February 2026

Environmental Report ('ER') – Volume 2 Appendices

Proposed 110kV Substation and Underground Grid Connection

at

Killoran, Co. Tipperary

On behalf of

Soleirticity Lisheen Ltd

MALONE O'REGAN ENVIRONMENTAL

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Environmental Report ('ER') – Volume 2

Proposed 110kV Substation and Underground Grid Connection

Soleirticity Lisheen Ltd

Killoran, Co. Tipperary

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Lisheen Milling Ltd

LISHEEN TMF ANNUAL REVIEW 2024

MARCH 2025

CONFIDENTIAL

Lisheen Milling Ltd

LISHEEN TMF ANNUAL REVIEW 2024

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Town Centre House
Dublin Road
Naas
Co Kildare

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Signature				
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Signature				
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TMF ANNUAL INSPECTION 2024

1 INTRODUCTION

WSP Ireland Consulting Ltd (WSP) were commissioned by Lisheen Milling Limited (Lisheen) to prepare this Annual Review Report to facilitate licensee compliance with the conditions of Schedule C.4: Monitoring of the Tailings Management Facility of the licence (IPCL P0088-04) namely the 'Annual Review' for the Lisheen Mine Tailings Management Facility (TMF).

The monitoring requirements (parameter, frequency and method) are described in Schedule C.4 of the licence, this schedule is applicable, unless otherwise agreed with the EPA in regard to a reduced monitoring programme. The monitoring programme has been amended to reflect the status of the facility and has been set out and agreed with the EPA via the aftercare plan, the current monitoring programme is provided in Table 3-1 (section 3)

WSP carried out site inspections of the closed TMF at the Lisheen Mine, County Tipperary at a minimum of quarterly during 2024 and conducted quarterly reviews of the monitoring data. The Annual Site Inspection for 2024 was carried out on Monday 3rd of February 2025 by Billy Murphy and James Purrington of WSP.

Annual Reviews and Annual Site Inspections have been carried out by WSP at the Lisheen TMF every year since operations began in 2000. Monthly inspections of the TMF have been carried out by WSP from July 2018 to 2024 and quarterly inspections are currently ongoing for Q1 of 2025.

The remediation works for a seepage issued identified in October 2018, located along the south-east sector of the dam wall between CH2300 and CH2500, were completed in early March 2020. No further issues have been identified from the monitoring data or site inspections subsequently.

No further anomalies were identified in the soil berm for the perimeter crest road since being identified in Q4 2022 and Q1 2023.

The following are specific topics of interest for the Lisheen TMF during 2024:

- A weir was installed in Q3 of 2022 (Golder-WSP 2022) with the specific objective to reduce the volume of water stored on the facility, and thereby the head and supply of water for existing and potential seepages and also to reduce the operating water level in the rock fill and observe the water quality results, and in this manner evaluate the required degree of saturation to alleviate the potential for acid generation in the tailings. The weir gate has been set at approx. 100mm above the tailings elevation and has been very effective in reducing the water elevation in the TMF cap, such that Spillway 2 was rarely in use during the winter period. The water arising from the decant pipe for the weir structure is being sampled and tested for water quality and pH. A CQA Validation Report was prepared and subsequently submitted to the EPA at the end of November 2022.
- The weir was installed on a trial basis and this trial will continue into late 2026, after which time a report will be prepared to address the effectiveness of the weir and any influence on the water quality being discharged from the TMF. A recommendation with respect to retention of a permanent weir and the long-term management of water level in the TMF will be addressed in this report.
- It is understood that planning permission has been granted to construct a solar farm on the surface on the TMF. Any works will require EPA approval in accordance with the IPCL conditions. It is recommended that WSP are consulted before any such works commence.

- In addition, an analysis of the weir testing period indicates that operating the weir in its open configuration since Q3 2022 has significantly reduced the water storage within the rock fill cap, thereby lowering seepage potential and influencing water quality parameters. A trial period involving temporary closure of the tilting weir—proposed until October 2026—will provide an opportunity to a direct comparison between the open and closed configurations, which allows better assessment of the long-term impacts on water quality. Based on the outcomes of this trial, recommendations may include adjustments such as re-opening the weir on a seasonal or permanent basis. Additionally, considering that flow measurement data have been identified as limited and are key for ongoing evaluation, it is recommended that flow meter(s) be installed to provide accurate and continuous flow data to support enhanced monitoring and informed decision-making regarding TMF management.

2 SITE INSPECTION

Lisheen operated an underground lead and zinc mine and processing plant in Co. Tipperary, which produced approximately 1.18 million tonnes of tailings per annum. Generally, approx. 50% of tailings generated were discharged to the TMF e.g., in 2012 and 2013, approximately 76% and 49% of the tailings, were discharged into the tailings facility whilst the remaining tailings were placed underground as mine backfill.

The tailings were discharged into a Tailings Management Facility (TMF) located on the Derryville Bog, approximately 2 km east-southeast of the ore bodies and adjacent to the plant site (Drawing 1, Appendix A). The TMF covers an area of approximately 70 ha of which 90% is located on the peat bog. The remaining 10% forming the north-western and south-eastern sectors are founded on farmland.

The TMF was designed by Golder Associates and was to be developed in three vertical stages with a final dam crest elevation of 136.5 mOD. The first stage (Stage 1) was constructed to an elevation of 129.85 mOD and commenced operations in 1999. The second stage (Stage 2) was constructed to an elevation of 134.5 mOD using the downstream method and operated from 2004 to 2012. The final stage (Stage 3) was constructed to an elevation of 136.5 mOD using a combined centreline / upstream method and extended the life of the facility to 2014, subject to throughput and backfill requirements. Stage 3 was constructed over 87% of the TMF while the remaining 9 ha on the western extent remained at the Stage 2 elevation (Sector D to E). This separated the TMF footprint into the Phase 1 TMF (9 ha along the west dam wall) and the Main TMF (57 ha).

The Stage 1 and 2 dam walls have been constructed of random fill, typically with a low permeability till (approximately 10^{-4} to 10^{-6} m/s). An internal drainage, consisting of a vertical chimney drain and horizontal upper finger drains (UFDs) has been constructed within the Stage 2 dam to prevent a rise in the phreatic surface on the downstream side of the dam wall. The upstream face of the dam was lined with HDPE geomembrane and geosynthetic clay lining (GCL) to reduce seepage. The Stage 3 dam wall is constructed of rock fill and is composite lined with the 2mm HDPE geomembrane and GCL located centrally within the raise.

A new cell, the TMF Adjoining Cell, was constructed near the end of the mine life, adjoining the northern sector of the north-east wall and confined between the mine site boundary and the wind turbine (Dam Sector A' to G'). The construction of the TMF Adjoining Cell was completed in December 2013. The new cell (6 ha) is independent of the Main TMF and was constructed to contain tailings for the remaining life of mine and allowed for the continuing progressive closure of the existing facility. The perimeter walls of the new cell were constructed to an elevation of 131.5 mOD and tailings were deposited to an elevation of 130.5 mOD. The dam walls are constructed of material derived from excavating, ripping and pneumatic breaking of weathered limestone from the Lisheen owned and operated Carrick Hill Quarry. This cell is also composite lined on the upstream face with 2 mm HDPE overlying a GCL.

Tailings discharge into the Main TMF and the Adjoining Cell ceased in the first week of 2016 and the mine site was decommissioned. Capping works for the Phase 1 TMF were completed in the 2010 and capping works for the Main TMF and the Adjoining Cell were started in 2012 and completed in Febuary 2018. Three spillways are in place and discharge into the Attenuation Ponds via the

Transfer Box. The Attenuation Pond typically only discharges between October and April to the Cloheen Pond via the Outfall Structure and subsequently to the Cloheen Ditch leading to the Drish River. A plan layout of the facility is shown in Appendix A – Drawing 1.

The capping for the various facilities was formed by placing a separation geotextile on the desiccated tailings overlain by a minimum of 700 mm depth of rock fill. A minimum 300 mm layer of peat/till mix was placed above the rock fill capping to support vegetation. The capping sequence for the three distinct zones of the TMF is as follows:

- **Phase 1 Capping** – 9 ha sector of the TMF located parallel to west dam wall between Dam Sector D and E. Capping was undertaken when the tailings were at 133.5 mOD in 2009. Surface runoff from the cap is decanted via a spillway and channels (Spillway 1, Channel 1 and Channel 4) into the Transfer Box.
- **Main TMF Capping** – 57 ha remaining area of TMF was completed by February 2018. This elevated portion of the TMF is separated from the Phase 1 TMF by the internal Stage 3 raise constructed from the north dam wall to the south dam wall. Capping was undertaken when the tailings were at 135.5 mOD and progressed from the south dam wall in 2012 to reach the north dam wall in 2018. Surface water from the cap is decanted via a spillway and channels (Spillway 2, Channel 2 and Channel 4) into the Transfer Box.
- **Adjoining Cell** – 6 ha independent sector of the TMF which adjoins the north wall of Main TMF and was capped during 2017. The cell was not fully filled with tailings to its design elevation of 130.5 mOD but was subsequently filled with soils and demolition rubble generated by the decommissioning of the plant site. Surface water from the cap is decanted via a spillway and channels (Spillway 3 and Channel 3) into the Transfer Box.

Note: The flows from Channel 1 and Channel 2 merge at Channel 4 which then enters the Transfer Box. The flows from all channels are mixed in the Transfer Box prior to entering the Attenuation Pond. The Attenuation Pond discharges at its western extent, via the Outfall Structure, into Channel 5 leading to the Cloheen Pond and subsequently discharging to the Cloheen Ditch at the SW1 monitoring point.

3 MONITORING PROGRAM

The Lisheen Mine TMF Monitoring Programme comprises the collection of water samples and water level readings from monitoring wells and piezometers installed around the perimeter of the facility, into the dam wall and in the cap of the TMF, in order to provide frequent and regular information on the physical and chemical stability of the facility. The general frequency of sampling and testing is given below:

- **Monitoring Wells**
  - Bi-annually in 2024 (March and October) – pH, conductivity, water level (conducted quarterly) and full suite of water quality (when samples are available)
- **Piezometers**
  - Bi-annually in 2024 (March and October) – pH, conductivity, water level (conducted quarterly) and full suite of water quality (when samples are available)
- **Settlement Points**
  - Annually.
- **Cap Monitoring Wells**
  - Quarterly.

The monitoring programme for 2024 is provided below and readings were taken for the quarters at early-Jan, mid-March, early-June, late-September 2024 and early February 2025.

Table 3-1 - Monitoring Programme and Sampling Points (Closure and Aftercare Phases)

Dam Sector	Chainage (m)	Monitoring Wells	Piezometers	Cap Monitoring Wells
A to B	1000 – 1780	MW1 to MW4, MW6 & MW7	P27A, P27B P1A, P1B, P1C P26A, P26B P25A, P25B P2A, P2B, P2C P24A, P24B	CW11, CW12, CW13, CW14
B to D	1780 – 2590	MW9, MW10 &MW12, MW14, MW15 and MW16	P23A, P23B P3A, P3B, P3C P22A, P22B P21A, P21B P20A, P20B P15A, P15B P13A, P13B P14B P4A, P4B, P4C	CW10, CW6
D to E	2590 – 3380	MW23, MW30 & MW33	P5A, P5B, P5C P19A, P19B P6A, P6B, P6C P18A, P18B P7A, P7B, P7C P17A, P17B P16A, P16B	CW1, CW2
E to A	3380 – 4190	MW35 & MW37	P29A, P29B P8A, P8B, P8C P28A, P28B P9A, P9B	CW3, CW7
Internal	Not applicable	Not applicable	Not applicable	CW4, CW5, CW8, CW9
New Cell G to A’	3800- 4190	MW40A, MW41A & MW42A	P10, P11, P12	CW15, CW16

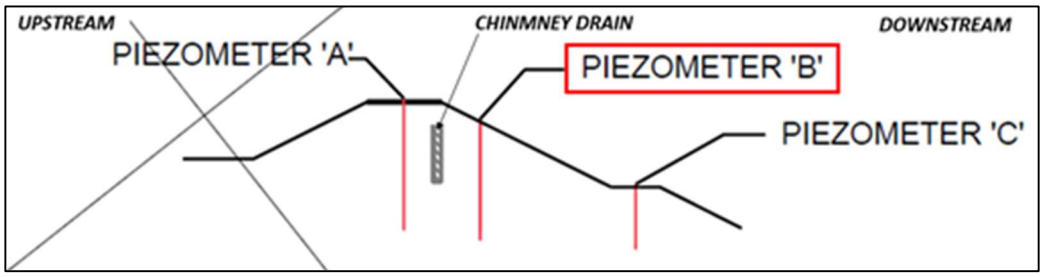
Piezometers clusters are at approx. 100m intervals around the Main TMF and each cluster is either of three instruments (A, B and C) installed in a line along the slope as described below and detailed in Figure 3-1 or of two instruments (A and B) together at the crest, one vertical and one inclined at 30 degrees as described below and detailed in Figure 3-2.

Piezometers are installed at approx. 200m intervals around the TMF Adjoining Cell and comprise a single piezometer at the crest, i.e., at the ‘A’ location.

The sequence of piezometers installed for the Lisheen TMF were:

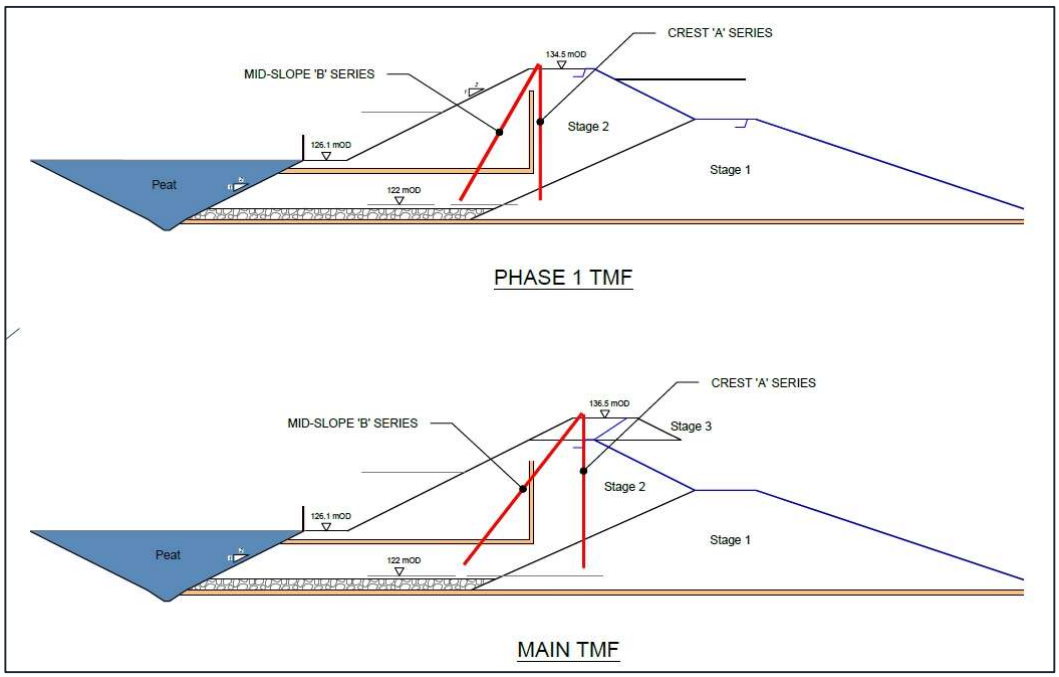
- P1 to P9 Series (Original Series): Installed for the Main TMF during the operational life of the TMF. Each piezometer cluster is arranged such that the three instruments run in a line (A, B then C) from the crest to the downstream toe.
- P10 to P12 Series: Installed for the TMF Adjoining Cell following construction and just comprises the Piezometer ‘A’ location at the crest.

Figure 3-1 - P1 to P12 Series Piezometers (A, B and C)



- P13 to P29 Series (Aftercare Series): Installed for the Main TMF following closure. 33 new piezometers comprising 16 pairs of vertical and inclined piezometers from P13A / P13B to P29A / P29B and one inclined installation at P14B.
- An inclinometer (I13) was also installed in Sector C to D at CH2510 as part of the seepage remediation investigation works and was read regularly for a period at the start of 2019. The reading of this instrument is no longer required

Figure 3-2 - P13 to P29 Series Piezometers (A and B)



The locations of the monitoring points for 2024 are provided on Drawing 03 in Appendix A. The results of the monitoring programme carried out during 2024 are presented in graphical form in the Appendices B to E.

4 WATER LEVEL READINGS

The water levels are from:

- Piezometers installed within the embankment (P-Series);
- Monitoring Wells along the downstream toe (MW-Series); and
- Cap Monitoring Wells installed in the TMF cap (CW-Series).

4.1 PIEZOMETERS

The physical stability of the facility is assessed by visual inspection and the water levels monitored in the piezometers installed in the downstream sector of the perimeter dam wall.

Stage 1 and 2 of the Phase 1 and Main TMF are constructed of till material and are composite lined on the upstream face with a HDPE geomembrane overlying a GCL. A rise in the phreatic surface in the dam wall is prevented by the internal chimney drain system positioned on the downstream side of the dam walls. Any flows entering the dam (via seepage, via infiltration on the downstream slope or via infiltration at the crest road) can be expected to enter the chimney drain and subsequently discharge via the upper finger drains (UFDs) below the perimeter road elevation at regular intervals around the TMF, typically at 200m spacings. Any remaining flows, bypassing the chimney drain system, can expect to be discharged at the downstream toe.

Stage 3 of the Main TMF and the Adjoining TMF Cell are constructed of coarse rock fill and both dams are composite lined with HDPE overlying a GCL. Any flows entering the dam walls (via seepage, via infiltration on the downstream slope or via infiltration at the crest road) can expect to be discharged at the base of the rock fill i.e., at the downstream Stage 2 crest elevation for Main TMF or at downstream toe for the Adjoining TMF Cell.

Should the piezometric level (water level) rise in the dam wall, the stability of the dam wall decreases. The A-series piezometers provide an indication of the water level upstream of the chimney drain and is expected to be higher than the B-series piezometers, which provide an indication of the water level downstream of the chimney drain. The C-series piezometers provide an indication of the groundwater level at the lower perimeter road and are similar to the monitoring well installations (MW-series).

Drawing 04 in Appendix A shows the locations of the monitoring wells and Appendix B provides the graphical representations.

4.1.1 PHASE 1 TMF: SECTOR D TO E

The relationship between Piezometric Level in the B-Series and the factor of safety of the dam wall for Phase 1 TMF (Sector D to E) is summarised below.

Table 4-1 - Phase 1 TMF - Relationship between Piezometer (X)B and FoS of the Dam Wall @ 134.5 mOD

Elevation of water in P(x)B (mOD)	Comment	Factor of Safety
125.0	Chimney Drain working and seepage emerging from UFD, Dam Wall is Dry	1.5
128.0	Chimney Drain may not be fully working, possibility for seepage to emerge from downstream toe, possibility for dam Wall to be saturated below piezometric line. To be confirmed by on-site observations.	1.3
129.5	Chimney Drain may not be fully working, possibility for seepage to emerge from 1/3 height up slope, possibility for dam Wall to be saturated below piezometric line. To be confirmed by on-site observations.	1.0
130.5	Chimney Drain may not be fully working, possibility for seepage to emerge from 1/2 height up slope, possibility for dam Wall to be saturated below piezometric line. To be confirmed by on-site observations.	0.9

The Phase 1 TMF was constructed to 134.5 mOD and filled with tailings to 133.5 mOD. Table 4-2 provides a summary for each piezometer water level during 2024.

Values in amber show piezometer reading elevations above the threshold for a FoS ≥ 1.5

Table 4-2 - Section D to E: Piezometer Elevation Summary

Sector	Piezo	Water Elevation (mOD)				Comment
		A-Series	B-Series	C-Series	Instal Depth	
D to E CH2590 to CH3380	P5	125.7 – 126.4	123.3 – 124.1	122.9 – 124.6	A = 124.2 B = 122.9 C = 120.0	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (125.0 mOD)
	P6	Dry @ 125.5	123.6 – 124.8	122.9 – 124.7	A = 125.7 B = 122.9 C = 120.4	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (125.0 mOD)
	P7	126.2 – 129.2	123.4 – 125.1	124 – 125.3	A = 125.7 B = 123.4 C = 122.5	B-Series reading was slightly above the threshold elevation for FoS ≥ 1.5 (125.0 mOD)

4.1.2 DATA REVIEW AND ASSESSMENT

- The original series of piezometers (P5 and P6) recorded phreatic elevations that are below the B-Series threshold or are dry at an elevation below the B-series threshold and appear to be functioning properly. P7 is 0.1 m above the threshold which has negligible effects on the FoS.

Table 4-3 – Phase 1 TMF - Relationship Piezometer (X)B and FoS of the Dam Wall @ 136.5 mOD

Elevation of water in P(x)B (mOD)	Comment	Factor of Safety
125.0, 128.0 (if installation depth >125 and <128)	Chimney Drain working and seepage emerging from UFD, Dam Wall is Dry	1.5
128.0 , 129.5 (if installation depth >125 and <128)	Chimney Drain not working, seepage emerging from downstream toe, Dam Wall is saturated below piezometric line	1.4
129.5, 131 (if installation depth >125 and <128)	Chimney Drain not working, seepage emerging from 1/3 up slope, Dam Wall is saturated below piezometric line	1.2
131, 132.5 (if installation depth >125 and <128)	Chimney Drain not working, seepage emerging from 1/2 up slope, Dam Wall is saturated below piezometric line	1.1

Table 4-4 provides a summary for each piezometer water level during 2024.

Values in amber show piezometer reading elevations above the threshold for a FoS ≥ 1.5

Table 4-4 - Section D to E: Piezometer Elevation Summary

Sector	Piezo	Water Elevation (mOD)				Comment
		A-Series	B-Series	C-Series	Instal Depth	
D to E CH2590 to CH3380	P16	Dry @ 127.6	Dry @ 127.8	-	A = 126.1 B = 127.8	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (128.0 mOD)
	P17	126.1	127.7	-	A = 125.6 B = 127.2	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (128.0 mOD)
	P18	125.7 – 126.1	125.1 – 126.7	-	A = 125.4 B = 124.8	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (128.0 mOD)
	P19	Dry @ 127.2	127.3 – 127.6	-	A = 127.2 B = 126.3	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (128.0 mOD)

4.1.3 DATA REVIEW AND ASSESSMENT

- The installation of the aftercare series of piezometers (P16, P17, P18, and P19) was completed in Q3 2019, with first readings recorded in Q4 2019. In the D to E sector (CH2590 to CH3380), the latest B-Series readings remain below the updated threshold elevation of 128.0 mOD for a FoS ≥ 1.5 when considering their installation depths. Specifically, P16 shows a dry reading at 127.80 mOD (installed at 127.8 mOD), P17 records 127.70 mOD (installed at 127.2 mOD), P18 displays readings ranging from 125.1 to 126.7 mOD (installed at 124.8 mOD), and P19 exhibits readings between 127.3 and 127.6 mOD (installed at 126.3 mOD). The elevated readings at the

locations of P16 and P17 are anticipated given the high groundwater elevation in this sector, while the slightly elevated readings above the base for P18 and P19 are attributed to transient surface water ingress from the perimeter crest road during rainfall events rather than to any seepage issues. Additionally, water quality measurements in the vicinity support the absence of a seepage concern, a finding further corroborated by the lack of observed seepage at the downstream toe of the dam wall.

- In comparison to the 2023 readings, almost all of the piezometers returned similar minimum and maximum readings, reflecting similar conditions during the year. No piezometer returned values that were dissimilar in range of those recorded in 2019 to 2023 or returned values that remained elevated for a prolonged period during the year.

4.1.4 MAIN TMF: SECTORS A TO B, B TO D AND E TO A

The relationship between piezometric level in the B-Series and the factor of safety of the dam wall for Main TMF (Sectors A to B, B to D and D to E) is summarised below.

Table 4-5 - Phase 1 TMF - Relationship between Piezometer (X)B and FoS of the Dam Wall @ 134.5 mOD

Elevation of water in P(x)B (mOD)	Comment	Factor of Safety
125.0, 128.0 (if installation depth >125 and <128) , 131.0 (if installation depth is >127 and < 130.0)	Chimney Drain working and seepage emerging from UFD, Dam Wall is Dry	1.5
128.0 , 129.5 (if installation depth >125 and <128) , 133.0 (if installation depth is >127 and < 130.0)	Chimney Drain may not be fully working, possibility for seepage to emerge from downstream toe, possibility for dam Wall to be saturated below piezometric line. To be confirmed by on-site observations.	1.3
129.5 131 (if installation depth >125 and <128) , 134.5 (if installation depth is >127 and < 130.0)	Chimney Drain may not be fully working, possibility for seepage to emerge from 1/3 height up slope, possibility for dam Wall to be saturated below piezometric line. To be confirmed by on-site observations.	1.0
130.5, 132.5 (if installation depth >125 and <128) , 135.5 (if installation depth is >127 and < 130.0)	Chimney Drain may not be fully working, possibility for seepage to emerge from 1/2 height up slope, possibility for dam Wall to be saturated below piezometric line. To be confirmed by on-site observations.	0.9

The Main TMF was constructed to 136.5 mOD and filled with tailings to 135.5 mOD. Table 4-6 below provides a summary by sector for each piezometer water level.

Values in amber show piezometer reading elevations above the threshold for a FoS ≥ 1.5

Table 4-6 - Sectors A to B, B to D and E to A: Piezometer Elevation Summary

Sector	Piezo	Water Elevation (mOD)				Comment
		A-Series	B-Series	C-Series	Instal Depth	
A to B CH1000 to CH1780	P1	126.2 – 127.6	123.9 – 124.6	123.9 – 124.6	A = 123.6 B = 119.7 C = 117.7	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (125.0 mOD)
	P2	125.1 – 125.5	124.2 – 124.6	123.85 – 124.6	A = 122.9 B = 119.7 C = 118.6	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (125.0 mOD)
B to D CH1780 to CH2590	P3	124.9	124.2 – 125.1	123.1 – 125.2	A = 123.6 B = 124.1 C = 117.2	B-Series reading is slightly above the threshold elevation for FoS ≥ 1.5 (125.0 mOD)
	P4	Dry @ 123.5	122.6 – 123.9	122.5 – 124.0	A = 123.5 B = 121.2 C = 120.2	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (125.0 mOD)
E to A CH3380 to CH4190	P8	Dry @ 130.34	128.6	126.4 – 128.4	A = 128.8 B = 128.4 C = 125.2	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (131.0 mOD)
	P9	Dry @ 127.33	124.3 – 124.6	-	A = ` B = 121.3 C = -	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (125.0 mOD)

4.1.5 DATA REVIEW AND ASSESSMENT:

- The original series of piezometers (P1, P2, P4 and P9) all recorded phreatic elevations that are below the B-Series threshold or are dry at an elevation below the B-series threshold and appear to be functioning properly. P8 is reading elevated values for the B-Series, as the instal depth for this piezometer is above the threshold elevation 125.0 mOD. P3 is 0.1 m above the threshold which has negligible effects on the FoS.

Table 4-7 - Main TMF - Relationship Piezometer (X)B and FoS of the Dam Wall @ 136.5 mOD

Elevation of water in P(x)B (mOD)	Comment	Factor of Safety
126.5, 128.0 (if installation depth >125 and <128)	Chimney Drain working and seepage emerging from UFD, Dam Wall is Dry	1.5
128.0, 129.5 128.0 (if installation depth >125 and <128)	Chimney Drain not working, seepage emerging from downstream toe, Dam Wall is saturated below piezometric line	1.4
129.5 , 131 (128.0 (if installation depth >125 and <128)	Chimney Drain not working, seepage emerging from 1/3 up slope, Dam Wall is saturated below piezometric line	1.2
131.0, 132.5 (128.0 (if installation depth >125 and <128)	Chimney Drain not working, seepage emerging from 1/2 up slope, Dam Wall is saturated below piezometric line	1.1

(x) refers to the piezometer number

The Main TMF was constructed to 136.5 mOD and filled with tailings to 135.5 mOD. Table 4-8 below provides a summary by sector for each piezometer water level.

Values in amber show piezometer reading elevations above the threshold for a FoS ≥ 1.5

Table 4-8 - Sectors A to B, B to D and E to A: Piezometer Elevation Summary

Sector	Piezo	Water Elevation (mOD)				Comment
		A-Series	B-Series		Instal Depth	
B to D CH1780 to CH2590	P13	125.6 – 126.2	123.8	-	A = 122.5 B = 123.0	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (126.5 mOD)
	P14	-	125.76 (dry)	-	B = 125.3	B-Series reading is above the threshold elevation for FoS ≥ 1.5 (126.5 mOD)
	P15	124.6 – 126.4	-	-	A = 121.0 B = 124.0	-
E to A	P20	126.5 – 126.8	125.5 – 125.8	-	A = 123.0 B = 124.4	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (126.5 mOD)

CH3380 to CH4190	P21	123.0 – 125.4	124.9 – 125.3	-	A = 122.2 B = 123.3	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (126.5 mOD)
	P22	123.3 – 125.5	125.8 – 126.6	-	A = 122.4 B = 124.1	B-Series reading 0.1 m over threshold elevation for FoS ≥ 1.5 (126.5 mOD)
	P23	123.6 – 125.1	124.4 – 128.8	-	A = 121.9 B = 124.2	B-Series reading exceeds the threshold elevation for FoS ≥ 1.5 (126.5 mOD). Consistent with seasonal variation.
A to B CH1000 to CH1780	P24	125.6 – 128.2	125.2 – 126.1	-	A = 121.7 B = 123.8	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (126.5 mOD)
	P25	123.9 – 124.6	123.7 – 124.5	-	A = 121.9 B = 123.6	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (126.5 mOD)
	P26	123.8 – 124.7	125.1 – 125.4	-	A = 121.8 B = 124.1	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (126.5 mOD)
	P27	125.0 – 126.1	125.1 – 126.7	-	A = 122.1 B = 123.5	B-Series reading is slightly above the threshold elevation for FoS ≥ 1.5 (126.5 mOD)
E to A CH3380 to CH4190	P28	124.8 – 126.2	126.3 – 126.6	-	A = 121.9 B = 126.1	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (128.0mOD)
	P29	125.5 – 128.1	128.1	-	A = 125.3 B = 126.4	B-Series reading is below the threshold elevation for FoS ≥ 1.5 (128.0mOD)

4.1.6 DATA REVIEW AND ASSESSMENT:

- During 2024, P23 recorded a phreatic elevation in the B-Series that exceeded the threshold for a FoS ≥ 1.5 (126.5 mOD), although this spike is consistent with seasonal variations and is attributed to localized surface water ingress at the crest, with water quality data in the vicinity not indicating any seepage—nor is there any seepage evident at the downstream toe of the dam wall. Along the north sector of the TMF (Sector E to A), where the phreatic surface remains above the dam's base (approximately 126.0 mOD) due to a recovering groundwater table, the B-Series piezometers at P28 and P29 continue to record elevated values similar to those observed in 2023, yet these remain below the updated threshold of 128.0 mOD. In comparison, P22 and P27, located in sectors A to B, show B-Series readings slightly above the threshold of 126.5

mOD; however, these increases are consistent with seasonal variation and have a negligible effect on the overall factor of safety. Overall, the readings across all piezometers in 2024 closely mirror those from 2023, which similarly indicates stable and consistent conditions throughout the year.

4.1.7 TMF ADJOINING CELL: SECTOR G TO A

The A-Series piezometers in the dam wall are used to monitor the phreatic surface and hence stability of the facility using the criteria below.

Table 4-9 - TMF Adjoining Cell - Relationship Piezometer (X) and Dam Wall FoS @ 132.0 mOD

Elevation of water in P(x) (mOD)	Comment	Factor of Safety
126.0	Dam Wall is Dry	1.9
128.0	Seepage emerging from downstream toe, Dam Wall is saturated below piezometric line	1.5
129.5	Seepage emerging from 1/3 up slope, Dam Wall is saturated below piezometric line	1.4
131.0	Seepage emerging from 1/2 up slope, Dam Wall is saturated below piezometric line	1.1

(x) refers to the piezometer number

The TMF Adjoining Cell was constructed to 132.0 mOD and filled with tailings to 131.0 mOD. Table 4-10 provides a summary by sector for each Piezometer water level.

Table 4-10 - Sector D to E: Piezometer Elevation Summary

Sector	Piezo	Water Elevation (mOD)			Comment
		A-Series	B-Series	C-Series	
G to A' CH3800* to CH4190*	P10	Dry @ 127.44	-	-	A-Series reading is below threshold elevation for FoS ≥ 1.5 (128.0 mOD)
	P11	Dry @ 126.60	-	-	A-Series reading is below threshold elevation for FoS ≥ 1.5 (128.0 mOD)
	P12	124.1 – 124.7	-	-	A-Series reading is below threshold elevation for FoS ≥ 1.5 (128.0 mOD)

Piezometers P10 and P11 were recorded to be dry for 2024. This is similar to previous years for P10 and P11. The P12 piezometer can be influenced by a high groundwater table as occurred during 2024.

4.1.8 DATA REVIEW AND ASSESSMENT:

- The series of piezometers (P10, P11 and P12) all recorded phreatic elevations that are below the A-Series threshold or are dry at an elevation below the A-series threshold and appear to be functioning properly.

4.2 MONITORING WELLS

Monitoring wells are located centrally on the lower perimeter road around the TMF and are monitored quarterly to assess groundwater elevation and water quality. Table 4-11 below provides a summary of the monitoring well water levels by Sector, Chainage and Facility. Drawing 03 in Appendix A shows the locations of the monitoring wells and Appendix C provides the graphical representations for each sector.

Table 4-11 - Monitoring Well Water Elevations Summary

Sector	Monitoring Well	Water Level Range (mOD)	Comment
A to B CH1000 to CH1780	MW1 to MW4, MW6 & MW7	123.1 (MW1) to 124.3 (MW4)	Wells installed in the middle of the lower perimeter road. Water elevations are similar to the 2018 to 2023 readings but are 1m to 2m below the pre-mining levels (1999).
B to D CH1780 to CH2590	MW9, MW10 & MW12, MW14, MW15 and MW16	122.3 (MW16) to 125.6 (MW12)	Wells installed in the middle of the lower perimeter road. Water elevations are similar to the 2018 to 2023 readings and the values are in the same range as those recorded pre-mining (1998).
D to E CH2590 to CH3380	MW23, MW30 & MW33	121.3 (MW30) to 126.4 (MW33)	Installed along the Mine Site Access Road, some 100m west of the TMF. Water elevations are similar to the 2018 to 2023 readings and slightly higher than those recorded pre-mining (1998).
E to A CH3380 to CH4190	MW35, MW37	125.1 (MW35) to 127.3 (MW35)	Wells installed in the middle of the lower perimeter road. Water elevations are slightly increased on the 2018 to 2023 readings and nearing towards those recorded pre-mining (1998).
G to A' CH3800* to CH4190*	MW40A, MW41A, MW42A	117.3 (MW42A) to 125.9 (MW40A)	Wells installed in the middle of the lower perimeter road. Water elevations are similar to the 2018 to 2023 readings.

4.2.1 DATA REVIEW AND ASSESSMENT:

- The highest groundwater elevations are recorded along Sector D to E and Sector E to A' and indicate a high groundwater table along the northwestern sector of the TMF for 2024, generally fluctuating between 121.3 and 127.3 mOD.
- The lowest groundwater levels are recorded along Sector A to B and Sector G to A, generally fluctuating between 123.1 and 125.9 mOD for 2024.
- The groundwater flow gradient is to south and south-west.

4.3 CAP MONITORING WELLS

The purpose of the cap monitoring wells is to measure the depth of water above the tailings surface for the three facilities. The spillways are designed such that a minimum 0.5 m depth of water is maintained above the tailings surface each facility before discharge this prevent the tailings from potential acid generation.

Table 4-12 provides a summary of the cap monitoring wells installed in the TMF capping for 2020 by Sector, Chainage and Facility.

Drawing 03 in Appendix A shows the locations of the cap monitoring wells and Appendix D provides the graphical representations.

Table 4-12 - Cap Monitoring Well Elevations Summary

Dam Sector	Chainage (m)	Capping Layer Wells	Range of Water Levels (mOD)	Tailings Level (mOD)	Comments
A to B	1000-1780 Main TMF	CW11	135.9 to 136.2	135.5	Highest level recorded in Q1 2024
		CW12	135.8 to 136.2	135.5	Highest level recorded in Q1 2024
		CW13	135.8 to 136.1	135.5	Highest level recorded in Q1 2024
		CW14	135.8 to 136.0	135.5	Highest level recorded in Q1 2024
B to D	1780 – 2590 Main TMF	CW10	135.9 to 136.0	135.5	Highest level recorded in Q1 2024
		CW6	135.7 to 136.1	135.5	Highest level recorded in Q1 2024
D to E	2590 – 3380 Phase 1 TMF	CW1	134 to 134.3	133.5	Highest level recorded in Q1 2024
		CW2	134.1 to 134.2	133.5	Highest level recorded in Q1 2024
E to A	3380 – 4190 Main TMF	CW3	135.7 to 136.0	135.5	Highest level recorded in Q1 2024
		CW7	135.9 to 136.1	135.5	Highest level recorded in Q1 2024

		CW11	135.9 to 136.1	135.5	Highest level recorded in Q1 2024
Internal	Main TMF	CW4	135.7 to 136.1	135.5	Highest level recorded in Q1 2024
		CW5	135.8 to 136.1	135.5	Highest level recorded in Q1 2024
		CW8	135.8 to 136.1	135.5	Highest level recorded in Q1 2024
		CW9	135.8 to 136.1	135.5	Highest level recorded in Q1 2024
G to A'	3800 - 4190 Adj. Cell	CW15	130.9 to 131.6	130.5	Highest level recorded in Q1 2024
		CW16	130.8 to 131.7	130.5	Highest level recorded in Q1 2024

4.3.1 DATA REVIEW AND ASSESSMENT

- For 2024, cap monitoring well data indicate that water depths above the tailings surface vary across the facilities. In the Main TMF, water levels recorded in Q1 2024 range from approximately 135.7 to 136.2 mOD against a tailings level of 135.5 mOD, yielding water depths from as low as 200 mm to as high as 700 mm; such variability may indicate localized settlement of the tailings surface or filling inconsistencies, particularly since the design requires a minimum water depth of 500 mm to prevent acid generation. The weir structure, installed in August 2022 with its gate set 100 mm above the tailings (i.e., at 135.60 mOD), functioned as intended, with Q1 2024 readings for CW3 to CW14 remaining lower than pre-installation levels recorded in Q1 2022. In the Phase 1 TMF, cap monitoring wells CW1 and CW2 recorded water levels between 134.0 and 134.3 mOD against a tailings level of 133.5 mOD, corresponding to water depths of approximately 500 to 800 mm, while the Adjoining Cell, monitored at CW15 and CW16, showed water levels ranging from about 130.8 to 131.7 mOD with a tailings level of 130.5 mOD—resulted in water depths between 300 mm and 1,200 mm. The Phase 1 TMF exhibited a narrow cap water elevation range of around 0.3 m (as seen at CW1), and both the Main TMF and the Adjoining Cell showed similarly limited ranges in water level variation (with differences of approximately 0.4–0.7 m and up to 0.74 m at CW15, respectively), which over all reflects the designed flow gradients toward Spillway 2 in the Main TMF (south to north) and Spillway 3 in the Adjoining Cell (east to west).

5 WATER QUALITY: SULPHATE LEVELS

Potential seepage through the TMF is tracked using data from the ongoing water quality testing and in particular, the sulphate concentration testing. Sulphate has been chosen for its mobility and is used as an indicator of potential seepage paths through the TMF.

The Sulphate levels are read from:

- Piezometers.
- Monitoring Wells; and
- Spillway (1, 2 and 3) and Final Discharge (SW1) flows.

5.1 PIEZOMETRIC SULPHATE LEVELS

The piezometer Sulphate levels are summarised below, and plots are provided in Appendix E.

Table 5-1 - Piezometer Sulphate Levels Summary

Sector	Piezo	Sulphate level (mg/l)			Comment
		A-Series	B-Series	C-Series	
A to B CH1000 to CH1780	P1	339.5	2.9 – 3.0	253.9 – 294.6	The ranges show a further modest reduction on the 2019 to 2023 values, A known historic minor seepage is located in the vicinity of CH1100.
	P2	340	293.5 – 453.4	315 – 492	The ranges returned similar values to 2019 to 2023. A known historic minor seepage is emerging from UFD07 at CH1660.
B to D CH1780 to CH2590	P3	(dry for 2024)	(dry for 2024)	17 – 21.7	The ranges returned similar values to 2021 to 2023, which had shown a significant decrease from historic values.
	P4	(dry for 2024)	78 – 132.2	15.2 – 24	The ranges show a further reduction on the 2021 to 2023 values, which had shown a significant decrease from historic values. A known historic seepage is emerging from UFD16 at CH2600.
D to E CH2590 to CH3380	P5	(dry for 2024)	(dry for 2024)	147.4 – 184	The ranges show a significant decrease on the 2018 to 2023 values, which had shown an increase from historic values. A known historic minor seepage is located in the vicinity of CH2800,

Sector	Piezo	Sulphate level (mg/l)			Comment
		A-Series	B-Series	C-Series	
					and a seepage flow is emerging from UFD16 at CH2600
	P6	(dry for 2024)	(dry for 2024)	14 – 75.2	The ranges show a further reduction on the 2019 to 2023 values, which had shown a significant decrease from historic values.
	P7	(dry for 2024)	86	7.5 – 27.4	The ranges show a further reduction on the 2019 to 2023 values, which had shown a significant decrease from historic values. A known historic minor seepage is located in the vicinity of CH3200.
E to A CH3380 to CH4190	P8	(dry for 2024)	(dry for 2024)	117.9 – 741.9	The ranges show a further reduction on the 2019 to 2023 values, which had shown a significant decrease from historic values.
	P9	139	(dry for 2024)	(dry for 2024)	This is a known location of historic damage to the lining system. The range is similar to the 2019 to 2023 values.
G to A' CH3800 to CH4190 Adj. Cell	P10	-	-	(dry for 2024)	No data in previous years
	P11	-	-	(dry for 2024)	No data in previous years
	P12	-	-	(dry for 2024)	Only previous reading was from June 2020 (119 mg/l)

5.2 MONITORING WELL SULPHATE LEVELS

Table 5-2 provides a summary of the monitoring well sulphate levels and plots are provided in Appendix E.

