Annual Environmental Report

2018

Dundalk

D0053-01

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2018 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 are included as an appendix to the AER as follows:

1.1 Licence specific reporting included in AER

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

1.2 Treatment Type

The agglomeration is served by a wastewater treatment plant DUNDALK WWTP with a Plant Capacity PE of 120000. The treatment process includes the following:

1.2.1 DUNDALK WWTP

Treatment type	Yes / No	Details
Preliminary Treatment	Yes	Screen
Primary Treatment	Yes	Primary Treatment
Secondary Treatment	Yes	Secondary Treatment, Anaerobic Digestion
Nutrient Removal	No	
Tertiary Treatment	No	

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 2.2 Discharges from the agglomeration.

1.3 ELV Overview

1.3.1 DUNDALK WWTP

Compliance Status	
Were all parameters compliant for DUNDALK WWTP treatment plant	No
Where non compliant see Table 2.2.1 for details of parameters	

1.4 Sludge Removal

The amount of sludge removed from the wastewater treatment plant is shown below along with the transported destination of the sludge from the treatment plant.

Treatment Plant	Sludge type	Quantity	Unit	% Dry Solids	Destination
DUNDALK WWTP	Cake Sludge	4113	Weight (Tonnes)	21.6	Biocore, Ballivor, Co. Meath

Annual Statement of Measures

Upgraded aeration to be installed by end of Q3 2019. Ferric dosing installed in 2018. 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 at this time. The expected completion of the DAP is 2020. SIP03: Installation of 1500m^3 storm water balancing tank: Works will be carried out if additional loading from proposed IDA biopharma site materialises and/or based on Network study recommendations.

2 MONITORING REPORTS SUMMARY

2.1 Summary report on monthly influent monitoring

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

2.1.1 Influent Monitoring Summary - DUNDALK WWTP

Parameters	Number of Samples	Annual Max	Annual Mean
COD-Cr mg/l	26	1148	302.25
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	26	597	112.58
Total Nitrogen mg/l	24	55.7	21.4
Suspended Solids mg/l	26	745	164.03
Total Phosphorus (as P) mg/l	26	12	3.72
Hydraulic Capacity	0	50114	27117

If other inputs in the form of sludge / leachate are added to the WWTP then these are included in Section 3.5 if applicable.

Significance of Results:

The annual mean hydraulic loading is less than the peak Treatment Plant Capacity as detailed further in Section 3.2. The annual maximum hydraulic loading is less than the peak Treatment Plant Capacity as detailed further in Section 3.2.

2.2 Discharges from the agglomeration

2.2.1 Effluent Monitoring Summary - DUNDALK WWTP

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 with Condition 2 Interpretation included	Annual Mean	Overall Compliance (Pass/Fail)
Conductivity 20 C µS/cm	0	0	0	26	0	0	2119.71	N/A
Dissolved Inorganic Nitrogen (as N) mg/l	0	0	0	26	0	0	8.38	N/A
BOD, 5 days with Inhibition (Carbonaceous BOD) mg/l	25	50	0	26	1	1	7.6	Fail
Suspended Solids mg/l	35	87.5	0	26	2	2	26.45	Fail
Ammonia-Total (as N) mg/l	0	0	0	26	0	0	4.28	N/A
Total Oxidised Nitrogen (as N) mg/l	0	0	0	2	0	0	6.15	N/A
COD-Cr mg/l	125	250	0	26	2	1	59.89	Fail
pH pH units	6 to 9	6 to 9	0	26	0	0	7.7	Pass

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 with Condition 2 Interpretation included	Annual Mean	Overall Compliance (Pass/Fail)
Total Phosphorus (as P) mg/l	1	1.2	0	26	11	8	1.34	Fail
ortho-Phosphate (as P) - unspecified mg/l	0	0	0	26	0	0	0.8	N/A
Total Nitrogen mg/l	10	12	0	26	12	11	10.27	Fail

Notes:
1– This represents the Emission Limit Values after the Interpretation provided for under Condition 2 of the licence is applied
2 - For parameters where a mean ELV applies

Cause of Exceedance(s):

Plant or equipment breakdown at WWTP and WWTP upgrade required to meet ELVs.

