



## National SARS-CoV-2 Wastewater Surveillance Programme

Week 45 2021 (07/11/2021—13/11/2021)

Report prepared on 17/11/2021

### Background

People with COVID-19/SARS-CoV-2 infection can shed the virus in their stool, which can then be detected in wastewater, making environmental surveillance of wastewater a feasible means to monitor the circulation of SARS-CoV-2, the virus that causes COVID-19 disease, in the population.

The National SARS-CoV-2 Wastewater Surveillance Programme (NWSP) has been established through a partnership with Irish Water, the National Virus Reference Laboratory (NVRL), University College Dublin (UCD), the HSE Health Protection Surveillance Centre (HPSC) and Health Intelligence Unit (HIU). Samples from 68 wastewater catchment areas across Ireland are taken on a weekly basis and analysed for the presence of SARS-CoV-2. The wastewater catchment area of Ringsend in Dublin is sampled twice a week given the size of the population it captures. These 68 wastewater catchment areas (see Figure 2) cover 80% of the population connected to public wastewater treatment facilities.

The NWSP is an additional tool in Ireland's response to COVID-19/ SARS-CoV-2. The NWSP aims to complement our case-based surveillance systems (i.e. monitoring the number of people testing positive or presenting to a healthcare provider with symptoms) through acting as an early warning system for the circulation, or an increase in the circulation, of SARS-CoV-2 in a wastewater catchment area.

Please note that stool or wastewater are not recognised sources of transmission for SARS-CoV-2. Standard hygiene measures should be used after using the toilet. [Guidance from the WHO](#) for water and sanitation providers recommends standard best practices, including PPE for those working in proximity to wastewater, be followed.

### Summary of results from week 45, 2021

In week 45<sup>1</sup>, 2021 SARS-CoV-2 was detected in wastewater samples from the 67 wastewater catchment areas analysed (n=67). These results are in keeping with the high incidence rate of COVID-19 currently being seen throughout Ireland.

Please read 'Data uses' and 'Data limitations and uncertainties' in the technical notes prior to making any interpretation of the data.

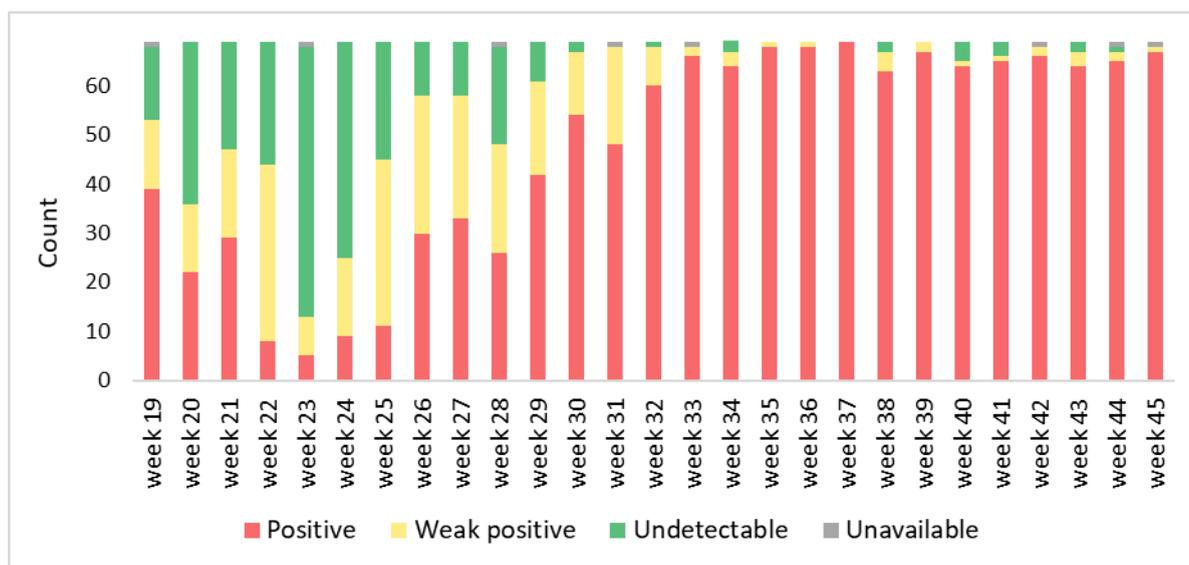
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<sup>1</sup> Dates of epidemiological weeks are available in the technical notes and at: <https://www.hpsc.ie/notifiablediseases/resources/epidemiologicalweeks/>

## Overview of SARS-CoV-2 detection in wastewater in Ireland

Results are presented as the numerical value of the concentration of SARS-CoV-2 in the wastewater sample and as a descriptive category. The descriptive categories used are ‘positive’ when SARS-CoV-2 RNA was detected and could be quantified; ‘weak positive’ when SARS-CoV-2 RNA was detected but was below the quantification limit (BQL); ‘undetected’ when the numerical value was below the detection limit (BDL); and ‘unavailable’ if a result was not available because either a sample was not received or could not be fully analysed e.g. if flow data were not available. Please see the glossary and technical notes for further explanations.

In week 44<sup>1</sup>, 2021, 68 samples were received and analysed for 67 wastewater catchment areas (Ringsend catchment area served by Ringsend wastewater treatment plant is sampled twice a week). SARS-CoV-2 RNA was detected in samples from all 67 wastewater catchment areas tested. In week 45, no sample was received from the Cork Lower Harbour (Shanbally)wastewater catchment area .



