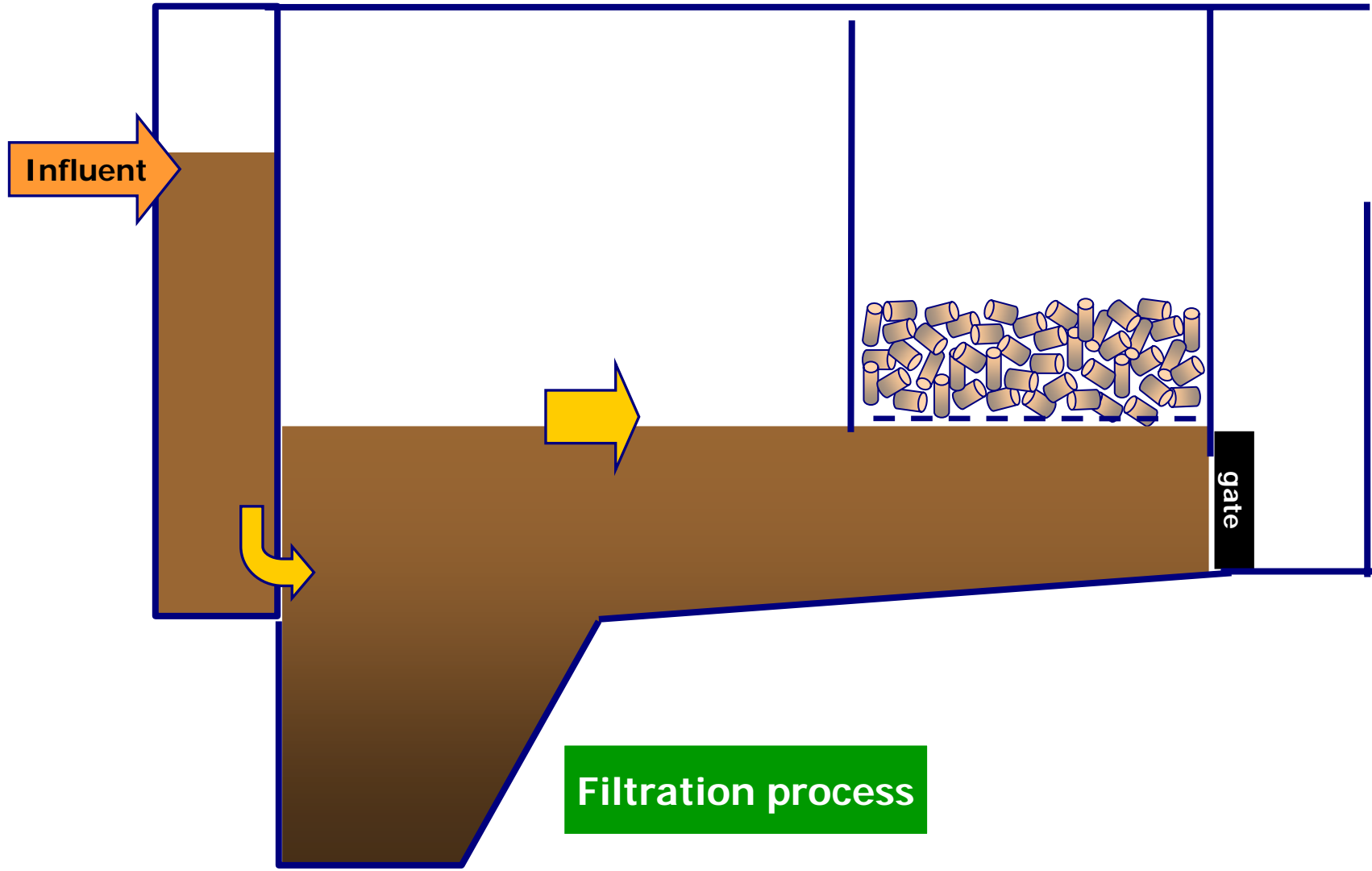


gate

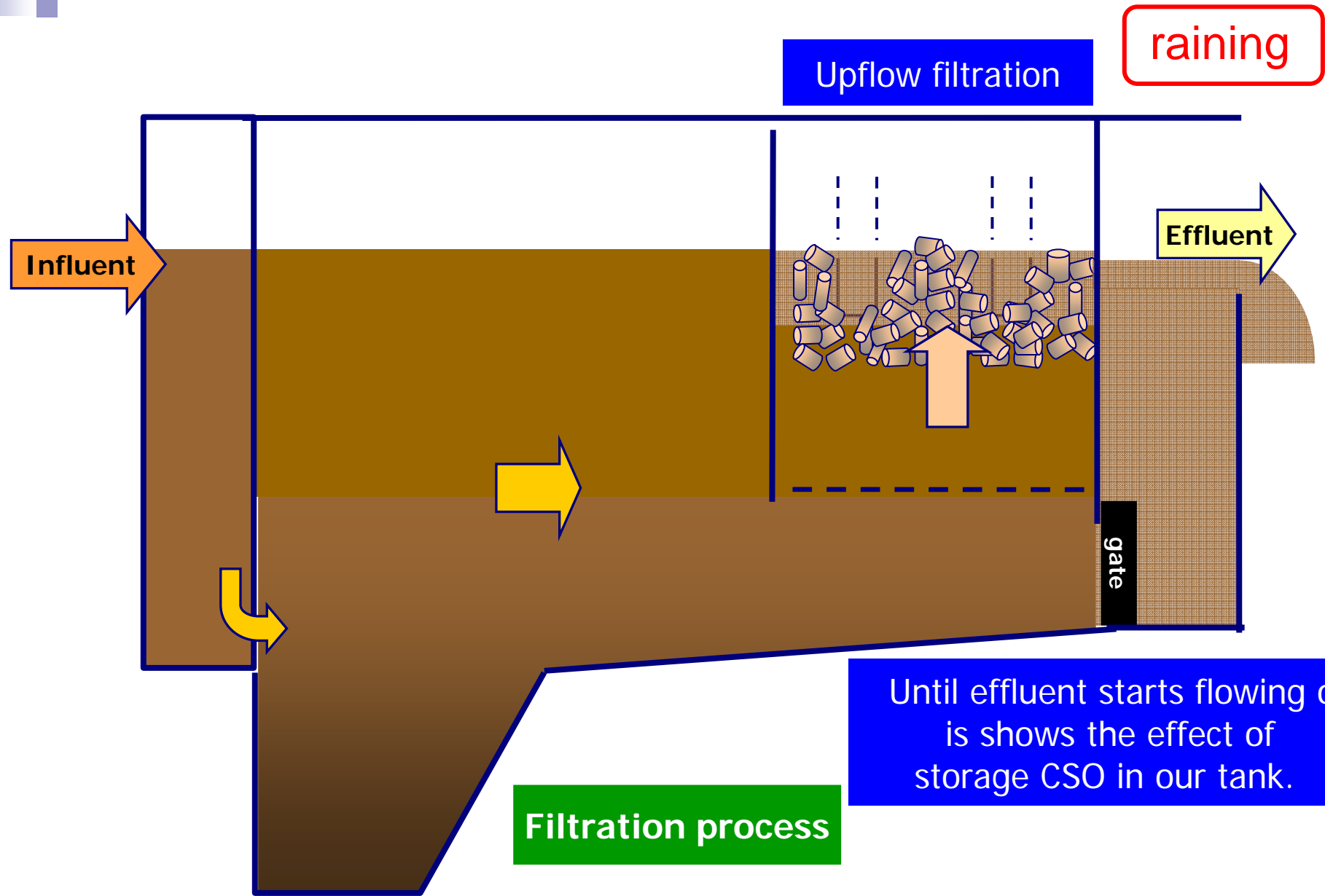
Waiting process

All equipment stands by for the event.

raining



Filtration process

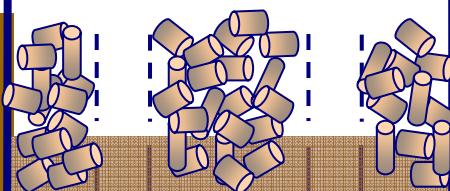


raining

Upflow filtration

Influent

Along with the increase of filtration head loss, the media float up to reduce it.



