Alexandra Basin Redevelopment 2

Bringing Dublin Port To 2040

Environmental Impact Assessment Report

Appendix 9-3 Assimilative Capacity Dublin Port

Volume 3



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Appendix 9-3 ABR2 Project Assimilative Capacity Dublin Port

1.0 Emission limit values for the relevant contaminants in the Industrial Emissions licence

When determining emission limit values for a licence to discharge to waters it is necessary to have regard to the environmental quality standards for the receiving water. Environmental Quality standards for a number of specific pollutants, priority substances and priority hazardous substances are prescribed in the European Communities Environmental Objectives (Surface Waters) Regulations S.I. No. 272 of 2009 as amended. As outlined in Regulation 51 of the Surface Water Regulations (S.I. No. 272 of 2009) compliance of a water body with the EQS will not be compromised within the mixing zone, i.e. the section of a body of surface water restricted to the proximity of the discharge point within which the prescribed EQS may be exceeded, provided that it does not affect the compliance of the rest of the surface water body with the EQS.

Guidance published by the Local Authority Services National Training Group (LASNTG, 2011[1]) on the licensing of discharges to surface waters, groundwater and sewer for Local Authorities states that a licensing authority may seek to have a mixing zone modelled in order to simulate the physical mixing process between an effluent discharge and ambient water and therefore delineate an area within which the EQS may be exceeded. However based on the Common Implementation Strategy (CIS) Technical Background Document on identification of mixing zones (CIRCABC, 2010[2]) it is not always necessary to carry out mixing zone modelling.

The purpose of this technical document is to assist in:

- Establishing whether the delineation of a mixing zone is required using a tier approach;
- Where is has been determined that a mixing zone is required the size and acceptability of the zone using a tier approach.

The first tier in the guidance is Tier 0 which provides a check to establish if the effluent is liable to contain a contaminant of potential concern. If the concentration of the contaminant in the effluent is above the EQS value for that contaminant then there will be a zone of EQS exceedance in the vicinity of the point of discharge and in such cases a tier 1 assessment is required under the guidance. All discharges where no contaminant of concern is present above the EQS are deselected at this stage, because this discharge will not lead to an exceedance of the EQS in the water body.

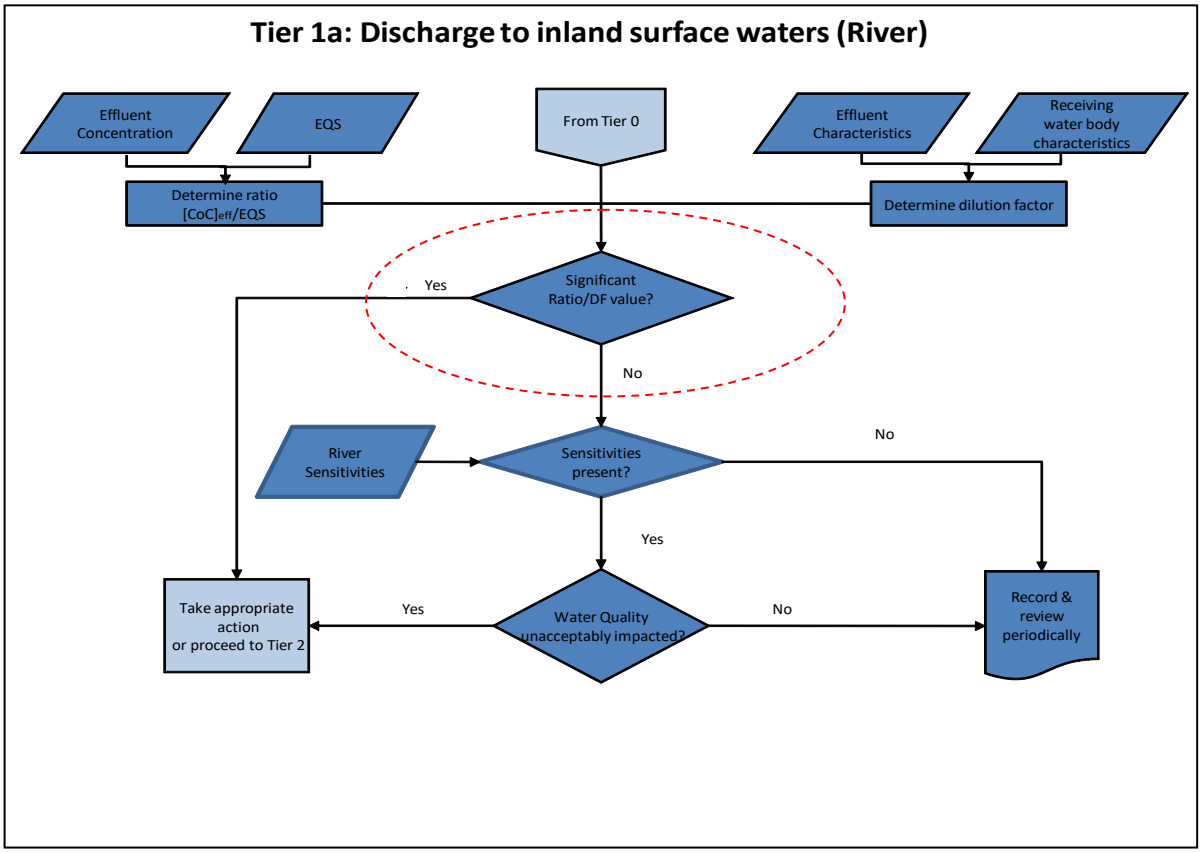
For the purposes of this assessment and in setting emission limit values for contaminants of potential concern it cannot be concluded that the concentrations will be below the EQS value and therefore a Tier 1 assessment is required.