**Figure 1. SARS-CoV-2 detection categories in Ireland by week, NWSP, weeks 19–45, 2021**

*\*Samples with an undetected result may have SARS-CoV-2 present but the amount was too low to be detected by the test. It does not mean that SARS-CoV-2 is not circulating in the wastewater catchment area of the Wastewater treatment plant (WWTP).*

Table 1 and Figures 1 and 2 summarise the results from wastewater samples taken during week 45. Table 2a summarises the results by category for each wastewater catchment area during weeks 19–45, 2021 for all NWSP catchment areas except Ringsend. Results for the Ringsend catchment area is summarised separately in Table 2b as samples are taken at Ringsend biweekly.

Figure 3 summarises the SARS-CoV-2 RNA levels and 3 week moving average of those levels by wastewater catchment area each week since the start of the NWSP in week 19. Figure 4 focuses on data from the last 8 weeks.

Please note that wastewater data from different wastewater catchment areas should not be directly compared. All data are subject to ongoing validation.

**Table 1. National Wastewater Surveillance Programme sampling results by wastewater catchment area, week 45, 2021**

County	Wastewater catchment area	Sample type	Sample date	Result category**
Carlow	Carlow	Complete (composite)	09/11/2021	Positive
	Tullow	Complete (composite)	09/11/2021	Positive*
Cavan	Cavan	Complete (composite)	08/11/2021	Positive
	Virginia	Complete (composite)	08/11/2021	Positive
Clare	Ennis North	Complete (composite)	07/11/2021	Positive
	Shannon	Complete (composite)	07/11/2021	Positive
Cork	Ballincollig	Complete (composite)	08/11/2021	Positive
	Clonakilty	Complete (composite)	08/11/2021	Positive
	Cork City	Complete (composite)	08/11/2021	Positive
	Cork Lower Harbour			No sample/not analysed
	Fermoy	Complete (composite)	08/11/2021	Positive
	Mallow	Complete (composite)	08/11/2021	Positive
	Midleton	Complete (composite)	08/11/2021	Positive
	Youghal	Complete (composite)	07/11/2021	Weak positive
Donegal	Buncrana	Complete (composite)	09/11/2021	Positive
	Letterkenny	Complete (composite)	09/11/2021	Positive
Dublin	Balbriggan	Complete (composite)	08/11/2021	Positive
	Malahide	Grab	08/11/2021	Positive
	Portrane Donabate	Complete (composite)	08/11/2021	Positive
	Ringsend	Complete (composite)	07/11/2021	Positive*
	Ringsend	Complete (composite)	10/11/2021	Positive*
	Shanganagh	Complete (composite)	09/11/2021	Positive
	Swords	Grab	08/11/2021	Positive
Galway	Galway	Complete (composite)	07/11/2021	Positive
	Tuam	Complete (composite)	07/11/2021	Positive
Kerry	Killarney	Complete (composite)	08/11/2021	Positive
	Tralee	Complete (composite)	08/11/2021	Positive*
Kildare	Athy	Complete (composite)	09/11/2021	Positive
	Kildare	Complete (composite)	09/11/2021	Positive
	Leixlip	Complete (composite)	09/11/2021	Positive
	Osberstown	Complete (composite)	09/11/2021	Positive
Kilkenny	Kilkenny	Complete (composite)	07/11/2021	Positive
	Thomastown	Complete (composite)	07/11/2021	Positive
Laois	Portarlinton	Complete (composite)	07/11/2021	Positive*
	Portlaoise	Complete (composite)	07/11/2021	Positive
Leitrim	Carrick on Shannon	Complete (composite)	09/11/2021	Positive
	Manorhamilton	Complete (composite)	09/11/2021	Positive
Limerick	Castletroy	Complete (composite)	08/11/2021	Positive
	Limerick City	Complete (composite)	08/11/2021	Positive
Longford	Edgeworthstown	Complete (composite)	09/11/2021	Positive
	Longford	Complete (composite)	09/11/2021	Positive
Louth	Drogheda	Complete (composite)	08/11/2021	Positive
	Dundalk	Incomplete (composite)	08/11/2021	Positive
Mayo	Ballina	Complete (composite)	08/11/2021	Positive
	Castlebar	Complete (composite)	07/11/2021	Positive*

**Table 1(continued). National Wastewater Surveillance Programme sampling results by wastewater catchment area, week 45, 2021**

County	Wastewater catchment area	Sample type	Sample date	Result category**
Meath	Navan	Grab	08/11/2021	Positive
	Trim	Complete (composite)	09/11/2021	Positive*
Monaghan	Carrickmacross	Grab	08/11/2021	Positive
	Monaghan	Grab	08/11/2021	Positive
Offaly	Birr	Complete (composite)	07/11/2021	Positive
	Tullamore	Unknown	07/11/2021	Positive*
Roscommon	Monksland	Complete (composite)	08/11/2021	Positive*
	Roscommon	Complete (composite)	08/11/2021	Positive
Sligo	Enniscrone	Complete (composite)	07/11/2021	Positive
	Sligo	Complete (composite)	09/11/2021	Positive
Tipperary	Clonmel	Complete (composite)	08/11/2021	Positive
	Nenagh	Unknown	08/11/2021	Positive
	Roscrea	Grab	08/11/2021	Positive
	Thurles	Complete (composite)	08/11/2021	Positive
Waterford	Dungarvan	Complete (composite)	07/11/2021	Positive
	Tramore	Complete (composite)	07/11/2021	Positive*
	Waterford	Complete (composite)	07/11/2021	Positive
Westmeath	Athlone	Complete (composite)	07/11/2021	Positive
	Mullingar	Complete (composite)	09/11/2021	Positive
Wexford	Courtown Gorey	Complete (composite)	09/11/2021	Positive*
	Enniscorthy	Complete (composite)	07/11/2021	Positive
	Wexford	Complete (composite)	07/11/2021	Positive*
Wicklow	Greystones	Complete (composite)	09/11/2021	Positive
	Wicklow	Complete (composite)	09/11/2021	Positive

\* Flow rate was not available at time of reporting, the average 2020 flow rate for the wastewater plant is used to calculate result.