Significance of Results:

The WWTP is not compliant with the ELV's set in the Wastewater Discharge Licence. There were 11 samples non-compliant with the Total P (mg/l) ELV, 8 of which were above the Condition 2 ELV. There were 12 samples non-compliant with the Total N (mg/l) ELV, 11 of which were above the Condition 2 ELV. There were 2 samples non-compliant with the COD (mg/l) ELV, one of which was above the Condition 2 ELV. There were 2 samples non-compliant with the SS (mg/l) ELV, both of which were above the Condition 2 ELV. There was one sample non-compliant with the BOD (mg/l) Condition 2 ELV. The impact on receiving waters is assessed in Section 2.3.

2.3 Ambient monitoring summary

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.

2.3.1 Ambient Monitoring Report Summary - DUNDALK WWTP

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	Code	Bathing Water	Drinking Water	FWPM	Shellfish	WFD Status
Upstream	307292, 307701	TPEFF2100D0053SW001	No	No	No	Yes	Moderate
Downstream	308271, 307891	TPEFF2100D0053SW001	No	No	No	Yes	Moderate
Downstream	308807, 307866	TPEFF2100D0053SW001	No	No	No	Yes	Moderate

2.3.2 Ambient Monitoring Parameter Summary - DUNDALK WWTP

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.

The ambient monitoring results did not meet the required EQS.

All three stations did not meet the salinity-based thresholds for chlorophyll median and chlorophyll 95%. 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 Moderate 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 recent 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.

3 OPERATIONAL REPORTS SUMMARY

3.1 Treatment Efficiency Report

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:

3.1.1 Treatment Efficiency Report Summary - DUNDALK WWTP

Parameter	Influent mass loading (kg/year)	Effluent mass emission (kg/year)	Efficiency (% reduction of influent load)
TP	41399.6	13354	67.74
TN	234563.11	102552.16	56.28
SS	1826594.14	264172.5	85.54
COD	3365790.08	598225.23	82.23
cBOD	1253674.86	75955.19	93.94

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

3.2 Treatment Capacity Report Summary

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 (m3/day) - As Constructed	56706
DWF to the Treatment Plant (m3/day)	18902
Current Hydraulic Loading - annual max (m3/day)	50114
Average Hydraulic loading to the Treatment Plant (m3/day)	27117
Organic Capacity (PE) - As Constructed	120000
Organic Capacity (PE) - Collected Load (peak week)	65428
Organic Capacity (PE) - Remaining	54572
Will the capacity be exceeded in the next three years? (Yes/No)	No

3.3 Complaints Summary

A summary of complaints of an environmental nature is included below.

Number of Complaints	Nature of Complaint	Number Open Complaints	Number Closed Complaints
9	Blocked Sewer	1	8

3.4 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.

3.4.1 Summary of Incidents

Incident Type	Cause	No. of incident occurrences	Recurring (Y/N)	Closed (Y/N)
Uncontrolled release	Other	1	No	Yes
Other	Other	1	No	Yes
Non-compliance	Other	1	No	Yes
Non-compliance	WWTP upgrade required to meet ELV	1	Yes	No

3.4.2 Summary of Overall Incidents

Question	Answer
Number of Incidents in 2018	4
Number of Incidents reported to the EPA via EDEN in 2018	4
Explanation of any discrepancies between the two numbers above	N/A

3.5 Sludge / Other inputs to the 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)
Industrial / Commercial Sludge	509	Weight (Tonnes)	6	0.01	Yes	Yes	Yes

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

In 2017, SWO activations and discharge volumes were based estimations and not monitored calibrated flow data. In all 2018 AERs only monitored flow data from a calibrated flow meter are being reported.

