

# Annual Environmental Report

2020



Dundalk

D0053-01

## **CONTENTS**

### **1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2020 AER**

- 1.1 ANNUAL STATEMENT OF MEASURES
- 1.2 TREATMENT SUMMARY
- 1.3 ELV OVERVIEW
- 1.4 LICENSE SPECIFIC REPORT INCLUDED IN AER

### **2 TREATMENT PLANT PERFORMANCE AND IMPACT SUMMARY**

- 2.1 DUNDALK WWTP - 2020 - TREATED DISCHARGE
  - 2.1.1 INFLUENT SUMMARY - DUNDALK WWTP - 2020
  - 2.1.2 EFFLUENT MONITORING SUMMARY - DUNDALK WWTP - 2020 -
  - 2.1.3 AMBIENT MONITORING SUMMARY FOR THE TREATMENT PLANT DISCHARGE -
  - 2.1.4 OPERATIONAL REPORTS SUMMARY FOR DUNDALK WWTP - 2020
  - 2.1.5 SLUDGE/OTHER INPUTS TO DUNDALK WWTP - 2020

### **3 COMPLAINTS AND INCIDENTS**

- 3.1 COMPLAINTS SUMMARY
- 3.2 REPORTED INCIDENTS SUMMARY
  - 3.2.1 SUMMARY OF INCIDENTS
  - 3.2.2 SUMMARY OF OVERALL INCIDENTS

### **4 INFRASTRUCTURAL ASSESSMENT AND PROGRAMME OF IMPROVEMENTS**

- 4.1 STORM WATER OVERFLOW IDENTIFICATION AND INSPECTION REPORT
  - 4.1.1 SWO IDENTIFICATION AND INSPECTION SUMMARY REPORT
- 4.2 REPORT ON PROGRESS MADE AND PROPOSALS BEING DEVELOPED TO MEET THE IMPROVEMENT PROGRAMME REQUIREMENTS
  - 4.2.1 SPECIFIED IMPROVEMENT PROGRAMME SUMMARY
  - 4.2.2 IMPROVEMENT PROGRAMME SUMMARY
  - 4.2.3 SEWER INTEGRITY RISK ASSESSMENT

### **5 LICENCE SPECIFIC REPORTS**

- 5.1 PRIORITY SUBSTANCES ASSESSMENT
- 5.2 SHELLFISH IMPACT ASSESSMENT

### **6 CERTIFICATION AND SIGN OFF**

- 6.1 SUMMARY OF AER CONTENTS

### **7 APPENDIX**

- 7.1 AMBIENT MONITORING SUMMARY

# 1 EXECUTIVE SUMMARY AND INTRODUCTION TO THE 2020 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 at this time.

## 1.2 TREATMENT SUMMARY

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

- DUNDALK WWTP - 2020 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 - 2020	Treated	Non-Compliant	Total Phosphorus mg/l Total Nitrogen mg/l

## 1.4 LICENCE SPECIFIC REPORTING INCLUDED IN AER

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

## 2 TREATMENT PLANT PERFORMANCE AND IMPACT SUMMARY

### 2.1 DUNDALK WWTP - 2020 - TREATED DISCHARGE

#### 2.1.1 INFLUENT MONITORING SUMMARY - DUNDALK WWTP - 2020

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
Total Nitrogen mg/l	26	63.7	27.91
Total Phosphorus mg/l	26	9.86	4.64
COD-Cr mg/l	26	878	346.33
BOD, 5 days with Inhibition (Carbonaceous) mg/l	26	200	90.37
Suspended Solids mg/l	26	507	177.87
Hydraulic Capacity	N/A	50059	26584

