



## Environment and Heritage - Science, Economics and Insights

### Environmental Forensics Report of Analysis Project 20230149

**1658**

Date Issued:

02-Jun-2023

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**Client Project Reference: Menindee Fish Kill - 19 (IMT 6 May 2**

Customer: Department of Planning & Environment

Attention: [REDACTED]

Report Date: 02 June 2023

Project Received: 08 May 2023

EF Project Contact: [REDACTED]

[REDACTED]

[REDACTED]



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**The following samples were analysed:**

| Sample ID | Client ID | Sample Type | Client Sampled Date/Time | Aliquot            |
|-----------|-----------|-------------|--------------------------|--------------------|
| 232977    | E1-1      | Liquid      | 06/05/2023 11:45AM       | Laboratory Aliquot |
| 232993    | E1-1      | Liquid      | 06/05/2023 11:45AM       | Laboratory Aliquot |
| 232978    | E1-2      | Liquid      | 06/05/2023 11:45AM       | Laboratory Aliquot |
| 232979    | E2-1      | Liquid      | 06/05/2023 12:00PM       | Laboratory Aliquot |
| 232994    | E2-1      | Liquid      | 06/05/2023 12:00PM       | Laboratory Aliquot |
| 232980    | E2-2      | Liquid      | 06/05/2023 12:00PM       | Laboratory Aliquot |
| 232981    | E3-1      | Liquid      | 06/05/2023 1:40PM        | Laboratory Aliquot |
| 232995    | E3-1      | Liquid      | 06/05/2023 1:40PM        | Laboratory Aliquot |
| 232982    | E3-2      | Liquid      | 06/05/2023 1:40PM        | Laboratory Aliquot |
| 232983    | E4-1      | Liquid      | 06/05/2023 3:00PM        | Laboratory Aliquot |
| 232996    | E4-1      | Liquid      | 06/05/2023 3:00PM        | Laboratory Aliquot |
| 232984    | E4-2      | Liquid      | 06/05/2023 3:00PM        | Laboratory Aliquot |
| 232985    | E5-1      | Liquid      | 06/05/2023 4:00PM        | Laboratory Aliquot |
| 232997    | E5-1      | Liquid      | 06/05/2023 4:00PM        | Laboratory Aliquot |
| 232986    | E5-2      | Liquid      | 06/05/2023 4:00PM        | Laboratory Aliquot |
| 232987    | B1-1      | Liquid      | 06/05/2023 10:25AM       | Laboratory Aliquot |
| 232998    | B1-1      | Liquid      | 06/05/2023 10:25AM       | Laboratory Aliquot |
| 232988    | B1-2      | Liquid      | 06/05/2023 10:25AM       | Laboratory Aliquot |
| 232989    | B2-1      | Liquid      | 06/05/2023 11:00AM       | Laboratory Aliquot |
| 232999    | B2-1      | Liquid      | 06/05/2023 11:00AM       | Laboratory Aliquot |
| 232990    | B2-2      | Liquid      | 06/05/2023 11:00AM       | Laboratory Aliquot |
| 232991    | B3-1      | Liquid      | 06/05/2023 3:15PM        | Laboratory Aliquot |
| 233000    | B3-1      | Liquid      | 06/05/2023 3:15PM        | Laboratory Aliquot |
| 232992    | B3-2      | Liquid      | 06/05/2023 3:15PM        | Laboratory Aliquot |
| 233027    | B1        | Liquid      | 06/05/2023 1:00PM        | Laboratory Aliquot |
| 233028    | B2        | Liquid      | 06/05/2023 1:00PM        | Laboratory Aliquot |
| 233029    | B3        | Liquid      | 06/05/2023 1:00PM        | Laboratory Aliquot |
| 233030    | E1        | Liquid      | 06/05/2023 1:00PM        | Laboratory Aliquot |
| 233031    | E2        | Liquid      | 06/05/2023 1:00PM        | Laboratory Aliquot |

Tests not covered by NATA accreditation 3040 are denoted with \*  
Codes: SN = Sample Note      RN = Result Note

