



Wastewater-based genomic epidemiology for SARS-CoV-2 surveillance in South Africa

3 November 2023

Sample collection dates up to 27 October 2023
(Epidemiological week 43)

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Summary: SARS-CoV-2 transmission and genomics based on evaluation of wastewater at sentinel sites across RSA

Wastewater levels

Epidemiological weeks 33-43

- From weeks 33-43, the cumulative SARS-CoV-2 levels measured at wastewater treatment works (WWTW) has remained around 2 log (100) genome copies/ml of wastewater. This has followed on from the increases observed in weeks 31-33, when the cumulative SARS-CoV-2 levels in wastewater at sentinel sites in South Africa showed increases to levels above 2 log (100) genome copies/ml of wastewater, up from below one log copy/ml in epidemiological week 22 (first week in June 2023).
- In weeks 33-43 increases and/or higher levels have been seen in Gauteng (Rooiwal WWTW, Goudkoppies WWTW and Vlakplaats WWTW), Eastern Cape (Mdantsane WWTW), Free State (Sterkwater WWTW) and Cape Town (Zandevleit WWTW).
- Correlation with syndromic surveillance for influenza-like illness (ILI) and severe acute respiratory infection findings (SARI) is required to determine the clinical and public health significance of ongoing transmission.
<https://www.nicd.ac.za/diseases-a-z-index/disease-index-covid-19/surveillance-reports/weekly-respiratory-pathogens-surveillance-report-week/>

Wastewater genomics

Epidemiological weeks 33-43

- No new genomics results were obtained for week 43
- Genomics results were obtained for weeks 33-39 for the heat map and mutational profile.
- **Omicron lineage BA.2.86 followed by JB.2, XBB.1.4, XBB.1.5.81 and XBB sub-lineages** were the dominant lineages circulating in wastewater samples between August and September 2023
- In clinical samples, **BA.2.86** was also the dominant lineage circulating between August and September 2023, followed by **XBB.1.5** and **XBB.1.5.81**.
- The **Omicron lineage BA.2.86** is circulating in KwaZulu-Natal in eThekweni (in the catchments of Northern and Central WWTWs), and in Gauteng, in the City of Johannesburg (in catchments of Northern and Goudkoppies WWTWs), in Ekurhuleni (in the catchments of Olifantsfontein, Vlakplaats, and Hartebeesfontein WWTWs), and the City of Tshwane (in the catchment of Daspoort WWTP). It is also circulating in Eastern Cape in Buffalo City (in the catchment of Mdantsane WWTW), in Western Cape, in the City of Cape Town (in the catchment of Borches Quarry WWTW), and Free State, in Mangaung (catchments Bloemspruit and Sterkwater WWTWs).

Interpretation: Ongoing transmission of SARS-CoV-2 due to Omicron lineages including the new lineage BA.2.86.

Wastewater-based Epidemiology for COVID-19

How is wastewater tested for SARS-CoV-2?

For a full description of this process, see the photoessay developed in collaboration with the Gauteng City Region Observatory

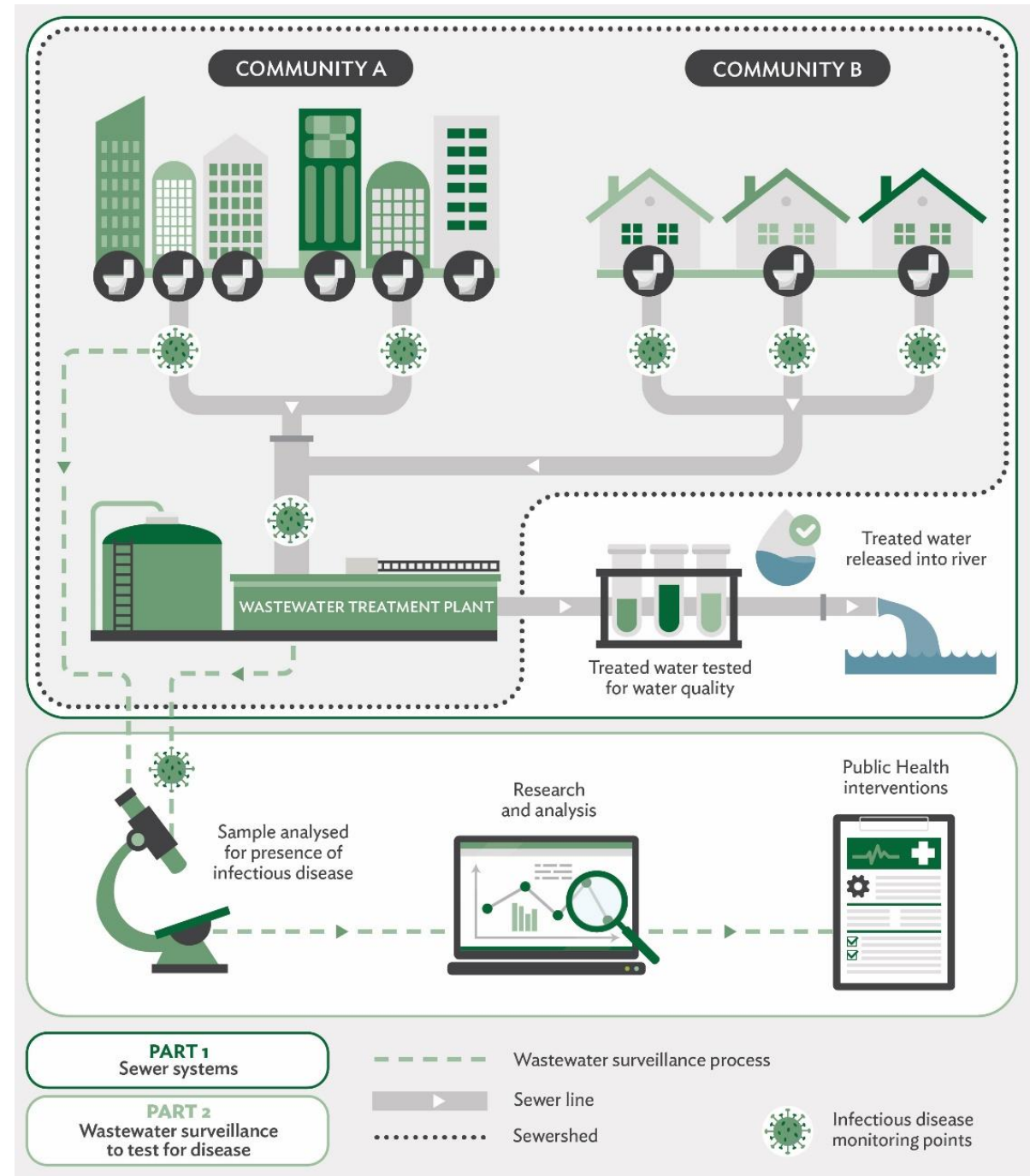
<https://www.gcro.ac.za/outputs/photo-essays/detail/photo-essay-sewersheds-what-can-wastewater-tell-us-about-community-health/>

For a technical description and analysis of wastewater levels and results see

<https://pubmed.ncbi.nlm.nih.gov/37506905/>

<https://www.medrxiv.org/content/10.1101/2022.12.15.22283506v1> (accepted by Nature Communications, publication pending)

SARS-CoV-2 is not transmitted by faeco-oral route. Wastewater with SARS-CoV-2 is not infectious



Wastewater-based Epidemiology for COVID-19

What does wastewater testing for SARS-CoV-2 mean?

Left vertical axis:

Number of lab confirmed cases in *the metro or district where the water treatment plant is located*

Bars:

Number of lab confirmed clinical cases in specimens submitted to NICD from persons in the metro/subdistrict where the plant is located

Horizontal axis:

Epidemiological weeks from 2021 to 2023

Coloured lines:

Changes in wastewater SARS-CoV-2 results over time for different treatment facilities

Coloured squares:

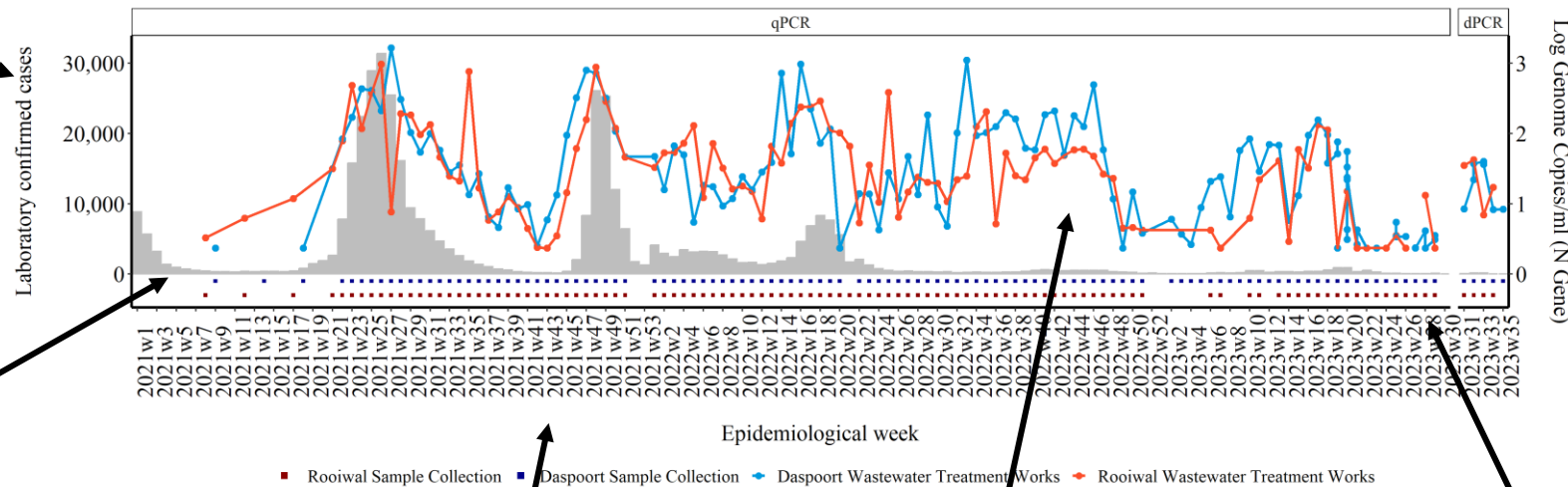
Epi weeks during which samples were collected

Facets:

