**Sequencing Report for SAN 21-02023**

This report provides a phylogenetic analysis of the H7 avian influenza A positive sample detected in SAN 21-02023 with comparison to NAIWB datasets and recent Victorian H7 (chicken and emu) outbreaks. Please also refer to the diagnostic test report.

Avian influenza A virus (AIV) HA sequences of H7 subtype was generated directly from the sample as shown in Table 1.

**Table 1: 21-02023 AIV PCR positive samples from which virus sequences was obtained**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ACDP(AAHL) SAMPLE No.** | **Sample ID** | **Host** | **Subtype** | **HA cleavage site sequence** |
| 21-02023-0003 | 21-02391-073 | wild bird | H7N8 | PEIPGKR\*GLF |

* The 21-02023 H7 HA sample had 96-98% nucleotide sequence similarities to LPAI H7N6 (20-02860) emu outbreak and HPAI H7N7 (20-02581) poultry outbreak samples respectively and 98-99% similarity to H7-HA from recent wild bird surveillance from VIC and SA (see Figure 1a: 21-02023 H7 HA nucleotide sequence similarities).
* The HA nucleotide sequence alignments are shown in Figure 2 "21-02023 H7 HA nucleotide sequence alignment".
* Figure 3 “21-02023 H7 HA amino acid sequence alignment” provides an overview of the translated HA amino acid sequences between the submitted virus sample and the H7 outbreak samples in poultry and emu and recent H7-HA sequences from wild bird surveillance. The 21-02023 H7 HA sample had 97-98% amino acid sequence similarities to the LPAI H7N6 (20-02860) emu outbreak and HPAI H7N7 (20-02581) poultry outbreak samples respectively and 99% similarity to H7-HA from recent wild bird surveillance from VIC and SA. (see Figure 1b: 21-02023 H7 HA amino acid sequence similarities)
* Phylogenetic analysis based on near complete HA gene sequence shows that the LPAI H7N8 virus detected in sample 21-02023-0003 belongs to circulating H7 HA Australian lineages (Figure 4).
* Table 2 shows the top 10 BLAST results for 21-02023-0003 H7-HA sequence against the NAIWB surveillance virus sequence database.

**Figure 1a: 21-02023 H7 HA nucleotide sequence similarities**

Reference molecule: 21-02023-0003 H7-HA (VIC)

Number of sequences to align: 7

Total length of aligned sequences with gaps: 1692 bps

Sequence Match NonMatch %Match

21-02023-0003 HA-H7 (VIC)

20-02581-0003 H7-HA (VIC-poultry) 1669 23 98

20-02860-5-01 H7-HA (VIC-emu) 1620 63 96

21-00167-1-01 H7-HA (VIC) 1673 10 99

20-03958-14-01 H7-HA (SA) 1671 12 99

20-03958-23-01 H7-HA (SA) 1670 13 99

20-03958-25-01 H7-HA (SA) 1666 17 98

**Figure 1b: 21-02023 H7 HA amino acid sequence similarities**

Reference molecule: 21-02023-0003 H7-HA (VIC)

Number of sequences to align: 7

Total length of aligned sequences with gaps: 564 aas

Sequence Match NonMatch %Match

21-02023-0003 H7-HA (VIC)

20-02581-0003 H7-HA (VIC-poultry) 558 6 98

20-02860-5-01 H7-HA (VIC-emu) 545 16 97

21-00167-1-01 H7-HA (VIC) 558 3 99

20-03958-14-01 H7-HA (SA) 558 3 99

20-03958-23-01 H7-HA (SA) 559 2 99

20-03958-25-01 H7-HA (SA) 557 4 99

**Figure 2: 21-02023 H7 HA nucleotide sequence alignment**

21-02023-0003 H7-HA (VIC) 1 ATGAACACTCGAATTCTAATACTCACCCTTACAGCAATCGTCCACACAAATGCAGACAAAATATGCATTGGACATCATGCTGTATCAAACGGCACCAAAGTGAACACGCTCACGGAGAGGGGTGTAGAAGTTGTCAATGCTACTGAAACAGTAGAGCAGATGAACATTCCCAGAATTTGTACTAAGGGAAAAAGAGCGATTGATCTCGGT

20-02581-0003 H7-HA (VIC-poultry) ATGAACACTCGAATTCTAATACTCACCCTTACAGCAATCGTCCACACAAATGCAGACAAAATATGCATTGGACATCATGCTGTATCAAATGGCACCAAAGTGAACACGCTCACGGAGAGGGGTGTAGAAGTTGTCAATGCTACCGAAACAGTGGAGCAGATGAACATTCCTAGAATTTGTACTAAGGGAAAAAGAGCGATTGATCTCGGT

20-02860-5-01 H7-HA (VIC-emu) ATGAACACTCGAATTCTAATACTCACCTTTATGGCAATCGTCCACACAAATGCAGACAAAATCTGCATTGGACATCACGCTGTATCAAATGGCACCAAAGTGAACACGCTCACGGAGAGGGATGTAGAAGTTGTCAATGCTACCGAAACAGTGGAACAGATGAACATCCCTAGAATTTGTACTAAGGGAAAAAGAGCGATTGATCTCGGT

21-00167-1-01 H7-HA (VIC) ATGAACACTCGAATTCTAATACTCACCCTTACAGCAATCGTCCACACAAATGCAGACAAAATATGCATTGGACATCATGCTGTATCAAATGGCACCAAAGTGAACACGCTCACGGAGAGGGGTGTAGAAGTTGTCAATGCTACTGAAACAGTAGAGCAGATGAACATTCCCAGAATTTGTACTAAGGGAAAAAGAGCGATTGATCTCGGT