RC = Project Comment



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|        |               |        |            |        |
|--------|---------------|--------|------------|--------|
| 233032 | E3            | Liquid | 06/05/2023 | 1:00PM |
| 233033 | E4            | Liquid | 06/05/2023 | 1:00PM |
| 233034 | E5            | Liquid | 06/05/2023 | 1:00PM |
| 233191 | MFK E1 BW     | Liquid | 06/05/2023 | 1:00AM |
| 233192 | MFK E2 BW     | Liquid | 06/05/2023 | 1:00AM |
| 233193 | MFK E3 BW     | Liquid | 06/05/2023 | 1:00AM |
| 233194 | MFK E4 BW     | Liquid | 06/05/2023 | 1:00AM |
| 233195 | MFK E5 BW     | Liquid | 06/05/2023 | 1:00AM |
| 233196 | MFK B2 BW     | Liquid | 06/05/2023 | 1:00AM |
| 233197 | MFK B3 BW     | Liquid | 06/05/2023 | 1:00AM |
| 233509 | E1 Filtered 1 | Liquid | 06/05/2023 |        |
| 233510 | E1 Filtered 2 | Liquid | 06/05/2023 |        |
| 233511 | E1 Unfiltered | Liquid | 06/05/2023 |        |
| 233512 | E2 Filtered 1 | Liquid | 06/05/2023 |        |
| 233513 | E2 Filtered 2 | Liquid | 06/05/2023 |        |
| 233514 | E2 Unfiltered | Liquid | 06/05/2023 |        |
| 233515 | E3 Filtered 1 | Liquid | 06/05/2023 |        |
| 233516 | E3 Filtered 2 | Liquid | 06/05/2023 |        |
| 233517 | E3 Unfiltered | Liquid | 06/05/2023 |        |
| 233518 | E4 Filtered 1 | Liquid | 06/05/2023 |        |
| 233519 | E4 Filtered 2 | Liquid | 06/05/2023 |        |
| 233520 | E4 Unfiltered | Liquid | 06/05/2023 |        |
| 233521 | E5 Filtered 1 | Liquid | 06/05/2023 |        |
| 233522 | E5 Filtered 2 | Liquid | 06/05/2023 |        |
| 233523 | E5 Unfiltered | Liquid | 06/05/2023 |        |
| 233524 | B1 Filtered 1 | Liquid | 06/05/2023 |        |
| 233525 | B1 Filtered 2 | Liquid | 06/05/2023 |        |
| 233526 | B1 Unfiltered | Liquid | 06/05/2023 |        |
| 233527 | B2 Filtered 1 | Liquid | 06/05/2023 |        |
| 233528 | B2 Filtered 2 | Liquid | 06/05/2023 |        |
| 233529 | B2 Unfiltered | Liquid | 06/05/2023 |        |

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|        |               |        |            |
|--------|---------------|--------|------------|
| 233530 | B3 Filtered 1 | Liquid | 06/05/2023 |
| 233531 | B3 Filtered 2 | Liquid | 06/05/2023 |
| 233532 | B3 Unfiltered | Liquid | 06/05/2023 |

#### Report Notes

- This document has been authorised by the person whose name appears in this report.
- This report shall not be reproduced except in full. Samples analysed as received from the client.
- Results reported as 'less than' (<) indicates a result below the practical quantitation limit for the sample matrix and method used.

#### Project Comments

· Samples 232977, 232979, 232981, 232983, 232985, 232987, 232989, 232991 were sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of EP202A: Phenoxyacetic Acid Herbicides by LCMS, EP202S: Phenoxycetic Acid Herbicide Surrogate, EP204: Glyphosate and AMPA. This report summarises data from the attached external report: ES2315347, dated 16-May-2023.

· Samples 233509 to 233532 were sent to ALS Environmental Laboratory (NATA Accreditation no: 825) for the analysis of EK055G: Ammonia as N by Discrete Analyser, EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser, EK061G: Total Kjeldahl Nitrogen By Discrete Analyser, EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser, EK067G: Total Phosphorus as P by Discrete Analyser, EK071G: Reactive Phosphorus as P by discrete analyser. This report summarises data from the attached external report: ES2316251, dated 22-May-2023.

