



Australian Government
Department of Health



enHEALTH

SARS-CoV-2 Wastewater Surveillance CDNA National Strategy

Version 2, 9 August 2022¹

¹ This document is dynamic and will be updated with new information as required.

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1. Background

Wastewater or sewage includes blackwater from toilets plus greywater from baths, showers, sinks and washing machines. Wastewater surveillance for Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) involves the systematic and targeted sampling and testing of wastewater to detect the SARS-CoV-2 virus, and interpretation of results. It is used as a complementary tool to case-based surveillance of infections and other surveillance measures, to inform public health control of COVID-19. Wastewater samples provide pooled samples from the community, which may detect SARS-CoV-2 from people at different stages of their infection, including those who are asymptomatic and pre-symptomatic. Approximately one third of people infected with SARS-CoV-2 are likely to be asymptomatic, depending on the infecting variant and vaccination status². Infected individuals can begin shedding SARS-CoV-2 into wastewater via faeces, respiratory and nasal secretions, and to a lesser extent, urine, prior to the onset of symptoms. Therefore, a key benefit of wastewater surveillance is that it can detect the presence of SARS-CoV-2 before symptoms occur and in asymptomatic people, and it is not dependent on the availability, uptake or reporting of clinical testing through Polymerase Chain Reaction (PCR) test or Rapid Antigen Test (RAT). This adds unbiased information to the assessment of community prevalence of COVID-19 because everyone uses the toilet, washbasin and shower³ but not everyone gets tested, nor can be in a high prevalence context. However, while wastewater surveillance can provide unbiased and early indications of COVID-19 in communities, it remains unclear how much SARS-CoV-2 material is shed by asymptomatic cases and the precise proportion of infected individuals that may not shed SARS-CoV-2. In addition, measurement of SARS-CoV-2 in wastewater needs to account for infected individuals continuing to shed the virus for a couple of weeks following cessation of symptoms and sometimes for longer.

Australian wastewater surveillance programs for SARS-CoV-2 were initially developed in the context of low community transmission when Australia's National COVID-19 response focused on suppression of community transmission. Australia is in the post-vaccination phase (Phase D) of the *National Plan to transition Australia's National COVID-19 Response, July 2021*, which focuses on preventing severe illness associated with COVID-19 rather than minimising community transmission. This requires transition of the wastewater surveillance program to bring it in line with current and anticipated waves of higher prevalence environments.

Wastewater surveillance has been utilised in Australia to detect poliovirus and other enteroviruses at selected sentinel sites⁴ and has been implemented in every state and territory to monitor SARS-CoV-2. A national wastewater surveillance program can readily extend to monitoring a range of organisms and other substances of concern to public health, including different strains of influenza and antimicrobial resistant organisms.

This Strategy has been developed in consultation with experts, various consultative committees and input from jurisdictions. The Australian Health Protection Principal Committee (AHPPC), Communicable Diseases Network of Australia (CDNA) and the Wastewater and Human Health SARS-CoV-2 Surveillance Working Group guided development of this document.

² Oran DP, Topol EJ. The Proportion of SARS-CoV-2 Infections That Are Asymptomatic: A Systematic Review. *Ann Intern Med.* 2021 May;174(5):655-662. doi: 10.7326/M20-6976. Epub 2021 Jan 22. PMID: 33481642; PMCID: PMC7839426.

³ Döhla M, Schulte B, Wilbring G, Kümmerer BM, Döhla C, Sib E, Richter E, Ottensmeyer PF, Haag A, Engelhart S, Eis-Hübinger AM, Exner M, Mutters NT, Schmithausen RM, Streeck H. SARS-CoV-2 in Environmental Samples of Quarantined Households. *Viruses.* 2022 May 17;14(5):1075. doi: 10.3390/v14051075.

⁴ [Department of Health | Review of Australia's polio surveillance](#)

2. Strategic context

This strategy aims to promote optimal use of SARS-CoV-2 wastewater surveillance adapted to specific local contexts, as well as knowledge exchange between jurisdictions and a consistent approach to reporting surveillance indicators in Australia.

The Strategy is supported by the following documents, which are currently being updated.

