National SARS-CoV-2 Wastewater Surveillance Programme

Week 36 2021 (05/09/2021—11/09/2021)

Report prepared on 15/09/2021

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 36, 2021

In week 36[1], 2021 SARS-CoV-2 was detected in wastewater samples from 67 of the 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.

[1] 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[1] 36, 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 67 wastewater catchment areas. A sample was not received from the Virginia catchment area in week 36 .

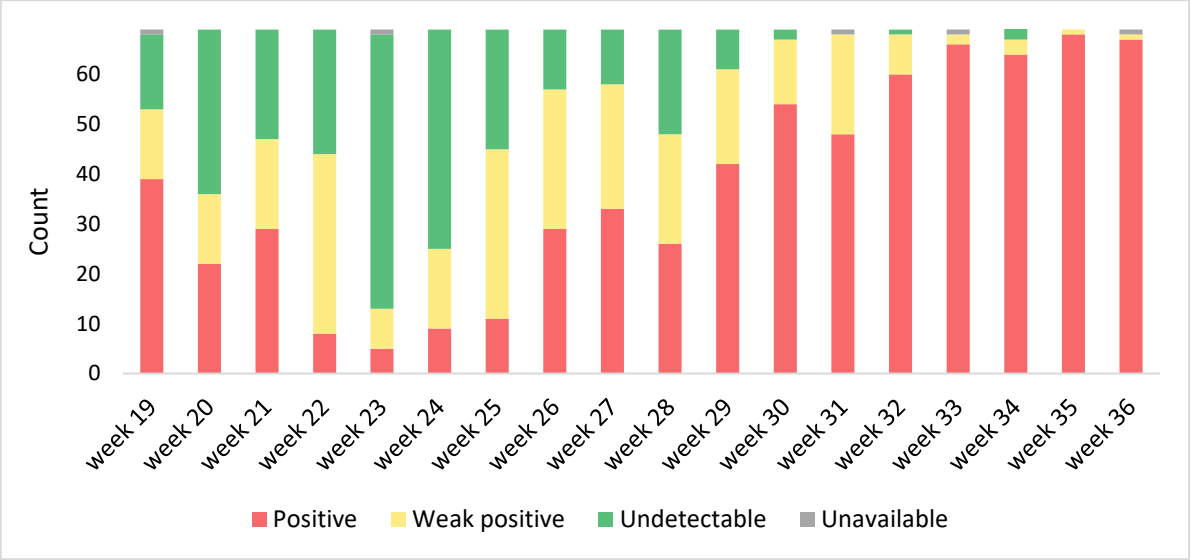


Figure 1. SARS-CoV-2 detection categories in Ireland by week, NWSP, weeks 19—36, 2021
**Samples with an undetected result may have SARS-CoV-2 present but the amount was too low to be detected by the test. It does not mean that SARS-CoV-2 is not circulating in the wastewater catchment area of the Wastewater treatment plant (WWTP).*

Table 1 and Figures 1 and 2 summarise the results from wastewater samples taken during week 36. Table 2a summarises the results by category for each wastewater catchment area during weeks 19—36, 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 6 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 36, 2021