WWDL Name / Code for Storm Water Overflow	Irish Grid Ref.	Included in Schedule A4 of the WWDL	Significance of the overflow(High / Medium / Low)	Assessed against DoEHLG Criteria	No. of times activated in 2018 (No. of events)	Total volume discharged in 2018 (m3)	Monitoring Status
SWO-1 (SW010)	307943, 307707	Yes	Unknown	Meeting			Not Monitored
SWO-1 (SW011)	306279, 307784	Yes	Unknown	Meeting			Not Monitored
SWO-3 (SW012)	305512, 307936	Yes	Unknown	Meeting			Not Monitored
SWO-4 (SW013)	305589, 310049	Yes	Unknown	Meeting			Not Monitored
SWO-5 (SW005)	304255, 308441	Yes	Unknown	Meeting			Not Monitored
SWO-6 (SW006)	303201, 309018	Yes	Unknown	Meeting			Not Monitored

WWDL Name / Code for Storm Water Overflow	Irish Grid Ref.	Included in Schedule A4 of the WWDL	Significance of the overflow(High / Medium / Low)	Assessed against DoEHLG Criteria	No. of times activated in 2018 (No. of events)	Total volume discharged in 2018 (m3)	Monitoring Status
SWO-7 (SW007)	304053, 306069	Yes	Unknown	Meeting			Not Monitored
SWO-8 (SW008)	306554, 307773	Yes	Unknown	Meeting			Not Monitored
SWO-9 (SW009)	307652, 307277	Yes	Unknown	Meeting			Not Monitored

4.1.2 Inspection Summary Report

SWO Summary	
How much sewage was discharged via SWOs in the agglomeration in the year (m3)?	Not Monitored
Is each SWO identified as non 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 / charges 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 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)	Licence Schedule	Licence Completion Date	Date Expired? (N/NA/Y)	Status of Works	Timeframe for Completing the Work	Comments
Installation of nutrient removal (nitrogen and phosphorus) processes at WWTP	C	31/12/2013	Yes	Works Completed	30/12/2018	
SW8 - Installation of 1,500 m^3 storm water balancing tank at Coe's Road Pumping Station	C		No	Not Started		The improvement programme will be reviewed by IW to assess the works required to comply with the licence condition on a prioritised basis.

A summary of the status of any improvements identified by under Condition 5.2 is included below.

4.2.2 Improvement Programme Summary

Improvement Identifier	Improvement Description	Improvement Source	Expected Completion Date	Comments
D0053-IP:40	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 at this time. The expected completion of the DAP is 2020.	Other	2020	Expected completion is 2020

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 Table.

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 list of the various reports required for this agglomeration and a brief summary of their recommendations.

5.a Licence Specific Reports Summary Table

Licence Specific Report	Required by licence	Year included in AER	Included in this AER	Reference to relevant section of AER
Priority Substances Assessment	Yes	2014	No	
Shellfish Impact Assessment	Yes	2013	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
Is there a need to advise the EPA for consideration of a Technical Amendment / Review of the licence?	No
List reason e.g. additional SWO identified	N/A
Is there a need to request/advise the EPA of any modifications to the existing WWDL?	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	No

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

Date: 19/03/2019

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,

Eleanor Roche

Acting Head of Environmental Regulation.

7 APPENDIX

Appendix
Appendix 7.1 - Ambient Monitoring Summary

Ambient Monitoring Data

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)	307292, 307701	TW21006031CN3003	N	N	N	Y	Moderate
Castletown Estuary (Transitional Water) (CN040)	308271, 307891	TW21006031CN3004	N	N	N	Y	Moderate
Dundalk Bay Inner (Transitional Waters) (CN110)	308807, 307866	TW21006030CN2004	N	N	N	Y	Moderate

The results for the monitoring data sets are included below. This assessment is based on the combined assessment of the 2017 EPA and 2018 Louth Co. Co datasets.