- *SARS-CoV-2 Wastewater Surveillance National Testing and Reporting Framework, April 2021*, which outlines common approaches to wastewater sample collection, testing methodologies and reporting to public health officials. Development of this work is led by the Environmental Health Standing Committee's (enHealth) Water Quality Expert Reference Panel (WQERP).
- *SARS-CoV-2 Wastewater Surveillance: Operational Guidance*, which provides guidance on development of a surveillance strategy, roles and responsibilities, results interpretation, investigation and public health actions. Development of this work was led by the Communicable Diseases Network Australia (CDNA), Wastewater and Human Health SARS-CoV-2 Surveillance Working Group.

The Strategy is consistent with the [Australian National Disease Surveillance Plan for COVID-19](#), the [Testing Framework for COVID-19 in Australia \(March 2022\)](#) and the [COVID-19 Communicable Diseases Network Australia \(CDNA\) National Guidelines for Public Health Units](#).

Considerations related to Aboriginal and Torres Strait Islander populations are referred to in the *SARS-CoV-2 Wastewater Surveillance Operational guidance*. This guidance aims to ensure that focused data collection, analysis, reporting, and review are carried out with appropriate cultural considerations.

As the COVID-19 pandemic progresses, it is anticipated that Australia will experience waves of COVID-19, with the prevalence of cases varying over time and by different geographical locations across the nation. It will be important to continue to understand the epidemiology of infections and ensure that appropriate public health actions are implemented to limit morbidity and mortality due to COVID-19 and avoid undue pressure on healthcare systems and disruption to business continuity.

Wastewater surveillance complements other forms of surveillance, particularly case-based surveillance of infections through the reporting of positive and negative tests. It can contribute valuable surveillance information in both high and low prevalence environments. In Australia, it was initially used as a leading indicator, providing early warning of detections of SARS-CoV-2 within communities and at entry ports during low COVID-19 prevalence. It was also used to inform more targeted approaches to individual clinical testing and public health messaging. Within the current high prevalence context, wastewater surveillance can be used to detect Variants of Concern (VOC), Variants of Interest (VOI) and Variants under Monitoring (VUM) arriving in Australia, as well as estimate the relative abundance and spread of specific SARS-CoV-2 variants within communities. In addition, quantification of viral loads of SARS-CoV-2 in wastewater catchment areas can be used to indicate changing trends in the prevalence of COVID-19 within communities ahead of clinical testing. This information can provide an early warning of the need to increase healthcare and testing capacity to meet demand, as well as support earlier decisions to scale up (or down) public health and social measures (PHSM). These measures become increasingly important for understanding the epidemiological situation and contributing to forecasting, where case ascertainment through clinical testing has become uncertain due to the high prevalence of COVID-19. Furthermore, targeted screening can continue to provide early warning of detections of SARS-CoV-2 in vulnerable communities or settings (e.g., Aboriginal and Torres Strait Islander communities, residential care facilities,

correctional facilities) and in settings that present a high-risk of transmission (e.g., some specific industrial and residential sites). In these contexts, screening may be continuous or time-limited, during periods of increased risk of cases or after a detected case has been removed from a community or setting, to provide confidence that the site is infection free.

In summary, SARS-CoV-2 wastewater surveillance can provide a contribution to overall surveillance of COVID-19 in the following key areas.

- **Early warning** - to identify undetected SARS-CoV-2 in the community and at entry ports during low prevalence.
- **Monitor variants** - by detecting and tracking incursions, spread and relative abundance of SARS-CoV-2 variants, including detection of new VOC/VOI/VUM. This provides an early indicator of incursions and complements genomic surveillance of individual clinical samples.
- **Monitor trends** - of population normalised viral concentrations of SARS-CoV-2, as an early indicator of major increases, peaks or decreases in the prevalence of COVID-19 in communities, ahead of (or complementary to) indications from clinical testing or surveillance of individuals.
- **Targeted screening** - for early warning of undetected SARS-CoV-2 in specific vulnerable communities or settings (and high-risk of transmission sites) where high control over transmission is desired during both low and high prevalence contexts.

Figure 1 illustrates the complementary role wastewater surveillance can provide within the overall surveillance objectives for COVID-19 (denoted as ‘ES data’ in figure). Diagnostic test data is subject to bias and lags behind the unbiased pooled population data provided by wastewater surveillance.