20-03958-14-01 H7-HA (SA) ATGAACACTCGAATTCTAATACTCACCCTTACAGCAATCGTCCACACAAATGCAGACAAAATATGCATTGGACATCATGCTGTATCAAATGGCACCAAAGTGAACACGCTCACGGAGAGGGGTGTAGAGGTTGTCAATGCTACTGAAACAGTAGAGCAGATGAACATTCCCAGAATTTGTACTAAAGGAAAAAGAGCGATTGATCTCGGT

20-03958-23-01 H7-HA (SA) ATGAACACTCGAATTCTAATACTCACCCTTACAGCAATCGTCCACACAAATGCAGACAAAATATGCATTGGACATCATGCTGTATCAAATGGCACCAAAGTGAACACGCTCACGGAGAGGGGTGTAGAGGTTGTCAATGCTACTGAAACAGTAGAGCAGATGAACATTCCCAGAATTTGTACTAAAGGAAAAAGAGCGATTGATCTCGGT

20-03958-25-01 H7-HA (SA) ATGAACACTCGAATTCTAATACTCACCCTTACAGCAATCGTCCACACAAATGCAGACAAAATATGCATTGGACATCATGCTGTATCAAATGGCACCAAAGTGAACACGCTCACGGAGAGAGGTGTAGAAGTTGTCAATGCTACTGAAACAGTAGAGCAGATGAACATTCCTAGAATTTGTACTAAGGGAAAAAGAGCAATTGATCTCGGT

21-02023-0003 H7-HA (VIC) 211 CAGTGTGGGTTACTTGGCATAGTCACAGGACCACCTCAATGTGATCAATTCCTCGAGTTTGCAGCGGATCTGATAATCGAGCGGAGAGAAGGAGATGATGTTTGCTATCCTGGGAAATTTGTAAATGAAGAAGCCCTACGCCAAATTCTCAGGGAGTCAGGAGGGATCAACAAAGAAACAACGGGATTCACATACAGTGGAATAAGGACT

20-02581-0003 H7-HA (VIC-poultry) CAGTGTGGGTTGCTTGGCATAGTCACAGGACCACCTCAATGTGATCAATTCCTCGAGTTTGCAGCGGATCTGATAATCGAGCGGAGAGAAGGAGATGATGTTTGCTATCCTGGGAAATTTGTAAATGAAGAAGCCCTACGCCAAATTCTCAGGGAGTCAGGAGGGATCAACAAAGAAACAACGGGATTCACATACAGTGGAATAAGGACT

20-02860-5-01 H7-HA (VIC-emu) CAGTGTGGGTTACTTGGCATTGTCACAGGACCACCTCAATGTGATCAACTCCTCGAGTTTGCAGCTGATCTGATAATCGAGCGGAGAGAAGGAAATGATGTCTGCTATCCTGGGAAATTTGTGAATGAAGAAGCCCTACGTCAAATTCTCAGGGAGTCAGGAGGGATCAACAAAGAAACAACTGGATTCACATACAGTGGAATAAGGACT

21-00167-1-01 H7-HA (VIC) CAGTGTGGGTTACTTGGCATAGTCACAGGACCACCTCAATGTGATCAATTCCTCGAGTTTGCAGCGGATCTGATAATCGAGCGGAGAGAAGGAGATGATGTTTGCTATCCTGGGAAATTTGTAAATGAAGAAGCCCTACGCCAAATTCTCAGGGAGTCAGGAGGGATCAACAAAGAAACAACGGGATTCACATACAGTGGAATAAGGACT

20-03958-14-01 H7-HA (SA) CAGTGTGGGTTACTTGGCATAGTCACAGGACCACCTCAATGTGATCAATTCCTCGAGTTTGCAGCGGATCTGATAATCGAGCGGAGAGAAGGAGATGATGTTTGCTATCCTGGGAAATTTGTAAATGAAGAAGCCCTACGCCAAATTCTCAGGGAGTCAGGAGGGATCAACAAAGAAACAACGGGATTCACATACAGTGGAATAAGGACT

20-03958-23-01 H7-HA (SA) CAGTGTGGGTTACTTGGCATAGTCACAGGACCACCTCAATGTGATCAATTCCTCGAGTTTGCAGCGGATCTGATAATCGAGCGGAGAGAAGGAGATGATGTTTGCTATCCTGGGAAATTTGTAAATGAAGAAGCCCTACGCCAAATTCTCAGGGAGTCAGGAGGGATCAACAAAGAAACAACGGGATTCACATACAGTGGAATAAGGACT

20-03958-25-01 H7-HA (SA) CAGTGTGGGTTACTTGGCATAGTCACAGGACCACCTCAATGTGATCAATTCCTCGAGTTTGCAGCGGATCTGATAATCGAGCGGAGAGAAGGAGATGATGTTTGCTATCCTGGGAAATTTGTAAATGAAGAAGCCCTACGCCAAATTCTCAGGGAGTCAGGAGGGATCAACAAAGAAACAACGGGATTCACATACAGTGGAATAAGGACT

21-02023-0003 H7-HA (VIC) 421 AATGGAGTGACCAATGCGTGTAGAAGATCAGGGTCCTCATTCTACACGGAAATGAAATGGCTTCTATCAAATACAGATAATGCTGCTTTCCCGCAAATGACAAAATCATACAAAAACATTAGGAATAAACCTGCTTTAATTGTATGGGGAATTCATCATTCTGGATCGACTGCTGAGCAGACCAAACTGTATGGGAGTGGGAACAAATTG