County	Wastewater catchment area	Sample type	Sample date	Result category^
Carlow	Carlow	Complete (composite)	07/09/2021	Positive*
	Tullow	Grab	08/09/2021	Positive*
Cavan	Cavan	Complete (composite)	06/09/2021	Positive
	Virginia		07/09/2021	No sample/not analysed
Clare	Ennis North	Complete (composite)	05/09/2021	Positive
	Shannon	Complete (composite)	05/09/2021	Positive
Cork	Ballincollig	Complete (composite)	06/09/2021	Positive
	Clonakilty	Complete (composite)	06/09/2021	Positive*
	Cork City	Complete (composite)	06/09/2021	Positive
	Cork Lower Harbour	Complete (composite)	06/09/2021	Positive
	Fermoy	Complete (composite)	06/09/2021	Positive
	Mallow	Complete (composite)	06/09/2021	Positive
	Midleton	Complete (composite)	06/09/2021	Positive
	Youghal	Complete (composite)	05/09/2021	Weak positive
Donegal	Buncrana	Complete (composite)	07/09/2021	Positive
	Letterkenny	Complete (composite)	07/09/2021	Positive*
Dublin	Balbriggan	Complete (composite)	06/09/2021	Positive
	Malahide	Unknown	06/09/2021	Positive*
	Portrane Donabate	Complete (composite)	06/09/2021	Positive*
	Ringsend	Complete (composite)	05/09/2021	Positive*
	Ringsend	Complete (composite)	08/09/2021	Positive*
	Shanganagh	Complete (composite)	07/09/2021	Positive*
	Swords	Complete (composite)	06/09/2021	Positive
Galway	Galway	Complete (composite)	05/09/2021	Positive*
	Tuam	Complete (composite)	05/09/2021	Positive
Kerry	Killarney	Complete (composite)	06/09/2021	Positive
	Tralee	Grab	07/09/2021	Positive
Kildare	Athy	Complete (composite)	07/09/2021	Positive
	Kildare	Complete (composite)	07/09/2021	Positive
	Lower Liffey Valley Regional Sewerage Scheme (Leixlip)	Complete (composite)	07/09/2021	Positive
	Upper Liffey Valley Sewerage Scheme (Osberstown)	Complete (composite)	07/09/2021	Positive
Kilkenny	Kilkenny	Complete (composite)	05/09/2021	Positive
	Thomastown	Complete (composite)	05/09/2021	Positive
Laois	Portarlington	Complete (composite)	05/09/2021	Positive
	Portlaoise	Complete (composite)	05/09/2021	Positive
Leitrim	Carrick on Shannon	Complete (composite)	07/09/2021	Positive
	Manorhamilton	Complete (composite)	07/09/2021	Positive
Limerick	Castletroy	Incomplete (composite)	06/09/2021	Positive
	Limerick City	Complete (composite)	06/09/2021	Positive
Longford	Edgeworthstown	Complete (composite)	07/09/2021	Positive*
	Longford	Complete (composite)	07/09/2021	Positive
Louth	Drogheda	Complete (composite)	06/09/2021	Positive
	Dundalk	Complete (composite)	06/09/2021	Positive
Mayo	Ballina	Complete (composite)	06/09/2021	Positive
	Castlebar	Complete (composite)	05/09/2021	Positive

Table 1(continued). National Wastewater Surveillance Programme sampling results by wastewater catchment area, week 36, 2021

County	Wastewater catchment area	Sample type	Sample date	Result category^
Meath	Navan	Complete (composite)	06/09/2021	Positive
	Trim	Complete (composite)	07/09/2021	Positive
Monaghan	Carrickmacross	Complete (composite)	06/09/2021	Positive
	Monaghan	Complete (composite)	06/09/2021	Positive
Offaly	Birr	Complete (composite)	05/09/2021	Positive
	Tullamore	Complete (composite)	05/09/2021	Positive*
Roscommon	Monksland	Complete (composite)	06/09/2021	Positive*
	Roscommon	Complete (composite)	06/09/2021	Positive
Sligo	Enniscrone	Complete (composite)	05/09/2021	Positive*
	Sligo	Complete (composite)	07/09/2021	Positive
Tipperary	Clonmel	Complete (composite)	06/09/2021	Positive
	Nenagh	Complete (composite)	06/09/2021	Positive*
	Roscrea	Complete (composite)	06/09/2021	Positive
	Thurles	Complete (composite)	06/09/2021	Positive
Waterford	Dungarvan	Complete (composite)	05/09/2021	Positive
	Tramore	Complete (composite)	05/09/2021	Positive
	Waterford	Grab	05/09/2021	Positive
Westmeath	Athlone	Complete (composite)	05/09/2021	Positive
	Mullingar	Complete (composite)	07/09/2021	Positive
Wexford	Courtown Gorey	Complete (composite)	07/09/2021	Positive*
	Enniscorthy	Complete (composite)	05/09/2021	Positive
	Wexford	Complete (composite)	05/09/2021	Positive
Wicklow	Greystones	Complete (composite)	07/09/2021	Positive*
	Wicklow	Complete (composite)	07/09/2021	Positive

^ 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.

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

Table 2a. SARS-CoV-2 detections in wastewater samples by wastewater catchment area and week, NWSP, week 19 to week 36, 2021

Positive	Weak positive	Undetected*	Unavailable

Dots indicate the result was obtained using average flow data.

