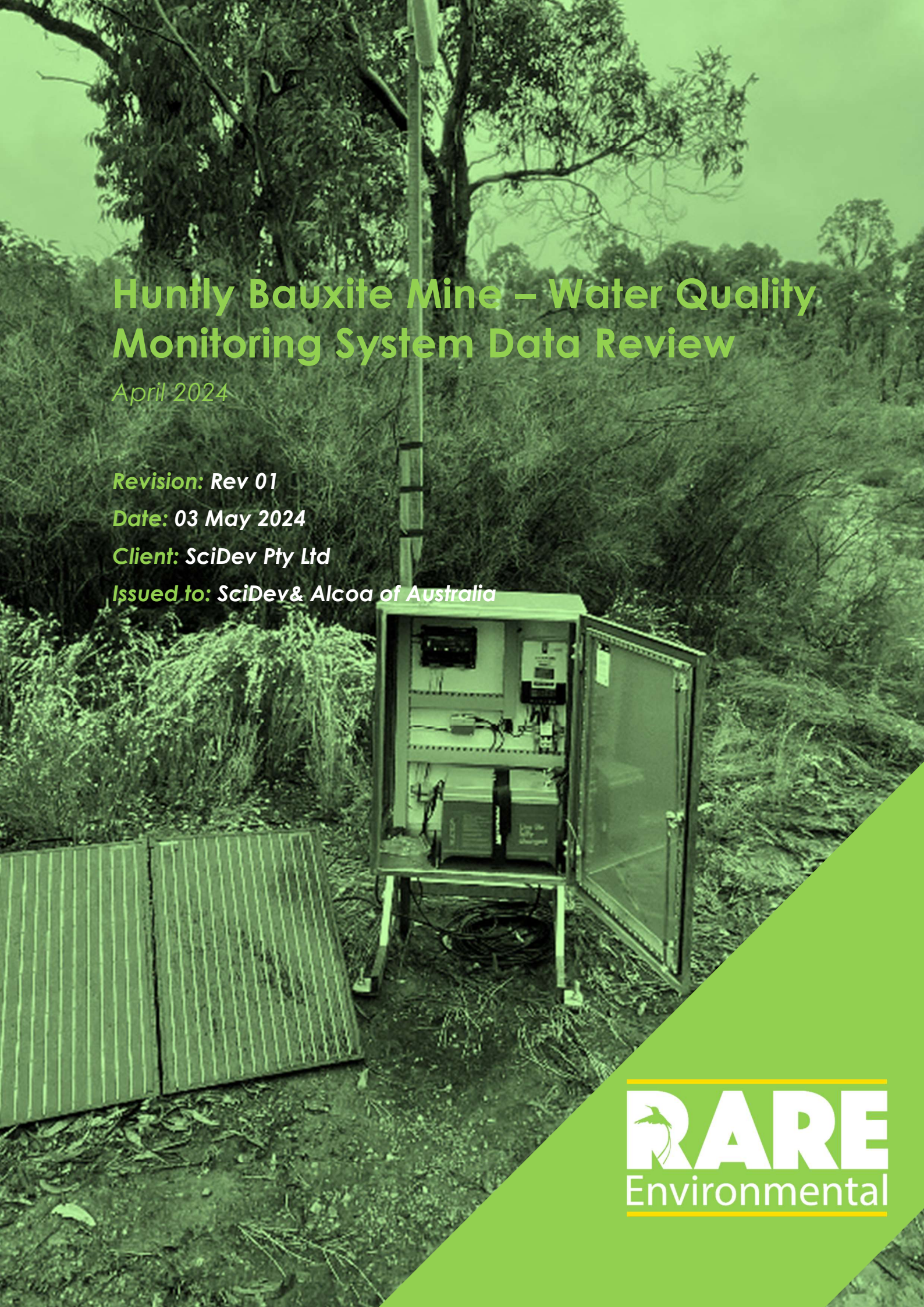


Huntly Bauxite Mine – Water Quality Monitoring System Data Review

April 2024

Revision: ***Rev 01***

Date: ***03 May 2024***

Client: ***SciDev Pty Ltd***

Issued to: ***SciDev& Alcoa of Australia***

RARE Environmental

Document Control

Project Details	
Document Title	Huntly Bauxite Mine – Water Quality Monitoring System Data Review
Document No	RP24050 HUN WQMS Data Review - April 2024
Project Name	SciDev WQ Data Processing
Project Number	RP24050
Client	SciDev
Client Reference	PO002447

Document History and Status						
Revision	Date	Description	Prepared	Reviewed	Approved	Issued to
01	03/05/24	Issued for internal review	MM	GD	GD	SciDev

Report Sign Off					
Report Version	01				
Prepared by		Technical Review		Approved for Issue	
Michael Minter		Georgia Duffy		Georgia Duffy	
Name	Michael Minter	Name	Georgia Duffy	Name	Georgia Duffy
Position	Env.Engineer	Position	Chemical Engineer	Position	Chemical Engineer
Date	3/05/2024	Date	3/05/2024	Date	3/05/2024

RARE Environmental Pty Ltd
ABN 41617855017
110/117 Old Pittwater Rd
Brookvale NSW 2100 Australia
P: 0413 223 401
www.rare-enviro.com.au

Infrastructure Sustainability Council MEMBER

Contents

1. Introduction

1.1. Purpose

RARE Environmental Pty Ltd (RARE) was engaged by SciDev Pty Ltd (SciDev) to analyse and comment on raw turbidity monitoring data collected by their Water Quality Monitoring Systems (WQMSs) under Section 6 of the Environmental Protection Act 1986 at the Huntly Bauxite Mine, owned and operated by Alcoa of Australia Limited (Alcoa). Stream turbidity monitoring is a core regulatory requirement stipulated as part of Alcoa's approvals and operating framework. The data for this reporting period was collected in April of 2024.

This report has been prepared to assess the quality of data provided and identify potential drainage incidents ('true' events) per the procedure detailed below within that data. Where possible recommendations are made for either WQMS network upgrades or further investigation of events identified within the data. This report should not be considered an assessment of the WQMS network and/or Alcoa's compliance to relevant legislation and requirements, nor should it be considered an assessment of the suitability of the adopted trigger level and event classification procedure.

1.2. Context

Data from each location has been collected and compared against the drainage incident trigger level outlined in the *Environmental Protection (Darling Range Bauxite Mining Proposal) Exemption Order 2023* Schedule 1 Division 2 Cl. 6. Trigger events have then been assessed against Alcoa's turbidity event classification guidelines to determine whether the event is true, i.e. caused by stream turbidity, or false, i.e. caused by stream debris, algae or other. For the purpose of this report a turbidity event is an event where turbidity levels, measured by a WQMS, are at least 25 nephelometric turbidity units (NTU) for a period of at least 1 hour.

A site map showing the WQMSs locations is provided in **Appendix A**.

1.3. Monitoring Requirements

Under Schedule 1, Division 2 ("Controls on activities"), of the *Environmental Protection (Darling Range Bauxite Mining Proposals) Exemption Order 2023* a drainage incident is defined as:

a) a runoff from a disturbance area to the surrounding environment of surface water that has a turbidity of at least 25 nephelometric turbidity units for a period of at least 1 hour; or

b) a discharge from containment infrastructure that includes or may include environmentally hazardous material;

1.4. Water Quality Monitoring System (WQMS)

At the Huntly site, for this reporting period, 8 (eight) WQMSs have been installed in streams within or downstream of mining operations to monitor stream turbidity levels. Each turbidity monitoring station is fitted with an Aquas SMR10 turbidity probe. The Aquas probes are placed directly in the streams, mounted at 90 degrees to the flow of water. Each sensor has a guard to protect the lens from larger debris and the units are fitted with a lens screen wiper. Note: disruptions or errant readings can occur with smaller pieces of debris (leaves etc.).

Data is collected via a Data Taker DT82 logger. Data from each logger is linked to an IOT data modem to transmit to a cloud-based platform. Data is logged locally in 6 second intervals with a 6-minute average pushed into the cloud-based platform. A float switch or cell indicates sensor immersion or a dry stream.

1.5. Data Review & Event Classification Process

Data produced by the WQMSs is reviewed by RARE per the following procedure and in consultation with SciDev. This allows for the identification of true events that require investigation to determine whether the mining operations may have contributed to the elevated turbidity levels, and false events.

