

**Table A1 Summary statistics for hourly NO<sub>2</sub> concentrations in Ireland in 2019 for Zones A and B**

	Wintavern St.	Davitt Road	St. Johns Road	Rathmines	Dun Laoghaire	Ballyfermot	Blanchardstown	Swords	Pearse St.	RingSEND	South Link Road	UCC Distillery Fields
µg/m <sup>1</sup>	Zone A										Zone B	
Annual mean <sup>2</sup>	28	24	43	22	15	20	31	15	49	24	21	10
Median	23	19	40	17	10	14	21	11	49	20	16	6
% Data Capture	100	100	100	92	76	100	100	99	13	96	100	100
NO <sub>2</sub> values >200	0	0	0	0	0	0	0	0	0	0	0	0
Values >140 (UAT)	1	0	6	2	0	0	21	0	1	0	1	0
Values >100 (LAT)	45	25	220	17	3	24	254	3	66	2	28	0
Hourly max <sup>3</sup>	142	127	156	183	104	124	163	108	151	109	142	79

<sup>1</sup> NO<sub>x</sub> is expressed as µg/m<sup>3</sup> NO<sub>2</sub>.

<sup>2</sup> NO<sub>2</sub> annual mean limit value for the protection of human health: 40 µg/m<sup>3</sup> applicable from 2010

<sup>3</sup> NO<sub>2</sub> hourly limit value for the protection of human health: No more than 18 hrs > 200 µg/m<sup>3</sup> applicable from 2010.

**Table A2 Summary statistics for hourly NO<sub>2</sub> concentrations in Ireland in 2019 for Zones C and D**

	Meath Navan	Waterford Brownes Road	Limerick Peoples Park	Kilkenny Seville Lodge	Portlaoise	Dundalk	Emo Court	Castlebar	Kil Kitt
µg/m <sup>4</sup>	Zone C						Zone D		
Annual mean <sup>5</sup>	23	8	13	5	11	12	4	8	5
Median	18	6	9	3	8	8	2	5	3
% Data Capture	9	75	33	99	91	97	94	98	99
NO <sub>2</sub> values >200	0	0	0	0	0	0	0	0	0
Values >140 (UAT)	0	0	0	0	0	1	0	0	0
Values >100 (LAT)	1	0	0	0	0	2	0	0	0
Hourly max <sup>6</sup>	102	83	91	59	77	144	56	86	59

<sup>4</sup> NO<sub>x</sub> is expressed as µg/m<sup>3</sup> NO<sub>2</sub>.

<sup>5</sup> NO<sub>2</sub> annual mean limit value for the protection of human health: 40 µg/m<sup>3</sup> applicable from 2010

<sup>6</sup> NO<sub>2</sub> hourly limit value for the protection of human health: No more than 18 hrs > 200 µg/m<sup>3</sup> applicable from 2010.

**Table A3 Summary statistics for hourly NO<sub>x</sub> concentrations in Ireland in 2019 for Zones A and B**

	Winetavern St.	Davitt Road	St. Johns Road	Rathmines	Dun Laoghaire	Ballyfermot	Blanchardstown	Swords	Pearse St.	Ringsend	South Link Road	UCC Distillery Fields
µg/m <sup>7</sup>	Zone A										Zone B	
Annual mean <sup>8</sup>	45.8	46.1	121.9	34.3	26.6	28.1	69.9	20.9	161.4	45.0		
Median	30.8	28.7	85.5	23.1	16.2	16.4	35.8	13.6	117.3	28.3		
% Data Capture	100	99	98	92	76	96	90	99	14	0.96		
Hourly max <sup>9</sup>	833.6	866.1	1235.3	1087.2	503.7	708.5	1097.7	593.6	886.4	687.0		

<sup>7</sup> NO<sub>x</sub> is expressed as µg/m<sup>3</sup> NO<sub>2</sub>.

<sup>8</sup> NO<sub>2</sub> annual mean limit value for the protection of human health: 40 µg/m<sup>3</sup> applicable from 2010

<sup>9</sup> NO<sub>2</sub> hourly limit value for the protection of human health: No more than 18 hrs > 200 µg/m<sup>3</sup> applicable from 2010.

