Nitrogen concentration calculation for Bunlicky WWTP

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Eli Lilly Kinsale Limited
Limerick site

Nitrogen concentration calculation for Bunlicky WWTP

Client name:	Eli Lilly Kinsale Limited		
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1. Introduction

This assessment is being prepared to investigate if the Limerick Wastewater Treatment Plant at Bunlicky is capable of operating within the BAT (Best Available Techniques) AEL for Total Nitrogen of 5-25mg/L. The Limerick WWTP operates under a Wastewater Discharge Licence D0013-01 which does not specify a limit for total nitrogen. Eli Lilly is applying for an Industrial Emission Licence and will contribute to the nitrogen loading of the wastewater treated at the Limerick WWTP. This is to be read along with Attachment 7.3.2 equivalent protection of sewer.

2. Effluent from Eli Lilly

The characteristics of the wastewater originating from the proposed site were estimated by Jacobs and included raw materials used in the manufacturing process, utilities waste, and sanitary waste.

Wastewater characteristic	Quantity
Current nitrogen loading	0kg/day
Estimated future peak nitrogen loading	100kg/day
Estimated future peak flow	625m^3/day
Estimated average peak flow	425m^3/day

Table 2-1: Eli Lilly wastewater characteristics

3. Limerick Wastewater Treatment Plant

The following information was obtained from the 2021 Annual Environmental Report, the latest report available at time of writing.

Treatment efficiency report	
Influent total nitrogen mass loading	1400kg/day
Effluent total nitrogen mass loading	924kg/day
Efficiency reduction	34%
Average hydraulic loading	45062 m^3/day
Annual maximum hydraulic loading	118605 m^3/day

Table 3-1: Treatment efficiency report - Limerick city WWTP - 2021

4. Estimated impact of Eli Lilly effluent to Limerick WWTP

Based on the information available at the time of writing the incoming nitrogen load (1400kg/day and average flow of 45062m^3) the resulting concentration of the influent is 31mg/L. Based on a reduction efficiency of 34% the effluent leaving the facility is estimated to be 20mg/L.

Allowing for the additional nitrogen load of 100kg/day and maximum flow of 625m^3 from the Eli Lilly site the concentrations for the influent and effluent change to 31mg/L and 20mg/L as shown in the following table.

The latter value is within the BAT AEL range of 5-25mg/L.

Current nitrogen loading at WWTP (kg/day)	1400kg/day
Nitrogen loading from Eli Lilly (kg/day)	100kg/day
Sum of nitrogen loading (kg/day)	1500kg/day
Current flow into WWTP	**45062 m^3/day**
Estimated peak flow from Eli Lilly	625m^3/day
Sum of flows	45687m^3/day
Estimated concentration of effluent based on 34% reduction efficiency	20mg/L

Table 4-1: Estimated impact of Eli Lilly wastewater on nitrogen concentration of WWTP influent and effluent

To accurately assess the impact of the Eli Lilly wastewater on the WWTP the capacity must also be assessed. The site has capacity to process 186,233 population equivalents (PE). The following table outlines the capacity consumed by the WWTP wastewater including the Eli Lilly contribution.

Estimated impact of Eli Lilly wastewater on capacity of WWTP	
Organic capacity as constructed	186233PE
Capacity as nitrogen load*	2421kg/day
Total nitrogen load calculated above	1500kg/day
Capacity remaining	921kg/day
% Capacity remaining	38%

Table 4-2: Estimated impact of Eli Lilly wastewater on capacity of WWTP

*Based on Metcalf & Eddy/AECOM 2014 value for Total Nitrogen per person per day of 13g

5. Conclusion

Based on the information available at this time the Limerick City WWTP has sufficient capacity to accommodate the wastewater from Eli Lilly and the resulting effluent will be within the BAT AEL for total nitrogen.