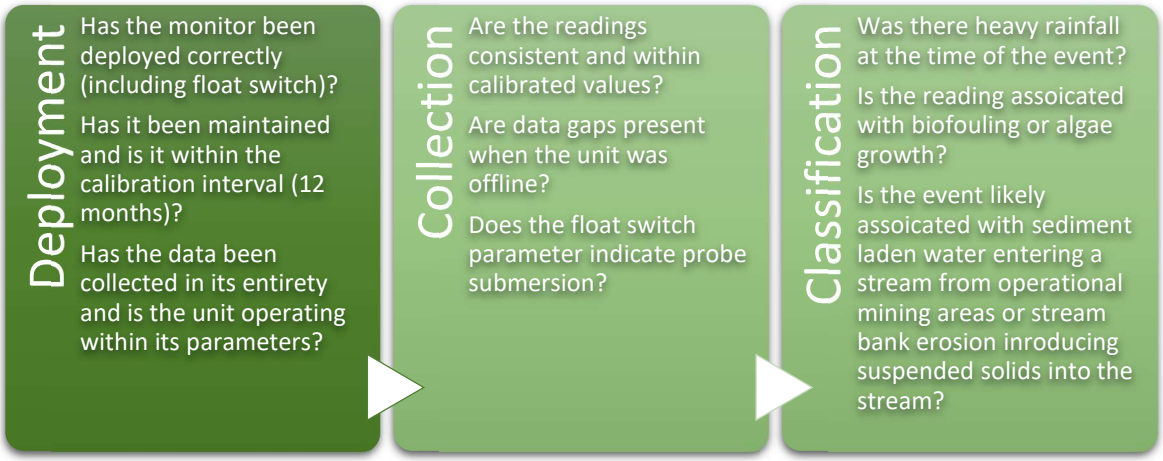


Figure 1: Data Review & Event Classification Process

The process considers the physical aspects of the WQMS deployment, the data collection by that monitor and finally classification of the events identified in that data. Classification of events is per Alcoa's procedure to identify events as true or false.

A 'true' stream turbidity exceedance event that is caused by an actual increase in stream water turbidity. Alcoa has identified that 'true' turbidity exceedance events typically show a sharp turbidity incline before gradually trailing off as the stream turbidity level returns to background.

Figure 2: Typical 'true' exceedance event showing the sharp incline and gradually return to background levels.

'False' stream turbidity exceedance events are caused by factors other than an actual increase in stream water turbidity (i.e. organic debris covering the monitor such as sticks/leaves/algae, stream water turbulence or air bubbles and fluctuating water levels that intermittently cover the monitor lens and then recede). Alcoa has identified that 'false' turbidity exceedance events typically illustrate sharp inclines and declines for turbidity when the data is graphed over time and lack the distinctive 'bell curve' shape that is associated with 'true' turbidity exceedance events.

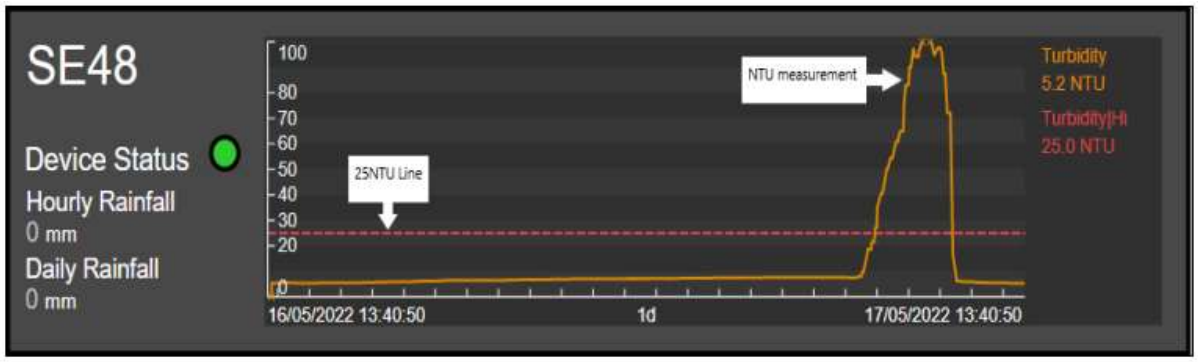


Figure 3: Typical 'false' exceedance event showing both a sharp incline and decline.

Any 'true' events identified in this report have been listed in **Section 3**.

2. WQMS Data Review

For the reporting period of April 2024, 57,490 data points were collected by 8 (eight) WQMSs across the Huntly site. From this data a total of 9 eight events were flagged where turbidity levels above 25 NTU were held for an hour or more. The following sections review this data, beginning with the deployment and operation of the WQMSs.

2.1. Deployment & Collection

From the data provided there were several units producing erroneous results, marked by spikes and/or non-sensical peaks.

RARE have identified WQMSs in **Table 1** that require review in regards erroneous data. SciDev confirmed that the data generated by these units is invalid and has therefore been excluded from further analysis.

Excluding the data from these units leaves eight potential turbidity events during the reporting period across 6 units as discussed in the following section.

Table 1: WQMS Requiring Review

Unit	Dates	SciDev Comment
SE61T	1/04/2024-18/04/2024	Site was last inspected on 27/03/2024 to check stream level, clean sensor and download data, sensor is recording consistently high NTU averages due to low stream level and heavy algae and vegetation build up. Site inspected again 3/04/2024, data shows a gradual increase in NTU building up to 2/04/2024 due to film building up on the lens. NTU dropped after lens clenaning. Site inspected on 10/04/2024, sensor cleaned and repositioned, stream is very low and heavily impacted by algae. Site inspected again 18/04/2024, stream impacted by alagal bloom and tanins floating on the surface, mid level clear but sensor required cleaning. NTU on arrival 267.47, dropped to 1.9 after cleaning.
SE06T	3/04/2024-30/04/2024	Site last inspected on 25/03/2024, stream level very low and heavy build up of vegetation and algae in the stream bed. Post 25/03/2024 turbidity data shows a continuous gradual increase in NTU averages likely from alage building up on the sesnor, as well as occasional spiking high and low turbidity, likely vegetation caught around the sensor dislodging. Attempted to access site 8/04/2024, access blocked. Site inspected 17/04/2024, dense build up of vegetation and suspended algae around the sensor. NTU dropped to below 1 after cleaning.

2.2. Classification

Analysing the data collected outside of the above periods leaves eight potential turbidity events during the reporting period across 6 units as summarised in **Table 2**. For this reporting period there were 0 (zero) 'true' turbidity events identified. Refer to the following section for analysis

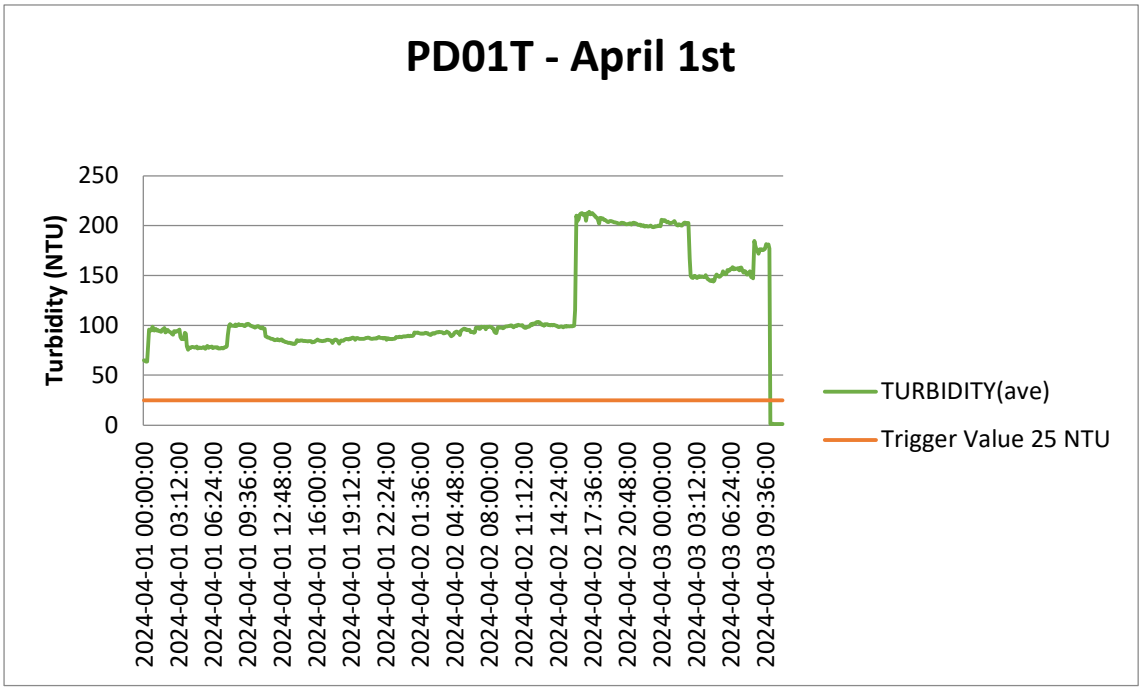
Table 2: Turbidity events summary

Date	Huntly WQMS Data - April 2024 - Events with turbidity > 25 NTU for an hour or more							
	ND14T	PD01T	SE02T	SE05T	SE06T	SE51T	SE59T	SE61T
1/04/2024		**1**						
2/04/2024								
3/04/2024								
4/04/2024								
5/04/2024								
6/04/2024								
7/04/2024								
8/04/2024								
9/04/2024								
10/04/2024								
11/04/2024			**1**					
12/04/2024								
13/04/2024								
14/04/2024								
15/04/2024			**1**					
16/04/2024			**1**					
17/04/2024			**2**					
18/04/2024		**1**						
19/04/2024								
20/04/2024								
21/04/2024								
22/04/2024								
23/04/2024								
24/04/2024								
25/04/2024								
26/04/2024								
27/04/2024								
28/04/2024								
29/04/2024								
30/04/2024		**1**						