Significance of results

- The WWTP was non-compliant with the ELVs set in the wastewater discharge licence as detailed in Section 2.2.
- According to the 2017 EPA TraC data and Louth 2018 data, Stations CN030, CN040 and CN110 met the salinity-based thresholds for DIN, MPR and DO. However, all three stations did not meet the salinity-based thresholds for Chlorophyll Median and Chlorophyll 95%. 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 Moderate 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 recent 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.

2018 Marine Ambient Monitoring Summary

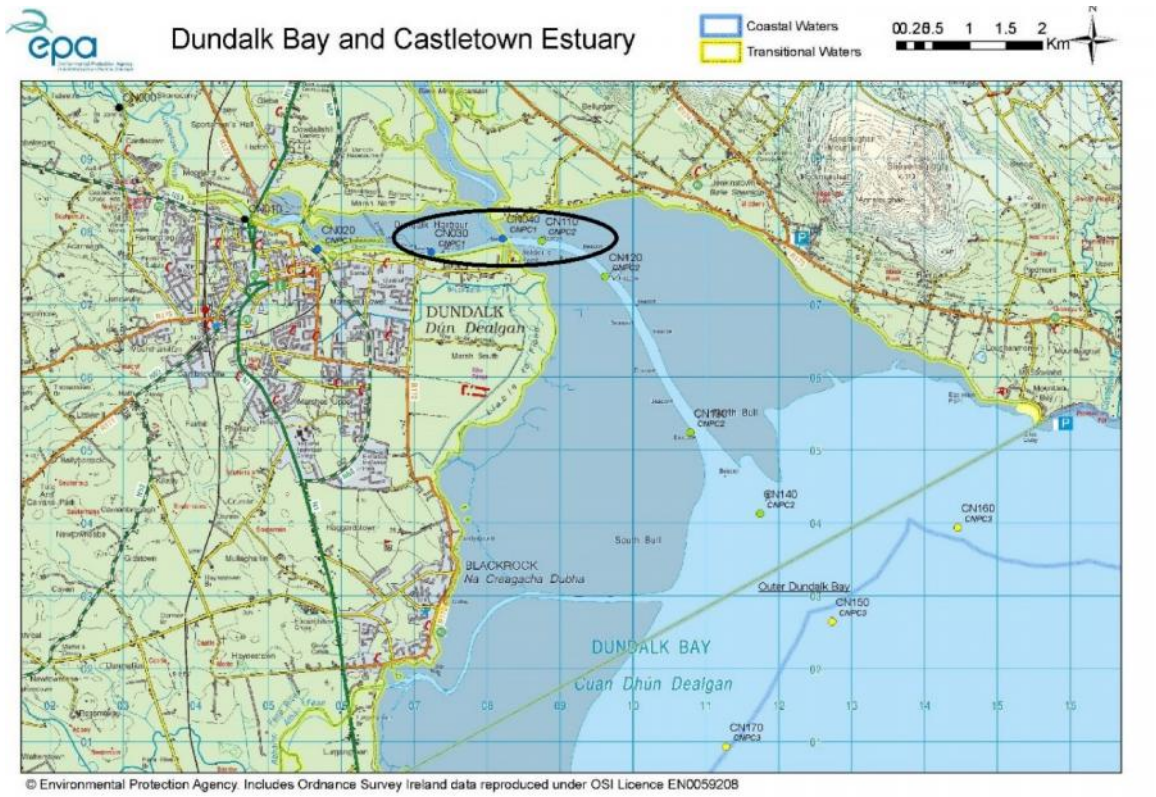

Figure 1: Location of the three transitional water sampling stations in the Castletown Estuary (CN030 and CB040) and Inner Dundalk Bay (CN110)