20-02581-0003 H7-HA (VIC-poultry) AATGGAGTGACCAGTGCGTGTAGAAGATCAGGGTCCTCATTCTACGCGGAAATGAAATGGCTTCTATCAAATACAGATAATGCTGCTTTCCCGCAAATGACAAAATCATACAAAAACATTAGGAATAAACCTGCTTTAATTGTATGGGGAATTCATCATTCTGGATCGACTGCTGAGCAGACCAAACTGTATGGGAGTGGGAACAAATTG

20-02860-5-01 H7-HA (VIC-emu) AATGGAGTGACCAGTGCGTGTAGAAGATCAGGATCCTCATTCTACGCGGAAATGAAATGGCTTCTGTCAAATACAGATAATGCTGCTTTCCCGCAAGTGACAAAATCATACAGAAACATCAGGAATAAACCTGCTTTAATTGTATGGGGAATTCATCATTCTGGATCGACTGCTGAGCAGACCAAACTATATGGGAGTGGGAACAAATTG

21-00167-1-01 H7-HA (VIC) AATGGAGTGACCAGTGCGTGTAGAAGATCAGGGTCCTCATTCTACACGGAAATGAAATGGCTTCTATCAAATACAGATAATGCTGCTTTCCCGCAAATGACAAAATCATACAAAAACATTAGGAACAAACCTGCTTTAATTGTATGGGGAATTCATCATTCTGGATCGACTGCTGAGCAGACCAAACTGTATGGGAGTGGGAACAAATTG

20-03958-14-01 H7-HA (SA) AATGGAGTGACCAGTGCGTGTAGAAGATCAGGGTCCTCATTCTACACGGAAATGAAATGGCTTCTATCAAATACAGATAATGCTGCTTTCCCGCAAATGACAAAATCATACAAAAACATTAGGAATAAACCTGCTTTAATTGTATGGGGAATTCATCATTCTGGATCGACTGCTGAGCAGACCAAACTGTATGGGAGTGGGAACAAATTG

20-03958-23-01 H7-HA (SA) AATGGAGTGACCAGTGCGTGTAGAAGATCAGGGTCCTCATTCTACACGGAAATGAAATGGCTTCTATCAAATACAGATAATGCTGCTTTCCCGCAAATGACAAAATCATACAAAAACATTAGGAATAAACCTGCTTTAATTGTATGGGGAATTCATCATTCTGGATCGACTGCTGAGCAGACCAAACTGTATGGAAGTGGGAACAAATTG

20-03958-25-01 H7-HA (SA) AATGGAGTGACCAGTGCGTGTAGAAGATCAGGGTCCTCATTCTACACGGAAATGAAATGGCTTCTATCAAATACAGATAATGCTGCTTTCCCGCAAATGACAAAATCATACAAAAACATTAGGAGTAAACCTGCTTTAATTGTATGGGGAATTCATCATTCTGGATCGACTGCTGAGCAGACCAAACTGTATGGGAGTGGGAACAAATTG

21-02023-0003 H7-HA (VIC) 631 ATAACAGTTGGGAGTTCTAACTACCAGCAATCCTTTGTTCCAAGTCCAGGAGCAAGACCACAAGTGAATGGTCAATCAGGAAGAATTGATTTTCATTGGTTAATATTGAATCCCAATGACACAGTCACCTTCAGTTTCAATGGGGCCTTCATTGCTCCAGACCGTGTGAGCTTTTTCCAAGGGAAGTCCATAGGAATTCAAAGTGGAGTG

20-02581-0003 H7-HA (VIC-poultry) ATAACAGTTGGGAGTTCTAACTACCAGCAATCCTTTGTTCCAAGTCCAGGAGCAAGACCACAAGTGAATGGTCAATCAGGAAGAATTGATTTTCATTGGTTAATATTGAATCCCAATGACACAGTCACCTTCAGTTTCAATGGGGCCTTCATTGCTCCAGACCGTGTGAGCTTTTTCCAAGGGAAGTCCATAGGAATTCAAAGTGGAGTG

20-02860-5-01 H7-HA (VIC-emu) ATAACAGTTGGGAGTTCTAACTACCAGCAATCCTTTGTTCCAAGTCCAGGAGCAAGACCACTAGTGAATGGTCAATCAGGAAGAATTGATTTTCATTGGTTGATATTGAATCCCAATGACACAGTCACCTTCAGTTTCAATGGAGCCTTTATTGCTCCAGACCGTGTGAGCTTTTTCCAAGGGGAGTCCATAGGAATTCAAAGTGAAGTG

21-00167-1-01 H7-HA (VIC) ATAACAGTTGGGAGTTCTAACTACCAGCAATCCTTTGTTCCAAGTCCAGGAGCAAGACCACAAGTGAATGGTCAATCAGGAAGAATTGATTTTCATTGGTTAATATTGAATCCCAATGACACAGTCACCTTCAGTTTCAATGGGGCCTTCATTGCTCCAGACCGTGTGAGCTTTTTCCAAGGGAAGTCCATAGGAATTCAAAGTGGAGTG

20-03958-14-01 H7-HA (SA) ATAACAGTTGGGAGTTCTAACTACCAGCAATCCTTTGTTCCAAGTCCAGGAGCAAGACCACAAGTGAATGGTCAATCAGGAAGAATTGATTTTCATTGGTTAATGTTGAATCCCAATGACACAGTCACCTTCAGTTTCAATGGGGCCTTCATTGCTCCAGACCGTGTGAGCTTTTTCCAAGGGAAGTCCATAGGAATTCAAAGTGGAGTG