· Samples 232978, 232980, 232982, 232984, 232986, 232988, 232990, 232992, were sent to Sydney Water Laboratory Services (NATA Accreditation no: 63 and 610) for the analysis of Blue-Green Algal ID and Enumeration. Please see detailed results in the attached Phytoplankton Analysis Report no. 285314 dated 29 May 2023. Samples 232993 to 233000 were sent to Sydney Water Laboratory Services (NATA Accreditation no: 63 and 610) for the analysis of Algal Toxins. Please see the attached Analytical Report No: 285314 dated 29 May 2023, which gives Algal Toxins analysis results and the Blue-Green Algal ID and Enumeration summary results.

· Samples 233191, 233192, 233193, 233194, 233195, 233196 and 233197 were analysed outside the method holding time for Total suspended solids.



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| Analysis Results - External Methods* |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Area - EXTERNAL                      |                                      |                                      |
| Analyte                              | Sample ID<br>Start Date<br>Client ID | Sample ID<br>Start Date<br>Client ID |
| Algal Enumeration                    | -                                    | 232993<br>12/05/2023<br>E1-1         |
| Algal Identification                 | -                                    | 232978<br>26/05/2023<br>E1-2         |
| Algal Toxins                         | -                                    | 232980<br>12/05/2023<br>E2-1         |

| Analysis Results - External Methods* |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Area - EXTERNAL                      |                                      |                                      |
| Analyte                              | Sample ID<br>Start Date<br>Client ID | Sample ID<br>Start Date<br>Client ID |
| Algal Enumeration                    | -                                    | 232999<br>12/05/2023<br>B2-1         |
| Algal Identification                 | -                                    | 232990<br>26/05/2023<br>B2-2         |
| Algal Toxins                         | -                                    | 232992<br>12/05/2023<br>B3-1         |

| Analysis Results - External Methods* |                                       |                                       |
|--------------------------------------|---------------------------------------|---------------------------------------|
| Area - EXTERNAL                      |                                       |                                       |
| Analyte                              | Sample ID<br>Start Date<br>Client ID  | Sample ID<br>Start Date<br>Client ID  |
| Ammonia as N                         | 233509<br>17/05/2023<br>E1 Filtered 1 | 233510<br>17/05/2023<br>E1 Filtered 2 |
| Nitrite+Nitrate as N                 | <0.01                                 | 0.03                                  |
| Reactive Phosphorus as P             | 0.04                                  | 0.05                                  |
| Total Kjeldahl Nitrogen as N         | 0.9                                   | 1.6                                   |
| Total Nitrogen as N                  | 0.9                                   | 1.6                                   |
| Total Phosphorus as P                | 0.08                                  | 0.21                                  |

| Analysis Results - External Methods* |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Area - EXTERNAL                      |                                      |                                      |
| Analyte                              | Sample ID<br>Start Date<br>Client ID | Sample ID<br>Start Date<br>Client ID |
| Ammonia as N                         | 0.04                                 | 0.05                                 |
| Nitrite+Nitrate as N                 | 0.03                                 | 0.07                                 |
| Reactive Phosphorus as P             | 0.10                                 | <0.01                                |
| Total Kjeldahl Nitrogen as N         | 0.8                                  | 1.3                                  |
| Total Nitrogen as N                  | 0.8                                  | 1.4                                  |
| Total Phosphorus as P                | 0.13                                 | 0.28                                 |

| Analysis Results - External Methods* |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Area - EXTERNAL                      |                                      |                                      |
| Analyte                              | Sample ID<br>Start Date<br>Client ID | Sample ID<br>Start Date<br>Client ID |
| Ammonia as N                         | 0.04                                 | <0.01                                |
| Nitrite+Nitrate as N                 | 0.03                                 | 0.07                                 |
| Reactive Phosphorus as P             | 0.10                                 | <0.01                                |
| Total Kjeldahl Nitrogen as N         | 0.8                                  | 1.3                                  |
| Total Nitrogen as N                  | 0.8                                  | 1.5                                  |
| Total Phosphorus as P                | 0.13                                 | 0.28                                 |