**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.*

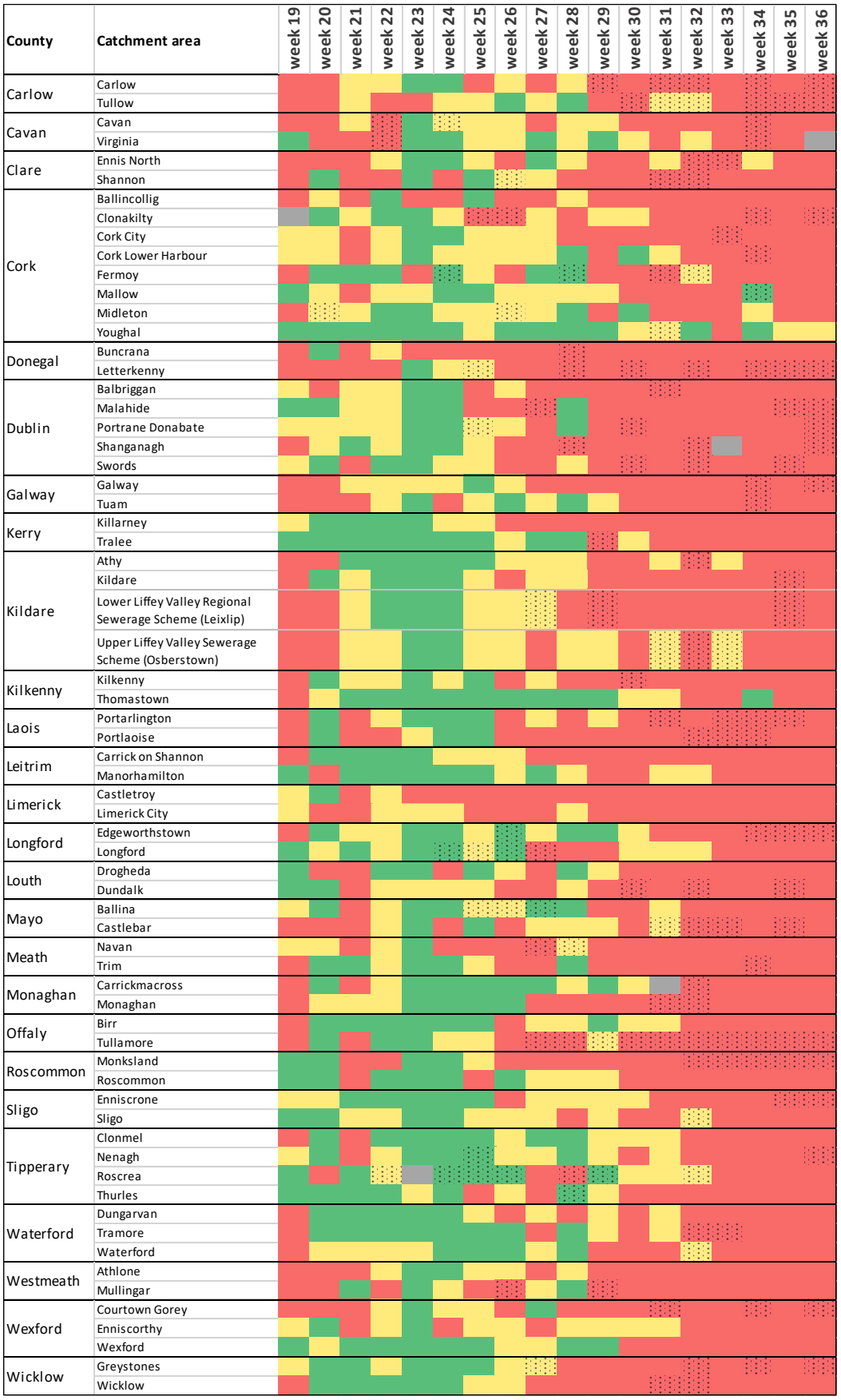


Table 2b. Biweekly results for SARS-CoV-2 detections in the Ringsend WWTP, week 19 to week 36, 2021