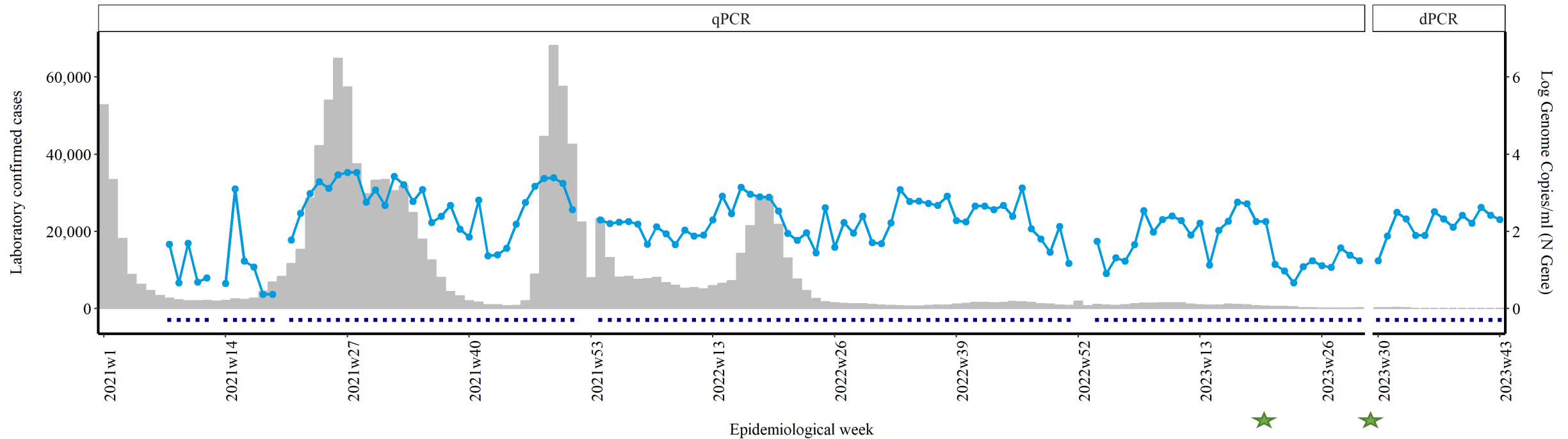
Indicates the platform used to test samples

Right vertical axis:

Log (ie 10 to the power x) copies of SARS-CoV-2 genome per ml of wastewater. So $\log 2=10^2=100$ copies per millilitre, $\log 3=10^3=1000$ copies per millilitre



South Africa at a glance: Summed total of clinical and genome copies



★ Chloroform start and end date

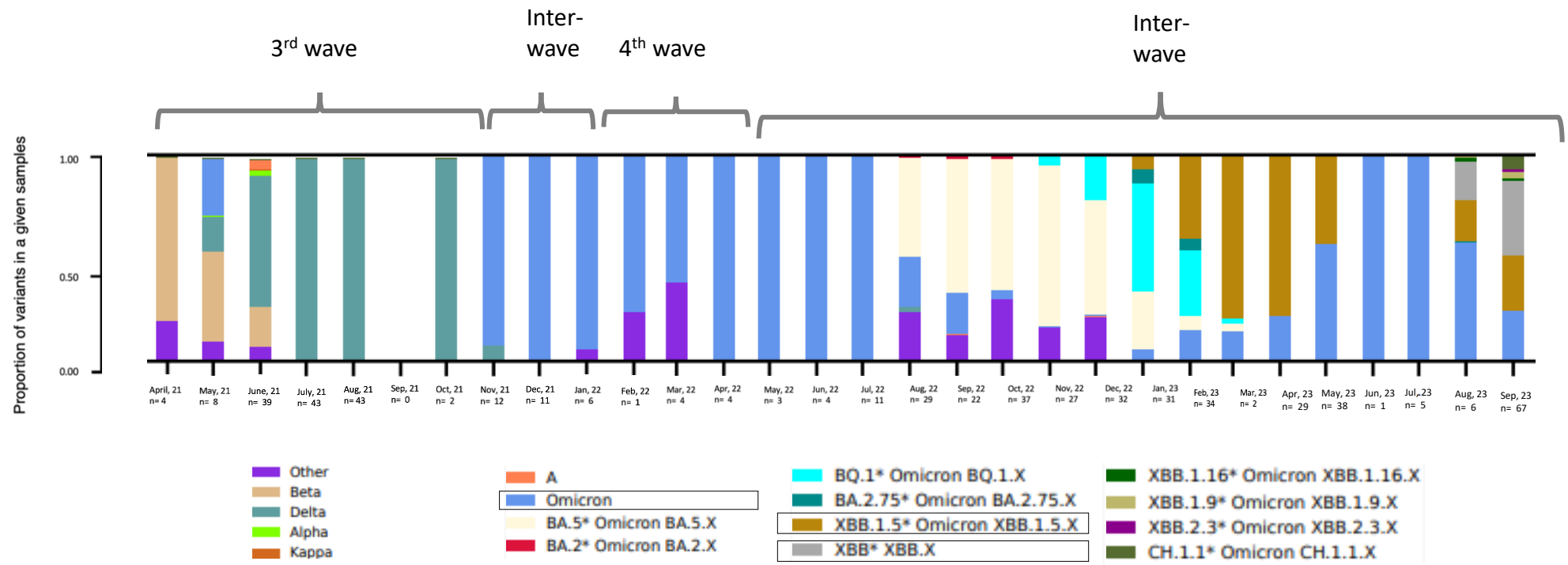
■ Sample Collection ◆ South African SARS-CoV-2 Wastewater Levels

Changes in levels of SARS-Cov-2 (line graph) in in-flowing untreated wastewater from plants tested by NICD, compared with laboratory-confirmed cases from Tshwane, Johannesburg, Ekurhuleni, eThekweni, Mangaung, Nelson Mandela, Buffalo City, and City of Cape Town (grey bars), by epidemiological week, 2021-2023.

South Africa at a glance: Circulating variants as determined by Freyja deconvolution of sequence data

- SARS-CoV-2 variants in wastewater as determined by the 'Freyja' tool (Scripps Institute)
 - Allows determination of variants in each wastewater sample
- Results from sequencing data ending in epi week 39 (29 September 2023)
 - Omicron lineages XBB.1.5 and Omicron were circulating from August to September, with XBB* dominance in September.

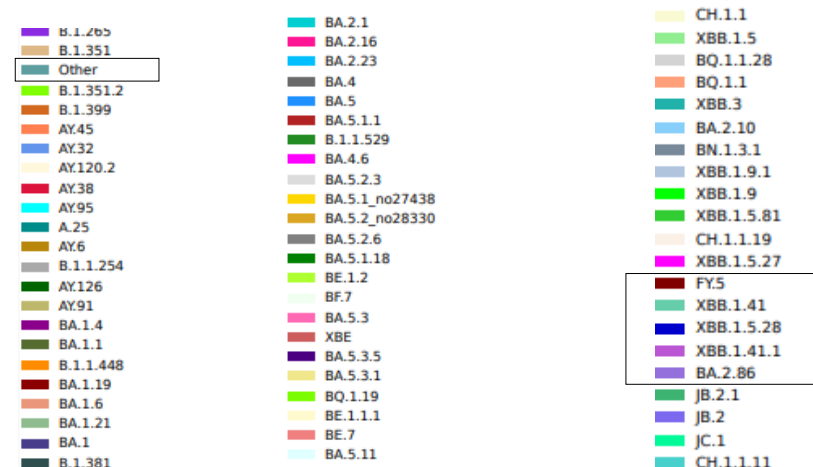
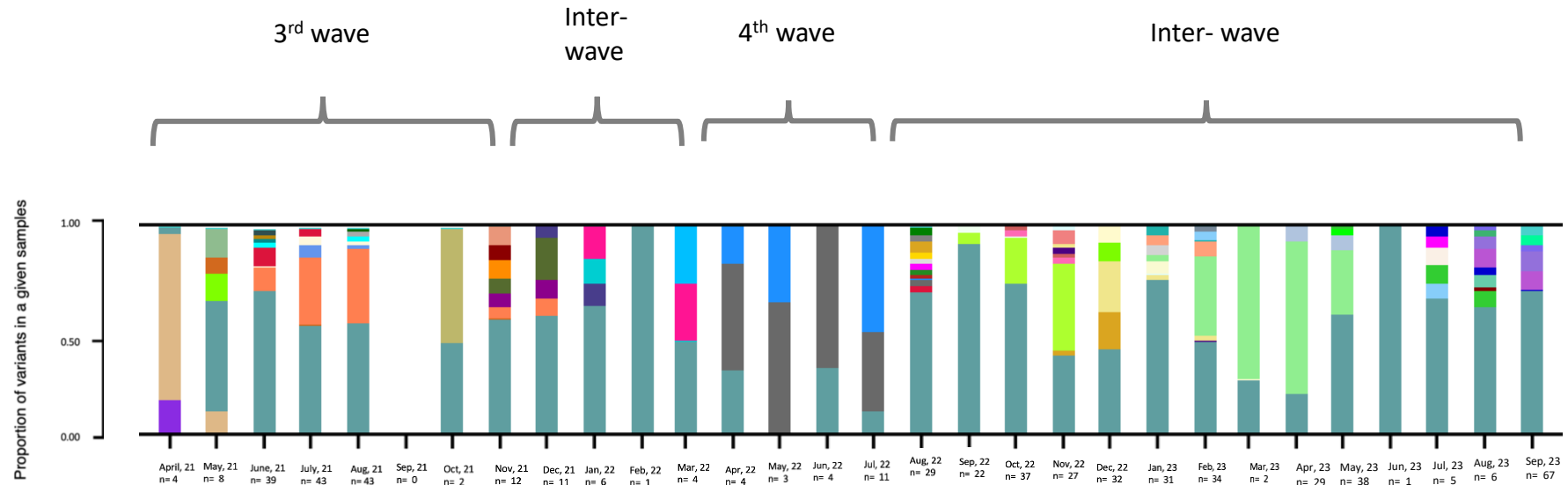
Inferred variants in wastewater samples from South African wastewater treatment plants by month, between April 2021- September 2023



South Africa at a glance: Circulating lineages as determined by Freyja deconvolution of sequence data

- Results from sequencing data ending in epi week 39 (29 September 2023)

- Omicron lineages XBB.1.41 and BA.2.86 were circulating from August to September with BA.2.86 dominance in September.
- Omicron XBB sub-lineages were in circulation throughout August.
- The predominant lineages circulating in clinical samples in the recent week are BA.2.86 followed by XBB.1.5, XBB.1.9 and XBB sub-lineages.