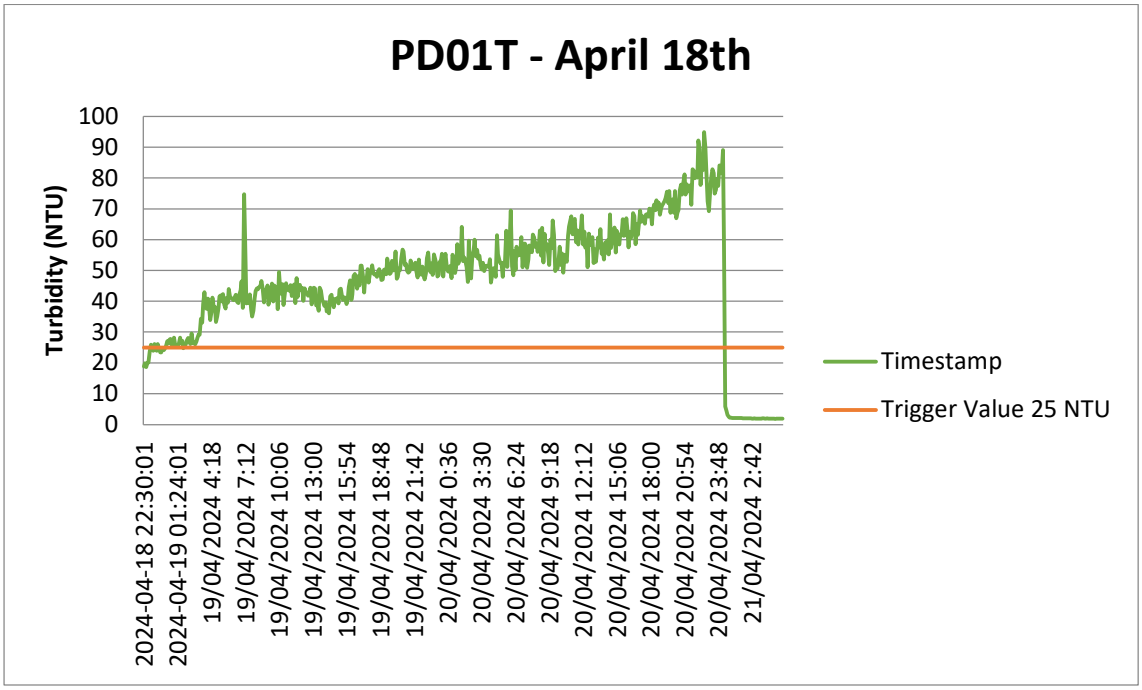
Note: Grey cells indicate data has been excluded. False events have been annotated by **black** bold text. True events for further investigation are annotated by **red** bold text. See following section for analysis.

2.2.1. PD01T Potential Turbidity Events

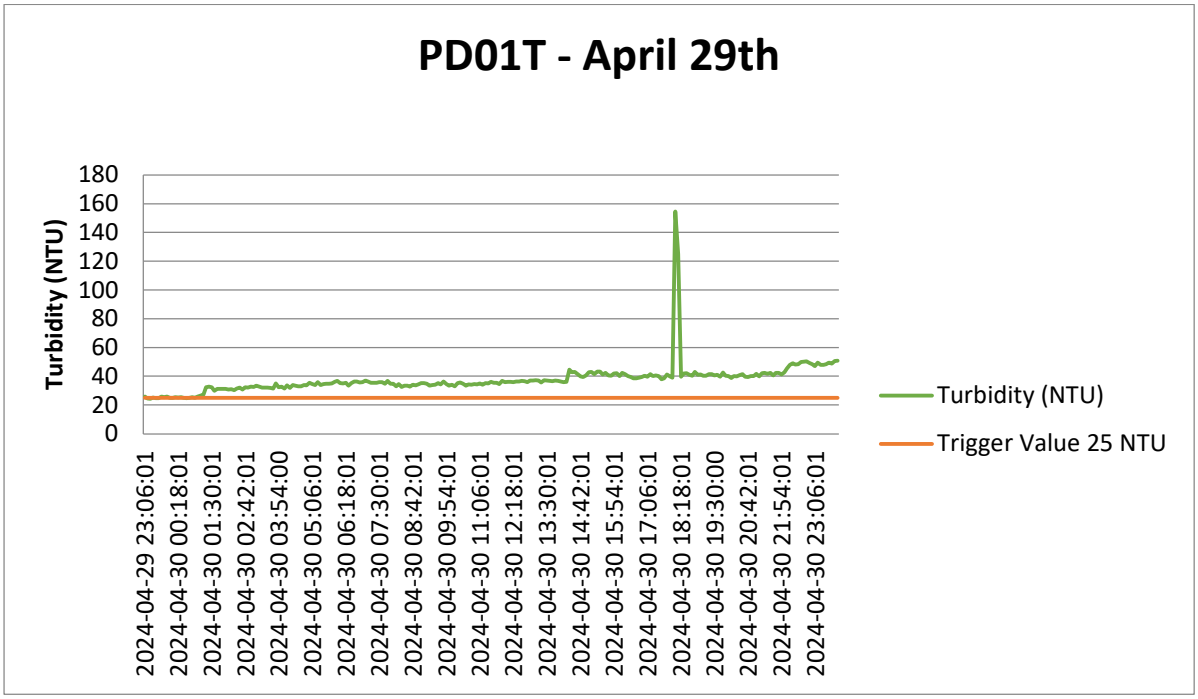
Chart(s) for data flagged at monitor PD01T are shown below for the potential events identified in the reporting period.



This event is marked by sporadic peaks indicative of a 'false' event, no further investigation required.



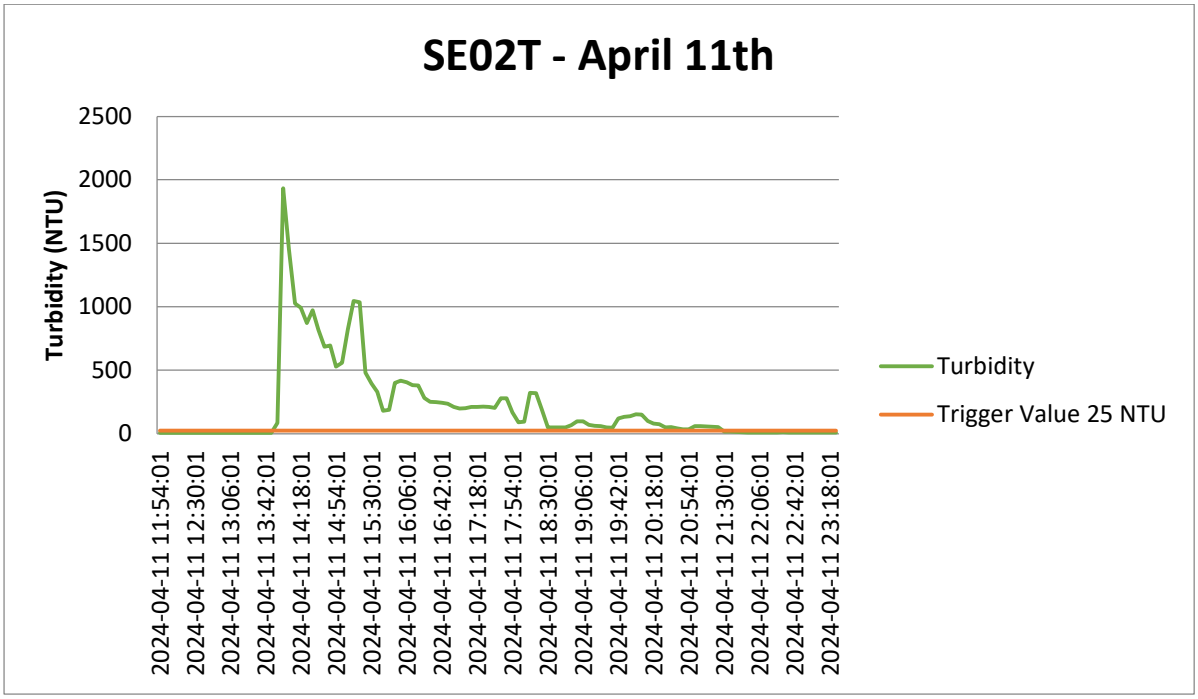
This event is marked by sporadic peaks indicative of a 'false' event, no further investigation required.