Effluent

gate

Until effluent starts flowing out, is shows the effect of storage CSO in our tank.

Filtration process

raining

Upflow filtration

maximum head loss is 5kPa

500mm

Along with the increase of filtration head loss, the media float up to reduce it.

In case it gets the maximum head loss, the treatment process of pretreatment sect, is still available.

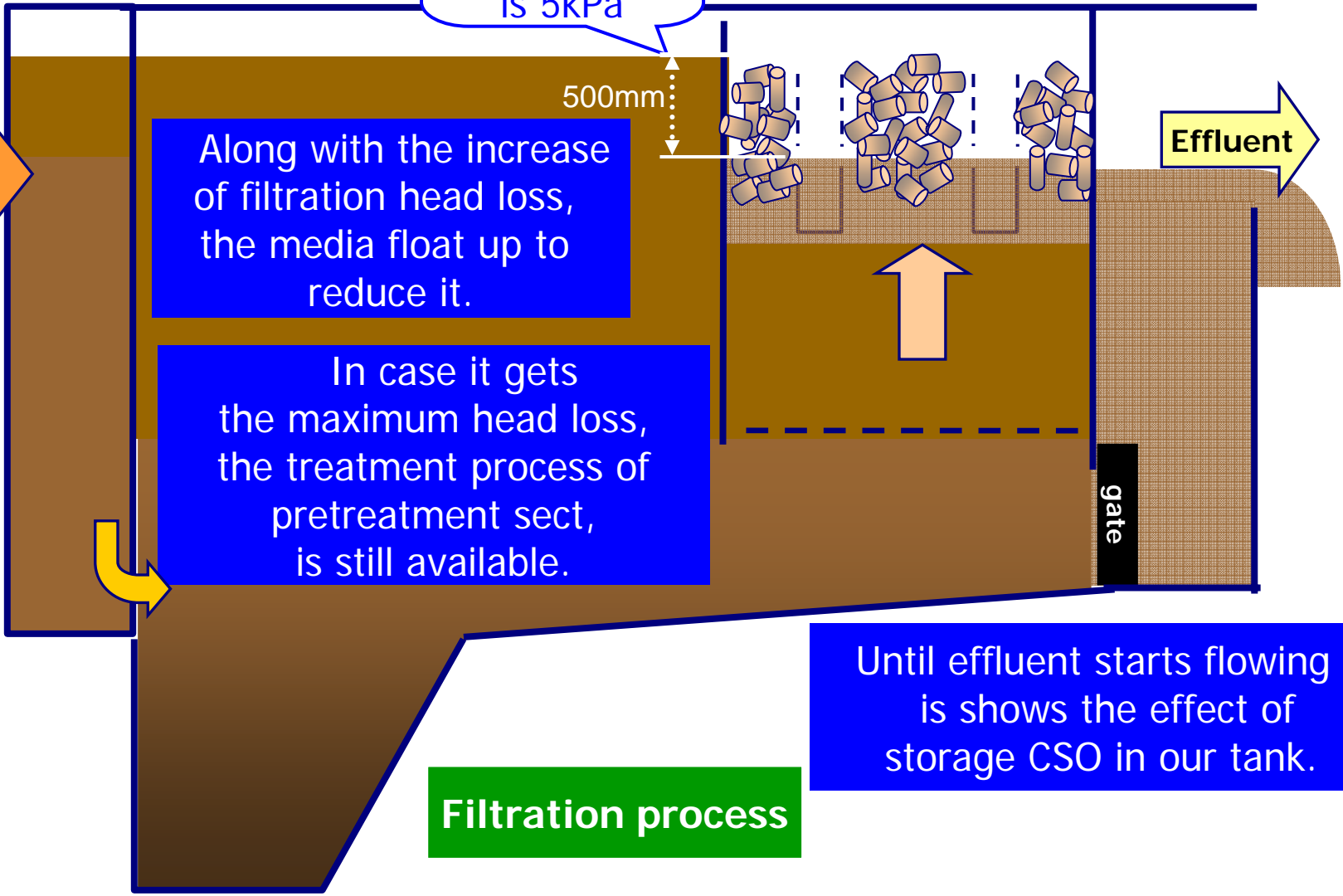
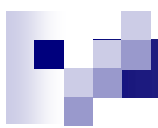
Effluent

gate

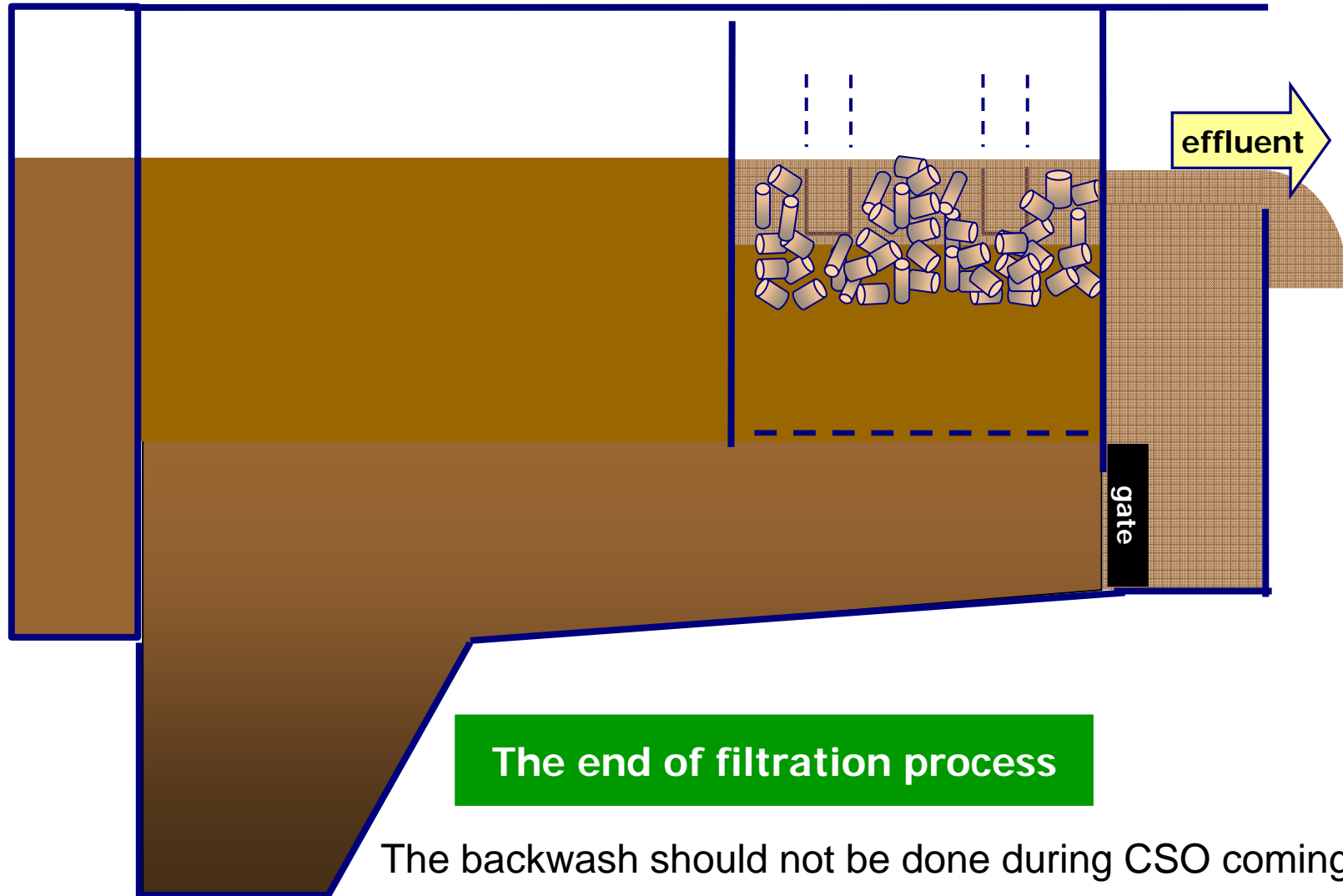
Until effluent starts flowing out, is shows the effect of storage CSO in our tank.