Week	Specimen date	Result category	Result category
19	09/05/2021		Positive*
	12/05/2021		Positive*
20	16/05/2021		Positive
	19/05/2021		Positive*
21	23/05/2021		Weak positive
	26/05/2021		Undetectable
22	30/05/2021		Weak positive
	02/06/2021		Weak positive
23	07/06/2021		Weak positive
	09/06/2021		Undetectable
24	13/06/2021		Undetectable
	16/06/2021		Undetectable
25	20/06/2021		Weak positive
	23/06/2021		Weak positive
26	27/06/2021		Positive
	30/06/2021		Positive
27	04/07/2021		Positive
	07/07/2021		Positive
28	11/07/2021		Positive
	14/07/2021		Weak positive
29	18/07/2021		Positive
	21/07/2021		Weak positive
30	25/07/2021		Positive*
	28/07/2021		Positive*
31	01/08/2021		Weak positive
	04/08/2021		Weak positive*
32	08/08/2021		Positive*
	11/08/2021		Positive*
33	15/08/2021		Positive*
	18/08/2021		Positive*
34	22/08/2021		Positive
	25/08/2021		Positive*
35	29/08/2021		Positive*
	01/09/2021		Positive*
36	05/09/2021		Positive*
	08/09/2021		Positive*

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

Figure 2. Map showing the approximate location of wastewater catchment areas and results for SARS-CoV-2 detections during week 36, 2021.