\*\* Samples with an 'undetectable' result may have SARS-CoV-2 present but the amount was too low to be detected by the test. It does not mean that SARS-CoV-2 is not circulating in the wastewater catchment area.

**Table 2a. SARS-CoV-2 detections in wastewater samples by wastewater catchment area and week, NWSP, week 19 to week 45, 2021**

Positive Weak positive Undetectable\* Unavailable

Dots indicate the result was obtained using average flow data

County	Catchment area	week 19	week 20	week 21	week 22	week 23	week 24	week 25	week 26	week 27	week 28	week 29	week 30	week 31	week 32	week 33	week 34	week 35	week 36	week 37	week 38	week 39	week 40	week 41	week 42	week 43	week 44	week 45
Carlow	Carlow																											
	Tullow																											
Cavan	Cavan																											
	Virginia																											
Clare	Ennis North																											
	Shannon																											
Cork	Ballincollig																											
	Clonakilty																											
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Dublin	Balbriggan																											
	Malahide																											
	Portrane Donabate																											
	Shanganagh																											
	Swords																											
Galway	Galway																											
	Tuam																											
Kerry	Killarney																											
	Tralee																											
Kildare	Athy																											
	Kildare																											
	Lower Liffey Valley Regional Sewerage Scheme (Leixlip)																											
	Upper Liffey Valley Sewerage Scheme (Osberstown)																											
Kilkenny	Kilkenny																											
	Thomastown																											
Laois	Portarlinton																											
	Portlaoise																											
Leitrim	Carrick on Shannon																											
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Limerick	Castletroy																											
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Longford	Edgeworthstown																											
	Longford																											
Louth	Drogheda																											
	Dundalk																											
Mayo	Ballina																											
	Castlebar																											
Meath	Navan																											
	Trim																											
Monaghan	Carrickmacross																											
	Monaghan																											
Offaly	Birr																											
	Tullamore																											
Roscommon	Monksland																											
	Roscommon																											
Sligo	Enniscrone																											
	Sligo																											
Tipperary	Clonmel																											
	Nenagh																											
	Roscrea																											
	Thurles																											
Waterford	Dungarvan																											
	Tramore																											
	Waterford																											
Westmeath	Athlone																											
	Mullingar																											
Wexford	Courtown Gorey																											
	Enniscorthy																											
	Wexford																											
Wicklow	Greystones																											
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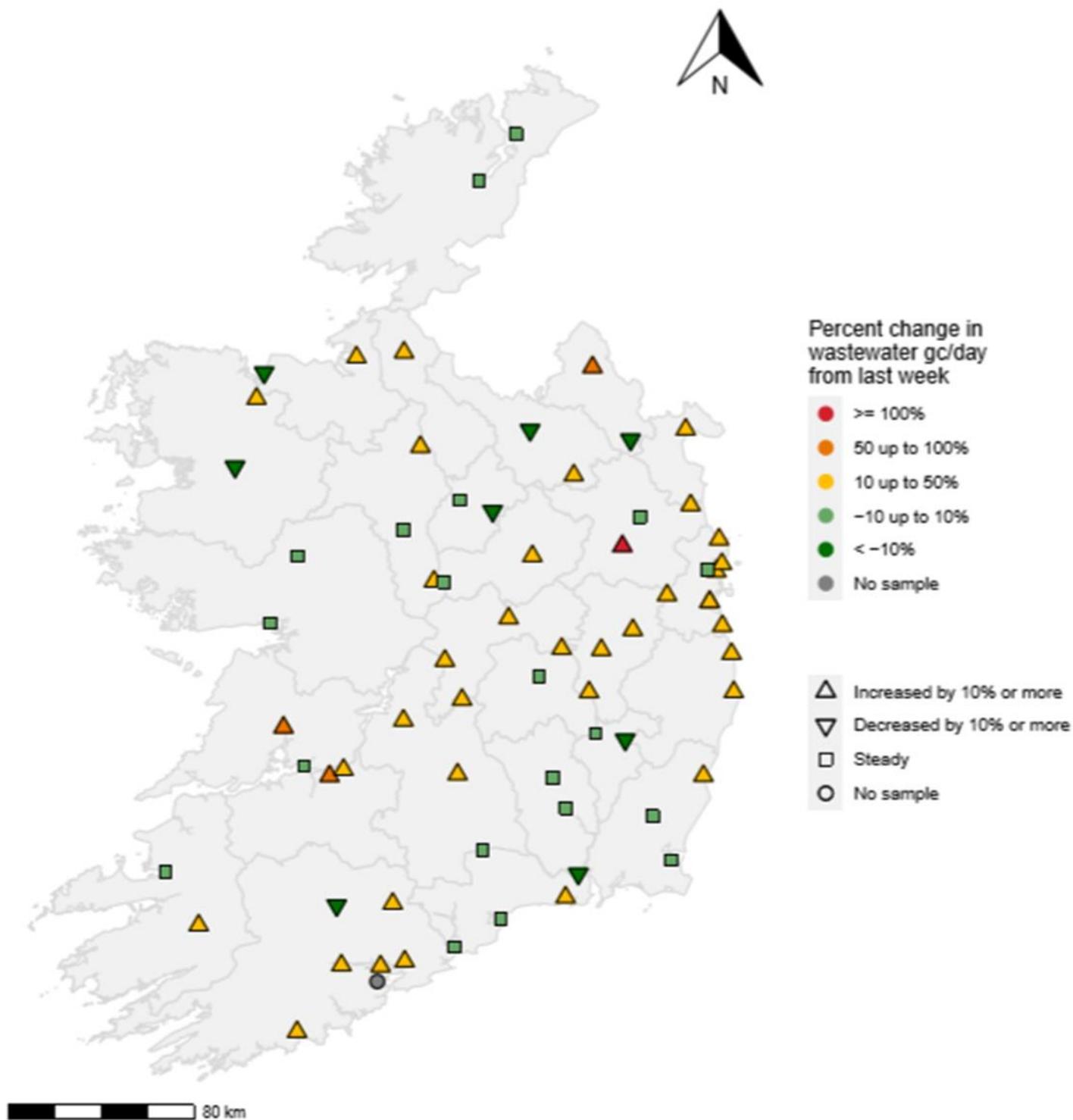
**Table 2b. Biweekly results for SARS-CoV-2 detections in the Ringsend WWTP, week 19 to week 45, 2021**