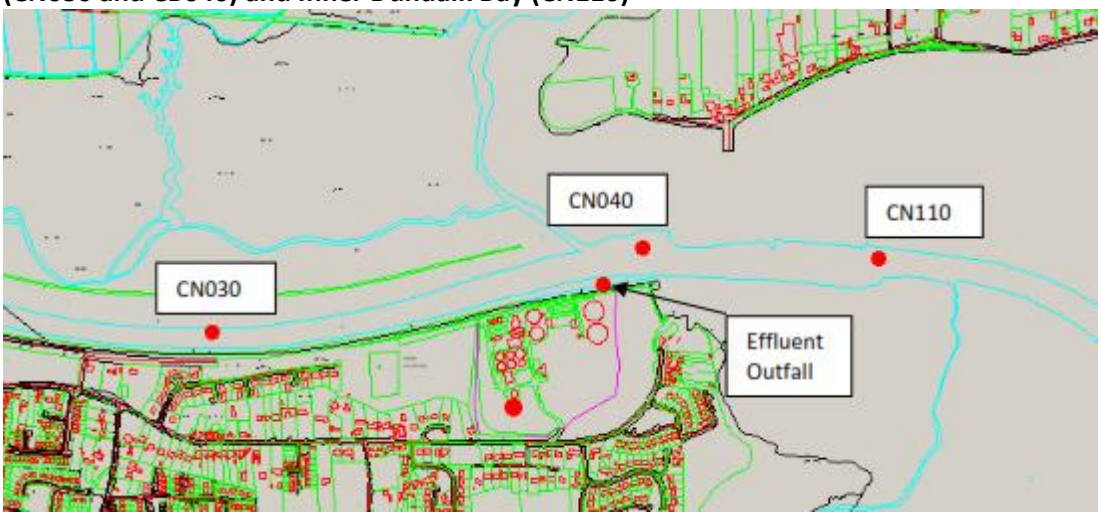

Figure 2: Location of the three transitional water sampling stations in the Castletown Estuary (CN030 and CB040) and Inner Dundalk Bay (CN110) in relation to the effluent outfall.

According to the combined 2017 EPA TraC data and Louth 2018 data, Stations CN030, CN040 and CN110 met the salinity-based thresholds for DIN, MPR and DO. However, all three stations did not meet the salinity-based thresholds for Chlorophyll Median and Chlorophyll 95%. 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 Moderate 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 recent 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. The discharge from the wastewater treatment plant may be contributing to the Moderate status of the Castletown Estuary and Inner Dundalk Bay.

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.

Water Body_Name	Station_No	Data Source	Date_Surveyed	Salinity	DO_saturation	DO_mgL	BOD	MRP (µg/l)	chl_a	DIN	Season
Castletown Estuary	CN030	Louth Data Data	29/05/2018	33.1	110		1	27	1.2		Summer
Castletown Estuary	CN030	Louth Data Data	29/05/2018	29.1	107		1	17	1		Summer
Castletown Estuary	CN030	Louth Data Data	11/07/2018	33.8	102		1.4	43	17		Summer
Castletown Estuary	CN030	Louth Data Data	11/07/2018	34.2	100		1	31	15		Summer
Castletown Estuary	CN030	Louth Data Data	26/09/2018	32.3	97		1	35	15		Summer
Castletown Estuary	CN030	Louth Data Data	26/09/2018	32.6	96		1	43	21		Summer
Castletown Estuary	CN030	EPA Data	24/05/2017	31.4	99.8	8.3	1.6	16	12	0.021	Summer
Castletown Estuary	CN030	EPA Data	05/07/2017	28.6	111.4	9.1	2.8	16	56	0.019	Summer
Castletown Estuary	CN030	EPA Data	05/09/2017	29.3	90.9	7.6	1.4	17	65	0.355	Summer
Castletown Estuary	CN030	EPA Data	16/11/2017	29.93	97.1	9.3	1.4	22	18	0.278	Winter
Castletown Estuary	CN030	EPA Data	24/05/2017	30.3	102.9	8.4	1	19	13	0.023	Summer
Castletown Estuary	CN030	EPA Data	05/07/2017	27.6	114.2	9.4	1.4	210	7.3	1.94	Summer
Castletown Estuary	CN030	EPA Data	05/09/2017	21.7	95.8	8.3	1.8	40	16	0.297	Summer
Castletown Estuary	CN030	EPA Data	16/11/2017	24.38	96.4	9.6	1.4	58	8.5	0.85	Winter
	MEDIAN			**30.115**	**99.9**	**8.75**	**1.4**	**29**	**15**	**0.29**	
	95%ile			**33.94**	**112.38**		**2.15**				
	5%ile			**23.442**	**94.085**						
	90%ile								**45.5**		