Filtration process

Influent



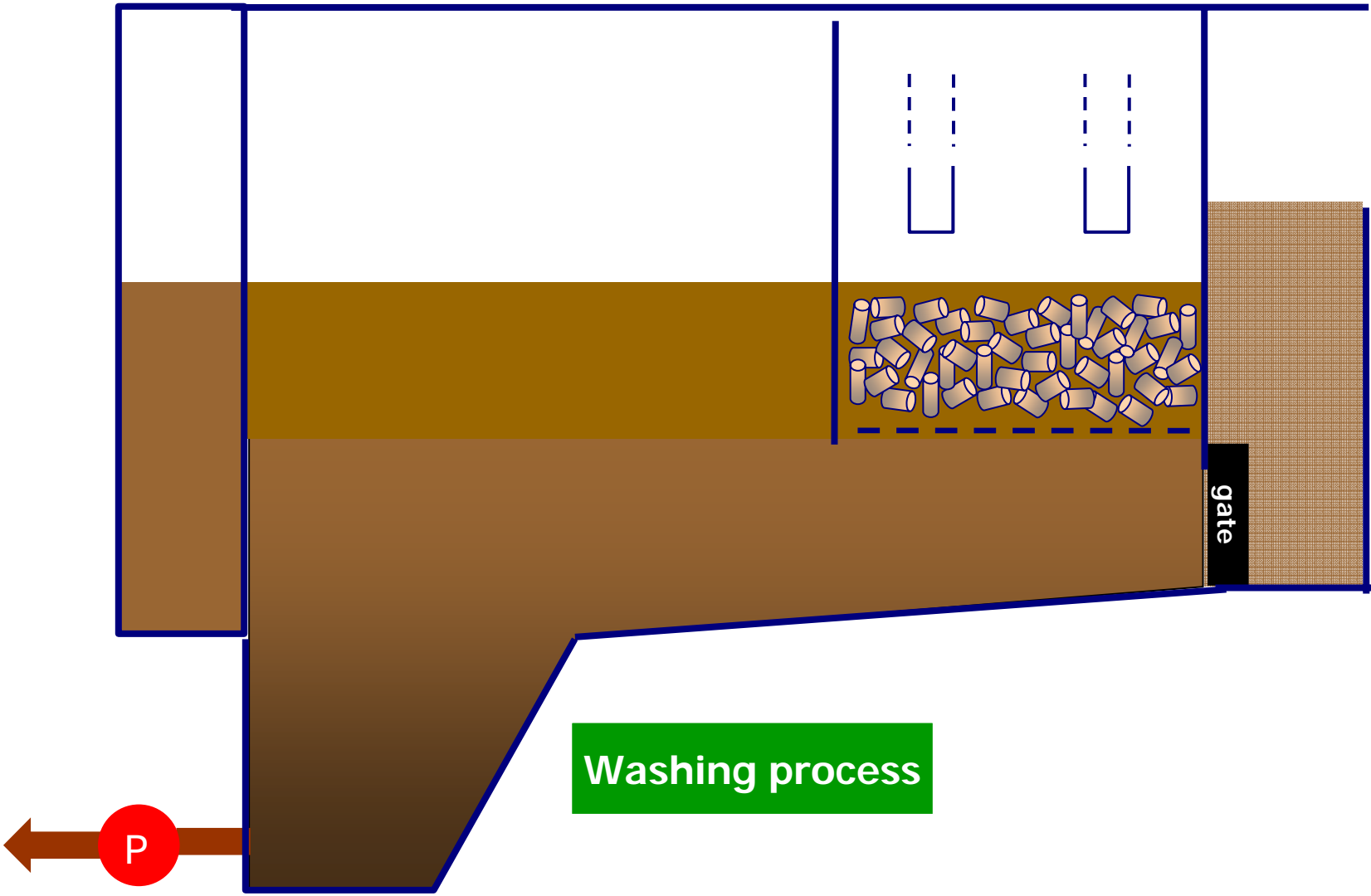
At the moment : stop raining



The end of filtration process

The backwash should not be done during CSO coming in.
No equipment is operated during filtration process and waiting process.