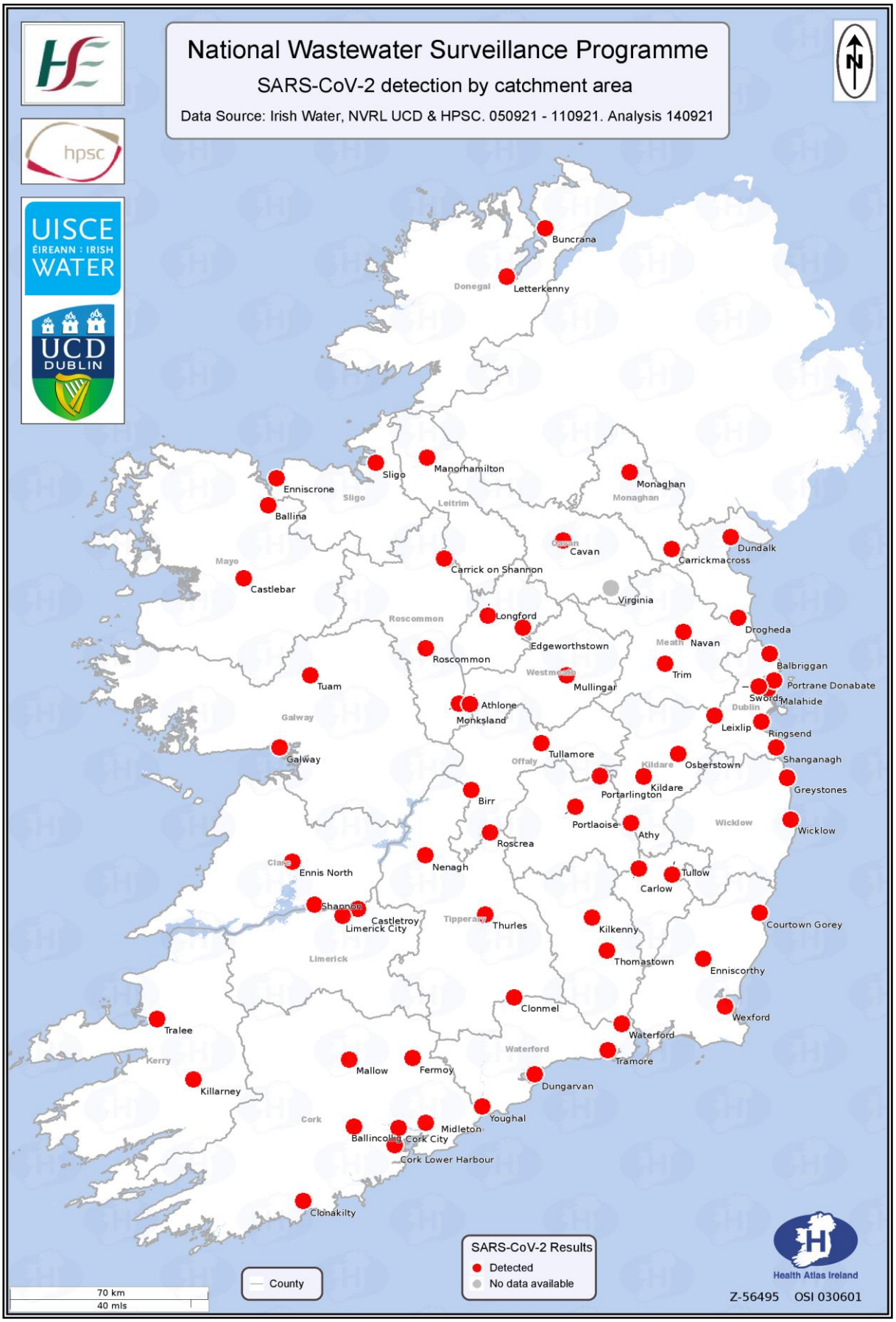


Figure 3. **SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 19—36, 2021**