Lineages detected by Freyja in weeks 33-39:

- XBB.1.41
- XBB.1.41.1
- XBB.1.41
- XBB.1.5.28
- FY.5
- XBB.1.5.81
- BA.2.86

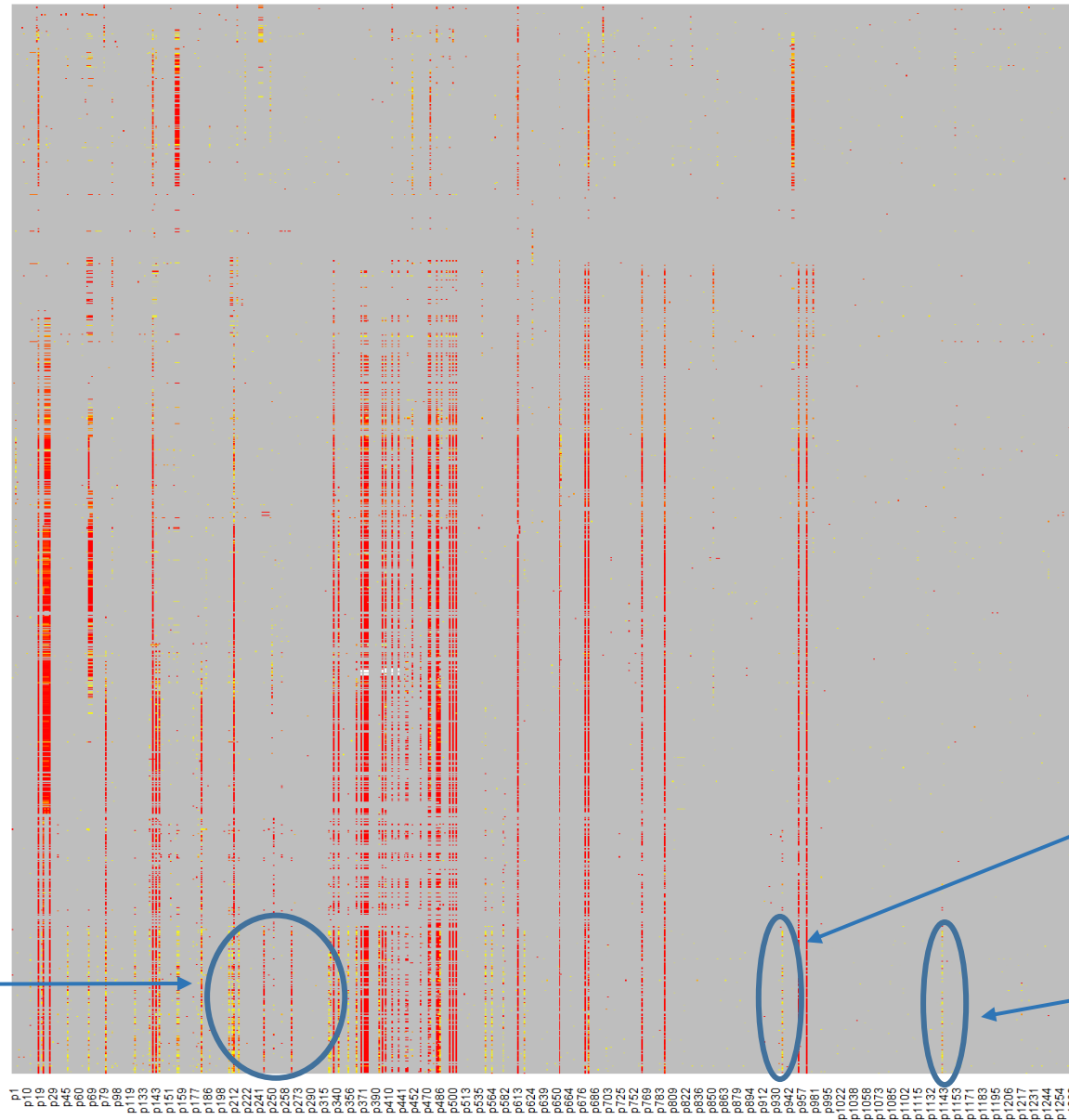
Amino acid mutations and frequency – Spike protein

XBB* is a recombinant of BA.2.10.1 and BA.2.75 that is characterised by one or more of the following mutations in the spike protein: V83A, Y144-, H146Q, Q183E, V213E, G252V, G339H, R346T, L368I, V445P, G446S, N460K, F486S, F490S

List of variants and sub-lineages of interest and concern
<https://www.who.int/en/activities/tracking-SARS-CoV-2-variants>

BA.2.86 is a highly mutated sub-lineage of BA.2, recently circulating in Denmark, Israel and the United States of America and is characterised by one or more of the following mutations in the spike protein: R21T, S50L, H69-, V70-, V127F, F157S, R158G, N211-, L212I, V213G, L216F, H245N, A264D, I332V, K356T, R403K, V445H, N450D, L452W, N481K, V483-, E484K, E554K, A570V, P621S, 1670V, P681R, S939F, P1143L, Ins16:MPLF*

V213E, R346T
 Mutations in spike protein associated with XBB* sub-lineages



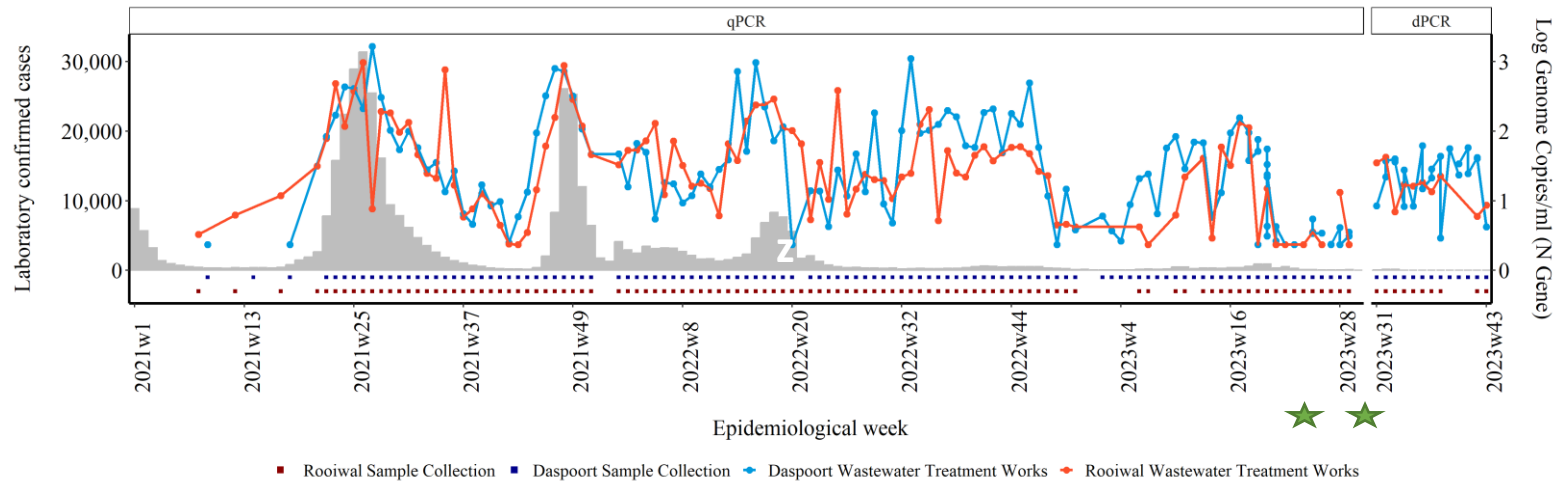
1149
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1023
1009
995
981
967
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911
897
883
869
855
841
827
813
799
785
771
757
743
729
715
701
687
673
659
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491
477
463
449
435
421
407
393
379
365
351
337
323
309
295
281
267
253
239
225
211
197
183
169
155
141
127
113
99
85
71
57
43
29
15
1

S939F
 Spike protein mutation associated with the BA.2.86 lineage

P143L
 Spike protein mutation associated with the BA.2.86 lineage

Heatmap showing patterns of emerging mutations in the spike region of SARS-CoV-2, collected from April, 2021 - August, 2023. Mutations appearing in yellow have a low read frequency, those appearing in orange have a medium read frequency and those appearing in red have a high read frequency. Mutations are included and updated weekly.

Gauteng - Tshwane



★ Chloroform start and end date

SARS-CoV-2 levels and Genomic Results in Epi week 43:

- In Epi week 43, SARS-CoV-2 levels in Daspoort WWTW decreased and are low.
- SARS-CoV-2 levels in Rooiwal WWTW have increased slightly in Epi week 43. Levels remain low.

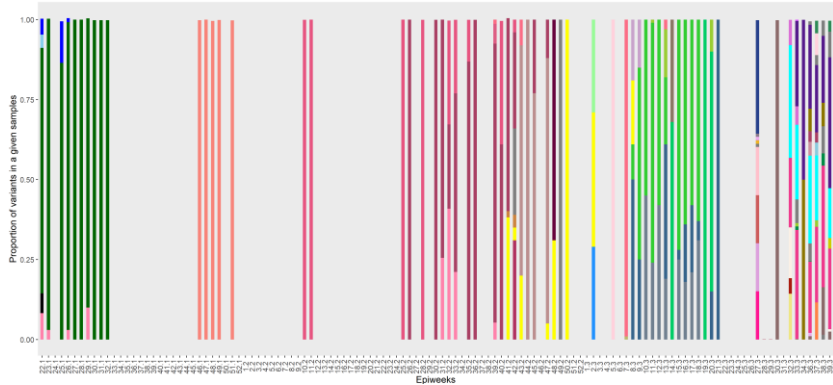
*** Sequencing data ending in Epi week 38 in Rooiwal and 39 in Daspoort. No new sequencing data available.**

- Omicron lineages XBB.1.5.49, XBB.1.16, XBB.1.9.1 and JB.2, were circulating in Daspoort during Epi week 39, with BA.2.86 dominating.
- BA.2.86 was also the dominant lineage detected in Rooiwal during epiweek 38. Other lineages including JB.2, XBB.3 and FY.5 were also in circulation.