20-03958-23-01 H7-HA (SA) ATAACAGTTGGGAGTTCTAACTACCAGCAATCCTTTGTTCCAAGTCCAGGAGCAAGACCACAAGTGAATGGTCAATCAGGAAGAATTGATTTTCATTGGTTAATATTGAATCCCAATGACACAGTCACCTTCAGTTTCAATGGGGCCTTCATTGCTCCAGACCGTGTGAGCTTTTTCCAAGGGAAGTCCATAGGAATTCAAAGTGGAGTG

20-03958-25-01 H7-HA (SA) ATAACAGTTGGGAGTTCTAACTACCAGCAATCCTTTGTTCCAAGTCCAGGAGCAAGACCACAAGTGAATGGTCAATCAGGAAGAATTGATTTTCATTGGTTAATATTGAATCCCAATGACACAGTCACCTTCAGTTTCAATGGGGCCTTCATTGCTCCAGACCGTGTGAGCTTTTTCCAAGGGAAGTCCATAGGAATTCAAAGTGGAGTG

21-02023-0003 H7-HA (VIC) 841 CCAGTTGATGTTAATTGCGAAGGAGAATGCCACCACAGTGGAGGTACTATAGCAAGCAATTTACCTTTCCAAAACATTAATAGTAGGGCAGTGGGCAAATGTCCAAGGTATGTAAAGCAAAAAAGCCTGCTATTGGCGACAGGAATGAAGAATGTTCCTGAAATCCCAGGGAAGAGAG---------GTCTGTTCGGCGCCATAGCTGGA

20-02581-0003 H7-HA (VIC-poultry) CCAGTTGATGTTAATTGCGAAGGGGAATGCCACCACAGTGGAGGTACTATAGCAAGCAATTTACCTTTCCAAAACATTAATAGTAGGGCAGTGGGCAAATGTCCAAGGTATGTAAAGCAAAAAAGCCTGCTATTGGCGACAGGGATGAAGAATGTTCCTGAAATCCCAGGGAAGAGAGAGAAGAGAGGTCTGTTCGGCGCCATAGCTGGA

20-02860-5-01 H7-HA (VIC-emu) CCAGTTGATGTTAATTGCGAAGGGGAGTGCCACCACAGTGGAGGTACAATAGCAAGCAATTTACCTTTCCAAAACATCAATAGTAGGGCTGTGGGCAAATGTCCAAGGTATGTAAAGCAAAAAAGCCTGCTATTGGCGACAGGAATGAAGAATGTTCCTGAAATTCCAAGGAAGAGAG---------GTCTATTCGGCGCCATAGCTGGA

21-00167-1-01 H7-HA (VIC) CCAGTTGATGTTAATTGCGAAGGGGAATGCCACCACAGTGGAGGTACTATAGCAAGCAATTTACCTTTCCAAAACATTAATAGTAGGGCAGTGGGCAAATGTCCAAGGTATGTAAAGCAAAAAAGCCTGCTATTGGCGACAGGAATGAAGAATGTTCCTGAAATCCCAAGGAAGAGAG---------GTCTGTTCGGCGCCATAGCTGGA

20-03958-14-01 H7-HA (SA) CCAGTTGATGTTAATTGCGAAGGGGAATGCCACCACAGTGGAGGTACTATAGCAAGCAATTTACCTTTCCAAAACATTAATAGTAGGGCAGTGGGCAAATGTCCAAGGTATGTAAAGCAAAAAAGCCTGCTATTGGCGACAGGAATGAAGAATGTTCCTGAAATCCCAGGGAAGAGAG---------GTCTGTTCGGCGCCATAGCTGGA

20-03958-23-01 H7-HA (SA) CCAGTTGATGTTAATTGTGAAGGGGAATGCCACCACAGTGGAGGTACTATAGCAAGCAATTTACCTTTCCAAAACATTAATAGTAGGGCAGTGGGCAAATGTCCAAGGTATGTAAAGCAAAAAAGCCTGCTATTGGCGACAGGAATGAAGAATGTTCCTGAAATCCCAGGGAAGAGAG---------GTCTGTTCGGCGCCATAGCTGGA

20-03958-25-01 H7-HA (SA) CCAGTTGATGTTAATTGCGAAGGGGAATGCCACCACAGTGGAGGTACTATAGCAAGCAATTTACCTTTCCAAAACATTAATAGTAGGGCAGTGGGCAAATGTCCAAGGTATGTAAAGCCAAAAAGCCTGCTATTGGCGACAGGAATGAAGAATGTTCCTGAAATCCCAGGGAAGAGAG---------GTCTGTTCGGCGCCATAGCTGGG

21-02023-0003 H7-HA (VIC) 1042 TTTATTGAAAACGGGTGGGAAGGTCTGGTTGATGGATGGTATGGATTCAGACATCAAAACTCACAGGGGGAAGGAACAGCAGCTGATTACAAAAGCACTCAATCTGCAATTGATCAGATAACGGGGAAATTGAATAGATTGATAGAAAAAACCAATCAACAATTTGAATTGATAGACAATGAATTCAATGAGGTGGAAAAGCAAATTGGC

