Annual Environmental Report

2021

Dundalk

D0053-01

CONTENTS

1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2021 AER

This Annual Environmental Report has been prepared for D0053-01, Dundalk, in Louth in accordance with the requirements of the wastewater discharge licence for the agglomeration. Specified reports where relevant are included as an appendix to the AER.

1.1 ANNUAL STATEMENT OF MEASURES

A summary of any improvements undertaken is provided where applicable.

A DAP is ongoing for Dundalk which includes Blackrock. The DAP will encompass both Storm Water Overflow and network assessments and will therefore comprehensively identify the need to carry out separate Storm Water Overflow or Sewer Integrity Assessments.

1.2 TREATMENT SUMMARY

The agglomeration is served by a wastewater treatment plant(s)

- DUNDALK WWTP with a Plant Capacity PE of 61000, the treatment type is 3NP - Tertiary N&P removal.

1.3 ELV OVERVIEW

The overall compliance of the final effluent with the Emission Limit Values (ELVs) is shown below. More detailed information on the below ELV's can be found in Section 2.

Discharge Point Reference	Treatment Plant	Discharge Type	Compliance Status	Parameters failing if relevant
TPEFF2100D0053SW001	DUNDALK WWTP	Treated	Non-Compliant	Total Nitrogen mg/l Total Phosphorus (as P) mg/l

1.4 LICENCE SPECIFIC REPORTING

Assessment / Report
There are no Licence Specific Reports included in this AER.

2 TREATMENT PLANT PERFORMANCE AND IMPACT SUMMARY

2.1 DUNDALK WWTP - TREATED DISCHARGE

2.1.1 INFLUENT MONITORING SUMMARY - DUNDALK WWTP

A summary of influent monitoring for the treatment plant is presented below. This monitoring is primarily undertaken in order to determine the overall efficiency of the plant in removing pollutants from the raw wastewater.

Parameters	Number of Samples	Annual Max	Annual Mean
BOD, 5 days with Inhibition (Carbonaceous) mg/l	26	318	114
COD-Cr mg/l	26	918	391.44
Suspended Solids mg/l	26	487	203.75
Total Phosphorus (as P) mg/l	26	10	4.82
Total Nitrogen mg/l	26	59	24
Hydraulic Capacity	N/A	47196	24525

If other inputs in the form of sludge / leachate are added to the WWTP then these are included in Section 2.1.5 if applicable.

Significance of Results:

The annual mean hydraulic loading is less than the peak Treatment Plant Capacity. The annual maximum hydraulic loading is less than the peak Treatment Plant Capacity. Further details on the plant capacity and efficiency can be found under the sectional ‘Operational Performance Summary’.

2.1.2 EFFLUENT MONITORING SUMMARY - TPEFF2100D0053SW001

Parameter	WWDL ELV (Schedule A)	ELV with Condition 2 Interpretation included Note 1	Interim % reduction from influent concentration	Number of sample results	Number of exceedances	Number of exceedances with Condition 2 Interpretation included	Annual Mean	Overall Compliance (Pass/Fail)
COD-Cr mg/l	125	250	N/A	26	N/A	N/A	35	Pass
Suspended Solids mg/l	35	87.5	N/A	26	1	N/A	15	Pass
BOD, 5 days with Inhibition (Carbonaceous) mg/l	25	50	N/A	26	N/A	N/A	4.14	Pass
Total Nitrogen mg/l	10	12	N/A	26	11	9	10	Fail
pH pH units	6.00	9.00	N/A	26	N/A	N/A	7.62	Pass
Total Phosphorus (as P) mg/l	1.00	1.20	N/A	26	17	15	1.27	Fail
ortho-Phosphate (as P) - unspecified mg/l	N/A	N/A	N/A	26	N/A	N/A	1.02	
Conductivity @20°C µS/cm	N/A	N/A	N/A	26	N/A	N/A	2755	

Parameter	WWDL ELV (Schedule A)	ELV with Condition 2 Interpretation included [Note 1]	Interim % reduction from influent concentration	Number of sample results	Number of exceedances	Number of exceedances with Condition 2 Interpretation included	Annual Mean	Overall Compliance (Pass/Fail)
Dissolved Inorganic Nitrogen (as N) mg/l	N/A	N/A	N/A	26	N/A	N/A	11	
Ammonia-Total (as N) mg/l	N/A	N/A	N/A	26	N/A	N/A	6.94	

Notes:
1 – This represents the Emission Limit Values after the Interpretation provided for under Condition 2 of the licence is applied
2 – For pH the WWDA specifies a range of pH 6 - 9

Cause of Exceedance(s):

Inadequate Operational Procedures/Training (Incident INCI016274). DBO plant operators are continuing to work with IW process optimisation Engineers / Specialists to improve compliance.

Significance of Results:

The WWTP is non compliant with the ELV's set in the Wastewater Discharge Licence. The impact on receiving waters is assessed further in Section 2.

2.1.3 AMBIENT MONITORING SUMMARY FOR THE TREATMENT PLANT DISCHARGE TPEFF2100D0053SW001

A summary of monitoring from ambient monitoring points associated with the wastewater discharge is provided in the sections below. For discharges to rivers upstream (U/S) and downstream (D/S) location data is provided. For other ambient points in lakes, coastal or transitional waters, monitoring data from the most appropriate monitoring station is selected.

The table below provides details of ambient monitoring locations and details of any designations as sensitive areas.

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish Grid Reference	River Station Code	Bathing Water	Drinking Water	FWPM	Shellfish	WFD Status
Upstream (CN030)	307227.17, 307718.49	TW21006031CN3003	No	No	No	Yes	Poor
Downstream (CN040)	308206.9, 307908.33	TW21006031CN3004	No	No	No	Yes	Poor
Downstream (CN110)	308745.37, 307876.19	TW21006030CN2004	No	No	No	Yes	Moderate

The results for ambient results and / or additional monitoring data sets are included in the **Appendix 7.1 - Ambient monitoring summary.**

Significance of Results:

The WWTP discharge was not compliant with the ELV's set in the wastewater discharge licence for the following: Total Nitrogen mg/l, Total Phosphorus (as P) mg/l.