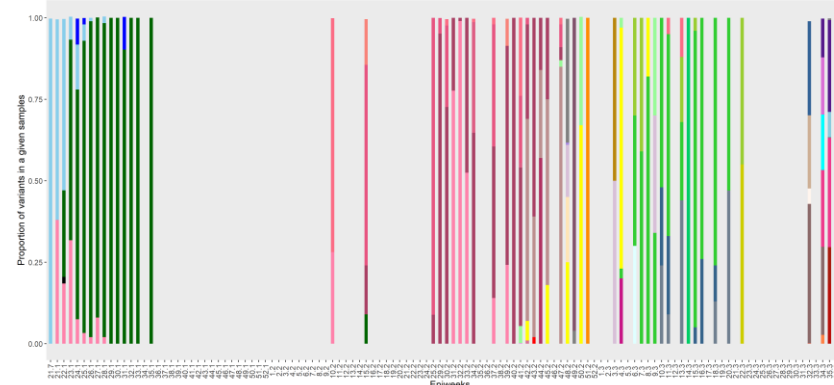
SNP Analysis:

- A combination of mutations (V127F, L212I, V213G, L216F, H245N, A264D, I332V, K356T) associated with lineage BA.2.86 were found in both Daspoort and Rooiwal.

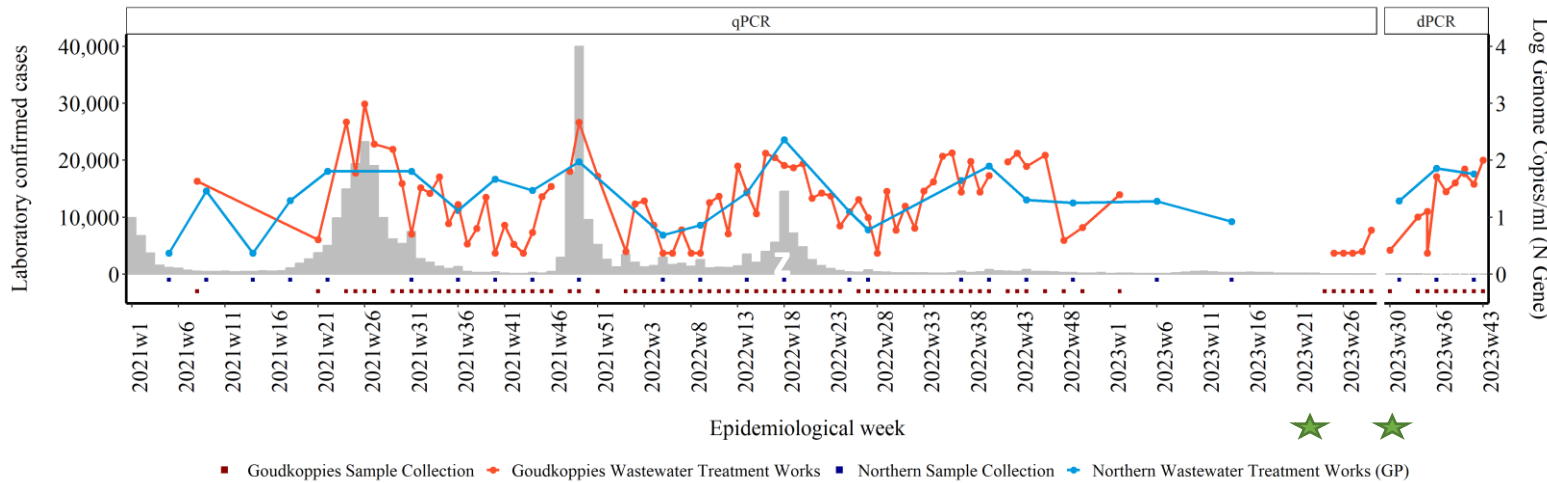
Daspoort Wastewater Treatment Works



Rooiwal Wastewater Treatment Works



Gauteng - Johannesburg



SARS-CoV-2 levels and Genomic Results in Epi week 43:

- As of Epi week 43, SARS-CoV-2 levels in Goudkoppies WWTW have increased slightly. Levels remain moderate (2 log (100) genome copies/ml of wastewater).
- In Northern WWTW, SARS-CoV-2 levels decreased slightly, but remain moderate in Epi week 42. No new results for Epi week 43 are available

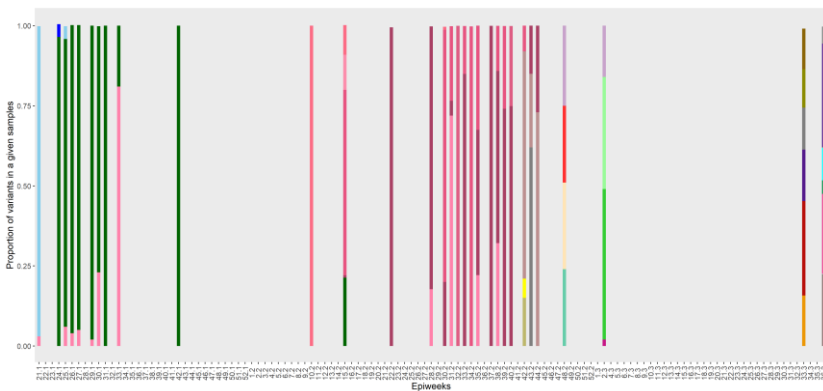
*** Sequencing data ending in Epi week 36 in Goudkoppies and 31 in Northern. No new sequencing data available.**

- During epiweek 36, Omicron lineage BA.2.86 was dominating in epiweek 36. Other lineages in circulation included XBB.1.5.81, XBB.1.41.1, JB.2 as well as XBB.1.16.17
- Omicron lineages XBB.1.5.28, XBB.1.41.1, XBB.2.4, XBB.1.42.1 and XBB.2.9 were circulating during Epi week 31 in Northern Gauteng.

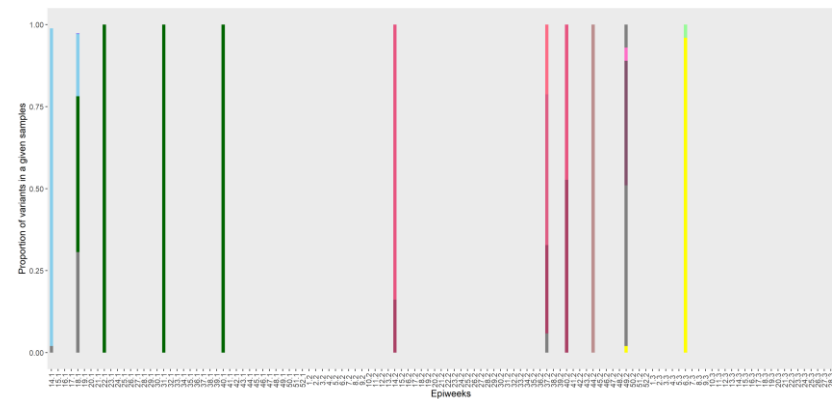
SNP Analysis:

- A combination of mutations (V127F, L212I, V213G, L216F, H245N, A264D, I332V, K356T) associated with lineage BA.2.86 were found in Goudkoppies.
- SNP analysis could not be performed as the SARS-CoV-2 sequencing coverage in the Northern Johannesburg samples collected during Epi week 34 was too low for meaningful interpretation

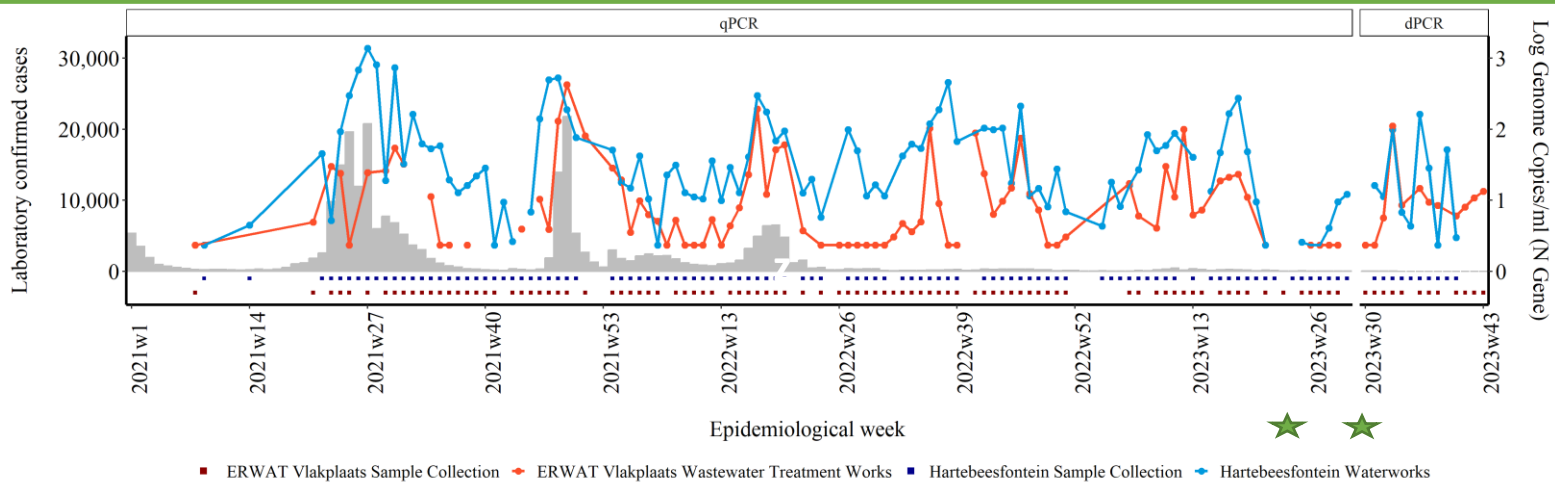
Goudkoppies Wastewater Treatment Works



Northern Wastewater Treatment Works



Gauteng - Ekurhuleni



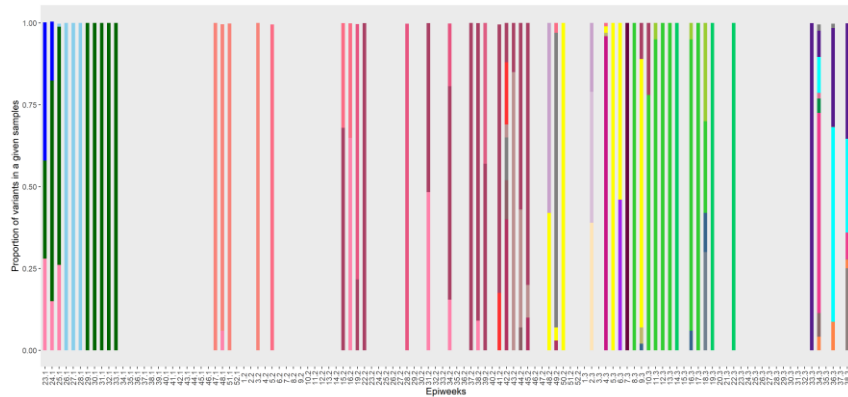
★ Chloroform start and end date

SARS-CoV-2 levels and Genomic Results in Epi week 43:

- No new results were obtained in Epi week 43 in the Hartebeesfontein WWTW. The SARS-CoV-2 levels in Hartebeesfontein WWTW decreased significantly from moderate levels in Epi week 33, to low levels in Epi week 40.
- As of Epi week 43, there was a slight increase in SARS-CoV-2 levels in Vlakplaats WWTW, after a decrease from Epi week 35.