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 <sup>Note 1</sup>	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)
Chemical Oxygen Demand mg/l	125	250	N/A	27	N/A	N/A	30.18	Pass
Suspended Solids mg/l	35	87.5	N/A	27	1	N/A	13.68	Pass
BOD, 5 days with Inhibition (Carbonaceous) mg/l	25	50	N/A	27	N/A	N/A	3.07	Pass
pH pH units	6-9	6-9	N/A	27	N/A	N/A	7.59	Pass
Total Phosphorus mg/l	1	1.2	N/A	27	10	9	0.9	Fail
Total Nitrogen mg/l	10	12	N/A	27	17	15	12.54	Fail
ortho-Phosphate (as P) - unspecified mg/l	N/A	N/A	N/A	27	N/A	N/A	0.64	
Conductivity 20 C $\mu$ S/cm	N/A	N/A	N/A	27	N/A	N/A	2749.58	
Ammonia-Total (as N) mg/l	N/A	N/A	N/A	27	N/A	N/A	7.67	

Parameter	WWDL ELV (Schedule A)	ELV with Condition 2 Interpretation included <sup>Note 1</sup>	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)
Dissolved Inorganic Nitrogen (as N) mg/l	N/A	N/A	N/A	27	N/A	N/A	12	
Temperature – Degrees Centigrade	25	N/A	N/A	0	N/A	N/A	N/A	

Notes:

1 – This represents the Emission Limit Values after the Interpretation provided for under Condition 2 of the licence is applied

### Cause of Exceedance(s):

Inadequate Operational Procedures/Training (Incident INCI016274).

### 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	307292, 307701	TW21006031CN3003	No	No	No	Yes	Poor
Downstream	308271, 307891	TW21006031CN3004	No	No	No	Yes	Poor
Downstream	308807, 307866	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.

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 by the WWTP.

Other causes of deterioration in water quality in the area are unknown.



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.

## 2.1.4 OPERATIONAL PERFORMANCE SUMMARY - DUNDALK WWTP - 2020

### 2.1.4.1 Treatment Efficiency Report - DUNDALK WWTP - 2020

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)
<b>cBOD</b>	852252	20868	98
<b>COD</b>	3266208	244914	93
<b>SS</b>	1677498	110497	93
<b>TN</b>	263237	101765	61
<b>TP</b>	43772	7289	83

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 - 2020

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 - 2020	
Peak Hydraulic Capacity (m <sup>3</sup> /day) - As Constructed	56706
DWF to the Treatment Plant (m <sup>3</sup> /day)	18902
Current Hydraulic Loading - annual max (m <sup>3</sup> /day)	50059
Average Hydraulic loading to the Treatment Plant (m <sup>3</sup> /day)	26584
Organic Capacity (PE) - As Constructed	61000
Organic Capacity (PE) - Collected Load (peak week) <sup>Note1</sup>	54918
Organic Capacity (PE) - Remaining	6082
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 - 2020

'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)
Other	21584.4	Weight (Tonnes)	153	0.63	Yes	Yes	No

## 3 COMPLAINTS AND INCIDENTS

### 3.1 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
There were no relevant environmental complaints in 2020.			

### 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)
Abatement Equipment offline	Plant or equipment maintenance 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)
Abatement Equipment offline	Plant or equipment breakdown at WWTP	1	No	Yes
Breach of ELV	Inadequate Operational Procedures / Training	1	Yes	No
Uncontrolled release	Broken Sewer Pipe	1	No	Yes
Uncontrolled release	EO caused by ragging or blocking	1	No	Yes
Uncontrolled release	Broken Sewer Pipe	1	No	Yes