Tier 1 is designed to provide a rapid assessment as to whether discharges screened in under Tier 0 require further attention. It is designed to remove from consideration all discharges

[1] Local Authority Services National training group – Guidance, procedures and training on the licensing of discharges to surface waters, groundwater and sewer for Local Authorities LASNTG, 2011

[2] Technical Background Document on identification of mixing zones - https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp

that are clearly trivial (i.e. those that are believed not to cause quality problems) using simple tests).



In order to assess the significance of a discharge for both tidal rivers and fresh water rivers the CIS guidance provides thresholds for the allowable increase in concentration after complete mixing below which the discharge can be considered insignificant. Where it is determined through the Tier 1 assessment that a discharge is significant in terms of the receiving water quality the process moves to Tier 2 where a mixing zone is delineated.

Table 3 of the CIS Guidance is reproduced below (Table 1) and outlines the allowable increase in concentrations as a percentage of the EQS in the receiving water depending on the type and scale of the receiving water. Q95 flows have been obtained from the EPA hydro tool upstream of the proposed point of discharge at Chapelizod and the flow exceeded 95 percent of the time is 6.491 m^3/s, however this is the fluvial low flows and the net Q90 flow is likely to be much more than this particularly during flood tide. As a result, and to ensure a conservative assessment the Liffey has been classified as a medium tidal river and therefore the allowable increase of the contaminant of concern after complete mixing is assumed to be 1% in order for the discharge to be considered insignificant. There may be justification for a 4% allowable increase if more detailed information was available on the net flows from both fluvial and tidal sources.

Table 1 Proposed allowable increase in concentration after complete mixing for different water types, which can meet criteria for MAC- and EQS mixing zone

Water types:	Net flow (Q90-flow) [m3/s]	Proposed allowable increase in concentration after complete mixing as % EQS [1)][2)][3)]
Fresh water rivers and tidal rivers		
Small	≤ 100	4
Medium	100 < flow ≤ 300	1
Large	> 300	0,5
Canals		
Small	≤ 10	6
Medium	10< flow ≤ 40	2,5
Large	> 40	1

[1]) based on net flow

[2]) if increase in concentration after complete mixing exceeds the percentage taken up in Table 3 further assessment in Tier 2 or further is necessary.

[3]) Tier 1 is the first filter in the assessment to discriminate between non-significant discharges, which can always meet the criteria in the discharge test in Tier 2, and other discharges. Criteria in a filter may not lead to a situation where discharges are ruled out in Tier 1, but when assessed in Tier 2 this would lead to a conclusion that discharges cannot meet the criteria of Tier 2 (discharge test). For this reason a worst-case approach seems to be appropriate.

The significance of the discharge can be calculated as follows:

- If the concentration of the discharge to the EQS after full mixing (i.e. the process contribution) is 1% (see table 3) of the EQS or less then the discharge can be considered as trivial with no further action required regardless of the upstream concentration or the presence of multiple discharges, i.e. the resultant concentration in the receiving water is 1% or less of the EQS where available dilutions are taken into consideration and background concentrations are ignored.
- If the discharge is above 10% the discharge cannot be considered trivial and a tier 2 assessment with delineation of a mixing zone would be required or appropriate action should be taken
- If the discharge is between 1% and 10% the discharge may or may not be significant depending on other considerations e.g. presence of sensitive receptors in the vicinity of the point of discharge. The licensing authority may require the delineation of a mixing zone to establish the potential impact.