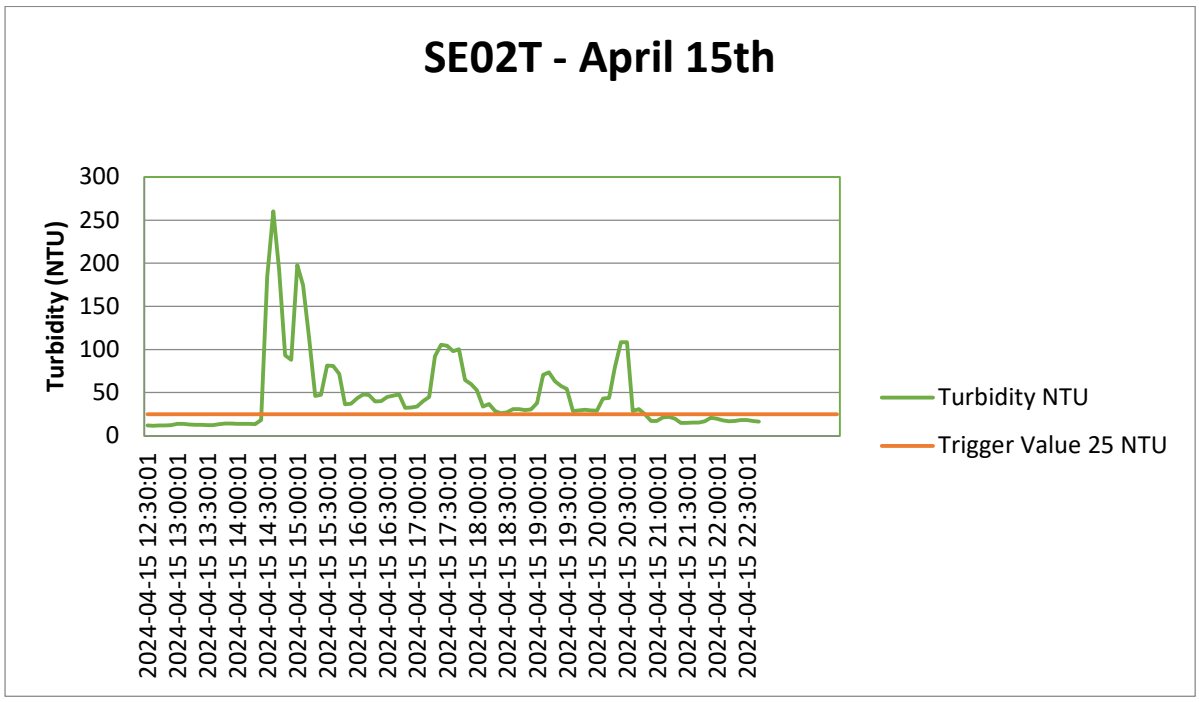
This event is marked by sporadic peaks indicative of a 'false' event, no further investigation required.

2.2.2. SE02T Potential Turbidity Events

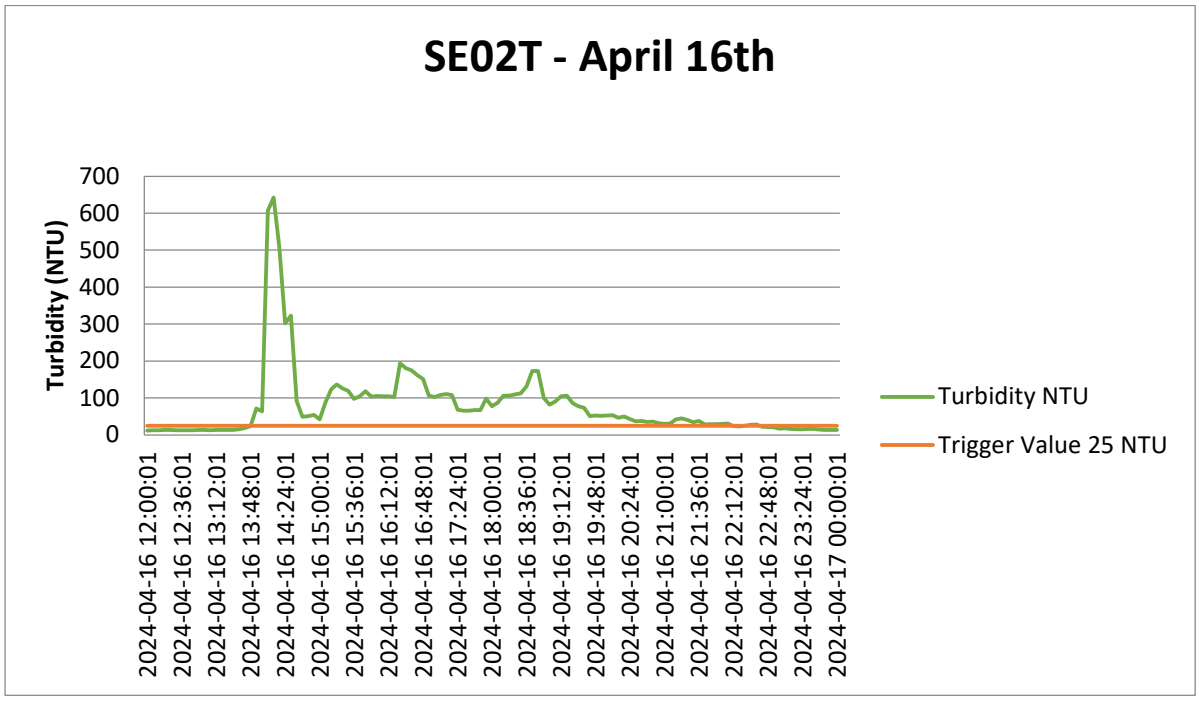
Chart(s) for data flagged at monitor SE02T are shown below for the potential events identified in the reporting period.



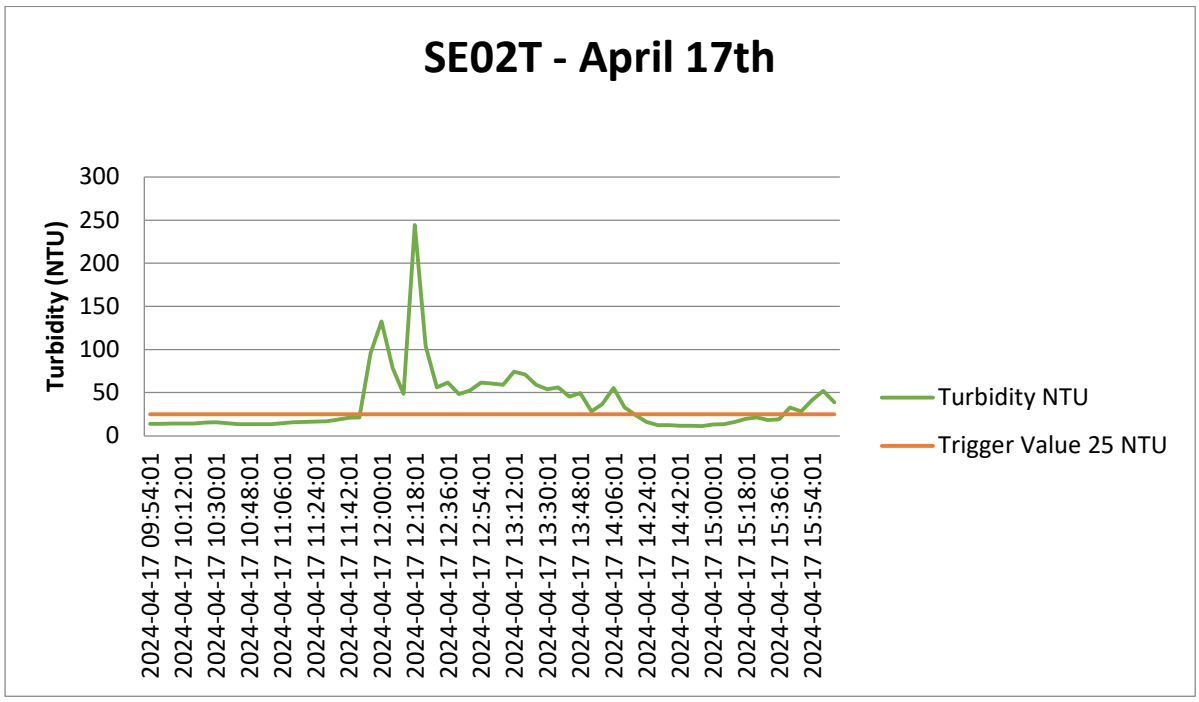
This event is marked by sporadic peaks indicative of a 'false' event, no further investigation required.