Table 5-2 - Monitoring Well Sulphate Levels Summary

Sector	Monitoring Well	Sulphate >250 mg/l	Comment
A to B CH1000 to CH1780	MW1 to MW4, MW6 & MW7	MW1 MW2 MW6	MW1 reporting values ranging between 270 and 312 mg/l. These values continue the downward trend in sulphate levels. MW2 reporting values ranging between 224 and 483 mg/l. This range is similar to the 2019 to 2023 readings. MW3 reported a value of 159 mg/l. This is similar to the same time last year. MW4 reported a value of 81 mg/l. This value continues the downward trend in sulphate levels. MW6 reporting values ranging between 198 and 321 mg/l. This range is an increase from 2019 to 2023 readings. MW7 reporting values ranging between 105 and 108 mg/l. This range is an increase from 2023 and continuing from historic values.
B to D CH1780 to CH2590	MW9, MW10 & MW12, MW14 to MW16		MW9 reporting values ranging between 2 and 28 mg/l. Similarly low values to those recorded from 2018 to 2023. MW10 reporting values ranging between 7 and 20 mg/l. Similarly low values to those recorded from 2018 to 2022. MW12 reporting values ranging between 13 and 75 mg/l. Similarly low values to those recorded from 2018 to 2023. MW14 reporting values ranging between 79 and 83 mg/l. Similarly low values to those recorded from 2018 to 2023. MW15 reporting values ranging between 5 and 37 mg/l. Similarly low values to those recorded from 2018 to 2023. MW16 reporting values ranging between 65 and 80 mg/l. Continuing reduction from 2018 to 2023.
D to E CH2590 to CH3380	MW23, MW30 and MW33		MW23 reporting values ranging between 66 and 203 mg/l. This range is similar to the 2019 to 2023 readings. MW30 reporting values ranging between 48 and 151 mg/l. This range is similar to the 2019 to 2023 readings.

			MW33 reporting values ranging between 54 and 69 mg/l. Similar range to that recorded from 2018 to 2023.
E to A CH3380 to CH4190	MW35 and MW37		MW35 reporting values ranging between 6 and 184 mg/l. Similar range to that recorded from 2018 to 2023. MW37 reporting values ranging between 146 and 514 mg/l. Similar range to that recorded from 2018 to 2023.
G to A' CH3800 to CH4190 Adj. Cell	MW40A, 41A, 42A	MW40A	MW40A reporting values ranging between 94 and 226 mg/l. Similar range to that recorded from 2019 to 2023. MW41A reporting values ranging between 39 and 106 mg/l. Similar range to that recorded from 2018 to 2023. MW42A reported a value of 96 mg/l. This value continues the downward trend in sulphate levels.

5.3 SPILLWAYS AND DISCHARGE

Discharge at Spillway 1 (SW1) generally occurs between October and April. Figure 5-1 presents a summary of readings from 2017 to 2024, with sulphate concentration plotted on the y-axis in mg/L. A stop-start discharge pattern can be observed for Spillways and Discharges between 2017 and 2024, except for Spillway 1 during 2019, when pumping was continuous as part of seepage remediation works between CH2300 and CH2500.

Water quality is monitored at three spillways (Spillway 1, Spillway 2, and Spillway 3), the Transfer Box (entry to the Attenuation Pond and Wetlands), the Outfall Structure (exit of the Attenuation Pond and Wetlands), and at the discharge sampling point downstream of the Cloheen Pond (SW1). Spillway 1 corresponds to the Phase 1 TMF, Spillway 2 corresponds to the Main TMF, and Spillway 3 corresponds to the Adjoining Cell.

During 2024, water quality samples were collected from Spillway 1, Spillway 3, the Weir, and at SW1. Spillway 2 remained dry due to the installation of the tilting weir. Flow depths and velocities are regularly measured at channels from the Spillways and at SW1 to estimate the annual discharge volume. The flows from the three Spillways combine in the Transfer Box before entering the Attenuation Pond and subsequently discharging at SW1.

The licence limit for sulphate concentration at SW1 is 400 mg/L. One exceedance of this value was recorded in 2024:

- A first flush reading of 411 mg/L on restart on 06 October 2024.

Based on additional data from October 2024, this exceedance is attributed to the 'first flush' effect commonly observed at the beginning of discharge cycles.

5.3.1 OBSERVATIONS IN 2024

- Spillway 1 recorded high sulphate concentrations, ranging from 142.7 to 802.9 mg/L. Dissolved nickel ranged from 0.006 to 0.124 mg/L, and zinc concentrations varied between 1.49 and 3.09 mg/L. Ammonia levels remained below 0.56 mg/L.
- Spillway 3 showed sulphate concentrations between 4.4 and 68.4 mg/L, with lower metal concentrations compared to Spillway 1. Nickel levels remained within 0.0032 to 0.022 mg/L, while zinc levels ranged from 0.005 to 0.046 mg/L.
- The Weir exhibited sulphate concentrations ranging from 8.2 to 159.7 mg/L, with dissolved nickel between 0.004 and 0.028 mg/L and zinc concentrations from 0.01 to 0.404 mg/L.
- Outlet of Wetland showed moderate reductions in sulphate (10.6 to 220.3 mg/L), nickel (0.013 to 0.024 mg/L), and zinc (0.009 to 0.554 mg/L).

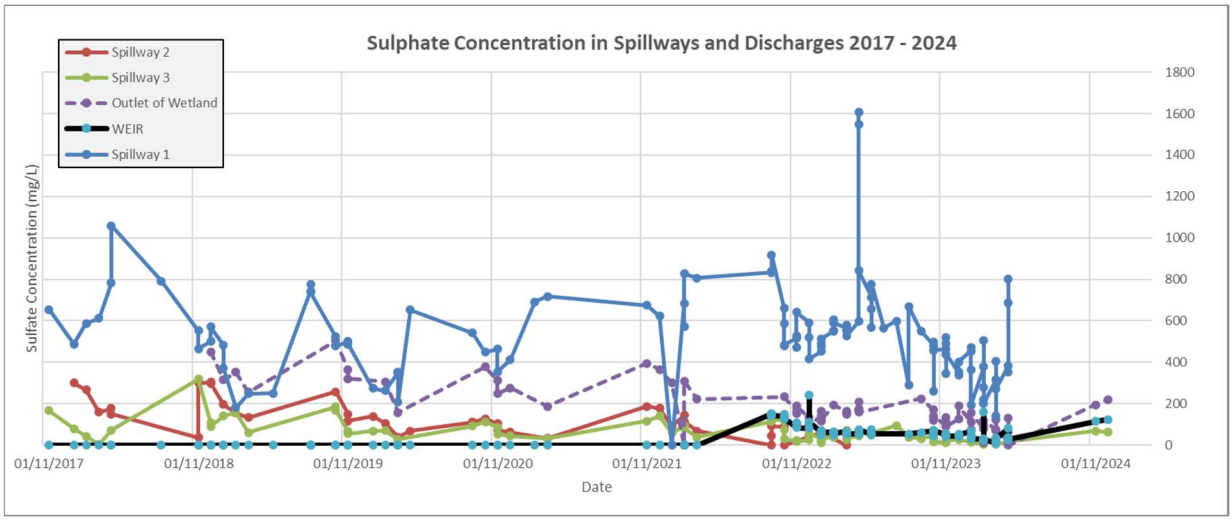
A new surface water drain installed in the Main TMF on the crest of Stage 3 directs drainage toward Spillway 2, reducing hydraulic head between the Main TMF and Phase 1 TMF. Data from 2020–2024 indicate this measure remains beneficial, with further assessment ongoing.

Spillway 2 had no discharge due to the installed tilting weir, reducing flow towards SW1. The weir structure installed in the Main TMF continues to aid in reducing stored water. Samples collected from the Spillway 3 showed sulphate concentrations below those recorded at Spillway 1 and the weir.

Table 5-3 Summary Table of Key Quality Parameters (2024)

Location	Dissolved Nickel (mg/L)	Sulphate (mg/L)	Dissolved Zinc (mg/L)	Ammonia (mg/L)	COD (mg/L)	BOD (mg/L)	pH
Spillway 1	0.006 - 0.124	142.7 - 802.9	1.49 - 3.09	0.16 - 0.56	N/A	N/A	7.3 - 8.0
Spillway 2	No Discharge	No Discharge	No Discharge	No Discharge	No Discharge	No Discharge	No Discharge
Spillway 3	0.003 - 0.022	4.4 - 68.4	0.005 - 0.046	<1.0	N/A	N/A	7.2 - 7.9
Weir	0.004 - 0.028	8.2 - 159.7	0.01 - 0.404	<0.33	N/A	N/A	7.1 - 7.8

Figure 5-1 - Spillways & Discharges Sulphate Concentration (Licence Limit only relates to SW1)



5.3.2 KEY OBSERVATIONS AND NEXT STEPS

- Spillway 1 continues to exhibit the highest sulphate, nickel, and zinc concentrations, indicating ongoing seepage influences.
- Spillway 3 continues to produce good quality water demonstrating the cap is working effectively. The water chemistry at the weir is comparable to the pre weir Spillway 2 water with the overall long term trend being downward, suggesting improved drainage control.
- The effectiveness of the weir in lowering water levels and reducing seepage will be assessed in a report towards the end of 2026.

This assessment will continue into 2026, with a focus on evaluating the long-term impact of the weir on discharge volumes and water quality.

5.4 WATER QUALITY MONITORING OVERVIEW

Samples were taken for water quality at key locations—including spillways, monitoring wells, and piezometers—over the reporting period spanning Q1 2024 through Q1 2025. The data continue to reveal both seasonal variability and site-specific trends:

- Deep Puddle at Chainage 1000–1100:
  The road-side puddle consistently holds water with high conductivity and elevated sulphate levels. Monitoring wells (MW1 and MW2) and piezometers (1A, 1B, and 1C) in this area show noticeable seasonal differences between January and May. For example, MW1 exhibits a decrease in sulphate from 694 mg/l in January to 511 mg/l in May, while the piezometers reveal differences in both water availability (e.g., “blocked” or “dry” samples) and water quality.
- Consistent Seepage at Chainages 2800, 2700, 2400, and 2500:
  Seepage water from these chainages exhibits stable characteristics overall. Chainage 2800, for example, shows high conductivity and sulphate (~908 mg/l), while Chainages 2700 and 2400 display moderately lower values. At Chainage 2500, seepage readings remain moderate, though monitoring wells (MW16) and associated piezometers indicate seasonal shifts in parameters such as pH and sulphate concentration.
- Trace Metals and pH Trends:
  Across all locations, pH values generally remain near neutral to slightly alkaline. Trace metals such as Nickel, Lead, and Zinc are consistently detected at low concentrations, with some variability noted between sampling periods. These minor variations further emphasize the importance of continued seasonal and site-specific monitoring.

Table 5-4 - Summarized Water Quality Data (Q1 2024 – Q1 2025)

Location / Chainage	Conductivity (µS/cm)	pH Range	SO_4 (mg/l)	Key Observations
Chainage 1000–1100 (Deep Puddle)	~2510	~7.8	~933	High conductivity and sulphate; MW1, MW2, and piezometers show seasonal variation (Jan vs May).
Chainage 2800 (Seepage)	~2480	~8.0	~908	Consistent seepage; monitoring wells (MW23, MW30) indicate seasonal shifts in pH and trace metals.
Chainage 2700 (Seepage)	~1464	~8.0	~614	Stable seepage conditions with moderate sulphate concentrations.
Chainage 2400 (Seepage)	~1461	~8.1	~607	Consistent seepage; additional MW (MW15) shows lower sulphate (~71 mg/l in May).
Chainage 2500 (Seepage)	~1878	~8.0	~764	Seepage readings with moderate values; MW16 and local piezometers display seasonal variability.

These updated observations and detailed summary table reflect the current water quality trends over the period. While some locations continue to show high sulphate concentrations (especially at Chainage 1000–1100 and 2800), the seasonal fluctuations and infrastructure modifications (such as new drainage installations and weir trials) are influencing water quality parameters.

5.5 DATA REVIEW AND ASSESSMENT

5.5.1 PIEZOMETERS

Piezometers P3a, P3b, P4a, P5a, P5b, P6a, P6b, P7a, P8a, P8b, P9B, P9c, P10, P11 and P12 were dry during 2024. All other existing piezometers installations had at least one water quality sample taken during 2024. The sulphate readings are above 250 mg/l in the following piezometers:

- P1a and P1c (Sector A to B, CH1170) @ 254 to 340 mg/l. A similar range of sulphate concentration was recorded in the monitoring wells located in this area (MW1 to MW4). A known historic minor seepage is located in the vicinity of CH1100. The P1a, P1b and P1c concentrations are trending downwards since 2021.
- P2a, P2b and P2c (Sector A to B, CH1530) @ 294 to 492 mg/l. A lower range of sulphate concentration (< 330 mg/l) was recorded in the monitoring wells located in this area (MW6 and MW7). A known historic minor seepage is emerging from UFD07 at CH1660. The concentrations are similar to those recorded during 2019 to 2022, which had shown an approx. 50% decrease since 2016.
- P5c (Sector D to E, CH2760) @ 147 to 184 mg/l. A known historic minor seepage is located in the vicinity of CH2800, and a minor seepage flow is emerging from UFD16 nearby. The range of concentrations shows a significant decrease from 2023. In general, 2024 showed marked reduction in sulphate concentration at areas of known historic seepages to those recorded during 2021 i.e., CH1110, CH1660, CH2300 to CH2500, CH2600, CH2800, CH3200 and CH4070.
- P8 (Sector E to A, CH3380 to CH4190) shows sulphate levels ranging from 117.9 to 741.9 mg/l. Similarly, MW37 reports values between 146 and 514 mg/l, both exceeding the threshold value of 250 mg/l. However, these elevated levels are consistent with seasonal variations in sulphate concentrations
- The bulk of the seepage remediation works was completed during Q1 2020, and the water quality readings have been uninfluenced since February 2020.
- The bulk of the piezometers retuned sulphate concentration ranges similar or lower than 2023.

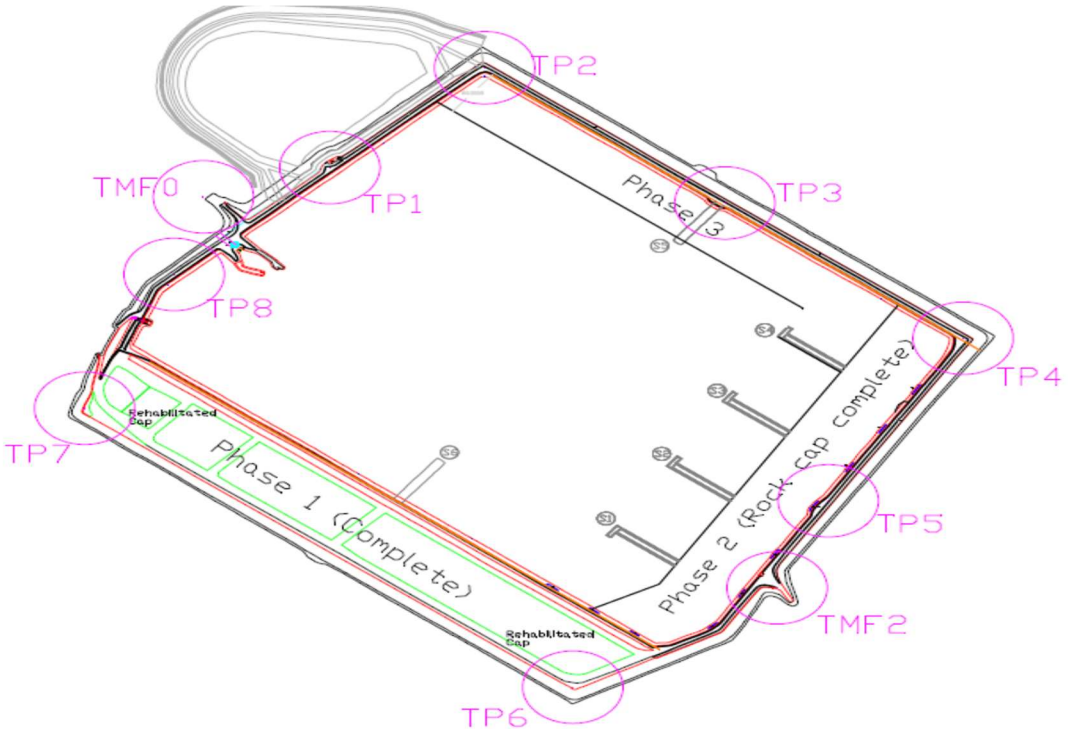
5.5.2 MONITORING WELLS

- The sulphate concentration values for 2024 are considered low (generally < 200 mg/l) with the maximum value recorded being 514 mg/l.
- Only MW1, MW2, MW6 and MW37 are recording a continuous exceedance of the threshold value of 250 mg/l for 2024.
- In general, 2024 continued the trend of reduction in sulphate concentration for the monitoring wells.

6 TMF SETTLEMENT POINTS

Eight TMF settlement monitoring points were established in 2013 to measure the vertical movements of the dam. TMF0 and TMF2 are base stations fixed into the bedrock.

Figure 6-1 - Location Map for TMF Settlement Monitoring Points



The initial data and readings were taken in March 2014, and new data is obtained each year.

Table 6-1 - TMF Settlement Monitoring Points – Cumulative Vertical Movements (2014 to 2025)

Station	Base May 2014	Mar 2015	18 Feb 2016	08 Feb 2017	22 Jan 2018	05 Oct 2018	20 Mar 2020	20 Dec 2021	17 Dec 2022	12 Feb 2024	28 Jan 2025
	Total Settlement (mm)*										
TP1	0	-8	-9	-9	LOST	LOST	LOST	LOST	LOST	LOST	LOST
TP2	0	-6	-3	2	-11	-10	-10	-11	-10	-10	-13
TP3	0	-8	-3	-9	-10	-11	-9	-9	LOST	-11	-15
TP4	0	-7	-3	-7	-13	-15	-16	-18	-16	-18	-21
TP5	0	-17	-13	-20	-21	-23	-22	-26	-24	-26	-30
TP6	0	-1	-2	2	-2	1	LOST	LOST	LOST	-1	-2
TP7	0	5	0	5	1	1	LOST	LOST	LOST	1	0
TP8	0	-8	-6	-2	-25	LOST	LOST	LOST	LOST	-26	-27
TMF0 (Control)	0	0	0	0	0	0	0	0	0	0	0
TMF2 (Control)	0	0	1	0	0	0	0	0	0	0	0

(+) indicates heave and (–) indicates settlement

** Values represent cumulative movements relative to the established baseline, not year-on-year changes.*

Settlement monitoring data for 2024 and early 2025 indicates continued subsidence at several points, particularly TP5 (-30 mm), TP4 (-21 mm), and TP3 (-15 mm), with TP5 experiencing the highest differential movement (-4 mm since February 2024). TP2, TP6, TP7, and TP8 showed minor changes, while control points TMF0 and TMF2 remained stable, confirming no external influences on ground movement.

6.1.1 DATA REVIEW AND ASSESSMENT:

- Movement recorded in all instruments is either too small in magnitude to be of concern or has not been sustained for a long period.
- The movements above are not expected to have an impact on the integrity of the structure. To be of concern, there would need to be a rapid change in movement over the monitoring periods or a gradual trend over a period of years. A trigger in terms of magnitude of movement would be

5mm per year. Once commenced, movement needs to be continuous and increasing i.e., 5mm or greater, year on year.

- It was identified in the 2022 annual report that 5 of the 8 stations were lost. These were replaced in Q3 2023 (Lisheen TMF: Survey Stations 41000013.TM80.B0).

7 ANNUAL SITE INSPECTION

Inspections of the TMF have been conducted a minimum of monthly from July 2018 by a WSP Senior Engineer, as part of the closure and aftercare monitoring requirements, and are reported separately. The Annual Site Inspection was carried out by the WSP team on Monday 3rd of February 2025 by Billy Murphy and James Purrington

7.1 GENERAL

The site is generally clean and tidy and is secure. A key is required to access the TMF site. The security fence constructed around the perimeter of the lower access road is in good condition. Some fence breaches at the south-east corner were observed

The vegetation on the TMF surface is well established and has been enhanced in the initial years with the addition of fertilizer. The grass was mowed and removed during Q3 in 2024. The additional drains installed in the Main TMF during 2019 cap have improved the surface water drainage towards Spillway 2. The drains continuing to Spillway 2 inlet have now been diverted to the inflow section of the weir gated structure installed during August 2022. This weir gate has had a noticeable effect on reducing the depth and volume of water stored in the Main TMF cap during the winter season. There was no ponding present on the Main TMF cap and the underfoot conditions were substantially improved during the winter season.

The perimeter interceptor channel has been backfilled with peat along Sectors A to E. The internal drainage system for the dam (chimney drain) discharged into the perimeter interceptor channel via upper-level finger drains (UFDs) installed at regular intervals around the TMF (UFD01 to UFD29). Prior to the backfilling in 2016, the face of all the upper finger drains (UFDs), measuring approximately 0.6m x 0.6m, were exposed to allow seepage to be monitored over a number of weeks. They were then backfilled with coarse clean rock fill and overlain with a separation geotextile to alleviate the surrounding peat clogging the drains. All of these UFDs were re-exposed in December 2018 as part of the seepage investigation works and monitored for a number of weeks.

Only three UFDs showed seepages (UFD07 @ CH1660, UFD14 @ CH2370 and UFD16 @ CH2600) and subsequently, the remaining UFDs were re-backfilled with coarse rock fill to surface.

UFD14 has not reported any seepage flow since February 2021. UFD07 and UFD16 are still reporting seepages throughout the year and the flows are increased during the rainfall events due to surface water on the dam wall crest entering the chimney drain system. Trigger levels for both flow rate and concentration have been established to reflect the ingress of surface water into the drainage system. The flow rate trigger level was exceeded in early January 2024 which is typical after heavy rain events. The concentration trigger level was not exceeded during the year (refer to Section 7.2 for further details).

The inner dam wall (Stage 3 raise between the Phase 1 TMF and the Main TMF) is constructed to 136.5 mOD on a rock fill platform above the tailings and has a lined upstream face. No sign of distress was observed, and the wall is in good condition. The central section of the raise has a ramp which allows plant access from the Phase 1 to the Main TMF. A drain is located on the downstream toe of the inner dam wall and collects seepage permeating through the tailings from the Main TMF and surface water runoff from the inner dam wall and the Phase 1 TMF, which it decants at Spillway 1.

The vegetation on the perimeter dam walls is well established and a program of gorse, bushes and small trees removal should be continued on an as needed bases.

There does not appear to be any noticeable settlement or bulging of the dam walls. The known historic seepage locations are assessed a minimum of monthly for any changes in flow and/or ponding on the perimeter road surface.

7.2 SEEPAGES

7.2.1 SEEPAGE HEAT MAPPING AND ALR ASSESSMENT – 2024 UPDATE

For the reporting period from Q1 2024 through Q1 2025, seepage monitoring was performed using a combination of visual inspections, seepage heat mapping, flow rate measurements, and conductivity testing at the key upper finger drain (UFD) locations (UFD07, UFD14, and UFD16) (see Figure 7-1 to Figure 7-4). The objective is to ensure that the facility's internal drainage system continues to operate within the acceptable Action Leakage Rate (ALR) thresholds.

- Visual and Field Observations:
  Regular inspections during this period confirmed that the dam walls and downstream toe areas maintained stable conditions. Although isolated seepage occurrences were noted during wet weather events, particularly following heavy rainfall, these events were transient and rapidly diluted by surface water ingress. Notably, no persistent or progressive seepage issues were identified, and remedial actions implemented in previous years continue to hold.
- Flow and Conductivity Measurements:
  Flow measurements at UFD07 and UFD16 consistently remained within the typical range of approximately 3–5 m³/day, while UFD14 recorded negligible flows under normal conditions. An isolated event in January 2024 registered a combined flow of 17.64 m³/day; however, corresponding conductivity readings remained below critical thresholds, indicating that the increased flow was due to rainwater dilution rather than an indication of increased leachate concentration.

The following table summarizes the average quarterly seepage data for each UFD, along with the combined flow rates:

Table 7-1 - Average Quarterly Seepage Data (Q1 2024 – Q1 2025)

Quarter	UFD07 Flow (m³/day)	UFD07 Conductivity (µS/cm)	UFD14 Flow (m³/day)	UFD14 Conductivity (µS/cm)	UFD16 Flow (m³/day)	UFD16 Conductivity (µS/cm)	Combined Flow (m³/day)
Q1 2024	4.0	950	0.3	800	4.5	980	8.8
Q2 2024	3.8	930	0.2	780	4.3	960	8.3
Q3 2024	4.2	920	0.4	790	4.7	970	9.3
Q4 2024	3.9	940	0.2	800	4.4	960	8.5

Q1 2025	4.1	935	0.3	795	4.6	975	9.0

- Key observations:
  - Stable Flow Rates: UFD07 and UFD16 maintained average flow rates consistently within 3–5 m³/day, while UFD14 continued to record minimal flow.
  - Conductivity Trends: The conductivity values remain in a stable range (approximately 920–975 µS/cm for UFD07 and UFD16, and 780–800 µS/cm for UFD14), supporting the conclusion that even during rain-induced increases in flow, the leachate is sufficiently diluted.
  - Combined Flow Dynamics: Despite the occasional higher combined flow (notably the January 2024 event), all measured values have remained within Level 1 ALR limits (<15.55 m³/day), with no instance of conductivity exceeding the predetermined thresholds for Level 2 or Level 3 ALRs.
- ALR Thresholds and System Performance:
  The ALR framework, which integrates both flow and conductivity parameters, remains effective. The current thresholds are:
  - Level 1 ALR: Seepage rate <0.18 l/sec (<15.55 m³/day) with routine monitoring and leachate testing.
  - Level 2 ALR: Seepage rate between 0.18 l/sec and 0.35 l/sec (15.55–30.24 m³/day) combined with conductivity exceeding 1,000 µS/cm at UFD07 and 2,000 µS/cm at UFD14 and UFD16, triggering further investigation.
  - Level 3 ALR: Seepage rate >0.35 l/sec (>30.24 m³/day) with elevated conductivity, prompting repair actions.

During the reporting period, all measured seepage rates and conductivity values remained within Level 1 conditions, confirming that the drainage system—including the chimney/finger drain network and the supplementary weir installed in August 2022—is performing effectively.

The integrated monitoring data from Q1 2024 to Q1 2025 show that the seepage management system continues to function within safe parameters. The observed transient increases in flow rates during rainfall are effectively mitigated by the dilution effect, as evidenced by stable conductivity readings. It is recommended that the current monitoring regime be maintained and that further assessments be conducted following major rainfall events to ensure any transient anomalies are promptly addressed. In summary, the 2024–2025 data validate the ongoing stability and integrity of the TMF's seepage management system, with all parameters remaining within the acceptable ALR thresholds

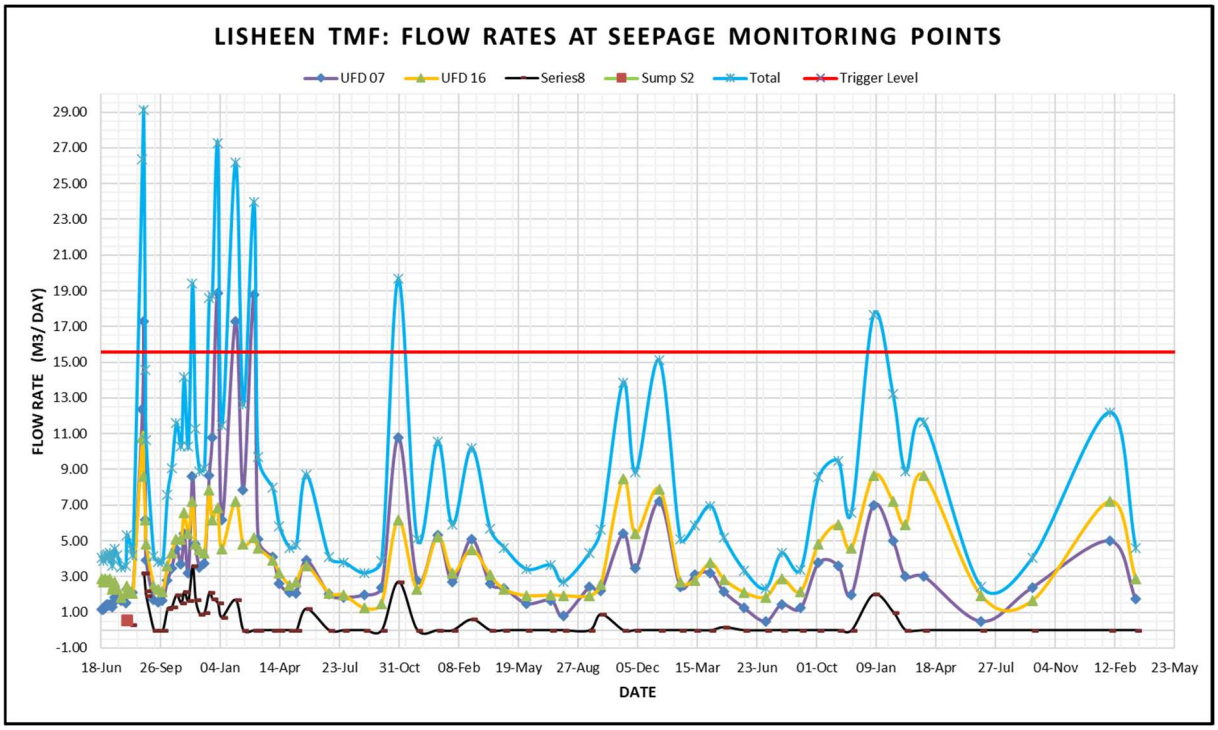


Figure 7-1 - Lisheen TMF - Seepage Flow Rates at UFD07, UFD14 and UFD16

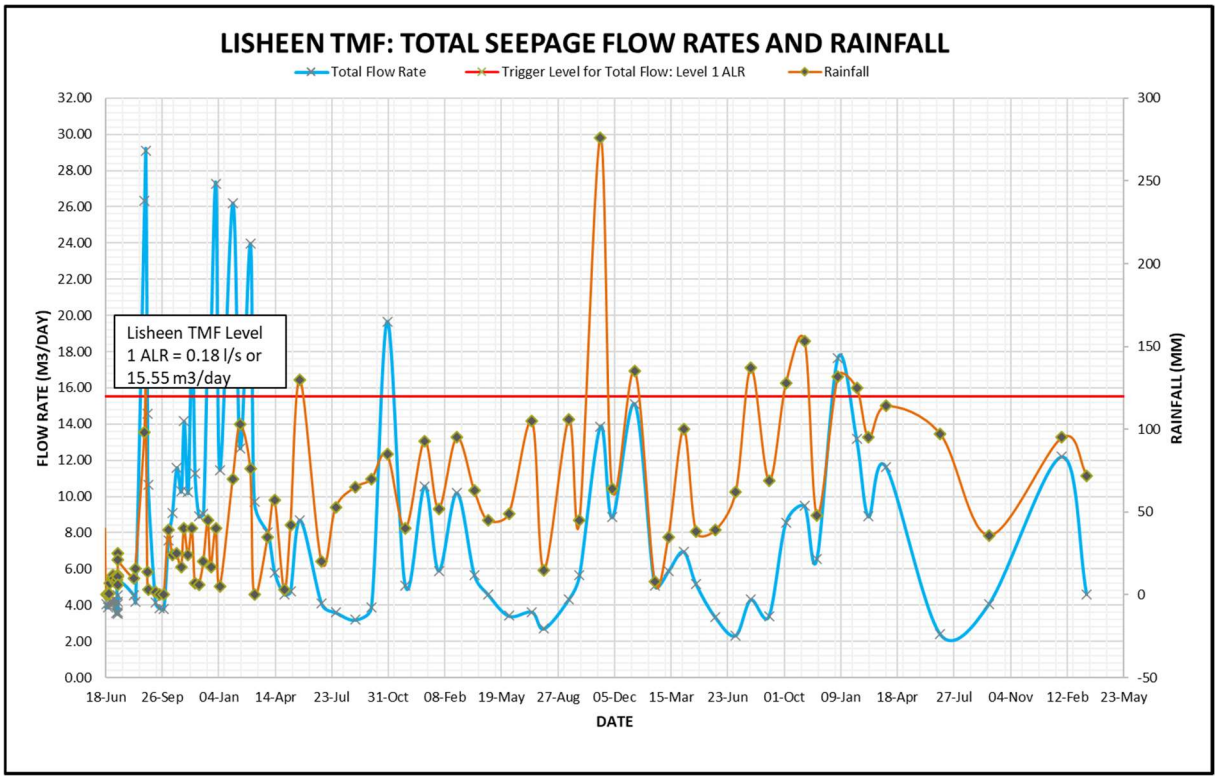


Figure 7-2 - Lisheen TMF – Seepage Flow Rates at UFDs and Weekly Rainfall

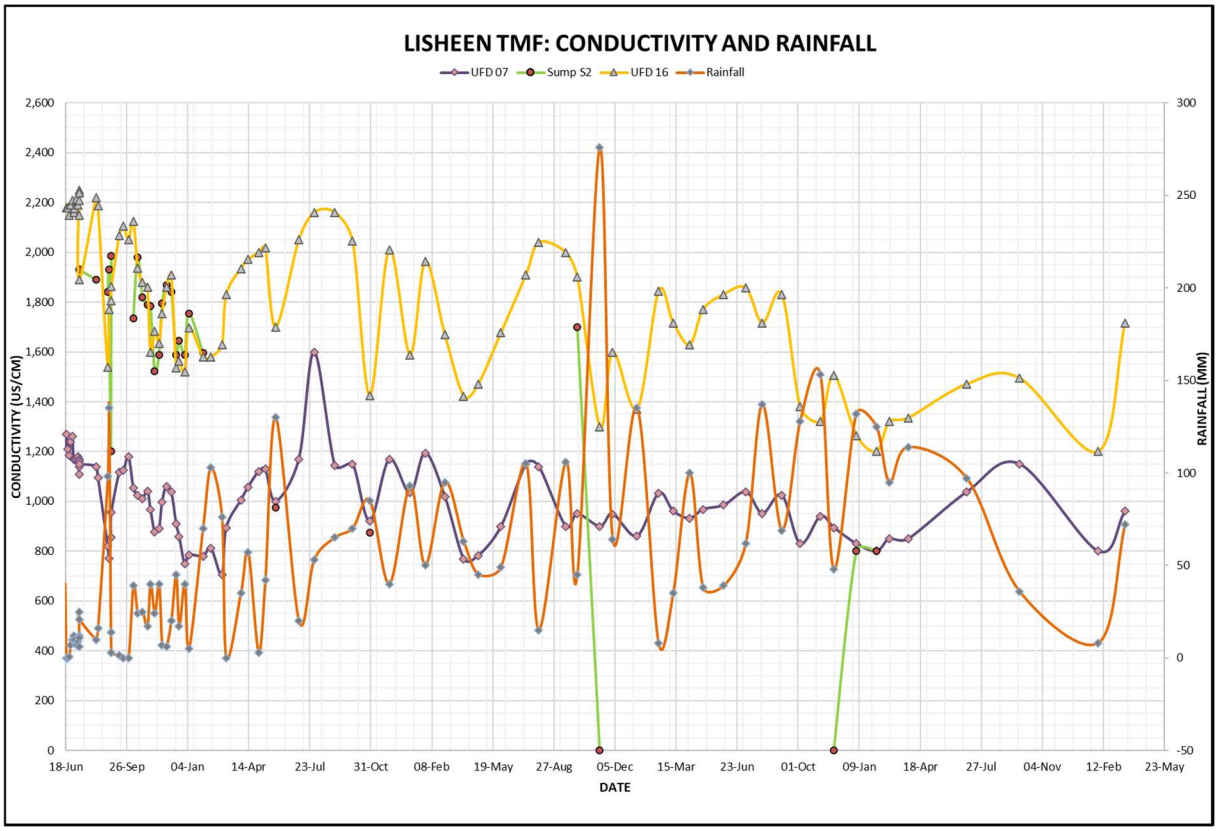


Figure 7-3 - Lisheen TMF - Conductivity Readings from UFDs and Weekly Rainfall

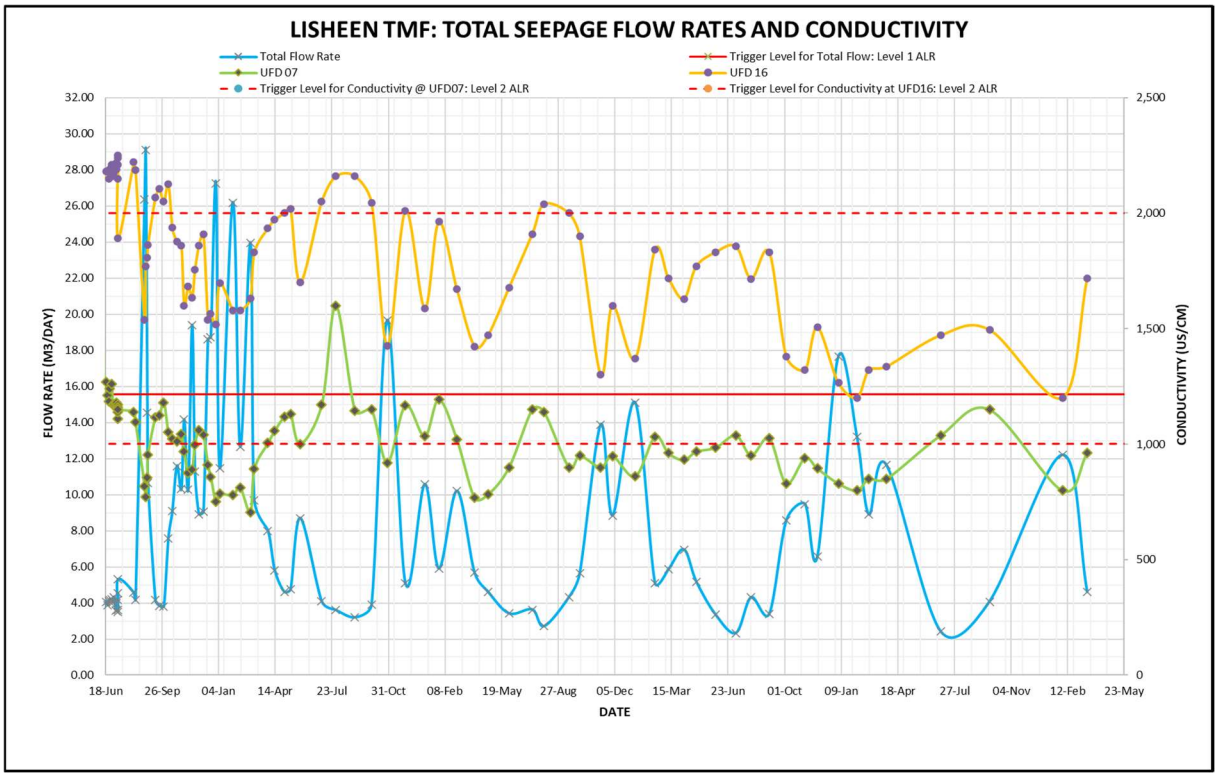


Figure 7-4 - Lisheen TMF – Seepage Flow Rates and Conductivity at UFD07 and UFD16 and Total Seepage Flow Rate

8 LISHEEN TMF PERFORMANCE

A review of the statistical data from tailings dam failures was conducted to estimate the average annual probability of failure of a tailings dam. Table 8-1 below provides a summary of the estimates of annual tailings dam failure rates.

Table 8-1 - Estimates of Annual Tailings Dam Failure Rates

Source	Annual tailings dam failure rate (TDF/year)
Golder assessment of ICOLD Bulletin 99 data	1.65 E-4 *
ICOLD Bulletin 121 & Davies and Martin (2000)	1.00 E-3
Golder assessment of tailings dam failures (2001 to 2010)	4.30 E-4
Golder assessment of tailings dam failures (since 2010)	1.43 to 1.33 E-3
Chambers and Higman (2011)	5.00 E-4
Peck (2007)	4.90 E-4
Davies at al. 2000, Davies 2002	5.70 E-04 to 1.40 E-03
Golder assessment of Bowkers and Chambers (2017)	4.26 E-04

** Omitted from range of annual failure rates of tailings dams as overly influenced by water retaining dams*

The estimated annual failure rates of tailings dams range from 1.43 E-3 to 4.26 E-4.

A guide used for the assignment and perception of probabilities is summarised in Table 8-2 below.

Table 8-2 - Description of Probabilities

Annual Probability of Occurrence	Description
1E-6 (1 in 1 million)	Almost Impossible or Negligible (no published information on a similar case exists)
1E-5 (1 in 100,000)	Highly Improbable (published information exists, but in a slightly different context)
1E-4 (1 in 10,000)	Very Unlikely (it has happened elsewhere, but some time ago)
1E-3 (1 in 1,000)	Unlikely (recorded recently elsewhere)
1E-2 (1 in 100)	Possible

	(could have occurred already without intervention)
0.1 (1 in 10)	Highly Probable (a previous incident of a similar nature has occurred already)
0.2 – 0.5 (1 in 5 to 1 in 2)	Uncertain (nearly equal chance of occurring to that of not occurring)
0.5 - 0.9 (>1 in 2)	Nearly Certain (one or more incidents of a similar nature have occurred recently)
1 (or 0.999)	Certain (or as near to, as makes no significant difference)

Probability of failures and safety factors have been investigated by Meyerhof (1970 and 1982) for soil slopes in dams, cuts and excavations, and more recently by Silva et. al (2008) for slopes failures, including tailings facilities. The probability of failure is linked to the calculated factor of safety against instability and is based on how the facilities were designed and constructed. The Silva et al. relationship is shown in Figure 5 below for four Categories of tailings facilities, ranging from Category IV facilities with little or no engineering to Category I facilities with state-of-the practice engineering.