Week	Specimen date	Result category	Result category**
19	09/05/2021	Positive	Positive
	12/05/2021		Positive
20	16/05/2021	Positive	Positive
	19/05/2021		Positive
21	23/05/2021	Weak positive	Weak positive
	26/05/2021	Undetectable	Undetectable
22	30/05/2021	Weak positive	Weak positive
	02/06/2021		Weak positive
23	07/06/2021	Weak positive	Weak positive
	09/06/2021		Undetectable
24	13/06/2021	Undetectable	Undetectable
	16/06/2021		Undetectable
25	20/06/2021	Weak positive	Weak positive
	23/06/2021		Weak positive
26	27/06/2021	Positive	Positive
	30/06/2021		Positive
27	04/07/2021	Positive	Positive
	07/07/2021		Positive
28	11/07/2021	Positive	Positive
	14/07/2021		Weak positive
29	18/07/2021	Positive	Positive
	21/07/2021		Weak positive
30	25/07/2021	Positive	Positive
	28/07/2021		Positive
31	01/08/2021	Weak positive	Weak positive
	04/08/2021		Weak positive
32	08/08/2021	Positive	Positive
	11/08/2021		Positive
33	15/08/2021	Positive	Positive
	18/08/2021		Positive
34	22/08/2021	Positive	Positive
	25/08/2021		Positive
35	29/08/2021	Positive	Positive
	01/09/2021		Positive
36	05/09/2021	Positive*	Positive*
	08/09/2021		Positive*
37	12/09/2021	Positive	Positive
	15/09/2021		Positive
38	19/09/2021	Positive	Positive
	22/09/2021		Positive
39	26/09/2021	Positive	Positive
	29/09/2021		Positive
40	03/10/2021	Positive	Positive
	06/10/2021		Positive
41	10/10/2021	Positive*	Positive*
	13/10/2021		Positive*
42	17/10/2021	Positive*	Positive*
	20/10/2021		Positive*
43	24/10/2021	Weak positive*	Weak positive*
	27/10/2021		Positive*
44	31/10/2021	Positive*	Positive*
	03/11/2021		Positive*
45	07/11/2021	Positive*	Positive*
	10/11/2021		Positive*

\* Flow rate was not available at time of reporting, the average 2020 flow rate for the wastewater plant is used to calculate result.

\*\*Samples with an 'undetectable' result may have SARS-CoV-2 present but the amount was too low to be detected by the test. It does not mean that SARS-CoV-2 is not circulating in the wastewater catchment area.

**Figure 2.** Map showing the approximate location of wastewater catchment areas and results for SARS-CoV-2 detections during week 45. Results are shown as percentage change in SARS-CoV-2 RNA (gc/day)<sup>§</sup> between week 44 and week 45 and whether this change is increasing, decreasing or steady<sup>^</sup>.