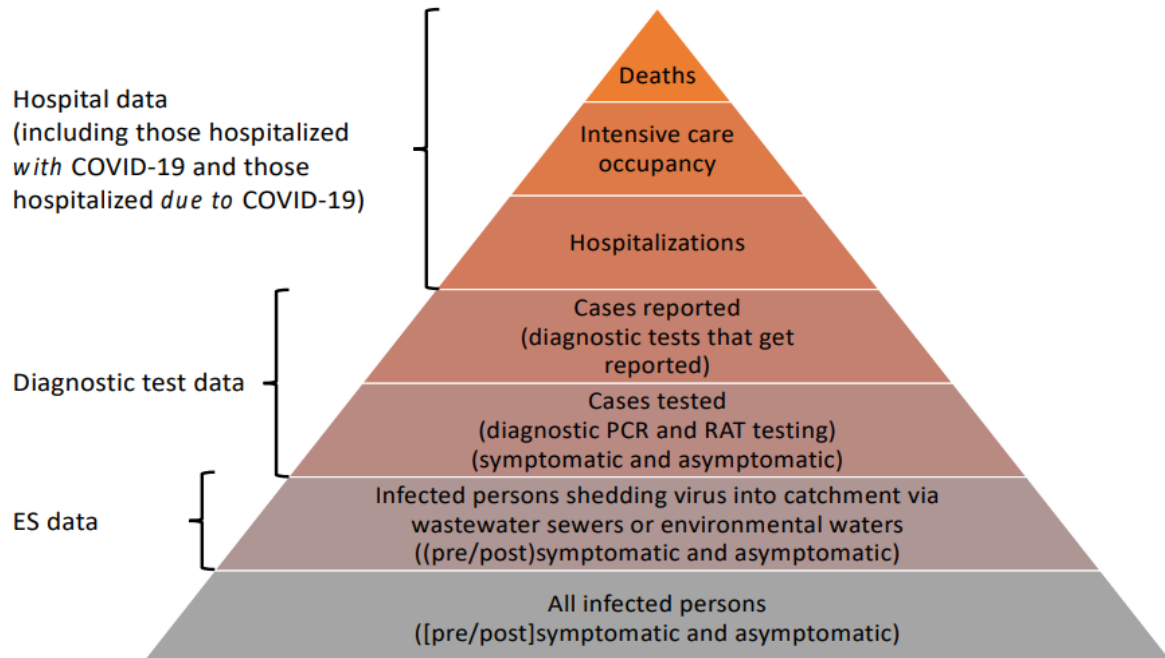


Figure 1. Illustration of the role of SARS-COV-2 environmental surveillance as a source of data on COVID-19 and SARS-CoV-2 in communities via a defined wastewater catchment⁵.

⁵ World Health Organisation (WHO) Environmental surveillance for SARS-COV-2 to complement public health surveillance, 14 April 2022. WHO-HEP-ECH-WSH-2022.1-eng.pdf. [Environmental surveillance for SARS-COV-2 to complement public health surveillance – Interim Guidance \(who.int\)](https://www.who.int/publications/m/item/environmental-surveillance-for-sars-cov-2-to-complement-public-health-surveillance--interim-guidance)

All jurisdictions used wastewater surveillance for detecting the presence of SARS-CoV-2 during low COVID-19 prevalence but its use in high prevalence contexts has been variable across jurisdictions to date.

In Western Australia, statistically significant correlations have been found between SARS-CoV-2 wastewater levels and COVID-19 case numbers, in both metropolitan and larger regional areas. The Australian Capital Territory (ACT) has also reported that SARS-CoV-2 wastewater level detections correlated with the presence of COVID-19 in the ACT community. In Victoria, quantitative wastewater data more accurately resembled the epidemiological situation related to the Omicron BA.2 variant than COVID-19 case-based notifications. Wastewater surveillance in Victoria also identified new SARS-CoV-2 variant incursions weeks before identification through clinical genomic surveillance and provided an early warning of additional mutations, which prompted the need for further investigation with clinical genomic sequencing. Wastewater surveillance has also contributed to modelling in Victoria, providing information on the timing of incursions of new variants and establishment of community transmission. More detail of current programs operating in jurisdictions is outlined in [Appendix A](#).

3. Governance and implementation

The Communicable Diseases Network Australia (CDNA) COVID-19 Working Group is responsible for the strategic direction and national coordination of COVID-19 surveillance, including the overarching [Australian National Disease Surveillance Plan for COVID-19](#).

States and territories implement and manage SARS-CoV-2 wastewater surveillance as they deem to be appropriate. The Strategy recognises that there are varying capacities across jurisdictions, and that individual jurisdictional plans may vary over time and are dependent on local epidemiological contexts.

