Guidelines for Estimating and managing wastewater of Housing, Construction Projects, Residential and Commercial Buildings

State Pollution Control Board, Odisha
A/118, Nilakantha
Nagar Bhubaneswar

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Guidelines for Housing, Construction Projects, Residential and Commercial Buildings

About the Guidelines

In urban areas buildings have grown in numbers, scale and functionalities. These buildings impart significant pressure on the surrounding environment depending upon its scale and functionalities. Realising the environmental impact of the building sector, the Ministry of Environment Forest & Climate Change brought this sector under the ambit of Environmental Clearance. Accordingly, the State Pollution Control Board (SPCB), Odisha also brought out various regulatory measures to control pollution from this sector. However, the regulatory measures were promulgated at different times and under different contexts. This guideline is prepared by collating these regulatory provisions and attempted to fill up the gaps that existed in the previous regulatory methods. This Guidance Document aims at heling the regulators at SPCB, designers, builders, architects, and others. This is particularly developed for guiding the regulators to estimate the wastewater generation potential and examine the adequacy of Sewage Treatment Plants (STPs) and suggest the extent of treatment required for protecting the wholesomeness of the receiving waterbodies.

Types of Projects under this Sector

There are many types of constructions and building projects. The housing and building construction projects are broadly classified under the following categories.

1. Residential Apartments
2. Multi-purpose Housing Projects
3. Commercial Complex
4. Hotels and Restaurants
5. Marriage Mandaps
6. Institutional buildings such as schools, colleges with or without boarding
7. Office Buildings
8. Cinema halls, Concert halls, theaters, and shopping malls
9. Factories where large numbers of people are working.
10. Industrial townships

To regulate these projects under the provisions of the Water (PCP) Act, 1974 and Air (PCP) Act, 1981, they have been classified under *Red, Orange, Green and White* Category based on pollution potential by CPCB and subsequently by SPCB, Odisha vide Office Order NO. 8333 dated 11.0.2018, Letter No. 8909 dated 18.09.2000 and Letter No. 6606 dated 26.04.2021 on the basis of built-up-area and potential of wastewater generation.

Categorization of building projects under the ROGW list

Wastewater Generation upto (KLD)	Built-up Area in m^2			
	≤ 20,000	>20,000-1,50,000	>1,50,000	≥ 1,50,000
< 50	White	Orange (21)	Orange (SSL-18)	Red (SSL-22) Township & area development projects covering an area more than or equal to 50 Ha. Or built up area more than or equal to 1.5 lakh sq.m.
50 to 100	Orange -88	Orange (21)	Red (SSL-2)	
>100	Orange -88	Red (SSL-2)	Red (SSL-2)	

To determine the category under which a particular project falls, it is necessary to determine the built-up area in m^2 and the volume of wastewater generation. While the built-up area can be determined from the approved building plan, estimation of wastewater volume requires examination of the activities of the project.

Estimating the wastewater generation

The first step of estimating the wastewater volume involves estimation of the water consumption potential of the project. Water consumption of a building depends upon the type of activity taking place in the building. The water requirement during construction phase and operation phase also differs significantly. This guideline intends to estimate the water consumption during operation phase only. Since there are no standard guidelines under the Environment Protection Act 1986 or Water (PCP) Act 1974 in this regard, it is prudent to use other guidelines for estimating the water requirements of this type of projects. For this purpose, the Manual on Sewerage and Sewage Treatment developed by Central Public Health and Environmental Engineering Organisation (CPHEEO), as amended from time to time, under the Ministry of Urban development, Government of India, is widely used by the planners and designers as reference document. The water requirements for any such projects can be estimated based on population by using the CPHEEO guidelines.

Average water uses per person per day in urban area.

	Purpose	Q (Liter per capita per day)
1.	Drinking	05
2.	Cooking	05
3.	Bathing	50
4.	Toilet Flushing	30
5.	Washing utensils	15
6.	Washing the house	10
7.	Washing clothes	20
	Total	**135**

However, it has been suggested that in larger cities the per capita water consumption is higher than smaller cities.

	City Population	Water Consumption in Liter per capita per day
1.	Cities with population < 1.0 Million	135
2.	Cities with population ≥ 1.0 Million	150

A normative estimation, as per the CPHEEO Guideline is presented in the following table. For further details the CPHEEO Manual on Sewerage and Sewage Treatment may be referred to.