*** Sequencing data ending in Epi week 38 in Vlakplaats and 39 in Hartebeesfontein. No new sequencing data available**

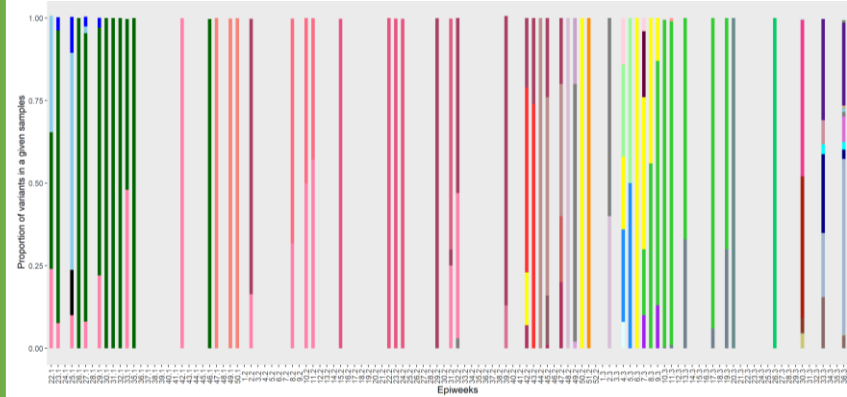
ERWAT Vlakplaats Wastewater Treatment Works



group

Alpha BA.1 BA.2 BA.4 BA.4.6 BA.5
 BA.5.1 BA.5.3 BE.1 BE.1.2 BE.7 BE.8 Beta
 BQ.1 CP.1 Delta JB.2 Other XAH XAS
 XBB XBB.1.16.17 XBB.1.41.1 XBB.1.5 XBB.1.5* XBB.1.5.81 XBB.1.5.91
 XBB.1.9 XBB.1.9.1 XBB.2 XBB.2.3.11 XBB.3 XBE

Hartebeesfontein Wastewater Treatment Works



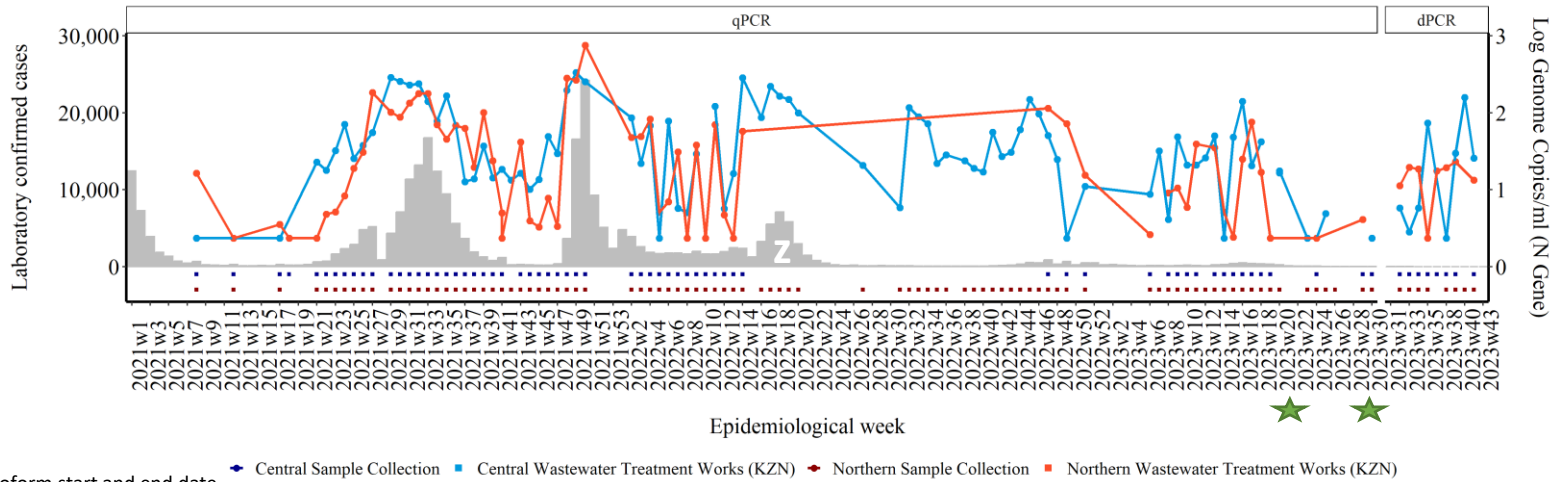
group

Alpha BE BE.1 BE.1.2 BE.7 BE.8 BE.9 BE.10 BE.11 BE.12 BE.14 BE.15 BE.16 BE.17 BE.18 BE.19 BE.20 BE.21 BE.22 BE.23 BE.24 BE.25 BE.26 BE.27 BE.28 BE.29 BE.30 BE.31 BE.32 BE.33 BE.34 BE.35 BE.36 BE.37 BE.38 BE.39 BE.40 BE.41 BE.42 BE.43 BE.44 BE.45 BE.46 BE.47 BE.48 BE.49 BE.50 BE.51 BE.52 BE.53 BE.54 BE.55 BE.56 BE.57 BE.58 BE.59 BE.60 BE.61 BE.62 BE.63 BE.64 BE.65 BE.66 BE.67 BE.68 BE.69 BE.70 BE.71 BE.72 BE.73 BE.74 BE.75 BE.76 BE.77 BE.78 BE.79 BE.80 BE.81 BE.82 BE.83 BE.84 BE.85 BE.86 BE.87 BE.88 BE.89 BE.90 BE.91 BE.92 BE.93 BE.94 BE.95 BE.96 BE.97 BE.98 BE.99 BE.100 BE.101 BE.102 BE.103 BE.104 BE.105 BE.106 BE.107 BE.108 BE.109 BE.110 BE.111 BE.112 BE.113 BE.114 BE.115 BE.116 BE.117 BE.118 BE.119 BE.120 BE.121 BE.122 BE.123 BE.124 BE.125 BE.126 BE.127 BE.128 BE.129 BE.130 BE.131 BE.132 BE.133 BE.134 BE.135 BE.136 BE.137 BE.138 BE.139 BE.140 BE.141 BE.142 BE.143 BE.144 BE.145 BE.146 BE.147 BE.148 BE.149 BE.150 BE.151 BE.152 BE.153 BE.154 BE.155 BE.156 BE.157 BE.158 BE.159 BE.160 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BE.590 BE.591 BE.592 BE.593 BE.594 BE.595 BE.596 BE.597 BE.598 BE.599 BE.600 BE.601 BE.602 BE.603 BE.604 BE.605 BE.606 BE.607 BE.608 BE.609 BE.610 BE.611 BE.612 BE.613 BE.614 BE.615 BE.616 BE.617 BE.618 BE.619 BE.620 BE.621 BE.622 BE.623 BE.624 BE.625 BE.626 BE.627 BE.628 BE.629 BE.630 BE.631 BE.632 BE.633 BE.634 BE.635 BE.636 BE.637 BE.638 BE.639 BE.640 BE.641 BE.642 BE.643 BE.644 BE.645 BE.646 BE.647 BE.648 BE.649 BE.650 BE.651 BE.652 BE.653 BE.654 BE.655 BE.656 BE.657 BE.658 BE.659 BE.660 BE.661 BE.662 BE.663 BE.664 BE.665 BE.666 BE.667 BE.668 BE.669 BE.670 BE.671 BE.672 BE.673 BE.674 BE.675 BE.676 BE.677 BE.678 BE.679 BE.680 BE.681 BE.682 BE.683 BE.684 BE.685 BE.686 BE.687 BE.688 BE.689 BE.690 BE.691 BE.692 BE.693 BE.694 BE.695 BE.696 BE.697 BE.698 BE.699 BE.700 BE.701 BE.702 BE.703 BE.704 BE.705 BE.706 BE.707 BE.708 BE.709 BE.710 BE.711 BE.712 BE.713 BE.714 BE.715 BE.716 BE.717 BE.718 BE.719 BE.720 BE.721 BE.722 BE.723 BE.724 BE.725 BE.726 BE.727 BE.728 BE.729 BE.730 BE.731 BE.732 BE.733 BE.734 BE.735 BE.736 BE.737 BE.738 BE.739 BE.740 BE.741 BE.742 BE.743 BE.744 BE.745 BE.746 BE.747 BE.748 BE.749 BE.750 BE.751 BE.752 BE.753 BE.754 BE.755 BE.756 BE.757 BE.758 BE.759 BE.760 BE.761 BE.762 BE.763 BE.764 BE.765 BE.766 BE.767 BE.768 BE.769 BE.770 BE.771 BE.772 BE.773 BE.774 BE.775 BE.776 BE.777 BE.778 BE.779 BE.780 BE.781 BE.782 BE.783 BE.784 BE.785 BE.786 BE.787 BE.788 BE.789 BE.790 BE.791 BE.792 BE.793 BE.794 BE.795 BE.796 BE.797 BE.798 BE.799 BE.800 BE.801 BE.802 BE.803 BE.804 BE.805 BE.806 BE.807 BE.808 BE.809 BE.810 BE.811 BE.812 BE.813 BE.814 BE.815 BE.816 BE.817 BE.818 BE.819 BE.820 BE.821 BE.822 BE.823 BE.824 BE.825 BE.826 BE.827 BE.828 BE.829 BE.830 BE.831 BE.832 BE.833 BE.834 BE.835 BE.836 BE.837 BE.838 BE.839 BE.840 BE.841 BE.842 BE.843 BE.844 BE.845 BE.846 BE.847 BE.848 BE.849 BE.850 BE.851 BE.852 BE.853 BE.854 BE.855 BE.856 BE.857 BE.858 BE.859 BE.860 BE.861 BE.862 BE.863 BE.864 BE.865 BE.866 BE.867 BE.868 BE.869 BE.870 BE.871 BE.872 BE.873 BE.874 BE.875 BE.876 BE.877 BE.878 BE.879 BE.880 BE.881 BE.882 BE.883 BE.884 BE.885 BE.886 BE.887 BE.888 BE.889 BE.890 BE.891 BE.892 BE.893 BE.894 BE.895 BE.896 BE.897 BE.898 BE.899 BE.900 BE.901 BE.902 BE.903 BE.904 BE.905 BE.906 BE.907 BE.908 BE.909 BE.910 BE.911 BE.912 BE.913 BE.914 BE.915 BE.916 BE.917 BE.918 BE.919 BE.920 BE.921 BE.922 BE.923 BE.924 BE.925 BE.926 BE.927 BE.928 BE.929 BE.930 BE.931 BE.932 BE.933 BE.934 BE.935 BE.936 BE.937 BE.938 BE.939 BE.940 BE.941 BE.942 BE.943 BE.944 BE.945 BE.946 BE.947 BE.948 BE.949 BE.950 BE.951 BE.952 BE.953 BE.954 BE.955 BE.956 BE.957 BE.958 BE.959 BE.960 BE.961 BE.962 BE.963 BE.964 BE.965 BE.966 BE.967 BE.968 BE.969 BE.970 BE.971 BE.972 BE.973 BE.974 BE.975 BE.976 BE.977 BE.978 BE.979 BE.980 BE.981 BE.982 BE.983 BE.984 BE.985 BE.986 BE.987 BE.988 BE.989 BE.990 BE.991 BE.992 BE.993 BE.994 BE.995 BE.996 BE.997 BE.998 BE.999 BE.1000