**Table A4 Summary statistics for hourly NO<sub>x</sub> concentrations in Ireland in 2019 for Zones C and D**

	Meath Navan	Waterford Brownes Road	Limerick Peoples Park	Kilkenny Seville Lodge	Portlaoise	Dundalk	Emo Court	Castlebar	Kilkitt
µg/m <sup>10</sup>	Zone C						Zone D		
Annual mean <sup>11</sup>	72.5	13.4	24.9	7.6	14.8	19.4	4.8	11.1	7.6
Median	37.1	7.8	13.2	4.2	10.3	10.7	2.9	6.7	4.2
% Data Capture	9	0.74	0.33	0.99	0.91	0.97	0.94	0.98	0.99
Hourly max <sup>12</sup>	528.7	638.3	507.1	258.4	391.9	505.4	164.8	307.1	258.4

<sup>10</sup> NO<sub>x</sub> is expressed as µg/m<sup>3</sup> NO<sub>2</sub>.

<sup>11</sup> NO<sub>2</sub> annual mean limit value for the protection of human health: 40 µg/m<sup>3</sup> applicable from 2010

<sup>12</sup> NO<sub>2</sub> hourly limit value for the protection of human health: No more than 18 hrs > 200 µg/m<sup>3</sup> applicable from 2010.

**Table A5 Summary statistics for hourly SO<sub>2</sub> concentrations in Ireland in 2019**

	Wintavern Street	Rathmines	Tallaght	Ringsend	South Link Road	Bishopstown CIT	Ennis	Dundalk	Portlaoise	Kilkitt	Letterkenny	Askeaton
(µg/m <sup>3</sup> )	Zone A				Zone B		Zone C			Zone D		
Annual mean <sup>13</sup>	0.8	1.3	2.5	1.4	2.5	0.8	3.6	1.5	1.3	0.7	6.8	1.8
Median	0.5	1.1	2.4	0.8	2.0	0.1	1.9	1.1	1.1	0.5	2.7	1.6
% data capture	94	96	58	98	99	100	99	97	86	97	57	4
Hourly values > 350	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hourly max <sup>14</sup>	6.1	29.3	18.6	42.8	23.4	32.1	92.0	19.7	17.8	6.7	191.5	2.9
Daily values > 125	0	0	0	0	0	0	0	0	0	0	0	0
Daily max	37.2	4.3	10.4	6.9	14.4	39.4	27.7	6.4	3.2	1.3	51.9	0.1

<sup>13</sup> SO<sub>2</sub> annual mean limit value for the protection of ecosystems: 20 µg/m<sup>3</sup> applicable from 2001.

<sup>14</sup> SO<sub>2</sub> hourly limit value for the protection of human health: No more than 24 hrs > 350 µg/m<sup>3</sup> applicable from 2005.

**Table A6 Summary statistics for rolling 8-hour CO concentrations in Ireland in 2019**

	Wintavern Street	South Link Road	Portlaoise	Dundalk
(mg/m <sup>3</sup> )	Zone A	Zone B	Zone C	
Annual mean	0.3	0.3	0.1	0.1
Median	0.2	0.2	0.1	0.1
% data capture	0.94	0.97	0.91	0.97
Values > 10	0.0	0.0	0.0	0.0
Max <sup>15</sup>	2.7	2.4	1.0	2.0

<sup>15</sup> CO maximum daily 8-hr mean limit value for the protection of human health: 10 mg/m<sup>3</sup>.



**Table A8 AOT40 values from rural stations (Zone D) in Ireland, 2011 – 2019**

( $\mu\text{g}/\text{m}^3$ ).h <sup>16</sup>	Kil Kitt Co. Monaghan	Mace Head Co. Galway	Castlebar Co. Mayo	Valentia Co. Kerry	Emo Court Co. Laois
2012	2046	3606	1757	2417	1375
2013	1482	5064	1366	4436	1017
2014	1316	4091	597	1583	785
2015	747	2521	693	3460	276
2016	5227	7622	2792	4116	1372
2017	3104	5070	1312	1699	4326
2018	7304	13020	5364	4967	3261
2019					
Average	3032	5856	1983	3240	1773

<sup>16</sup> AOT40 target value for 2010 is 18,000  $\mu\text{g}/\text{m}^3$ .h; long-term objective for 2020 is 6,000  $\mu\text{g}/\text{m}^3$ .h. AOT40 is calculated 1 May – 31 July.