20-02581-0003 H7-HA (VIC-poultry) TTTATTGAAAACGGATGGGAAGGTCTGGTTGATGGATGGTACGGATTCAGACATCAAAACTCACAGGGGGAAGGAACAGCAGCTGATTACAAAAGCACTCAATCTGCAATTGATCAGATAACGGGGAAATTGAATAGATTGATAGAAAAAACCAATCAACAATTTGGATTGATAGACAATGAATTCAATGAGGTGGAAAAGCAAATTGGC

20-02860-5-01 H7-HA (VIC-emu) TTCATTGAAAATGGATGGGAAGGTCTAGTTGATGGATGGTACGGATTCAGACATCAAAACTCACAGGGGGAAGGGACAGCGGCTGATTATAAAAGCACTCAATCTGCAATTGATCAGATAACGGGGAAATTGAATAGGTTGATAGAAAAAACCAATCAACAATTTGGATTGATAGACAACGAATTCAATGAAGTGGAAAAGCAGATTGGC

21-00167-1-01 H7-HA (VIC) TTTATTGAAAACGGATGGGAAGGTCTGGTTGATGGATGGTACGGATTCAGACATCAAAACTCACAGGGGGAAGGAACAGCAGCTGATTACAAAAGCACTCAATCTGCAATTGATCAGATAACGGGGAAATTGAATAGATTGATAGAAAAAACCAATCAACAATTTGGATTGATAGACAATGAATTCAATGAGGTGGAAAAGCAAATTGGC

20-03958-14-01 H7-HA (SA) TTTATTGAAAACGGATGGGAAGGTCTGGTTGATGGATGGTACGGATTCAGACATCAAAACTCACAGGGGGAAGGAACAGCTGCTGATTACAAAAGCACTCAATCTGCAATTGATCAGATAACGGGGAAATTGAATAGATTGATAGAAAAAACCAATCAACAATTTGGATTGATAGACAATGAATTCAATGAGGTGGAAAAGCAAATTGGC

20-03958-23-01 H7-HA (SA) TTTATTGAAAACGGATGGGAAGGTCTGGTTGATGGATGGTACGGATTCAGACATCAAAACTCACAGGGGGAAGGAACAGCTGCTGATTACAAAAGCACTCAATCTGCAATTGATCAGATAACGGGGAAATTGAATAGATTGATAGAAAAAACCAATCAACAATTTGGATTGATAGACAATGAATTCAATGAGGTGGAAAAGCAAATTGGC

20-03958-25-01 H7-HA (SA) TTTATTGAAAACGGATGGGAAGGTCTGGTTGATGGATGGTACGGATTCAGACATCAAAACTCACAGGGGGAAGGAACAGCAGCTGATTACAAAAGCACTCAATCTGCAATTGATCAGATAACGGGGAAATTGAATAGATTGATAGAAAAAACCAATCAACAATTTGGATTGATAGACAATGAATTCAATGAGGTGGAAAAGCAAATTGGT

21-02023-0003 H7-HA (VIC) 1252 AATGTAATCAATTGGACTCGGGATTCCATAACAGAAGTATGGTCTTACAATGCTGAACTCCTAGTGGCAATGGAGAACCAGCATACCATCGATTTGACAGATTCAGAAATGAATAAGTTGTATGAAAAAGTGAGACGACAATTGAGAGAAAATGCTGAAGAGGATGGCACTGGTTGTTTTGAGATTTTCCACAAGTGCGATGATGATTGT

20-02581-0003 H7-HA (VIC-poultry) AATGTAATCAATTGGACTCGAGATTCCATAACAGAAGTATGGTCTTACAATGCTGAACTCCTAGTGGCAATGGAGAACCAGCATACCATCGATTTGACAGATTCAGAAATGAATAAGTTGTATGAAAAAGTGAGACGACAATTGAGAGAGAATGCTGAAGAGGATGGCACTGGTTGTTTTGAGATTTTCCACAAGTGCGATGATGATTGT

20-02860-5-01 H7-HA (VIC-emu) AATGTAATCAATTGGACTCGAGACTCCATAACAGAAGTATGGTCTTACAATGCTGAACTCCTAGTGGCAATGGAGAACCAGCATACCATCGATTTGACAGATTCAGAAATGAATAAGTTGTATGAAAGGGTGAGACGACAATTGAGAGAGAATGCTAAAGAGGATGGCACTGGTTGTTTTGAGATTTTCCACAAGTGCGATGATGATTGT

21-00167-1-01 H7-HA (VIC) AATGTAATCAATTGGACTCGAGATTCCATAACAGAAGTATGGTCTTACAATGCTGAACTCCTAGTGGCAATGGAGAACCAGCATACCATCGATTTGACAGATTCAGAAATGAATAAGTTGTATGAAAAAGTGAGACGACAATTGAGAGAGAATGCTGAAGAGGATGGCACTGGTTGTTTTGAGATTTTCCACAAGTGCGATGATGATTGT

20-03958-14-01 H7-HA (SA) AATGTAATCAATTGGACTCGAGATTCCATAACAGAAGTATGGTCTTACAATGCTGAACTCCTAGTGGCAATGGAGAACCAGCATACCATCGATTTGACAGATTCAGAAATGAATAAGTTGTATGAAAAAGTGAGACGACAATTGAGAGAGAATGCTGAAGAGGATGGCACTGGTTGTTTTGAGATTTTCCACAAGTGCGATGATGATTGT