State and territory health departments interpret results from SARS-CoV-2 wastewater surveillance by considering sampling methods and frequency, the population of the catchment area, local case-based epidemiology, clinical genomic data and existing public health interventions. Local responses, including testing and public health messaging, are framed within local contexts taking account of clinical information, characteristics of the sample location and the population represented by the sample.

The frequency of sampling and reporting of indicators at the national level will depend on the current epidemiological situation in jurisdictions and across Australia. This strategy intends to provide broad surveillance priorities as a guide and may be updated as disease surveillance priorities change and in response to emerging technologies and advances in wastewater testing.

4. Principles

Wastewater surveillance of SARS-CoV-2 in Australia should provide relevant and responsive information to support public health decision making. The following principles provide a guide for development of jurisdictional wastewater surveillance systems for SARS-CoV-2.

- Provide relevant and responsive information to support regional and local public health decision-making, which aligns with epidemiological contexts.
- Maximise coverage of large urban and regional population centres for routine sentinel surveillance, including key ports of entry for variant incursion surveillance.
- Adapt sampling of sites and sampling frequency to dynamic virologic, seasonal and emergent risks, in accordance with epidemiological contexts.

- Following agreement with communities, consider wastewater screening of Aboriginal and Torres Strait Islander and other vulnerable communities and localised settings to inform individual testing.
- Use standardised and quality assured methods for sampling and analysis⁶.
- Facilitate public communication of wastewater detections via a platform that is accessible and regularly updated.

The Australian Government Department of Health will work with jurisdictions to consider the establishment of channels for national reporting of agreed indicators to support a national review of the epidemiological situation in a timely manner, where feasible.

5. Targeting of SARS-CoV-2 wastewater surveillance

Effective and efficient wastewater surveillance needs to be responsive to changes in the virologic and epidemiological situation over time and waves of COVID-19, which may have different impacts on local areas, as well as vulnerable communities and settings across jurisdictions.

The *Testing Framework for COVID-19 in Australia (March 2022)* sets out the overall framework for epidemiological testing, including suggestions for wastewater surveillance. It is proposed that the four key contributions from SARS-CoV-2 wastewater surveillance (outlined in Section 2) are appropriately targeted to provide complementary data to support overall epidemiological assessment and public health decision-making for the COVID-19 community transmission context. Table 1 summarises the potential use of wastewater surveillance aligned to specific community transmission contexts, as proposed in the *Testing Framework for COVID-19 in Australia (March 2022)*.

Table 1:
Potential use of wastewater surveillance in different community transmission contexts

No community transmission	Community transmission	Community transmission placing a burden on/exceeding clinical testing capacity
<p>Early warning</p> <ul style="list-style-type: none"> • Identify undetected SARS-CoV-2 in the community and at entry ports <p>Monitor Variants</p> <ul style="list-style-type: none"> • Monitor for SARS-CoV-2 variant incursions arriving via international airports <p>Targeted Screening</p> <ul style="list-style-type: none"> • Early warning of SARS-CoV-2 in vulnerable communities or settings and high-risk of transmission settings. 	<p>Monitor Variants</p> <ul style="list-style-type: none"> • Monitor for new SARS-CoV-2 variant incursions arriving at entry ports and community locations • Track the spread and abundance of variants. <p>Monitor Trends</p> <ul style="list-style-type: none"> • Monitor community trends in prevalence by quantifying and tracking the SARS-CoV-2 viral load in sampled wastewater across communities. <p>Targeted Screening</p> <ul style="list-style-type: none"> • As per “no community transmission”. 	<p>Monitor Variants</p> <ul style="list-style-type: none"> • As per “community transmission” <i>(this measure becomes important where individual testing is unable to effectively detect and assess variant abundance in the community).</i> <p>Monitor Trends</p> <ul style="list-style-type: none"> • As per “community transmission” <i>(this measure can contribute to forecasting where ascertainment of COVID-19 cases from individual testing becomes uncertain).</i> <p>Targeted Screening</p> <ul style="list-style-type: none"> • As per “no community transmission”.

⁶ Ensure laboratories adhere to standardised practices and participate in external quality assurance preferably with accreditation with the National Association of Testing Authorities, Australia using the international laboratory testing standard ISO 17025 as an assessment guide.