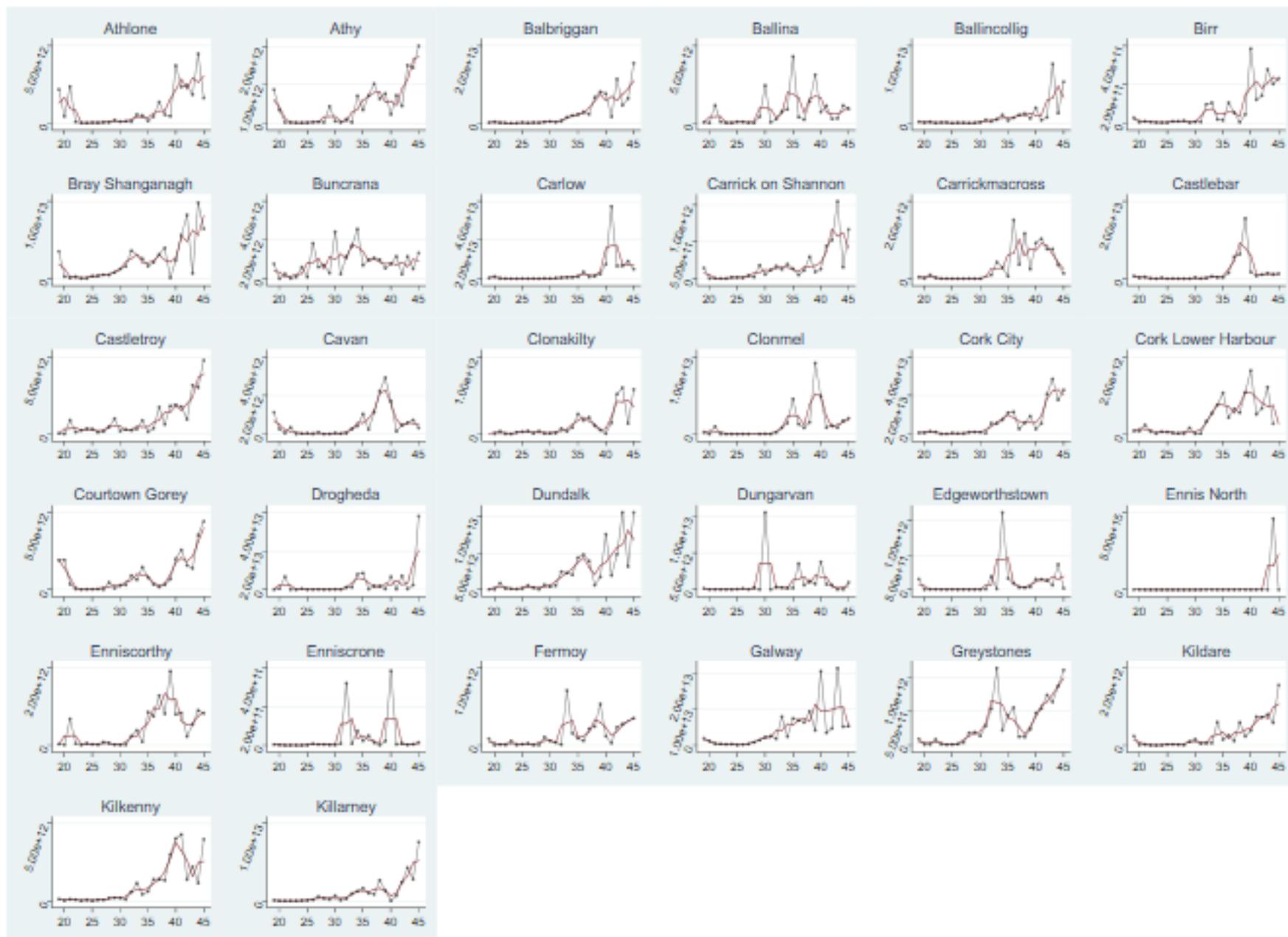


In week 45, no sample was received from the Cork Lower Harbour (Shanbally) wastewater catchment area .

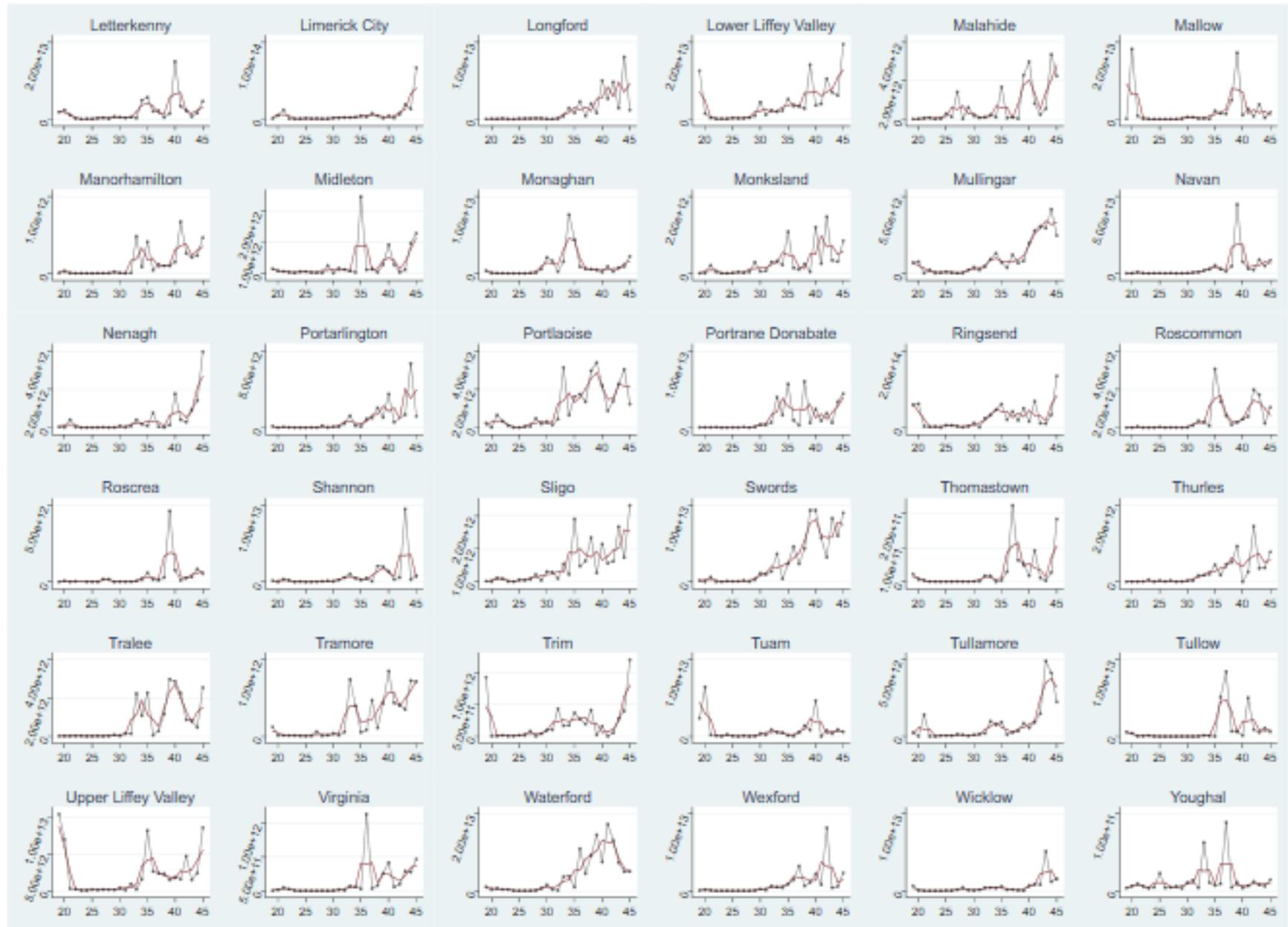
<sup>^</sup>Wastewater catchment areas where the percentage difference in gc/day has increased or decreased by less than 10% between the current and previous weeks are considered to be steady.