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| Analysis Results - External Methods* |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Area - EXTERNAL                      |                                      |                                      |
| Analyte                              | Sample ID<br>Start Date<br>Client ID | Sample ID<br>Start Date<br>Client ID |
| Algal Enumeration                    | -                                    | 232993<br>12/05/2023<br>E1-1         |
| Algal Identification                 | -                                    | 232978<br>26/05/2023<br>E1-2         |
| Algal Toxins                         | -                                    | 232980<br>12/05/2023<br>E2-1         |

| Analysis Results - External Methods* |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Area - EXTERNAL                      |                                      |                                      |
| Analyte                              | Sample ID<br>Start Date<br>Client ID | Sample ID<br>Start Date<br>Client ID |
| Algal Enumeration                    | -                                    | 232999<br>12/05/2023<br>B2-1         |
| Algal Identification                 | -                                    | 232990<br>26/05/2023<br>B2-2         |
| Algal Toxins                         | -                                    | 232992<br>12/05/2023<br>B3-1         |

| Analysis Results - External Methods* |                                       |                                       |
|--------------------------------------|---------------------------------------|---------------------------------------|
| Area - EXTERNAL                      |                                       |                                       |
| Analyte                              | Sample ID<br>Start Date<br>Client ID  | Sample ID<br>Start Date<br>Client ID  |
| Ammonia as N                         | 233509<br>17/05/2023<br>E1 Filtered 1 | 233510<br>17/05/2023<br>E1 Filtered 2 |
| Nitrite+Nitrate as N                 | <0.01                                 | 0.03                                  |
| Reactive Phosphorus as P             | 0.04                                  | 0.05                                  |
| Total Kjeldahl Nitrogen as N         | 0.9                                   | 1.6                                   |
| Total Nitrogen as N                  | 0.9                                   | 1.6                                   |
| Total Phosphorus as P                | 0.08                                  | 0.21                                  |

| Analysis Results - External Methods* |                                      |                                      |
|--------------------------------------|--------------------------------------|--------------------------------------|
| Area - EXTERNAL                      |                                      |                                      |
| Analyte                              | Sample ID<br>Start Date<br>Client ID | Sample ID<br>Start Date<br>Client ID |
| Ammonia as N                         | 0.04                                 | <0.01                                |
| Nitrite+Nitrate as N                 | 0.03                                 | 0.07                                 |
| Reactive Phosphorus as P             | 0.10                                 | <0.01                                |
| Total Kjeldahl Nitrogen as N         | 0.8                                  | 1.3                                  |
| Total Nitrogen as N                  | 0.8                                  | 1.5                                  |
| Total Phosphorus as P                | 0.13                                 | 0.28                                 |