	Salinity Based Threshold	CN030 Result	
Salinity =	**30.115**		
DIN-	0.569	0.29	Pass
MRP-	46	29	Pass
Chloro. Median	11.4	**15**	**Fail**
Chloro 90 percentile	22.8	**45.5**	**Fail**
DO%sat 5 percentile	77	94.085	Pass
DO%sat 95 percentile	123	112.38	Pass
BOD	4	2.15	Pass

Water Body_Name	Station_No	Data Source	Date_Surveyed	Salinity	DO_saturation	DO_mgL	BOD	MRP (µg/l)	chl_a	DIN	Season
Castletown Estuary	CN030	Louth Data Data	29/05/2018	33.3	111		1	100	1		Summer
Castletown Estuary	CN030	Louth Data Data	29/05/2018	33.6	108		1	6.3	1		Summer
Castletown Estuary	CN030	Louth Data Data	11/07/2018	29.5	100		1.2	400	8.5		Summer
Castletown Estuary	CN030	Louth Data Data	11/07/2018	34.1	102		1	20	3.6		Summer
Castletown Estuary	CN030	Louth Data Data	26/09/2018	30.9	99		1	240	22		Summer
Castletown Estuary	CN030	Louth Data Data	26/09/2018	33.2	99		1	27	19		Summer
Castletown Estuary	CN040	EPA Data	24/05/2017	31.7	100.9	8.4	1.5	15	7.7	0.033	Summer
Castletown Estuary	CN040	EPA Data	05/07/2017	29.6	114.3	9.3	3.1	26	35	0.021	Summer
Castletown Estuary	CN040	EPA Data	05/09/2017	30.3	96.6	8	1	18	54	0.355	Summer
Castletown Estuary	CN040	EPA Data	16/11/2017	30.52	97.8	9.3	1.3	22	20	0.276	Winter
Castletown Estuary	CN040	EPA Data	24/05/2017	29.3	101.8	8.4	1.8	370	13	2.53	Summer
Castletown Estuary	CN040	EPA Data	05/07/2017	29.4	114.9	9.4	2.4	8	46	0.017	Summer
Castletown Estuary	CN040	EPA Data	05/09/2017	27.2	100.8	8.5	1.3	20	47	0.307	Summer
Castletown Estuary	CN040	EPA Data	16/11/2017	27.35	97.8	9.5	1.4	28	9.5	0.47	Winter
	MEDIAN			**30.41**	**100.85**	**8.9**	**1.25**	**24**	**16**	**0.2915**	
	95%ile			**33.775**	**114.51**		**2.645**				
	5%ile			**27.2975**	**97.38**						
	90%ile								**46.7**		

	Salinity Based Threshold	CN040 Result	
Salinity =	**30.41**		
DIN-	0.569	0.2915	Pass
MRP-	46	24	Pass
Chloro. Median	11.4	**16**	**Fail**
Chloro 90 percentile	22.8	**46.7**	**Fail**
DO%sat 5 percentile	77	97.38	Pass
DO%sat 95 percentile	123	114.51	Pass
BOD	4	2.645	Pass