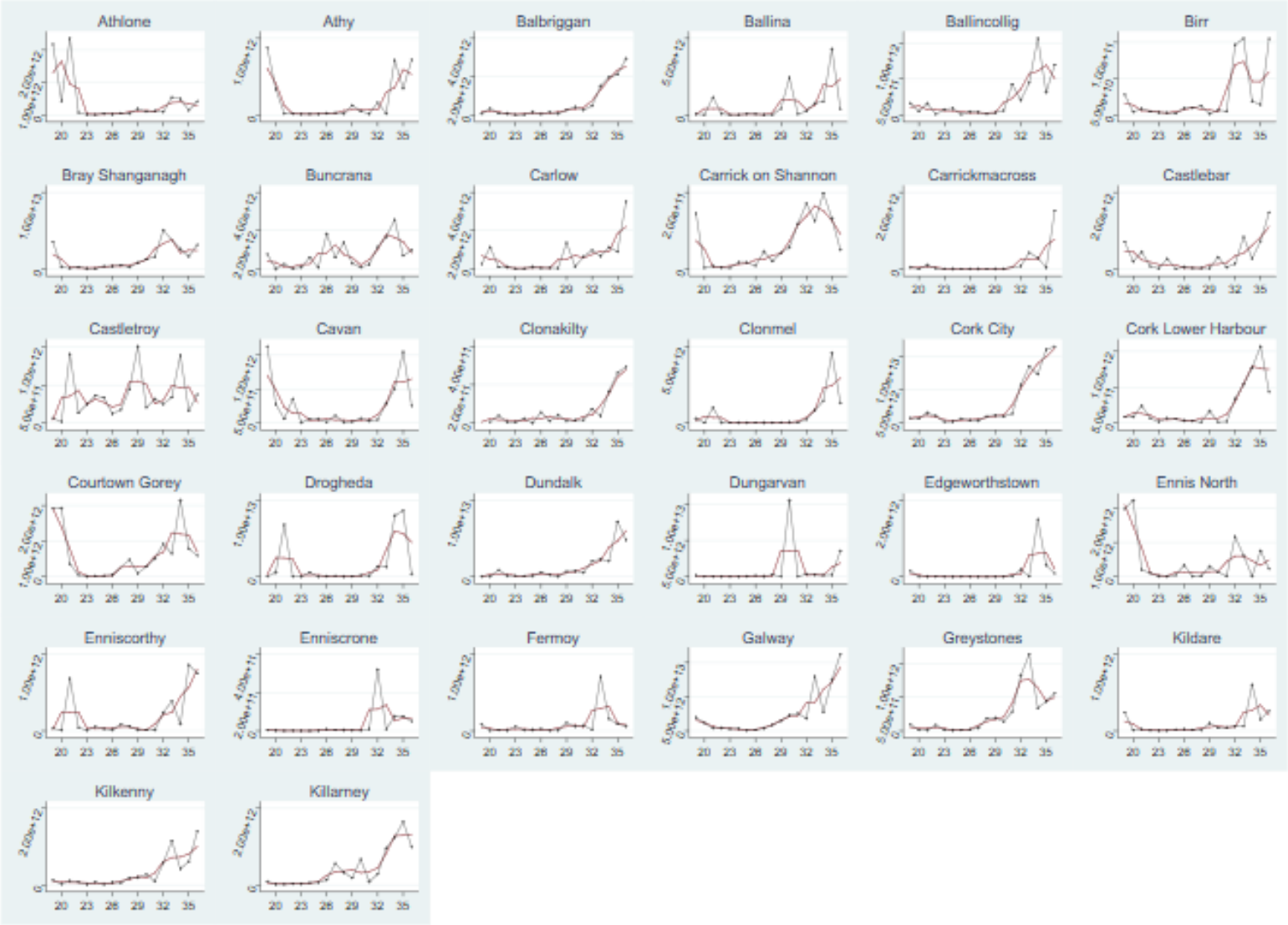


Figure 3 (continued). SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 19—36, 2021