20-03958-23-01 H7-HA (SA) AATGTAATCAATTGGACTCGAGATTCCATAACAGAAGTATGGTCTTACAATGCTGAACTCCTAGTGGCAATGGAGAACCAGCATACCATCGATTTGACAGATTCAGAAATGAATAAGTTGTATGAAAAAGTGAGACGACAATTGAGAGAGAATGCTGAAGAGGATGGCACTGGTTGTTTTGAGATTTTCCACAAGTGCGATGATGATTGT

20-03958-25-01 H7-HA (SA) AATGTAATCAATTGGACTCGAGATTCCATAACAGAAGTATGGTCTTACAATGCTGAACTCCTAGTGGCAATGGAGAACCAGCATACCATCGATTTGACAGATTCAGAAATGAATAAGTTGTATGAAAAAGTGAGACGACAATTGAGAGAGAATGCTGAAGAGGATGGCACTGGTTGTTTTGAGATTTTCCACAAGTGCGATGATGATTGC

21-02023-0003 H7-HA (VIC) 1462 ATGGCTAGTATAAGAAATAACACTTATGATCATAGCACATACAGAGAAGAGGCAATGCAGAATAGGTTGAAAATCGATCAGGTCAAATTGAATAGTGGCTACAAAGATGTGATACTTTGGTTTAGCTTCGGGGCATCATGCTTCCTACTTCTTGCCATTGCAATGGGCCTTGGTTTCATATGTGTAAAAAATGGAAACATGCGGTGCACT

20-02581-0003 H7-HA (VIC-poultry) ATGGCTAGTATAAGAAATAACACTTATGATCATAGCACATACAGAGAAGAGGCAATGCAGAATAGGTTGAAAATCGATCAGGTCAAATTGAATAGTGGCTACAAAGATGTGATACTTTGGTTTAGCTTCGGGGCATCATGCTTCCTACTTCTTGCCATTGCAATGGGCCTTGGTTTCATATGTGTAAAAAATGGAAACATGCGGTGCACT

20-02860-5-01 H7-HA (VIC-emu) ATGGCTAGTATAAGAAATAATACTTATGATCATAGCACATACAGAGAAGAGGCAATGCAGAATAGATTGAAAATCGATCAGGTCAAATTGAATAGTGGCTACAAAGATGTGATACTTTGGTTTAGCTTCGGGGCATCATGCTTCCTACTTCTTGCCATTGCAATGGGCCTTGGTTTCATATGTGTAAAAAATGGAAACATGCGGTGCACT

21-00167-1-01 H7-HA (VIC) ATGGCTAGTATAAGAAATAACACTTATGATCATAGCACATACAGAGAAGAGGCAATGCAGAATAGGTTGAAAATCGATCAGGTCAAATTGAATAGTGGCTACAAAGATGTGATACTTTGGTTTAGCTTCGGGGCATCATGCTTCCTACTTCTTGCCATTGCAATGGGCCTTGGTTTCATATGTGTAAAAAATGGAAACATGCGGTGCACT

20-03958-14-01 H7-HA (SA) ATGGCTAGTATAAGAAATAACACTTATGATCATAGCACATACAGAGAAGAGGCAATGCAGAATAGGTTGAAAATCGATCAGGTCAAATTGAATAGTGGCTACAAAGATGTGATACTTTGGTTTAGCTTCGGGGCATCATGCTTCCTACTTCTTGCCATTGCAATGGGCCTTGGTTTCATATGTGTAAAAAATGGAAACATGCGGTGCACT

20-03958-23-01 H7-HA (SA) ATGGCTAGTATAAGAAATAACACTTATGATCATAGCACATACAGAGAAGAGGCAATGCAGAATAGGTTGAAAATCGATCAGGTCAAATTGAATAGTGGCTACAAAGATGTGATACTTTGGTTTAGCTTCGGGGCATCATGCTTCCTACTTCTTGCCATTGCAATGGGCCTTGGTTTCATATGTGTAAAAAATGGAAACATGCGGTGCACT

20-03958-25-01 H7-HA (SA) ATGGCTAGTATAAGAAATAACACTTATGATCATAGCACATACAGAGAAGAGGCAATGCAGAATAGGTTGAAAATCGATCAGGTCAAATTGAATAGTGGCTACAAAGATGTGATACTTTGGTTTAGCTTCGGGGCATCATGCTTCCTACTTCTTGCCATTGCAATGGGCCTTGGTTTCATATGTGTAAAAAATGGAAACATGCGGTGCACT

21-02023-0003 H7-HA (VIC) 1672 ATTTGTATATAA

20-02581-0003 H7-HA (VIC-poultry) ATTTGTATATAA

20-02860-5-01 H7-HA (VIC-emu) ATTTGTATATAA

21-00167-1-01 H7-HA (VIC) ATTTGTATATAA

20-03958-14-01 H7-HA (SA) ATTTGTATATAA

20-03958-23-01 H7-HA (SA) ATTTGTATATAA

20-03958-25-01 H7-HA (SA) ATTTGTATATAG

**Figure 3: 21-02023 H7 HA amino acid sequence alignment. Position of the multi-basic HA cleavage site is indicated by the red box.**

21-02023-0003 H7-HA (VIC) 1 MNTRILILTLTAIVHTNADKICIGHHAVSNGTKVNTLTERGVEVVNATETVEQMNIPRICTKGKRAIDLGQCGLLGIVTGPPQCDQFLEFAADLIIERREGDDVCYPGKFVNEEALRQILRESGGINKETTGFTYSGIRTNGVTNACRRSGSSFYTEMKWLLSNTDNAAFPQMTKSYKNIRNKPALIVWGIHHSGSTAEQTKLYGSGNKL