**Table A9 Summary statistics for daily PM<sub>10</sub> concentrations in Zones A and B in Ireland in 2019<sup>17</sup>**

	Wintavern St	Rathmines	Phoenix Park	Blanchardstown	Dun Laoghaire	Ballyfermot	Tallaght	Ringsend	St. John's Road	St. Anne's Park	Davitt Road	Finglas	Marino	South Link Road	Heatherton Park	Bishopstown CIT
µg/m <sup>3</sup>	Zone A													Zone B		
Annual mean <sup>18</sup>	15	15	11	19	12	14	12	19	14	12	19	13	14	18	12	15
Median	13	12	9	16	10	11	10	14	11	9	15	11	11	15	10	12
% data capture	88	100	100	88	87	99	93	89	98	100	91	100	99	89	95	93
Values > 50 <sup>19</sup>	9	9	2	11	2	7	3	12	5	1	15	2	4	6	1	1
Daily Max	85	83	64	83	77	76	65	94	71	68	107	68	74	58	51	61

<sup>17</sup> St. John's Road 26/10/2018 – 31/12/2018, Roscommon 05/09/2018 – 31/12/2018, Waterford 29/11/2018 – 31/12/2018, Carlow 16/09/2018 – 31/12/2018, Cobh 15/11/2018 – 31/12/2018, Heatherton Park 21/02/2018 – 31/12/2018, Marino 15/08/2018 – 31/12/2018, Finglas 02/08/2018 – 31/12/2018, Davitt Road 10/07/2018 – 31/12/2018, St. Anne's Park 05/09/2018 – 31/12/2018

<sup>18</sup> PM<sub>10</sub> annual mean limit value for the protection of human health: 40 µg/m<sup>3</sup> applicable from 2005.

<sup>19</sup> PM<sub>10</sub> daily limit for the protection of human health: No more than 35 days >50 µg/m<sup>3</sup> applicable from 2005.

**Table A10 Summary statistics for daily PM<sub>10</sub> concentrations in Zones D and C in Ireland in 2019<sup>20</sup>**

	Portlaoise	Ennis	Galway Rahoon	Dundalk	Carlow Town	Waterford Brownes Road	Kilkenny Seville Lodge	Letterkenny	Limerick People's Park	Athlone	Tralee	Tipperary Town	Eniscorthy	Macroom	Castlebar	Cobh	Clarenorris	Kilkit	Roscommon Town
$\mu\text{g}/\text{m}^3$	Zone C											Zone D							
Annual mean <sup>21</sup>	15	18	13	14	11	15	18	17	13	17	28	9	18	28	16	13	11	7	12
Median	14	13	11	12	9	11	15	12	11	16	25	7	14	26	14	11	10	5	10
% data capture	40	100	100	92	100	98	98	55	42	7	5	55	100	9	93	100	92	98	100
Values > 50 <sup>22</sup>	0	12	0	2	0	3	7	9	4	0	2	1	14	2	1	0	0	1	2
Daily Max	40	94	49	64	46	154	63	121	67	42	55	54	63	69	53	47	44	63	54

<sup>20</sup> Macroom 29/11/2019 – 31/12/2019 Letterkenny 06/06/2019 – 31/12/2019 Limerick People's Park 01/08/2019 – 31/12/2019, Tralee 13/12/2019 – 31/12/2019, Athlone 06/12/2019 – 31/12/2019

<sup>21</sup> PM<sub>10</sub> annual mean limit value for the protection of human health: 40  $\mu\text{g}/\text{m}^3$  applicable from 2005.

<sup>22</sup> PM<sub>10</sub> daily limit for the protection of human health: No more than 35 days >50  $\mu\text{g}/\text{m}^3$  applicable from 2005.

**Table A11 Summary statistics for daily PM<sub>2.5</sub> concentrations in Zones A and B in Ireland in 2019<sup>23</sup>**

	Ballyfermot	Rathmines	Phoenix Park	Finglas	Davitt Road	Marino	St. John's Road	St. Annes Park	Ringsend	Dun Laoghaire	Heatherton Park	UCC Distillery Fields
$\mu\text{g}/\text{m}^3$	Zone A										Zone B	
Annual mean <sup>24</sup>	10	8	8	9	11	9	9	8	10	10	8	8
Median	7	5	5	6	7	7	6	5	7	8	6	5
% data capture	99	82	100	100	91	99	98	100	98	16	95	94
Days > WHO 24hr AQ Guideline	33	36	23	24	37	32	23	20	29	3	22	22
Daily Max	66	68	58	59	68	66	60	61	73	32	43	46

<sup>23</sup> St. John's Road 26/10/2018 – 31/12/2018, Roscommon 05/09/2018 – 31/12/2018, Waterford 29/11/2018 – 31/12/2018, Carlow 16/09/2018 – 31/12/2018, Cobh 15/11/2018 – 31/12/2018, Heatherton Park 21/02/2018 – 31/12/2018, Marino 15/08/2018 – 31/12/2018, Finglas 02/08/2018 – 31/12/2018, Davitt Road 10/07/2018 – 31/12/2018, Davitt Road 10/07/2018 – 31/12/2018, St. Anne's Park 05/09/2018 – 31/12/2018

<sup>24</sup> PM<sub>10</sub> annual mean limit value for the protection of human health: 40  $\mu\text{g}/\text{m}^3$  applicable from 2005.