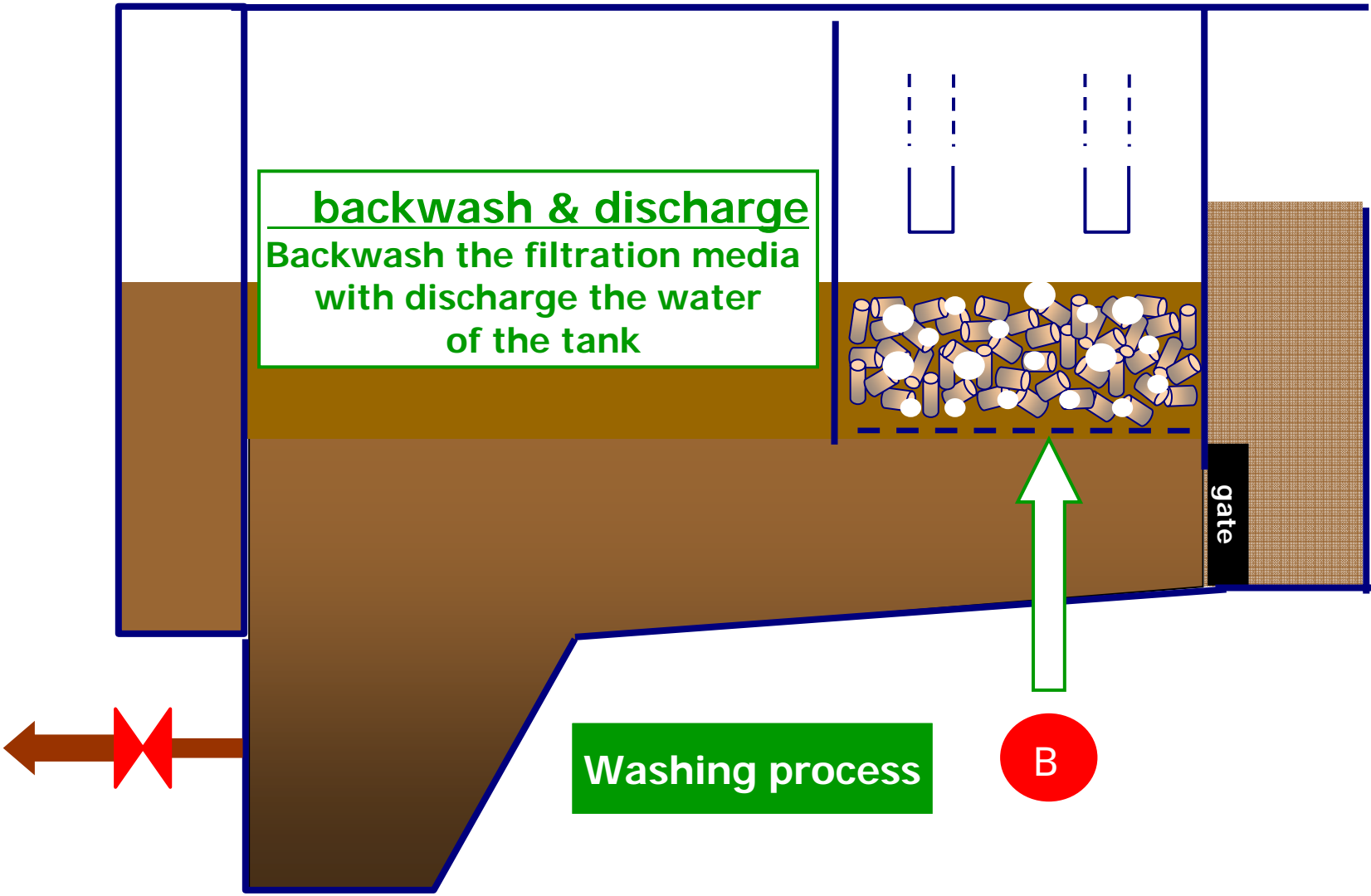
not raining



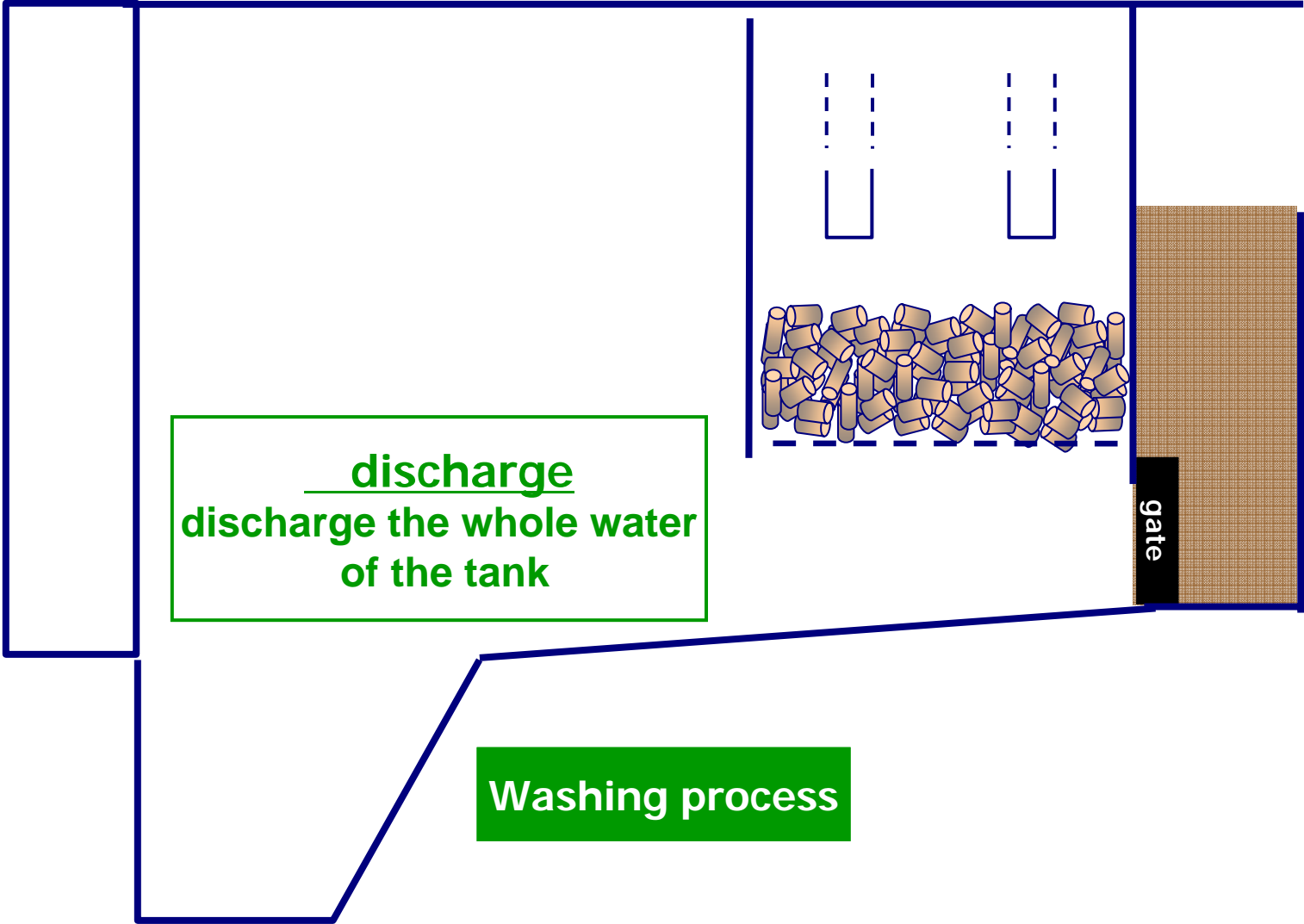
Washing process

P

not raining