<sup>§</sup>Viral load values based on GAM-smoothed estimates. See technical notes.

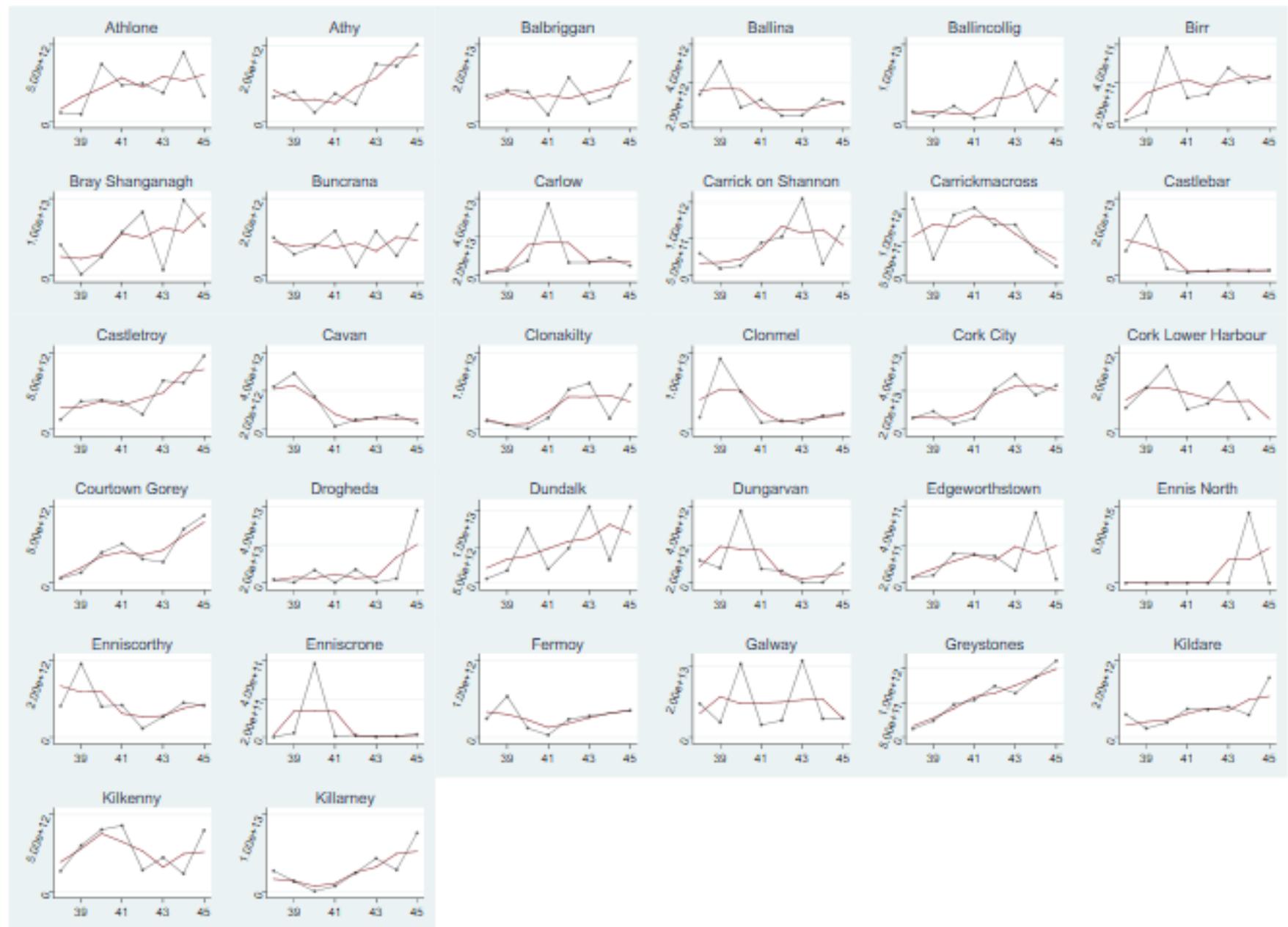
**Figure 3.** SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 19–45, 2021