**Table A12 Summary statistics for daily PM<sub>2.5</sub> concentrations in Zones D and C in Ireland in 2019<sup>25</sup>**

	Bray	Ennis	Carlow Town	Waterford Brownes Road	Letterkenny	Limerick People's Park	Athlone	Tralee	Navan	Tipperary Town	Longford	Emiscorthy	Macroom	Cobh	Claremorris	Roscommon Town
$\mu\text{g}/\text{m}^3$	Zone C															
Annual mean <sup>26</sup>	7	14	8	11	13	9	14	23	11	6	9	14	15	8	4	9
Median	5	10	6	7	8	7	14	18	10	4	6	10	12	7	4	7
% data capture	79	84	100	98	56	42	7	5	16	58	85	100	29	100	48	100
Days > WHO 24hr AQ Guideline	9	59	21	36	28	8	1	8	4	6	26	70	22	19	0	26
Daily Max	75	90	39	148	117	61	41	54	29	51	56	77	51	40	16	47

<sup>25</sup> The following stations were newly installed and had partial coverage for the year - Macroom 29/11/2019 – 31/12/2019, Letterkenny 06/06/2019 – 31/12/2019, Limerick People's Park 01/08/2019 – 31/12/2019, Athlone 06/12/2019 – 31/12/2019, Limerick People's Park 01/08/2019 – 31/12/2019, Macroom 18/09/2019 – 31/12/2019, Navan 02/11/2019 – 31/12/2019, Tralee 13/12/2019 – 31/12/2019, Tipperary Town 30/05/2019 – 31/12/2019

<sup>26</sup> PM<sub>10</sub> annual mean limit value for the protection of human health: 40  $\mu\text{g}/\text{m}^3$  applicable from 2005.

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**Table A13 Summary statistics for chemical composition of PM<sub>2.5</sub> in 2019**

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Chemical Species	Claremorris, Co. Mayo
Annual Mean (ug/m <sup>3</sup> ) <sup>27</sup>	Zone D
Elemental Carbon (Transmittance Correction) <sup>28</sup>	0.12
Organic Carbon (Transmittance Correction)	1.02
Total Carbon	1.14
Chloride (Cl <sup>-</sup> )	0.38
Nitrate (NO <sub>3</sub> <sup>-</sup> )	0.37
Sulphate (SO <sub>4</sub> <sup>2-</sup> )	0.59
Ammonium (NH <sub>4</sub> <sup>+</sup> )	0.25
Calcium (Ca <sup>+</sup> )	0.60
Magnesium (Mg <sup>2+</sup> )	0.11
Potassium (K <sup>+</sup> )	0.38
Sodium (Na <sup>+</sup> )	0.59
% data capture	92

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<sup>27</sup> There are no limit values for chemical composition of PM<sub>2.5</sub>.

**Table A14 Summary statistics for daily ozone precursor VOCs concentrations at Rathmines in 2019**

	Benzene	Toluene	Ethylbenzene	m- and p-Xylene	o-Xylene
( $\mu\text{g}/\text{m}^3$ )	Zone A				
Annual mean <sup>29</sup>	0.26	0.53	0.05	0.23	0.32
Median	0.05	0.02	0.00	0.01	0.04
% data capture	89	89	89	89	89
Hourly max	4.26	6.83	1.71	3.31	8.34

<sup>29</sup> No limit values for toluene, ethylbenzene, m-and-p-xylene and o-xylene.

**Table A15 Summary statistics for daily ozone precursor VOCs concentrations at Kilkenny in 2019**

	Benzene	Toluene	Ethylbenzene	m- and p-Xylene	o-Xylene
( $\mu\text{g}/\text{m}^3$ )	Zone C				
Annual mean <sup>30</sup>	0.12	0.25	0.06	0.25	0.11
Median	0.09	0.12	0.00	0.04	0.00
% data capture	89	89	89	89	89
Hourly max	1.38	2.01	2.42	5.76	2.72

**Table A 16 Summary statistics for daily ozone precursor VOCs concentrations at Longford in 2019**

	Benzene	Toluene	Ethylbenzene	m- and p-Xylene	o-Xylene
( $\mu\text{g}/\text{m}^3$ )	Zone C				
Annual mean <sup>31</sup>	0.21	0.36	0.08	0.20	0.28
Median	0.10	0.21	0.04	0.12	0.07
% data capture	83	83	83	83	83
Hourly max	2.38	5.85	2.93	6.22	5.23

<sup>30</sup> No limit values for toluene, ethylbenzene, m-and-p-xylene and o-xylene.