The ambient monitoring results do not meet the required EQS. The EQS relates to the Oxygenation and Nutrient Conditions set out in the Surface Water Regulations 2009.

Based on ambient monitoring results a deterioration in Chlorophyll Median (at Stations CN030 and CN110) and Chlorophyll 90% (at Stations CN030, CN040 and CN110) concentrations downstream of the effluent discharge is noted.

A deterioration in water quality has been identified, however it is not known if it or is not caused directly by the WWTP.

Based on the above and the effluent compliance results, the discharge from the wastewater treatment plant may be having an observable negative impact on the water quality and the WFD status of the Castletown Estuary and Inner Dundalk Bay.

Shellfish Water – Dundalk Bay

It was noted in the 2013 Shellfish Assessment and a 2018 Stage 2 Scoping Assessment Report prepared by IW, that Dundalk WWTP is the most likely of the WWTPs in the environs to have an effect on the Shellfish waters on Dundalk Bay due to outflow levels and oceanography of the bay. The results from these reports show that in general the microbiological results of shellfish flesh of species collected within Dundalk Bay Shellfish Waters are good, but that on occasion levels may be above the Class B standard. It is likely that discharge from Dundalk WWTP may contribute to these high microbiological levels in the shellfish, however, these levels are within acceptable limits and the shellfish remain fit for human consumption after appropriate treatment. It is most likely that the high microbiological values occur during periods of heavy rainfall as it is during such periods that waters from Dundalk town have the greatest chance of reaching and affecting the shellfish production areas.

In 2019, the Stage 3 - Site Survey Report validates the assumption that Dundalk WwTP consistently generates effluent of a secondary treated standards. No changes to the existing overall process or current unit processes could be identified which would ensure a reduction in the concentrations of faecal coliform or E.coli in the plant final effluent discharged. No further information was available to confirm that Dundalk WwTP plant has a negative effect on the receiving waters. The progression to Stage 4 - Detailed Assessment of Discharges has been agreed.

2.1.4 OPERATIONAL PERFORMANCE SUMMARY - DUNDALK WWTP

2.1.4.1 Treatment Efficiency Report - DUNDALK WWTP

Treatment efficiency is based on the removal of key pollutants from the influent wastewater by the treatment plant. In essence the calculation is based on the balance of load coming into the plant versus the load leaving the plant. The efficiency is presented as a percentage removal rate.

A summary presentation of the efficiency of the treatment process including information for all the parameters specified in the licence is included below:

Parameter	Influent mass loading (kg/year)	Effluent mass emission (kg/year)	Efficiency (% reduction of influent load)
COD	3350877	285402	91
cBOD	974764	33697	97

Parameter	Influent mass loading (kg/year)	Effluent mass emission (kg/year)	Efficiency (% reduction of influent load)
TP	41235	10333	75
TN	207949	84446	59
SS	1744173	118131	93

Note: The above data is based on sample results for the number of dates reported

2.1.4.2 Treatment Capacity Report Summary - DUNDALK WWTP

Treatment capacity is an assessment of the hydraulic (flow) and organic (the amount of pollutants) load a treatment plant is designed to treat versus the current loading of that plant.

DUNDALK WWTP	
Peak Hydraulic Capacity (m^3/day) - As Constructed	56706
DWF to the Treatment Plant (m^3/day)	18902
Current Hydraulic Loading - annual max (m^3/day)	47196
Average Hydraulic loading to the Treatment Plant (m^3/day)	24525
Organic Capacity (PE) - As Constructed	61000
Organic Capacity (PE) - Collected Load (peak week)[Note1]	53816
Organic Capacity (PE) - Remaining	7184
Will the capacity be exceeded in the next three years? (Yes/No)	No

Nominal design capacities can be based on conservative design principles. In some cases assessment of existing plants has shown organic capacities significantly higher than the nominal design capacity. Accordingly plants that appear to be overloaded when comparing a collected peak load with the nominal design capacity can be fully compliant due to the safety factors in the original design.

2.1.5 SLUDGE / OTHER INPUTS - DUNDALK WWTP

'Other inputs' to the waste water treatment plant are summarised in table below

Input type	Quantity	Unit	P.E.	% of load to WWTP	Included in Influent Monitoring (Y/N)?	Is there a leachate/sludge acceptance procedure for the WWTP?	Is there a dedicated leachate/sludge acceptance facility for the WWTP? (Y/N)
Domestic /Septic Tank Sludge	513.5	Weight (Tonnes)	0.01	0.01	Yes	Yes	Yes
Other	26193.5	Weight (Tonnes)	319	0.29	Yes	Yes	Yes

3 COMPLAINTS AND INCIDENTS

3.1 COMPLAINTS SUMMARY

A summary of complaints of an environmental nature related to the discharge(s) to water from the WWTP and network is included below.

Number of Complaints	Nature of Complaint	Number Open Complaints	Number Closed Complaints
There were no relevant environmental complaints in 2021.			

3.2 REPORTED INCIDENTS SUMMARY

Environmental incidents that arise in an agglomeration are reported on an on-going basis in accordance with our waste water discharge licences. Where an incident occurs and it is reportable under the licence, it is reported to the Environmental Protection Agency through their Environmental Data Exchange Network, or in some instances by telephone. Some incidents which arise in the agglomeration are recorded by Irish Water but may not be reportable under our licence for example where the incident does not have an impact on environmental performance.

A summary of reported incidents is included below.