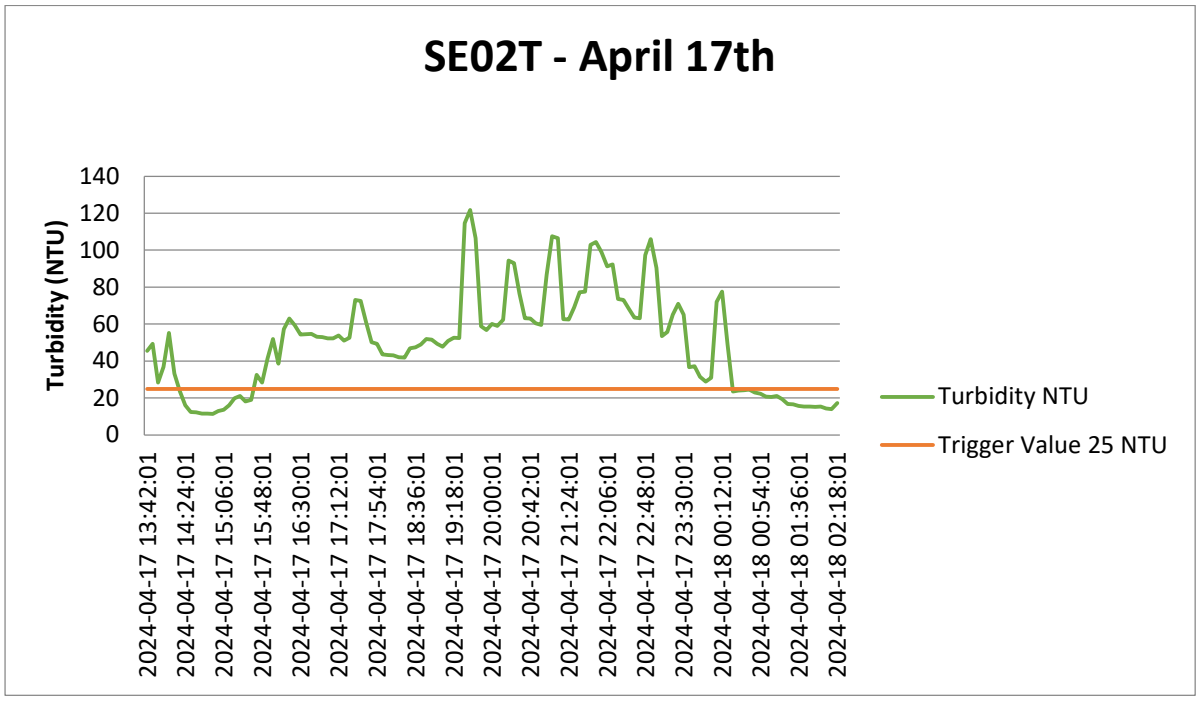
This event is marked by a sporadic peaks indicative of a 'false' event, no further investigation required.



This event is marked by a sporadic peaks indicative of a 'false' event, no further investigation required.



This event is marked by a sporadic peaks indicative of a 'false' event, no further investigation required.



This event is marked by a sporadic peaks indicative of a 'false' event, no further investigation required.

2.3. True Turbidity Events

For this reporting period, zero potential drainage or 'true' incidents were identified for further investigation.

Table 3: True Turbidity Events

*end date and time provided by Alcoa

3. Recommendations

3.1. WQMS Network

RARE recommends:

- Perform routine maintenance on all units to ensure their correct operation.

4. Raw WQMS Data

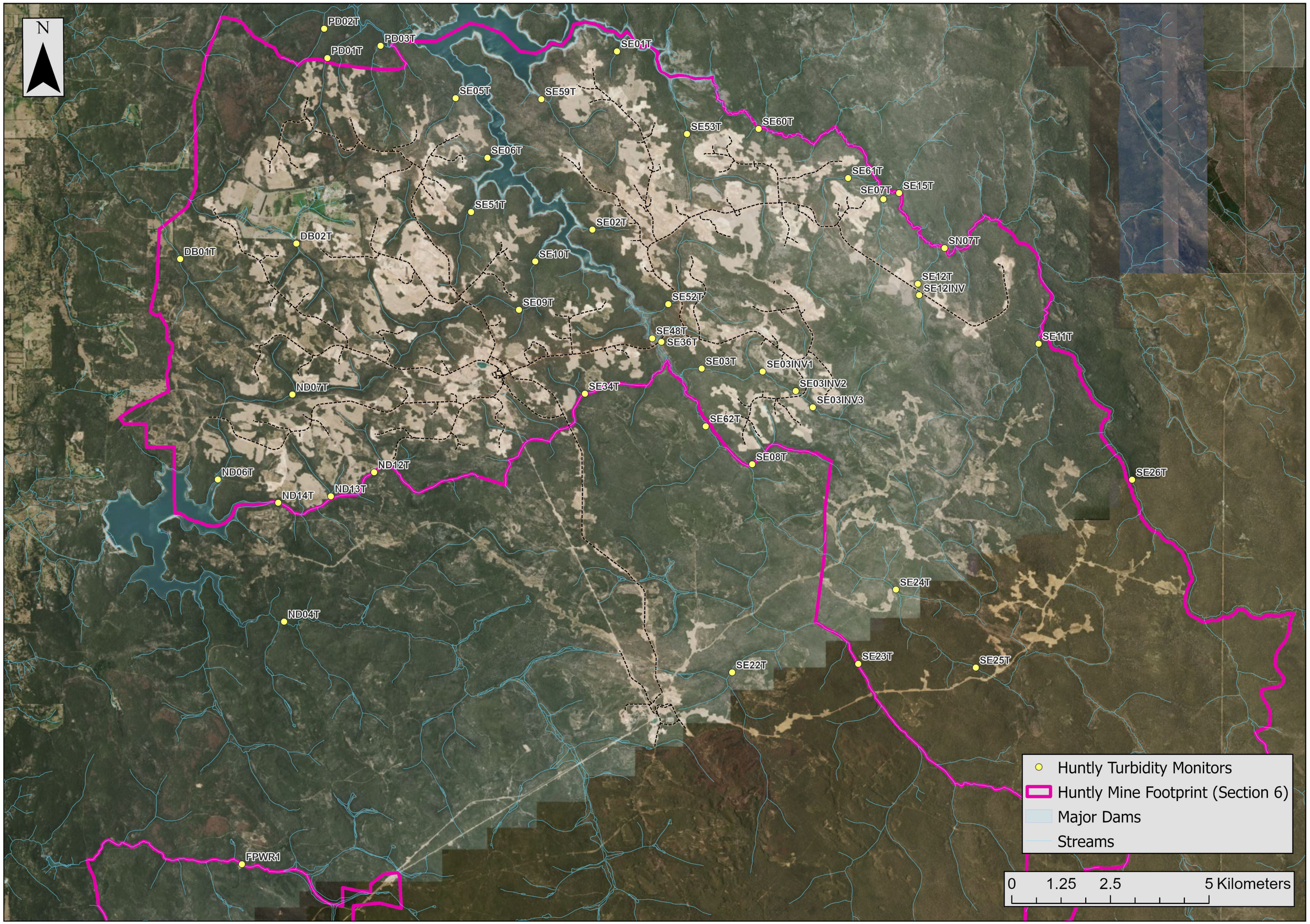
Note: False events have been annotated by **black** bold text. True events for further investigation are annotated by **red** bold text.

Date	Huntly WQMS Data - April 2024 - Events with turbidity > 25 NTU for an hour or more							
	ND14T	PD01T	SE02T	SE05T	SE06T	SE51T	SE59T	SE61T
1/04/2024		**1**						
2/04/2024								
3/04/2024								
4/04/2024								
5/04/2024								
6/04/2024								
7/04/2024								
8/04/2024								
9/04/2024								
10/04/2024								
11/04/2024			**1**					
12/04/2024								
13/04/2024								
14/04/2024								
15/04/2024			**1**					
16/04/2024			**1**					
17/04/2024			**2**					
18/04/2024								
19/04/2024		**1**						
20/04/2024								
21/04/2024								
22/04/2024								
23/04/2024								
24/04/2024								
25/04/2024								
26/04/2024								
27/04/2024								
28/04/2024								
29/04/2024								
30/04/2024		**1**						

Date	Huntly WQMS Data - April 2024 - Turbidity (Daily Average, NTU)							
	ND14T	PD01T	SE02T	SE05T	SE06T	SE51T	SE59T	SE61T
1/04/2024	1.76	87.02	12.94	4.90	7.29	2.45	16.15	9.42
2/04/2024	1.04	131.69	9.38	5.90	10.01	2.49	18.62	14.60
3/04/2024	1.05	73.61	6.12	4.74	34.88	1.81	20.88	
4/04/2024	1.16	1.38	6.16	4.22	61.26	1.35	6.08	2.12
5/04/2024	1.13	1.50	6.04	4.31	70.82	1.52	1.04	1.57
6/04/2024	1.27	1.24	6.24	5.49	42.39	1.66	1.56	3.41
7/04/2024	1.22	1.16	6.17	5.26	8.10	1.84	1.59	9.00
8/04/2024	1.60	1.32	7.51	6.72	9.48	1.97	1.05	12.09
9/04/2024	1.26	1.44	6.55	5.50	11.11	2.36	1.18	13.97
10/04/2024	1.58	1.52	6.81	6.17	15.15	2.26	1.26	25.23
11/04/2024	1.06	1.16	104.78	6.18	15.84	2.53	1.58	31.99
12/04/2024	1.13	1.56	9.87	4.76	16.06	2.75	1.97	13.64
13/04/2024	1.13	1.45	10.48	4.61	29.35	2.91	2.86	22.45
14/04/2024	1.02	1.82	11.35	5.75	27.04	2.70	3.01	26.79
15/04/2024	1.10	1.74	26.60	5.98	33.06	2.48	5.91	29.23
16/04/2024	1.01	2.48	45.59	5.51	41.82	2.63	5.04	33.77
17/04/2024	1.11	6.44	36.56	6.30	98.73	2.26	11.14	114.92
18/04/2024	1.10	15.76	13.82	6.30	0.30	2.23	14.01	127.06
19/04/2024	1.27	42.16	9.82	6.53	0.62	2.22	12.67	10.23
20/04/2024	1.16	62.04	10.51	6.69	20.71	2.40	11.99	7.45
21/04/2024	1.10	3.14	11.12	6.66	0.74	2.42	19.11	11.27
22/04/2024	1.12	1.57	11.61	7.06	0.89	2.02	19.52	8.91
23/04/2024	1.08	1.27	12.03	5.79	10.50	2.10	11.43	7.13
24/04/2024	1.07	1.58	12.29	12.08	8.51	2.30	2.04	3.74
25/04/2024	1.08	1.66	12.74	5.94	6.76	2.43	2.50	4.75
26/04/2024	1.08	3.17	13.56	6.50	32.26	2.67	2.69	6.75
27/04/2024	1.13	7.84	13.79	7.36	7.73	2.58	2.32	7.69
28/04/2024	1.10	13.69	13.92	8.28	9.36	3.75	3.21	9.27
29/04/2024	1.11	20.60	14.42	6.88	10.89	2.25	4.63	12.21
30/04/2024	1.12	37.99	15.00	7.98	73.52	2.25	9.46	14.14

Note: Daily averages above 25 NTU have been annotated by **black** bold text. Daily averages inclusive of with true events for further investigation are annotated by **red** bold text. Grey shading indicates no data available for that day at that unit.