232988  
B1-2

26/05/2023  
RC

232986  
B1-1

25/05/2023  
RC

232984  
E4-2

12/05/2023  
RC

232997  
E5-1

12/05/2023  
RC

232996  
E5-2

12/05/2023  
RC

232995  
E3-1

12/05/2023  
RC

232993  
E4-1

12/05/2023  
RC

232992  
B3-2

26/05/2023  
RC

232991  
B3-1

26/05/2023  
RC

232990  
B3-2

26/05/2023  
RC

232989  
B3-1

26/05/2023  
RC

232988  
B1-2

26/05/2023  
RC

232987  
B1-1

26/05/2023  
RC

232986  
B1-2

26/05/2023  
RC

232985  
E3-2

12/05/2023  
RC

232984  
E4-1

12/05/2023  
RC

232983  
E4-2

12/05/2023  
RC

232982  
E5-1

12/05/2023  
RC

232981  
E5-2

12/05/2023  
RC

232980  
E5-3

12/05/2023  
RC

232979  
E5-4

12/05/2023  
RC

232978  
E5-5

12/05/2023  
RC

232977  
E5-6

12/05/2023  
RC

232976  
E5-7

12/05/2023  
RC

232975  
E5-8

12/05/2023  
RC

232974  
E5-9

12/05/2023  
RC

232973  
E5-10

12/05/2023  
RC

232972  
E5-11

12/05/2023  
RC

232971  
E5-12

12/05/2023  
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232970  
E5-13

12/05/2023  
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232969  
E5-14

12/05/2023  
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232968  
E5-15

12/05/2023  
RC

232967  
E5-16

12/05/2023  
RC

232966  
E5-17

12/05/2023  
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232965  
E5-18

12/05/2023  
RC

232964  
E5-19

12/05/2023  
RC

232963  
E5-20

12/05/2023  
RC

232962  
E5-21

12/05/2023  
RC

232961  
E5-22

12/05/2023  
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232960  
E5-23

12/05/2023  
RC

232959  
E5-24

12/05/2023  
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232958  
E5-25

12/05/2023  
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232957  
E5-26

12/05/2023  
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232956  
E5-27

12/05/2023  
RC

232955  
E5-28

12/05/2023  
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232954  
E5-29

12/05/2023  
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232953  
E5-30

12/05/2023  
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232952  
E5-31

12/05/2023  
RC

232951  
E5-32

12/05/2023  
RC

232950  
E5-33

12/05/2023  
RC

232949  
E5-34

12/05/2023  
RC

232948  
E5-35

12/05/2023  
RC

232947  
E5-36

12/05/2023  
RC

232946  
E5-37

12/05/2023  
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232945  
E5-38

12/05/2023  
RC

232944  
E5-39

12/05/2023  
RC

232943  
E5-40

12/05/2023  
RC

232942  
E5-41

12/05/2023  
RC

232941  
E5-42

12/05/2023  
RC

232940  
E5-43

12/05/2023  
RC



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| Analysis Results - External Methods* |      | Sample ID<br>Start Date<br>Client ID | 232977<br>11/05/2023<br>E1-1 | 232979<br>11/05/2023<br>E2-1 | 232981<br>11/05/2023<br>E3-1 | 232983<br>11/05/2023<br>E4-1 | 232985<br>11/05/2023<br>E5-1 | 232987<br>11/05/2023<br>B1-1 | 232989<br>11/05/2023<br>B2-1 | 232991<br>11/05/2023<br>B3-1 |
|--------------------------------------|------|--------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| Analyte                              |      |                                      |                              |                              |                              |                              |                              |                              |                              |                              |
| 2,4,5-T                              | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| 2,4,6-T                              | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| 2,4-D                                | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| 2,4-DB                               | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| 2,4-DP                               | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| 2,6-D                                | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| 4-Chlorophenoxy acetic acid          | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| AMPA                                 | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Clopyralid                           | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Dicamba                              | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Fluroxypyr                           | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Glyphosate                           | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| MCPA                                 | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| MCPB                                 | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Mecoprop                             | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Pridoram                             | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Silvex (2,4,5-TP/Epenotrop)          | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |
| Tridopyr                             | µg/L | <10                                  | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          | <10                          |

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| Analysis Results - IGRTSS |                                      |                            |
|---------------------------|--------------------------------------|----------------------------|
| Area - INORGANIC          |                                      |                            |
| Analyte                   | Sample ID<br>Start Date<br>Client ID |                            |
| Fixed Suspended Solids    | 233027<br>11/05/2023<br>B1           | 233028<br>11/05/2023<br>B2 |
| Total Suspended Solids    | 15<br>mg/L                           | 32<br>13                   |
| Volatile Suspended Solids | 25<br>mg/L                           | 42<br>18                   |

  

| Analysis Results - IGRTSS |                                      |                                   |
|---------------------------|--------------------------------------|-----------------------------------|
| Area - INORGANIC          |                                      |                                   |
| Analyte                   | Sample ID<br>Start Date<br>Client ID |                                   |
| Fixed Suspended Solids    | 233195<br>25/05/2023<br>MFK E5 BW    | 233196<br>25/05/2023<br>MFK B2 BW |
| Total Suspended Solids    | 55<br>mg/L                           | 60<br>42                          |
| Volatile Suspended Solids | 65<br>mg/L                           | 72<br>49                          |

The sample(s) referred to in this report were analysed by the following method(s):

| Method code       | Method description  | Area      |
|-------------------|---|-----------|
| External Methods* | External Methods - Analysis completed externally                            | EXTERNAL  |
| External Methods* | External Methods - Analysis completed externally                            | EXTERNAL  |
| External Methods* | External Methods - Analysis completed externally                            | EXTERNAL  |
| IGRTSS            | Total Suspended Solids (TSS) (includes Volatile and Fixed Suspended Solids) | INORGANIC |

The results in this report were authorised by:

| Name       | Title                         |
|------------|-------------------------------|
| [Redacted] | Senior Scientist<br>Scientist |

| Area      |
|-----------|
| EXTERNAL  |
| INORGANIC |