3.2.1 SUMMARY OF INCIDENTS

Incident Type	Cause	No. of incident occurrences	Recurring (Y/N)	Closed (Y/N)
Other	Plant or equipment breakdown at WWTP	1	No	Yes
Abatement Equipment offline	Plant or equipment breakdown at WWTP	1	No	Yes
Abatement Equipment offline	Plant or equipment breakdown at WWTP	1	No	No

Incident Type	Cause	No. of incident occurrences	Recurring (Y/N)	Closed (Y/N)
Breach of ELV	Inadequate Operational Procedures / Training	1	Yes	No
Spillage	Inadequate Infrastructure	1	No	Yes

3.2.2 SUMMARY OF OVERALL INCIDENTS

Question	Answer
Number of Incidents in 2021	5
Number of Incidents reported to the EPA via EDEN in 2021	5
Explanation of any discrepancies between the two numbers above	N/A

4 INFRASTRUCTURAL ASSESSMENTS AND PROGRAMME OF IMPROVEMENTS

4.1 STORM WATER OVERFLOW IDENTIFICATION AND INSPECTION REPORT

A summary of the operation of the storm water overflows and their significance where known is included below:

4.1.1 SWO IDENTIFICATION

WWDL Name / Code for Storm Water Overflow (chamber) where applicable	Irish Grid Ref. (outfall)	Included in Schedule of the WWDL	Significance of the overflow(High / Medium / Low)	Assessed against DoEHLG Criteria	No. of times activated in 2021 (No. of events)	Total volume discharged in 2021 (m^3)	Monitoring Status
TBC	304348, 306476	No	Medium	Meeting	Unknown	Unknown	Not Monitored
TBC	TBC, TBC	No	Medium	Not yet Assessed	Unknown	Unknown	Not Monitored
TBC	TBC, TBC	No	Medium	Not yet Assessed	Unknown	Unknown	Not Monitored
TBC	303214, 309006	No	Medium	Meeting	Unknown	Unknown	Not Monitored
SW011	306284, 307740	Yes	Medium	Meeting	Unknown	Unknown	Monitored
SWO-1	308183, 307800	Yes	Medium	Not Meeting	Unknown	Unknown	Monitored

WWDL Name / Code for Storm Water Overflow (chamber) where applicable	Irish Grid Ref. (outfall)	Included in Schedule of the WWDL	Significance of the overflow(High / Medium / Low)	Assessed against DoEHLG Criteria	No. of times activated in 2021 (No. of events)	Total volume discharged in 2021 (m^3)	Monitoring Status
SWO-3	305504, 307942	Yes	Medium	Meeting	Unknown	Unknown	Monitored
SWO-5	304291, 308446	Yes	Medium	Meeting	Unknown	Unknown	Monitored
SWO-6	303214, 309006	Yes	Medium	Meeting	Unknown	Unknown	Not Monitored
SWO-7	304053, 306069	Yes	Medium	Meeting	Unknown	Unknown	Not Monitored
SWO-8	306263, 306860	Yes	High	Not Meeting	Unknown	Unknown	Monitored
SWO-9	307652, 307279	Yes	Medium	Not Meeting	Unknown	Unknown	Monitored

Any TBC SWO(s) were identified as part of the on-going National SWO programme and will be updated in subsequent AER(s) once the information is confirmed.

SWO Summary	
How much sewage was discharged via monitored SWOs in the agglomeration in the year (m^3)?	Unknown
Is each SWO identified as not meeting DoEHLG Guidance included in the Programme of Improvements?	No
The SWO Assessment included the requirements of relevant of WWDL schedules?	Yes
Have the EPA been advised of any additional SWOs / changes to Schedule C3 and A4 under Condition 1.7?	No

4.2 REPORT ON PROGRESS MADE AND PROPOSALS BEING DEVELOPED TO MEET THE IMPROVEMENT PROGRAMME REQUIREMENTS

4.2.1 SPECIFIED IMPROVEMENT PROGRAMME SUMMARY

A wastewater discharge licence may require a number of reports on specific subject areas to be prepared for the agglomeration in question. These reports are submitted to the EPA as part of the Annual Environmental Report. This section provides a list of the various reports required for this agglomeration and a brief summary of their recommendations.

Specified Improvement Programmes (under Schedule A and C of WWDL)	Description	Licence Schedule	Licence Completion Date	Date Expired? (N/NA/Y)	Status of Works	Timeframe for Completing the Work	Comments
D0053-SIP:01	Installation of nutrient removal (nitrogen and phosphorus) processes at WWTP	C	31/12/2013	Yes	Works Completed		
D0053-SIP:02	SW8 - Installation of 1,500 m3 storm water balancing tank at Coe's Road Pumping Station	C	31/12/2020	No	At Planning Stage		Completion date 2024+

A summary of the status of any other improvements identified by under Condition 5 assessments- is included below.

4.2.2 IMPROVEMENT PROGRAMME SUMMARY

Improvement Identifier	Improvement Description / or any Operational Improvements	Improvement Source	Expected Completion Date	Comments
No additional improvements planned at this time.				

4.2.3 SEWER INTEGRITY RISK ASSESSMENT

The utilisation of multiple capital maintenance programmes and the outputs of the workshops with the Local Authority Operations Staff held under the programme can be used to satisfy the requirements of Condition 5 regarding network integrity. Improvement works identified by way of these programmes and workshops will be included in the Improvements Summary Tables 4.2.1 and 4.2.2.

5 LICENCE SPECIFIC REPORTS

A wastewater discharge licence may require a number of reports on specific subject areas to be prepared for the agglomeration in question. These reports are submitted to the EPA as part of the Annual Environmental Report. This section provides a list of the various reports required for this agglomeration and a brief summary of their recommendations.

