

How to upgrade your wastewater treatment plant
To meet the General Effluent Standards of
DENR Administrative Order No. 2016-08 (DAO-08)

The Updates on the Water Quality Guidelines and Water Effluent Standards DENR Administrative Order No. 2016-08 (DAO-08) was approved on May 24, 2016, published on May 30, 2016 and is effective on June 14, 2016. This DAO-08 Setting the General Effluent Standards (GES) affect nearly all existing Waste Water Treatment Plant or such facilities under design/ construction. A grace period of not more than five (5) years can only be given to establishments that submit Compliance Action Plan and periodic status of implementation to the DENR on the steps taken for the establishment's compliance schedule within the prescribed grace period.

Most existing WWTPs were designed and built to meet DAO1990 -35 Inland Waters Class C-NPI, such as the one for an industrial park in Batangas of the Philippines, as shown in the following photo No.1.

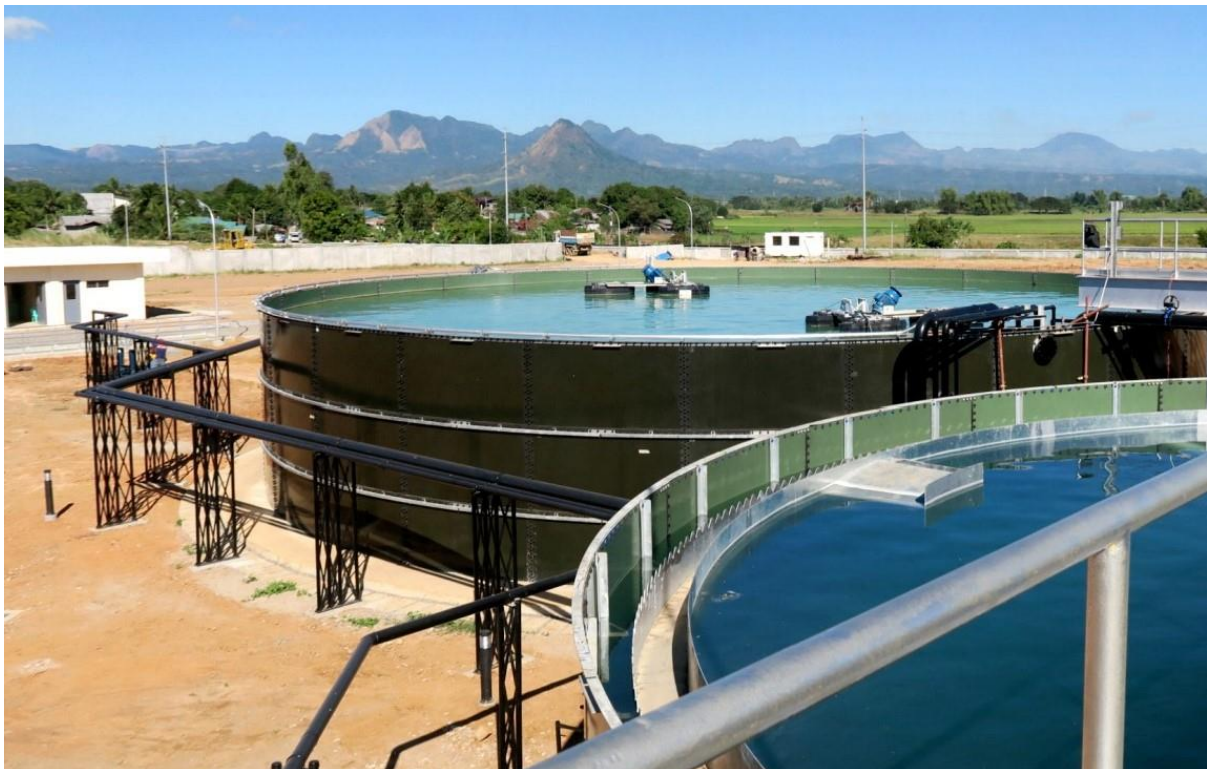


Photo No.1

The main differences between the effluent standard of DAO1990 -35 and DAO-08 GES are the new limits on Ammonia ($\text{NH}_3\text{-N}$), Nitrate ($\text{NO}_3\text{-N}$), Total Phosphate (TP) and Fecal Coliform. In order to meet GES, when anyone analytical value of these four substances in the raw wastewater are higher than the limits, specific treatment is required, as follows:

$\text{NH}_3\text{-N}$: Ammonia can be converted to nitrate biologically in an activated sludge system by nitrifying bacteria. When additional oxygen is provided for oxidation, more aerobic bacteria can be retained longer in the system for transformation into nitrifying bacteria which nitrify ammonia. That is to say, the aeration equipment/ system and the aeration tank and clarifier shown in Photo No. 1 are need to be upgraded with the equipment are show in Photo No. 2 .



Photo No. 2

NO₃-N: When ammonia is converted to nitrate, the total nitrate-N may be more than the GES limit 14 mg/l. When there is no oxygen in a reactor, Nitrate may be broken down into Nitrogen gas by denitrifying bacteria when they take up oxygen for respiration. That is to say, when the nitrate bearing mixed liquor goes in a reactor with mixing device, under appropriate temperature and pH, nitrate can be reduced. Thus, these are the equipment required for this upgrade is similar to Photo No.3.



Photo No. 3

Total Phosphate (TP): Dissolved phosphates, depending on the concentrations in raw wastewater, may be removed by chemical or biological treatment (or a combination of both) in an activated sludge system. When TP concentration is high in combined raw wastewater, Enhanced Biological Phosphorous Removal (EBPR) process may be more economical in the long run for medium to large scale WWTP! Since TP discharge limit is only 1 mg/l, when using chemical for TP removal, coagulation/ flocculation must be thorough and clarification process must be effective. Therefore, solids contact type reactor/ clarifier, as shown in Photo No. 4 is required especially when treating secondary effluent.



Photo No. 4

Remark: After TP removal, the quality of treated effluent meets cleaning and flushing purpose except the suspended solids are still high. In order to recycle clarified effluent for non-drinking applications, a media filtration system is required.

Fecal Coliform: It is a type of coliforms. If the existing facility has a disinfection system, such as chlorination, it may be able to kill the Fecal Coliform too. So, it a matter of ordering the Fecal coliform test apparatus/ reagent for such test in addition to total coliforms. Increase the dosage of the disinfectant if the number of Fecal Coliform exceeds the GES limit.

When an existing WWTP needs to be upgraded to meet DAO-08, Hydrex can custom design the upgraded facility with the lowest Capex and Opex for you. Please provide the following information:

1. To prepare composite sample of raw wastewater for laboratory analysis, the best sampling should be done for one week in the most representative season. Note down the total daily flow when samples are collected in those days. All the control parameters are indicated in the GES should be tested.
2. To prepare a complete set of WWTP general arrangement drawing with all process tanks dimensions. The drawings also show the proposed space for use in the upgrade.
3. To prepare a list of existing M&E equipment which can still be used in the coming 3~4 years in the proposed upgraded plant. Each equipment should be provided with its design and actual running capacity. Basing on the information in such list, the additional equipment can be selected/ sized and proposed to meet the actual or forecasted capacity of the upgrade.