6. National reporting

National reporting of SARS-CoV-2 wastewater surveillance would allow for centralised and consistent collection and sharing of surveillance data. State and territory health departments, in collaboration with laboratories, are the principal sources of sampling and provision of wastewater surveillance information. While wastewater surveillance data has been utilised by jurisdictions to assist with public health decision-making, national reporting and collaboration also provides opportunities to:

- contribute to an understanding of COVID-19 contexts across the nation and support national trend analysis and forecasting
- provide visibility to jurisdictions of the national COVID-19 situation, particularly new variants arriving in Australia
- combine wastewater variant testing results with clinical whole genome sequencing and variant PCR results for integrated variant reporting and risk assessment
- provide early identification of the need for national surge, to assist jurisdictions with both individual testing and healthcare capacity demands
- gain a better understanding of the contribution different aspects of wastewater surveillance can make to public health management of COVID-19 in different epidemiological contexts, to improve targeting and cost-effectiveness of wastewater surveillance
- support implementation of best practice and standards across jurisdictions as this emerging scientific field advances.

National reporting would also facilitate the sharing of knowledge of methods and advances in wastewater surveillance between jurisdictions, building valuable relationships between environmental and public health areas that are likely to be beneficial beyond the COVID-19 pandemic. In addition, it provides the opportunity to build on the Water Research Australia's Collaboration on Sewage Surveillance of SARS-CoV-2 project (ColoSSoS). This project shared national and global advances in this evolving scientific field with its jurisdictional members, which now continue as an active community of practice.

It is proposed that jurisdictions participating in SARS-CoV-2 wastewater surveillance, report results for a small number of agreed national indicators to inform the *National Disease Surveillance Plan for COVID-19*. The following indicators are proposed, although it is recognised that further discussion regarding jurisdictional capacities and implementation is required.

- first detection of a new VOC, VOI or VUM in a jurisdiction
- monitoring the relative abundance and spread of different VOI/VOC/VUM in a jurisdiction
- trends in population normalised viral concentrations of SARS-CoV-2.

Consistent sampling of SARS-CoV-2 in wastewater would be required to contribute to a national understanding of the epidemiological environment and support forecasting. For this reason, it is proposed that each participating jurisdiction would identify a key set of wastewater collection sites (sentinel sites) that are sampled on a consistent and ongoing basis and that international airports are included as sentinel sites. Further community sites, ports of entry or other local sites may be monitored at jurisdictional discretion as virologic, and epidemiological contexts change.

Frequencies of sampling (and turn-around times for results) would be determined by jurisdictions to support local public health decision-making appropriate to changing epidemiological contexts. Locations might be sampled weekly, biweekly, or triweekly (e.g., airports) with the option to increase or decrease frequency depending on catchment-specific

epidemiological contexts, feasibility and resource considerations. Reporting of an incursion of a variant of significant concern may be more prompt and align with the standing committee for variant review under the Communicable Diseases Genomics Network (CDGN) and Public Health Laboratory Network (PHLN).

Other results would be reported through or made available to the Office of Health Protection and Response in the Australian Government Department of Health on an agreed periodic basis through a national reporting framework. A draft set of national objectives and indicators are proposed in the next section, recognising that refinement of measures and methods of reporting require further discussion.

7. Goal, proposed national objectives, and indicators

Goal

To implement, monitor and report results of appropriately targeted wastewater surveillance for SARS-CoV-2, which assists with understanding local epidemiological contexts and informing public health responses to COVID-19 in conjunction with other case-based and clinical genomics data.

Proposed national objectives and indicators

Objective 1. To monitor the extent of community catchment wastewater surveillance for SARS-CoV-2 occurring in participating states and territories (*Static report – only updated when changed*).

Indicators	
1.1	The total number of community catchment wastewater sites tested for SARS-CoV-2., disaggregated by major cities and rural/remote.
1.2	The estimated percentage (or quartile) of the jurisdictional population represented in community catchment wastewater surveillance of SARS-CoV-2, stratified by major cities and rural/remote sites.

Objective 2: To identify new SARS-CoV-2 Variants of Concern (VOC), Variants of Interest (VOI), Variants under Monitoring (VUM) arriving in a jurisdiction and relative abundance and spread of variants across each participating state and territory.