The process contribution (PC) is defined as

$$PC = (CoC_{\text{eff}}/DF)$$

Where DF is the dilution factor = $(Q_{\text{river}} + Q_{\text{eff}})/Q_{\text{eff}}$

CoC_{eff} = Contaminant of Concern in the effluent

Based on this equation it is possible to establish the concentration of the contaminant of concern within the effluent that will ensure that the process contribution will not result in an increase in

concentration in the receiving water by more than 1% therefore ensuring that the discharge can be considered as trivial and unlikely to have an impact. The amended equation is therefore:

$$CoC_{\text{eff}} = PC * DF$$

As an example the EQS – AA (annual average) for tributyltin as prescribed in schedule 6 of the Surface Water Regulations for transitional waters is 0.0002 µg/l. The process contribution must be 1% or less of this EQS, i.e. 0.000002 µg/l (2.0×10^{-6}). In order to determine the concentration of the contaminant of concern it is necessary to establish the dilution factor. The effluent will be discharges to the Liffey at a rate of 69.0 litres/sec and the assumed low flows in the Liffey is assumed to be 6491 litres/sec (based on information in EPA Hydrotool) therefore the dilution factor is 95.

DF = $(Q_{\text{river}} + Q_{\text{eff}})/Q_{\text{eff}}$

DF = (6491 + 69) /69

DF = 94.5

The concentration of the contaminant of concern in the effluent in order to ensure a process contribution of 2.0×10^{-6} µg/l, i.e. 1 % of the EQS-AA, and a dilution factor of 95 is therefore:

CoC_{eff} = 2.0×10^{-6} µg/l x 94.5

CoC_{eff} = 0.00019 µg/l

If the EQS MAC (maximum allowable concentration) value is applied (1% of 0.0015 µg/l) this will result in a CoC_{eff} of 0.00142 µg/l. It is therefore proposed that for tributyltin a maximum emission limit value of 0.00142 µg/l is applied. This will ensure that the process contribution is less than 1% of the EQS in the receiving water and there will be no impact on the Liffey transitional water body.

Table 2 below provides a summary of the calculations used to derive emission limit values for other contaminants of concern within the proposed effluent discharge.

2.0 Environmental assessment of the impact of the treated wastewater on the receiving waters if discharges at the proposed emission limit values

The assessment undertaken in section 1.0 has identified emission limit values which can be considered as insignificant or trivial and will not have an impact on the receiving water bodies. This approach is based on that outlined in the Guidance published by the Local Authority Services National Training Group (LASNTG) on the licensing of discharges to surface waters, groundwater and sewer for Local Authorities and the Common Implementation Strategy (CIS) Technical Background Document on identification of mixing zones.

Table 2 Assessment of emission limit values (process contribution) for contaminants of concern within the proposed effluent discharge to the Liffey

	Contaminant of Potential Concern								
	TBT	**Nickel**	**Mercury**	**Arsenic**	**Cadmium**	**Chromium VI**	**Copper**	**Lead**	**Zinc**
Flow and Quality data									
Discharge (Qeff) m3/day	6000	6000	6000	6000	6000	6000	6000	6000	6000
Discharge (Qeff) m3/sec	0.0694	0.0694	0.0694	0.0694	0.0694	0.0694	0.0694	0.0694	0.0694
Q river m3/sec	6.491	6.491	6.491	6.491	6.491	6.491	6.491	6.491	6.491
U/S Background Concentration (µg/l)	0.00016	3.033	0.013	3.358	0.100	0.300	2.500	0.650	30.892
Dilution Factor	94	94	94	94	94	94	94	94	94
Background Monitoring data									
2022 Mean (SW1)	0.000178365	1.907659574	0.0141224	1.51102041	0.1308163	0.362040816	2.736531	0.97531	35.0469
2023 Mean (SW1)	0.000128451	2.290163934	0.0148689	4.64370968	0.27	0.179677419	4.991129	8.48645	34.3279
2024 Mean (SW1)	0.0001799	4.902	0.0107	3.92	0.11	1.254	2.177	0.75	23.3
Mean Background (u/s)	**0.00016**	**3.03**	**0.013**	**3.36**	**0.17**	**0.60**	**3.30**	**3.40**	**30.89**
Process Contribution and ELVs (µg/l)									
EQS - MAC (µg/l)	0.0015	34	0.07	-	0.45	32	-	14	-
1% of EQS (µg/l)	0.000015	0.34	0.0007	-	0.0045	0.32	-	0.14	-
Process contribution (µg/l)	0.00142	32.12	0.066	-	0.425	30.2	-	13.2	-
EQS - AA (µg/l)	0.0002			20			5		40
1% of EQS (µg/l)	0.000002			0.2			0.05		0.4
Process contribution (µg/l)	0.00019			18.9			4.7		37.8
Proposed ELV (µg/l)	**0.00142**	**32.12**	**0.066**	**18.9**	**0.425**	**30**	**4.7**	**13.23**	**38**