<sup>31</sup> No limit values for toluene, ethylbenzene, m-and-p-xylene and o-xylene.

**Table A17 Summary statistics for monthly lead, arsenic, cadmium and nickel concentrations in Ireland in 2019**

	Rathmines				Heatherton Park				Galway Rahoon Road				Castlebar				Kilkitt			
	Zone A				Zone B				Zone C				Zone D							
(ng/m <sup>3</sup> )	Pb	As	Cd	Ni	Pb	As	Cd	Ni	Pb	As	Cd	Ni	Pb	As	Cd	Ni	Pb	As	Cd	Ni
Annual mean <sup>32</sup>	3.7	0.9	0.1	0.6	0.8	0.5	0.1	0.0	0.0	0.44	0.0	2.68	3.6	0.3	0.3	0.6	14.07	0.07	1.30	0.78
Median	0.7	0.7	0.0	0.6	0.0	0.1	0.0	0.0	0.0	0.33	0.0	0	0.1	0.4	0.1	0.6	14.2	0.0	0.9	0.8
% data capture	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Monthly average max	11.9	2.2	0.8	1.7	6.7	1.4	1.0	0.0	0.0	1.01	0.0	30.0322	13.0	0.7	1.2	1.5	31.1	1.1	3.7	2.0

<sup>32</sup> Annual mean limit value for lead is 500 ng/m<sup>3</sup>. Target values for remaining heavy metals are applicable from 2013: arsenic 6ng/m<sup>3</sup>, cadmium 5ng/m<sup>3</sup>, nickel 20ng/m<sup>3</sup>.



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**Table A18 Summary statistics for monthly mercury concentrations in 2019**

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	Mace Head
(ng/m <sup>3</sup> )	Zone D
Annual mean <sup>33</sup>	1.26
Median	1.26
% data capture	67
Monthly average max	1.37

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<sup>33</sup> No limit values for mercury.

**Table A19 Summary statistics for monthly metal deposition concentrations in 2019**

Metal <sup>34</sup>	Rosemount, UCD	Shannon Estuary, Co. Limerick	Valentia, Co. Kerry
Annual Mean ( $\mu\text{g}/\text{m}^2/\text{day}$ ) <sup>35</sup>	Zone A	Zone D	
Arsenic *	0.3	0.9	0.2
Cadmium *	0.5	0.7	1.3
Nickel *	0.8	3.2	0.5
Lead *	0.7	2.7	0.5
Mercury *	0.0	0.0	0.0
Aluminium	16.1	77.0	9.1
Chromium	0.7	3.3	0.5
Cobalt	0.6	3.0	1.3
Copper	16.9	5.4	21.5
Manganese	4.8	20.1	1.2
Antimony	0.2	0.6	0.1
Thallium	0.1	0.9	0.1
Vanadium	0.8	3.5	0.5
Zinc	34.8	31.5	58.3
Barium	0.8	11.5	1.3
Uranium	1.7	5.0	0.2
% data capture	83	100	100

<sup>34</sup> The metals marked \* require monitoring under the legislation. The remainder are reported for information purposes.

<sup>35</sup> There are no limit values for metal deposition.

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**Table A20 Summary statistics for monthly PAH concentrations in 2019**

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Polycyclic Aromatic Hydrocarbon	Rathmines	Heatherton Park	Galway Rahoon Road	Kilkitt	Castlebar
Annual Mean (ng/m <sup>3</sup> )	Zone A	Zone B	Zone C	Zone D	Zone D
Benzo[a]Pyrene <sup>36</sup>	0.16	0.26	0.22	0.04	0.19
% data capture	100	100	100	100	100

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**Table A21 Summary statistics for monthly PAH deposition concentrations in 2019**

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Polycyclic Aromatic Hydrocarbon	Rosemount, UCD	Shannon Estuary, Co. Limerick
Annual Mean (ng/m <sup>2</sup> /day) <sup>37</sup>	Zone A	Zone D
Benzo(a)Pyrene	0.005	0.003
% data capture	83	100

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<sup>36</sup> Annual mean limit value for benzo(a)pyrene is 1ng/m<sup>3</sup>. There are no limit values for any other PAH.

<sup>37</sup> There are no limit values for metal deposition.