Indicators	
2.1	Report for agreed genomic/variant sentinel monitoring sites: <ul style="list-style-type: none"> proportion of sentinel sites with detections of SARS-CoV-2 VOC/VOI/VUM new to the jurisdiction by variant nomenclature and method used (dynamic to emerging variant risks e.g., current Omicron BA.4, BA.5 and BA.2.12.1) disaggregated by major cities and rural/remote for community locations and specific sites e.g., airports.
2.2	Report for agreed genomic/variant sentinel monitoring sites: <ul style="list-style-type: none"> the lineage/sub-lineage and quantified abundance* (%) of each SARS-CoV-2 VOC/VOI/VUM detected and their spread within the jurisdiction. <p>* <i>Pre-existing and declining variants (e.g., Delta, Omicron BA.1) recorded as below 1% would be grouped and recorded as "other".</i></p>

Objective 3. Contribute to understanding the spread of and trends in population normalised concentrations of SARS-COV-2 across each participating state and territory.

Indicators	
3.1	Report for sentinel sites: <ul style="list-style-type: none"> Trends overtime in population normalised SARS-CoV-2 concentrations (e.g., gene-copy (GC) values) detected in the prior 15 days at each site as % increased, % decreased or is neither (%↑ or %↓ or stable). Visual map of above (Optional)

Objective 4. To monitor utilisation and results of wastewater surveillance of SARS-CoV-2 in vulnerable communities and settings (and high-risk of transmission settings) across states and territories.

Indicators	
4.1	The number and type of vulnerable (or high-risk) communities and settings ⁷ monitored for SARS-CoV-2 in an agreed reporting period: <ul style="list-style-type: none">○ an ongoing basis○ a time-limited basis

⁷ Vulnerable communities and settings might include residential care facilities, correctional facilities and some jurisdiction identified Aboriginal and Torres Strait Islander communities. High-risk of transmission settings might include some industrial and residential sites.

8. Appendix A: Jurisdiction wastewater surveillance programs (June 2022)

NEW SOUTH WALES	
Website	https://www.health.nsw.gov.au/Infectious/covid-19/Pages/sewage-surveillance.aspx
Description	<p>Sampling sites 22</p> <p>Frequency of sampling Weekly</p> <p>Locations Community catchments (major cities and rural/remote)</p> <p>Measurements</p> <ul style="list-style-type: none"> • Detection/no detection of SARS-CoV-2 • Trends in and viral load of SARS-CoV-2 • Detection of VOCs (community catchments only) • Spread and abundance of VOCs <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations Nil</p> <p>Contributing to public health decision-making</p> <ul style="list-style-type: none"> • Early detection of COVID cases prior to clinical testing • Targeted community clinical testing • Trend data informs assessment of COVID in the community • Decisions to ease Public Health and Social Measures (PHSMs) • Detected VOC ahead of clinical testing • Early warning of increasing VOC in the community • Informed early and targeted public communication regarding testing and PHSMs • Informed management of COVID-19 in high-risk settings <p>Planned and potential future wastewater surveillance</p> <ul style="list-style-type: none"> • The focus of the program has changed from early warning to monitoring of trends and detection of variants to supplement information from clinical testing.
Public reporting	Results from the NSW Sewage Surveillance Program are reported on a website in tabular form on a weekly basis, showing trend data (stable, increasing, decreasing) across a five-week period.
VICTORIA	
Website	https://www.dhhs.vic.gov.au/wastewater-testing-covid-19
Description	<p>Sampling sites: 33</p> <p>Frequency of sampling Biweekly (some weekly), Airports triweekly</p> <p>Locations Community catchments (major cities and rural/remote), airports</p> <p>Measurements</p> <ul style="list-style-type: none"> • Detection/no detection of SARS-CoV-2 • Trends in viral load of SARS-CoV-2 • Detection of VOCs • Spread and abundance of VOCs <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations</p> <ul style="list-style-type: none"> • Two major airports on an ongoing basis • Opt-in, user-pays high-risk industry sites with high numbers of workers on site (e.g., food distribution, abattoirs/meat/poultry, construction). <p>Contributing to public health decision-making</p> <ul style="list-style-type: none"> • Early detection of COVID cases prior to clinical testing • Targeted community clinical testing