Appendix A. Huntly WQMS Locations


N
PD02T
PD03T
PD01T
SE01T
SE05T
SE59T
SE53T
SE60T
SE06T
SE61T
SE07T
SE15T
SE51T
SE02T
DB02T
DB01T
SN07T
SE10T
SE12T
SE12INV
SE52T
SE09T
SE48T
SE36T
SE11T
SE03T
SE03INV1
SE03INV2
SE03INV3
ND07T
SE34T
SE62T
SE08T
ND12T
ND06T
ND13T
ND14T
SE26T
SE24T
ND04T
SE23T
SE25T
SE22T
FPWR1
Huntly Turbidity Monitors
Huntly Mine Footprint (Section 6)
Major Dams
Streams
0
1.25
2.5
5 Kilometers

Appendix B. WQMS General Arrangement

ANTENNA

SOLAR PANEL

DATA TRANSMISSION TO IOT

DATA OUTLET

POWER INLET

40 X 60 MM CABLE DUCT

20 AMP MPPT
SOLAR CHARGER

40 X 60 MM CABLE DUCT

SIERRA WIRELESS FX30

40 X 60 MM CABLE DUCT

12 V, 120 AH LI-ION BATTERY

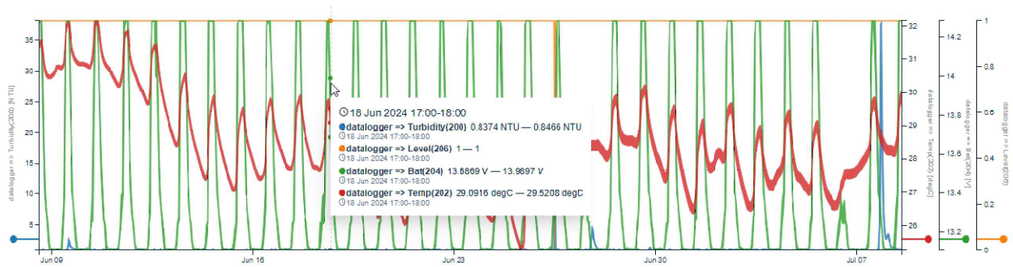
DATA INLET

SENSOR

STREAM DRY

SENSOR

STREAM FLOWING



REV.	REMARKS	DATE	DESIGNED	DRAWN	CHECKED	APPROVED	REFERENCE DRAWINGS
0	ISSUE FOR APPROVAL	05.07.2024	A.K.	S.A.	A.K.	A.K.	

ALL DIMENSIONS IN MILLIMETRES U.N.O.
LEVELS ARE IN METRES ON AHD U.N.O.
DO NOT SCALE DRAWING
IF IN DOUBT - ASK
TOLERANCES ISO2768-m U.N.O.

CLIENT

NSW - BUILDING G, 22 POWERS RD, SEVEN HILLS, NSW 2147
(02) 8385 5357
WA - 512, 1A QUEEN ST FREEMANTLE WA 6160
(08) 6245 9843
waterservices@scidev.com.au
www.scidev.com.au
SCIDEV

TITLE
IOT TURBIDITY MONITORING STATION
SITE LAYOUT
GENERAL ARRANGEMENT

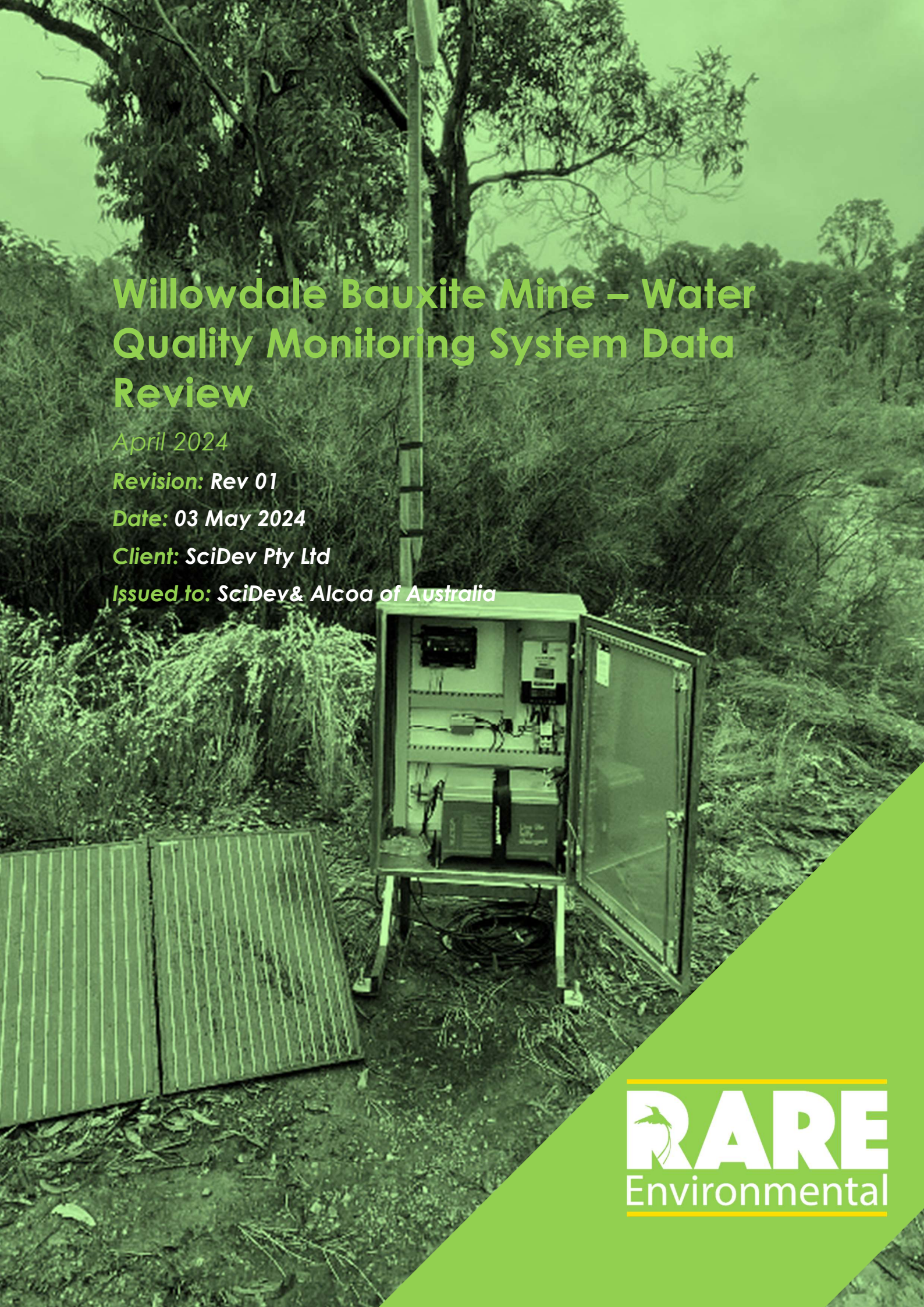
SHEET 1 OF 2

SCALE NTS OR AS SHOWN

DRAWING NO.
HI0090 - ALCOA WQMS

SHEET SIZE
A3

REV.
1



Willowdale Bauxite Mine – Water Quality Monitoring System Data Review

April 2024

Revision: ***Rev 01***

Date: ***03 May 2024***

Client: ***SciDev Pty Ltd***

Issued to: ***SciDev& Alcoa of Australia***

RARE Environmental

Document Control

Project Details	
Document Title	Willowdale Bauxite Mine – Water Quality Monitoring System Data Review
Document No	RP24050 WDL WQMS Data Review - April 2024
Project Name	SciDev WQ Data Processing
Project Number	RP24050
Client	SciDev
Client Reference	PO002447

Document History and Status						
Revision	Date	Description	Prepared	Reviewed	Approved	Issued to
01	03/05/24	Issued to client	MM	GD	GD	SciDev

Report Sign Off					
Report Version	01				
Prepared by		Technical Review		Approved for Issue	
Michael Minter		Georgia Duffy		Georgia Duffy	
Name	Michael Minter	Name	Georgia Duffy	Name	Georgia Duffy
Position	Env.Engineer	Position	Chemical Engineer	Position	Chemical Engineer
Date	3/05/2024	Date	3/05/2024	Date	3/05/2024

RARE Environmental Pty Ltd
ABN 41617855017
110/117 Old Pittwater Rd
Brookvale NSW 2100 Australia
P: 0413 223 401
www.rare-enviro.com.au

Contents

1. Introduction

1.1. Purpose

RARE Environmental Pty Ltd (RARE) was engaged by SciDev Pty Ltd (SciDev) to analyse and comment on raw turbidity monitoring data collected by their Water Quality Monitoring Systems (WQMSs) under Section 6 of the Environmental Protection Act 1986 at the Willowdale Bauxite Mine, owned and operated by Alcoa of Australia Limited (Alcoa). Stream turbidity monitoring is a core regulatory requirement stipulated as part of Alcoa's approvals and operating framework. The data for this reporting period was collected in April of 2024.