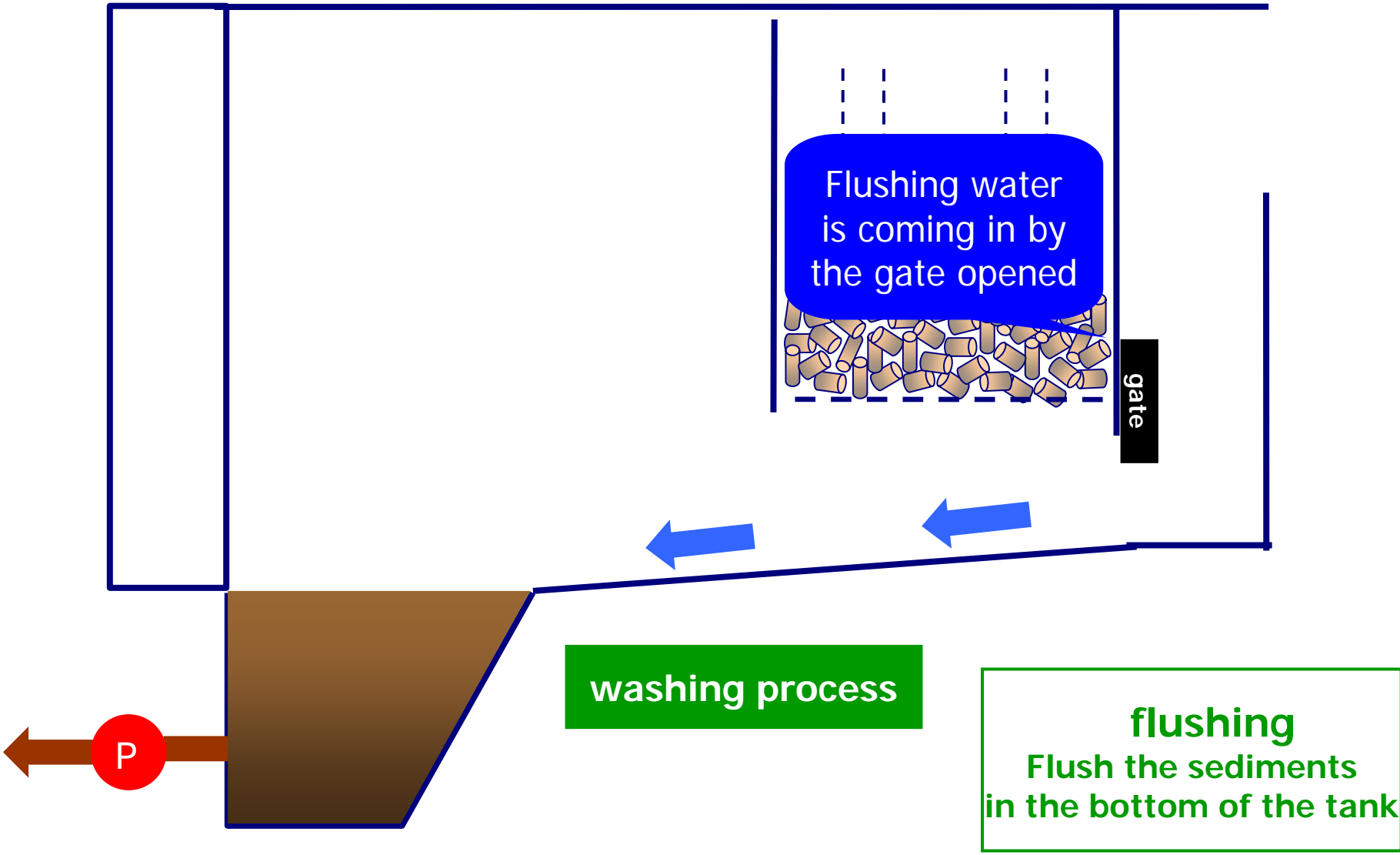
not raining



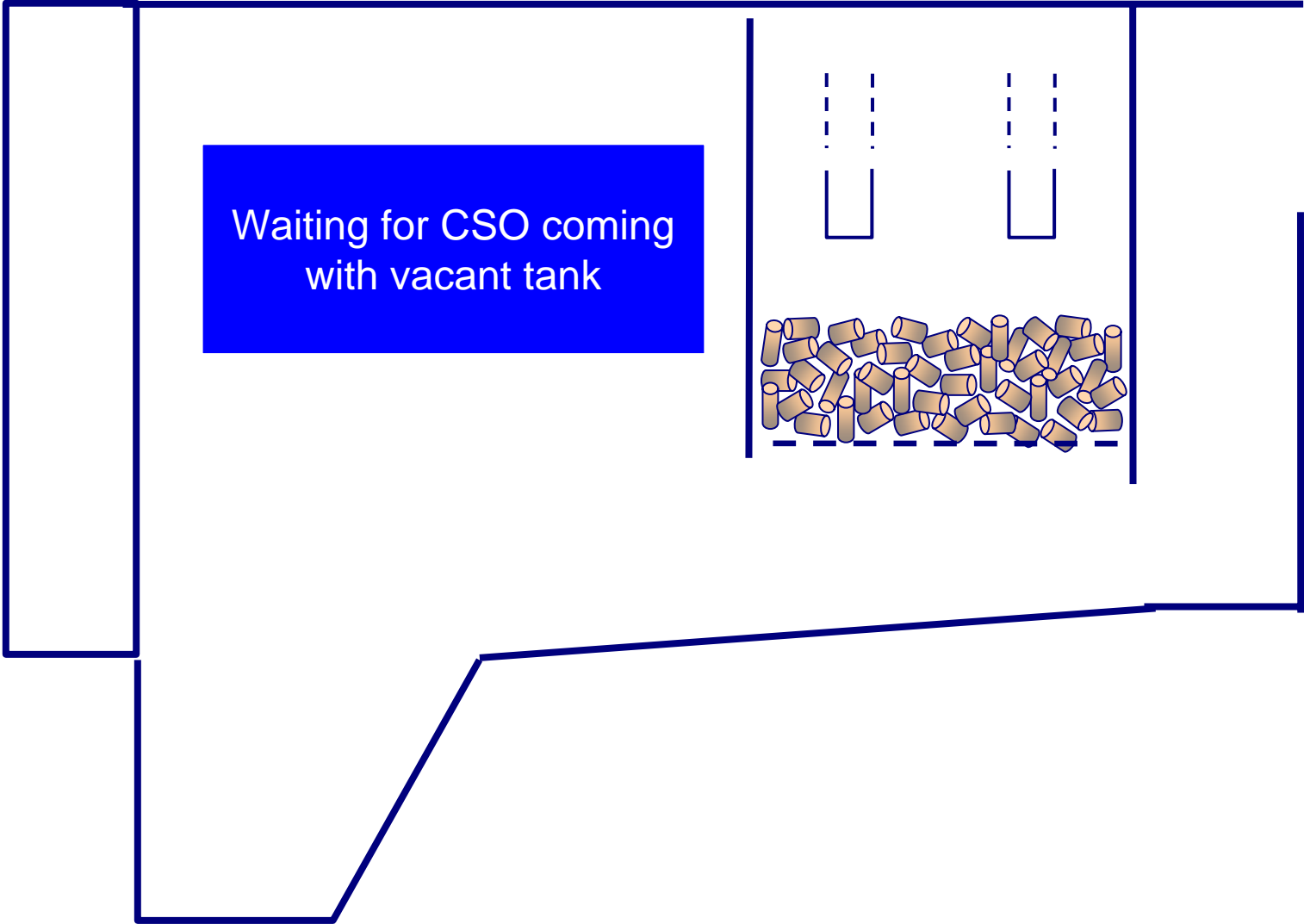
discharge
discharge the whole water
of the tank