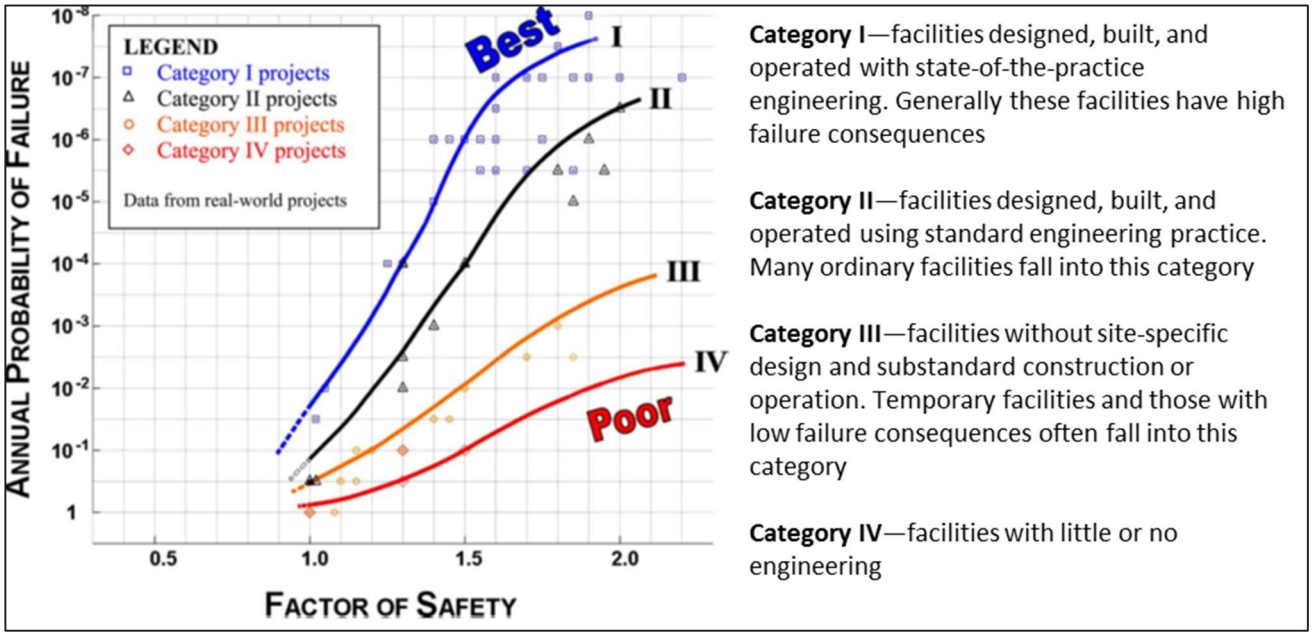


Figure 5: Factor of Safety versus Annual Probability of Failure (Silva et al. 2008)

The Lisheen TMF and ancillary infrastructure are considered to be at least a Category II facility, with components of a Category I facility.

Table 8-3 below summarises the annual probability and compares it to the Meyerhoff (1970) values. The probabilities reported by Meyerhof are total probabilities and based on various time periods but

are used conservatively as annual probabilities. The relationships from Silva et. al (2008) result in a lower probability of failure when the FoS exceeds 1.4.

Table 8-3 - Probability of Failure and Factor of Safety (FoS)

Annual Probability of Failure	Factor of Safety for Category II (Silva et. al. 2008)	Factor of Safety (Meyerhoff 1970)
1E-6 (1 in 1 million)	1.8	2.0
1E-5 (1 in 100,000)	1.7	1.8
1E-4 (1 in 10,000)	1.5	1.6
1E-3 (1 in 1,000)	1.4	1.4
1E-2 (1 in 100)	1.2	1.2
0.1 (1 in 10)	1.0	1.0

The annual probability of failure for modern engineered embankment dams ranges from 1.43 E-3 to 4.26 E-4 or 1 in 700 to 1 in 2,350 which equates to a factor of safety (FoS), in terms of stability, of 1.33 to 1.42, based on the data provided above for a Category II tailings facility. This annual probability of failure corresponds to an Unlikely to Very Unlikely risk.

The dam walls for the Lisheen TMF have been designed to provide a minimum FoS ≥ 1.3, in terms of stability, and the monitoring data (see Section 4.1) demonstrates that this FoS is being attained. The majority of sections are assessed to have FoS > 1.5 and a number of sections are assessed to have a FoS between 1.3 and 1.5.

The Lisheen TMF can be considered to have an annual probability of failure in the 1.00 E-4 to 1.00 E-5 range, which corresponds to Very Unlikely to Highly Improbable risk.

9 CONCLUSIONS AND RECOMMENDATIONS

- The anomaly readings from Q4 2022 have been fully investigated in January 2023 and are attributed to a number of intense rainfall events for the north Tipperary and north Kilkenny areas, and in particular in the vicinity of the Lisheen TMF, during mid-to-late October 2022. Any of the noted holes in the crest are to be filled in with sand during Q1 2025.
- The additional drainage works installed in the Main TMF Cap, the opening of the drain for the Phase 1 TMF and the installation of the overtopping bund between the Phase 1 TMF and the Main TMF appear to have been beneficial in reducing ponding on the surface of the TMF Cap and improving the water quality at discharge via the Spillways.
- The drains continuing to Spillway 2 inlet have now been diverted to the inflow section of the weir gated structure installed during August 2022. This weir gate has had a noticeable effect on reducing the depth and volume of water stored in the Main TMF cap during the winter season. There was no ponding present on the Main TMF cap and the underfoot conditions were substantially improved during the winter season.
- In the majority of monitoring locations, the sulphate concentration readings are showing similar to declining trends, which are considered to be due to the throttling by tailings of known historic seepage locations in either the Stage 1 or Stage 2 elevations.
- The monitoring data indicates that the dam walls for the Lisheen TMF are attaining a FoS ≥ 1.5, in terms of stability. The Lisheen TMF can be considered to have an annual probability of failure in the 1.00 E-4 to 1.00 E-5 range, which corresponds to Very Unlikely to Highly Improbable risk.

9.1 RECOMMENDATIONS

- Quarterly inspections of the TMF should be maintained throughout 2025 in accordance with the current monitoring schedule. These inspections should focus on identifying any changes in flow, phreatic surface levels, and sulphate concentrations.
- In addition to quarterly inspections, routine reviews of monitoring data (flow, groundwater levels, and geochemical parameters) should continue to be carried out at the existing monitoring points.
- Considering that flow measurement data has been identified as limited and is important for ongoing performance evaluation, it is recommended that flow meter(s) be installed to provide accurate and continuous flow data to support enhanced monitoring and informed decision-making regarding TMF management.
- Should the solar farm project proceed and involve any use of the Adjoining Cell surface, it is recommended that WSP be consulted in advance to review implications for TMF integrity and monitoring requirements.

10 REFERENCES

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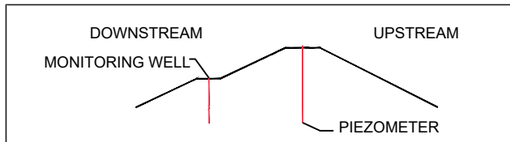
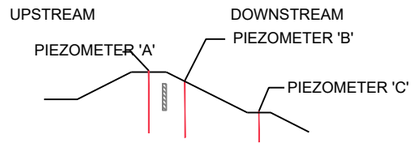
Appendix A

DRAWINGS 2024



TYPICAL SECTION THROUGH ADJOINING CELL PIEZOMETER & MONITORING WELL CLUSTER



TYPICAL SECTION THROUGH MAIN TMF AND PHASE 1 TMF DAM WALLS PIEZOMETER CLUSTER

REFERENCE
DRAWING BASED ON SURVEYS CONDUCTED BY LIFFEY AND LISHEEN DURING AUGUST 2017

LEGEND

1000	Dam chainage
MW16	Monitoring well
P–SERIES	Piezometer
CW14	TMF Cap Monitoring Well

CLIENT
LISHEEN MINES LIMITED

CONSULTANT
GOLDER

PROJECT
LISHEEN TMF: INTERIM REVIEW REPORT - Q1 to Q3 2020

TITLE
LISHEEN TMF & WATER MANAGEMENT SYSTEM AS-BUILT SURVEY (Q4 2018)

YYYY-MM-DD	2020-11-06
PREPARED	BK
DESIGN	BK
REVIEW	PC
APPROVED	PC

PROJECT No.	SCALE	Rev.	DRAWING
18104445	A1 @ 1:5,000	A	01

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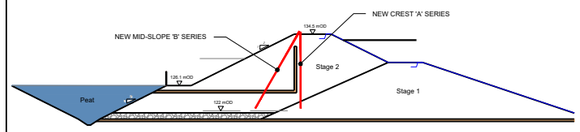
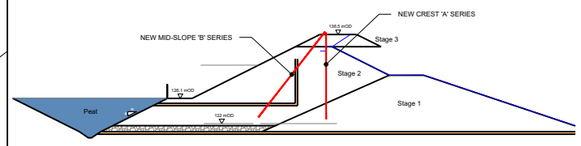
LEGEND

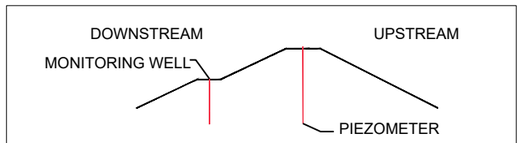
- Upper Finger Drains (UFDs)
- 1000 — Dam Chainage
- MW16 — Monitoring Well
- P–SERIES — Existing A, B & C-Series Piezometers
- CW14 — TMF Cap Monitoring Well
- P13A — New Vertical Piezometer (U/S of Chimney Drain)
- P13B — New Inclined Piezometer (D/S of Chimney Drain)
- Seepage Area - Works Complete in March 2020
- TMF Capping (Grasslands)
- Overtopping Area - Works Complete in Aug 2020



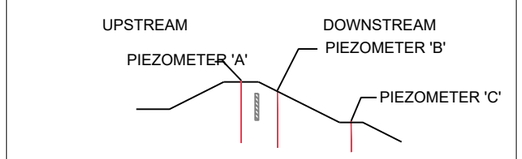
PHASE 1 TMF



MAIN TMF



TYPICAL SECTION THROUGH ADJOINING CELL PIEZOMETER & MONITORING WELL CLUSTER



TYPICAL SECTION THROUGH MAIN TMF AND PHASE 1 TMF DAM WALLS PIEZOMETER CLUSTER

0 25 50
1:1,000 METRES

0 100 200
1:5,000 METRES

CLIENT
LISHEEN MINES LIMITED

CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-06
PREPARED	BK
DESIGN	BK
REVIEW	PC
APPROVED	PC

PROJECT
LISHEEN TMF: INTERIM REVIEW REPORT - Q1 to Q3 2020

TITLE
LISHEEN TMF MONITORING INSTALLATIONS (Q4 2019)

PROJECT No.	SCALE	Rev.	DRAWING
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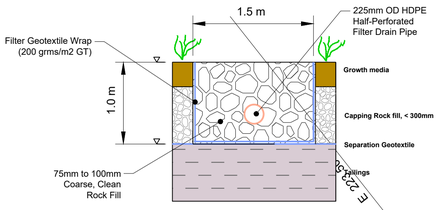

DRAIN DETAIL

0 1.25 2.5
1:75 METRES

0 100 200
1:5,000 METRES

LEGEND

- EARTHEN BUNDS SEPARATING FIELDS
- EXISTING DRAINS FILLED WITH COARSE ROCK FILL, NO 225mm OD PIPE
- PROPOSED DRAINS FILLED WITH COARSE ROCK FILL AND 225mm OD PIPE

CLIENT
LISHEEN MINES LIMITED

CONSULTANT
GOLDER

YYYY-MM-DD	2020-11-06
PREPARED	BK
DESIGN	BK
REVIEW	PC
APPROVED	PC

PROJECT
LISHEEN TMF: INTERIM REVIEW REPORT - Q1 to Q3 2020

TITLE
AS BUILT OF DRAINS IN TMF CAP (Q4 2019)

PROJECT No.	SCALE	Rev.	DRAWING
18104445	A1 as shown	A	03

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

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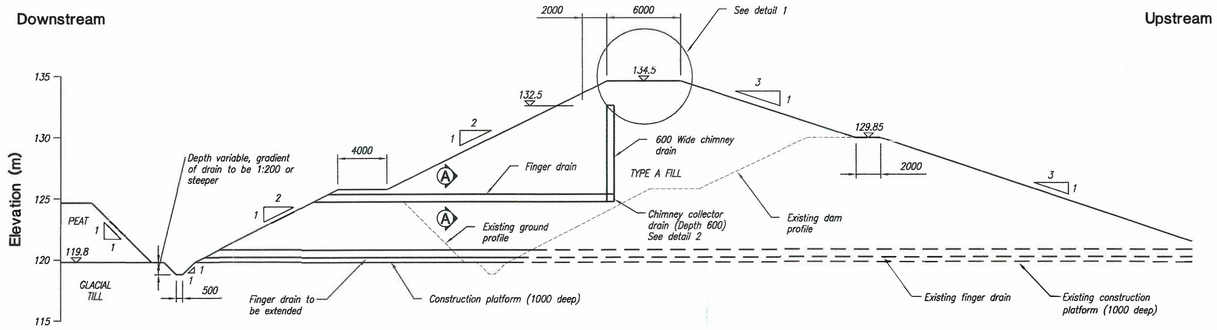
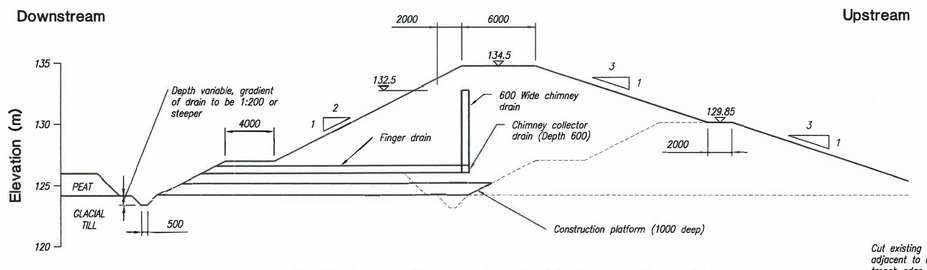
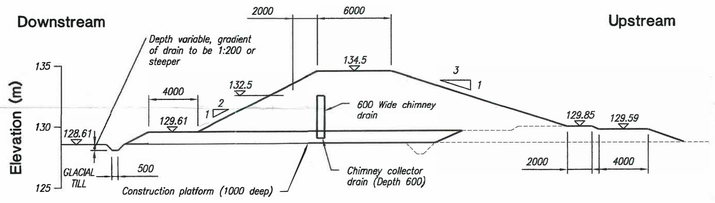


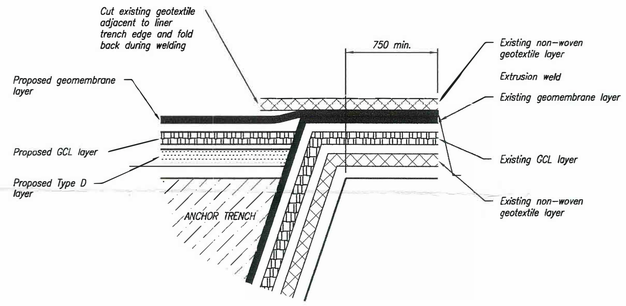
TYPICAL SECTION AT CHAINAGE 1160
Scale 1:250



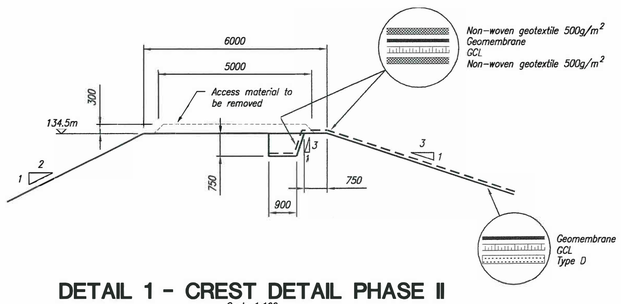
TYPICAL SECTION AT CHAINAGE 2930
Scale 1:250



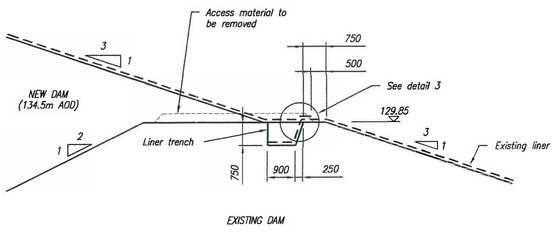
TYPICAL SECTION AT CHAINAGE 3560
Scale 1:250



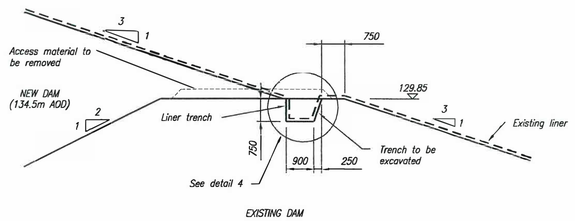
DETAIL 3 - EXTRUSION WELD
NTS



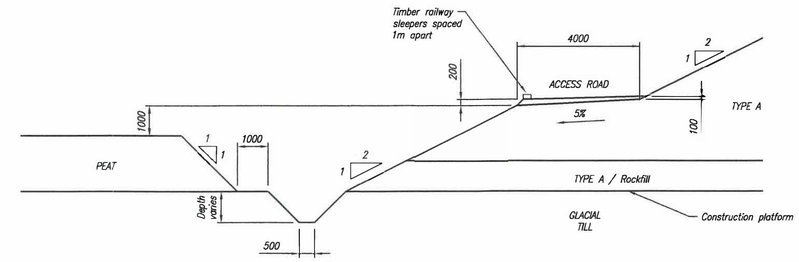
DETAIL 1 - CREST DETAIL PHASE II
Scale 1:100



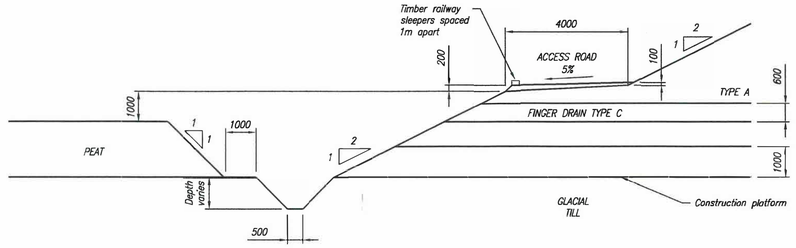
STAGE II TOE MEMBRANE CONNECTION DETAIL - EXTRUSION WELD
Scale 1:100



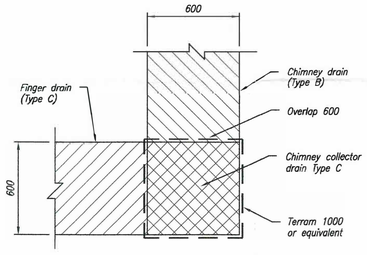
STAGE II TOE MEMBRANE CONNECTION DETAIL - OVERLAP
Scale 1:100



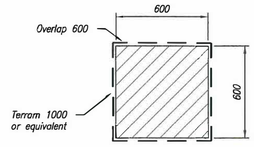
PHASE II DOWNSTREAM TOE DETAIL - FINGER DRAIN ABSENT
Scale 1:100



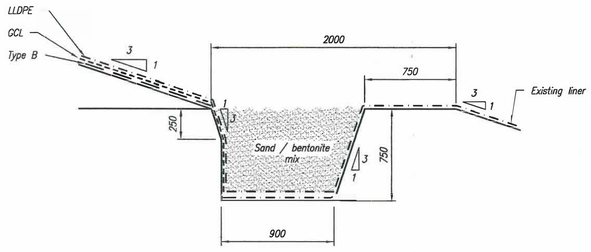
PHASE II DOWNSTREAM TOE DETAIL - SHOWING FINGER DRAIN
Scale 1:100



DETAIL 2
CHIMNEY COLLECTOR DRAIN
Scale 1:20



SECTION A-A
TYPICAL SECTION THROUGH FINGER DRAIN
Scale 1:20



DETAIL 4
Scale 1:25

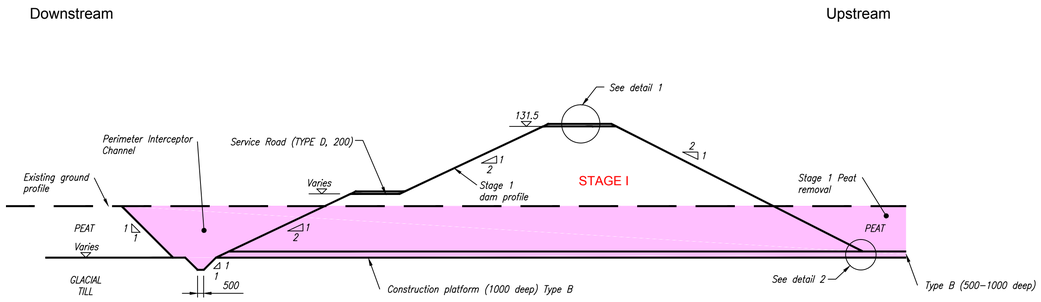
Notes
1. All dimensions in millimetres and all levels in metres AOD unless stated otherwise.
2. Access road to be 1m above peat level.
3. Crest width increases to 10m between 3880 – 3900m.

References
001 1 0392 3031 522 C0153 – Minorco Lisheen, Rev. 0

Client:	Lisheen Milling Ltd
Project:	Stage II TMF Raise
Site:	Lisheen, Ireland
Drawing Title:	Typical Sections of TMF Stage II Raise
Drawing No.:	05
Date:	10.10.01
Scale:	As Shown
Project No.:	01511529
File No.:	511222_05
Revision No.:	
Drawn By:	P.A.T.
Engineer:	M.T.
Reviewed By:	R.W.

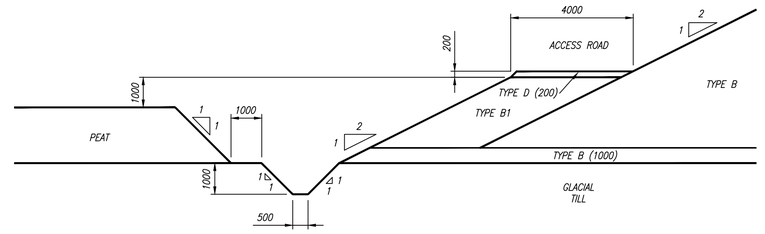
Revisions:	Date:	Engineer:	Reviewed By:

Golder Associates



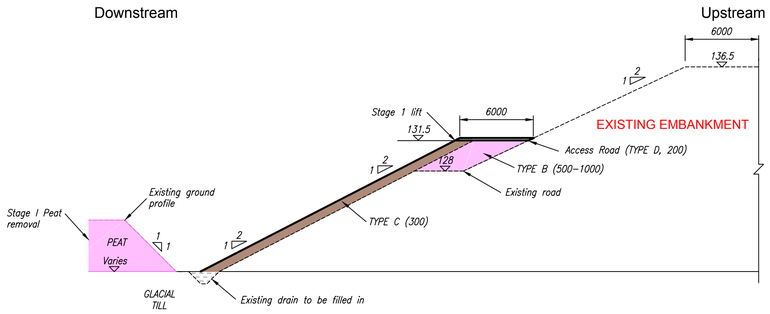
TYPICAL SECTION - STAGE I

NTS



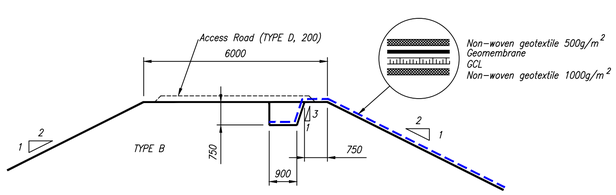
STAGE I - DOWNSTREAM TOE DETAIL

Scale 1:100



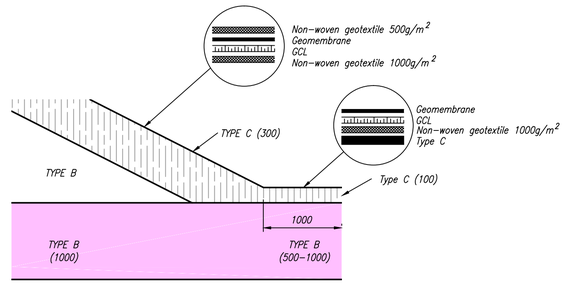
TYPICAL SECTION THROUGH EXISTING EMBANKMENT - STAGE I

NTS



DETAIL 1

Scale 1:100



DETAIL 2
TYPICAL SECTION CONSTRUCTION PLATFORM STAGE I

NTS

Rev	Description	Prep	Review	Date
B	Minor amendments	RW	RW	27/09/13
A	Drawing updated	RW	RW	23/07/13

Client: Lisheen Mines Limited

Project: Tailings Storage New Adjoining Cell

Title: Typical Sections and Details

Drawn by	Prepared by	Proj Manager	Reviewed	Date
PAT	RW	RW	RW	05/07/13

File No.: 519770 R4 | Project No.: 11514150166

Size: A1 | Scale: As shown | Status: Report Issue

Drawing No.: 06 | Rev.: B

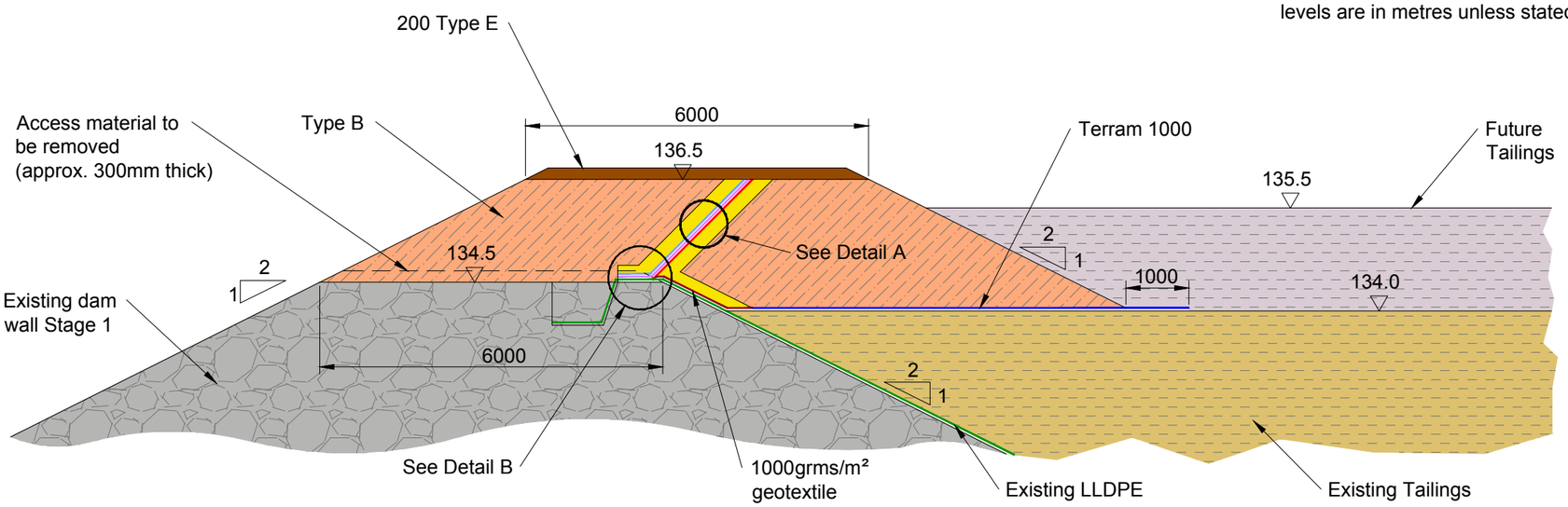
Golder Associates (UK) Ltd
Cavendish House
Bourne End Business Park
Cores End Road
Bourne End
Buckinghamshire
SL8 5AS
+44 (0)1628 851 851

Notes

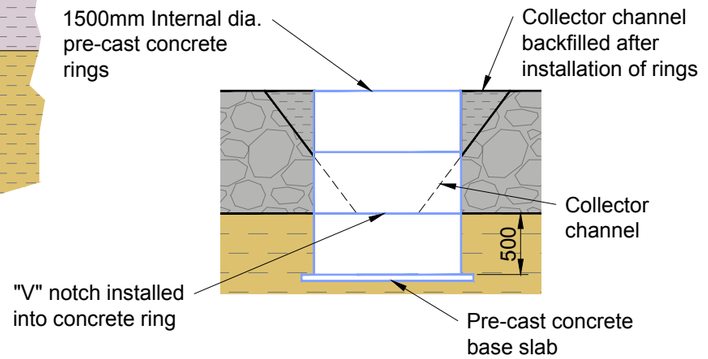
1. All dimensions are in millimetres and all levels are in metres unless stated otherwise.

Legend

- Proposed LLDPE
- Existing LLDPE
- Terram 1000
- GCL
- 500grms/m²
- 1000grms/m²
- 500grms/m² carbon rich geotextile

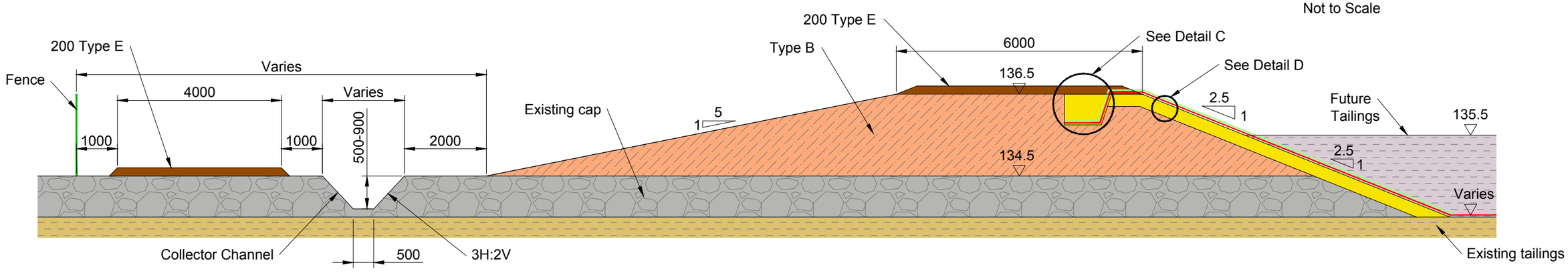


TYPICAL SECTION UPSTREAM DAM RAISE

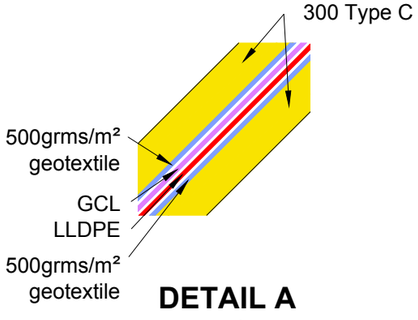


TYPICAL COLLECTOR CHANNEL SUMP DETAIL

Not to Scale

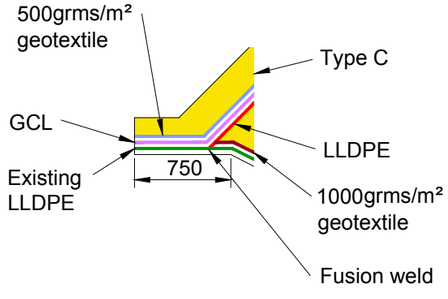


TYPICAL SECTION DAM WALL ON CAP



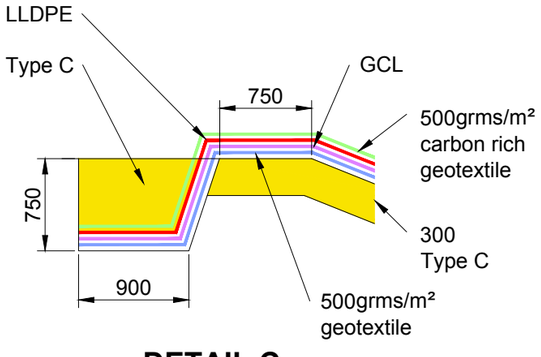
DETAIL A

Not to Scale



DETAIL B

Not to Scale



DETAIL C

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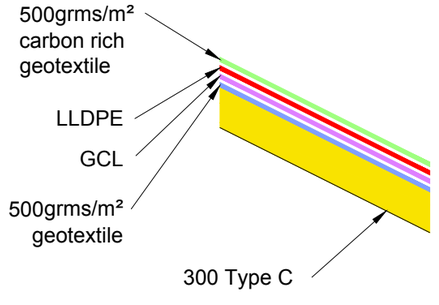


DETAIL D

Not to Scale

Rev	Description			
A	Project title & detail 'B' altered.	RW	RW	05/04/11
		PM	Review	Date

Client: Lisheen Mines Limited

Project: Stage 2 Raise

Title: Typical Sections and Details

Created by	Requested by	Proj Manager	Reviewer	Date
PAT	RW	RW		

File No.	Project No.
518613A	10514150188

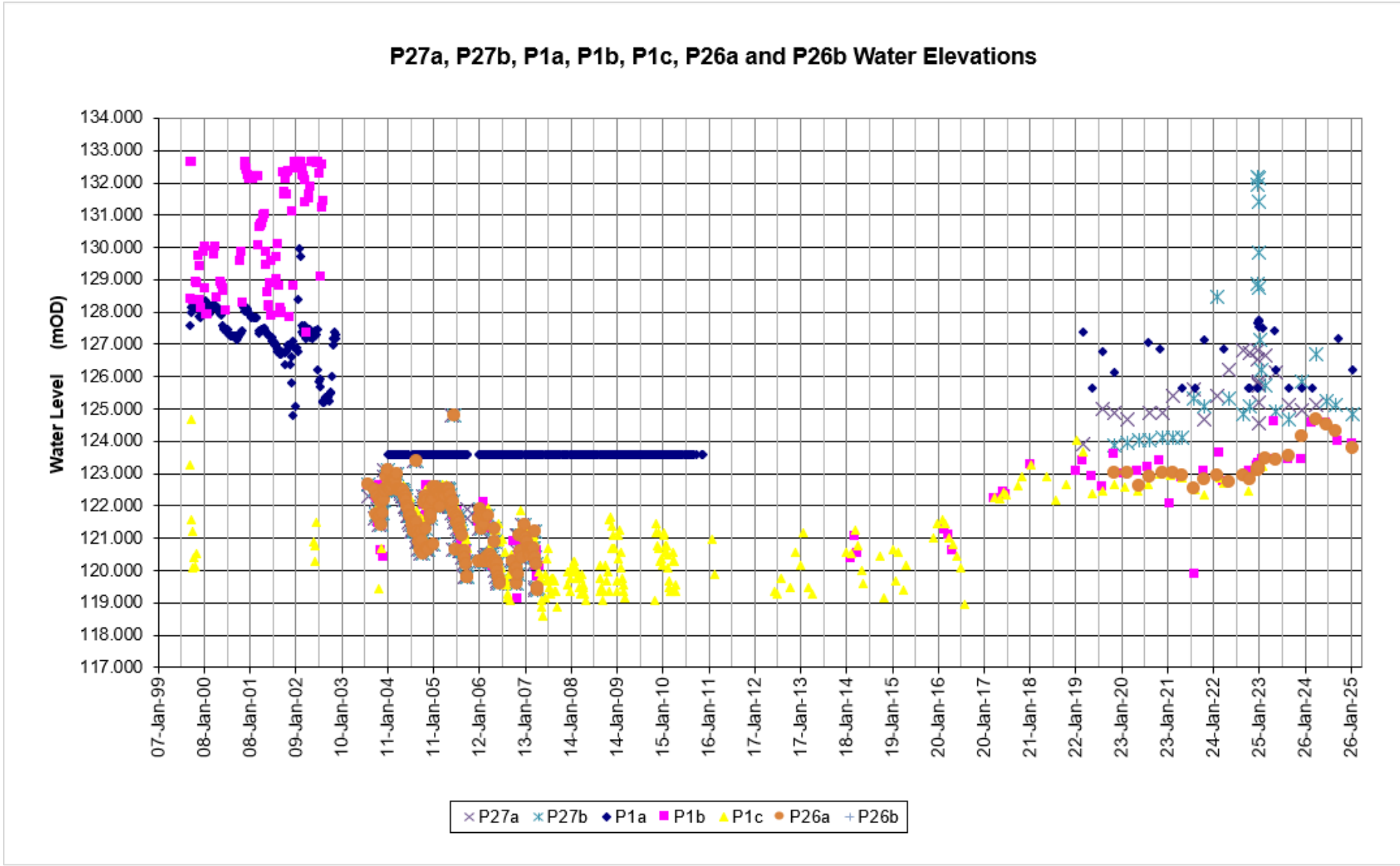
Size	Scale	Status
A3	Not to scale	Report Issue

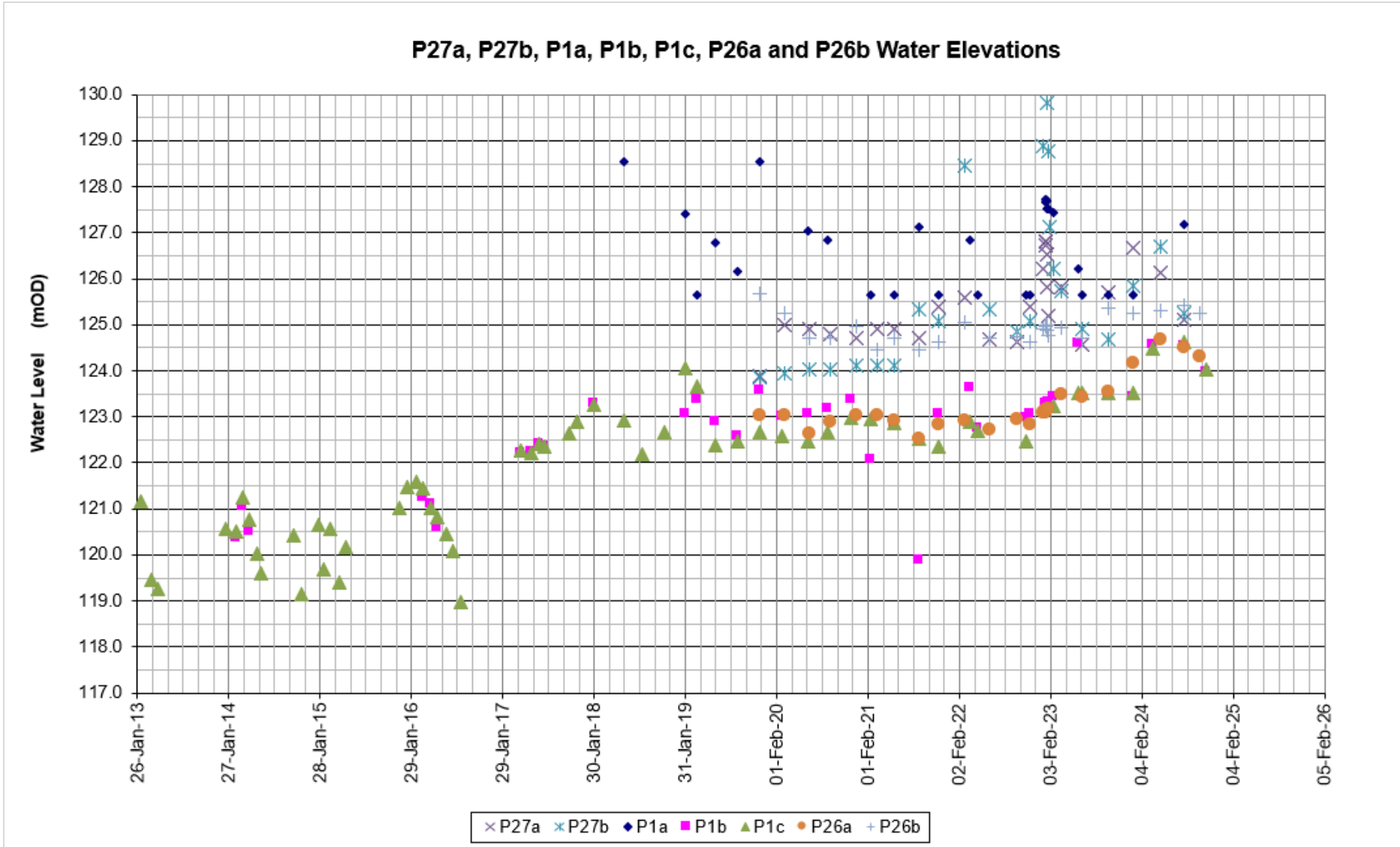
Drawing No. 07 — Rev A

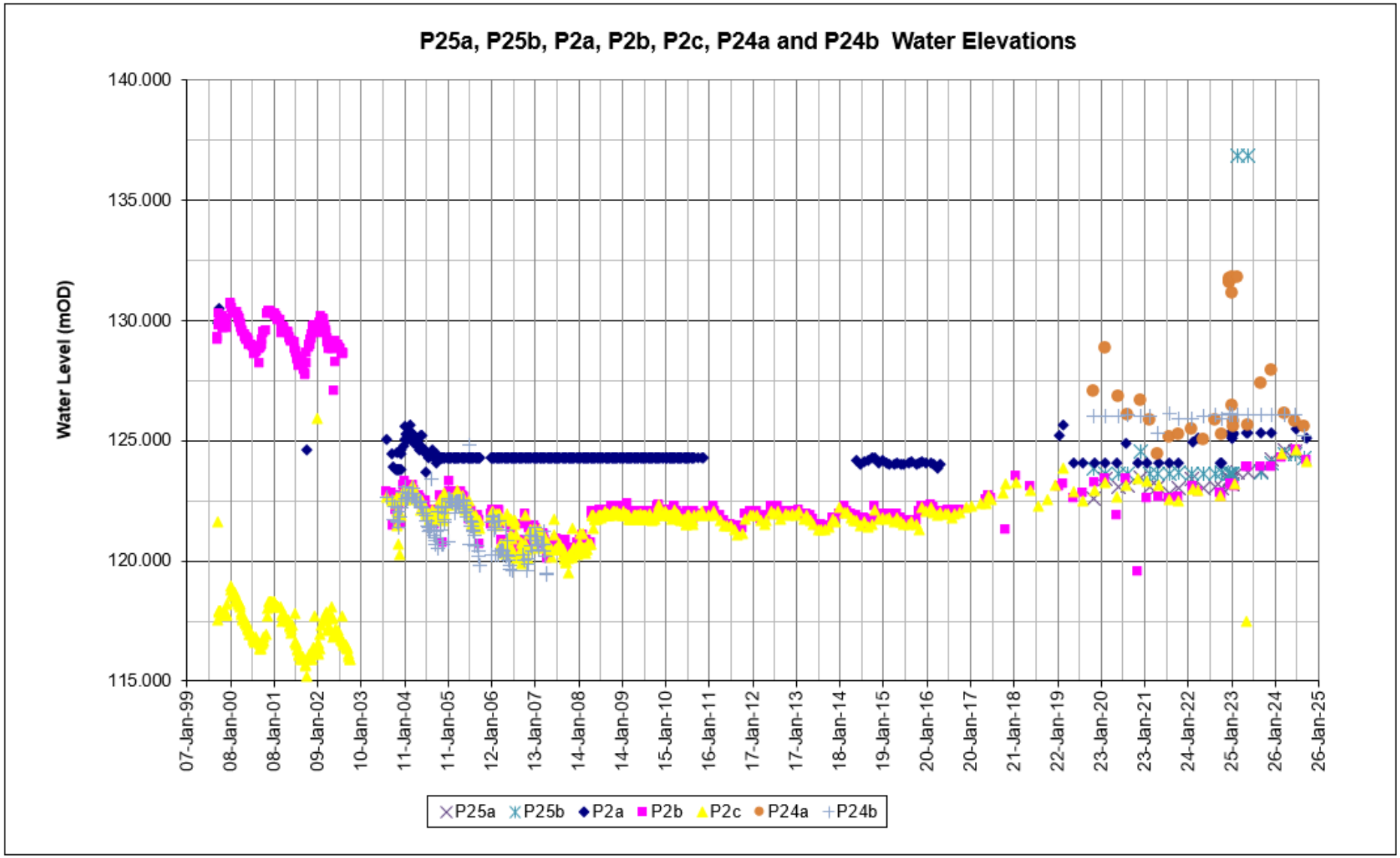
Golder Associates
1st Floor
Clyde House
Reform Road
Maidenhead
Berkshire
SL6 8BY
+44 (0)1628 586 200