This report has been prepared to assess the quality of data provided and identify potential drainage incidents ('true' events) per the procedure detailed below within that data. Where possible recommendations are made for either WQMS network upgrades or further investigation of events identified within the data. This report should not be considered an assessment of the WQMS network and/or Alcoa's compliance to relevant legislation and requirements, nor should it be considered an assessment of the suitability of the adopted trigger level and event classification procedure.

1.2. Context

Data from each location has been collected and compared against the drainage incident trigger level outlined in the *Environmental Protection (Darling Range Bauxite Mining Proposal) Exemption Order 2023* Schedule 1 Division 2 Cl. 6. Trigger events have then been assessed against Alcoa's turbidity event classification guidelines to determine whether the event is true, i.e. caused by stream turbidity, or false, i.e. caused by stream debris, algae or other. For the purpose of this report a turbidity event is an event where turbidity levels, measured by a WQMS, are at least 25 nephelometric turbidity units (NTU) for a period of at least 1 hour.

A site map showing the WQMSs locations is provided in **Appendix A**.

1.3. Monitoring Requirements

Under Schedule 1, Division 2 ("Controls on activities"), of the *Environmental Protection (Darling Range Bauxite Mining Proposals) Exemption Order 2023* a drainage incident is defined as:

a) *a runoff from a disturbance area to the surrounding environment of surface water that has a turbidity of at least 25 nephelometric turbidity units for a period of at least 1 hour; or*
b) *a discharge from containment infrastructure that includes or may include environmentally hazardous material;*

1.4. Water Quality Monitoring System (WQMS)

At the Willowdale site, for this reporting period, 2 (two) WQMS units have been installed in section 6 areas within or downstream of mining operations. Each turbidity monitoring station is fitted with an Aquas SMR10 turbidity probe. The Aquas probes are placed directly in the streams, mounted at 90 degrees to the flow of water. Each sensor has a guard to protect the lens from larger debris and the units are fitted with a lens screen wiper. Note: disruptions or errant readings can occur with smaller pieces of debris (leaves etc.).

Data is collected via a Data Taker DT82 logger. Data from each logger is linked to an IOT data modem to transmit to a cloud-based platform. Data is logged locally in 6 second intervals with a 6-minute average pushed into the cloud-based platform. A float switch or cell indicates sensor immersion or a dry stream.

1.5. Data Review & Event Classification Process

Data produced by the WQMSs is reviewed by RARE per the following procedure and in consultation with SciDev. This allows for the identification of true events that require investigation to determine whether the mining operations may have contributed to the elevated turbidity levels, and false events.

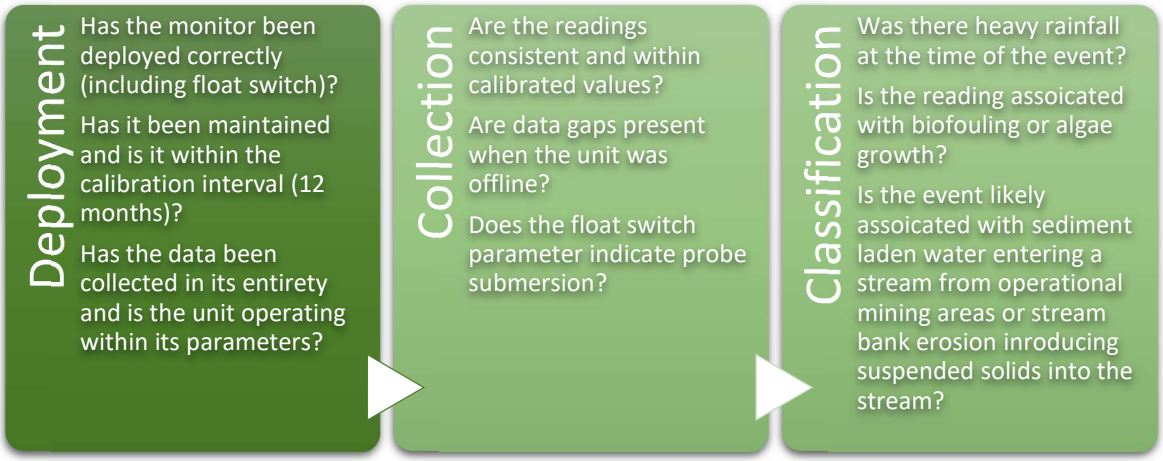


Figure 1: Data Review & Event Classification Process

The process considers the physical aspects of the WQMS deployment, the data collection by that monitor and finally classification of the events identified in that data. Classification of events is per Alcoa's procedure to identify events as true or false.

A 'true' stream turbidity exceedance event that is caused by an actual increase in stream water turbidity. Alcoa has identified that 'true' turbidity exceedance events typically show a sharp turbidity incline before gradually trailing off as the stream turbidity level returns to background.

Figure 2: Typical 'true' exceedance event showing the sharp incline and gradually return to background levels.

'False' stream turbidity exceedance events are caused by factors other than an actual increase in stream water turbidity (i.e. organic debris covering the monitor such as sticks/leaves/algae, stream water turbulence or air bubbles and fluctuating water levels that intermittently cover the monitor lens and then recede). Alcoa has identified that 'false' turbidity exceedance events typically illustrate sharp inclines and declines for turbidity when the data is graphed over time and lack the distinctive 'bell curve' shape that is associated with 'true' turbidity exceedance events.

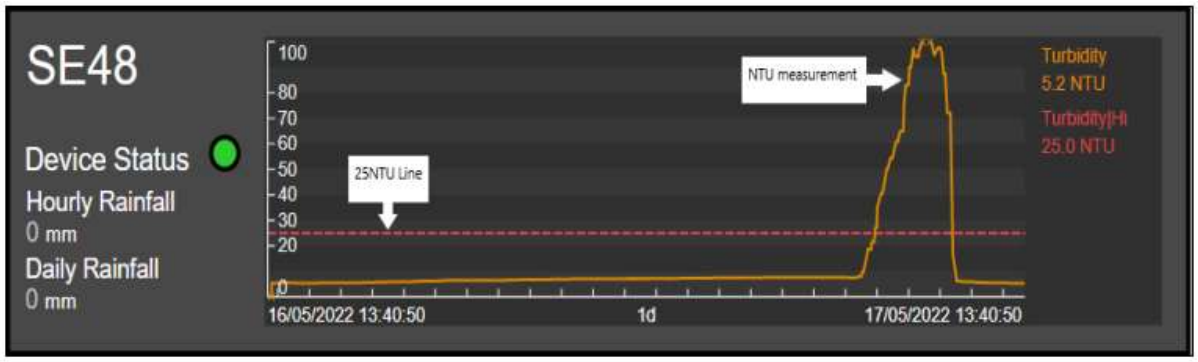


Figure 3: Typical 'false' exceedance event showing both a sharp incline and decline.

Any 'true' events identified in this report have been listed in **Section 3**.

2. WQMS Data Review

For the reporting period of April 2024, 7024 data points were collected by one WQMS unit in section 6 areas across the Willowdale site. From this data a total of zero events were flagged where turbidity levels above 25 NTU were held for an hour or more. The following sections review this data, beginning with the deployment and operation of the WQMSs.

2.1. Deployment & Collection

From the data provided there were several units producing erroneous results, marked by spikes and/or non-sensical peaks.

RARE have identified WQMSs in **Table 1** that require review in regard to erroneous data. SciDev confirmed that the data generated by these units is invalid and has therefore been excluded from further analysis.

Excluding the data from these units leaves zero potential turbidity events during the reporting period across zero units as discussed in the following section.

Table 1: WQMS Requiring Review

Unit	Dates	SciDev Comment
HV07	01/04/2024-30/04/2024	Data invalid for April 2024. Turbidity unit encountered equipment malfunctions in April causing the unit to fail at various points throughout the month.
PTM01	01/04/2024-30/04/2024	Stream is dry no data available

2.2. Classification

Analysing the data collected outside of the above periods leaves zero potential turbidity events during the reporting period as summarised in **Table 2**. For this reporting period there was zero 'true' turbidity event identified. Refer to the following section for analysis.