### 3.2.2 SUMMARY OF OVERALL INCIDENTS

Question	Answer
Number of Incidents in 2020	8
Number of Incidents reported to the EPA via EDEN in 2020	8
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	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 2020 (No. of events)	Total volume discharged in 2020 (m <sup>3</sup> )	Monitoring Status
<b>SW011</b>	306284, 307740	No	Medium	Meeting	Unknown	Unknown	Monitored
<b>SWO-1</b>	308183, 307800	Yes	Medium	Not Meeting	Unknown	Unknown	Monitored
<b>SWO-3</b>	305504, 307942	Yes	Medium	Meeting	Unknown	Unknown	Monitored
<b>SWO-5</b>	304291, 308446	Yes	Medium	Meeting	Unknown	Unknown	Monitored
<b>SWO-6</b>	303214, 309006	Yes	Medium	Meeting	Unknown	Unknown	Not Monitored
<b>SWO-7</b>	304053, 306069	Yes	Medium	Meeting	Unknown	Unknown	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 2020 (No. of events)	Total volume discharged in 2020 (m <sup>3</sup> )	Monitoring Status
<b>SWO-8</b>	306263, 306860	Yes	High	Not Meeting	Unknown	Unknown	Monitored
<b>SWO-9</b>	307652, 307278	Yes	Medium	Not Meeting	Unknown	Unknown	Monitored
<b>TBC</b>	304348, 306476	No	Medium	Meeting	Unknown	Unknown	Not Monitored
<b>TBC</b>	TBC, TBC	No	Medium	Not yet Assessed	Unknown	Unknown	Unknown
<b>TBC</b>	TBC, TBC	No	Medium	Not yet Assessed	Unknown	Unknown	Unknown
<b>TBC</b>	303214, 309006	No	Medium	Meeting	Unknown	Unknown	Not Monitored

<b>SWO Summary</b>	
<b>How much sewage was discharged via SWOs in the agglomeration in the year (m<sup>3</sup>)?</b>	Unknown
<b>Is each SWO identified as not meeting DoEHLG Guidance included in the Programme of Improvements?</b>	Yes
<b>The SWO Assessment included the requirements of relevant of WWDL schedules?</b>	Yes
<b>Have the EPA been advised of any additional SWOs / changes to Schedule C3 and A4 under Condition 1.7?</b>	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)	Description	Licence Schedule	Licence Completion Date	Date Expired? (N/NA/Y)	Status of Works	Timeframe for Completing the Work	Comments
<b>D0053-SIP:01</b>	Installation of nutrient removal (nitrogen and phosphorus) processes at WWTP	C	31/12/2013	Yes	Works Completed		
<b>D0053-SIP:02</b>	SW8 - Installation of 1,500 m <sup>3</sup> 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 improvements identified by under Condition 5.2 is included below.

### 4.2.2 IMPROVEMENT PROGRAMME SUMMARY

Improvement Identifier	Improvement Description / or any Operational Improvements	Improvement Source	Expected Completion Date	Comments
<b>There are no Improvements Programme for this Agglomeration.</b>				



### **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.

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	N/A
Shellfish Impact Assessment	Yes	2016	No	N/A

### 5.1 PRIORITY SUBSTANCES ASSESSMENT

The Priority Substances Assessment Report has been included in the AER 2014.

### 5.2 SHELLFISH IMPACT ASSESSMENT

The Shellfish Impact Assessment Report has been included in the AER 2016.

## 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 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: 12/03/2021