SNP Analysis:

- A combination of mutations (V127F, L212I, V213G, L216F, H245N, A264D, I332V, K356T) associated with lineage BA.2.86 were found in both Ekurhuleni treatment plants.

KwaZulu-Natal - eThekweni

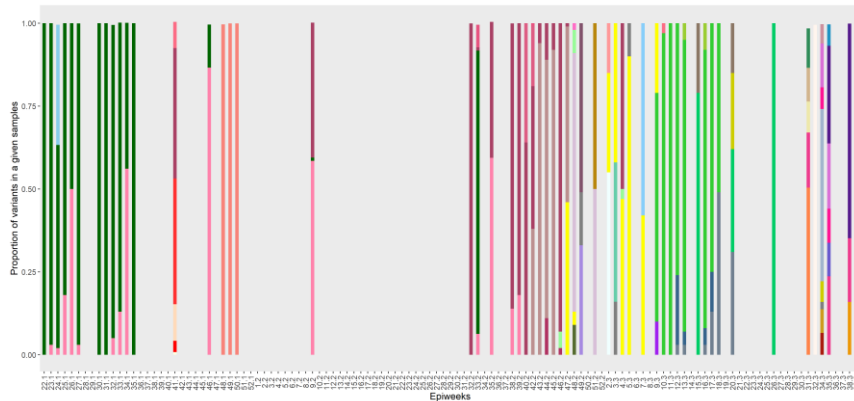


SARS-CoV-2 levels and Genomic Results in Epi week 43:

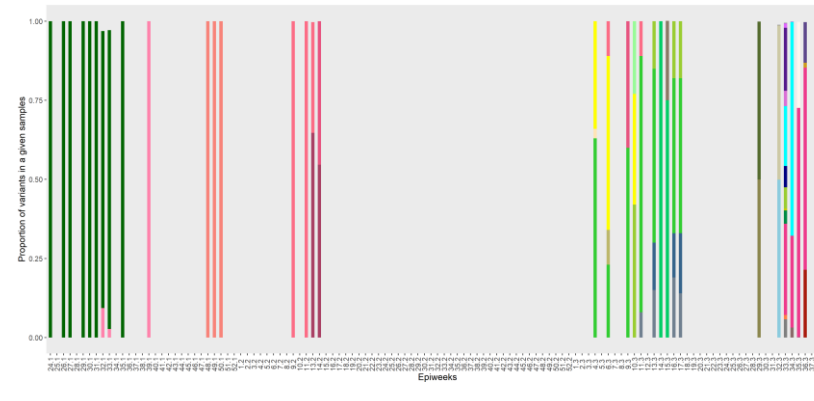
- No new results were obtained in Epi week 43 however, SARS-CoV-2 levels in Central WWTW in Epi week 39 showed a sharp increase from low levels in Epi week 38 (1 log copy/ml) to moderate levels (2 log copies/ml), followed by a decrease. Levels remain moderate.
- No new results were obtained in Epi week 43 however, SARS-CoV-2 levels increased from low to moderate in week Epi 36 in Northern WWTW, after which there was a slight decrease. Levels remain moderate in Epi week 42.

*** Sequencing data ending in Epi week 39 in Central eThekweni and in eThekweni North. No new sequencing data available**

Central Wastewater Treatment Works



Northern Wastewater Treatment Works

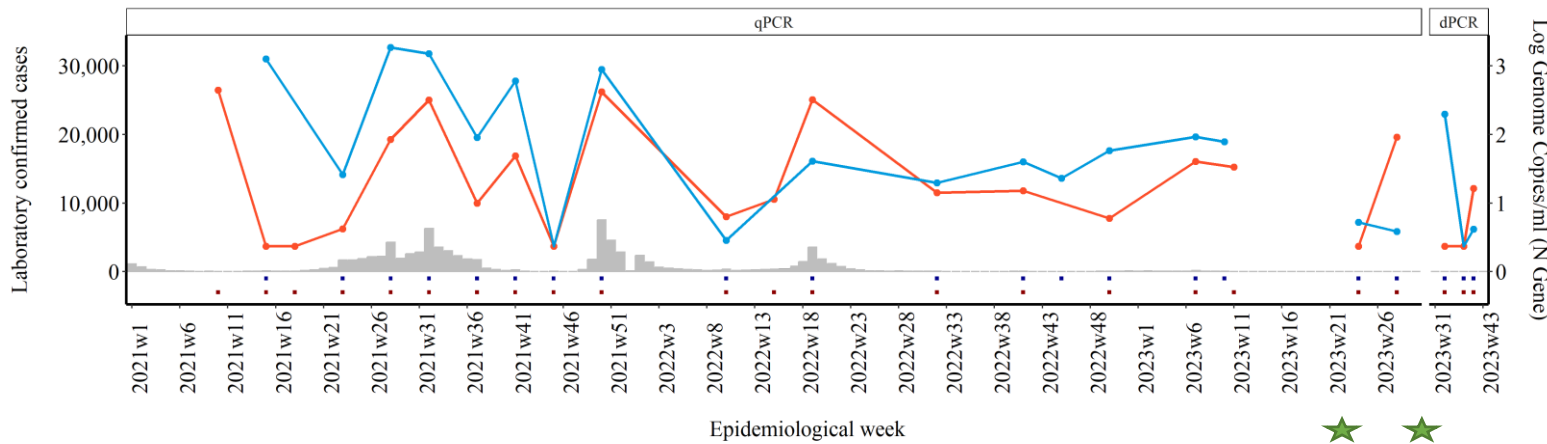


- XBB, XBB.1.5.28, JC.1, JB.2 were circulating in Epi week 39, with a BA.2.86 dominance at the Central eThekweni water treatment plant.
- In eThekweni North, XBB.1.42.1, JB.2, and BA.2.86 were circulating during Epi week 39

SNP Analysis:

- A combination of mutations (V127F, L212I, V213G, L216F, H245N, A264D, I332V, K356T) associated with lineage BA.2.86 were found in both eThekweni wastewater treatment plants.

Eastern Cape – Nelson Mandela



Chloroform start and end date

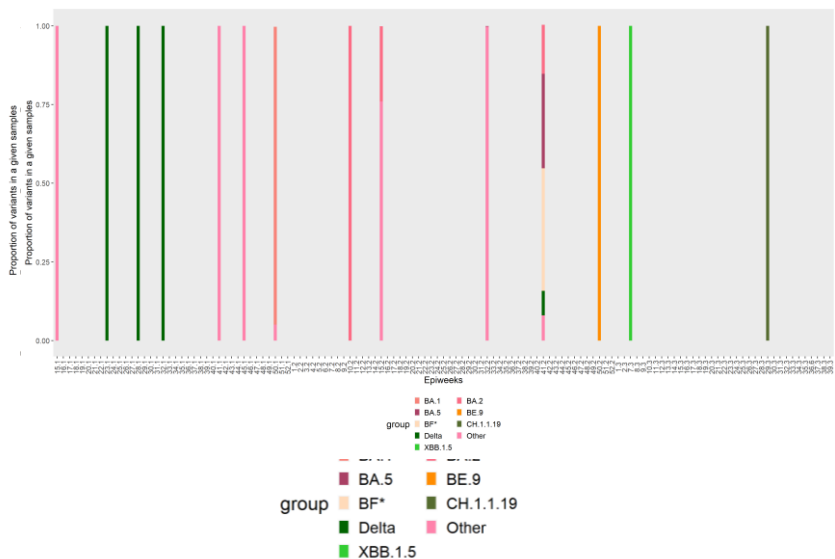
■ Brickfield Sample Collection ◆ Brickfield Pre-treatment Works ■ Kwanobuhle Sample Collection ◆ Kwanobuhle Wastewater Treatment Works

SARS-CoV-2 levels and Genomic Results in Epi week 43:

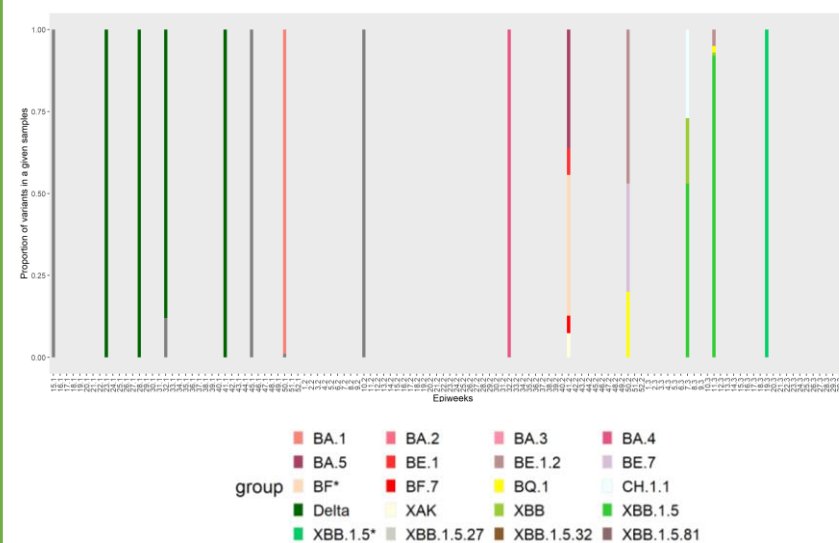
- No new results were obtained in Epi week 43, however, in Epi week 37, a sharp decrease in SARS-CoV-2 levels were seen in Kwanobuhle WWTW, followed by a slight increase. SARS-CoV-2 levels remain low.
- SARS-CoV-2 levels increased from low to moderate from Epi week 33 to Epi week 34 in Brickfield Pre-treatment works. No new results are available for Epi week 43.