Table 2: Turbidity events summary

Date	Willowdale WQMS Data - April 2024 - Events with turbidity > 25 NTU for an hour or more	
	HV07	PTM01
1/04/2024		
2/04/2024		
3/04/2024		
4/04/2024		
5/04/2024		
6/04/2024		
7/04/2024		
8/04/2024		
9/04/2024		
10/04/2024		
11/04/2024		
12/04/2024		
13/04/2024		
14/04/2024		
15/04/2024		
16/04/2024		
17/04/2024		
18/04/2024		
19/04/2024		
20/04/2024		
21/04/2024		
22/04/2024		
23/04/2024		
24/04/2024		
25/04/2024		
26/04/2024		
27/04/2024		
28/04/2024		
29/04/2024		
30/04/2024		

Note: Grey cells indicate data has been excluded. False events have been annotated by **black** bold text. True events for further investigation are annotated by **red** bold text. See following section for analysis.

3. Recommendations

3.1. WQMS Network

RARE recommends:

- WQMSs include a flow switch or similar mechanism to detect when the stream is dry if they haven't been fitted with one.

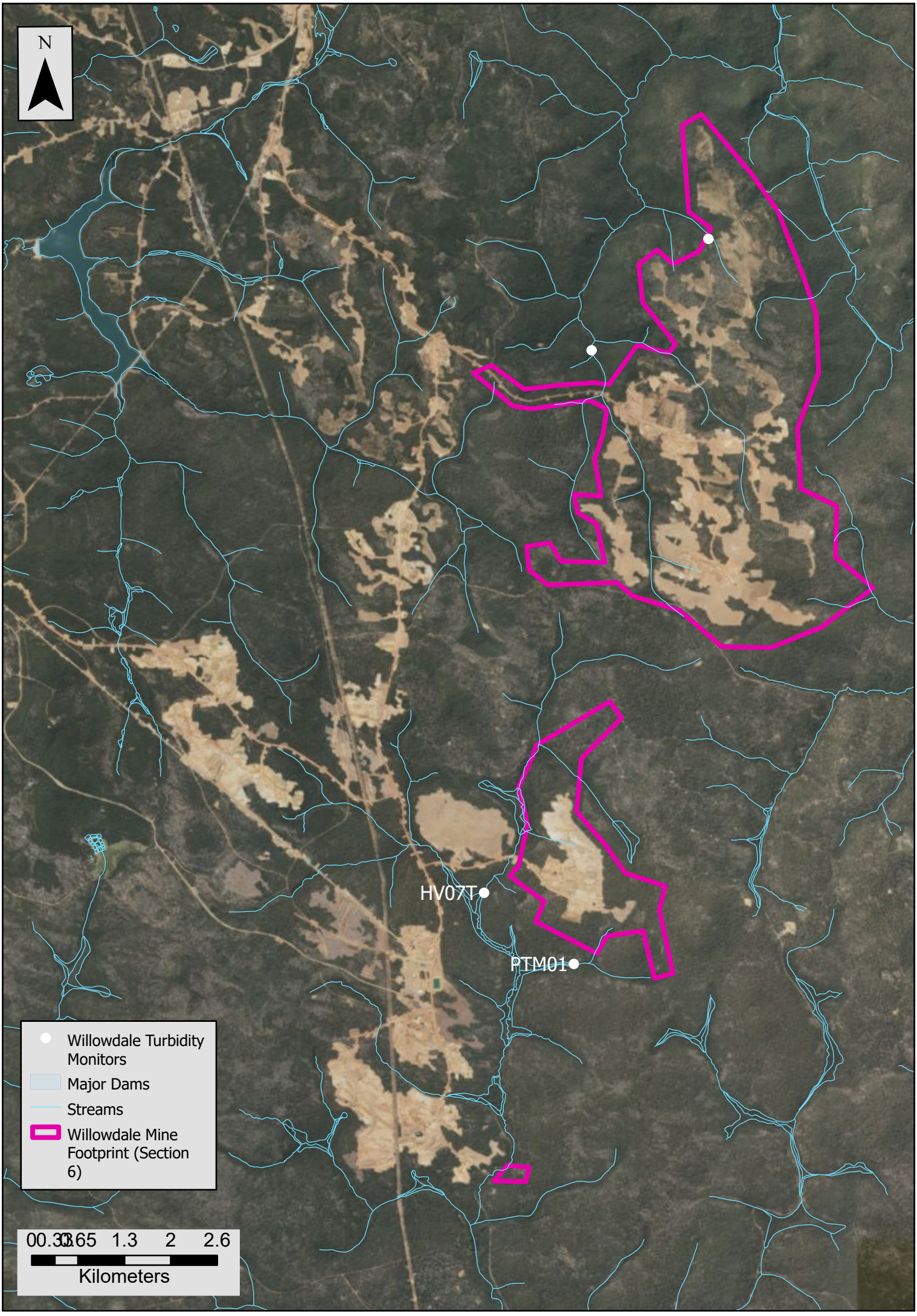
4. Raw WQMS Data

Date	Willowdale WQMS Data - April 2024 - Events with turbidity > 25 NTU for an hour or more	
	HV07	PTM01
1/04/2024		
2/04/2024		
3/04/2024		
4/04/2024		
5/04/2024		
6/04/2024		
7/04/2024		
8/04/2024		
9/04/2024		
10/04/2024		
11/04/2024		
12/04/2024		
13/04/2024		
14/04/2024		
15/04/2024		
16/04/2024		
17/04/2024		
18/04/2024		
19/04/2024		
20/04/2024		
21/04/2024		
22/04/2024		
23/04/2024		
24/04/2024		
25/04/2024		
26/04/2024		
27/04/2024		
28/04/2024		
29/04/2024		
30/04/2024		

Date	Willowdale WQMS Data - April 2024 - Turbidity (Daily Average, NTU)	
	HV07	PTM01
1/04/2024		
2/04/2024		
3/04/2024		
4/04/2024		
5/04/2024		
6/04/2024		
7/04/2024		
8/04/2024		
9/04/2024		
10/04/2024		
11/04/2024		
12/04/2024		
13/04/2024		
14/04/2024		
15/04/2024		
16/04/2024		
17/04/2024		
18/04/2024		
19/04/2024		
20/04/2024		
21/04/2024		
22/04/2024		
23/04/2024		
24/04/2024		
25/04/2024		
26/04/2024		
27/04/2024		
28/04/2024		
29/04/2024		
30/04/2024		

Note: Grey shading indicates no data available for that day at that unit.

Appendix A. WDL WQMS Locations


N
HV07T
PTM01
Willowdale Turbidity Monitors
Major Dams
Streams
Willowdale Mine Footprint (Section 6)
0 0.33 0.65 1.3 2 2.6
Kilometers

Appendix B. WQMS General Arrangement

ANTENNA

SOLAR PANEL

DATA OUTLET

POWER INLET

40 X 60 MM CABLE DUCT

20 AMP MPPT
SOLAR CHARGER

SIERRA WIRELESS FX30

40 X 60 MM CABLE DUCT

DATA INLET

40 X 60 MM CABLE DUCT

12 V, 120 AH LI-ION BATTERY

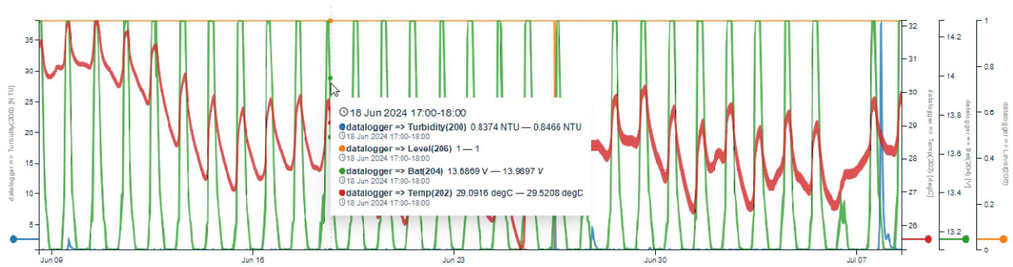
DATA TRANSMISSION TO IOT

SENSOR

STREAM DRY

SENSOR

STREAM FLOWING



REV.	REMARKS	DATE	DESIGNED	DRAWN	CHECKED	APPROVED	REFERENCE DRAWINGS
0	ISSUE FOR APPROVAL	05.07.2024	A.K.	S.A.	A.K.	A.K.	

ALL DIMENSIONS IN MILLIMETRES U.N.O.
LEVELS ARE IN METRES ON AHD U.N.O.
DO NOT SCALE DRAWING
IF IN DOUBT - ASK
TOLERANCES ISO2768-m U.N.O.
© SCIDEV

CLIENT

NSW - BUILDING G, 22 POWERS RD, SEVEN HILLS, NSW 2147
(02) 8385 5357
WA - 512, 1A QUEEN ST FREEMANTLE WA 6160
(08) 6245 9843
waterservices@scidev.com.au
www.scidev.com.au

SCIDEV

TITLE

IOT TURBIDITY MONITORING STATION
SITE LAYOUT
GENERAL ARRANGEMENT

SHEET 1 OF 2

SCALE NTS OR AS SHOWN

DRAWING NO. HI0090 - ALCOA WQMS

SHEET SIZE A3

REV. 1