20-02581-0003 H7-HA (VIC-poultry) MNTRILILTLTAIVHTNADKICIGHHAVSNGTKVNTLTERGVEVVNATETVEQMNIPRICTKGKRAIDLGQCGLLGIVTGPPQCDQFLEFAADLIIERREGDDVCYPGKFVNEEALRQILRESGGINKETTGFTYSGIRTNGVTSACRRSGSSFYAEMKWLLSNTDNAAFPQMTKSYKNIRNKPALIVWGIHHSGSTAEQTKLYGSGNKL

20-02860-5-01 H7-HA (VIC-emu) MNTRILILTFMAIVHTNADKICIGHHAVSNGTKVNTLTERDVEVVNATETVEQMNIPRICTKGKRAIDLGQCGLLGIVTGPPQCDQLLEFAADLIIERREGNDVCYPGKFVNEEALRQILRESGGINKETTGFTYSGIRTNGVTSACRRSGSSFYAEMKWLLSNTDNAAFPQVTKSYRNIRNKPALIVWGIHHSGSTAEQTKLYGSGNKL

21-00167-1-01 H7-HA (VIC) MNTRILILTLTAIVHTNADKICIGHHAVSNGTKVNTLTERGVEVVNATETVEQMNIPRICTKGKRAIDLGQCGLLGIVTGPPQCDQFLEFAADLIIERREGDDVCYPGKFVNEEALRQILRESGGINKETTGFTYSGIRTNGVTSACRRSGSSFYTEMKWLLSNTDNAAFPQMTKSYKNIRNKPALIVWGIHHSGSTAEQTKLYGSGNKL

20-03958-14-01 H7-HA (SA) MNTRILILTLTAIVHTNADKICIGHHAVSNGTKVNTLTERGVEVVNATETVEQMNIPRICTKGKRAIDLGQCGLLGIVTGPPQCDQFLEFAADLIIERREGDDVCYPGKFVNEEALRQILRESGGINKETTGFTYSGIRTNGVTSACRRSGSSFYTEMKWLLSNTDNAAFPQMTKSYKNIRNKPALIVWGIHHSGSTAEQTKLYGSGNKL

20-03958-23-01 H7-HA (SA) MNTRILILTLTAIVHTNADKICIGHHAVSNGTKVNTLTERGVEVVNATETVEQMNIPRICTKGKRAIDLGQCGLLGIVTGPPQCDQFLEFAADLIIERREGDDVCYPGKFVNEEALRQILRESGGINKETTGFTYSGIRTNGVTSACRRSGSSFYTEMKWLLSNTDNAAFPQMTKSYKNIRNKPALIVWGIHHSGSTAEQTKLYGSGNKL

20-03958-25-01 H7-HA (SA) MNTRILILTLTAIVHTNADKICIGHHAVSNGTKVNTLTERGVEVVNATETVEQMNIPRICTKGKRAIDLGQCGLLGIVTGPPQCDQFLEFAADLIIERREGDDVCYPGKFVNEEALRQILRESGGINKETTGFTYSGIRTNGVTSACRRSGSSFYTEMKWLLSNTDNAAFPQMTKSYKNIRSKPALIVWGIHHSGSTAEQTKLYGSGNKL

21-02023-0003 H7-HA (VIC) 211 ITVGSSNYQQSFVPSPGARPQVNGQSGRIDFHWLILNPNDTVTFSFNGAFIAPDRVSFFQGKSIGIQSGVPVDVNCEGECHHSGGTIASNLPFQNINSRAVGKCPRYVKQKSLLLATGMKNVPEIPGKR---GLFGAIAGFIENGWEGLVDGWYGFRHQNSQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFELIDNEFNEVEKQIG

20-02581-0003 H7-HA (VIC-poultry) ITVGSSNYQQSFVPSPGARPQVNGQSGRIDFHWLILNPNDTVTFSFNGAFIAPDRVSFFQGKSIGIQSGVPVDVNCEGECHHSGGTIASNLPFQNINSRAVGKCPRYVKQKSLLLATGMKNVPEIPGKREKRGLFGAIAGFIENGWEGLVDGWYGFRHQNSQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFGLIDNEFNEVEKQIG

20-02860-5-01 H7-HA (VIC-emu) ITVGSSNYQQSFVPSPGARPLVNGQSGRIDFHWLILNPNDTVTFSFNGAFIAPDRVSFFQGESIGIQSEVPVDVNCEGECHHSGGTIASNLPFQNINSRAVGKCPRYVKQKSLLLATGMKNVPEIPRKR---GLFGAIAGFIENGWEGLVDGWYGFRHQNSQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFGLIDNEFNEVEKQIG

21-00167-1-01 H7-HA (VIC) ITVGSSNYQQSFVPSPGARPQVNGQSGRIDFHWLILNPNDTVTFSFNGAFIAPDRVSFFQGKSIGIQSGVPVDVNCEGECHHSGGTIASNLPFQNINSRAVGKCPRYVKQKSLLLATGMKNVPEIPRKR---GLFGAIAGFIENGWEGLVDGWYGFRHQNSQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFGLIDNEFNEVEKQIG

20-03958-14-01 H7-HA (SA) ITVGSSNYQQSFVPSPGARPQVNGQSGRIDFHWLMLNPNDTVTFSFNGAFIAPDRVSFFQGKSIGIQSGVPVDVNCEGECHHSGGTIASNLPFQNINSRAVGKCPRYVKQKSLLLATGMKNVPEIPGKR---GLFGAIAGFIENGWEGLVDGWYGFRHQNSQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFGLIDNEFNEVEKQIG

20-03958-23-01 H7-HA (SA) ITVGSSNYQQSFVPSPGARPQVNGQSGRIDFHWLILNPNDTVTFSFNGAFIAPDRVSFFQGKSIGIQSGVPVDVNCEGECHHSGGTIASNLPFQNINSRAVGKCPRYVKQKSLLLATGMKNVPEIPGKR---GLFGAIAGFIENGWEGLVDGWYGFRHQNSQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFGLIDNEFNEVEKQIG

20-03958-25-01 H7-HA (SA) ITVGSSNYQQSFVPSPGARPQVNGQSGRIDFHWLILNPNDTVTFSFNGAFIAPDRVSFFQGKSIGIQSGVPVDVNCEGECHHSGGTIASNLPFQNINSRAVGKCPRYVKPKSLLLATGMKNVPEIPGKR---GLFGAIAGFIENGWEGLVDGWYGFRHQNSQGEGTAADYKSTQSAIDQITGKLNRLIEKTNQQFGLIDNEFNEVEKQIG

21-02023-0003 H7-HA (VIC) 421 NVINWTRDSITEVWSYNAELLVAMENQHTIDLTDSEMNKLYEKVRRQLRENAEEDGTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRLKIDQVKLNSGYKDVILWFSFGASCFLLLAIAMGLGFICVKNGNMRCTICI\*

20-02581-0003 H7-HA (VIC-poultry) NVINWTRDSITEVWSYNAELLVAMENQHTIDLTDSEMNKLYEKVRRQLRENAEEDGTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRLKIDQVKLNSGYKDVILWFSFGASCFLLLAIAMGLGFICVKNGNMRCTICI\*

20-02860-5-01 H7-HA (VIC-emu) NVINWTRDSITEVWSYNAELLVAMENQHTIDLTDSEMNKLYERVRRQLRENAKEDGTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRLKIDQVKLNSGYKDVILWFSFGASCFLLLAIAMGLGFICVKNGNMRCTICI\*

21-00167-1-01 H7-HA (VIC) NVINWTRDSITEVWSYNAELLVAMENQHTIDLTDSEMNKLYEKVRRQLRENAEEDGTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRLKIDQVKLNSGYKDVILWFSFGASCFLLLAIAMGLGFICVKNGNMRCTICI\*

20-03958-14-01 H7-HA (SA) NVINWTRDSITEVWSYNAELLVAMENQHTIDLTDSEMNKLYEKVRRQLRENAEEDGTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRLKIDQVKLNSGYKDVILWFSFGASCFLLLAIAMGLGFICVKNGNMRCTICI\*

20-03958-23-01 H7-HA (SA) NVINWTRDSITEVWSYNAELLVAMENQHTIDLTDSEMNKLYEKVRRQLRENAEEDGTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRLKIDQVKLNSGYKDVILWFSFGASCFLLLAIAMGLGFICVKNGNMRCTICI\*

20-03958-25-01 H7-HA (SA) NVINWTRDSITEVWSYNAELLVAMENQHTIDLTDSEMNKLYEKVRRQLRENAEEDGTGCFEIFHKCDDDCMASIRNNTYDHSTYREEAMQNRLKIDQVKLNSGYKDVILWFSFGASCFLLLAIAMGLGFICVKNGNMRCTICI\*

\*

**Figure 1:** Phylogenetic tree based on near full-length H7 HA gene sequences (1643bp) showing the relationship of wild bird sample 21-02023-03 (Green) to low pathogenic avian influenza (LPAI) virus from recent emu H7N6 outbreak (Red), high pathogenic avian influenza (HPAI) virus from recent poultry H7N7 outbreaks (Blue) and to other H7 HA virus sequences.



**Table 2: Nucleotide BLAST analysis of the H7-HA segment from 21-02023-0003 against the National Avian Influenza in Wild Birds (NAIWB)b surveillance virus sequence database. This table shows the 10 highest pairwise matching virus sequences.** **bThe NAIWB is acknowledged for use of the wild bird surveillance data**

|  |  |
| --- | --- |
| **Closest available NAIWB match** | **Similarity (%)** |
| AAHL21-02204-0004.4\_A/Australian\_shelduck/Victoria/20-05408-0059/2020 (H7N8) | 99.406 |
| AAHL21-00167-0001.4\_A/wild\_bird/Victoria/20-05408/2020 (H7N8) | 99.406 |
| AAHL20-03958-0031.4\_A/duck/South\_Australia/109\_Swab\_Pooled/2020 (H7) | 99.346 |
| AAHL20-03958-0014.4\_A/Duck/South\_Australia/51\_Swab\_Pooled/2020 (H7N8) | 99.346 |
| AAHL20-03958-0023-01.4\_A/wild\_duck/South\_Australia/84/2020 (H7N8) | 99.228 |
| AAHL20-03958-0025.4\_A/duck/South\_Australia/93\_Swab\_Pooled/2020 (H7N8) | 99.108 |
| AAHL19-03250-0001.4\_A/duck/Australia/M19-11593-0066/2019 (H7N7) | 98.217 |
| AAHL18-01781-0001.4\_A/wild\_bird/Victoria/18-01589-232/2018 (H7N7) | 97.683 |
| AAHL19-04530-0001.4\_A/wild\_bird/Victoria/19-01749-185/2019 (H7N8) | 97.089 |
| AAHL18-03214-0014.4\_A/wild\_duck/Australia/65/2018 (H7N6) | 97.029 |