*** Sequencing data ending in Epi week 29 in Brickfield and 32 in Kwanobuhle. No new sequencing data available**

Brickfield Pre-treatment works



Kwanobuhle Wastewater Treatment Works

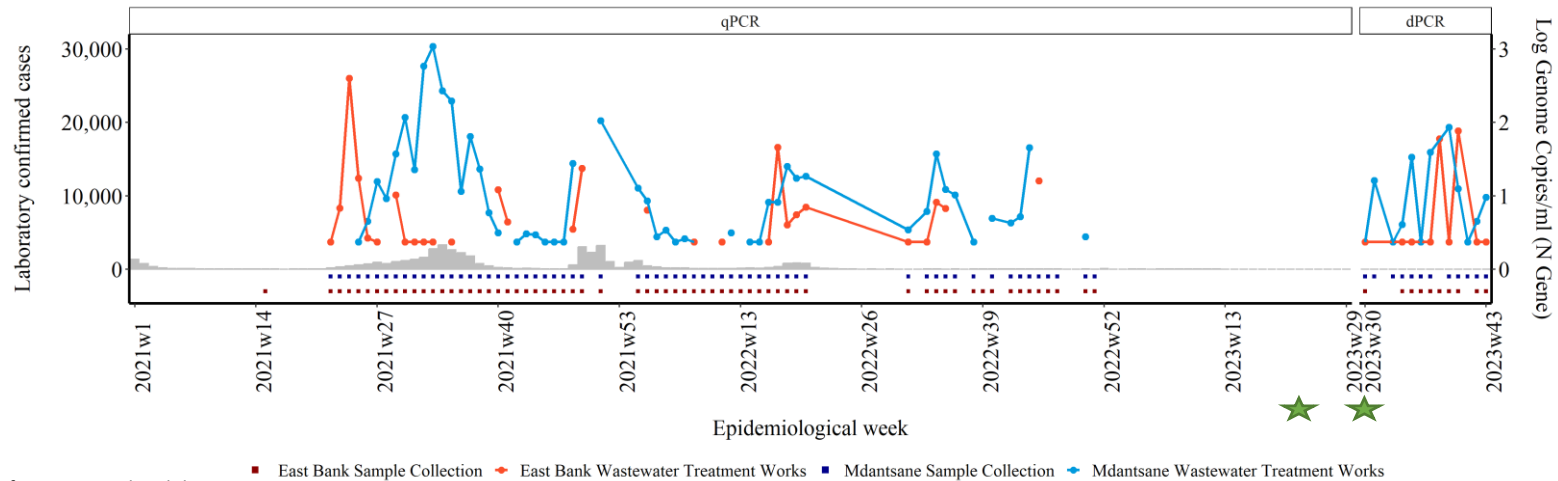


- SARS-CoV-2 sequencing coverage in the Brickfield samples collected during Epi weeks 30-32 are too low for meaningful interpretation
- Omicron lineages XBB.1.5.81, XBB.1.5.32 and XBB.1.5.27 were circulating in Kwanobuhle during epi week 32.

SNP Analysis:

- SNP analysis could not be performed as the SARS-CoV-2 sequencing coverage in the Brickfield and Kwanobuhle samples collected during Epi weeks 30-39 were too low for meaningful interpretation.

Eastern Cape – Buffalo City



SARS-CoV-2 levels and Genomic Results in Epi week 43:

- In Epi week 43, SARS-CoV-2 levels in Mdantsane WWTW increased but remain low.
- SARS-CoV-2 levels in East Bank WWTW in Epi week 43 were low after decrease was observed in Epi week 38.

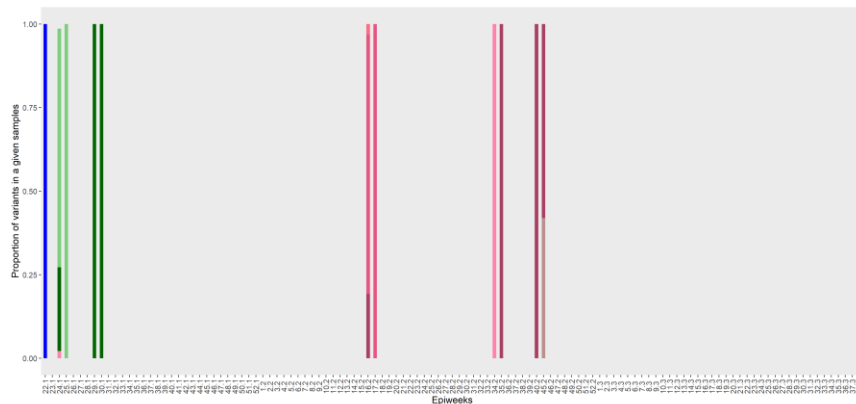
*** Sequencing data ending in Epi week 38 in Eastbank and 39 in Mdantsane. No new sequencing data available**

- Omicron lineage BA.2.86, XBB.2.9, XBB.2.9 and GG.1 were circulating in Eastbank during Epi week 38.
- Lineages CH.1.1.11, BA.2.86, XBB.1.5.81 and XBB.1.5.88 were circulating in Mdantsane during Epi week 39.

SNP Analysis:

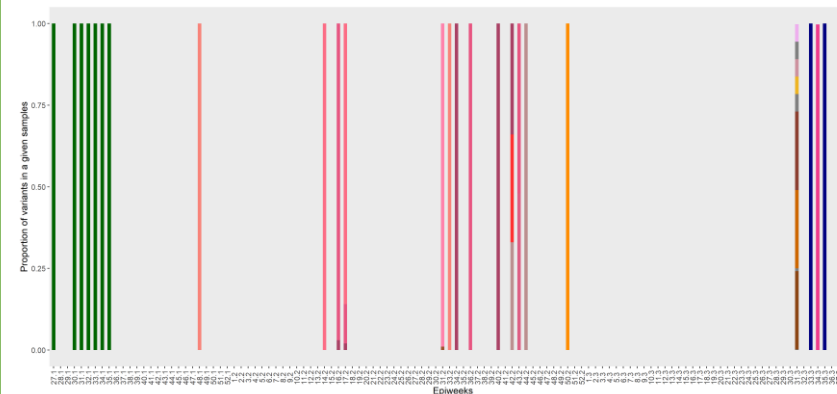
- A combination of mutations (V127F, L212I, V213G, L216F, H245N, A264D, I332V, K356T) associated with lineage BA.2.86 were found in both Eastbank and Mdantsane.

East Bank Wastewater Treatment Works



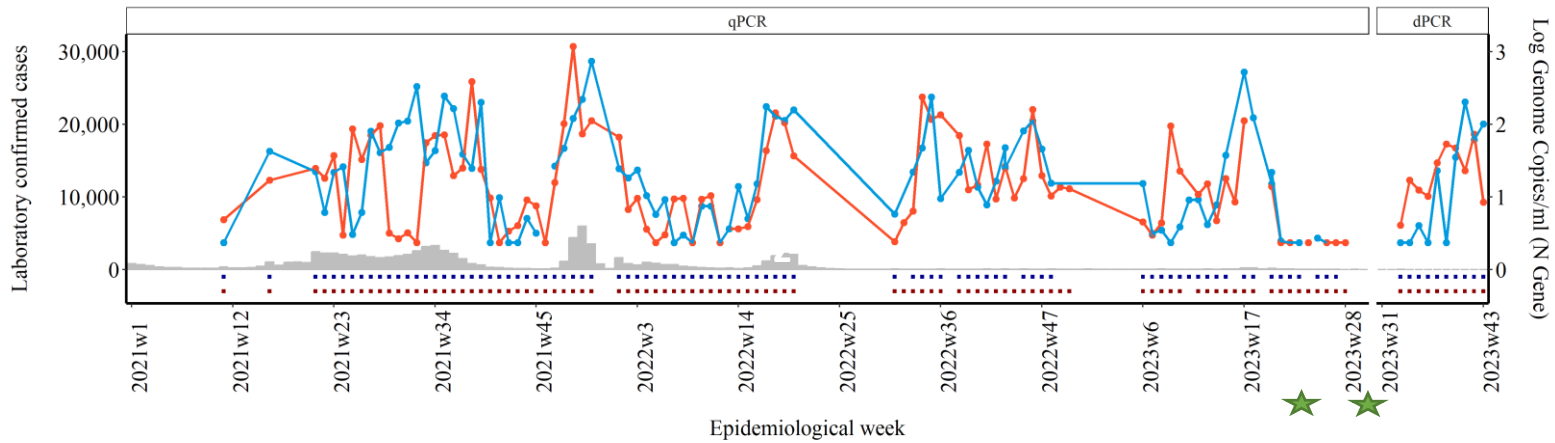
- | | | |
|-----------|-----------|-----------|
| ■ A | ■ Alpha | ■ BA.2 |
| ■ BA.2.86 | ■ BA.4 | ■ BA.5 |
| ■ BE.1.2 | ■ Delta | ■ GG.1 |
| ■ Other | ■ XBB.2.4 | ■ XBB.2.9 |

Mdantsane Wastewater Treatment Works



- | | | | | | |
|--------------|--------------|--------------|--------------|--------------|--------------|
| ■ BA.1 | ■ BA.2 | ■ BA.2.86 | ■ BA.2.86.1 | ■ BA.3 | ■ BA.4 |
| ■ BA.4.6 | ■ BA.5 | ■ BE.1 | ■ BE.1.2 | ■ BE.9 | ■ CH.1.1.11 |
| ■ CJ.1 | ■ Delta | ■ FY.3 | ■ FY.5 | ■ HS.1 | ■ JB.2 |
| ■ JB.2.1 | ■ Other | ■ XAP | ■ XBB.1.22 | ■ XBB.1.41.1 | ■ XBB.1.5.32 |
| ■ XBB.1.5.56 | ■ XBB.1.5.81 | ■ XBB.1.5.88 | ■ XBB.1.5.91 | | |

Free State – Mangaung



SARS-CoV-2 levels and Genomic Results in Epi week 43:

- In Bloemspruit WWTW, a decrease in SARS-CoV-2 levels were seen in Epi week 43. Levels are low.
- A sharp increase in SARS-CoV-2 levels were seen in Sterkwater WWTW from Epi week 38. In Epi week 42 levels decreased and increased again in Epi week 43 and remain moderate.