Licence Specific Report	Required by licence	Year included in AER	Included in this AER
Priority Substances Assessment	Yes	2014	No
Shellfish Impact Assessment	Yes	2016	No

6 CERTIFICATION AND SIGN OFF

6.1 SUMMARY OF AER CONTENTS

Parameter	Answer
Does the AER include an Executive Summary?	Yes
Does the AER include an assessment of the performance of the Waste Water Works (i.e., have the results of assessments been interpreted against WWDL requirements and or Environmental Quality Standards)?	Yes
Has a Technical amendment/licence review application been submitted to the Agency by IW?	No
List reason e.g., additional SWO identified	N/A
Is there a need to request/advise the EPA of any modification to the existing WWDL with respect to condition 4 changes to monitoring location, frequency etc	No
List reason e.g., changes to monitoring requirements	N/A
Have these processes commenced?	N/A
Are all outstanding reports and assessments from previous AERs included as an appendix to this AER	N/A

I certify that the information given in this Annual Environmental Report is truthful, accurate and complete:

Date: 22/04/2022

This AER has been produced by Irish Water's Environmental Information System (EIMS) and has been electronically signed off in that system for and on behalf of,

Katherine Walshe

Acting Head of Environmental Regulation.

7 APPENDIX

Appendix
Appendix 7.1 - Ambient monitoring summary

D0053-01 Dundalk Ambient Monitoring Data 2021

Ambient Monitoring Report Summary Table

Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish Grid Reference	EPA Feature Coding Tool code	Bathing Water	Drinking Water	FWPM	Shellfish	Current WFD Status
Castletown Estuary (Transitional Water) (CN030)	307227.17, 307718.49	TW21006031 CN3003	N	N	N	Y	Poor
Castletown Estuary (Transitional Water) (CN040)	308206.9, 307908.33	TW21006031 CN3004	N	N	N	Y	Poor
Dundalk Bay Inner (Transitional Waters) (CN110)	308745.37, 307876.19	TW21006030 CN2004	N	N	N	Y	Moderate

The results for the monitoring data sets are included below. This assessment is based on the 2016-2019 EPA TraC datasets. The 2021 EPA TraC dataset was being quality checked by the EPA and therefore was not available at the time of preparing this Ambient Monitoring Summary document.

Ambient Monitoring Summary

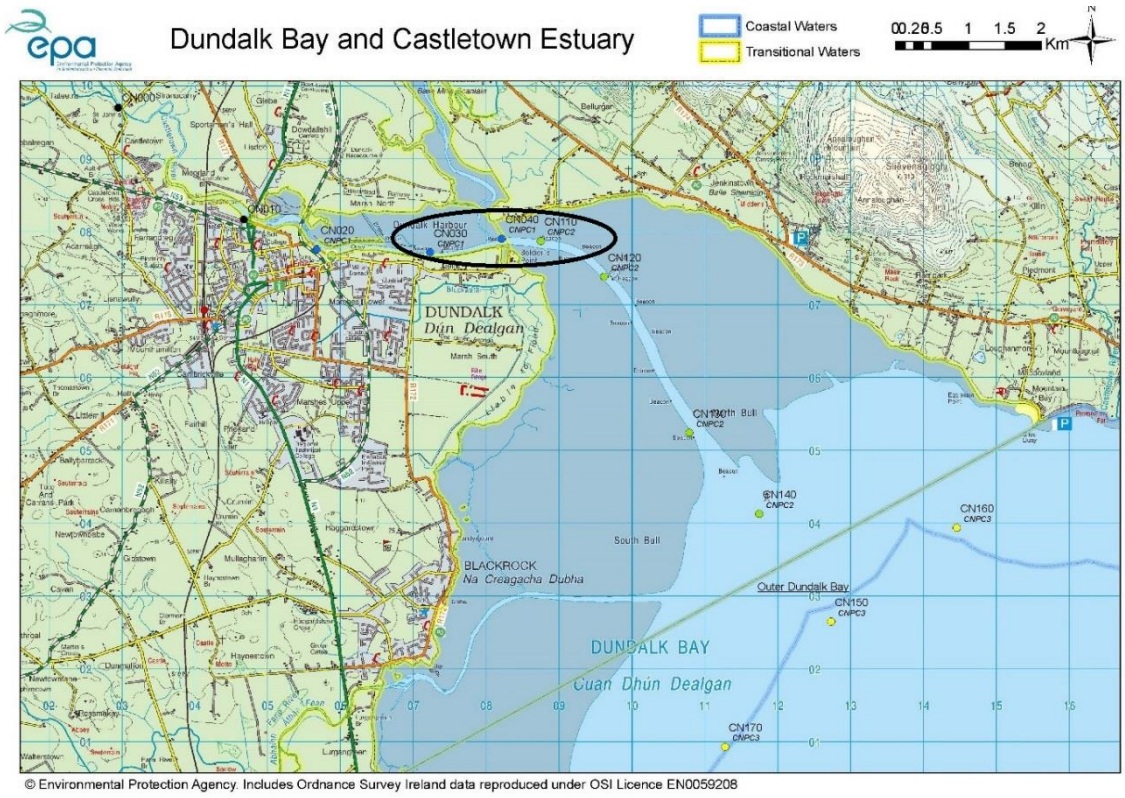

Figure 1: Location of the three transitional water sampling stations in the Castletown Estuary (CN030 and CB040) and Inner Dundalk Bay (CN110)