	<ul style="list-style-type: none"> • Trend data informs assessment of COVID in the community • Decisions to ease Public Health and Social Measures (PHSMs) • Detected VOC ahead of clinical testing • Early warning of increasing VOC/VOI/VUM in the community • Informed early and targeted public communication regarding testing and PHSMs • Informed outbreak assessment, communication and testing strategies in high-risk settings • Informed modelling of predictions of COVID-19 cases with new variant incursion and early establishment. <p>Planned and potential future measurement</p> <ul style="list-style-type: none"> • Ongoing surveillance of variants (incursions, spread and abundance) and quantitative trends (including categorical data) at 33 sentinel sites (including 2 airports and maritime port) • Continue surveillance service to high-risk industry sites on a user-pays basis • Ability to increase number of sites monitored depending on variant and epidemiological profiles • Consider monitoring other organisms e.g., influenza, other respiratory illnesses, Monkeypox) depending on cost-benefit (i.e., at low marginal costs to add to current monitoring)
Public reporting	Map of catchment areas and tabular results showing quantitative categories (weak, moderate, strong and very strong). Tables include results from the last 28 days. Development is underway to integrate variant reporting into the public facing website.
QUEENSLAND	
Website	https://www.qld.gov.au/health/conditions/health-alerts/coronavirus-covid-19/current-status/wastewater
Description	<p>Sampling sites 18 (including 3 Aboriginal and Torres Strait Islander communities)</p> <p>Frequency of sampling Weekly (16 sites), Biweekly (2 sites).</p> <p>Locations Community catchments (major cities and rural/remote)</p> <p>Measurements</p> <ul style="list-style-type: none"> • Gene copies of SARS-CoV-2 in wastewater and passive samplers <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations</p> <ul style="list-style-type: none"> • Three Aboriginal and Torres Strait Islander Communities sampled weekly on an ongoing basis. <p>Contributing to public health decision-making</p> <ul style="list-style-type: none"> • Early detection of COVID cases prior to clinical testing • Targeted community clinical testing • Trend data informs assessment of COVID in the community. Trend data is available to internal stakeholders via a dashboard and is used by individual public health units to affirm or highlight discrepancies in human case or hospitalisation data. • Informed early and targeted public communication regarding testing and PHSMs. • Informed management of COVID-19 in high-risk settings. <p>Planned and potential future wastewater surveillance</p> <ul style="list-style-type: none"> • The wastewater program currently covers 20% of the state population and is currently funded until 30 September 2022. • The program is not undertaking any normalisation measures and does not undertake genomic sequencing or analysis of variants. • A future program based on monitoring at sentinel sites is under consideration – this may include other targets apart from SARS-CoV-2. • Capacity for variant testing could be implemented relatively quickly.

Public reporting	A public dashboard that showed a map of wastewater testing results for the last two weeks and in tabular format for the last four weeks, was removed from the Queensland Health website in June 2022. All results are uploaded to the Queensland Government Open Data Portal on a quarterly basis, as detections and non-detections.
SOUTH AUSTRALIA	
Website	COVID-19 Wastewater Surveillance Program SA Health
Description	<p>Sampling sites 11</p> <p>Frequency of sampling Weekly, biweekly (major metropolitan sites). Multiday composites used.</p> <p>Locations Community catchments (major cities and rural/remote)</p> <p>Measurements</p> <ul style="list-style-type: none"> Trends in and viral load of SARS-CoV-2 compared to detected case numbers. <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations Nil</p> <p>Contributing to public health decision-making</p> <ul style="list-style-type: none"> Early detection of COVID cases prior to clinical testing Targeted community clinical testing Trend data informs assessment of COVID in the community Indication of changes in case ascertainment Informed early and targeted public communication regarding testing and PHSMs <p>Planned and potential future wastewater surveillance</p> <ul style="list-style-type: none"> Monitoring being undertaken at 7 sentinel sites Inclusion of variant analysis is being developed Considering the applicability of wastewater surveillance to monitoring Japanese Encephalitis virus
Public reporting	The wastewater surveillance website includes weekly summaries and tabular reporting of confirmed detections of fragments of SARS-CoV-2 for metropolitan and rural sites (Latest report 22 July 2022)
WESTERN AUSTRALIA	
Website	https://ww2.health.wa.gov.au/Articles/A_E/Coronavirus/COVID19-wastewater-testing
Description	<p>Sampling sites 6</p> <p>Frequency of sampling Biweekly</p> <p>Locations Community catchments (major cities and rural/remote)</p> <p>Measurements</p> <ul style="list-style-type: none"> Detection/no detection of SARS-CoV-2 Trends in and viral load of SARS-CoV-2 Detection of VOCs <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations Nil</p> <p>Contributing to public health decision-making</p> <ul style="list-style-type: none"> Early detection of COVID cases prior to clinical testing Targeted community clinical testing Trend data informed assessment of COVID in the community Decisions to ease Public Health and Social Measures (PHSMs) Detected VOC ahead of clinical testing Informed early and targeted public communication regarding testing and PHSMs <p>Planned and potential future wastewater surveillance</p>