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

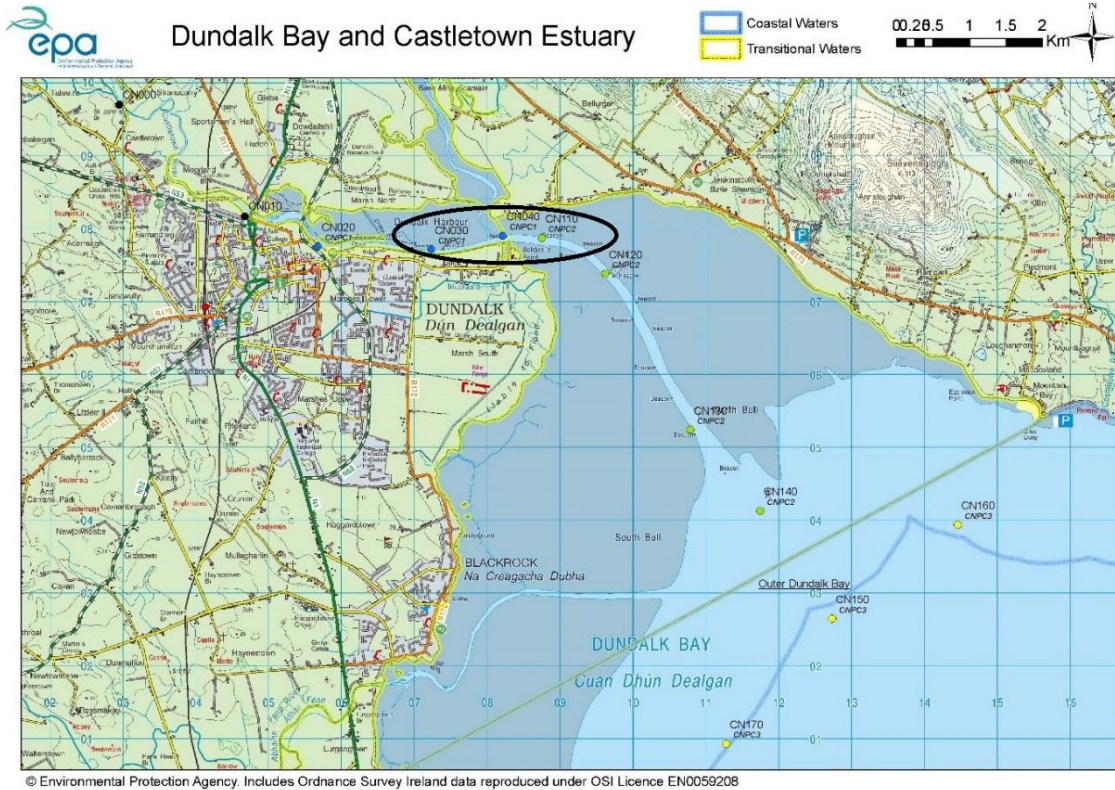
## D0053-01 Dundalk Ambient Monitoring Data 2020

### Ambient Monitoring Report Summary Table

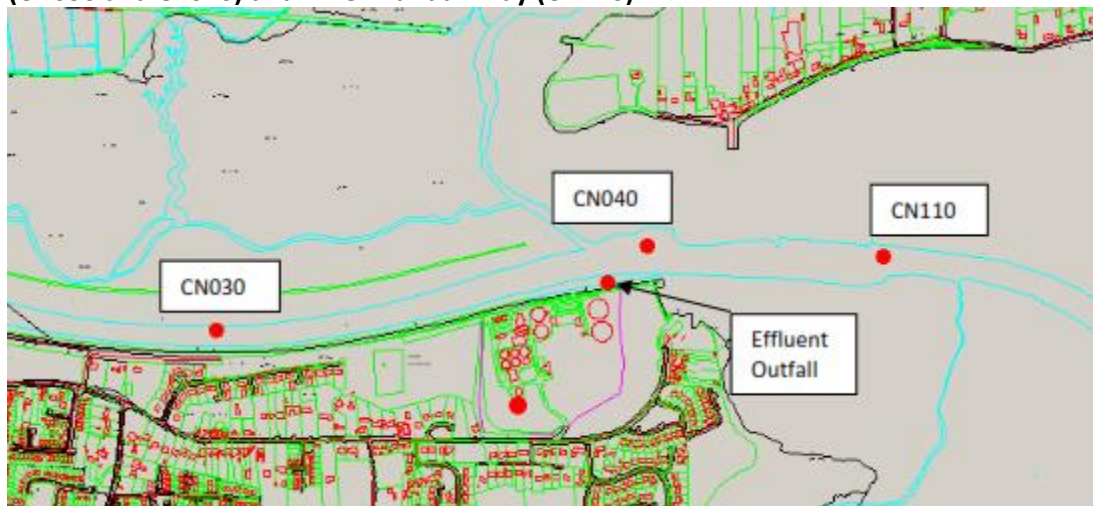
Ambient Monitoring Point from WWDL (or as agreed with EPA)	Irish Grid Reference	EPA Feature Coding Tool code	Bathing Water	Drinking Water	FWPM	Shellfish	Current WFD Status
Castletown Estuary (Transitional Water) (CN030)	307227.17, 307718.49	TW21006031 CN3003	N	N	N	Y	Poor
Castletown Estuary (Transitional 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.