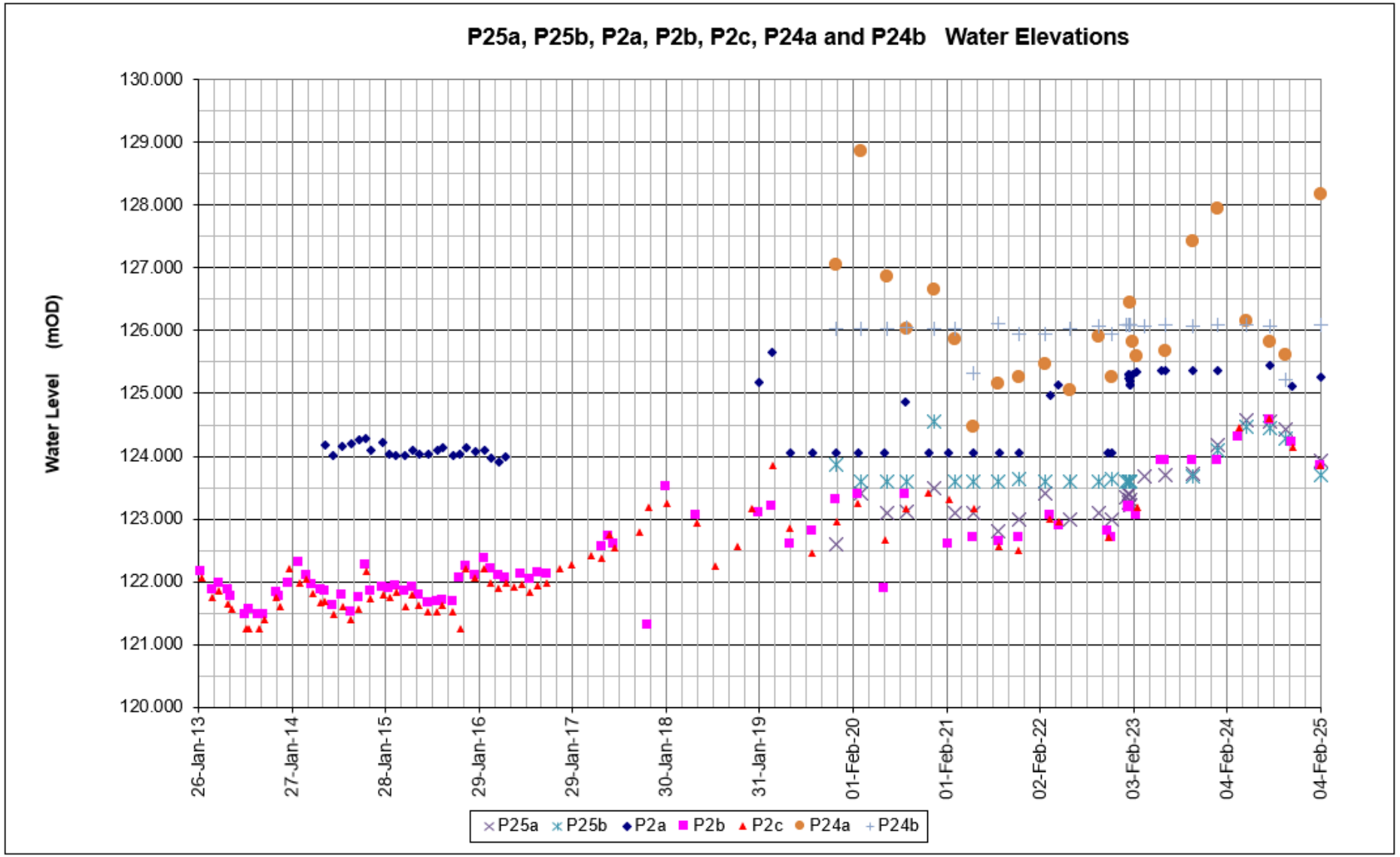
Appendix B

PIEZOMETER DATA 2024


P27a, P27b, P1a, P1b, P1c, P26a and P26b Water Elevations
Water Level (mOD)
134.000
133.000
132.000
131.000
130.000
129.000
128.000
127.000
126.000
125.000
124.000
123.000
122.000
121.000
120.000
119.000
118.000
117.000
07-Jan-99
08-Jan-00
08-Jan-01
09-Jan-02
10-Jan-03
11-Jan-04
11-Jan-05
12-Jan-06
13-Jan-07
14-Jan-08
14-Jan-09
15-Jan-10
16-Jan-11
17-Jan-12
17-Jan-13
18-Jan-14
19-Jan-15
20-Jan-16
20-Jan-17
21-Jan-18
22-Jan-19
23-Jan-20
23-Jan-21
24-Jan-22
25-Jan-23
26-Jan-24
26-Jan-25
P27a
P27b
P1a
P1b
P1c
P26a
P26b


P27a, P27b, P1a, P1b, P1c, P26a and P26b Water Elevations
Water Level (mOD)
130.0
129.0
128.0
127.0
126.0
125.0
124.0
123.0
122.0
121.0
120.0
119.0
118.0
117.0
26-Jan-13
27-Jan-14
28-Jan-15
29-Jan-16
29-Jan-17
30-Jan-18
31-Jan-19
01-Feb-20
01-Feb-21
02-Feb-22
03-Feb-23
04-Feb-24
04-Feb-25
05-Feb-26
P27a
P27b
P1a
P1b
P1c
P26a
P26b


P25a, P25b, P2a, P2b, P2c, P24a and P24b Water Elevations
Water Level (mOD)
140.000
135.000
130.000
125.000
120.000
115.000
07-Jan-99
08-Jan-00
08-Jan-01
09-Jan-02
10-Jan-03
11-Jan-04
11-Jan-05
12-Jan-06
13-Jan-07
14-Jan-08
14-Jan-09
15-Jan-10
16-Jan-11
17-Jan-12
17-Jan-13
18-Jan-14
19-Jan-15
20-Jan-16
20-Jan-17
21-Jan-18
22-Jan-19
23-Jan-20
23-Jan-21
24-Jan-22
25-Jan-23
26-Jan-24
26-Jan-25
P25a
P25b
P2a
P2b
P2c
P24a
P24b


P25a, P25b, P2a, P2b, P2c, P24a and P24b Water Elevations
Water Level (mOD)
130.000
129.000
128.000
127.000
126.000
125.000
124.000
123.000
122.000
121.000
120.000
26-Jan-13
27-Jan-14
28-Jan-15
29-Jan-16
29-Jan-17
30-Jan-18
31-Jan-19
01-Feb-20
01-Feb-21
02-Feb-22
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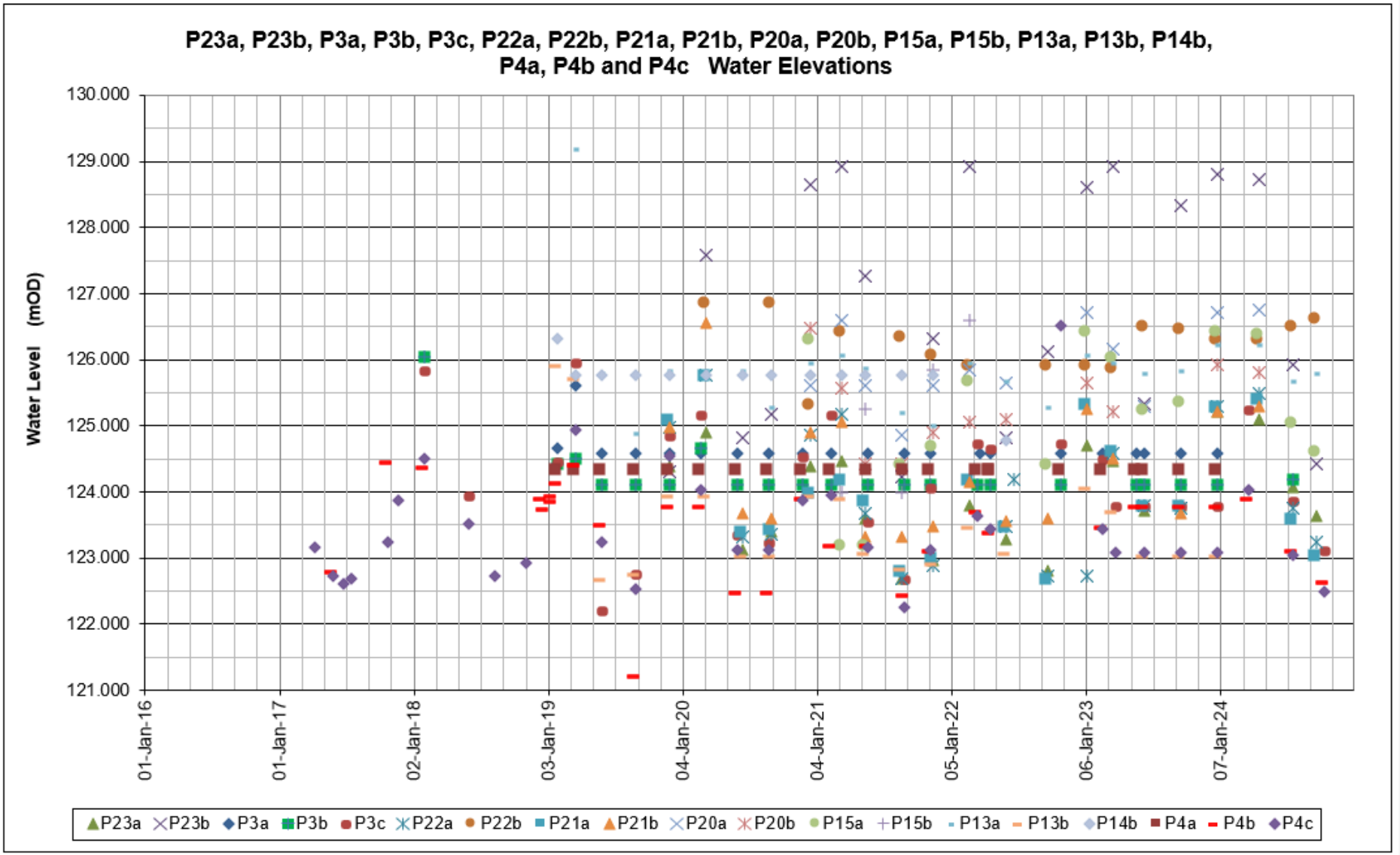
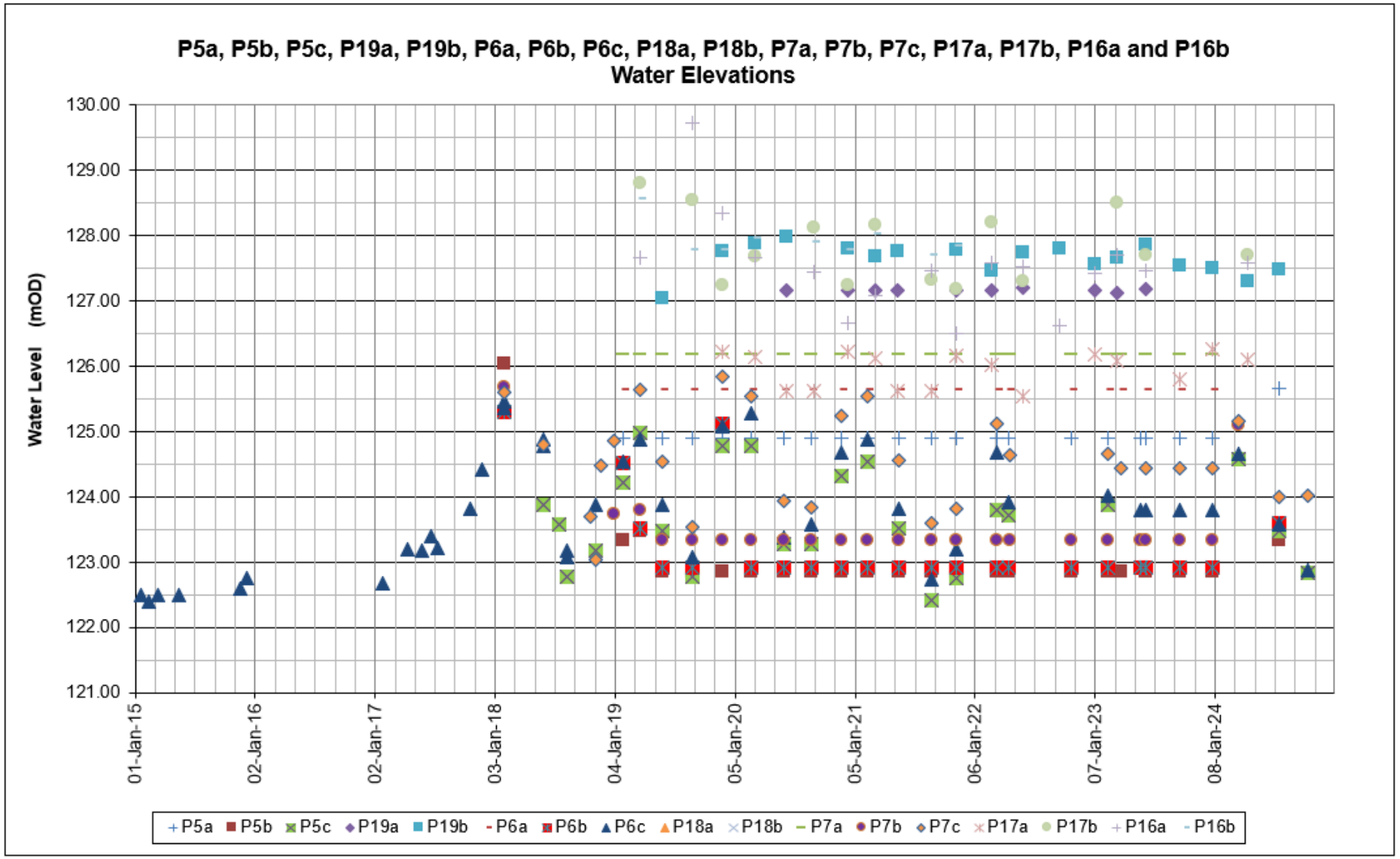
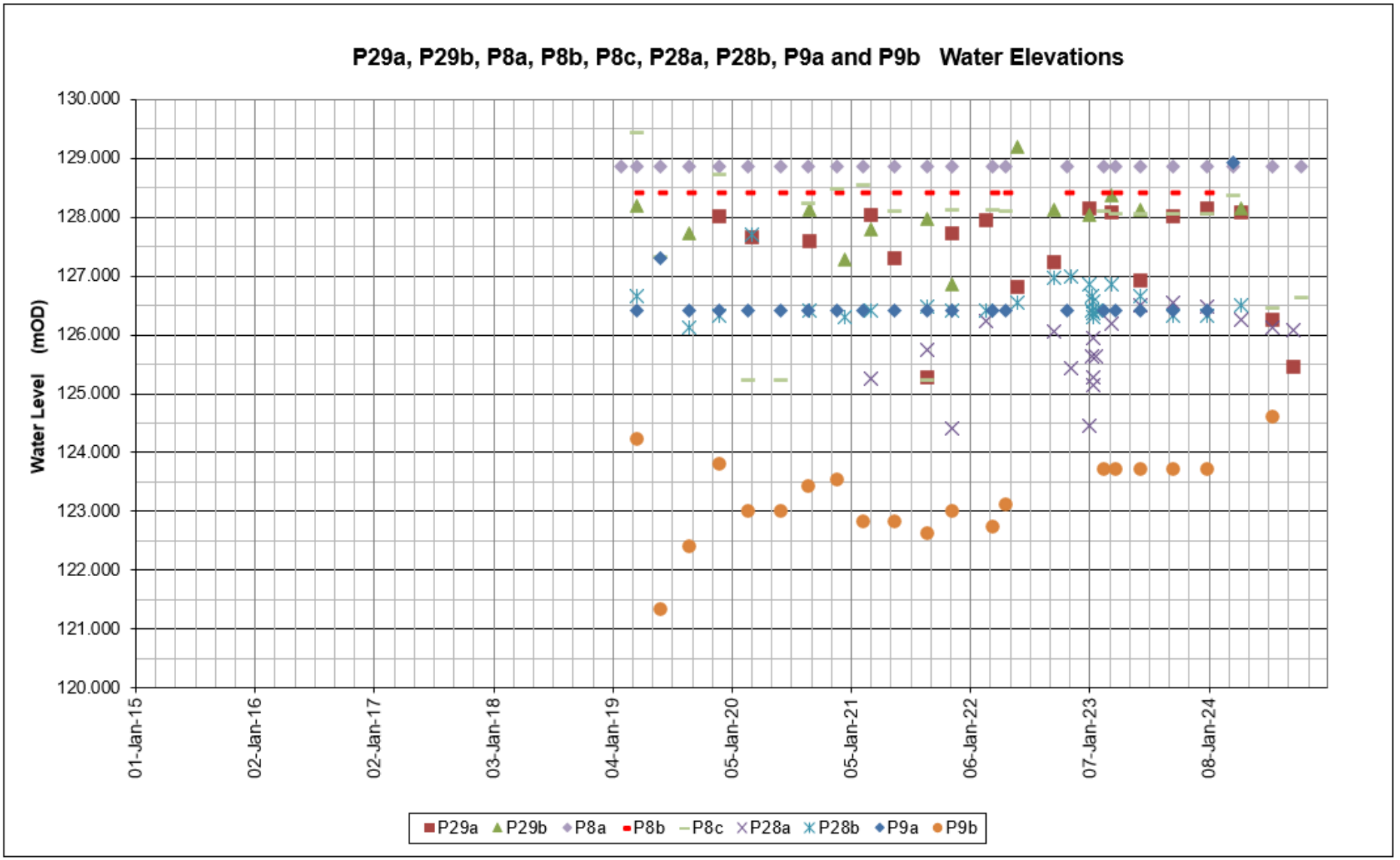
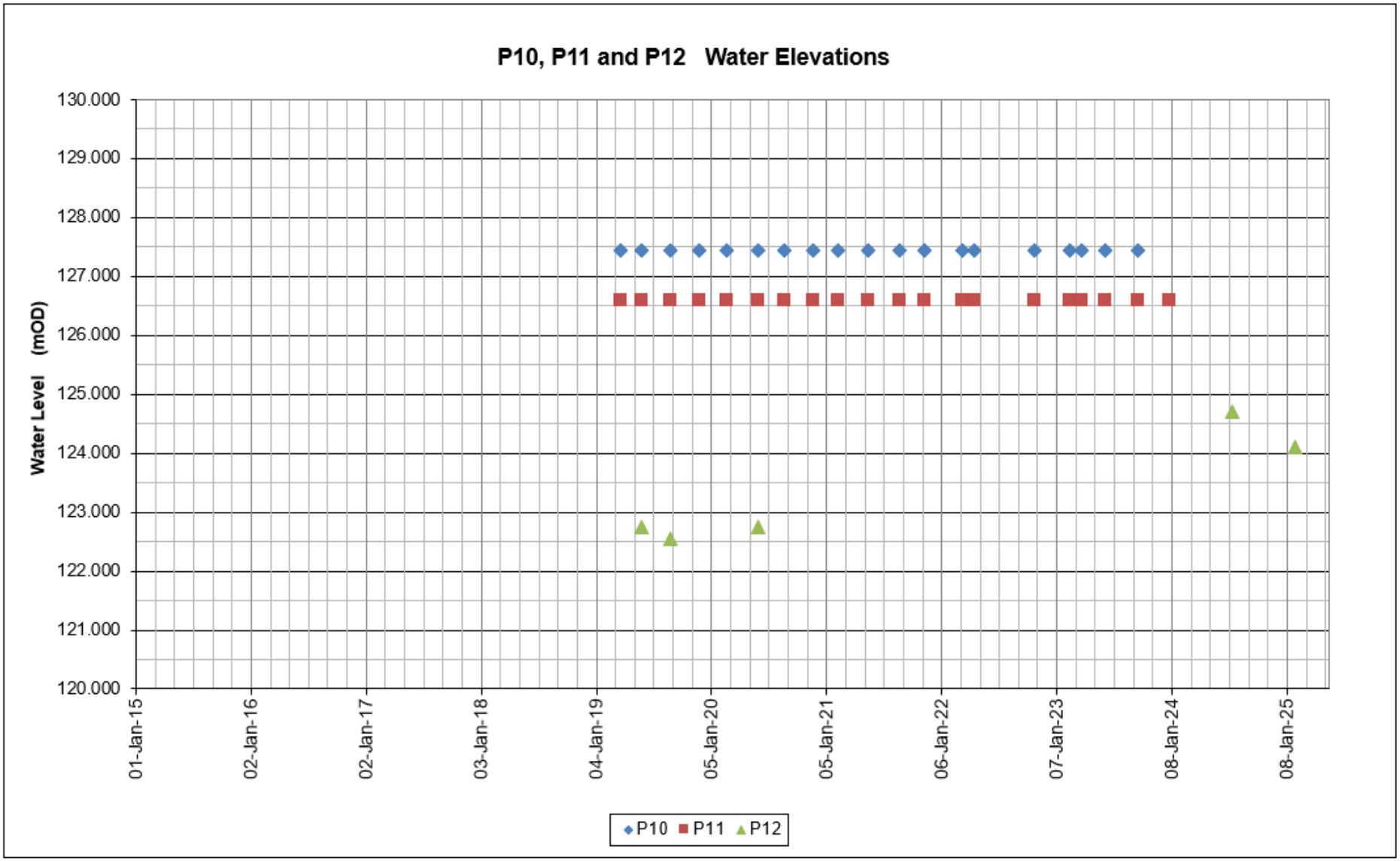
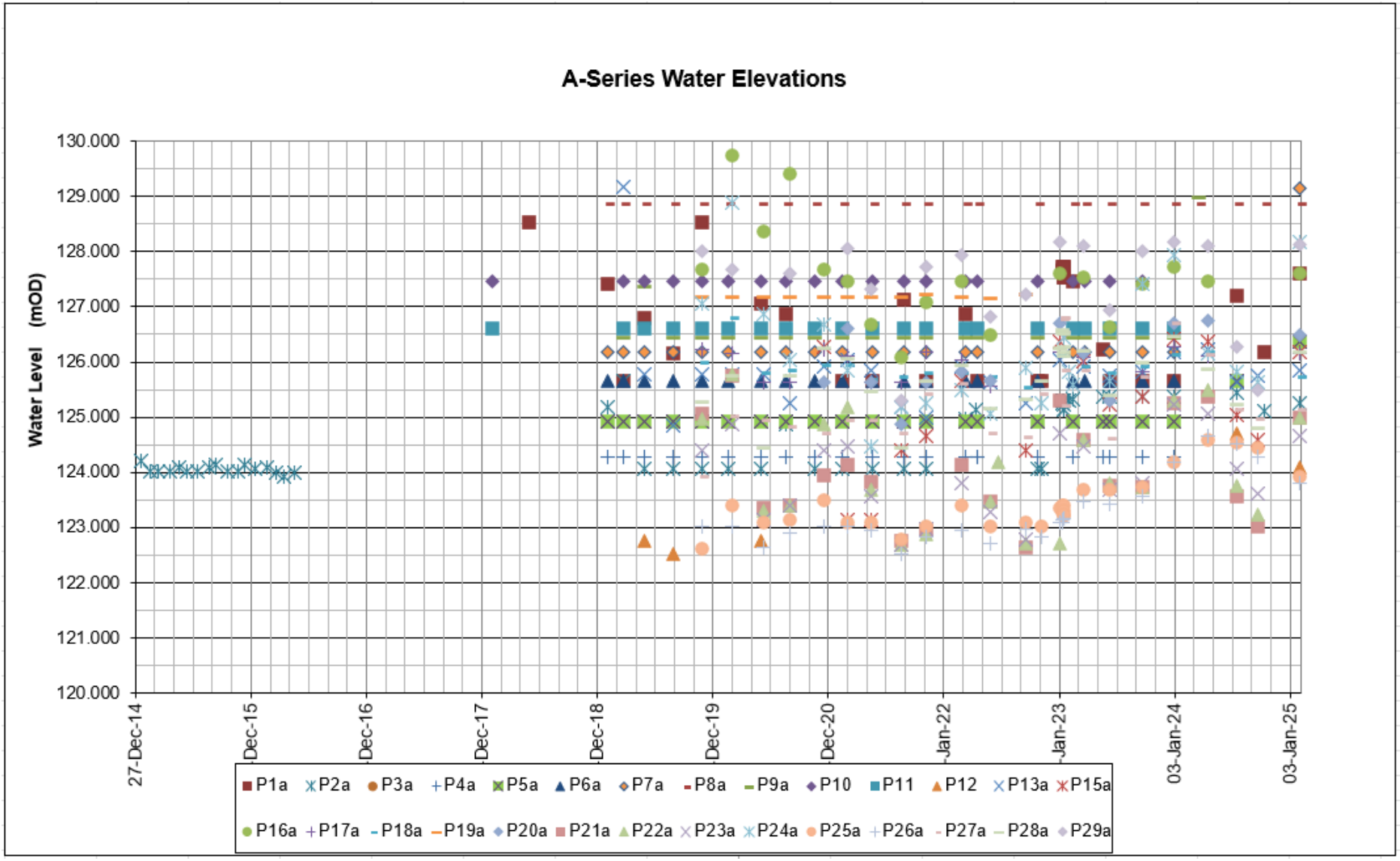
04-Feb-25
P25a
P25b
P2a
P2b
P2c
P24a
P24b

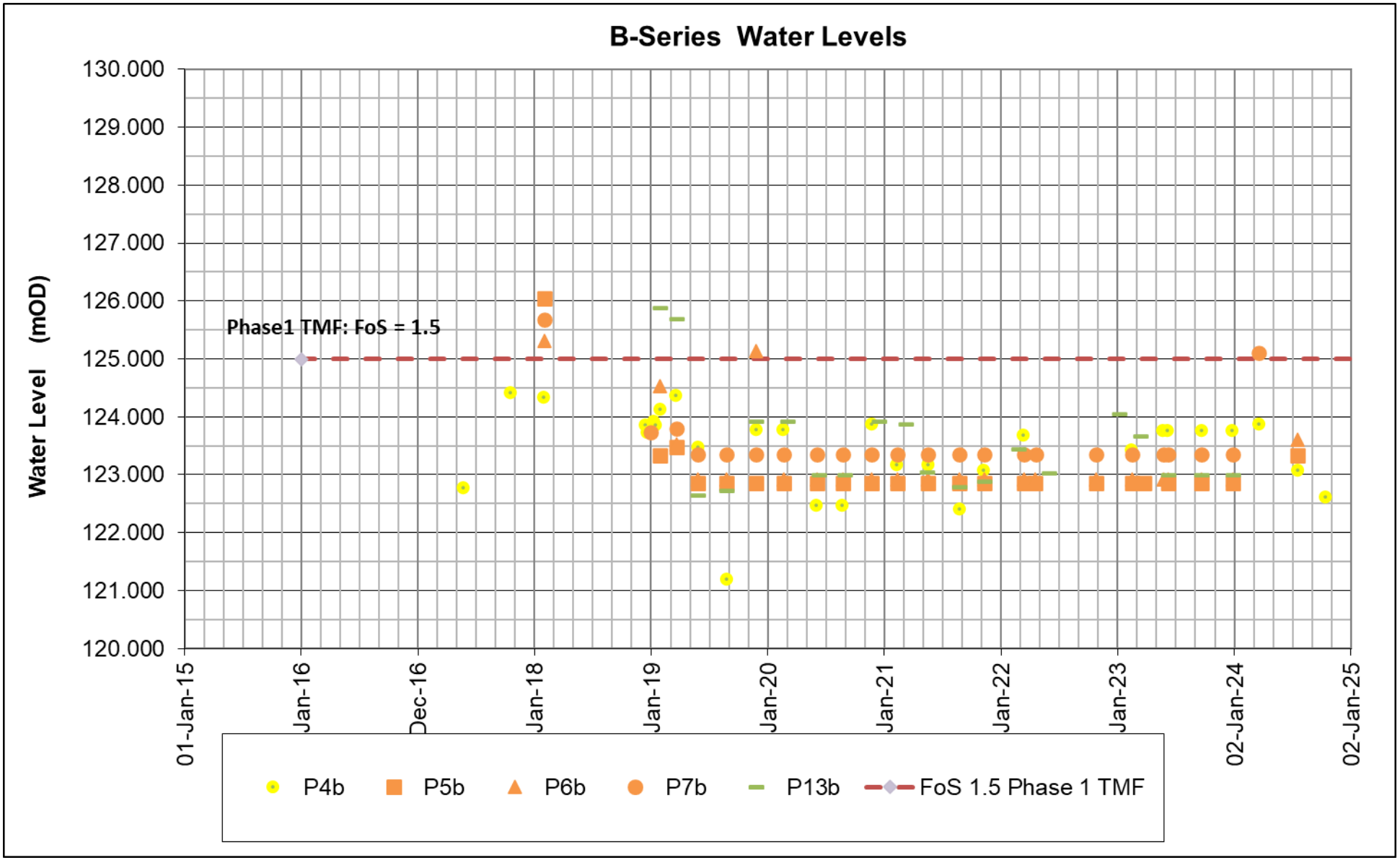

P23a, P23b, P3a, P3b, P3c, P22a, P22b, P21a, P21b, P20a, P20b, P15a, P15b, P13a, P13b, P14b, P4a, P4b and P4c Water Elevations
Water Level (mOD)
130.000
129.000
128.000
127.000
126.000
125.000
124.000
123.000
122.000
121.000
01-Jan-16
01-Jan-17
02-Jan-18
03-Jan-19
04-Jan-20
04-Jan-21
05-Jan-22
06-Jan-23
07-Jan-24
P23a P23b P3a P3b P3c P22a P22b P21a P21b P20a P20b P15a P15b P13a P13b P14b P4a P4b P4c

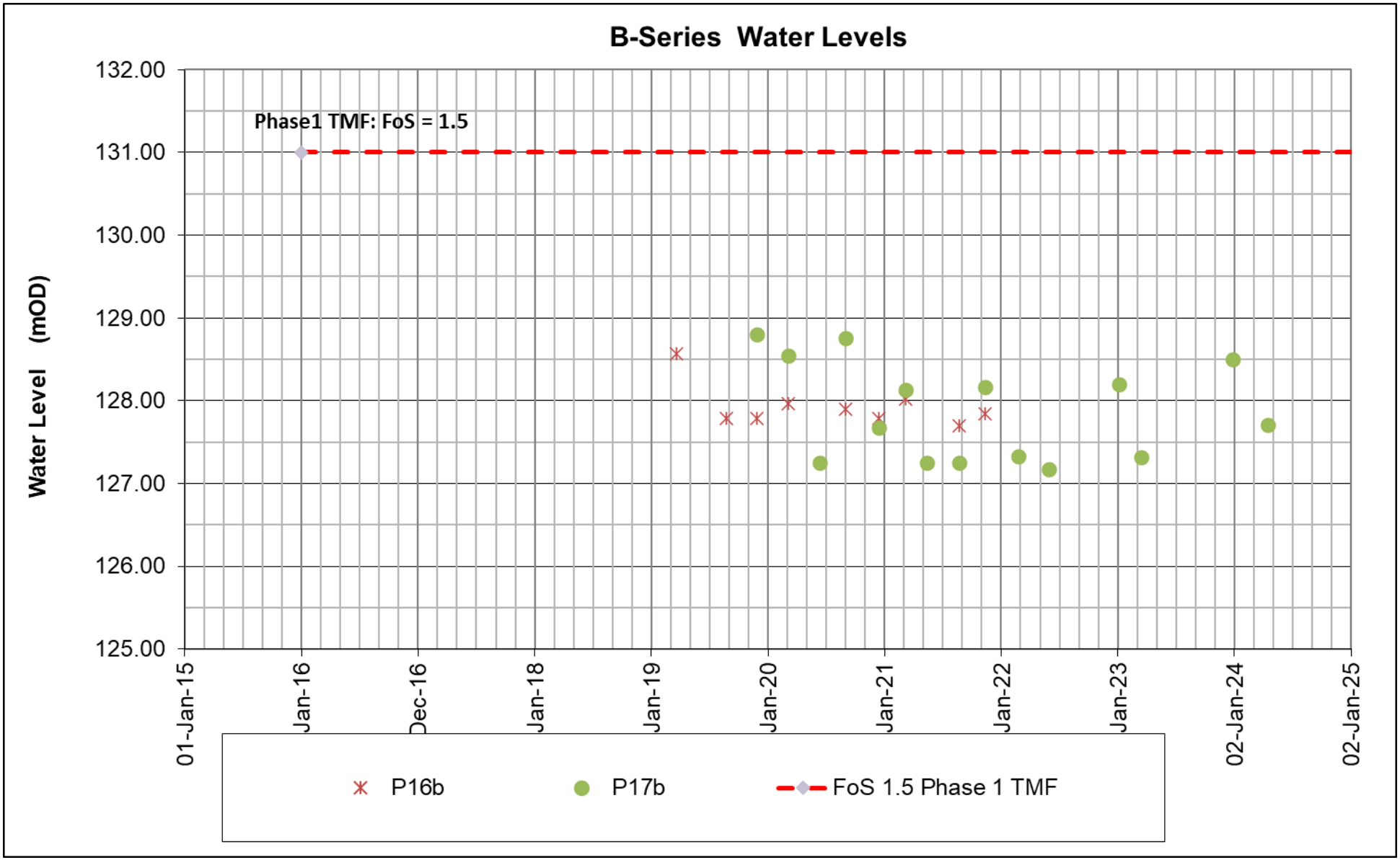

P5a, P5b, P5c, P19a, P19b, P6a, P6b, P6c, P18a, P18b, P7a, P7b, P7c, P17a, P17b, P16a and P16b
Water Elevations
Water Level (mOD)
130.00
129.00
128.00
127.00
126.00
125.00
124.00
123.00
122.00
121.00
01-Jan-15
02-Jan-16
02-Jan-17
03-Jan-18
04-Jan-19
05-Jan-20
05-Jan-21
06-Jan-22
07-Jan-23
08-Jan-24
P5a
P5b
P5c
P19a
P19b
P6a
P6b
P6c
P18a
P18b
P7a
P7b
P7c
P17a
P17b
P16a
P16b

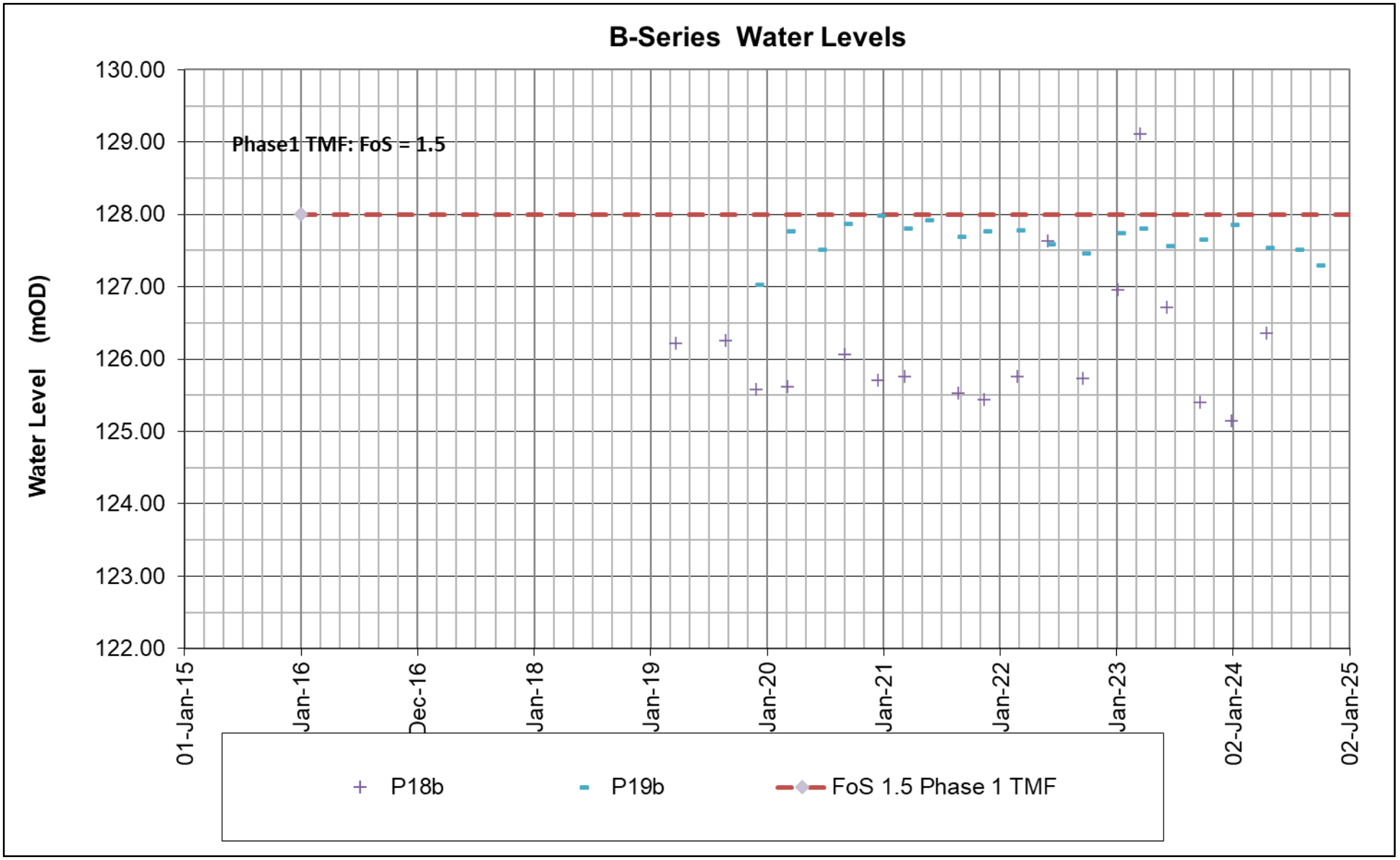

P29a, P29b, P8a, P8b, P8c, P28a, P28b, P9a and P9b Water Elevations
Water Level (mOD)
130.000
129.000
128.000
127.000
126.000
125.000
124.000
123.000
122.000
121.000
120.000
01-Jan-15
02-Jan-16
02-Jan-17
03-Jan-18
04-Jan-19
05-Jan-20
05-Jan-21
06-Jan-22
07-Jan-23
08-Jan-24
P29a
P29b
P8a
P8b
P8c
P28a
P28b
P9a
P9b