Water Body_Name	Station_No	Source	Date_Surveyed	Salinity	DO_saturation	DO_mgL	BOD	MRP (ug/l)	chl_a	DIN	Season
Inner Dundalk Bay	CN110	Louth Data	29/05/2018	33	107			7.7	1.5		Summer
Inner Dundalk Bay	CN110	Louth Data	29/05/2018	33.6	106			6.1	1		Summer
Inner Dundalk Bay	CN110	Louth Data	11/07/2018	34.3	103			7.4	3.2		Summer
Inner Dundalk Bay	CN110	Louth Data	26/09/2018	32.4	101			22	25		Summer
Inner Dundalk Bay	CN110	Louth Data	26/09/2018	32.6	101			22	29		Summer
Inner Dundalk Bay	CN110	EPA Data	24/05/2017	32.2	102.3	8.5		7.5	5.8	0.021	Summer
Inner Dundalk Bay	CN110	EPA Data	05/09/2017	31.1	94.3	7.8		20	47	0.375	Summer
Inner Dundalk Bay	CN110	EPA Data	16/11/2017	31.42	98.3	9.3		19	15	0.213	Winter
Inner Dundalk Bay	CN110	EPA Data	05/07/2017	31.1	111.9	9.1		8.3	23	0.01	Summer
Inner Dundalk Bay	CN110	EPA Data	05/07/2017	30.7	115.9	9.4		8.3	23	0.01	Summer
Inner Dundalk Bay	CN110	EPA Data	24/05/2017	31.8	103.3	8.5		11	6.1	0.021	Summer
Inner Dundalk Bay	CN110	EPA Data	05/09/2017	30.2	107.8	8.9		15	54	0.365	Summer
Inner Dundalk Bay	CN110	EPA Data	16/11/2017	27.41	98	9.6		27	15	0.388	Winter
	MEDIAN			**31.8**	**103**	**9**		**11**	**15**	**0.117**	
	95%ile			**33.88**	**113.5**						
	5%ile			**29.084**	**96.52**						
	90%ile								**43.4**		

	Salinity Based Threshold	CN110 Result	
Salinity =	**31.8**		
DIN-	0.506	0.117	Pass
MRP-	44	11	Pass
Chloro. Median	11.1	**15.0**	**Fail**
Chloro 90 percentile	22.2	**43.4**	**Fail**
DO%sat 5 percentile	78	96.52	Pass
DO%sat 95 percentile	122	113.5	Pass
BOD	N/A	N/A	N/A

Shellfish Biota Data - Inner Dundalk Bay

Year	Date	Sample	Programme	Station	WFD Area	Latitude	Longitude	Species (latin)	# of individuals	Length Range (mm)	Length Mean (mm)	Length Stdev (mm)	Tissue analysed	Moisture (%)	Lipid (%)	oxychlordane (ug kg-1 WW)	perfluorooctanoic acid (ug kg-1 WW)	perfluorooctanyl sulphonic acid (ug kg-1 WW)	trans-chlordane (gamma-chlordane) (ug kg-1 WW)	trans-nonachlor (ug kg-1 WW)	tributyltin ion (ug kg-1 WW)	acenaphthene (ug kg-1 WW)	acenaphthylene (ug kg-1 WW)	anthracene (ug kg-1 WW)	benzo[a]anthracene (ug kg-1 WW)	benzo[a]pyrene (ug kg-1 WW)	benzo[b]fluoranthene (ug kg-1 WW)	benzo[b+k]fluoranthene (ug kg-1 WW)	benzo[ghi]perylene (ug kg-1 WW)	benzo[k]fluoranthene (ug kg-1 WW)
2015	24/11/15	2424	WFD	Dundalk Bay Inner	Inner Dundalk Bay	54.01083	-6.34633	Mytilus edulis	75	40.76 - 57.11	46.47	2.93	SB	80	2.139	<0.033	<1	<1	<0.03	0.037	<20	0.847	0.232	0.982	1.126	0.628	2.381		1.6	0.845
2016	14/11/16	2448	WFD	Dundalk Bay Inner	Inner Dundalk Bay	54.01101	-6.34629	Mytilus edulis	75	40.1 - 53.5	45.91	2.866	SB	81.9	2.26	nd (<0.013)			<0.031	0.036		3.115	0.214	7.839	1.201	0.7	2.683	nd (<0.002)	1.986	0.816