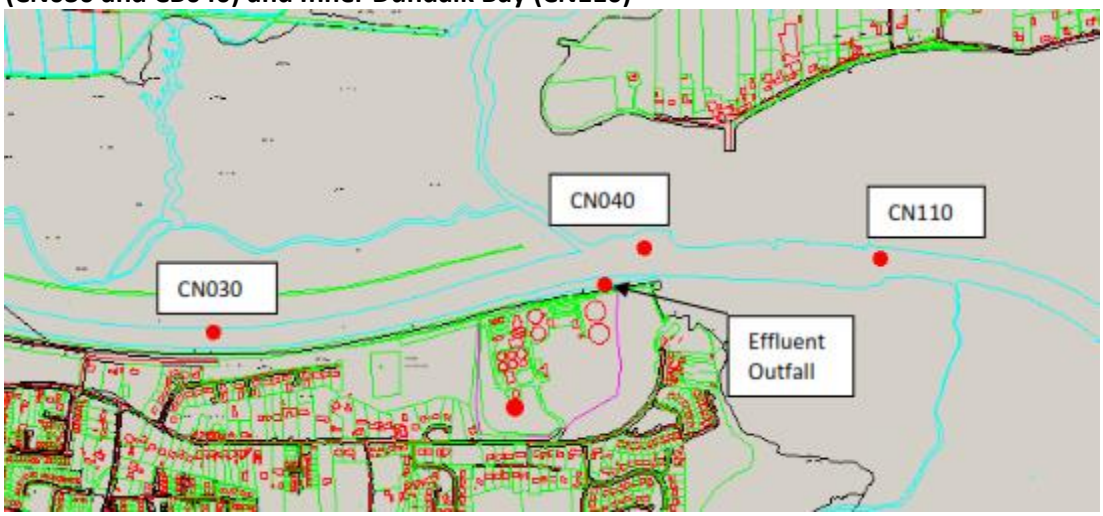

Figure 2: Location of the three transitional water sampling stations in the Castletown Estuary (CN030 and CB040) and Inner Dundalk Bay (CN110) in relation to the effluent outfall.

Based on the above and the effluent compliance results, the discharge from the wastewater treatment plant may be having an observable negative impact on the water quality of the Castletown Estuary and Inner Dundalk Bay.

The discharge from the wastewater treatment plant may be contributing to the WFD status of the Castletown Estuary and Inner Dundalk Bay.

Dundalk Shellfish Waters are located *ca*. 3.5km south of the primary discharge. It was noted in the 2013 Shellfish Assessment and the Stage 2 Scoping Assessment Report prepared by IW that Dundalk WWTP is the most likely of the WWTPs in the environs to have an effect on the Shellfish waters on Dundalk Bay due to outflow levels and oceanography of the bay. The results from this study show that in general the microbiological results of shellfish flesh of species collected within Dundalk Bay Shellfish Waters are good, but that on occasion levels may be above the Class B standard. It is likely that discharge from Dundalk WWTP may contribute to these high microbiological levels in the shellfish, however, these levels are within acceptable limits and the shellfish remain fit for human consumption after appropriate treatment. It is most likely that the high microbiological values occur during periods of heavy rainfall as it is during such periods that waters from Dundalk town have the greatest chance of reaching and affecting the shellfish production areas. Detailed assessments of impacts are currently ongoing to confirm any impacts.

It is important to have an understanding of the physical oceanographic processes that regulate the dispersion of both marine and fresh waters in Dundalk Bay. Sea water circulation in Dundalk Bay is driven primarily by tidal forcing: the flooding tide rises from the south and fills the bay from the southeast at Dunany Point. The tide flows in a clockwise direction flowing eastwards by Giles Quay and then heads north past Carlingford Lough. The ebbing tide follows the reverse order to this flow pattern. This pattern can be altered by both wind direction and fresh water inflow rates of the main rivers into the bay e.g. the Castletown, Fane and Glyde Rivers. Strong Easterly winds will increase surface flows and keep the freshwater close to the shore while strong Westerly winds will reduce flow rates but force fresh water in an Easterly direction. The outfall from the Dundalk Waste Water Treatment Plant (WWTP) is located in the Castletown River and dilution and dispersion of the effluent into the sea will depend on the stage of the tide, tidal height, freshwater flows and wind speed and direction. Summers river flows are typically less than Winter flows and the spatial extent of the plume (and therefore the distribution of bacteria and nutrients) will therefore be smaller in Summer months. Specifically, in relation to bacteria, Summer conditions are also less favourable to bacteria in that suspended solids (to which bacteria can attach) loadings are lower and because of this, water transparency levels are better thereby allowing ultraviolet (UV) rays to penetrate deeper into the water column. Bacteria are very sensitive to UV rays and are killed by even small dosages. It is apparent therefore that during later Spring through to late Summer/early Autumn, water chemistry in the eastern part of Dundalk Bay is unlikely to be affected by water from the WWTP. As most of the conditions during the remaining part of the year are more suitable for water from the WWTP to affect a greater area of Dundalk Bay. The only condition that will be less suitable during this part of the year is the fact that there is more freshwater being delivered to the coast thereby increasing the dilution factor. Clearly Stations (EPA CODE) CN030 and CN040 are much more under the influence of the Castletown River rather than a marine influence – this only applies during flood tide periods. However, the opposite is the case for CN110 which may be only seasonally affected by the Castletown River.