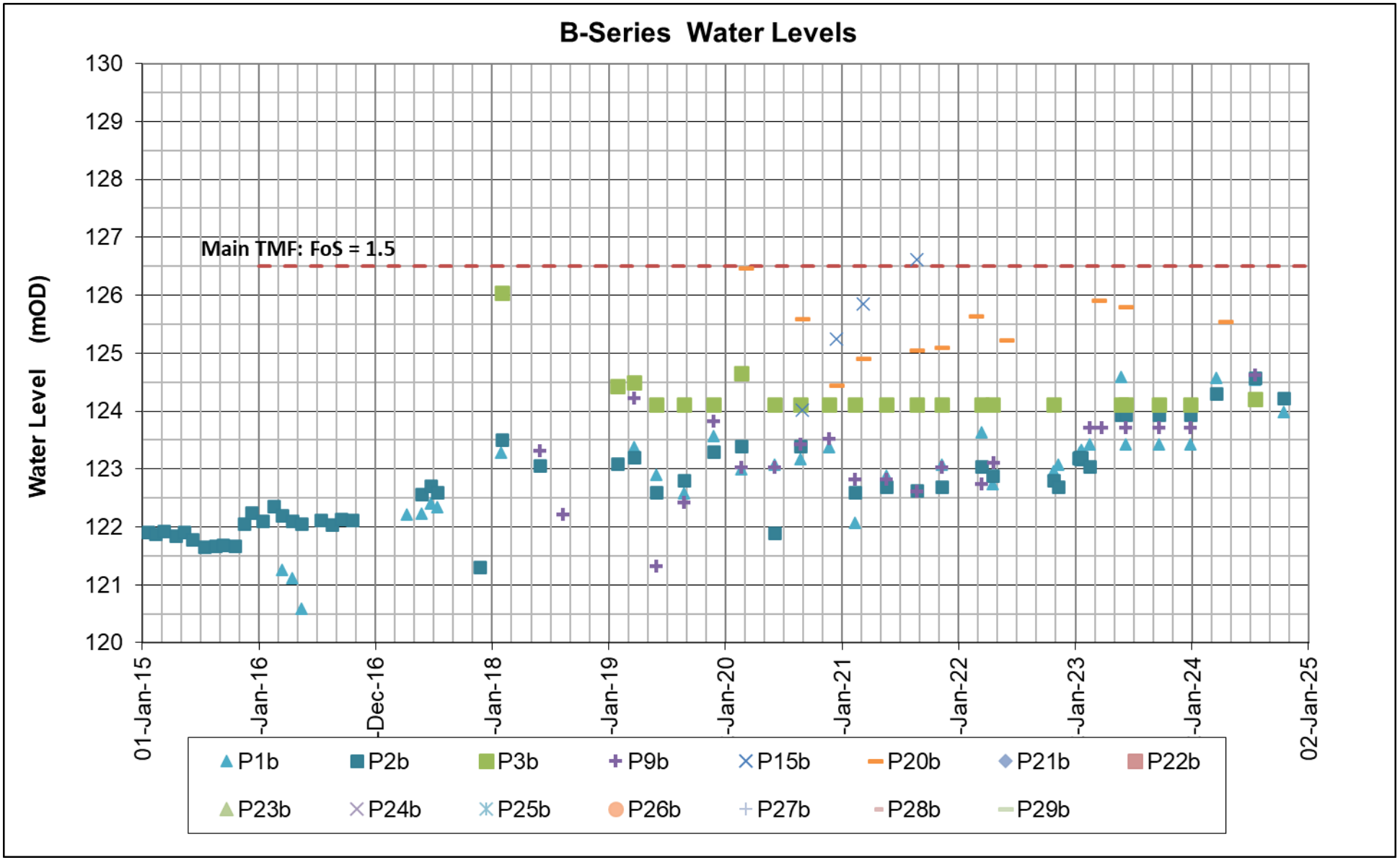

P10, P11 and P12 Water Elevations
Water Level (mOD)
130.000
129.000
128.000
127.000
126.000
125.000
124.000
123.000
122.000
121.000
120.000
01-Jan-15
02-Jan-16
02-Jan-17
03-Jan-18
04-Jan-19
05-Jan-20
05-Jan-21
06-Jan-22
07-Jan-23
08-Jan-24
08-Jan-25
P10
P11
P12

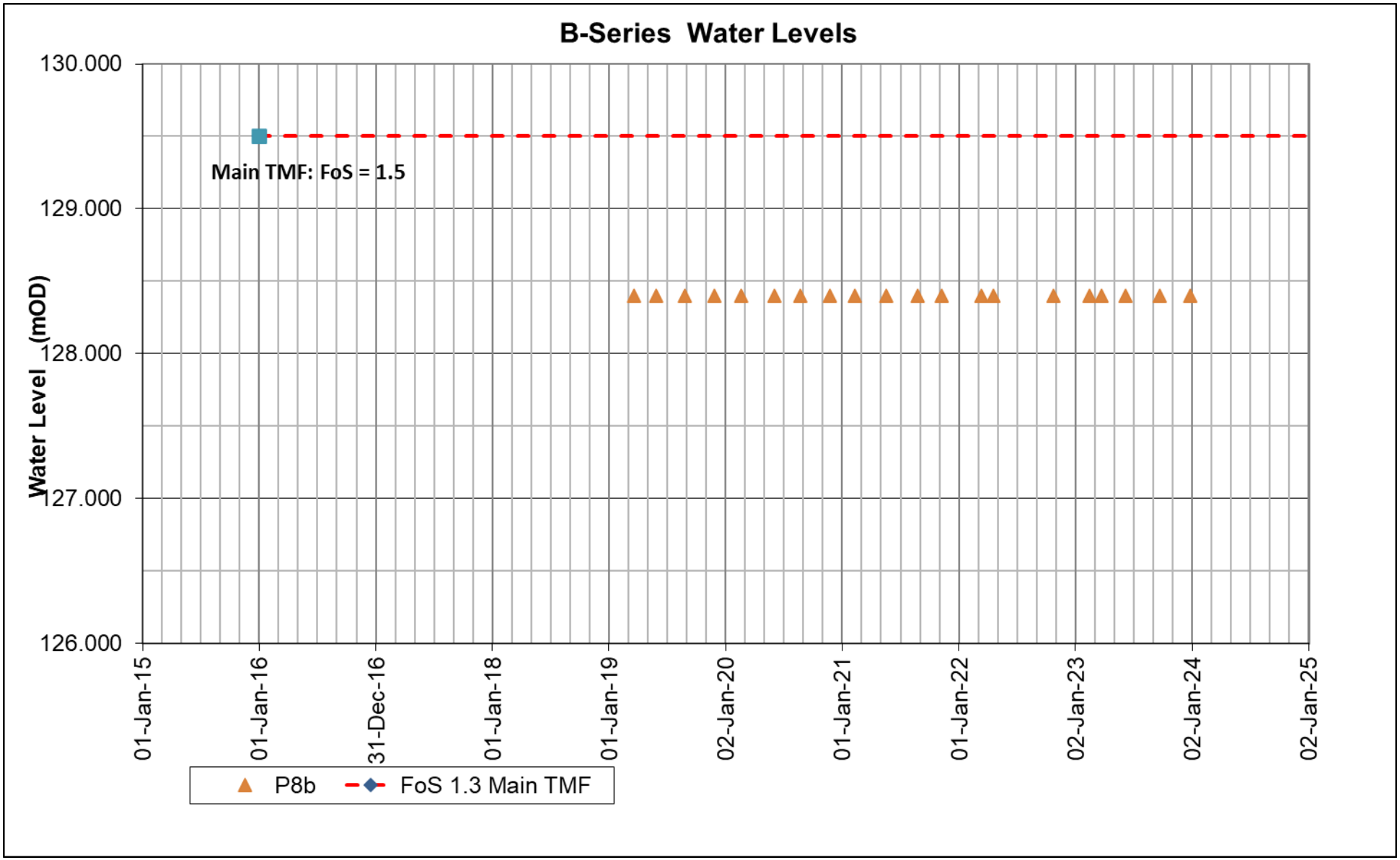

A-Series Water Elevations
Water Level (mOD)
130.000
129.000
128.000
127.000
126.000
125.000
124.000
123.000
122.000
121.000
120.000
27-Dec-14
Dec-15
Dec-16
Dec-17
Dec-18
Dec-19
Dec-20
Jan-22
Jan-23
03-Jan-24
03-Jan-25
P1a P2a P3a P4a P5a P6a P7a P8a P9a P10 P11 P12 P13a P15a
P16a P17a P18a P19a P20a P21a P22a P23a P24a P25a P26a P27a P28a P29a

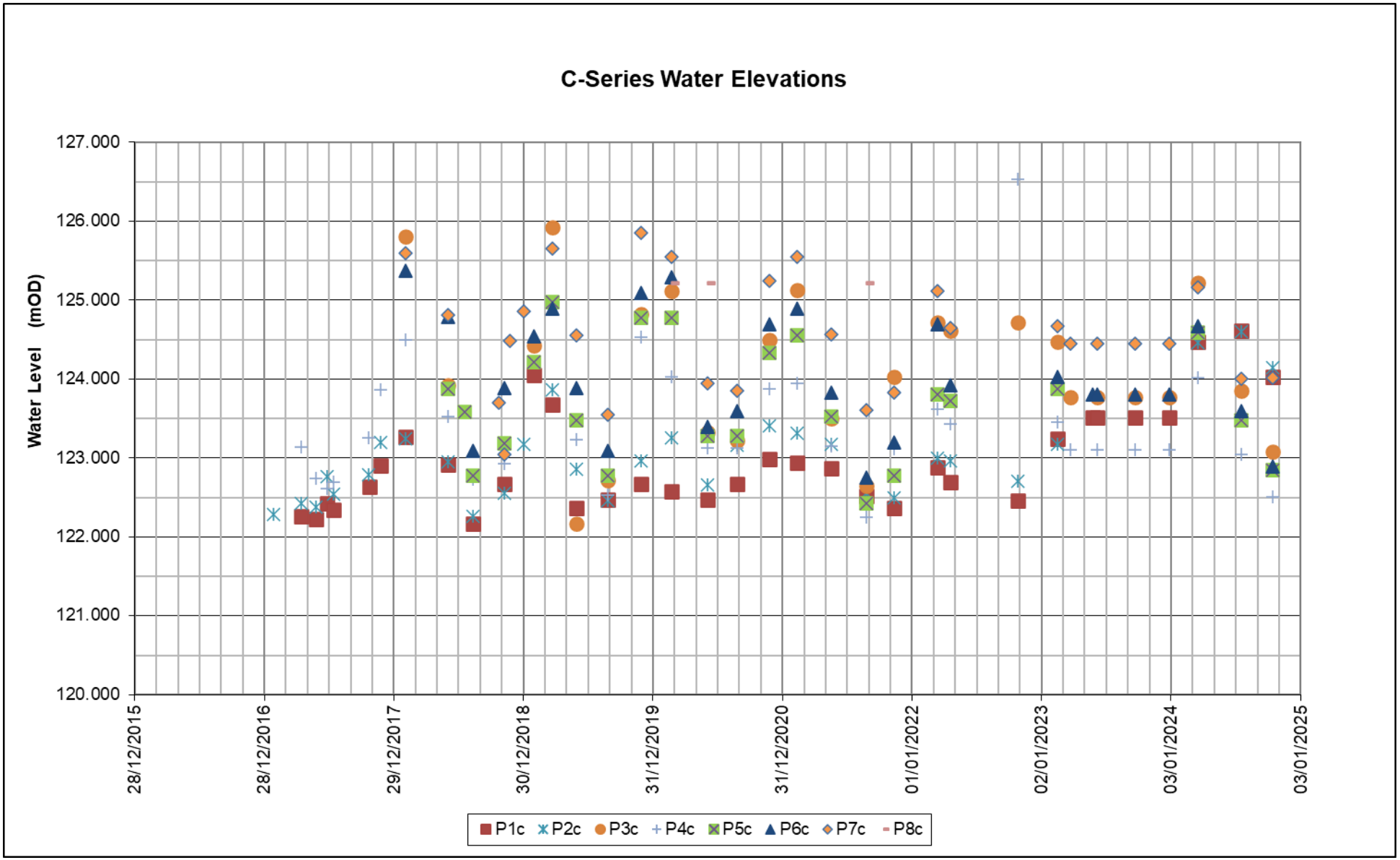

B-Series Water Levels
Water Level (mOD)
130.000
129.000
128.000
127.000
126.000
125.000
124.000
123.000
122.000
121.000
120.000
Phase1 TMF: FoS = 1.5
01-Jan-15
Jan-16
Dec-16
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
02-Jan-24
02-Jan-25
P4b
P5b
P6b
P7b
P13b
FoS 1.5 Phase 1 TMF


B-Series Water Levels
Phase1 TMF: FoS = 1.5
Water Level (mOD)
132.00
131.00
130.00
129.00
128.00
127.00
126.00
125.00
01-Jan-15
Jan-16
Dec-16
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
02-Jan-24
02-Jan-25
P16b
P17b
FoS 1.5 Phase 1 TMF


B-Series Water Levels
Phase1 TMF: FoS = 1.5
Water Level (mOD)
130.00
129.00
128.00
127.00
126.00
125.00
124.00
123.00
122.00
01-Jan-15
Jan-16
Dec-16
Jan-18
Jan-19
Jan-20
Jan-21
Jan-22
Jan-23
02-Jan-24
02-Jan-25
P18b
P19b
FoS 1.5 Phase 1 TMF

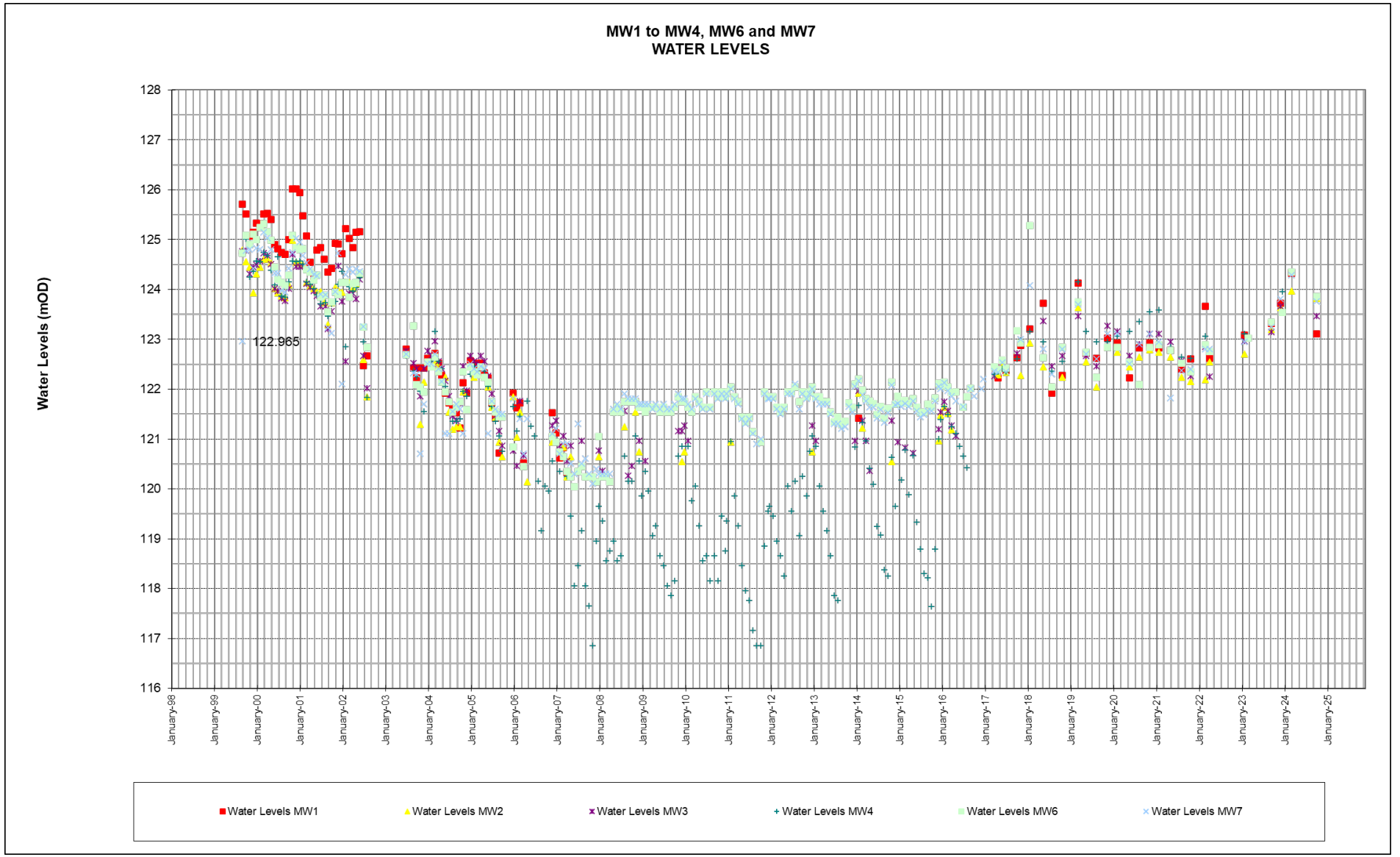

B-Series Water Levels
Water Level (mOD)
130
129
128
127
126
125
124
123
122
121
120
Main TMF: FoS = 1.5
01-Jan-15
-Jan-16
-Dec-16
-Jan-18
-Jan-19
-Jan-20
-Jan-21
-Jan-22
-Jan-23
-Jan-24
02-Jan-25
P1b
P2b
P3b
P9b
P15b
P20b
P21b
P22b
P23b
P24b
P25b
P26b
P27b
P28b
P29b

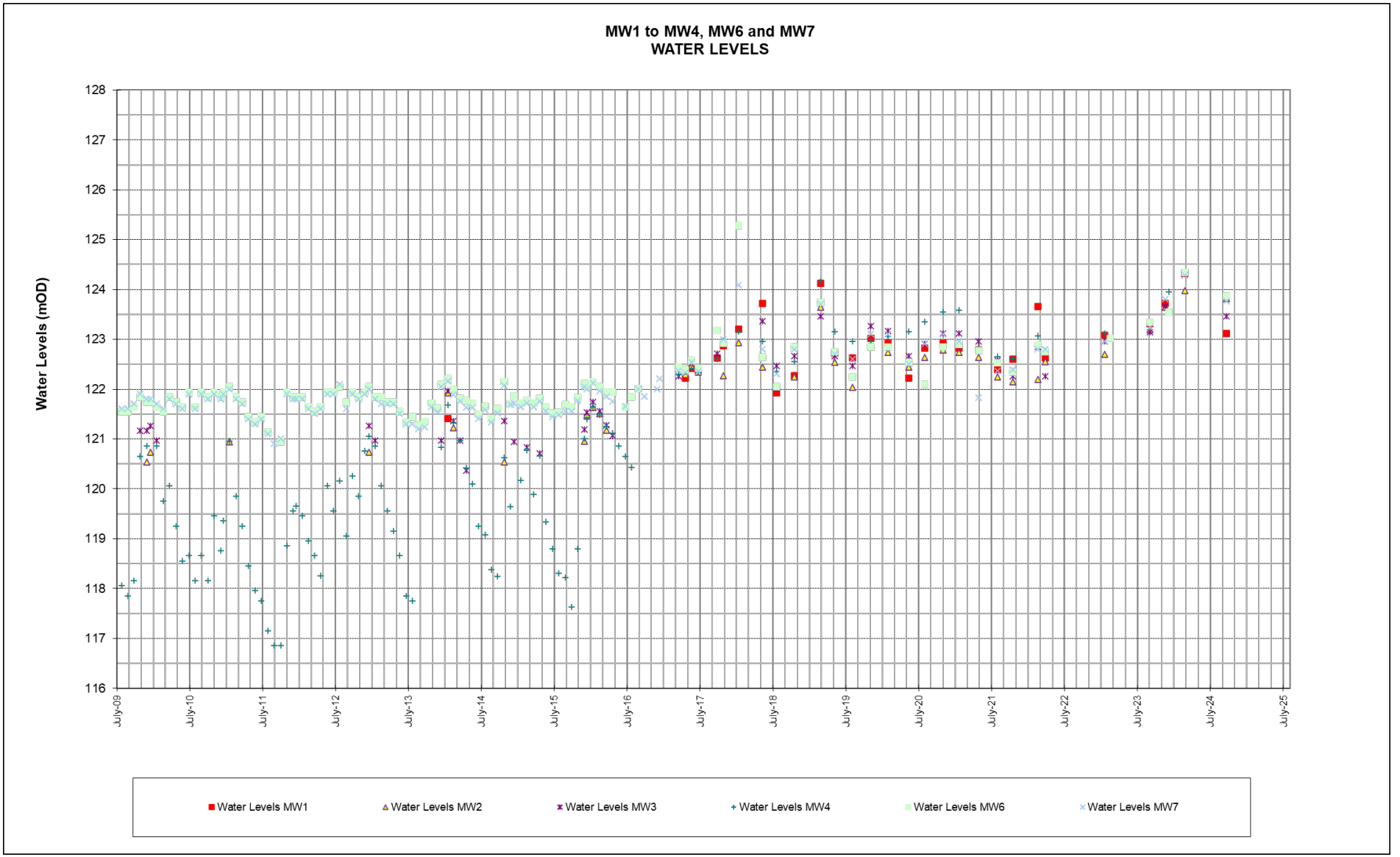

B-Series Water Levels
130.000
129.000
128.000
127.000
126.000
Water Level (mOD)
Main TMF: FoS = 1.5
01-Jan-15
01-Jan-16
31-Dec-16
01-Jan-18
01-Jan-19
02-Jan-20
01-Jan-21
01-Jan-22
02-Jan-23
02-Jan-24
02-Jan-25
P8b
FoS 1.3 Main TMF


C-Series Water Elevations
Water Level (mOD)
127.000
126.000
125.000
124.000
123.000
122.000
121.000
120.000
28/12/2015
28/12/2016
29/12/2017
30/12/2018
31/12/2019
31/12/2020
01/01/2022
02/01/2023
03/01/2024
03/01/2025
P1c
P2c
P3c
P4c
P5c
P6c
P7c
P8c

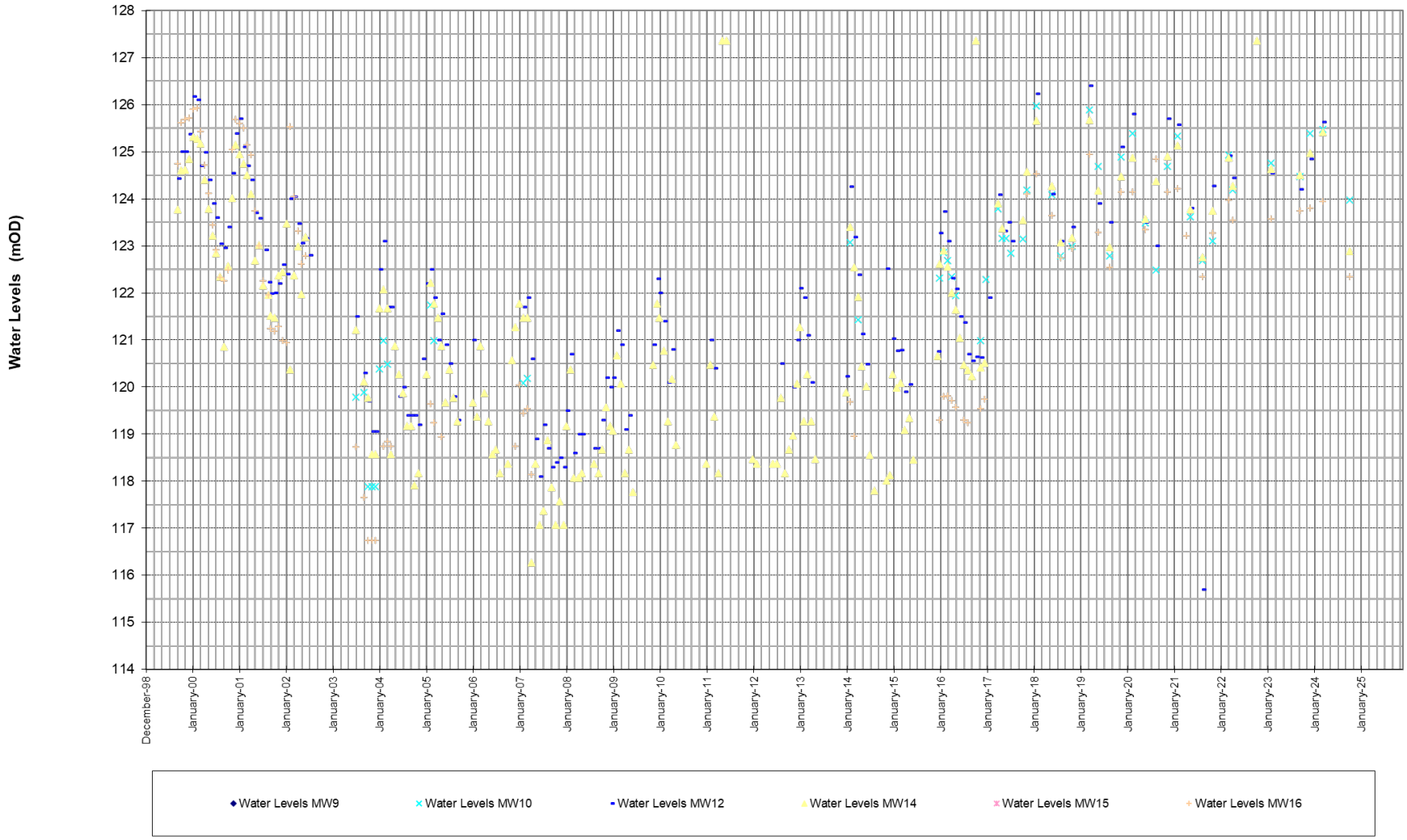
Appendix C

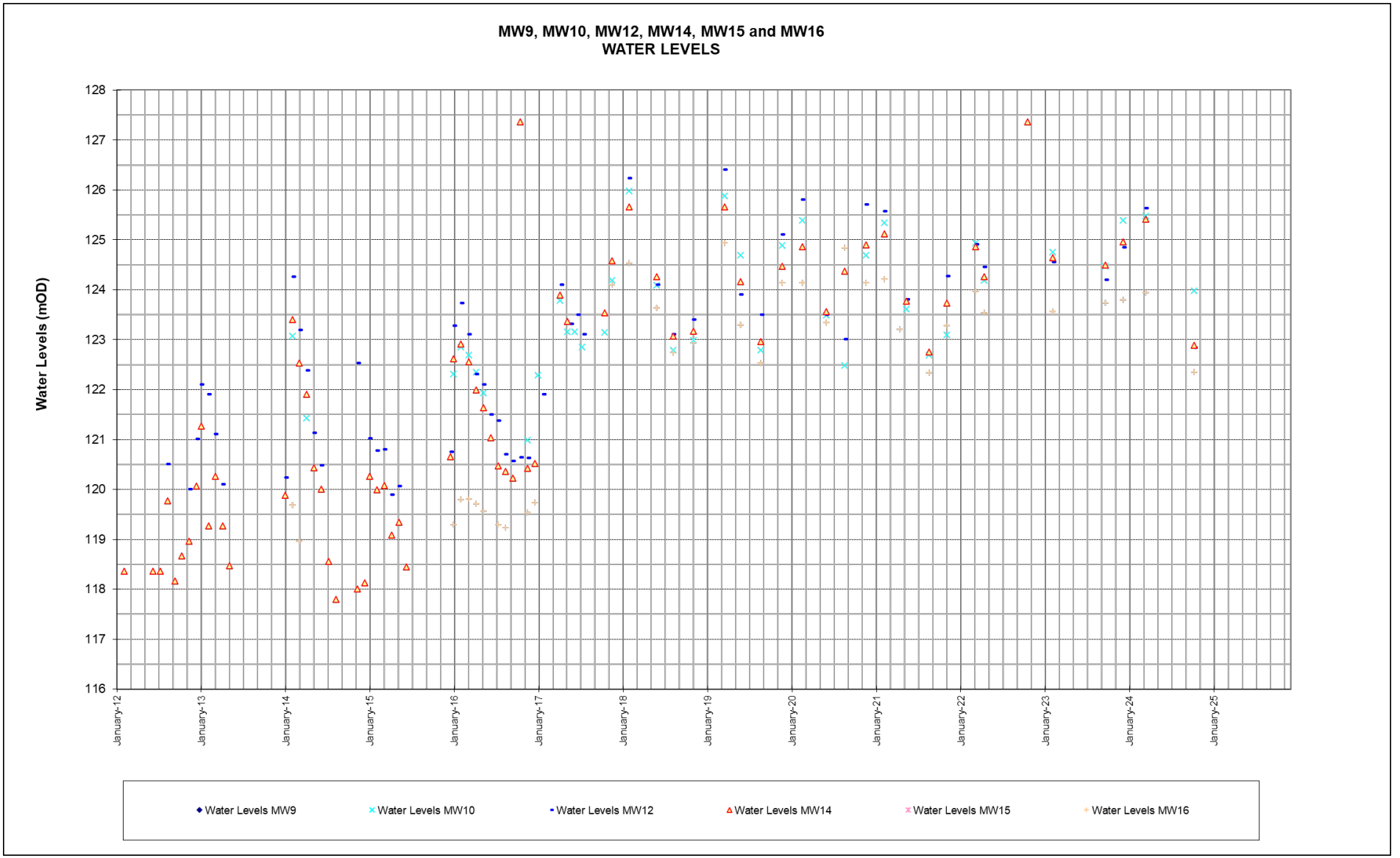
MONITORING WELL DATA 2024


MW1 to MW4, MW6 and MW7
WATER LEVELS
Water Levels (mOD)
128
127
126
125
124
123
122
121
120
119
118
117
116
122.965
January-98
January-99
January-00
January-01
January-02
January-03
January-04
January-05
January-06
January-07
January-08
January-09
January-10
January-11
January-12
January-13
January-14
January-15
January-16
January-17
January-18
January-19
January-20
January-21
January-22
January-23
January-24
January-25
Water Levels MW1
Water Levels MW2
Water Levels MW3
Water Levels MW4
Water Levels MW6
Water Levels MW7

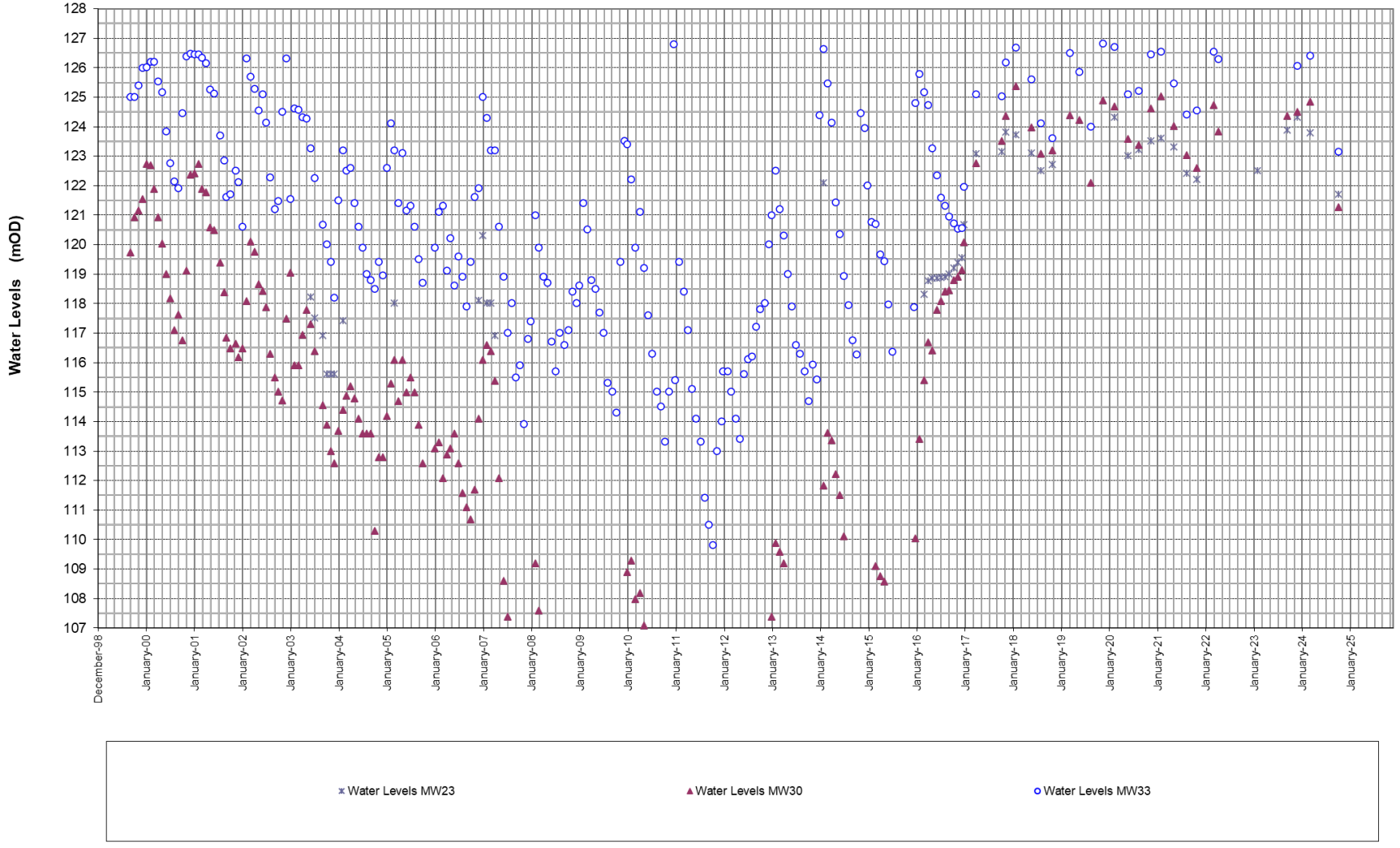

MW1 to MW4, MW6 and MW7
WATER LEVELS
Water Levels (mOD)
128
127
126
125
124
123
122
121
120
119
118
117
116
July-09
July-10
July-11
July-12
July-13
July-14
July-15
July-16
July-17
July-18
July-19
July-20
July-21
July-22
July-23
July-24
July-25
Water Levels MW1
Water Levels MW2
Water Levels MW3
Water Levels MW4
Water Levels MW6
Water Levels MW7

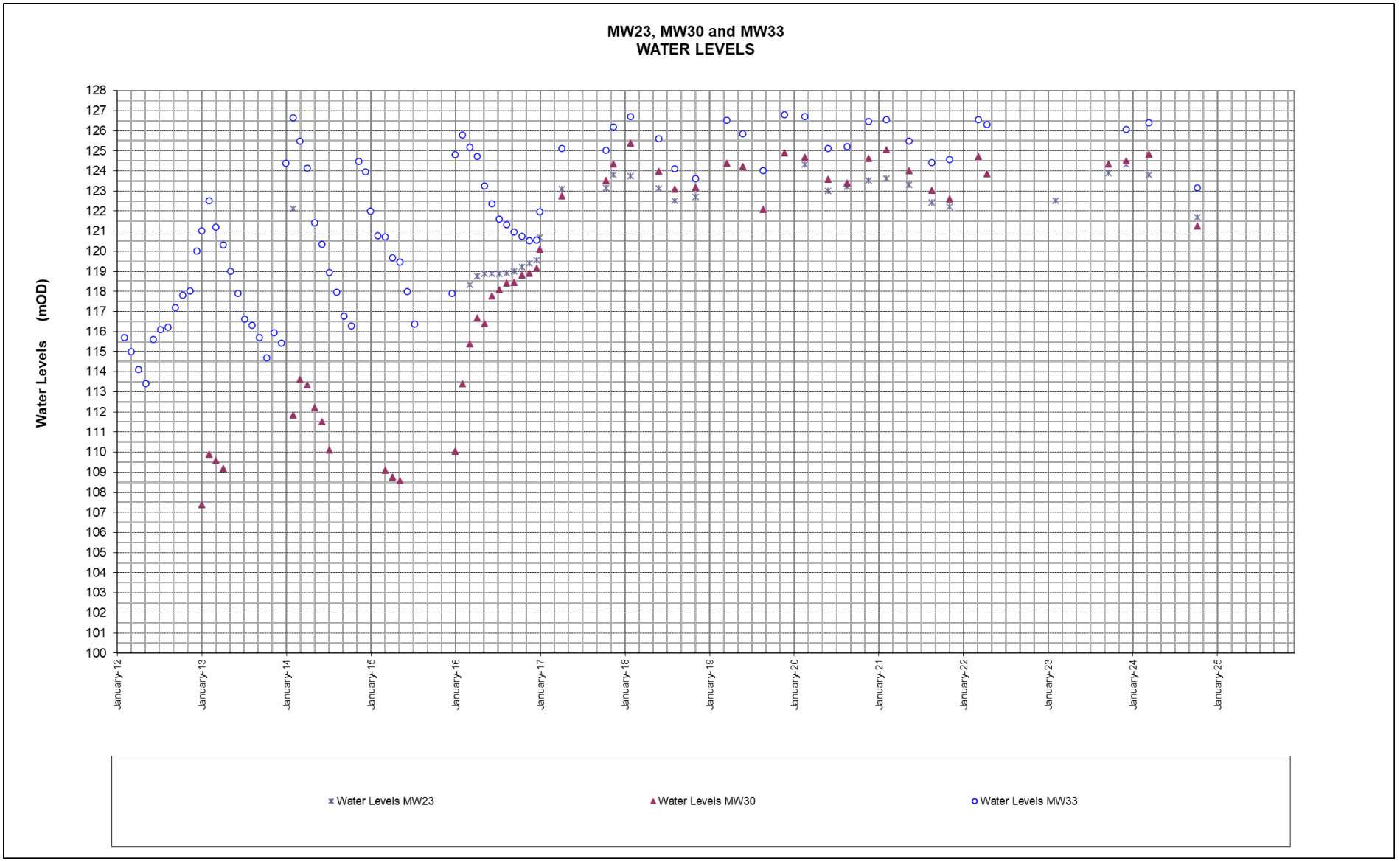
MW9, MW10, MW12, MW14, MW15 and MW16
WATER LEVELS

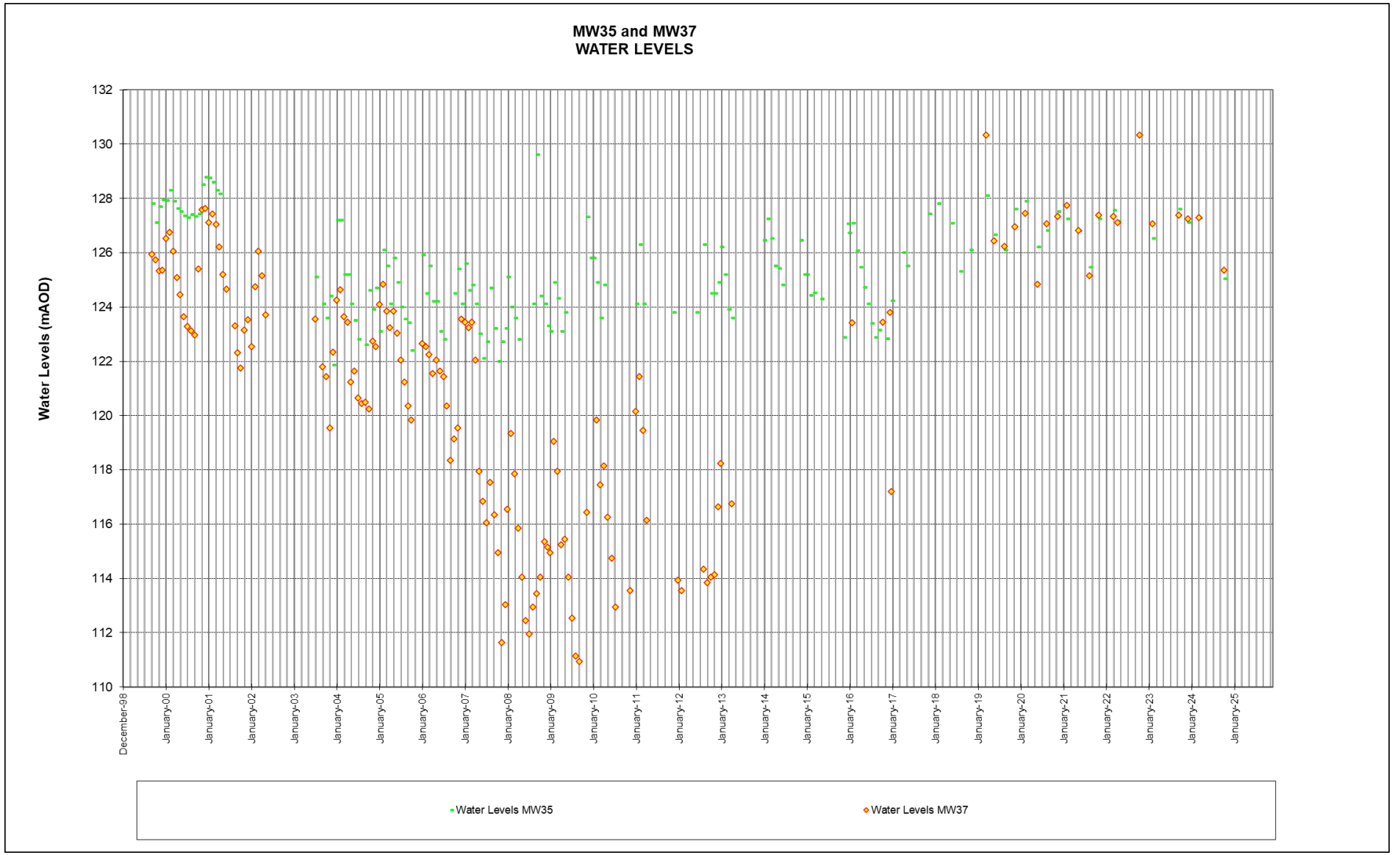


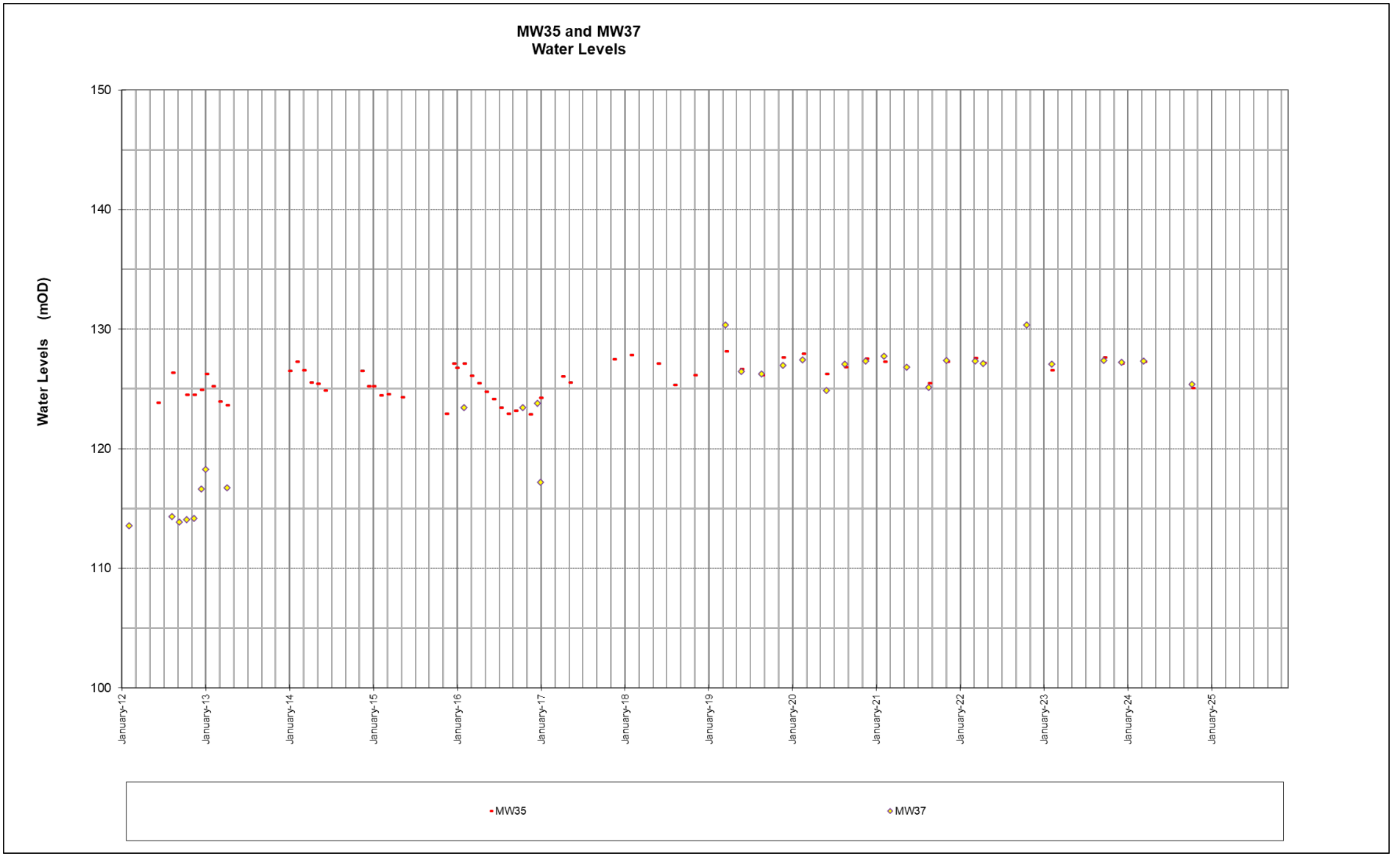

MW9, MW10, MW12, MW14, MW15 and MW16
WATER LEVELS
Water Levels (mOD)
128
127
126
125
124
123
122
121
120
119
118
117
116
January-12
January-13
January-14
January-15
January-16
January-17
January-18
January-19
January-20
January-21
January-22
January-23
January-24
January-25
Water Levels MW9
Water Levels MW10
Water Levels MW12
Water Levels MW14
Water Levels MW15
Water Levels MW16