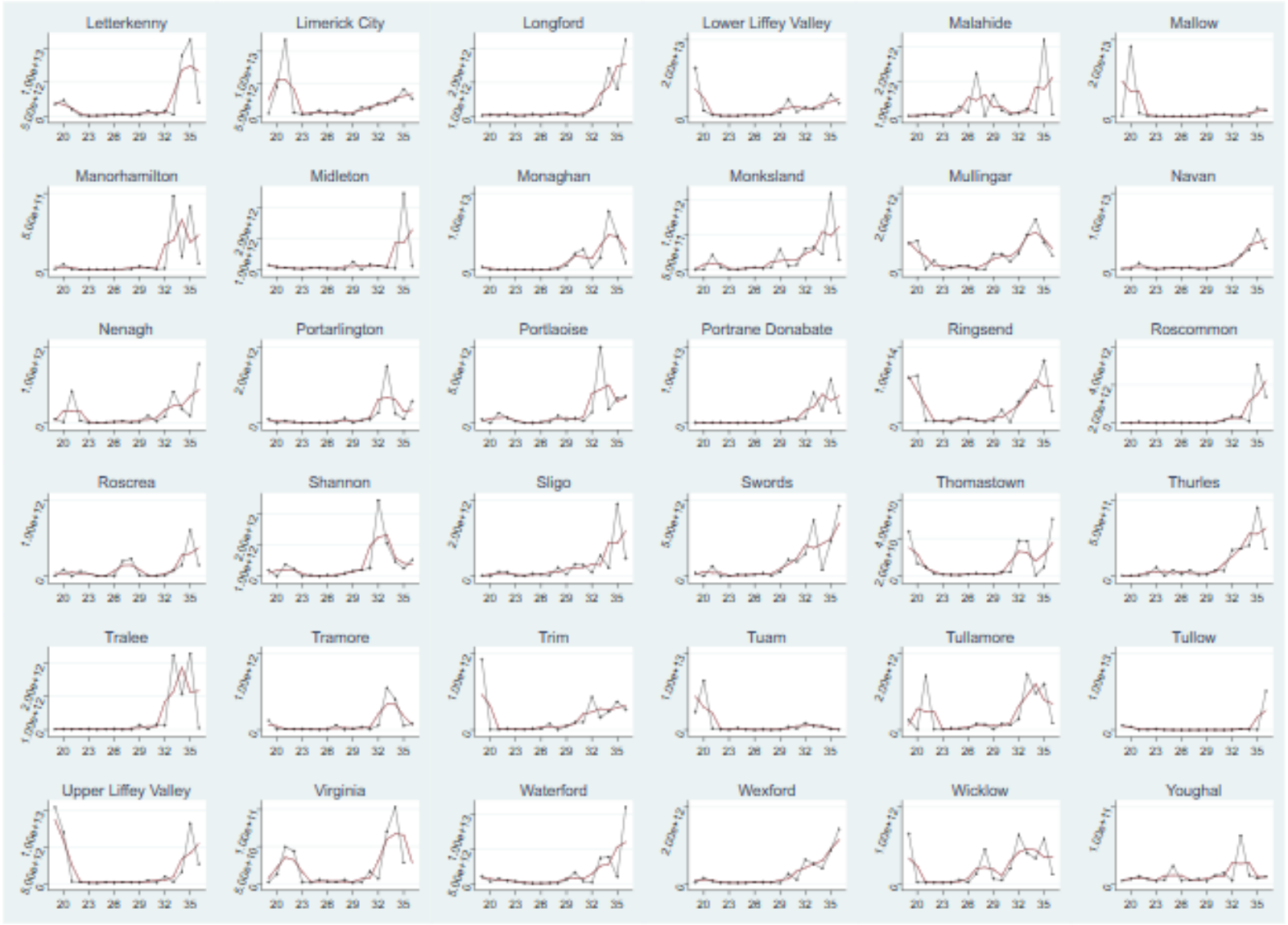


Figure 4. SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 31—36, 2021

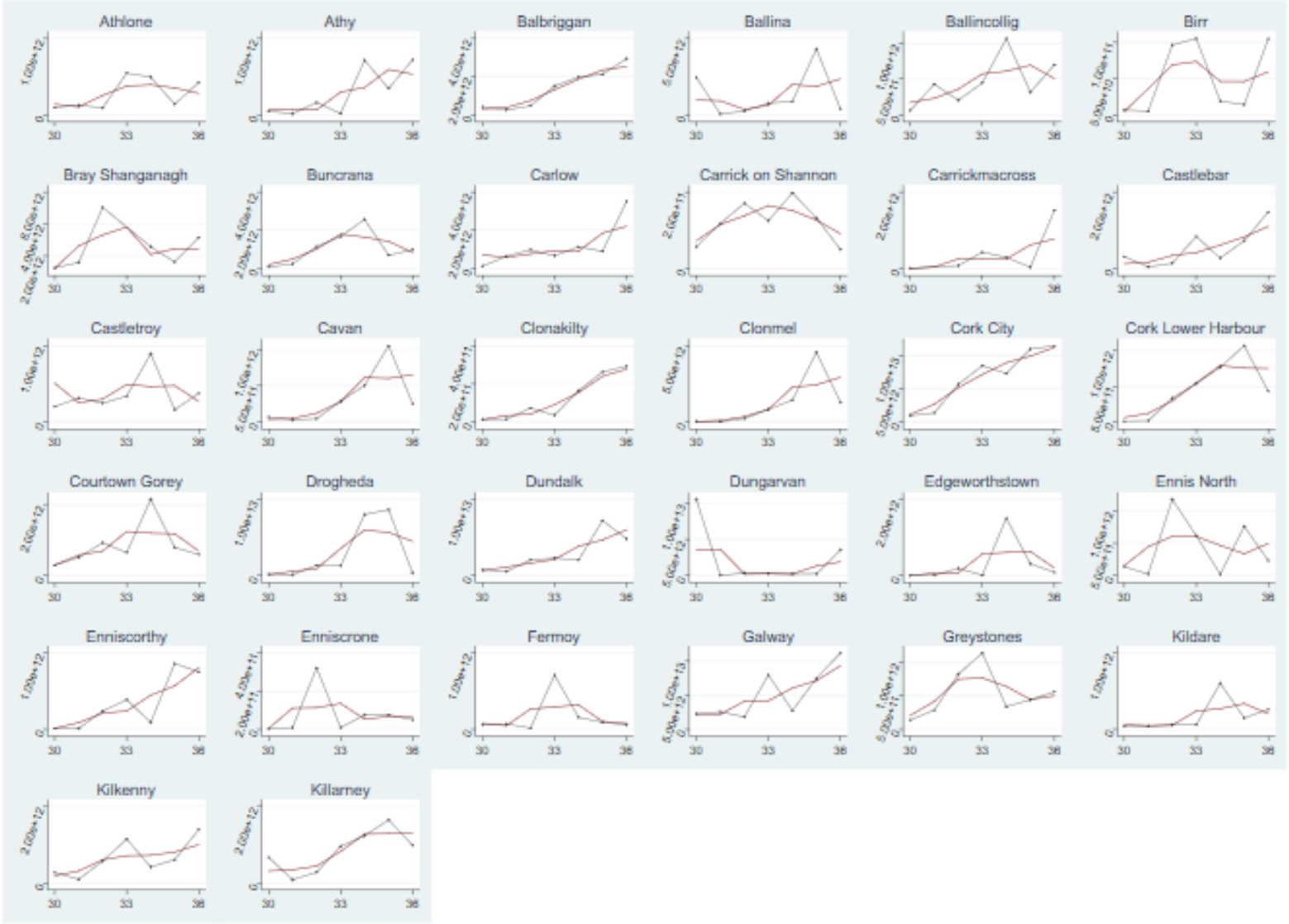
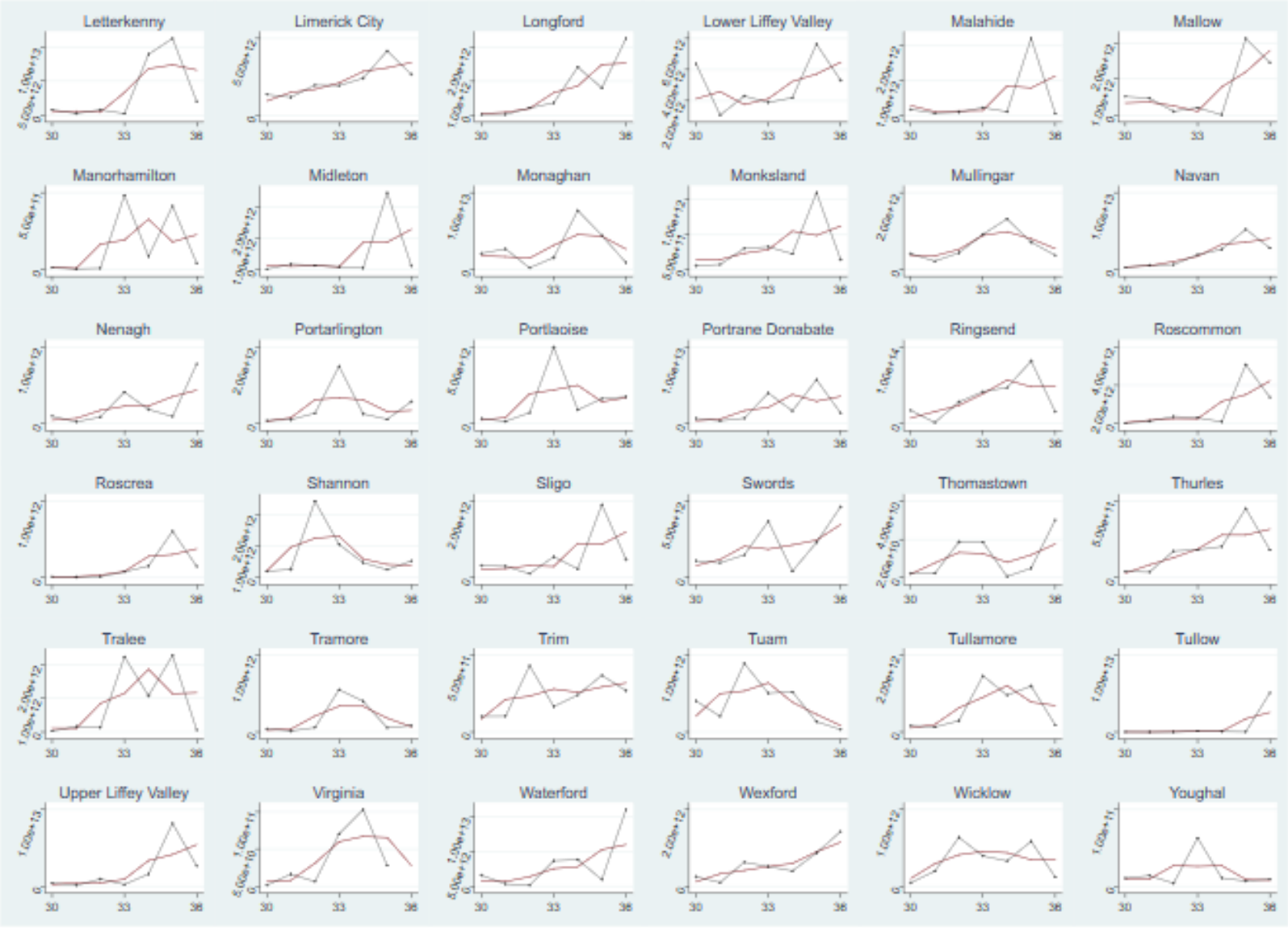


Figure 4 (continued). SARS-CoV-2 concentration by wastewater catchment area by week (grey connected line), and 3 week moving average (maroon line), NWSP, weeks 31—36, 2021



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 24hours the sample is taken (m3 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).

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 are 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 the 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