	<ul style="list-style-type: none"> The current baseline program will be expanded to include 8 sites (3 largest metropolitan [75% population], 5 regional) in July 2022. The new program will include quantitative analysis (biweekly) and whole-genome sequencing (weekly). Specific measures are still to be determined. The purpose of the expanded program is to monitor prevalence of COVID-19 and new VOCs, in the context of decreasing individual testing and lack of case ascertainment from that source.
Public reporting	Dashboard displaying interactive map of weekly results of wastewater testing for six metropolitan areas (expected detection, unexpected detection, not detected). Quantitative analysis of trends over time and genomic sequencing for variant monitoring are referred to on the website but results are not displayed.
TASMANIA	
Website	Previously https://www.coronavirus.tas.gov.au/facts/covid-19-wastewater-testing
Description	<p>Sampling sites 0</p> <p>Frequency of sampling N/A</p> <p>Locations Community catchments (major cities and rural/remote) were under surveillance previously</p> <p>Measurements (previously)</p> <ul style="list-style-type: none"> Detection/no detection of SARS-CoV-2 (samples are now tested in Tasmania. They were previously processed in South Australia) <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations Nil</p> <p>Contributing to public health decision-making (previously)</p> <ul style="list-style-type: none"> Early detection of COVID cases prior to clinical testing Targeted community clinical testing Informed early and targeted public communication regarding testing and PHSMs <p>Planned and potential future wastewater surveillance</p> <ul style="list-style-type: none"> Quantitative assessment or genomic testing is not undertaken in current samples. These would be required to make wastewater surveillance useful for Tasmania but are costly to implement. SARS-CoV-2 wastewater testing ceased on 30 June 2022. A review of the cost effectiveness of an ongoing wastewater testing program is planned for late 2022.
Public reporting	Results published weekly on website. Map and tabular display of weekly/monthly results by testing site (detection/no detection).
NORTHERN TERRITORY	
Website	https://coronavirus.nt.gov.au/stay-safe/covid-19-wastewater-surveillance-pilot-program
Description	<p>Sampling sites 20 (including 13 Aboriginal and Torres Strait Islander communities)</p> <p>Frequency of sampling Weekly and biweekly.</p> <p>Locations Community catchments (major cities and rural/remote)</p> <p>Measurements</p> <ul style="list-style-type: none"> Detection/no detection of SARS-CoV-2 Quantity of viral load of SARS-CoV-2 <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations</p> <ul style="list-style-type: none"> Thirteen Aboriginal and Torres Strait Islander communities sampled weekly on an ongoing basis (to be phased out from June 2022). <p>Contributing to public health decision-making</p> <ul style="list-style-type: none"> Early detection of COVID cases prior to clinical testing

	<ul style="list-style-type: none"> Informed management of COVID-19 in high-risk settings <p>Planned and potential future wastewater surveillance</p> <ul style="list-style-type: none"> Wastewater sites to be reduced to regional towns only (Darwin and four regional sites), instead of focused testing on key Aboriginal and Torres Strait Islander communities, from mid-June 2022. Currently developing the technology with Charles Darwin University to detect variants of concern.
Public reporting	Results not currently displayed or published
AUSTRALIAN CAPITAL TERRITORY	
Website	No wastewater surveillance website currently
Description	<p>Sampling sites 0</p> <p>Frequency of sampling N/A</p> <p>Locations Seven community sites and one high-risk (correctional) facility were under surveillance previously and can be restarted or used for ad-hoc testing on request</p> <p>Measurements (previously)</p> <ul style="list-style-type: none"> Detection/no detection of SARS-CoV-2 Quantity of viral load of SARS-CoV-2 <p>Monitoring SARS-CoV-2 in vulnerable or high-risk populations Nil</p> <p>No current monitoring due to high and dispersed community transmission.</p> <p>Contributing to public health decision-making Nil</p> <p>Planned and potential future wastewater surveillance</p> <ul style="list-style-type: none"> ACT ceased community wide wastewater testing in January 2022. Correctional facility wastewater testing ceased in June 2022.
Public reporting	Results not currently displayed or published

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All information in this publication is correct as of 9 August 2022

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