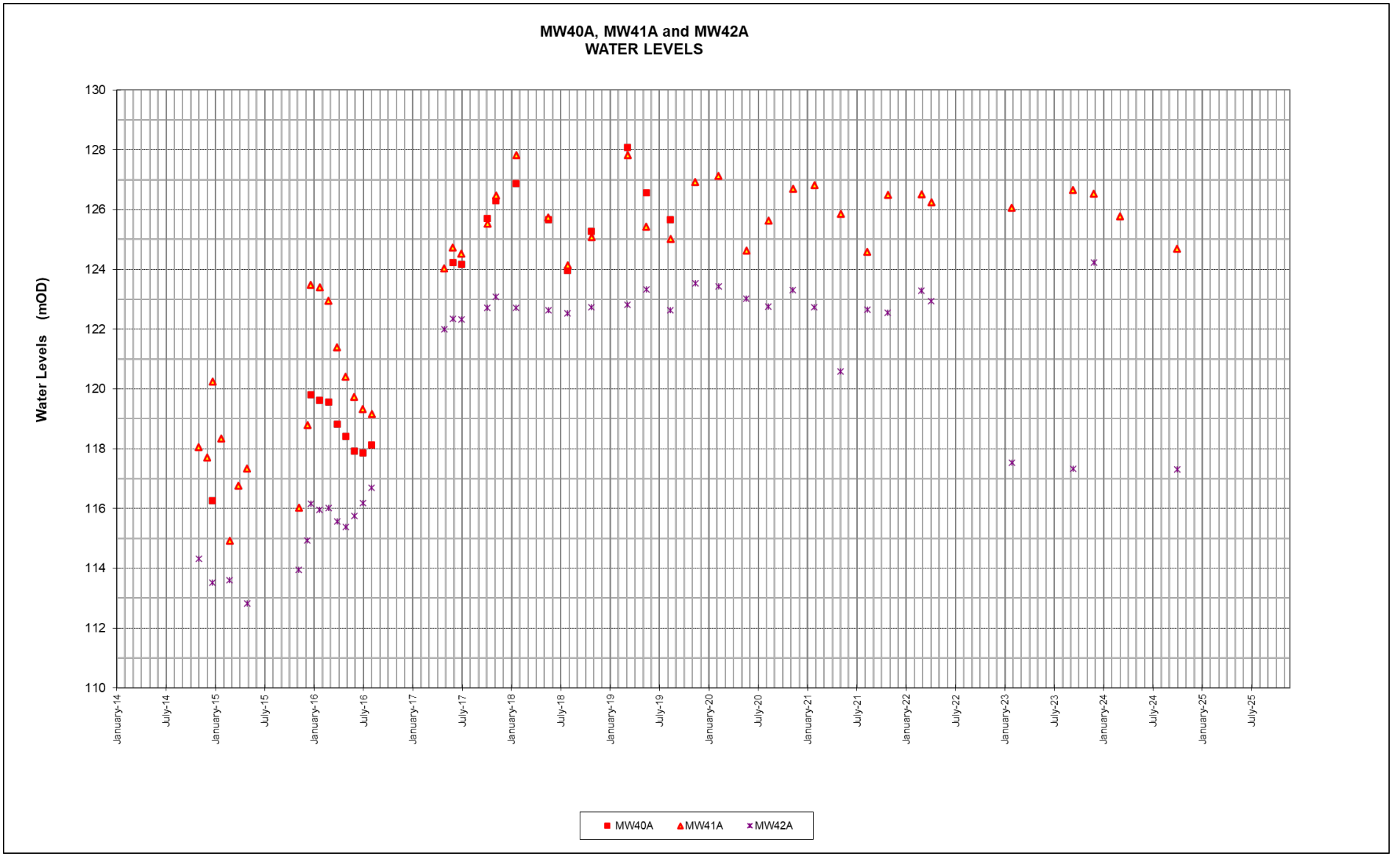
MW23, MW30 and MW33
WATER LEVELS




MW23, MW30 and MW33
WATER LEVELS
Water Levels (mOD)
128
127
126
125
124
123
122
121
120
119
118
117
116
115
114
113
112
111
110
109
108
107
106
105
104
103
102
101
100
January-12
January-13
January-14
January-15
January-16
January-17
January-18
January-19
January-20
January-21
January-22
January-23
January-24
January-25
Water Levels MW23
Water Levels MW30
Water Levels MW33

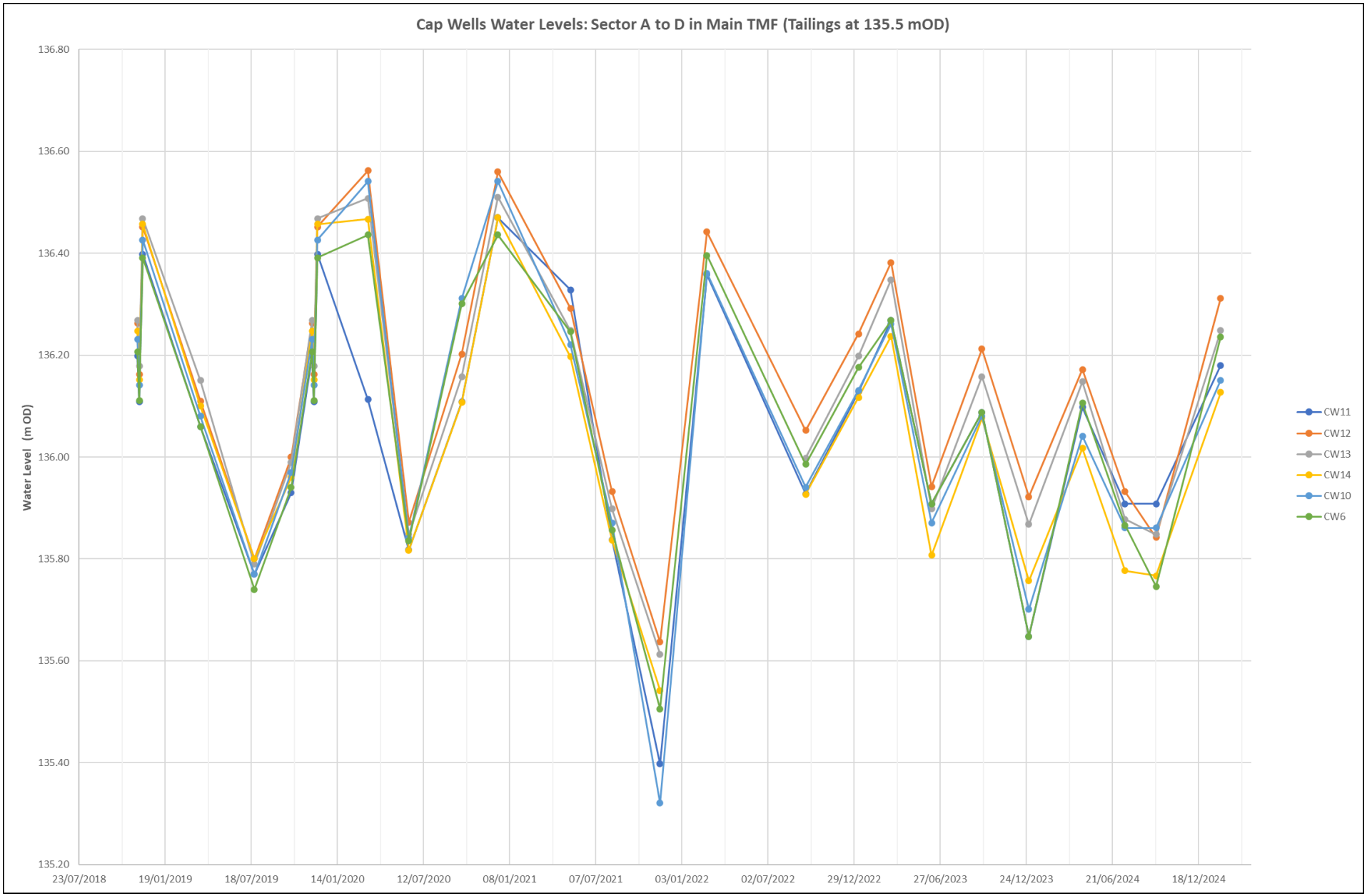

MW35 and MW37
WATER LEVELS
Water Levels (mAOD)
132
130
128
126
124
122
120
118
116
114
112
110
December-98
January-00
January-01
January-02
January-03
January-04
January-05
January-06
January-07
January-08
January-09
January-10
January-11
January-12
January-13
January-14
January-15
January-16
January-17
January-18
January-19
January-20
January-21
January-22
January-23
January-24
January-25
Water Levels MW35
Water Levels MW37

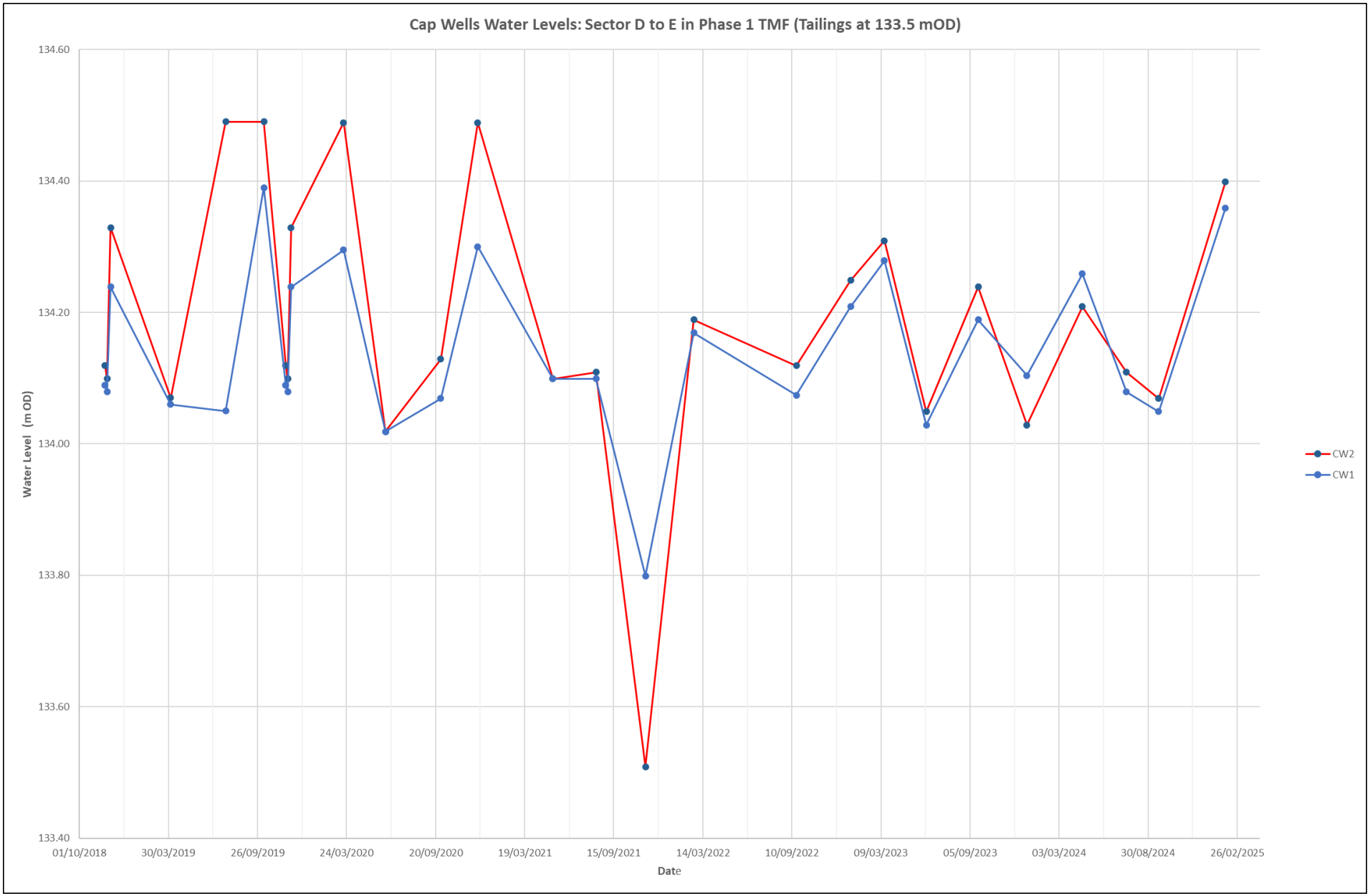

MW35 and MW37
Water Levels
Water Levels (mOD)
150
140
130
120
110
100
January-12
January-13
January-14
January-15
January-16
January-17
January-18
January-19
January-20
January-21
January-22
January-23
January-24
January-25
MW35
MW37

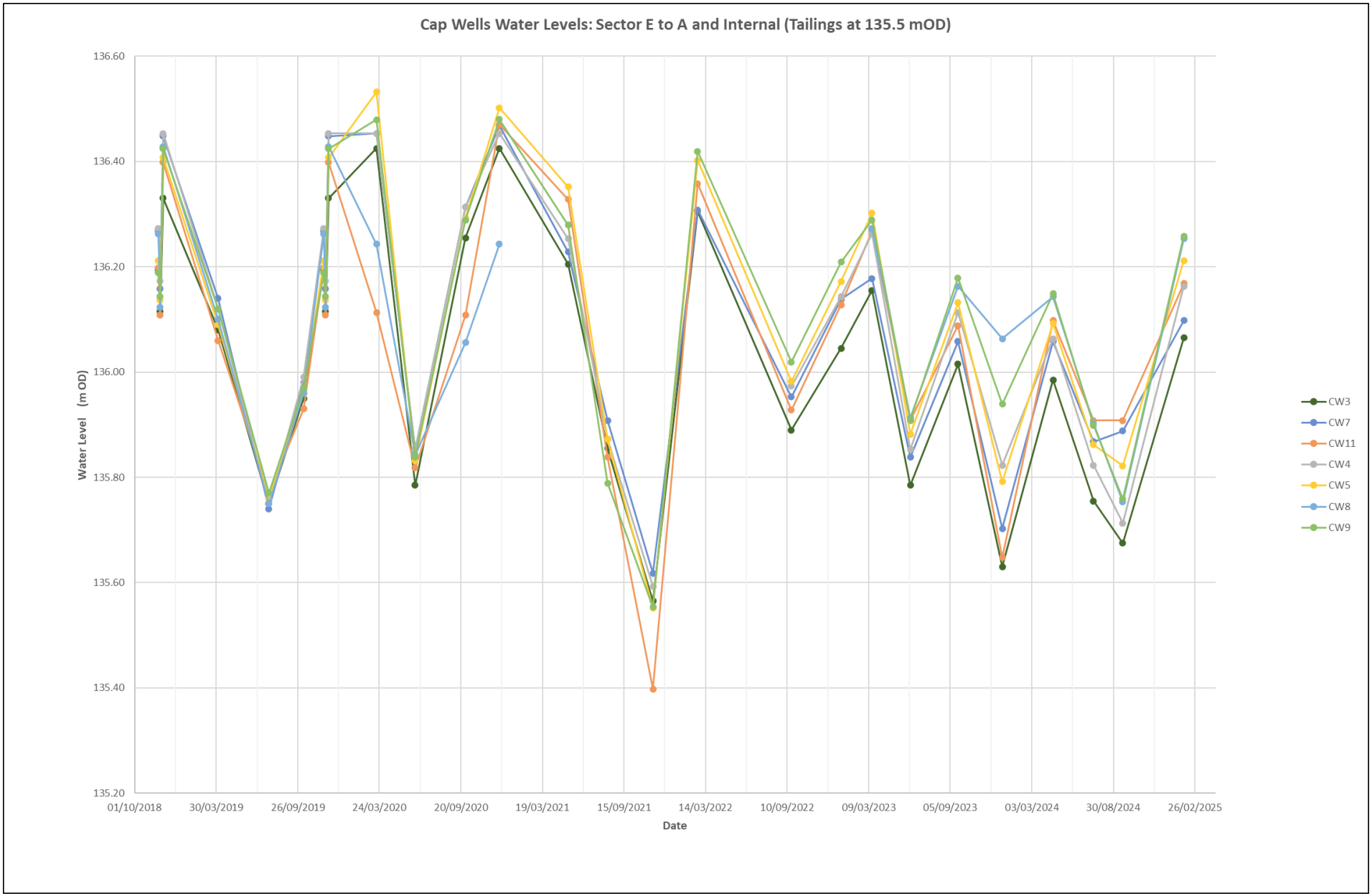

MW40A, MW41A and MW42A
WATER LEVELS
Water Levels (mOD)
130
128
126
124
122
120
118
116
114
112
110
January-14
July-14
January-15
July-15
January-16
July-16
January-17
July-17
January-18
July-18
January-19
July-19
January-20
July-20
January-21
July-21
January-22
July-22
January-23
July-23
January-24
July-24
January-25
July-25
MW40A
MW41A
MW42A

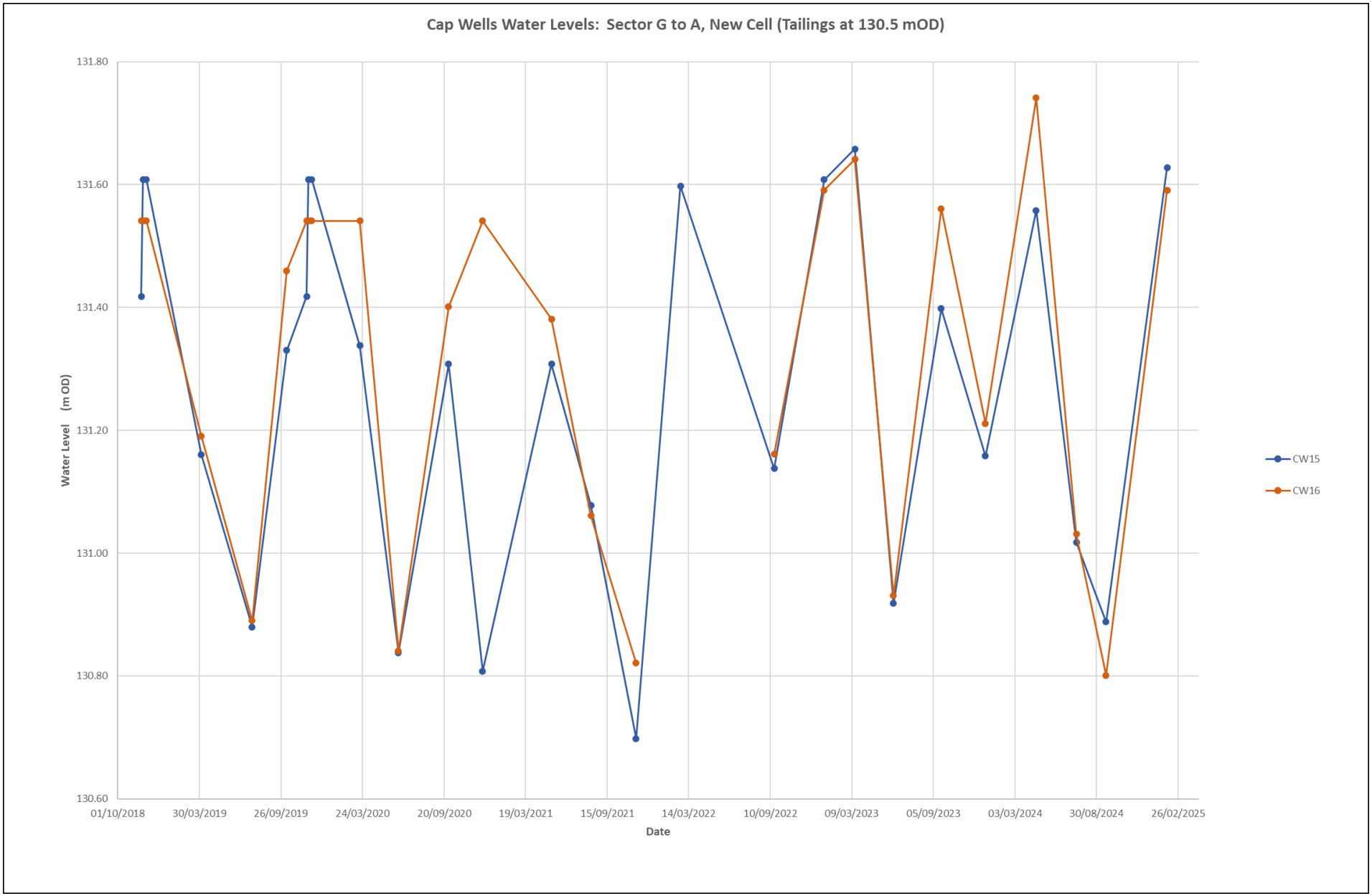
Appendix D

CAP WELL DATA 2024


Cap Wells Water Levels: Sector A to D in Main TMF (Tailings at 135.5 mOD)
Water Level (m OD)
136.80
136.60
136.40
136.20
136.00
135.80
135.60
135.40
135.20
23/07/2018
19/01/2019
18/07/2019
14/01/2020
12/07/2020
08/01/2021
07/07/2021
03/01/2022
02/07/2022
29/12/2022
27/06/2023
24/12/2023
21/06/2024
18/12/2024
CW11
CW12
CW13
CW14
CW10
CW6

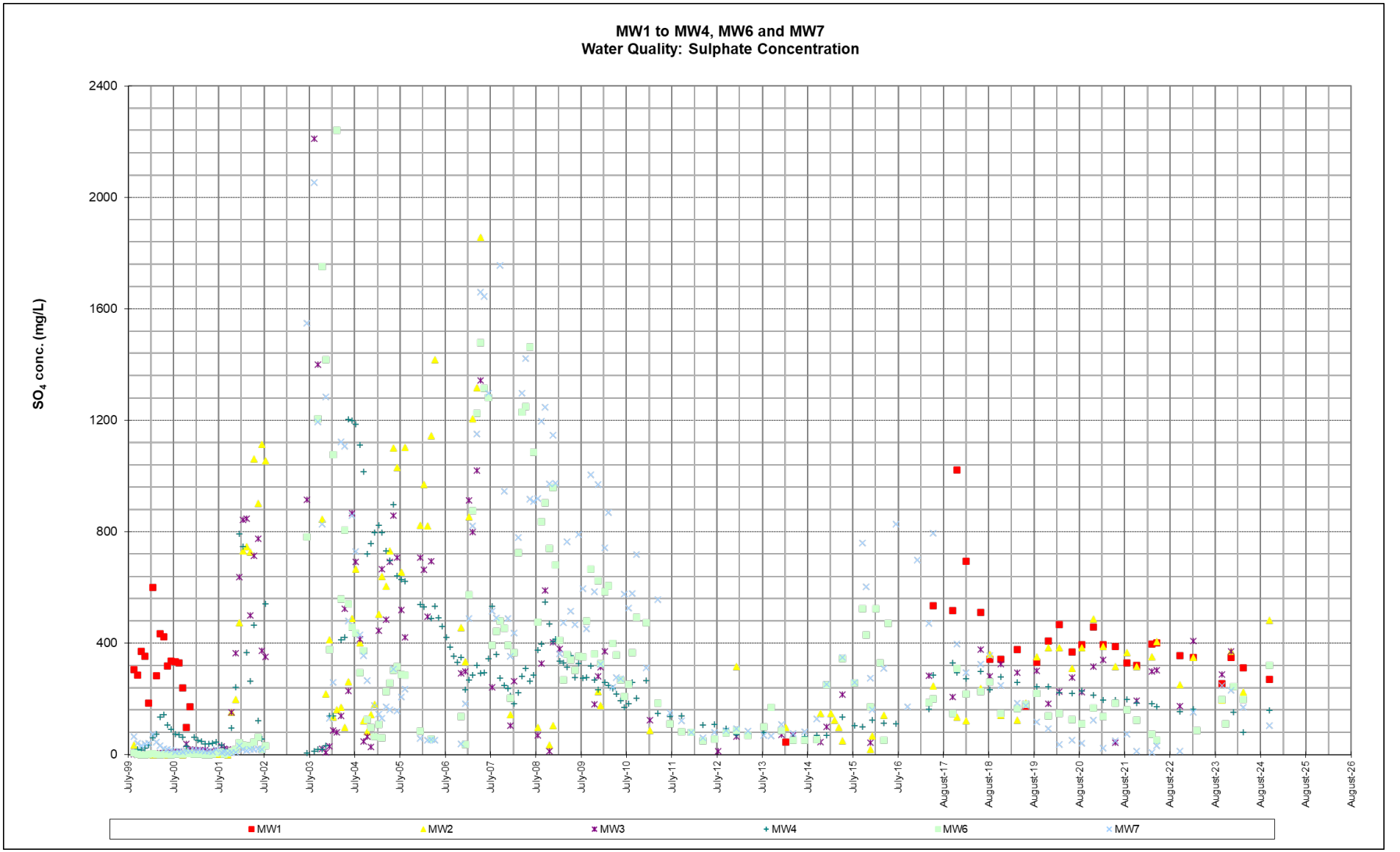

Cap Wells Water Levels: Sector D to E in Phase 1 TMF (Tailings at 133.5 mOD)
134.60
134.40
134.20
134.00
133.80
133.60
133.40
Water Level (m OD)
01/10/2018
30/03/2019
26/09/2019
24/03/2020
20/09/2020
19/03/2021
15/09/2021
14/03/2022
10/09/2022
09/03/2023
05/09/2023
03/03/2024
30/08/2024
26/02/2025
Date
CW2
CW1


Cap Wells Water Levels: Sector E to A and Internal (Tailings at 135.5 mOD)
136.60
136.40
136.20
136.00
135.80
135.60
135.40
135.20
Water Level (m OD)
01/10/2018
30/03/2019
26/09/2019
24/03/2020
20/09/2020
19/03/2021
15/09/2021
14/03/2022
10/09/2022
09/03/2023
05/09/2023
03/03/2024
30/08/2024
26/02/2025
Date
CW3
CW7
CW11
CW4
CW5
CW8
CW9

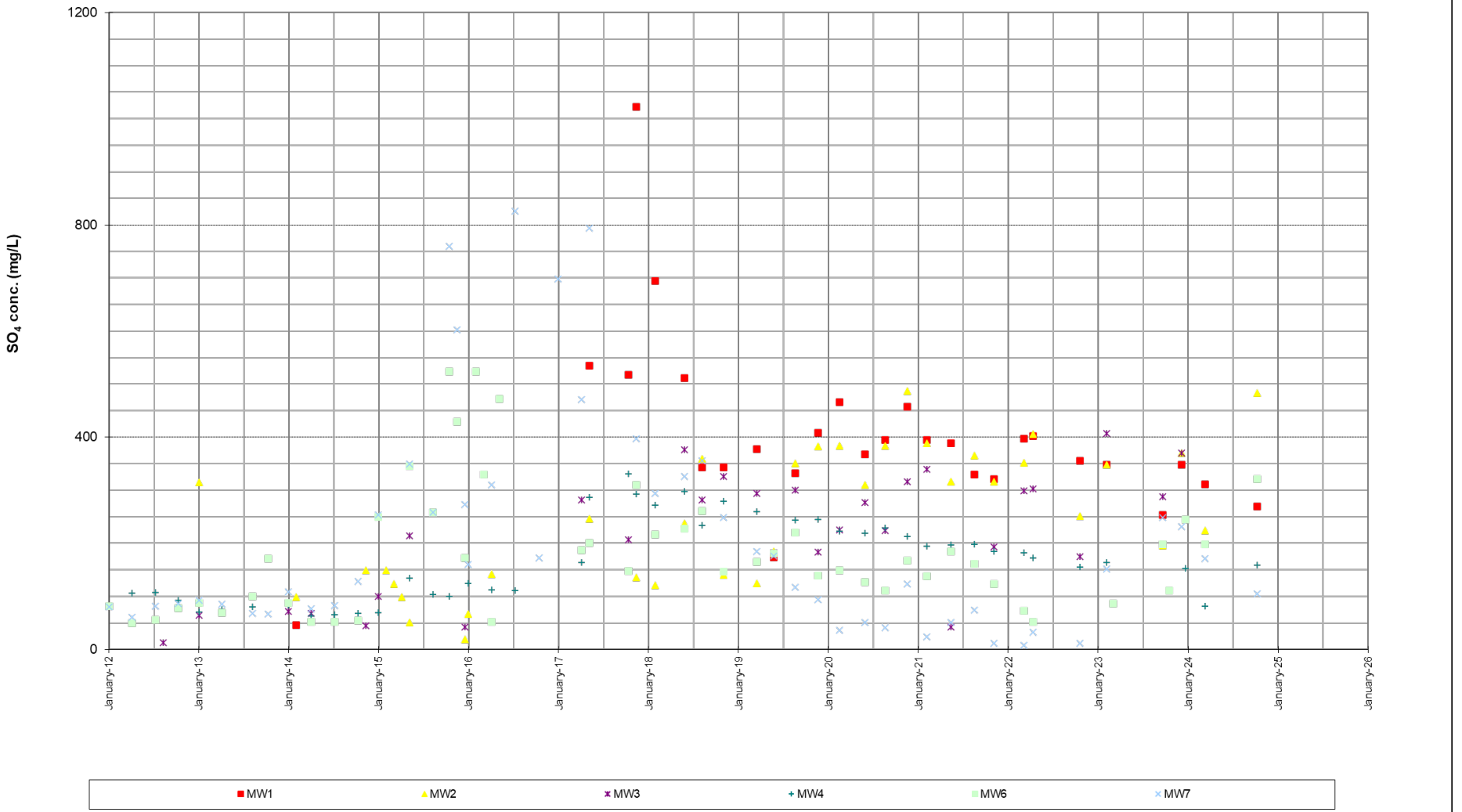

Cap Wells Water Levels: Sector G to A, New Cell (Tailings at 130.5 mOD)
131.80
131.60
131.40
131.20
131.00
130.80
130.60
Water Level (m OD)
01/10/2018
30/03/2019
26/09/2019
24/03/2020
20/09/2020
19/03/2021
15/09/2021
14/03/2022
10/09/2022
09/03/2023
05/09/2023
03/03/2024
30/08/2024
26/02/2025
Date
CW15
CW16

Appendix E

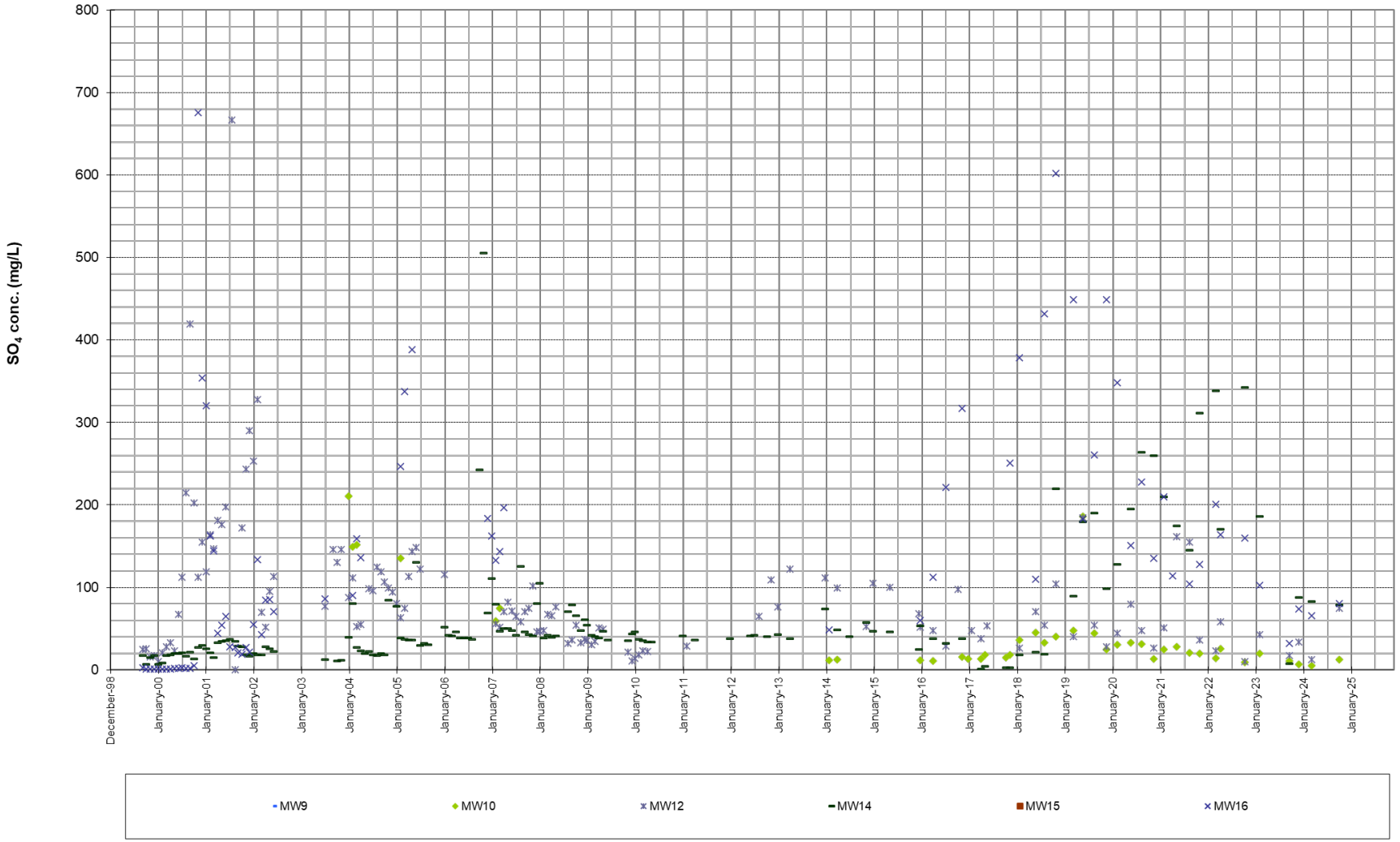
WATER QUALITY DATA 2024

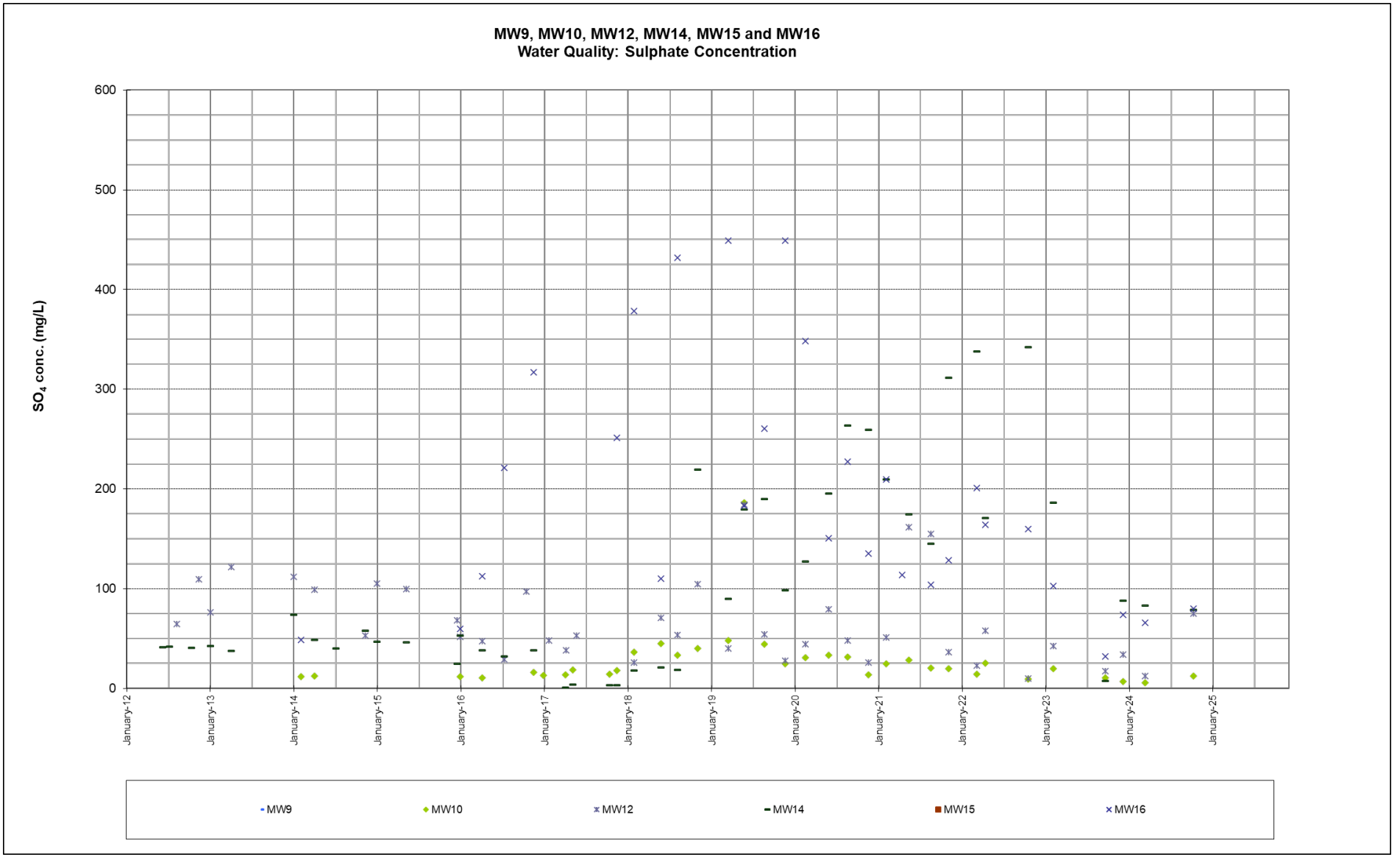

MW1 to MW4, MW6 and MW7
Water Quality: Sulphate Concentration
SO4 conc. (mg/L)
2400
2000
1600
1200
800
400
0
July-99
July-00
July-01
July-02
July-03
July-04
July-05
July-06
July-07
July-08
July-09
July-10
July-11
July-12
July-13
July-14
July-15
July-16
August-17
August-18
August-19
August-20
August-21
August-22
August-23
August-24
August-25
August-26
MW1
MW2
MW3
MW4
MW6
MW7