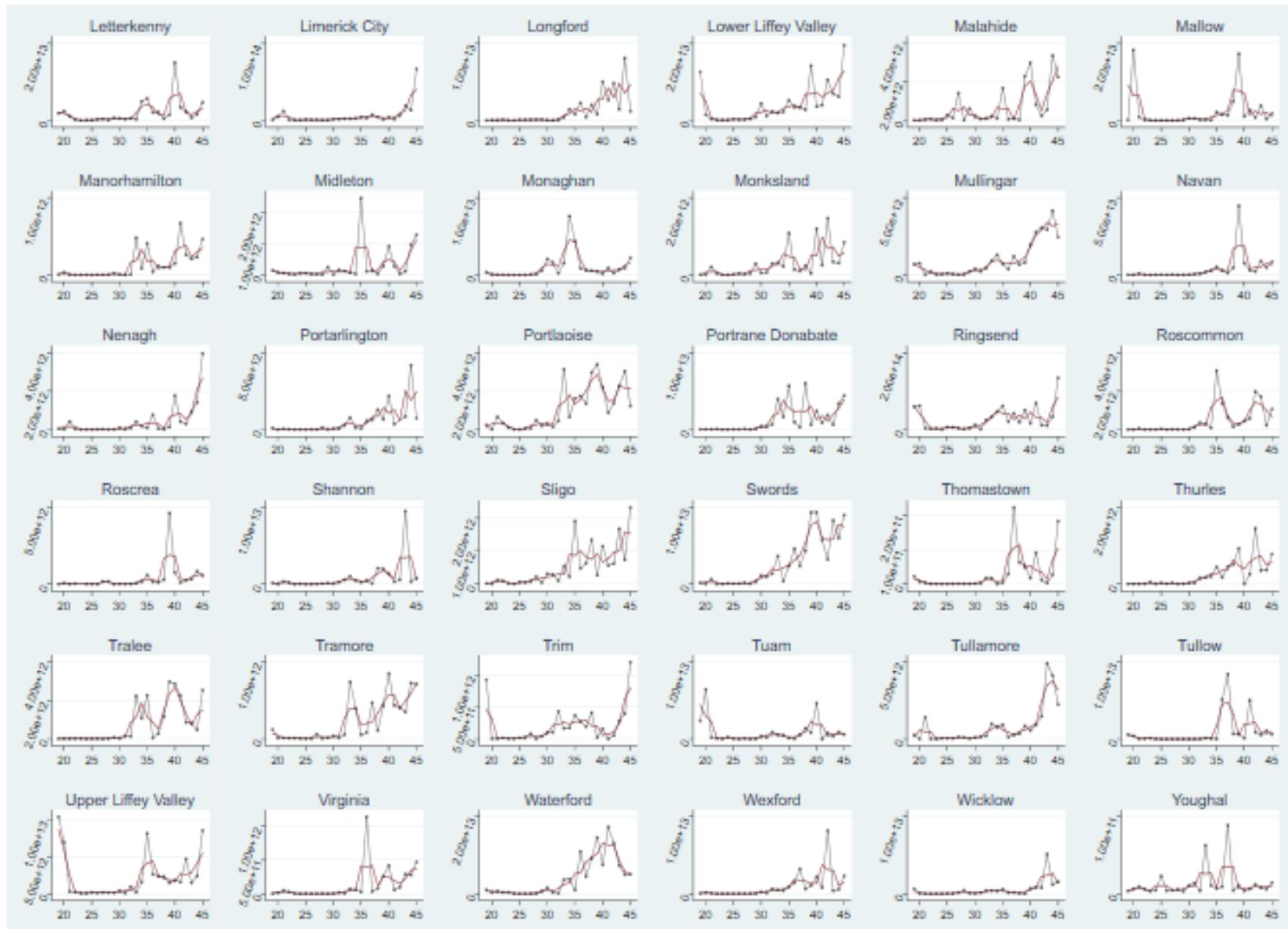
**Figure 3 (continued).** SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 19–45, 2021



**Figure 4.** SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 38—45, 2021



**Figure 4 (continued).** SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 38—45, 2021



## Acknowledgements

Sincere thanks are extended to all those who are participating in the collection and processing of samples, processing data and reporting of data used in this report. This includes the staff at participating wastewater treatment plants, Irish Water, laboratory staff (UCD and NVRL), HSE COVID-19 Contact Management Programme (CMP), Health Intelligence Unit (HIU), surveillance scientists, microbiologists and administrative staff.

Report prepared by COVID-19 Epidemiology Team, HPSC

## Glossary

### **Below detection limit (BDL):**

The limit of detection is the lowest concentration of viral material that can be detected in a wastewater sample. If the concentration of viral material in a sample is below the limit of detection, it does not mean that there is no virus present. Viral material may be present, but it cannot be detected by the test due to its very low concentration.

### **Below Quantifiable Limits (BQL)**

The limit of quantification is the lowest concentration of viral genetic material that can be reliably quantified. A result which is BQL means that viral RNA was detected but the concentration cannot be accurately determined.

### **Composite Samples:**

Wastewater sample consists of numerous individual discrete samples taken at regular intervals over a period of 24 hours.

### **Flow rate**

Is the total volume arising from the wastewater catchment area in the 24 hours the sample is taken (m<sup>3</sup> per day) as measured at the inlet of the wastewater treatment plant.

### **Grab sample**

A wastewater sample collected at a particular time and place can represent only the composition of the source at that time and place.

## Technical notes

**Wastewater sample collection:** Staff of the participating wastewater treatment plants collect 24-hour composite samples on specified days. In some instances incomplete composite, or grab samples may be collected.

**Laboratory analysis of wastewater samples:** Carried out by UCD. Following arrival of the wastewater samples in the laboratory, the virus is concentrated and the genetic material is extracted. The genetic material (RNA) is quantified using reverse transcriptase quantitative PCR which is used to determine the concentration of the virus in wastewater. The amount of viral genetic material per day entering a wastewater treatment plant can be calculated based on the concentration of the virus and the flow rate.