D0053-01 Dundalk - 2016-2019 TrAC Data

Water Body_Name	Station_No	Sample Label	Data Source	Date_Surveyed	Salinity	DO_saturation	DO_mgL	BOD	MRP (µg/l)	chl_a	DIN
Castletown Estuary	CN030	CN030BR	EPA Data	11/02/2016	30.64	96.4	9.8	0.5	44	5	0.53
Castletown Estuary	CN030	CN030SR	EPA Data	11/02/2016	24.81	94.5	10.1	0.5	48	2.4	0.9
Castletown Estuary	CN030	CN030B	EPA Data	11/02/2016	10.16	91.5	11		60	14	1.4
Castletown Estuary	CN030	CN030S	EPA Data	11/02/2016	2.62	94.7	12		43	4.2	2.6
Castletown Estuary	CN030	CN030BR	EPA Data	21/06/2016	32.73	103.6	8.3	0.5	32	6.1	0.152
Castletown Estuary	CN030	CN030B	EPA Data	21/06/2016	32.22	97.4	7.8	3.2	54	9.2	0.196
Castletown Estuary	CN030	CN030S	EPA Data	21/06/2016	32.01	97.4	7.8	1.1	54	5.4	0.196
Castletown Estuary	CN030	CN030SR	EPA Data	21/06/2016	30.37	98	7.9	0.5	75	6.1	0.55
Castletown Estuary	CN030	CN030B	EPA Data	28/07/2016	29.9	75.5	6	1.3	94	19	1.08
Castletown Estuary	CN030	CN030BR	EPA Data	28/07/2016	24.3	86.2	7.1	1.6	100	20	1.1
Castletown Estuary	CN030	CN030S	EPA Data	28/07/2016	14.02	70.2	6.2	1.8	100	17	1.35
Castletown Estuary	CN030	CN030SR	EPA Data	28/07/2016	8.66	80.3	7.2	1.5	120	18	1.45
Castletown Estuary	CN030	CN030BR	EPA Data	06/09/2016	28.56	92.2	7.3	1.1	58	7.8	0.257
Castletown Estuary	CN030	CN030SR	EPA Data	06/09/2016	27.69	91.1	7.2	1.2	76	4	0.57
Castletown Estuary	CN030	CN030B	EPA Data	06/09/2016	18.42	77.8	6.5	1.2	91	22	0.83
Castletown Estuary	CN030	CN030S	EPA Data	06/09/2016	17.06	76.9	6.5	1.2	120	11	1.09
Castletown Estuary	CN030	CN030B	EPA Data	24/05/2017	31.4	99.8	8.3	1.6	16	12	0.021
Castletown Estuary	CN030	CN030S	EPA Data	24/05/2017	30.3	102.9	8.4	1	19	13	0.023
Castletown Estuary	CN030	CN030B	EPA Data	05/07/2017	28.6	111.4	9.1	2.8	16	56	0.019
Castletown Estuary	CN030	CN030S	EPA Data	05/07/2017	27.6	114.2	9.4	1.4	210	7.3	1.94
Castletown Estuary	CN030	CN030B	EPA Data	05/09/2017	29.3	90.9	7.6	1.4	17	65	0.355
Castletown Estuary	CN030	CN030S	EPA Data	05/09/2017	21.7	95.8	8.3	1.8	40	16	0.297
Castletown Estuary	CN030	CN030B	EPA Data	16/11/2017	29.93	97.1	9.3	1.4	22	18	0.278
Castletown Estuary	CN030	CN030S	EPA Data	16/11/2017	24.38	96.4	9.6	1.4	58	8.5	0.85
Castletown Estuary	CN030	CN030B	EPA Data	29/05/2018	32.69	106.9	8.7	0.5	17	0.5	0.158
Castletown Estuary	CN030	CN030S	EPA Data	29/05/2018	32.29	110.3	8.8	0.5	27	1.2	0.339
Castletown Estuary	CN030	CN030B	EPA Data	11/07/2018	33.66	100	7.5	0.5	31	15	0.031
Castletown Estuary	CN030	CN030S	EPA Data	11/07/2018	33.33	102.4	7.6	1.4	43	17	0.028
Castletown Estuary	CN030	CN030B	EPA Data	26/09/2018	31.93	95.9	8.5	0.5	43	21	0.037
Castletown Estuary	CN030	CN030S	EPA Data	26/09/2018	31.5	96.9	8.5	0.5	35	15	0.041
Castletown Estuary	CN030	CN030B	EPA Data	21/05/2019	32.3	104	6.6	0.5	0.012	5.2	0.135
Castletown Estuary	CN030	CN030S	EPA Data	21/05/2019	31.6	104	7.8		0.013	5.3	0.222
Castletown Estuary	CN030	CN030B	EPA Data	31/07/2019	32.4	96	7.7	1.6	0.037	21	0.028
Castletown Estuary	CN030	CN030S	EPA Data	31/07/2019	31.8	96	7.7	1	0.049	25	0.031
Castletown Estuary	CN030	CN030S	EPA Data	28/08/2019	27.8	82	9.3	1.9	0.039	24	0.079
Castletown Estuary	CN030	CN030B	EPA Data	28/08/2019	30	96	8.8	1.3	0.032	16	0.037
	MEDIAN				**30.0**	**96.2**	**8.1**	**1.2**	**43**	**13.5**	**0.2675**
	95%ile				**32.88**	**110.575**		**2.26**			
	5%ile				**9.785**	**76.55**					
	90%ile									**23**	

	Salinity Based Threshold	CN030 Result	
Salinity =	**30.0**		
DIN-	0.569	0.268	Pass
MRP-	46	43	Pass
Chloro. Median	11.4	**13.5**	Fail
Chloro 90 percentile	22.8	**23**	Fail
DO%sat 5 percentile	77	76.55	Pass
DO%sat 95 percentile	123	110.575	Pass
BOD	4	2.26	Pass