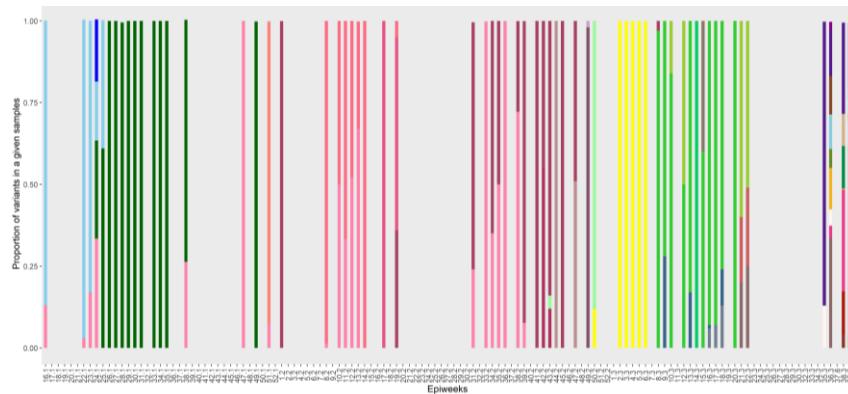
*** Sequencing data ending in Epi week 39 in Bloemspruit and 38 in Sterkwater. No new sequencing data available**

- Lineage JB.2 was the dominant lineage circulating in Bloemspruit during week 39, with BA.2.86, FL.25, FY.5 and XBB.2.4 also circulating in the area.
- XBB.1.41.1 was the dominant lineage circulating in Sterkwater during week 38. HS.1, JB.2, XBB.1.22 and JB.2.1 were also circulating during this time.

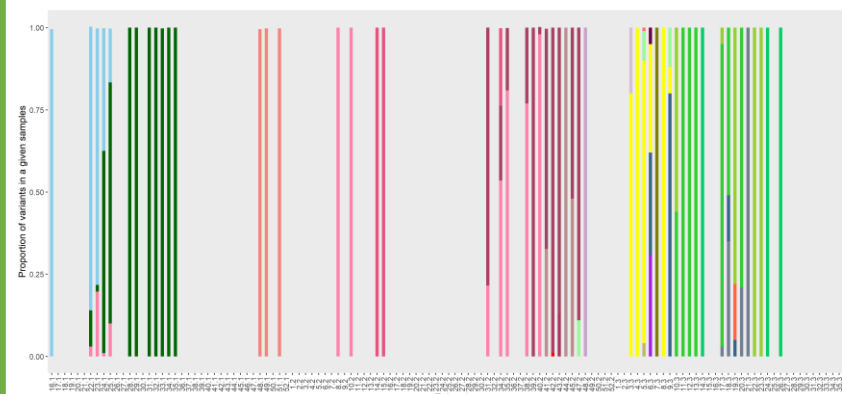
SNP Analysis:

- A combination of mutations (V127F, L212I, V213G, L216F, H245N, A264D, I332V, K356T) associated with lineage BA.2.86 were found in both Bloemspruit and Sterkwater.

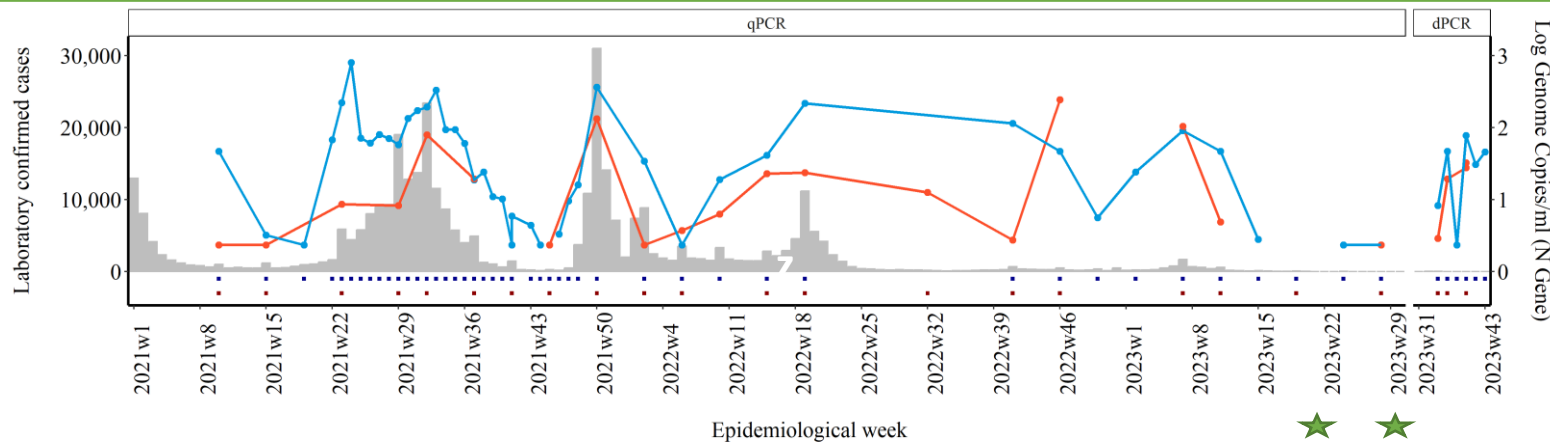
Bloemspruit Wastewater Treatment Works



Sterkwater Wastewater Treatment Works



Western Cape – City of Cape Town



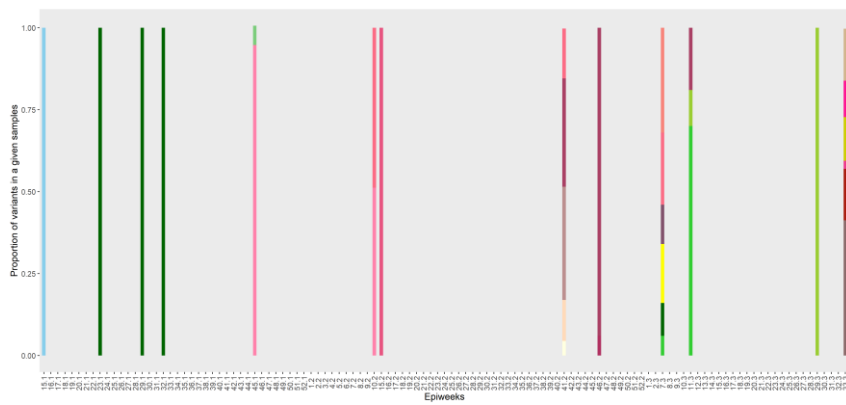
★ Chloroform start and end date

SARS-CoV-2 levels and Genomic Results in Epi week 43

- After a sharp increase in SARS-CoV-2 levels in Epi week 37, SARS-CoV-2 levels in Borcheds Quarry WWTW remain moderate. No new results are available in Epi week 43.
- In Epi week 41, a 2-fold increase in SARS-CoV-2 levels were observed in Zandvleit WWTW. In Epi week 43, SARS-CoV-2 levels remain moderate.

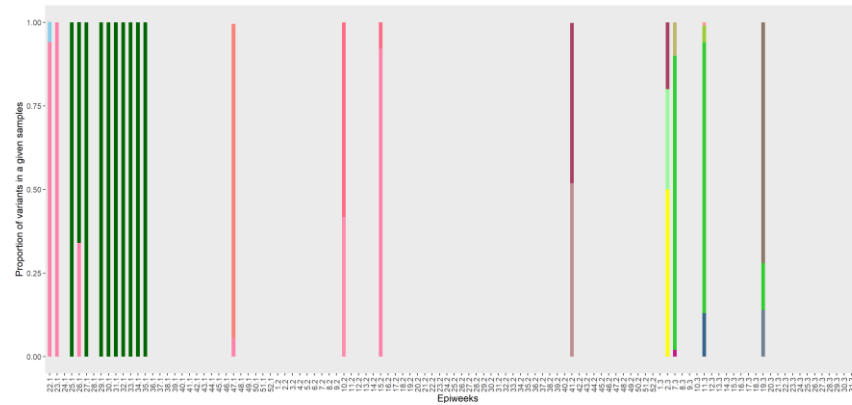
*** Sequencing data ending in Epi week 33 in Bloemspruit and in Sterkwater. No new sequencing data available**

Borcheds Quarry Wastewater Treatment Works



- | | | | | |
|--------------|------------|--------------|-----------|--------------|
| ■ A | ■ BA.1 | ■ BA.2 | ■ BA.4 | ■ BA.5 |
| ■ BA.5.2 | ■ BE.1.2 | ■ Beta | ■ BF* | ■ BQ.1 |
| ■ Delta | ■ EG.2 | ■ JB.2 | ■ Other | ■ XAK |
| ■ XBB | ■ XBB.1.16 | ■ XBB.1.41.1 | ■ XBB.1.5 | ■ XBB.1.5.28 |
| ■ XBB.1.5.81 | ■ XBE | | | |

Zandvleit Wastewater Treatment Works



- | | | | | |
|-------------|---------------|---------------|-------------|-----------|
| ■ BA.1 | ■ BA.2 | ■ BA.2.75 | ■ BA.3 | ■ BA.4 |
| ■ BA.5 | ■ BE.1.1 | ■ BE.1.2 | ■ Beta | ■ BQ.1 |
| ■ Delta | ■ FL* | ■ JB.2.1 | ■ Other | ■ XAS |
| ■ XBB | ■ XBB.1.16.16 | ■ XBB.1.16.21 | ■ XBB.1.22 | ■ XBB.1.5 |
| ■ XBB.1.5.1 | ■ XBB.1.5.28 | ■ XBB.1.9 | ■ XBB.1.9.1 | ■ XBB.3 |

SNP Analysis:

- A combination of mutations (V127F, L212I, V213G, L216F, H245N, A264D, I332V, K356T) associated with lineage BA.2.86 were found in both Borcheds Quarry and Zandvleit.

COLLABORATORS



FUNDERS



TEAM