**Selection of wastewater catchment areas for inclusion in the NWSP:** Catchment areas were selected to provide the greatest coverage of the population and to represent catchment areas in all counties. Two catchment areas from each county have been included in the NWSP. In addition, we included all wastewater catchment areas greater than 10,000 population equivalent (PE) in size. The 68 wastewater catchment areas included in the NWSP cover 80% of the population connected to public wastewater treatment plants, and are shown in Figure 1.

**Case based data:** Data are currently based on information uploaded to the COVID Care Tracker (CCT). Please note that these data do not represent notified cases, and have not undergone normal data validation procedures. Data are therefore provisional and subject to ongoing review and update. As a result, figures in this report may differ from previously published figures.

**Mapping:** provided by Health intelligence Unit (HIU).

**Smoothing:** Smoothed trends were fit to observed data with generalised additive models using restricted maximum likelihood estimates of smoothing parameters. The resulting trends should only be viewed as one reasonable, visual summary of the observed data

## Data uses

Since the onset of the Covid-19 pandemic, analysis of wastewater for the presence of SARS-CoV-2 has been taking place in many European countries and elsewhere as recommended by the European Union. The NWSP will work with Departments of Public Health and other stakeholders on how the data can best support the public health response to SARS-CoV-2/COVID-19 in Ireland. At the current stage of the pandemic, circulation is widespread with high incidence rates across Ireland. The NWSP will likely be of greatest value when the circulation of SARS-CoV-2 and testing rates are lower, when a detection of SARS-CoV-2 in wastewater may be the first indication of circulation in a catchment area.

The NWSP will also be of value in monitoring for the presence of new variants of SARS-CoV-2 as they emerge.

## Data limitations and uncertainties

In general, higher levels of SARS-CoV-2 in wastewater suggests more people with SARS-CoV-2 infection in the wastewater catchment area. However, people shed different amounts of virus during the period that they are infected which declines as they are clearing the virus. For this and other reasons it is therefore difficult to reliably estimate the number of people with SARS-CoV-2 infection in the catchment area based on analysis of SARS-CoV-2 RNA in wastewater.

Aside from the number of people with SARS-CoV-2 infection, and the amount of virus they shed, there are other factors which influence the amount of SARS-CoV-2 detected in wastewater. For example, wastewater treatment plants also take in surface waters from rainfall, which alters the flow rate of influent entering the treatment plant. The concentration of SARS-CoV-2 is therefore adjusted to take the daily flow rate of the plant into account. When a flow rate is not available for the day the composite sample was taken, the average annual flow rate is used instead. Composite samples are the preferred sample type as they reflect wastewater passing through the sampling point for a 24-hour period. However, composite samples are not always possible. The NWSP will continue to monitor its methodology as part of its quality improvement process.

NWSP data should be reviewed in conjunction with data from other case-based surveillance systems.

## Further information

A technical report by the Joint Research Centre (JRC) and the Directorate-General for Environment (DG-ENV) of the European Commission on wastewater surveillance for SARS-CoV-2 is available [here](#).

Links to dashboards of other SARS-CoV-2 wastewater surveillance programmes are available [here](#).

## Epidemiological weeks, 2021

Table A: List of epidemiological weeks, start and end dates, 2021

Year	Week	Start date	End date (Midnight on )
2021	1	03/01/2021	09/01/2021
2021	2	10/01/2021	16/01/2021
2021	3	17/01/2021	23/01/2021
2021	4	24/01/2021	30/01/2021
2021	5	31/01/2021	06/02/2021
2021	6	07/02/2021	13/02/2021
2021	7	14/02/2021	20/02/2021
2021	8	21/02/2021	27/02/2021
2021	9	28/02/2021	06/03/2021
2021	10	07/03/2021	13/03/2021
2021	11	14/03/2021	20/03/2021
2021	12	21/03/2021	27/03/2021
2021	13	28/03/2021	03/04/2021
2021	14	04/04/2021	10/04/2021
2021	15	11/04/2021	17/04/2021
2021	16	18/04/2021	24/04/2021
2021	17	25/04/2021	01/05/2021
2021	18	02/05/2021	08/05/2021
2021	19	09/05/2021	15/05/2021
2021	20	16/05/2021	22/05/2021
2021	21	23/05/2021	29/05/2021
2021	22	30/05/2021	05/06/2021
2021	23	06/06/2021	12/06/2021
2021	24	13/06/2021	19/06/2021
2021	25	20/06/2021	26/06/2021
2021	26	27/06/2021	03/07/2021

Year	Week	Start date	End date (Midnight on )
2021	27	04/07/2021	10/07/2021
2021	28	11/07/2021	17/07/2021
2021	29	18/07/2021	24/07/2021
2021	30	25/07/2021	31/07/2021
2021	31	01/08/2021	07/08/2021
2021	32	08/08/2021	14/08/2021
2021	33	15/08/2021	21/08/2021
2021	34	22/08/2021	28/08/2021
2021	35	29/08/2021	04/09/2021
2021	36	05/09/2021	11/09/2021
2021	37	12/09/2021	18/09/2021
2021	38	19/09/2021	25/09/2021
2021	39	26/09/2021	02/10/2021
2021	40	03/10/2021	09/10/2021
2021	41	10/10/2021	16/10/2021
2021	42	17/10/2021	23/10/2021
2021	43	24/10/2021	30/10/2021
2021	44	31/10/2021	06/11/2021
2021	45	07/11/2021	13/11/2021
2021	46	14/11/2021	20/11/2021
2021	47	21/11/2021	27/11/2021
2021	48	28/11/2021	04/12/2021
2021	49	05/12/2021	11/12/2021
2021	50	12/12/2021	18/12/2021
2021	51	19/12/2021	25/12/2021
2021	52	26/12/2021	01/01/2022