SL	Institution type	Water consumption in Liters per day
1	Hospitals (Including laundry)	
	a) Nos of beds more than 100	450 / bed
	b) Nos of beds less than or equal to 100	350 / bed
2	Hotels	180 / bed
3	Hostels	135 / person
4	Residential buildings	135 / person
5	Nurses home and medical quarters	135 / person
6	Boarding Schools and Colleges	135 / person
7	Day schools and colleges	45 / person
8	Restaurants	70 / seat
9	Airport and Seaport	70 / person
10	Junction stations (Railway and Bus)	70 / person
11	Terminal stations (Rail and Bus)	45 / person
12	Offices	45 / person
13	Factories with bathrooms	45 / person
14	Factories without bathrooms	30 / person
15	Cinema halls, concert halls, theatres, and shopping malls	15 / person

In modern complexes several activities go on, whose wastewater generation also varies widely depending upon the nature and scale of activities. In this case, the wastewater generation potential may be estimated for each type of activities separately and they may be added up to estimate the total wastewater generation potential.

For example, if a complex has the following components.

(i) Residential apartments for a population of 500
(ii) Office space for a capacity of 300 persons
(iii) Restaurants with seating capacity of 100 persons
(iv) Theatres of seating capacity of 500 persons

The wastewater generation potential of this complex can be estimated as:

Activity type	Capacity (Nos of Person)	Specific Water consumption in Liters per capita per day	Total water consumption in Liters per day
Residential Apartment	500	135	67,500
Office Space	300	45	13,500
Restaurant	100	70	7,000
Theatres	500	15	7,500
		Grant Total	**95,500**

The wastewater generation potential can be calculated as 80% of the above value, which comes out to be 76.4 KLD. The capacity of Sewage Treatment Plants (STP) can be determined by considering peak flow in a day. The peak load factor can be considered between 1.2 and 1.5. Therefore, to assess the adequacy of STP the wastewater generation may be multiplied with peak load factor. Considering a peak load factor of 1.3 in the current example the STP capacity should be 76.4X1.3 = 99.32 KLD or say 100 KLD.

Monitoring frequency

To ensure that the STP is performing satisfactorily, it is necessary to monitor the quality of treated wastewater at the outlet of the STP. Online monitors for the relevant parameters, such as pH, BOD and other parameters, shall preferably be installed along with the STP. However, this shall be supplemented with manual collection of samples and tested in a well-equipped NABL accredited laboratory.

1. The monitoring frequency shall be once in six months for Red category and once in a year for the orange category of Building projects. However, the facility shall monitor the wastewater quality at the inlet and outlet of STP through NABL accredited laboratory to assess the adequacy and efficiency of the STP and submit consolidated monitoring reports on an annual basis.
2. The monitoring of the STPs of these projects whose final discharge outlets are connected to municipal drain with terminal STP are exempted from monitoring schedule of Board.

Treated wastewater quality standards.

All the wastewater, generated from these types of projects should be treated so as to meet the Standards prescribed under the Environmental Protection Rule 1986. In case where sector-specific standards are stipulated under the EP Rule 1986, the sector-specific standards shall be adhered to. In the case where sector-specific standards have not been notified, then General Standards for discharge, as specified in Scheule VI of the said Rule shall be stipulated. However, care shall be taken to ensure that the wholesomeness of the receiving water bodies is maintained. If the regulator has a reason to believe that the wholesomeness of the receiving water bodies is likely to be impacted adversely, then a stringent Standard can also be stipulated as per the Rule 3 of the EP Rule 1986. For the details regarding the stipulation of such stringent Standard Environmental Protection Rule 1986 may be referred.

Discharge standards for hotels of 20 rooms and above

	Inland surface water	On land for irrigation	Public Sewer
PH	5.5 – 9.0	5.5 – 9.0	5.5 – 9.0
BOD	100	100	350
TSS	100	100	600
O & G	10	10	20

Discharge standards for hotel of < 20 rooms, Banquet Halls / Party Lawns of more than or equal to 100 m^2, and Restaurants with seating capacity of 36 or more

	Inland surface water	On land for irrigation	Public Sewer	Marine coastal area
PH	5.5 – 9.0	5.5 – 9.0	5.5 – 9.0	5.5 – 9.0
BOD	30	100	350	100
TSS	50	100	600	100
O & G	10	10	20	10
PO_4 as P	1.0	---	---	---

GSR 794 (E), Dt.04.11.2009

Discharge standards for sewage treatment plants

	Bhubaneswar / Khordha / Jatni / Cuttack	Rest of Odisha
PH	6.5	6.5 – 9.0
BOD	20	30
TSS	50	100
FC	1000	1000

The projects as above shall install necessary treatment system for treatment of wastewater being discharged from their premises.

Limitation of this Guidelines

These guidelines should be used as a guidance document only. For detail implementation, relevant provisions of respective Acts, Rules, respective manuals, and standards notified by the Ministry of Environment, Forest & Climate Change, as amended from time to time may be referred.