Washing process

not raining

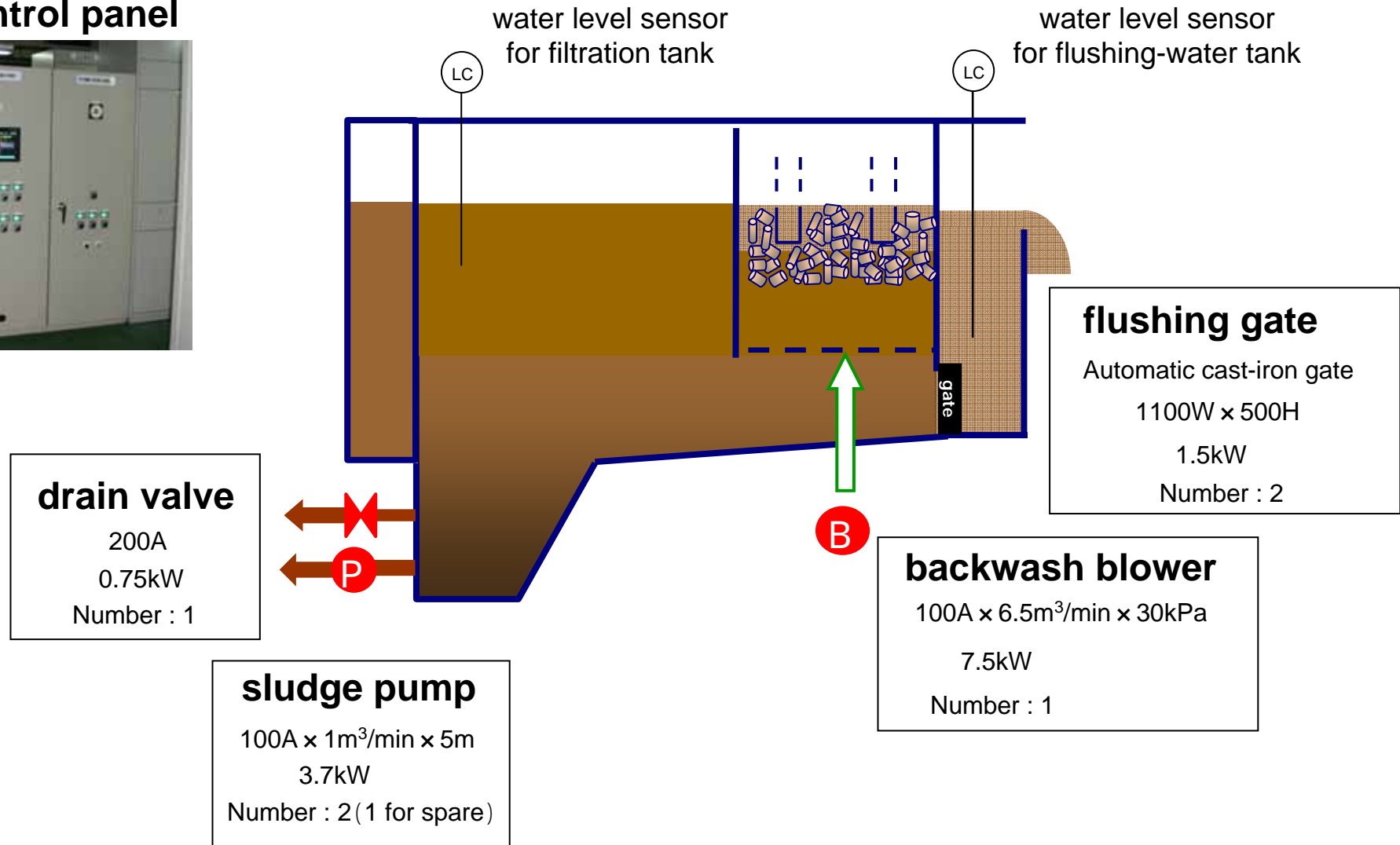


not raining



Facilities composition

control panel



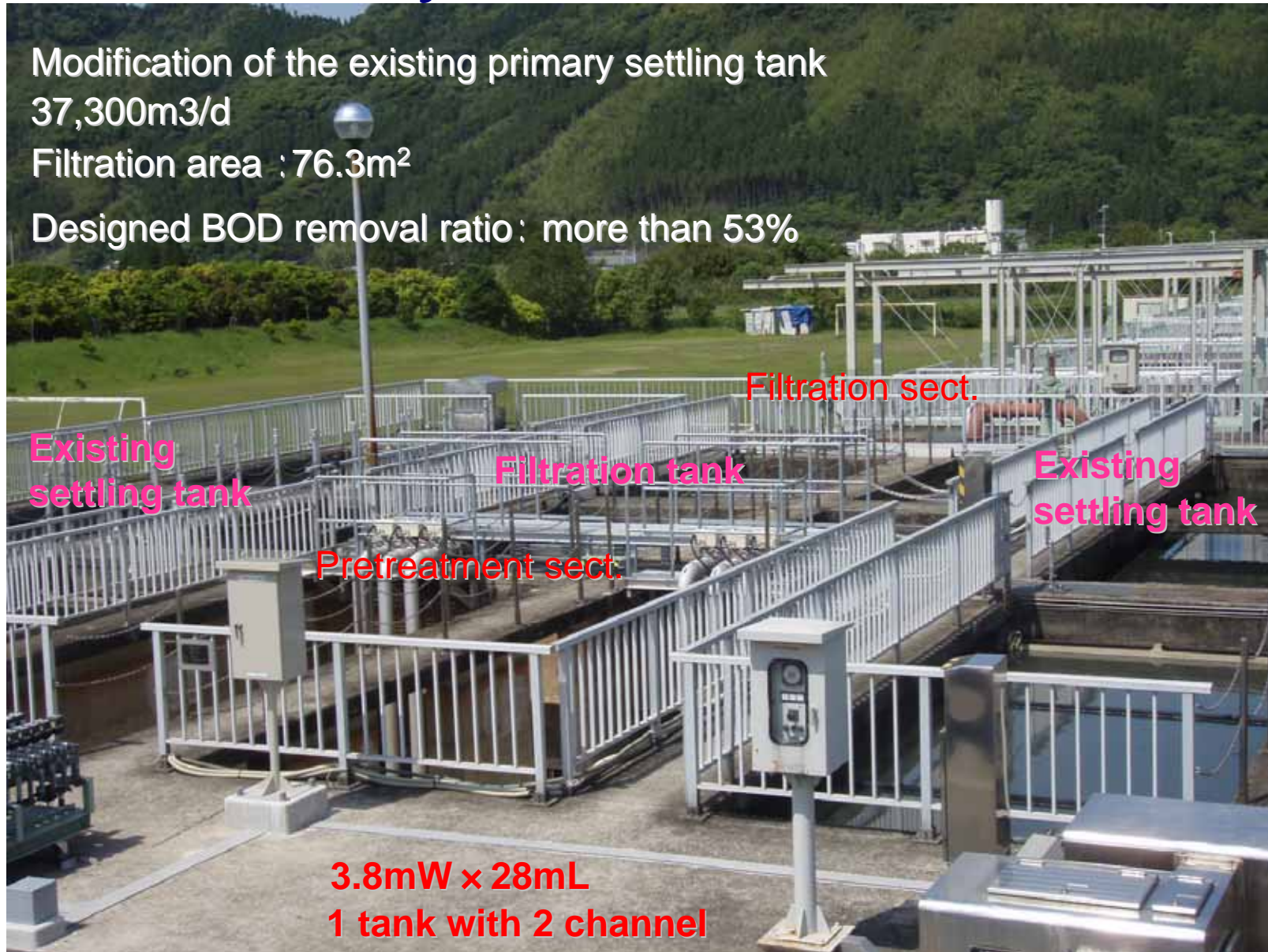
The facility installed in S.W.T.P

Modification of the existing primary settling tank

37,300m³/d

Filtration area : 76.3m²

Designed BOD removal ratio : more than 53%



Operating situation photograph

Filtration sect. (inside)



Filtration sect. (upside)