Water Body_Name	Station_No	Sample Label	Data Source	Date_Surveyed	Salinity	DO_saturation	DO_mgL	BOD	MRP (µg/l)	chl_a	DIN
Castletown Estuary	CN040	CN040BR	EPA Data	11/02/2016	32.56	97.8	9.7	0.5	36	3.1	0.274
Castletown Estuary	CN040	CN040SR	EPA Data	11/02/2016	32.09	97.3	9.7	0.5	25	3.5	0.246
Castletown Estuary	CN040	CN040B	EPA Data	11/02/2016	30.06	96.6	9.9	0.5	39	6.3	0.344
Castletown Estuary	CN040	CN040S	EPA Data	11/02/2016	27.59	95	10	0.5	38	2.1	0.82
Castletown Estuary	CN040	CN040BR	EPA Data	21/06/2016	33.09	106.7	8.5	0.5	33	5.5	0.114
Castletown Estuary	CN040	CN040B	EPA Data	21/06/2016	32.74	104.1	8.3	0.5	38	8.2	0.13
Castletown Estuary	CN040	CN040S	EPA Data	21/06/2016	32.14	101.5	8.2	0.5	47	5.5	0.186
Castletown Estuary	CN040	CN040SR	EPA Data	21/06/2016	31.66	103.2	8.2	0.5	55	5.9	0.292
Castletown Estuary	CN040	CN040B	EPA Data	28/07/2016	22.78	79	6.7	1.7	73	24	0.66
Castletown Estuary	CN040	CN040S	EPA Data	28/07/2016	19.35	80.4	6.9	1	91	18	1.08
Castletown Estuary	CN040	CN040BR	EPA Data	28/07/2016	14.24	86.3	7.4	3.2	120	20	1.5
Castletown Estuary	CN040	CN040SR	EPA Data	28/07/2016	14.06	87	7.5	2.2	120	21	1.94
Castletown Estuary	CN040	CN040BR	EPA Data	06/09/2016	31.36	100.8	7.9	0.5	41	3.5	0.078
Castletown Estuary	CN040	CN040SR	EPA Data	06/09/2016	29.9	98.4	7.7	1.1	44	12	0.126
Castletown Estuary	CN040	CN040B	EPA Data	06/09/2016	22.49	82.7	6.8	1.2	87	11	0.58
Castletown Estuary	CN040	CN040S	EPA Data	06/09/2016	21.29	77.4	6.4	1.4	96	14	0.74
Castletown Estuary	CN040	CN040B	EPA Data	24/05/2017	31.7	100.9	8.4	1.5	15	7.7	0.033
Castletown Estuary	CN040	CN040S	EPA Data	24/05/2017	29.3	101.8	8.4	1.8	370	13	2.53
Castletown Estuary	CN040	CN040B	EPA Data	05/07/2017	29.6	114.3	9.3	3.1	26	35	0.021
Castletown Estuary	CN040	CN040S	EPA Data	05/07/2017	29.4	114.9	9.4	2.4	8	46	0.017
Castletown Estuary	CN041	CN040B	EPA Data	05/09/2017	30.3	96.6	8	1	18	54	0.355
Castletown Estuary	CN042	CN040S	EPA Data	05/09/2017	27.2	100.8	8.5	1.3	20	47	0.307
Castletown Estuary	CN043	CN040B	EPA Data	16/11/2017	30.52	97.8	9.3	1.3	22	20	0.276
Castletown Estuary	CN040	CN040S	EPA Data	16/11/2017	27.35	97.8	9.5	1.4	28	9.5	0.47
Castletown Estuary	CN040	CN040B	EPA Data	29/05/2018	33.13	107.8	8.8	0.5	6.3	0.5	0.029
Castletown Estuary	CN040	CN040S	EPA Data	29/05/2018	32.81	111.1	8.9	0.5	10	0.5	0.044
Castletown Estuary	CN040	CN040B	EPA Data	11/07/2018	33.73	102.5	7.7	0.5	20	3.6	0.046
Castletown Estuary	CN040	CN040S	EPA Data	11/07/2018	28.68	100.1	7.7	1.2	400	8.5	1.255
Castletown Estuary	CN040	CN040B	EPA Data	26/09/2018	32.4	99.1	8.7	0.5	27	19	0.023
Castletown Estuary	CN040	CN040S	EPA Data	26/09/2018		99.4	10.4	0.5	240	22	0.36
Castletown Estuary	CN040	CN040S	EPA Data	21/05/2019	30.5	104	8.8	0.5	0.0025	3.2	0.074
Castletown Estuary	CN040	CN040B	EPA Data	21/05/2019	32.5	105	8.9		0.0065	3.8	0.016
Castletown Estuary	CN040	CN040S	EPA Data	31/07/2019	33	96	7.7	1.4	0.03	21	0.027
Castletown Estuary	CN040	CN040B	EPA Data	31/07/2019	31.5	99	7.9	0.5	0.028	8.6	0.029
Castletown Estuary	CN040	CN040S	EPA Data	28/08/2019	27.2	98	8	1.1	0.037	15	0.172
Castletown Estuary	CN040	CN040B	EPA Data	28/08/2019	30.7	94	7.5	1.1	0.029	16	0.1
	MEDIAN				**30.5**	**99.05**	**8.35**	**1**	**30.5**	**10.25**	**0.216**
	95%ile				**33.102**	**111.9**		**2.61**			
	5%ile				**17.817**	**80.05**					
	90%ile									**29.5**	

	Salinity Based Threshold	CN040 Result	
Salinity =	**30.5**		
DIN-	0.569	0.216	Pass
MRP-	46	30.5	Pass
Chloro. Median	11.4	10.25	Pass
Chloro 90 percentile	22.8	**29.5**	Fail
DO%sat 5 percentile	77	80.05	Pass
DO%sat 95 percentile	123	111.9	Pass
BOD	4	2.61	Pass