aluminium (mg kg-1 WW)*	arsenic (mg kg-1 WW)	cadmium (mg kg-1 WW)	chromium (mg kg-1 WW)	cobalt (mg kg-1 WW)*	copper (mg kg-1 WW)	iron (mg kg-1 WW)*	lead (mg kg-1 WW)	manganese (mg kg-1 WW)*	mercury (mg kg-1 WW)	nickel (mg kg-1 WW)	selenium (mg kg-1 WW)*	silver (mg kg-1 WW)	vanadium (mg kg-1 WW)*	zinc (mg kg-1 WW)
82.5	2.08	0.09	0.31	0.09	1.11	93.3	0.29	5.17	0.02	0.25	0.3	0.006	0.27	15.5
74.5	1.94	0.08	0.18	0.08	0.89	80.3	0.27	7.99	0.019	0.23	0.33	0.007	0.23	12.6

CB101 (ug kg-1 WW)	CB105 (ug kg-1 WW)	CB118 (ug kg-1 WW)	CB138 (ug kg-1 WW)	CB149 (ug kg-1 WW)	CB153 (ug kg-1 WW)	CB156 (ug kg-1 WW)	CB170 (ug kg-1 WW)	CB18 (ug kg-1 WW)	CB180 (ug kg-1 WW)	CB194 (ug kg-1 WW)	CB209 (ug kg-1 WW)	CB28 (ug kg-1 WW)	CB31 (ug kg-1 WW)	CB44 (ug kg-1 WW)
0.256	0.099	0.276	0.37	0.206	0.582	0.028	nd (<0.005)	0.17	0.038	<0.005	nd (<0.002)	0.085	0.093	0.517
0.26	0.075	0.225	0.348	0.222	0.698	0.016	0.103	0.067	0.037	<0.006	nd (<0.001)	0.161	0.172	0.278

dibenz[a h]anthracene (ug kg-1 WW)	fluoranthene (ug kg-1 WW)	fluorene (ug kg-1 WW)	indeno[1 2 3-cd]pyrene (ug kg-1 WW)	naphthalene (ug kg-1 WW)	phenanthrene (ug kg-1 WW)	pyrene (ug kg-1 WW)	BDE100 (ug kg-1 WW)	BDE153 (ug kg-1 WW)	BDE154 (ug kg-1 WW)	BDE183 (ug kg-1 WW)	BDE28 (ug kg-1 WW)	BDE47 (ug kg-1 WW)	BDE99 (ug kg-1 WW)	alpha-HCH (ug kg-1 WW)
0.186	11.71	2.197	0.936		13.38	10.33	0.069	<0.036	<0.036	nd (<0.003)	<0.036	0.21	0.137	
0.387	12.88	3.687	1.267	nd (<0.002)	12.95	11.94	0.076	<0.036	<0.036	<0.038	nd (<0.003)	0.213	0.113	<0.03

beta-HCH (ug kg-1 WW)	cis-chlordane (ug kg-1 WW)	cis-heptachlorepoxide (ug kg-1 WW)	DDD (o p') (ug kg-1 WW)	DDD (p p') (ug kg-1 WW)	DDE (o p') (ug kg-1 WW)	DDE (p p') (ug kg-1 WW)	DDT (o p') (ug kg-1 WW)	DDT (p p') (ug kg-1 WW)	delta-HCH (ug kg-1 WW)	gamma-HCH (ug kg-1 WW)	heptachlor (ug kg-1 WW)	hexachlorobenzene (ug kg-1 WW)	hexachlorobutadiene (ug kg-1 WW)	CB52 (ug kg-1 WW)
	0.037	0.097	0.234	0.603	0.061	0.402	0.215	0.267			0.184	0.062	nd (<0.005)	0.114
<0.03	0.066	<0.032	0.075	0.154	0.056	0.422	0.043	0.059	nd (<0.001)	<0.03	nd (<0.003)	0.051	0.059	0.133