effluent trough

During filtration

effluent channel



Washing process photograph

Backwash with air



The filtration sect.
shown from upside

After discharge of the water

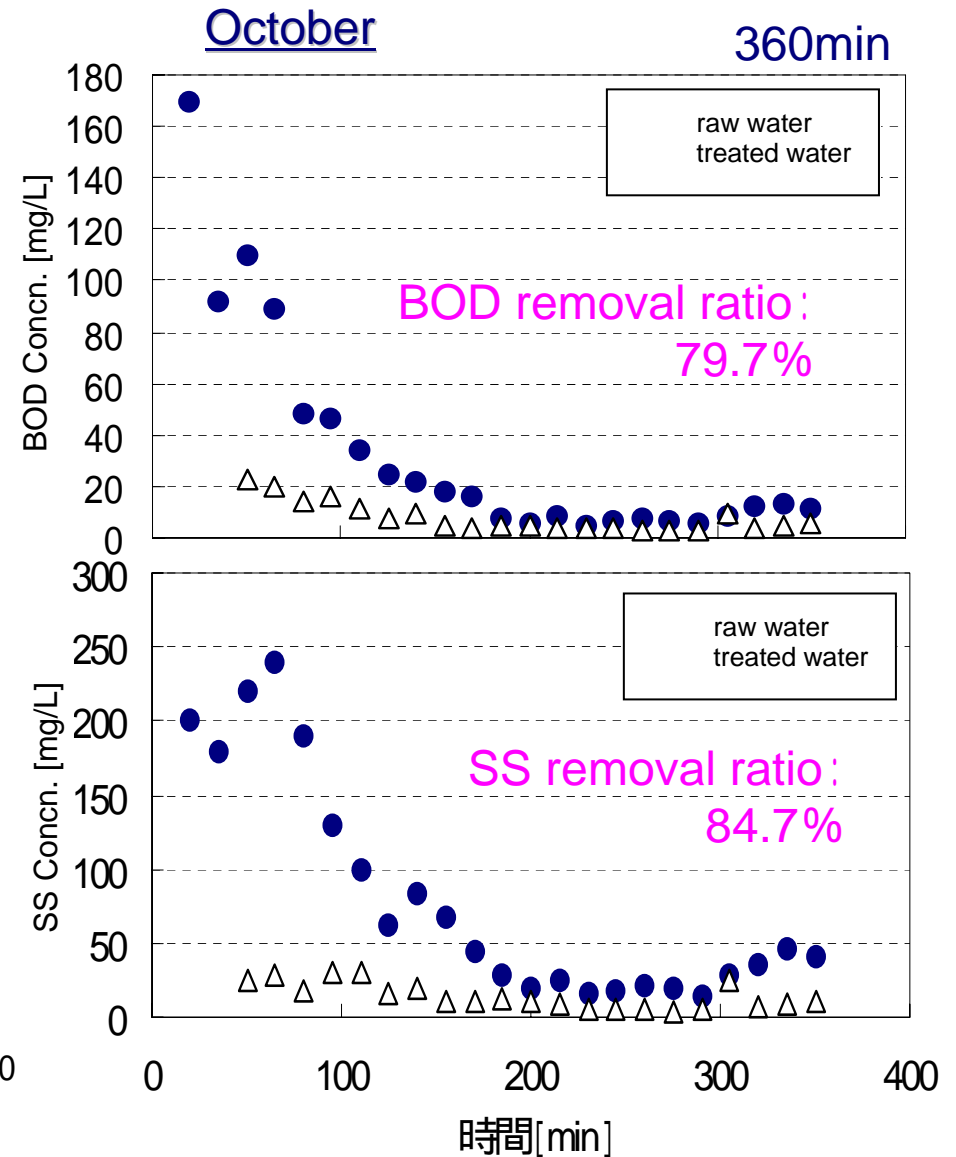
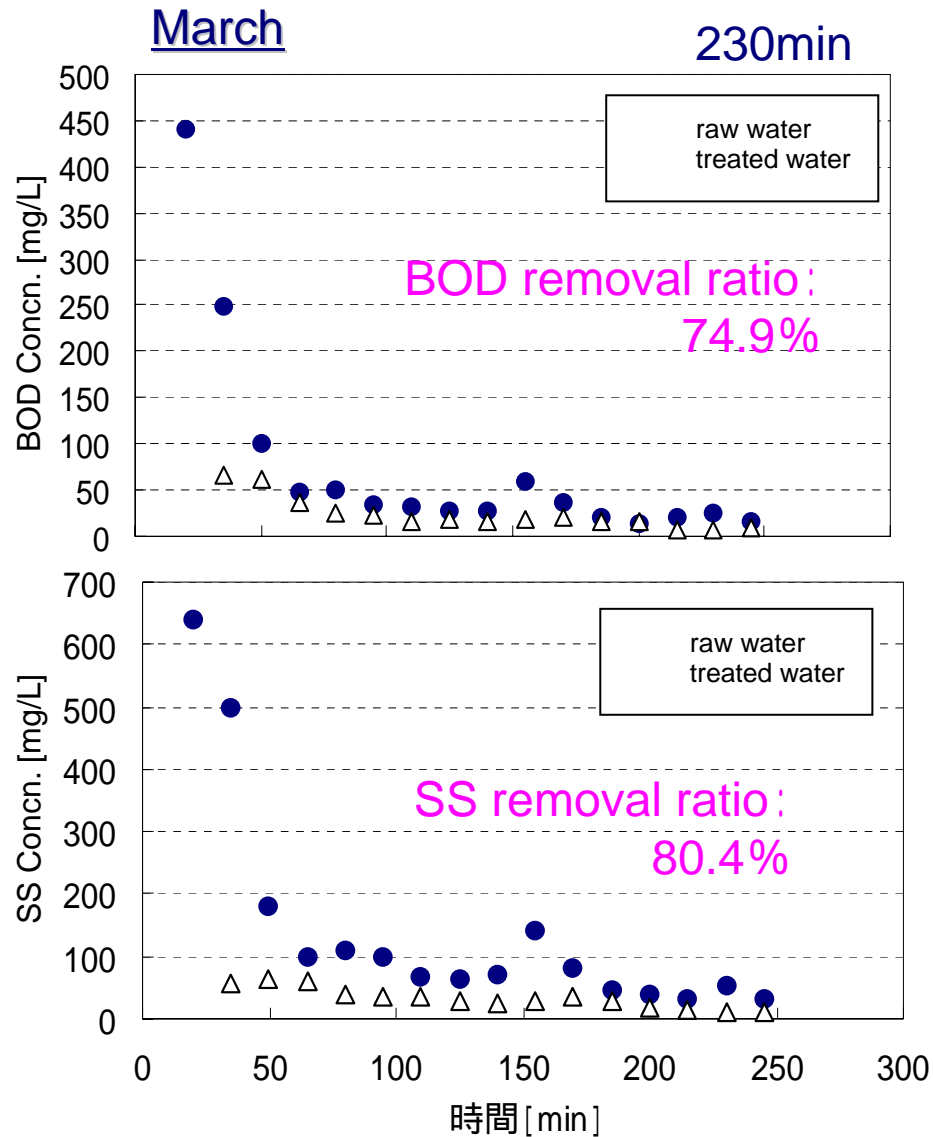