MW1 to MW4, MW6 and MW7
Water Quality: Sulphate Concentration

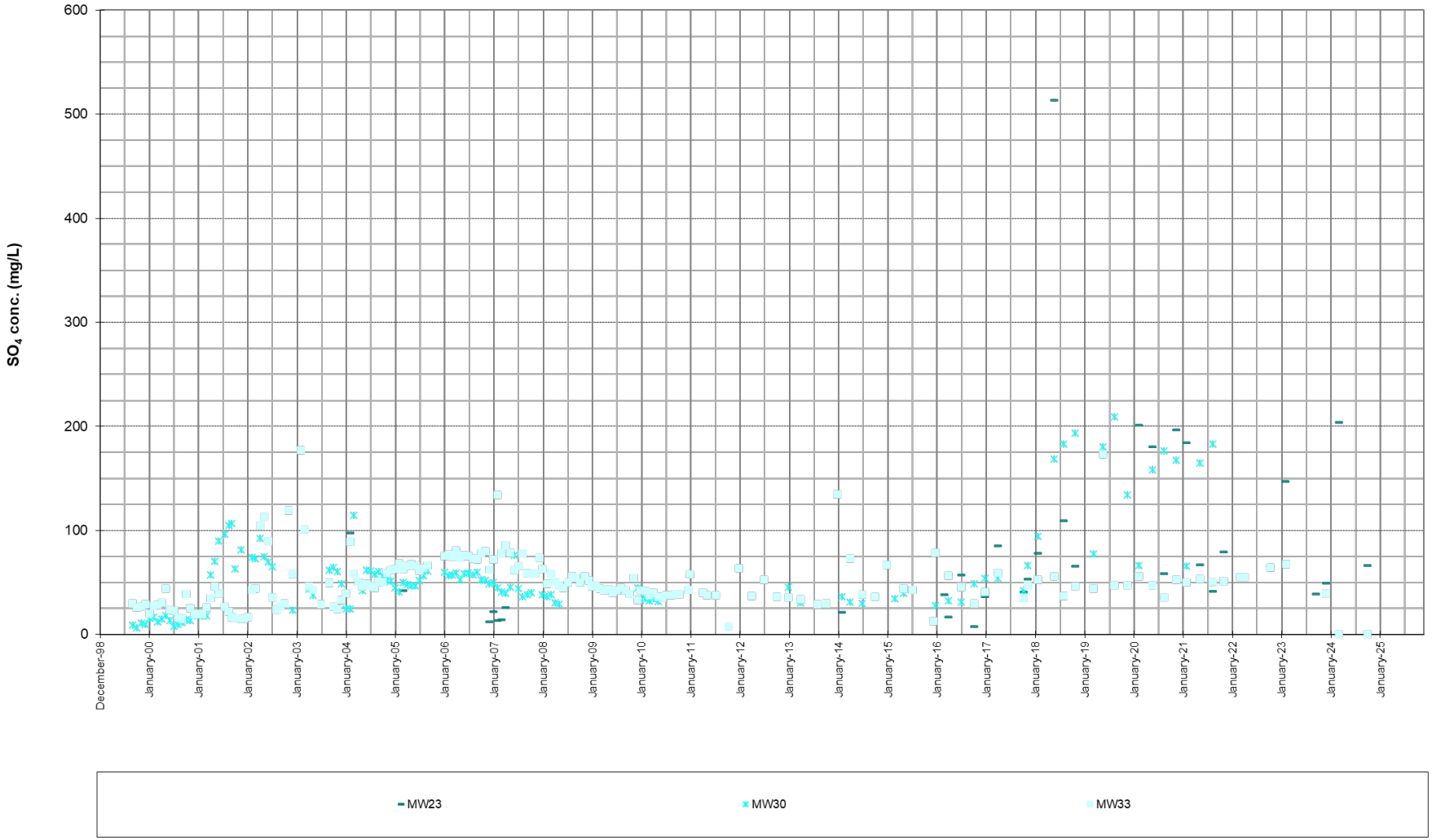


MW9, MW10, MW12, MW14, MW15 and MW16
Water Quality: Sulphate Concentration

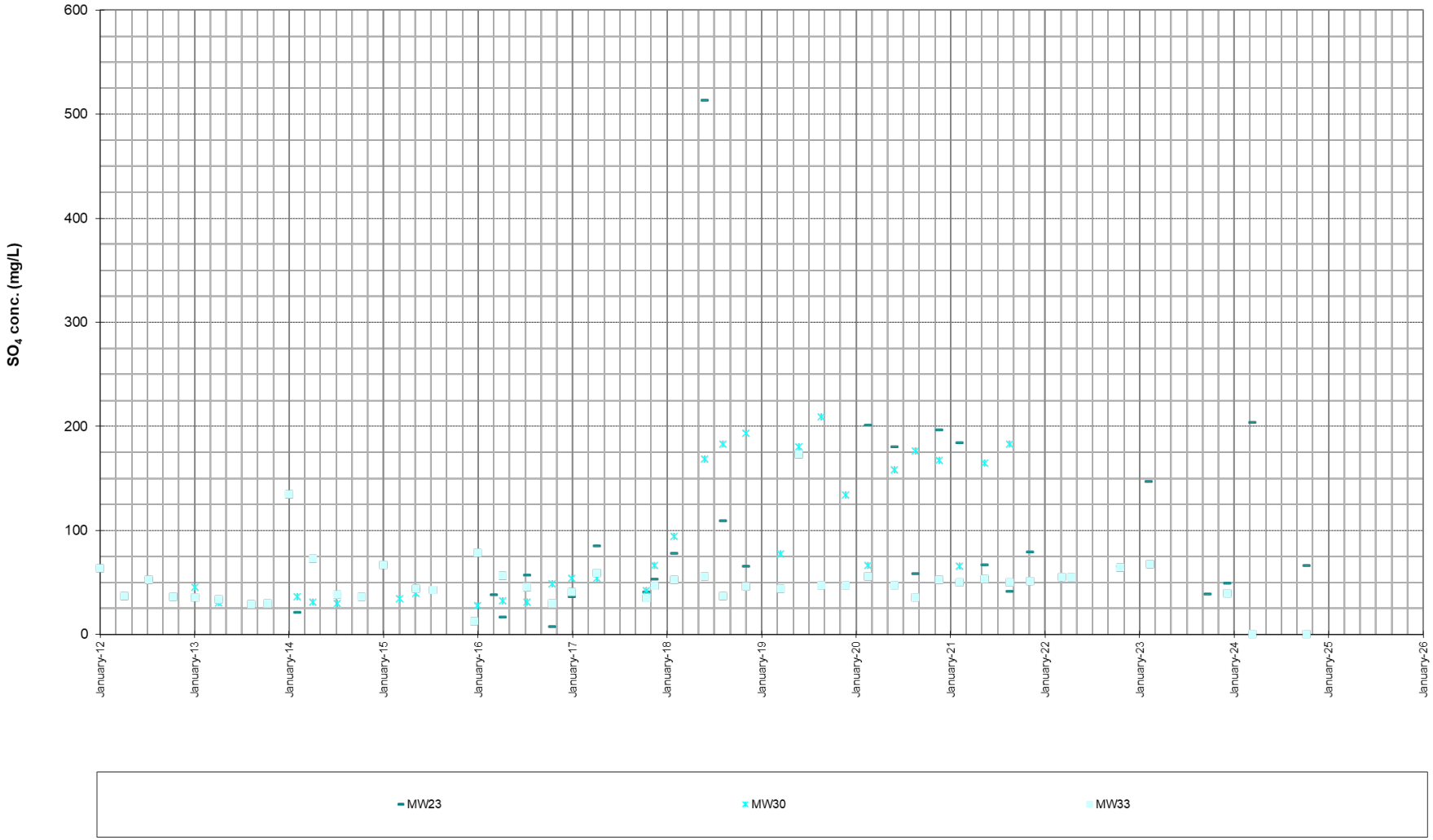



MW9, MW10, MW12, MW14, MW15 and MW16
Water Quality: Sulphate Concentration
SO4 conc. (mg/L)
600
500
400
300
200
100
0
January-12
January-13
January-14
January-15
January-16
January-17
January-18
January-19
January-20
January-21
January-22
January-23
January-24
January-25
MW9
MW10
MW12
MW14
MW15
MW16

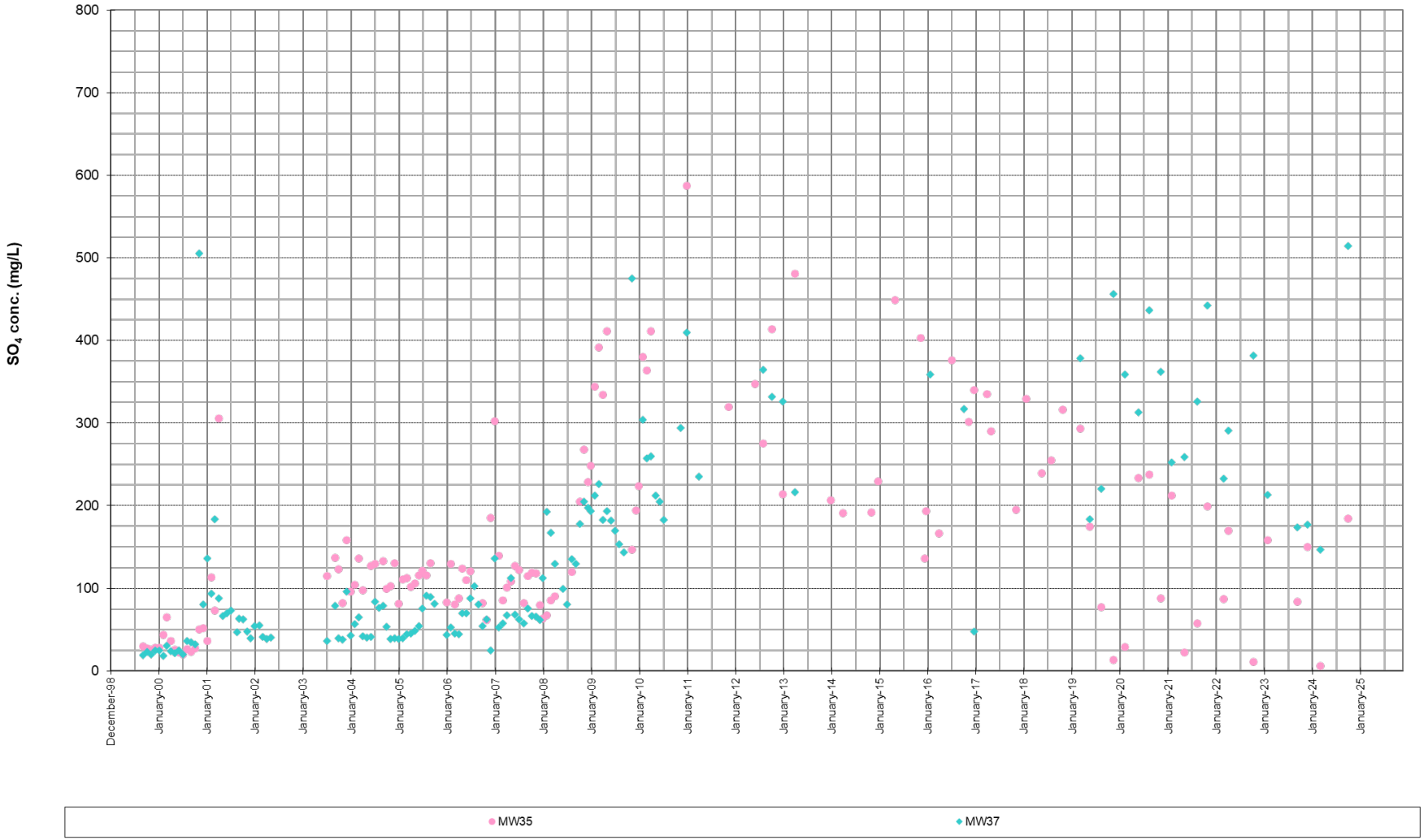
MW23, MW30 and MW33
Water Quality: Sulphate Concentration



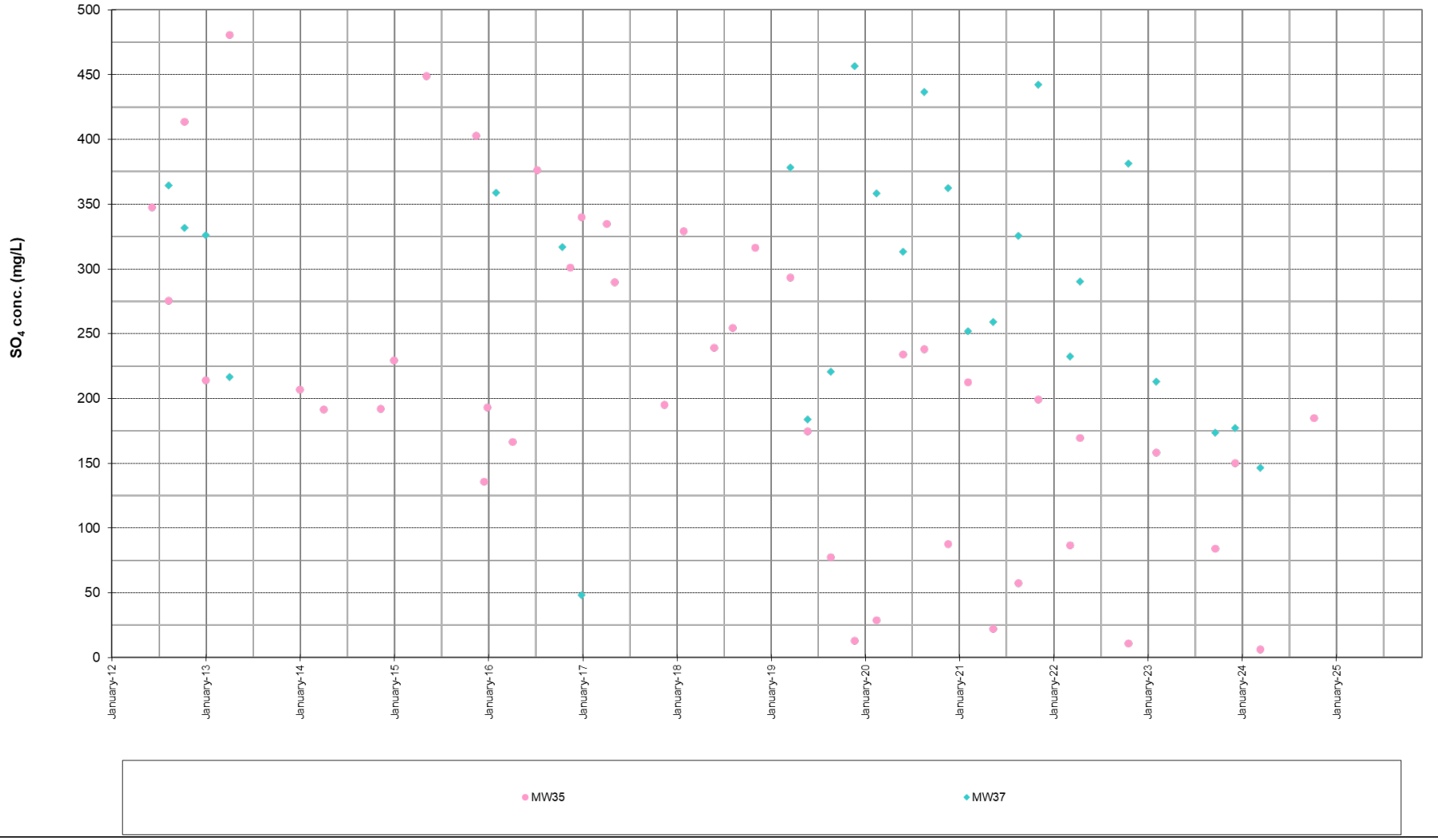
MW23, MW30 and MW33
Water Quality: Sulphate Concentration



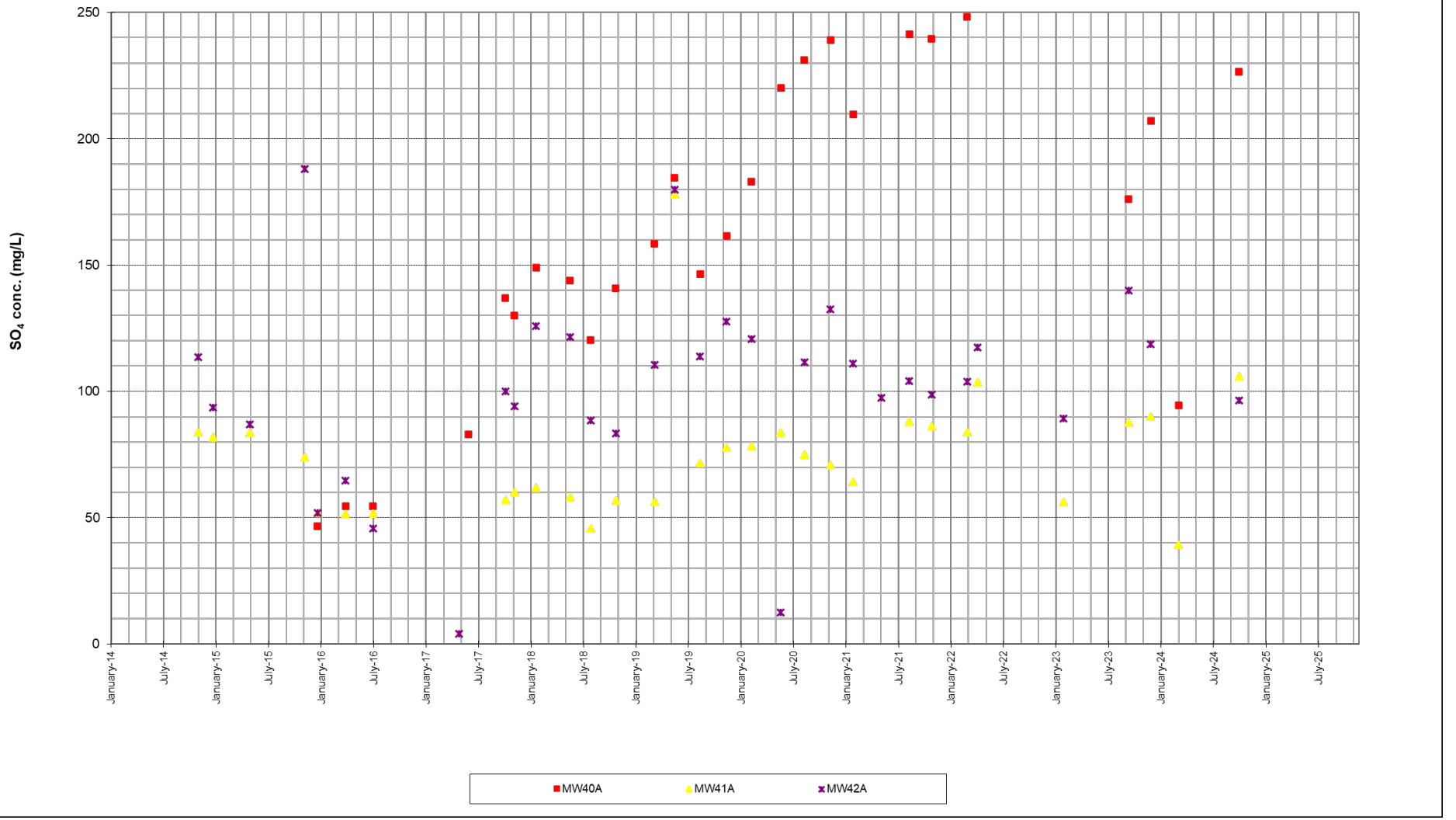
MW35 and MW37
Water Quality: Sulphate Concentration

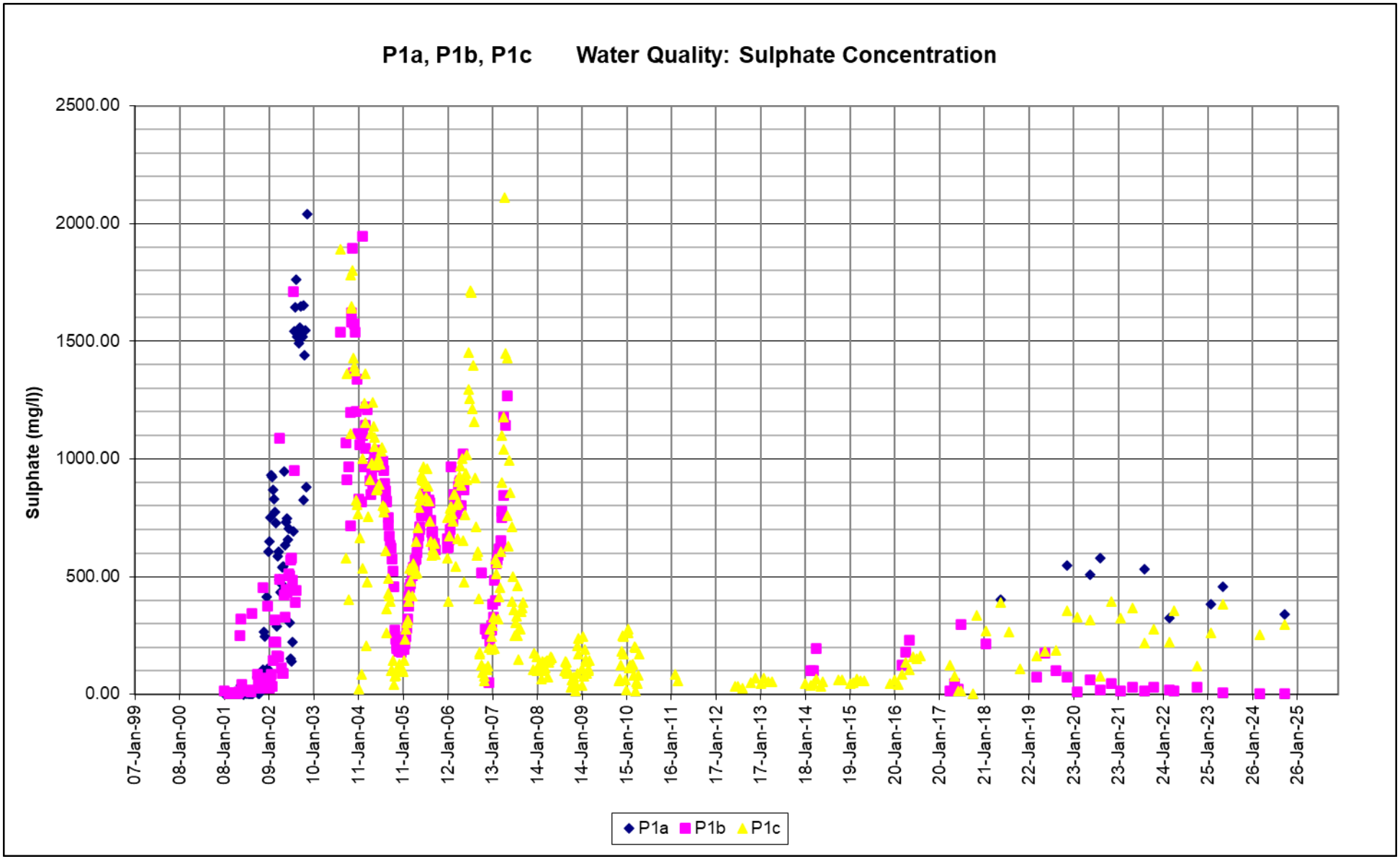


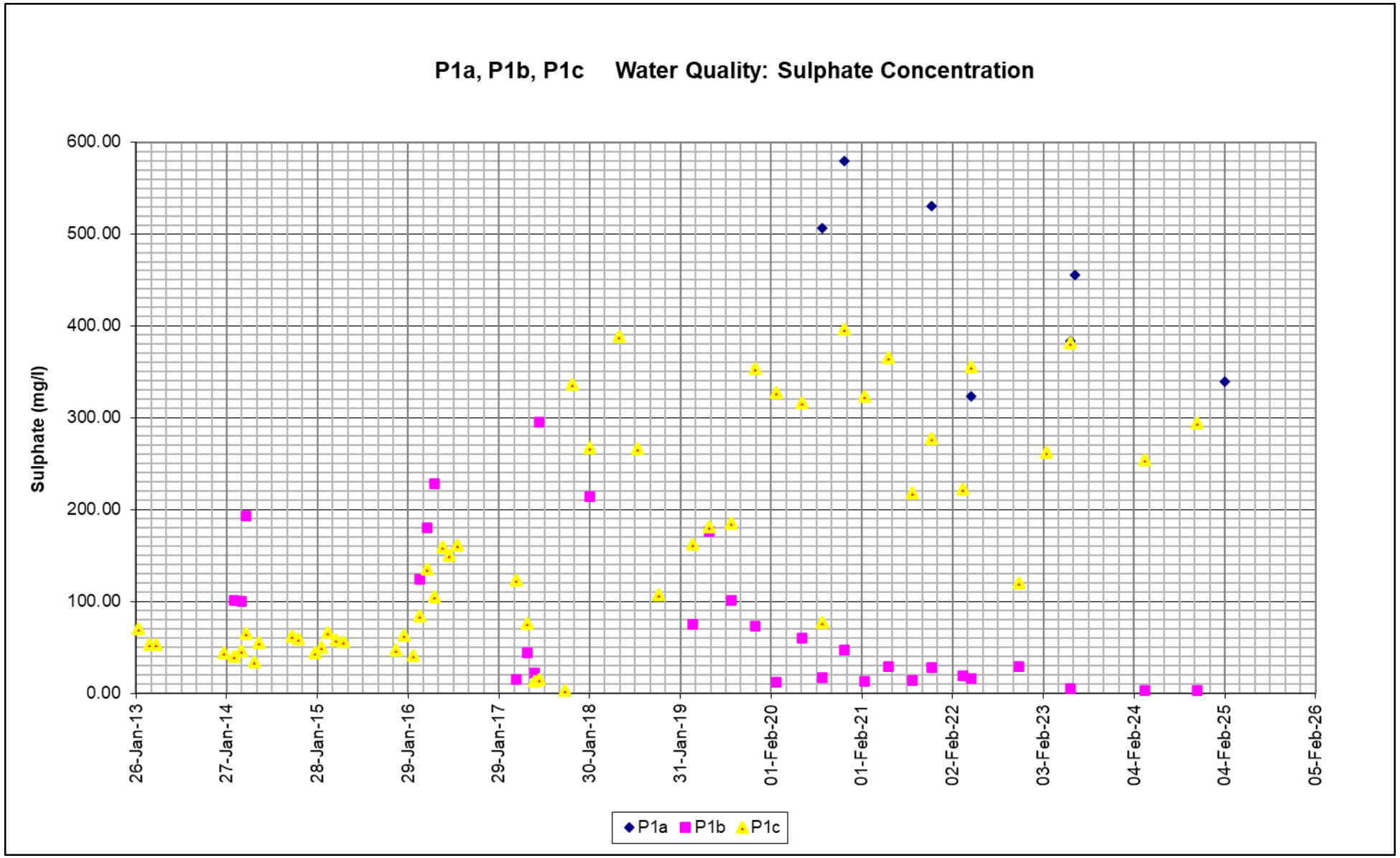
MW35 and MW37
Water Quality: Sulphate Concentration

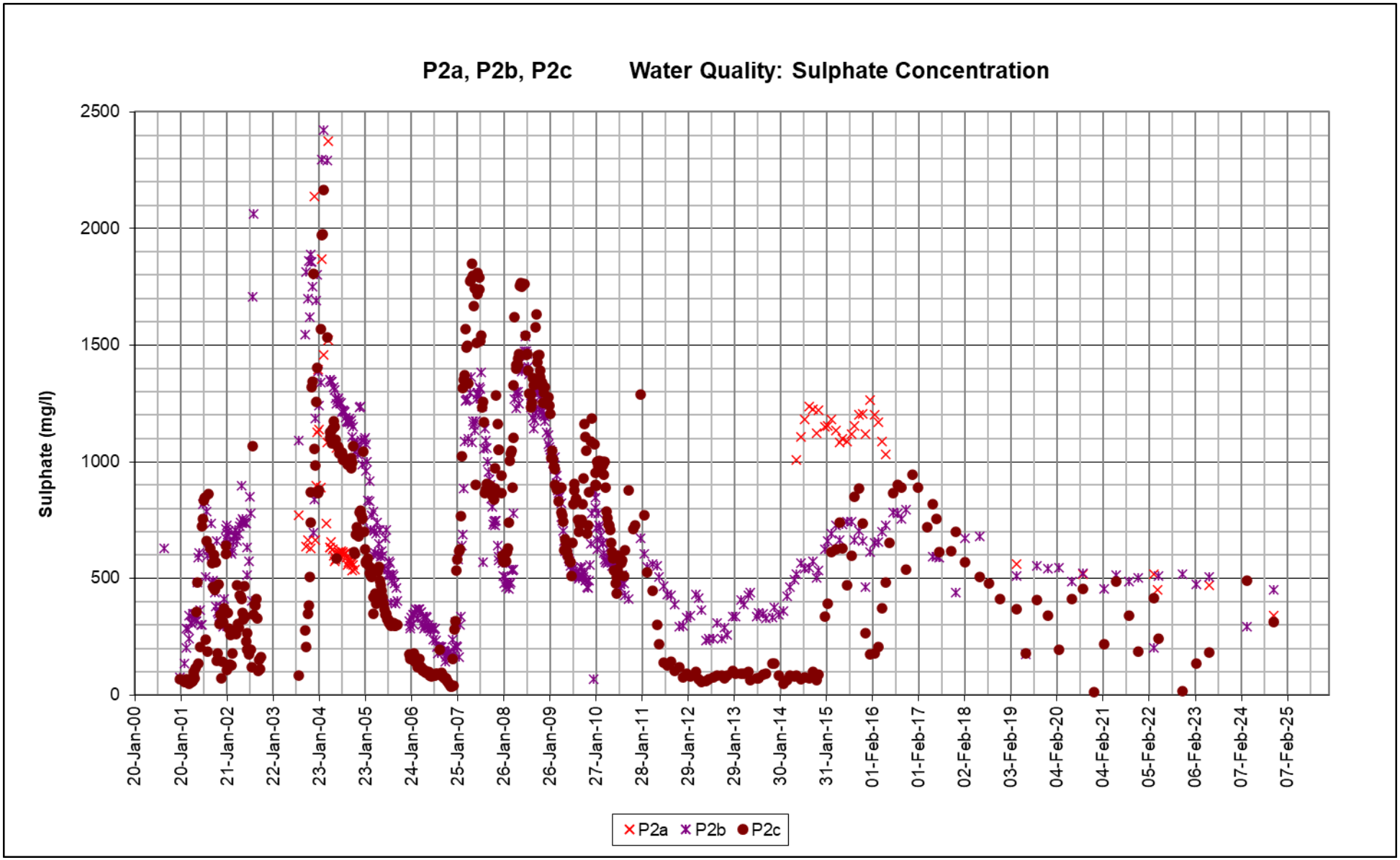


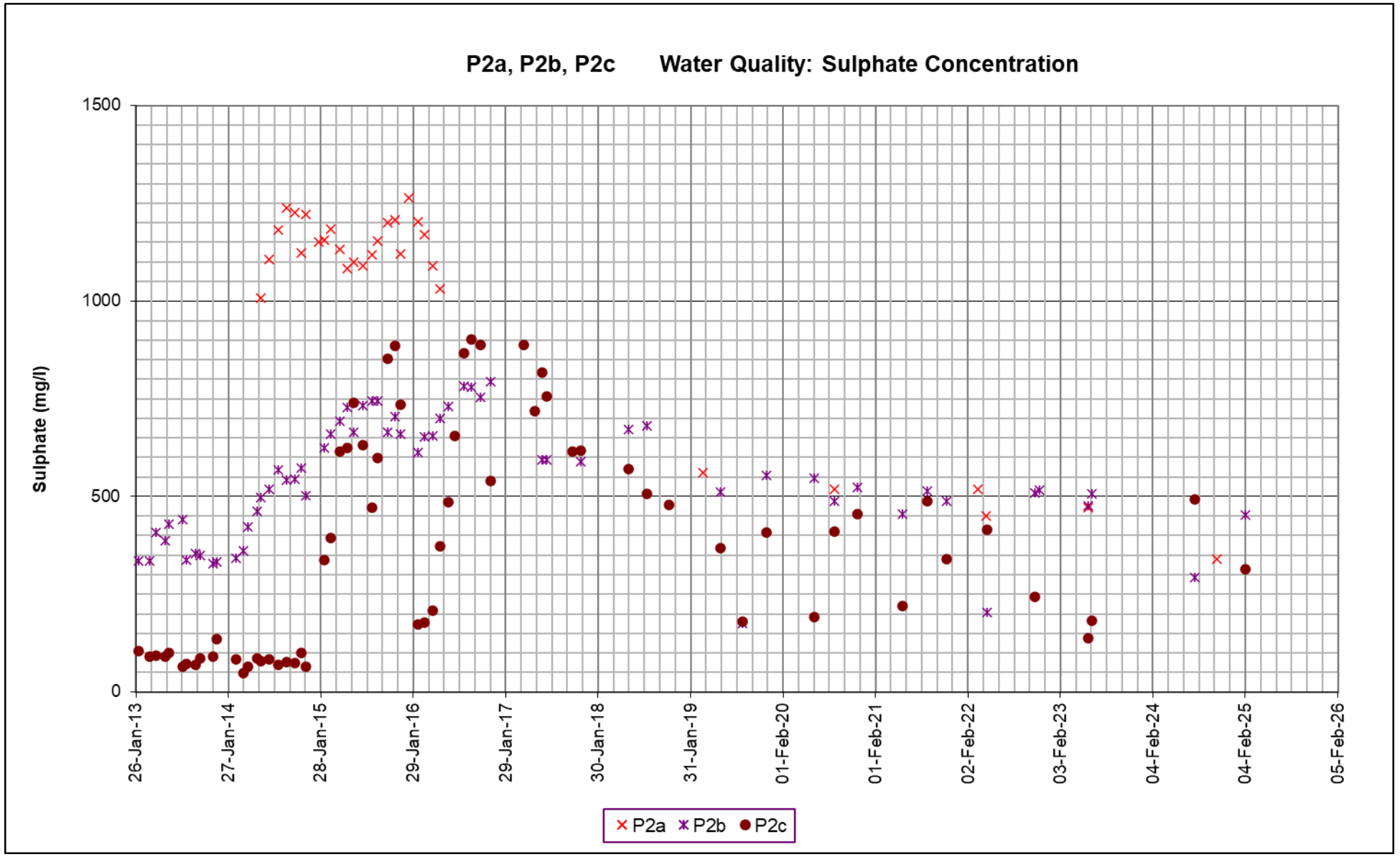
MW40A, MW41A and MW42A
Water Quality: Sulphate Concentration

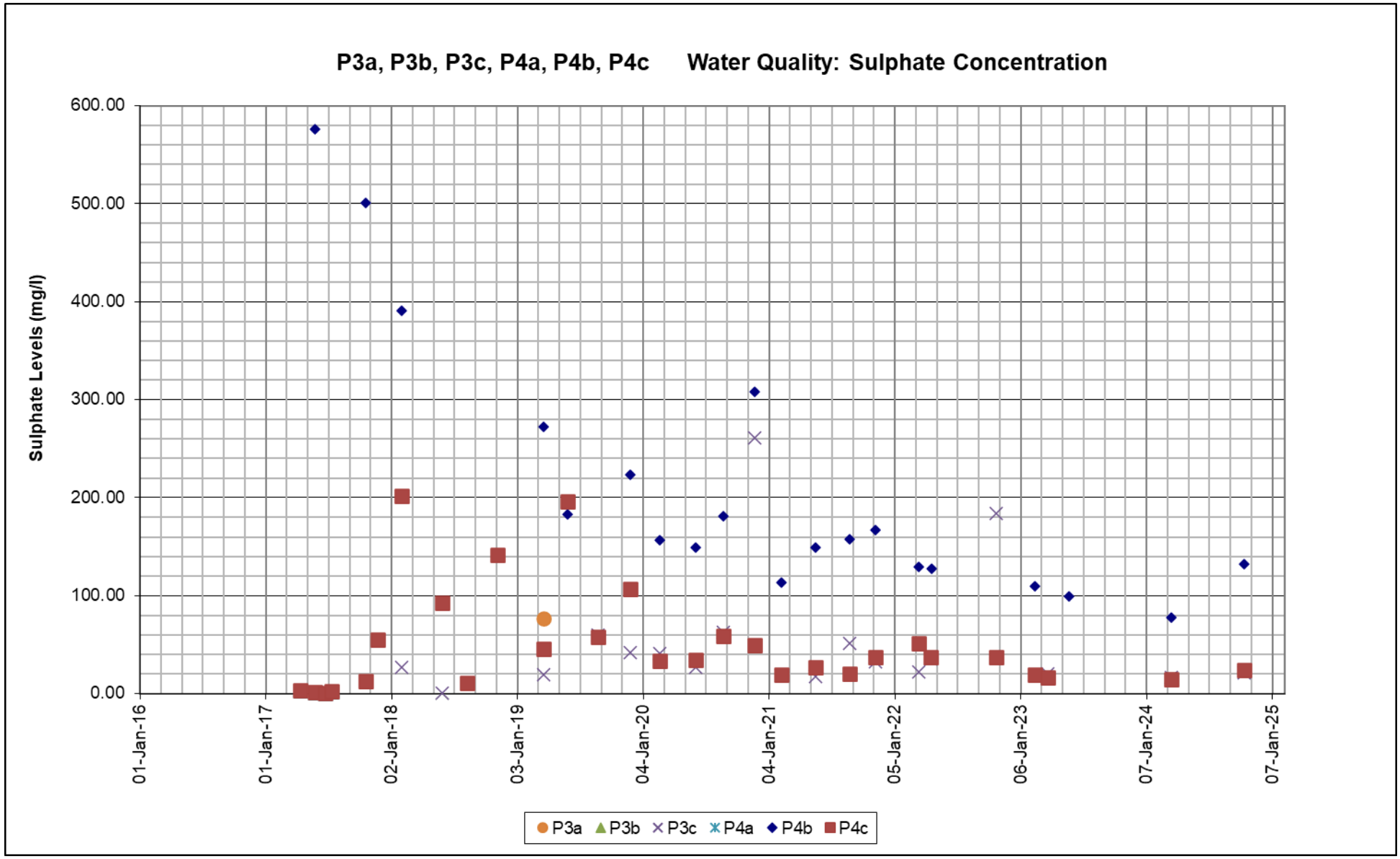


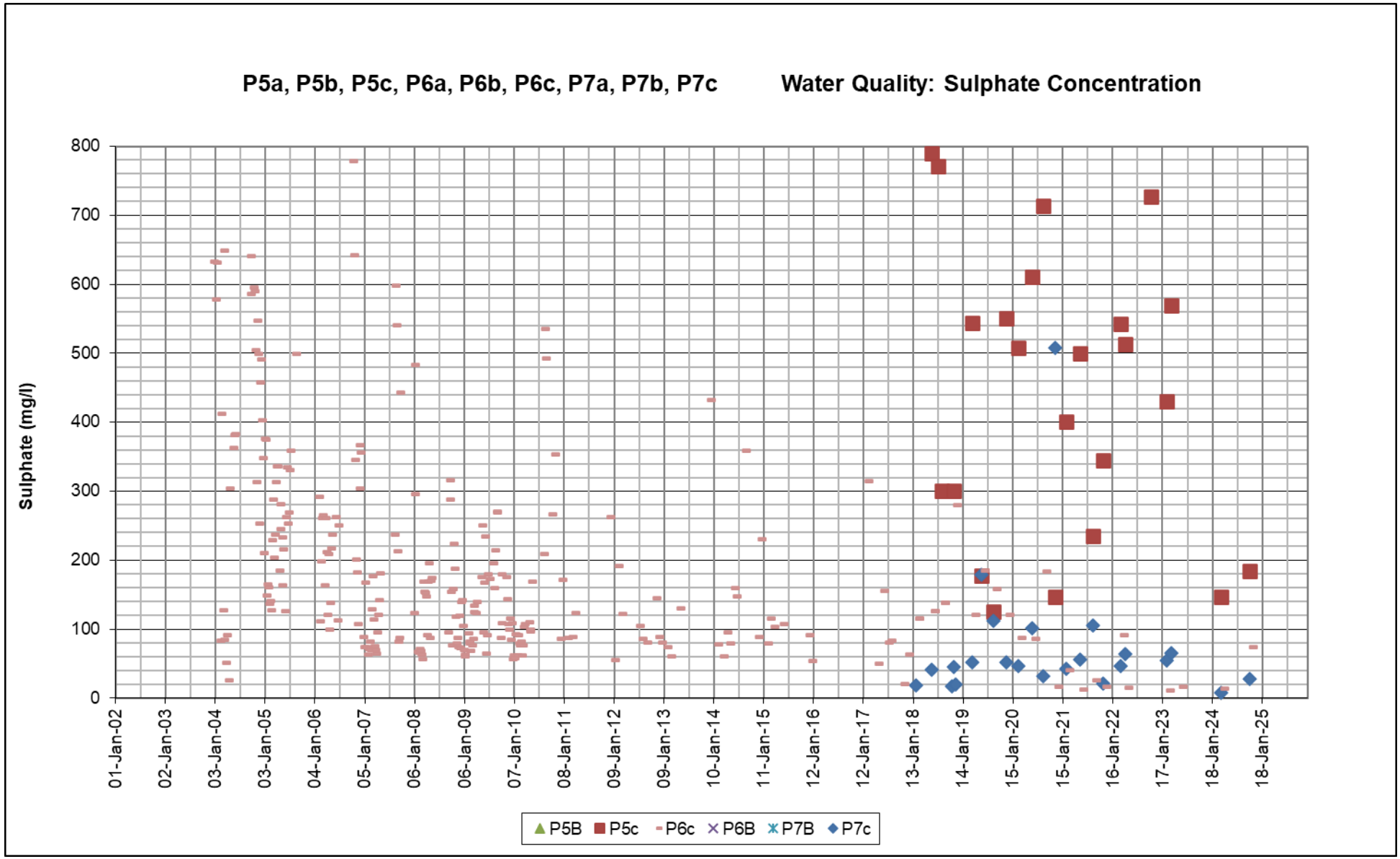

P1a, P1b, P1c Water Quality: Sulphate Concentration
Sulphate (mg/l))
2500.00
2000.00
1500.00
1000.00
500.00
0.00
07-Jan-99
08-Jan-00
08-Jan-01
09-Jan-02
10-Jan-03
11-Jan-04
11-Jan-05
12-Jan-06
13-Jan-07
14-Jan-08
14-Jan-09
15-Jan-10
16-Jan-11
17-Jan-12
17-Jan-13
18-Jan-14
19-Jan-15
20-Jan-16
20-Jan-17
21-Jan-18
22-Jan-19
23-Jan-20
23-Jan-21
24-Jan-22
25-Jan-23
26-Jan-24
26-Jan-25
P1a
P1b
P1c