## 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. Summer 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
	<b>MEDIAN</b>				<b>30.0</b>	<b>96.2</b>	<b>8.1</b>	<b>1.2</b>	<b>43</b>	<b>13.5</b>	<b>0.2675</b>
	<b>95%ile</b>				<b>32.88</b>	<b>110.575</b>		<b>2.26</b>			
	<b>5%ile</b>				<b>9.785</b>	<b>76.55</b>					
	<b>90%ile</b>									<b>23</b>	

	Salinity Based Threshold	CN030 Result	
<b>Salinity =</b>	<b>30.0</b>		
DIN-	0.569	0.268	Pass
MRP-	46	43	Pass
Chloro. Median	11.4	<b>13.5</b>	<b>Fail</b>
Chloro 90 percentile	22.8	<b>23</b>	<b>Fail</b>
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	CN040B	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
	<b>MEDIAN</b>				<b>30.5</b>	<b>99.05</b>	<b>8.35</b>	<b>1</b>	<b>30.5</b>	<b>10.25</b>	<b>0.216</b>
	<b>95%ile</b>				<b>33.102</b>	<b>111.9</b>		<b>2.61</b>			
	<b>5%ile</b>				<b>17.817</b>	<b>80.05</b>					
	<b>90%ile</b>									<b>29.5</b>	

	Salinity Based Threshold	CN040 Result	
<b>Salinity =</b>	<b>30.5</b>		
DIN-	0.569	0.216	Pass
MRP-	46	30.5	Pass
Chloro. Median	11.4	10.25	Pass
Chloro 90 percentile	22.8	<b>29.5</b>	<b>Fail</b>
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
	<b>MEDIAN</b>				<b>32</b>	<b>100.9</b>	<b>8.5</b>	<b>0.5</b>	<b>24.5</b>	<b>11.4</b>	<b>0.126</b>
	<b>95%ile</b>				<b>33.299</b>	<b>109.8</b>		<b>0.5</b>	<b>84</b>		
	<b>5%ile</b>				<b>21.055</b>	<b>83.33</b>		<b>0.5</b>			
	<b>90%ile</b>									<b>24.5</b>	

	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 Ambient Monitoring Data 2020

Monitoring Result Source	Sampling Method	Sample Date	pH pH units	BOD mg/l	Dissolved Inorganic Nitrogen as N mg/l	Total Nitrogen as N mg/l	Total Ammonia as N mg/l	Ortho-Phosphate as P mg/l	Nitrite as N mg/l	Nitrate as N mg/l	Chlorophyll mg/m <sup>3</sup>	Salinity $\mu$ S/cm	DO % sat
SW-BA-Dundaik CN030	Grab	25/02/2020	7.66	1.8	4.03	6.8	0.29	0.082	0.02	3.72	4.9	9.9	110.6
SW-BA-Dundaik CN030	Grab	15/05/2020	8.43	5.7	3	4	0.5	<0.014			83.8	14.7	116.1
SW-BA-Dundaik CN030	Grab	24/09/2020	7.76	3.5	1.87	3.1	1.28	0.28	0.02	0.57	<3	13.7	102.7
SW-BA-Dundaik CN040	Grab	25/02/2020	7.71	2.4	1.72	8	0.14	0.066	0.02	1.56	3.8	1.2	111.1
SW-BA-Dundaik CN040	Grab	15/05/2020	8.41	6.7	3.1	4.3	0.54	<0.014			56.2	14.5	120.5
SW-BA-Dundaik CN040	Grab	24/09/2020	7.74	3.5	2.44	3	1.13	0.29	<0.006	1.31	6.5	11.4	102.9
SW-BA-CN110	Grab	25/02/2020	7.73	1.8	3.8	6.3	0.27	0.034	0.01	3.52	8.5	9.4	111
SW-BA-CN110	Grab	15/05/2020	8.42	7.6	4.1	5.3	0.53	<0.014			85.5	14.4	132.6
SW-BA-CN110	Grab	25/09/2020	7.97	1.3	<1	0.5	0.47	0.01	<0.006	<0.51	11	24.7	116.2