After flushing process

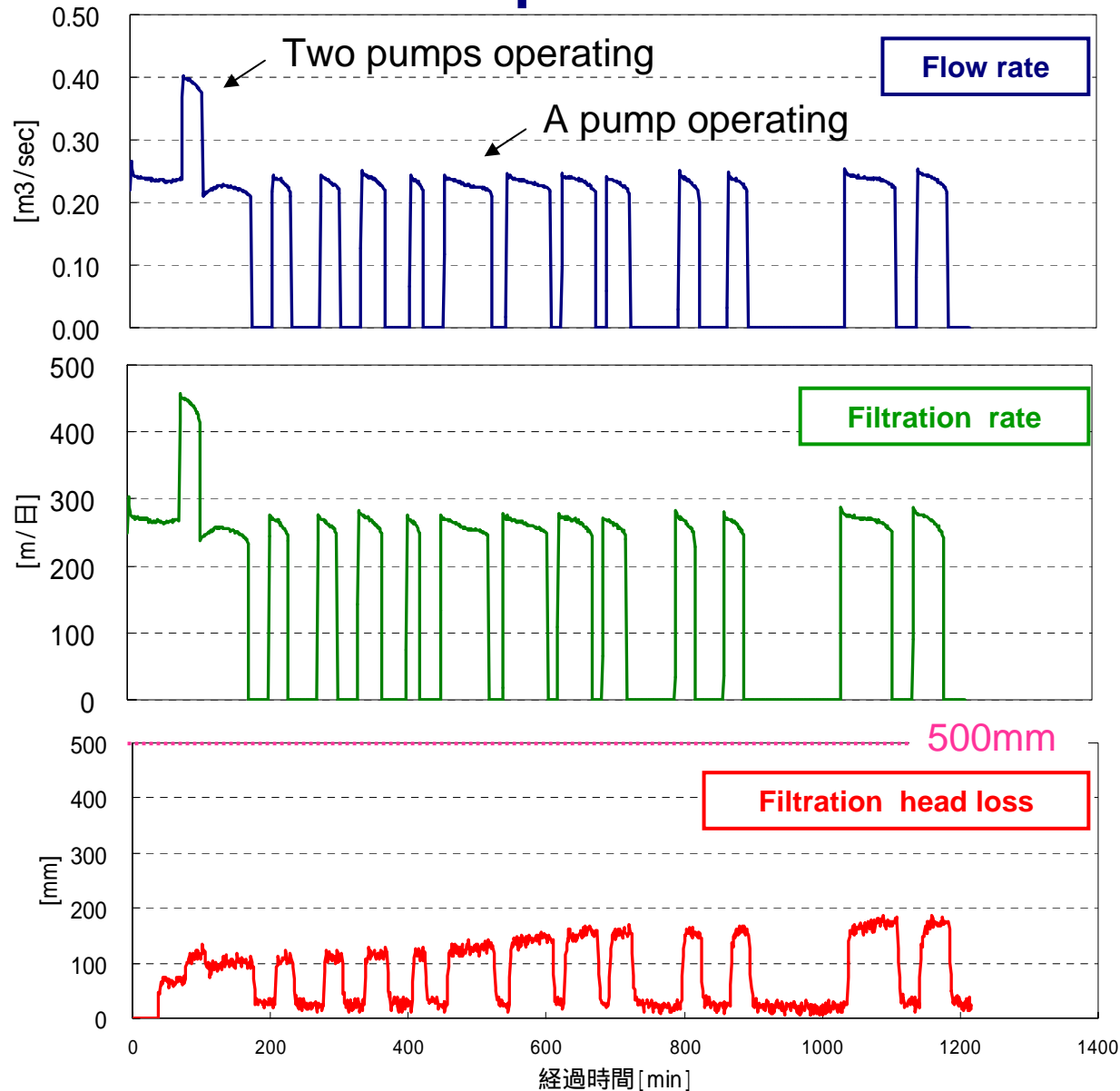


The bottom of the tank

Practical performance - Removal ratio



Practical performance - Head loss



April

rainfall time : 1,216 min

= over 20hrs

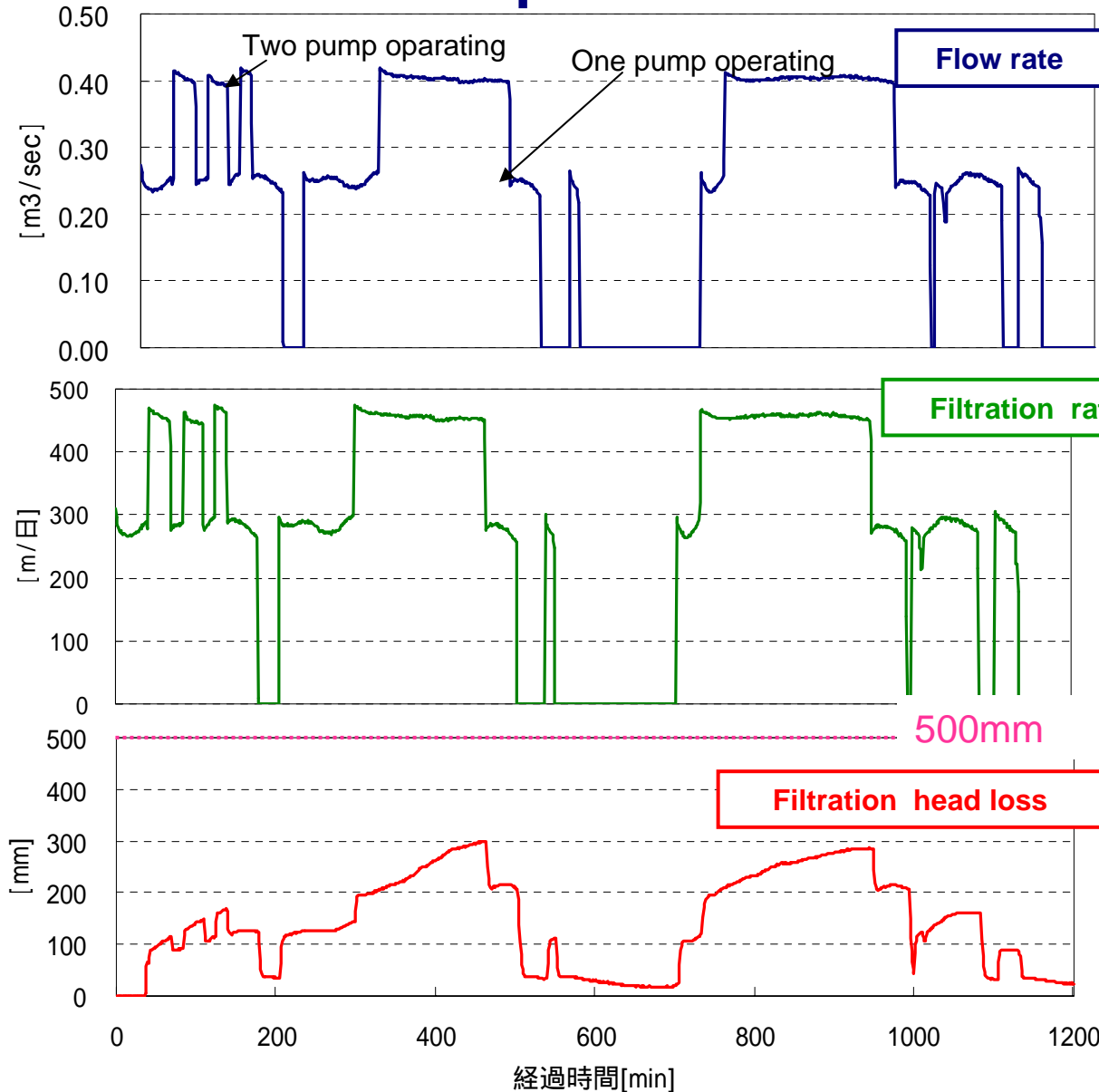
(inflow time : 11.3hrs)

The amount of the
filtrated water : 9,756m³

Max. head loss :

186mm < 500mm

Practical performance - Head loss



October

rainfall time : 1,134min
19hrs

(inflow time : 14.9hrs)

The amount of the
filtrated water : 17,464m³

Max. head loss :

299mm < 500mm

The performance of this system

Date	Rainfall duration [min]	CSO Incoming hours [min]	Amount of CSO [m ³]	BOD * Removal ratio [%]	SS * removal ratio [%]
Mar. 15, 2010	230	230	5,190	74.9	80.4
Apr. 15, 2010	1,216	679	9,756	82.8	90.4
July 3, 2010	1,392	1,019	22,175	77.9	72.2
Oct. 24, 2010	1,134	895	17,464	79.7	84.7
May 23, 2011	598	408	7,555	77.7	88.9
Aug. 03, 2011	152	152	3,110	80.5	86.4

*) Removal ratio based on water analyses during 6 hours after CSO in coming

Conclusion

- Practical performance that was higher than the designed target was obtained.
- SFF system, the Simplified Fiber Filtration for CSO, was acceptable in practical application.

Operating condition for one and a years
The number of operation : about 70 times

- Durability and stability of filter media against a long term usage will be followed up.

construction results

No.	Treatment quantity [m ³ /day]	Construction type	The form of the tank	The number of the tank	Construction completed date
1	37,300	Modification of the existing primary tank	rectangle	2channels/ 1 tank	March, 2010
2	36,400	New construction	rectangle	1channels/ 1 tank	March, 2012 (Under construction)
3	60,000	Modification of the existing primary tank	round shape	1 tank	Feb., 2012 (Under construction)
4	19,000	Modification of the existing primary tank	rectangle	2channels/ 1 tank	Nov., 2012 (Under construction)