Water Body_Name	Station_No	Sample Label	Source	Date_Surveyed	Salinity	DO_saturation	DO_mgL	BOD	MRP (ug/l)	chl_a	DIN mg/l N
Inner Dundalk Bay	CN110	CN110B	EPA Data	26/09/2018	32.52	100.9	8.8		22	29	0.02
Inner Dundalk Bay	CN110	CN110S	EPA Data	26/09/2018	31.76	101	8.9		22	25	0.02
Inner Dundalk Bay	CN110	CN110C	EPA Data	11/07/2018	33.72	103.6	7.8		7.4	3.2	0.026
Inner Dundalk Bay	CN110	CN110C	EPA Data	11/07/2018	33.53	103.3	7.7		7.4	3.2	0.026
Inner Dundalk Bay	CN110	CN110B	EPA Data	29/05/2018	33.11	105.8	8.6		6.1	1	0.04
Inner Dundalk Bay	CN110	CN110S	EPA Data	29/05/2018	33.08	107.4	8.6		7.7	1.5	0.036
Inner Dundalk Bay	CN110	CN110B	EPA Data	16/11/2017	31.42	98.3	9.3		19	15	0.213
Inner Dundalk Bay	CN110	CN110S	EPA Data	16/11/2017	27.41	98	9.6		27	15	0.388
Inner Dundalk Bay	CN110	CN110B	EPA Data	05/09/2017	31.1	94.3	7.8		20	47	0.375
Inner Dundalk Bay	CN110	CN110S	EPA Data	05/09/2017	30.2	107.8	8.9		15	54	0.365
Inner Dundalk Bay	CN110	CN110C	EPA Data	05/07/2017	31.1	111.9	9.1		8.3	23	0.01
Inner Dundalk Bay	CN110	CN110C	EPA Data	05/07/2017	30.7	115.9	9.4		8.3	23	0.01
Inner Dundalk Bay	CN110	CN110B	EPA Data	24/05/2017	32.2	102.3	8.5		7.5	5.8	0.021
Inner Dundalk Bay	CN110	CN110S	EPA Data	24/05/2017	31.8	103.3	8.5		11	6.1	0.021
Inner Dundalk Bay	CN110	CN110BR	EPA Data	06/09/2016	31.69	105.6	8.2		39	16	0.065
Inner Dundalk Bay	CN110	CN110SR	EPA Data	06/09/2016	31.23	107.9	8.4		34	14	0.05
Inner Dundalk Bay	CN110	CN110B	EPA Data	06/09/2016	22.85	80.6	6.6		80	15	0.56
Inner Dundalk Bay	CN110	CN110S	EPA Data	06/09/2016	22.45	78.4	6.4		82	15	0.55
Inner Dundalk Bay	CN110	CN110B	EPA Data	28/07/2016	27.36	91.9	7.5		62	21	0.45
Inner Dundalk Bay	CN110	CN110S	EPA Data	28/07/2016	22.09	84.5	7.1		77	20	0.84
Inner Dundalk Bay	CN110	CN110BR	EPA Data	28/07/2016	18.64	96.2	8.1		90	24	1.36
Inner Dundalk Bay	CN110	CN110SR	EPA Data	28/07/2016	17.91	95.5	8.1		92	22	1.33
Inner Dundalk Bay	CN110	CN110BR	EPA Data	21/06/2016	33.13	108.9	8.7		33	5.8	0.105
Inner Dundalk Bay	CN110	CN110B	EPA Data	21/06/2016	32.74	108.1	8.7		34	6.2	0.123
Inner Dundalk Bay	CN110	CN110S	EPA Data	21/06/2016	32.52	106.6	8.6		56	6	0.194
Inner Dundalk Bay	CN110	CN110SR	EPA Data	21/06/2016	32.13	106.7	8.5		46	6.3	0.193
Inner Dundalk Bay	CN110	CN110SR	EPA Data	11/02/2016	31.88	97	9.8		29	3.5	0.296
Inner Dundalk Bay	CN110	CN110B	EPA Data	11/02/2016	31.79	97	9.8	0.5	32	3.2	0.296
Inner Dundalk Bay	CN110	CN110S	EPA Data	11/02/2016	31.74	97.1	9.8	0.5	28	2.1	0.296
Inner Dundalk Bay	CN110	CN110B	EPA Data	11/02/2016	31.68	97.1	9.8	0.5	32	3.2	0.296
Inner Dundalk Bay	CN110	CN110BR	EPA Data	11/02/2016					36	3.2	0.291
Inner Dundalk Bay	CN110	Composite	EPA Data	21/05/2019	32.5	106	9	0.5	0.0025	2.5	0.01
Inner Dundalk Bay	CN110	CN110S	EPA Data	31/07/2019	32.8	98	7.9		0.091	8.5	0.038
Inner Dundalk Bay	CN110	CN110B	EPA Data	31/07/2019	33.2	99	7.9		0.03	8.8	0.028
Inner Dundalk Bay	CN110	CN110S	EPA Data	28/08/2019	31.2	100	8.1		0.03	19	0.128
Inner Dundalk Bay	CN110	CN110B	EPA Data	28/08/2019	29.3	96	7.1		0.024	17	0.088
	MEDIAN				**32**	**100.9**	**8.5**	**0.5**	**24.5**	**11.4**	**0.126**
	95%ile				**33.299**	**109.8**		**0.5**	**84**		
	5%ile				**21.055**	**83.33**		**0.5**			
	90%ile									**24.5**	

	Salinity Based Threshold	CN110 Result	
Salinity =	**32**		
DIN-	0.442	0.126	Pass
MRP-	43	25	Pass
Chloro. Median	10.8	**11.4**	Fail
Chloro 90 percentile	21.7	**24.5**	Fail
DO%sat 5 percentile	78	83.33	Pass
DO%sat 95 percentile	122	109.8	Pass
BOD	4	0.5	Pass

IW/LCC Ambient Monitoring Data 2021

		Total Ammonia N	pH	Biological Oxygen Demand	Total Nitrogen N	Chlorophyll	Dissolved Inorganic Nitrogen DIN	Ortho-Phosphate P	Salinity	Dissolved Oxygen % Saturation
Station	Sample Date	mg/l	pH units	mg/l	mg/l	mg/m3	mg/l	mg/l	ppt	% Sat.
CN030	19-Mar-2021	0.32	8.01	3.2	3.5	5.2	3.6	0.04	0.8	117.2
CN030	19-Oct-2021	0.4	7.93	2.3	1.2	11.3	< 1	0.05	18	80

		Total Ammonia N	pH	Biological Oxygen Demand	Total Nitrogen N	Chlorophyll	Dissolved Inorganic Nitrogen DIN	Ortho-Phosphate P	Salinity	Dissolved Oxygen % Saturation
Station	Sample Date	mg/l	pH units	mg/l	mg/l	mg/m3	mg/l	mg/l	ppt	% Sat.
CN040	19-Mar-2021	0.27	8.01	2.1	3.6	3.9	5.5	0.05	0.4	118.8
CN040	19-Oct-2021	0.39	7.96	2.6	1	8.5	< 1	0.06	18.1	93

		Total Ammonia N	pH	Biological Oxygen Demand	Total Nitrogen N	Chlorophyll	Dissolved Inorganic Nitrogen DIN	Ortho-Phosphate P	Salinity	Dissolved Oxygen % Saturation
Station	Sample Date	mg/l	pH units	mg/l	mg/l	mg/m3	mg/l	mg/l	ppt	% Sat.
CN110	19-Mar-2021	0.35	8.01	2.9	3.8	8.4	3.6	0.05	0.1	114.4
CN110	19-Oct-2021	0.4	7.98	2.1	1	12.7	< 1	0.05	18.2	79.1