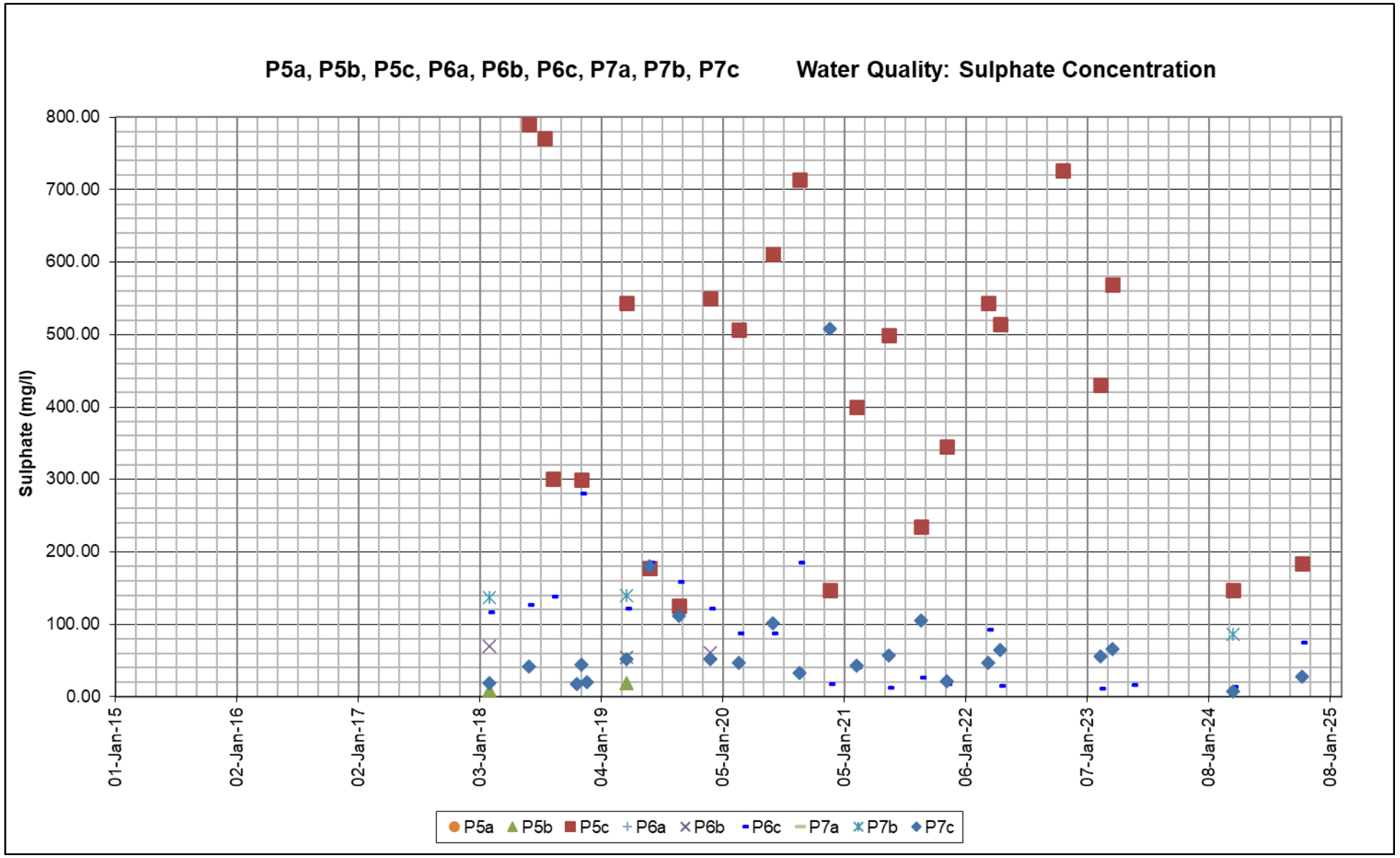

P1a, P1b, P1c Water Quality: Sulphate Concentration
Sulphate (mg/l)
600.00
500.00
400.00
300.00
200.00
100.00
0.00
26-Jan-13
27-Jan-14
28-Jan-15
29-Jan-16
29-Jan-17
30-Jan-18
31-Jan-19
01-Feb-20
01-Feb-21
02-Feb-22
03-Feb-23
04-Feb-24
04-Feb-25
05-Feb-26
P1a
P1b
P1c

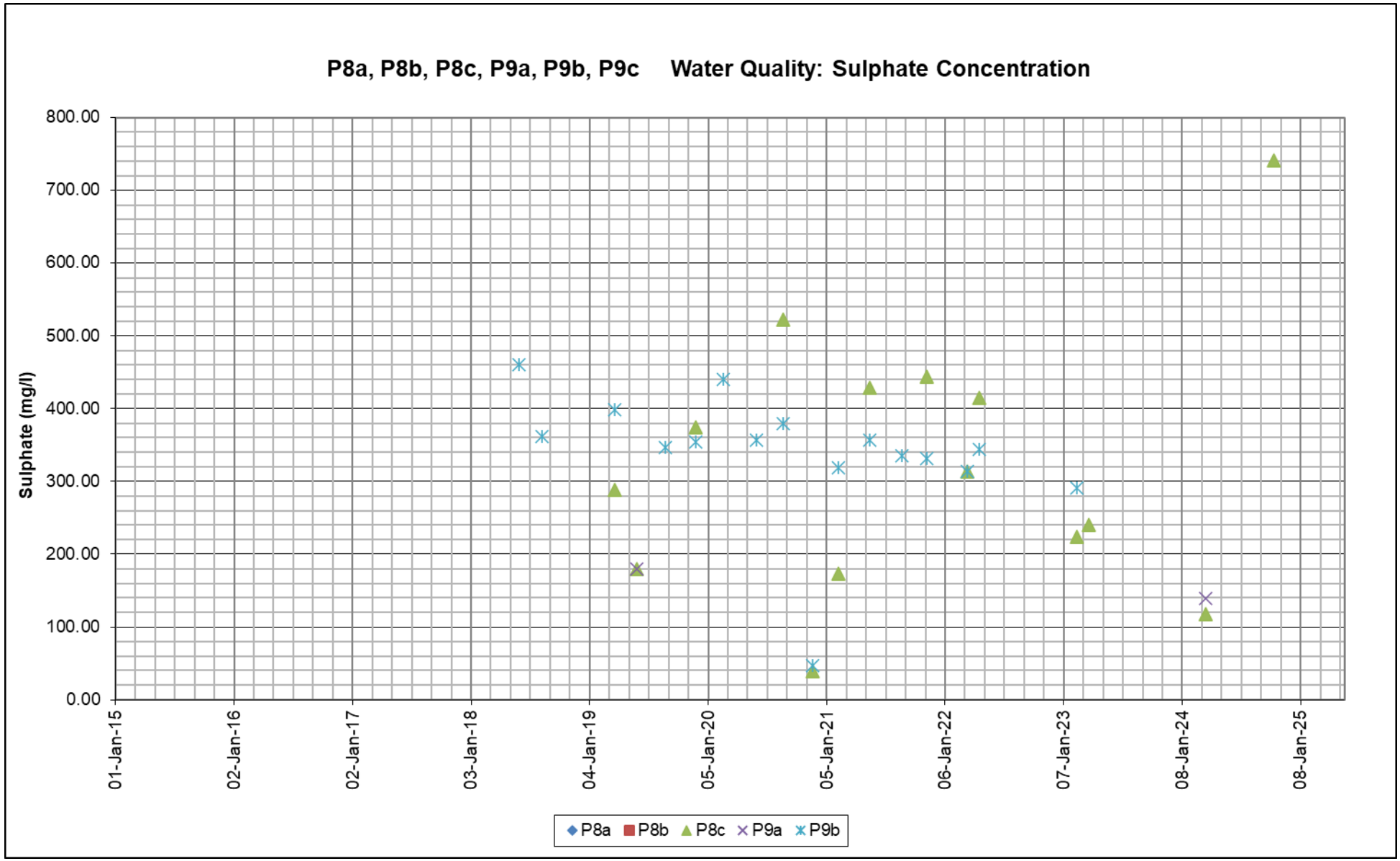

P2a, P2b, P2c Water Quality: Sulphate Concentration
Sulphate (mg/l)
2500
2000
1500
1000
500
0
20-Jan-00
20-Jan-01
21-Jan-02
22-Jan-03
23-Jan-04
23-Jan-05
24-Jan-06
25-Jan-07
26-Jan-08
26-Jan-09
27-Jan-10
28-Jan-11
29-Jan-12
29-Jan-13
30-Jan-14
31-Jan-15
01-Feb-16
01-Feb-17
02-Feb-18
03-Feb-19
04-Feb-20
04-Feb-21
05-Feb-22
06-Feb-23
07-Feb-24
07-Feb-25
P2a
P2b
P2c

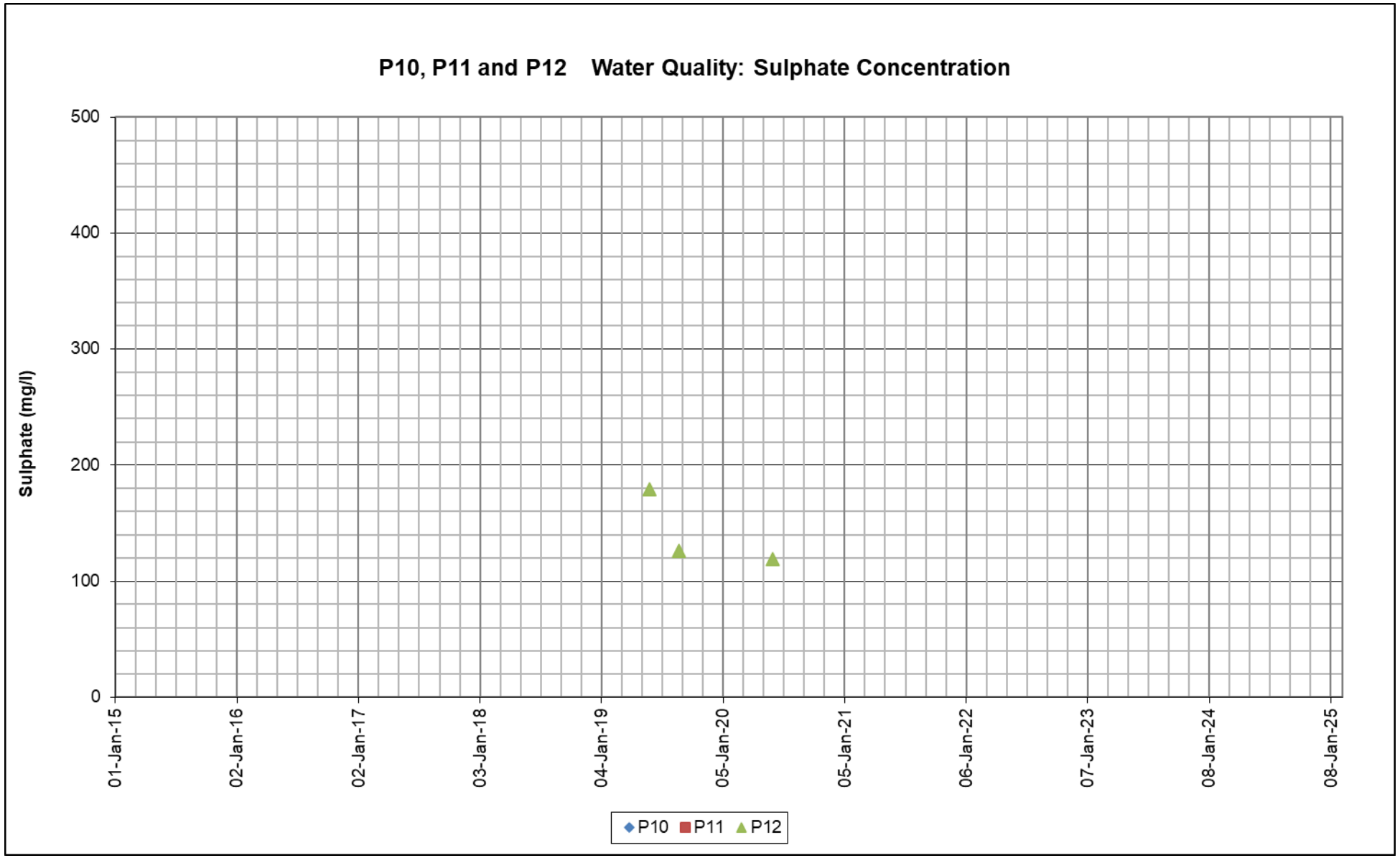

P2a, P2b, P2c Water Quality: Sulphate Concentration
Sulphate (mg/l)
1500
1000
500
0
26-Jan-13
27-Jan-14
28-Jan-15
29-Jan-16
29-Jan-17
30-Jan-18
31-Jan-19
01-Feb-20
01-Feb-21
02-Feb-22
03-Feb-23
04-Feb-24
04-Feb-25
05-Feb-26
P2a
P2b
P2c


P3a, P3b, P3c, P4a, P4b, P4c Water Quality: Sulphate Concentration
Sulphate Levels (mg/l)
600.00
500.00
400.00
300.00
200.00
100.00
0.00
01-Jan-16
01-Jan-17
02-Jan-18
03-Jan-19
04-Jan-20
04-Jan-21
05-Jan-22
06-Jan-23
07-Jan-24
07-Jan-25
P3a
P3b
P3c
P4a
P4b
P4c


P5a, P5b, P5c, P6a, P6b, P6c, P7a, P7b, P7c
Water Quality: Sulphate Concentration
Sulphate (mg/l)
800
700
600
500
400
300
200
100
0
01-Jan-02
02-Jan-03
03-Jan-04
03-Jan-05
04-Jan-06
05-Jan-07
06-Jan-08
06-Jan-09
07-Jan-10
08-Jan-11
09-Jan-12
09-Jan-13
10-Jan-14
11-Jan-15
12-Jan-16
12-Jan-17
13-Jan-18
14-Jan-19
15-Jan-20
15-Jan-21
16-Jan-22
17-Jan-23
18-Jan-24
18-Jan-25
P5B
P5c
P6c
P6B
P7B
P7c


P5a, P5b, P5c, P6a, P6b, P6c, P7a, P7b, P7c
Water Quality: Sulphate Concentration
Sulphate (mg/l)
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
01-Jan-15
02-Jan-16
02-Jan-17
03-Jan-18
04-Jan-19
05-Jan-20
05-Jan-21
06-Jan-22
07-Jan-23
08-Jan-24
08-Jan-25
P5a
P5b
P5c
P6a
P6b
P6c
P7a
P7b
P7c

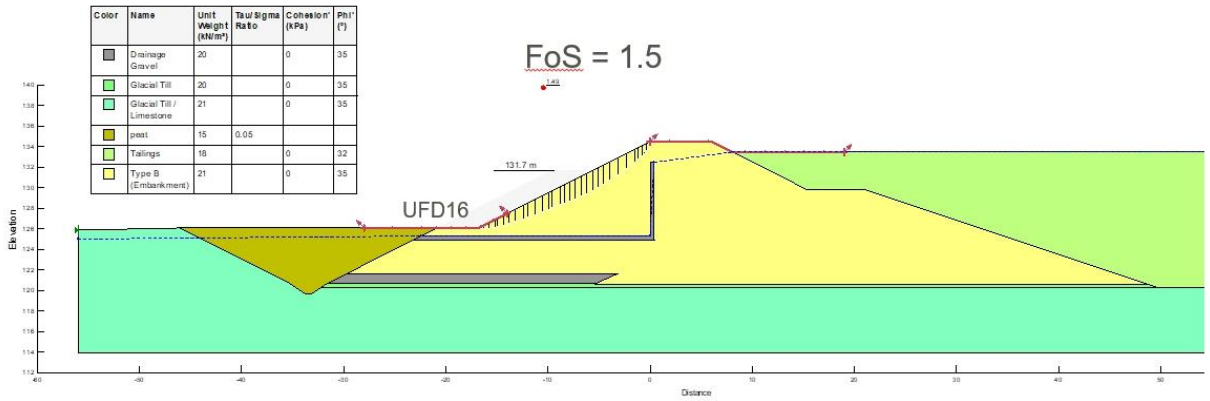

P8a, P8b, P8c, P9a, P9b, P9c Water Quality: Sulphate Concentration
Sulphate (mg/l)
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
01-Jan-15
02-Jan-16
02-Jan-17
03-Jan-18
04-Jan-19
05-Jan-20
05-Jan-21
06-Jan-22
07-Jan-23
08-Jan-24
08-Jan-25
P8a
P8b
P8c
P9a
P9b

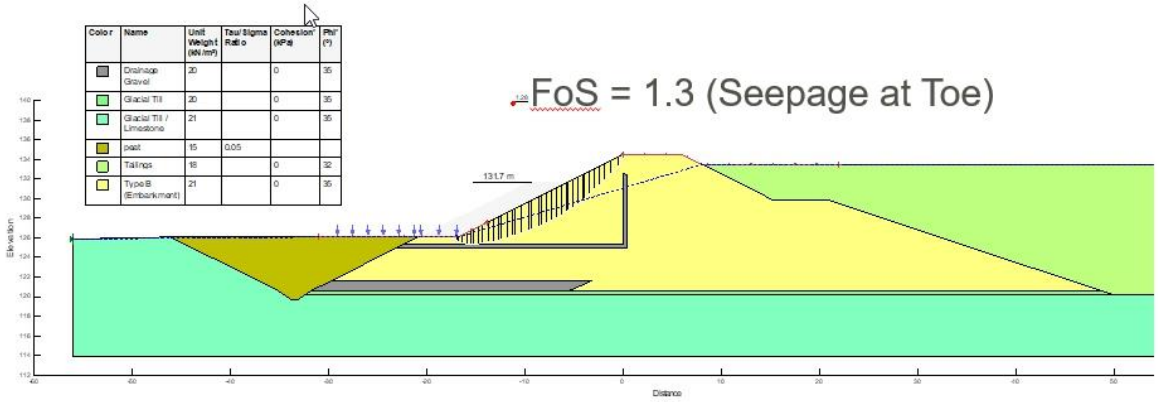

P10, P11 and P12 Water Quality: Sulphate Concentration
Sulphate (mg/l)
500
400
300
200
100
0
01-Jan-15
02-Jan-16
02-Jan-17
03-Jan-18
04-Jan-19
05-Jan-20
05-Jan-21
06-Jan-22
07-Jan-23
08-Jan-24
08-Jan-25
P10
P11
P12

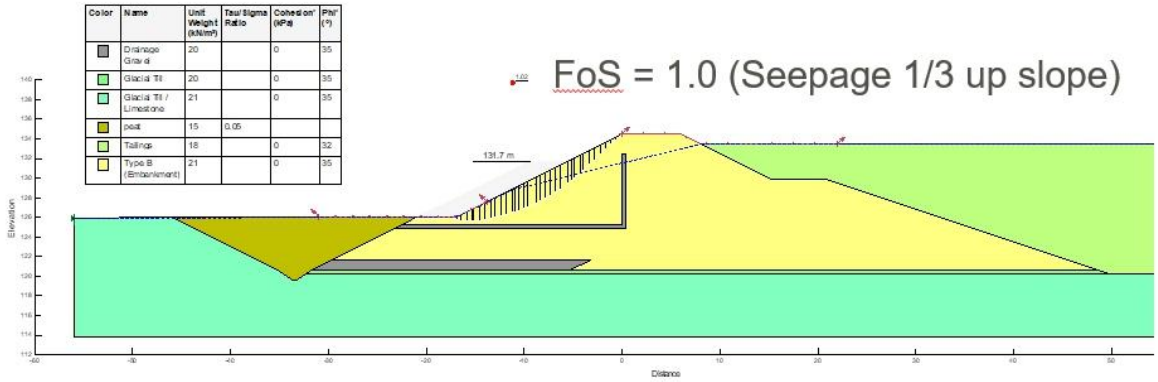
Appendix F

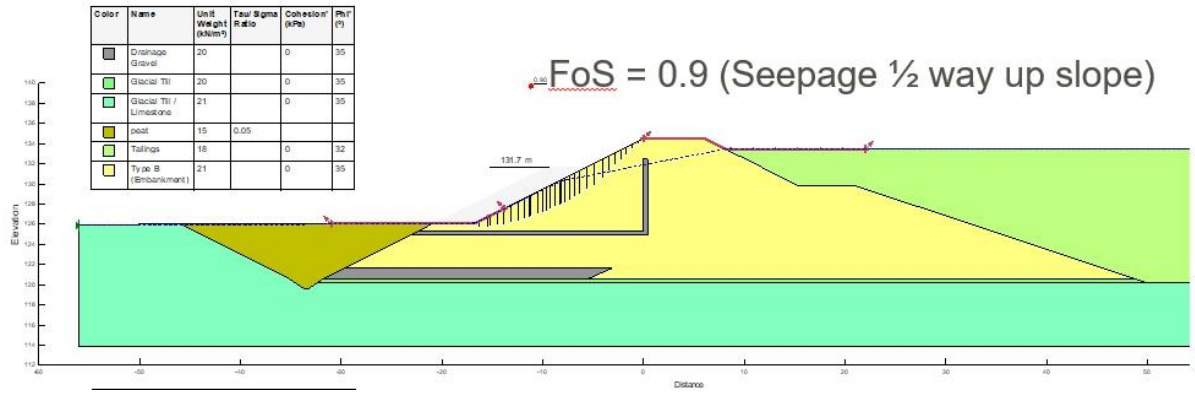
SLOPE STABILITY 2024

PHASE 1 TMF


Color | Name | Unit Weight (kN/m³) | Tau/ Sigma Ratio | Cohesion' (kPa) | Phi' (°)
Drainage Gravel | 20 | | 0 | 35
Glacial Till | 20 | | 0 | 35
Glacial Till / Limestone | 21 | | 0 | 35
peat | 15 | 0.05 | | |
Tailings | 18 | | 0 | 32
Type B (Embankment) | 21 | | 0 | 35
FoS = 1.5
131.7 m
UFD16
Elevation
Distance


Color | Name | Unit Weight (kN/m³) | Tau/ Sigma Ratio | Cohesion' (kPa) | Phi' (°)
Drainage Gravel | 20 | | 0 | 35
Glacial Till | 20 | | 0 | 35
Glacial Till / Limestone | 21 | | 0 | 35
peat | 15 | 0.05 | | |
Tailings | 18 | | 0 | 32
Type B (Embankment) | 21 | | 0 | 35
FoS = 1.3 (Seepage at Toe)
131.7 m
Elevation
Distance


Color | Name | Unit Weight (kN/m³) | Tau/ Sigma Ratio | Cohesion' (kPa) | Phi' (°)
Drainage Gravel | 20 | | 0 | 35
Glacial Till | 20 | | 0 | 35
Glacial Till / Limestone | 21 | | 0 | 35
peat | 15 | 0.05 | | |
Tailings | 18 | | 0 | 32
Type B (Embankment) | 21 | | 0 | 35
FoS = 1.0 (Seepage 1/3 up slope)
131.7 m
Elevation
Distance


Color | Name | Unit Weight (kN/m³) | Tau/ Sigma Ratio | Cohesion' (kPa) | Phi' (°)
Drainage Gravel | 20 | | 0 | 35
Glacial Till | 20 | | 0 | 35
Glacial Till / Limestone | 21 | | 0 | 35
peat | 15 | 0.05 | | |
Tailings | 18 | | 0 | 32
Type B (Embankment) | 21 | | 0 | 35
FoS = 0.9 (Seepage ½ way up slope)
131.7 m
Elevation
Distance

MAIN TMF

Materal Properties

Description: Peat	Description: Silty Sandy Gravel Fill	Description: Gravel/Rock Fill	Description: Tailings	Description: Limestone
Model: MohrCoulomb	Model: MohrCoulomb	Model: MohrCoulomb	Model: MohrCoulomb	Model: Bedrock
Wt: 18	Wt: 21	Wt: 21	Wt: 18	
Cohesion: 0	Cohesion: 0	Cohesion: 0	Cohesion: 0	
Phi: 35	Phi: 33	Phi: 35	Phi: 32	

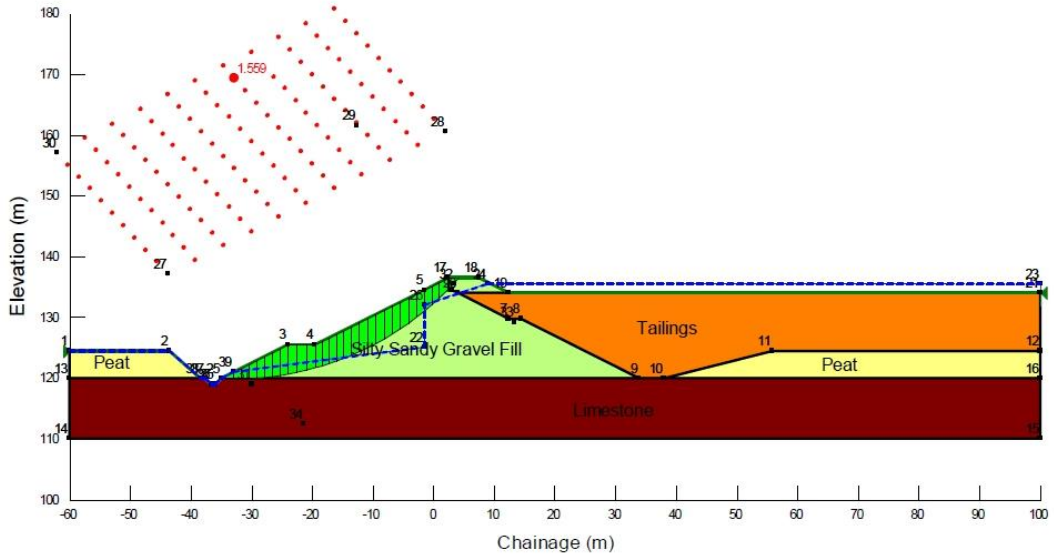


Figure 1: Operating Condition - Deep seated failure FOS

Material Properties

Description: Peat	Description: Silty Sandy Gravel Fill	Description: Gravel/Rock Fill	Description: Tailings	Description: Limestone
Model: MohrCoulomb	Model: MohrCoulomb	Model: MohrCoulomb	Model: MohrCoulomb	Model: Bedrock
Wt: 18	Wt: 21	Wt: 21	Wt: 18	
Cohesion: 0	Cohesion: 0	Cohesion: 0	Cohesion: 0	
Phi: 35	Phi: 33	Phi: 35	Phi: 32	

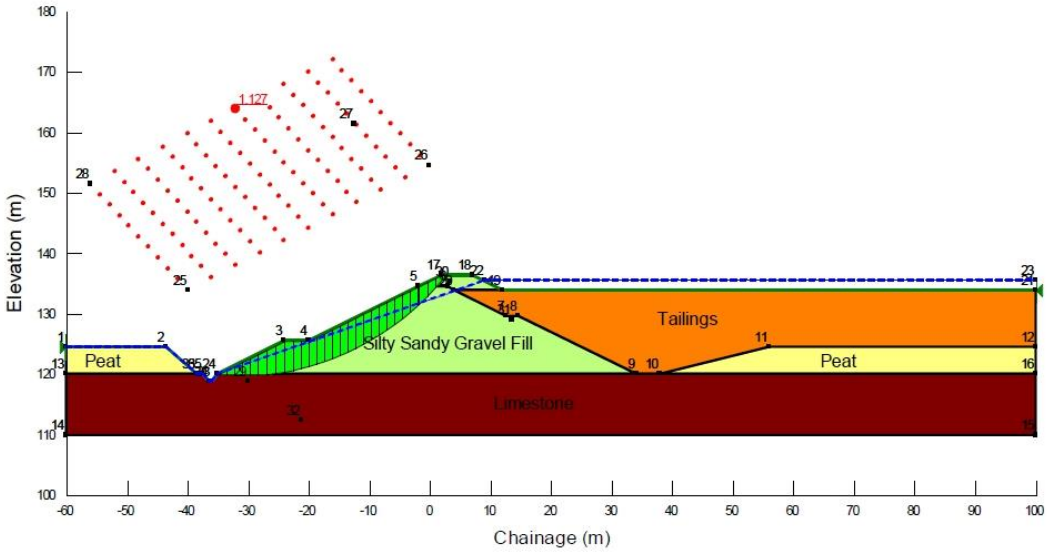
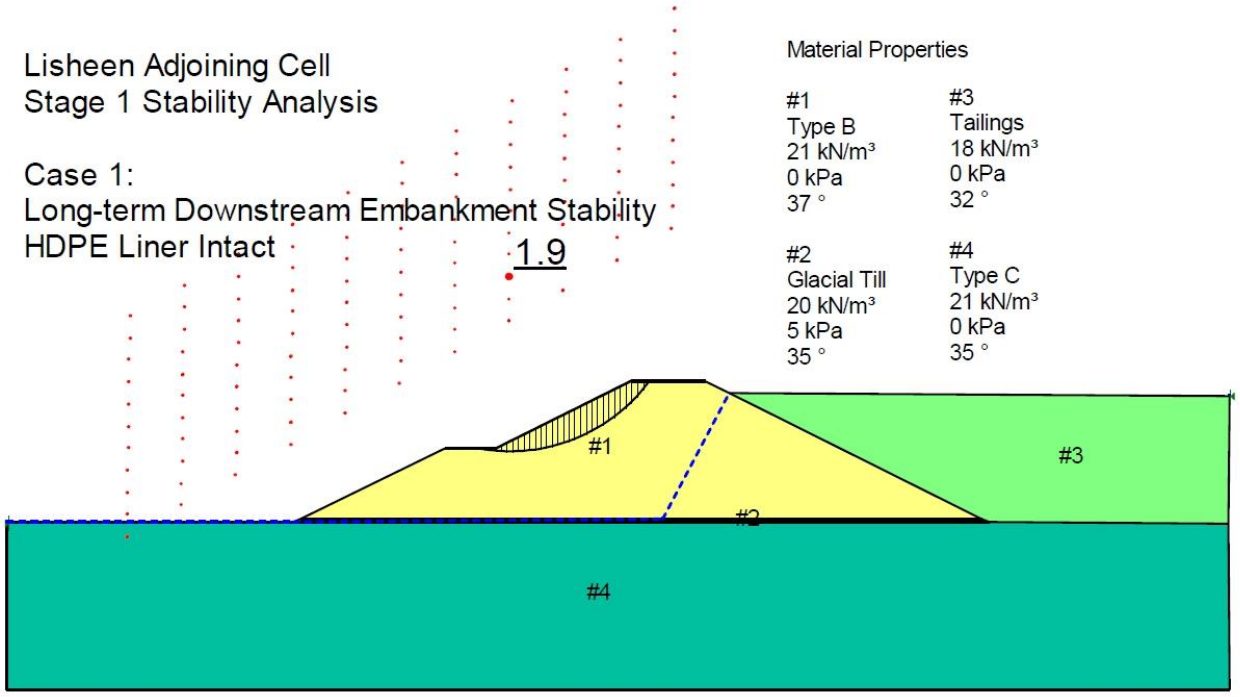
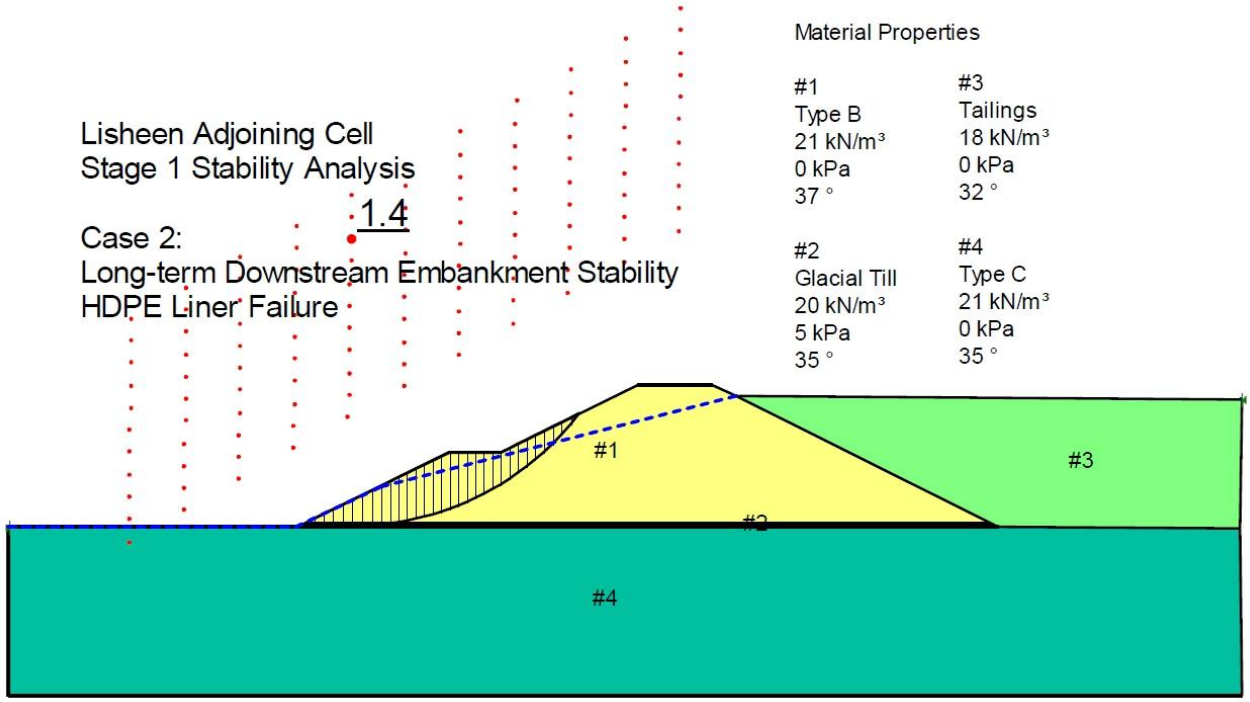


Figure 2: Critical Condition - Deep seated failure FOS

NEW CELL


Lisheen Adjoining Cell
Stage 1 Stability Analysis
Case 1:
Long-term Downstream Embankment Stability
HDPE Liner Intact
1.9
Material Properties
#1
Type B
21 kN/m³
0 kPa
37 °
#2
Glacial Till
20 kN/m³
5 kPa
35 °
#3
Tailings
18 kN/m³
0 kPa
32 °
#4
Type C
21 kN/m³
0 kPa
35 °
#1
#2
#3
#4


Lisheen Adjoining Cell
Stage 1 Stability Analysis
1.4
Case 2:
Long-term Downstream Embankment Stability
HDPE Liner Failure
Material Properties
#1
Type B
21 kN/m³
0 kPa
37 °
#2
Glacial Till
20 kN/m³
5 kPa
35 °
#3
Tailings
18 kN/m³
0 kPa
32 °
#4
Type C
21 kN/m³
0 kPa
35 °
#1
#2
#3
#4

Appendix G

TMF ANNUAL INSPECTION 2024


N
E
S
W
wsp
Google
3 Feb 2025 11:30:31
52°44'55.66385"N 7°40'33.9254"W
23° NE


N
E
S
W
Google
3 Feb 2025 11:30:35
52°44'55.65592"N 7°40'33.83463"W
69° E


3 Feb 2025 11:30:40
52°44'55.59688"N 7°40'33.95993"W
229° SW
Google


S
W
E
N
Google
3 Feb 2025 11:33:28
233° SW


N
E
S
W
Google
3 Feb 2025 11:36:22
49° NE


S
E
W
N
Google
3 Feb 2025 11:36:26
160° S


E
S
N
W
Google
3 Feb 2025 11:38:41
52°45'2.33354"N 7°40'27.42366"W
128° SE


3 Feb 2025 11:39:40
52°45'1.90554"N 7°40'24.29884"W
233° SW
Google


S
E
W
N
3 Feb 2025 11:39:43
52°45'1.89726"N 7°40'24.32771"W
175° S
Google


E
S
N
W
Google
3 Feb 2025 11:39:47
52°45'1.90439"N 7°40'24.3259"W
128° SE


W
N
S
E
Google
3 Feb 2025 11:48:52
314° NW


N
W
E
S
Google
3 Feb 2025 11:51:33
1° N


S
W
E
N
Google
3 Feb 2025 11:51:57
52°45'4.62138"N 7°40'19.65642"W
227° SW


N
E
S
W
Google
3 Feb 2025 11:56:04
31° NE


E
S
W
N
Google
3 Feb 2025 11:57:40
90° E


3 Feb 2025 12:02:44
52°45'10.54382"N 7°40'3.2075"W
127° SE
Unnamed Road
County Tipperary
Google


W
N
S
E
Google
3 Feb 2025 12:02:48
52°45'10.68873"N 7°40'3.36395"W
311° NW
Unnamed Road
County Tipperary


W
N
S
E
Mill Rd
R639
Urlingford
Google
3 Feb 2025 12:19:09
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317° NW
Main Street
Urlingford
County Kilkenny


E
N
S
W
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122° SE
Main Street
Urlingford
County Kilkenny
Google


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210° SW
Main Street
Urlingford
County Kilkenny
Google


W
S
N
E
Google
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269° W


N
E
S
W
Google
3 Feb 2025 12:34:17
51° NE


N
N
E
S
Google
3 Feb 2025 12:40:50
291° W


N
E
S
W
Google
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62° NE


W
N
S
E
Google
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315° NW


E
S
W
N
Google
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106° E


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S
W
Google
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22° N


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E
S
W
wsp
Google
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150° SE


3 Feb 2025 12:58:58
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150° SE
Google


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S
E
Google
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N
W
E
S
Google
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332° NW


N
W
E
S
Google
3 Feb 2025 13:01:53
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Google
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Google
3 Feb 2025 13:08:33
129° SE


E
S
N
W
Google
3 Feb 2025 13:08:36
101° E


N
W
E
S
Google
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322° NW


W
N
S
E
Mill Rd
R639
Urlingford
Google
URLINGFORD
3 Feb 2025 13:20:24
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319° NW
Mill Road
Urlingford
County Kilkenny


S
W
N
KILKENNY
TIPPERARY
Google
3 Feb 2025 13:20:35
52°44'54.45843"N 7°39'31.81075"W
206° SW
Mill Road
Urlingford
County Kilkenny


W
N
S
E
KILKENNY
TIPPERARY
Google
3 Feb 2025 13:20:45
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278° W
Mill Road
Urlingford
County Kilkenny


W
N
S
E
KILKENNY
TIPPERARY
Google
3 Feb 2025 13:36:40
297° NW


S
E
W
N
Google
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153° SE


N
W
E
S
Google
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290° W


S
E
W
N
Google
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52°44'45.59248"N 7°40'10.70849"W
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E
S
W
N
Google
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95° E


W
N
S
E
Google
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349° N


E
S
N
W
Google
3 Feb 2025 13:57:25
120° SE


W
N
S
E
Google
3 Feb 2025 13:57:35
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275° W


N
E
S
W
Google
3 Feb 2025 14:02:03
311° NW

Town Centre House
Dublin Road
Naas
Co Kildare

wsp.com

APPENDIX 7-2

Annual Environmental Report (AER)

2024

Company Name: Lisheen Milling Ltd

Licence Number: P0088-04

Address: Killoran, Cooleeney Derryfadda Moyne, Thurles Co Tipperary

Class of Activity[1]:1.3a (aftercare)

[1] See Appendix I

Purpose of this Report

One of the functions of the Environmental Protection Agency (EPA) is to licence and regulate the activities[2] of large scale industrial (e.g. chemical, food processors, power plants) and waste facilities. Submitting an Annual Environmental Report (AER) is a requirement of all EPA licences.

An AER is a public document. To this end, this format has been developed for industrial and waste licence holders (other than the intensive agriculture sector) to use as a template. This is to assist any member of the public to interpret and understand the environmental performance of the licensed facility.

The AER is a **summary** of environmental information for a given year. It includes:

- Details of the licence holder's environmental goals achieved, goals to maintain compliance and/or improve their environmental performance;
- Answers to questions regarding their facility's activities;
- Tables of results from monitoring emissions such as air, water, noise, and odour; and
- Details of waste generated, accepted and treated.

An AER does **not** provide detailed technical data. Such information is available in three ways:

1) Contacting the licence holder directly. The Contact Us section of this template enables the licence holder to provide details of where a member of the public can obtain further information on topics reported in this document.

[2] See Appendix I

2) Some documents[3] are available on the EPA website via the licence details page for each individual licence. This can be found by browsing either the http://www.epa.ie/licensing/ or http://www.epa.ie/enforcement/ pages of the EPA website.

3) All formal enforcement correspondence exchanged between the EPA and a licence holder during the regulatory process is available for public viewing by appointment at any EPA Office.

If you have a question or query about an AER or an individual EPA licensed facility see the EPA's website or contact the relevant EPA office. See http://www.epa.ie/about/contactus/ for contact details.

[3] This includes EPA site inspection and compliance monitoring reports, licence holders' self-monitoring reports, AERs and special reports

Contents

Glossary

Abatement Equipment	Technology used to reduce pollution
AER	Annual Environmental Report.
Beyond Compliance	Beyond compliance is concept to help deliver greater organisational performance and long-term value for the environment, society and the economy.
CRAMP	Closure, Restoration and Aftercare Management Plan.
ELRA	Environmental Liability Risk Assessment.
Emission Limit Value	Limits set for specified emissions, typically outlined in Schedule B of an EPA licence.
EMS	Environmental Management System.
Environmental Goal	An objective or target set by a licensee as part of an environmental management system (EMS).
Environmental Pollutant	Substance or material that due to its quantity and/or nature has a negative impact on the environment.
Facility	Any site or premises that holds an EPA industrial or waste licence.
FP	Financial Provision.
GJ	Giga joules, an international unit of energy measurement.

Groundwater	All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
Incident	As defined by an EPA industrial or waste licence.
Inert Waste	Is waste that will not undergo physical, chemical or biological change thereby, is unlikely to cause environmental pollution or harm human health.
List of Wastes (LoW)	A list of wastes drawn up by the European Commission and published as Commission Decision 2014/955/EU.
Noise Sensitive Location	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other installation or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
Non-Renewable Resource	A resource of economic value that cannot be replaced at the same rate it is being consumed e.g. coal, peat, oil and natural gas.
Oil Separator	Separator system for light liquids (e.g. oil and petrol).
PRTR	Pollutant Release and Transfer Register.
Renewable Resource	Wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.
Sanitary Waste	Waste water from toilet, washroom and canteen facilities.

Storm Water	Rain water run-off from roof and non-process areas.
Surface Water	Lakes, rivers, streams, estuaries and coastal waters.
Trigger Level	A value set for a specific parameter, the achievement or exceedance of which requires certain actions to be taken by the licence holder.
Volatile Organic Compounds	Gases produced from solids or liquids that evaporate readily in ambient conditions.
Waste	Any substance or object which the holder discards or intends or is required to discard.

Disclaimer

These are **not** legal definitions. Legal definitions can be found in the corresponding legislation.

Declaration

I, Katheen Quinn Facilities Manager ,,confirm that by ticking the box below, all information in this report is truthful and accurate to the best of my knowledge and belief.

In addition, I confirm that all monitoring and performance reporting required by our EPA licence and summarised herein is available for inspection by the EPA.

Tick here [x]

1) Introduction

See below a brief description of our facility and a summary of our environmental performance this year.

Production at this facility ceased in 2015. All closure works are completed and following 2 years of Active Closure and 3 years in Passive Closure the facility is transitioned to Aftercare in June 2021. Although there have been non-compliances at SW1 overall there is a general reduction in emission and improvement in compliance for 2024 compared to previous years and a significant reduction in several parameter emission in comparison to 2019/2020 results. The two metals that have been sources of non-compliance are zinc and nickel. All relevant data from the Lisheen Mine has been reported through the Environmental Performance Report. All data is related to water emissions.	

Contact Us

If you have any questions or would like further information on any aspect of our licensed activity, please contact us directly.

See below details:

The Installation Manager, The Lisheen Mine, Killoran, Moyne, Thurles, Co. Tipperary.

2) How we Manage our Facility

Environmental Management System

Explanation
To ensure our facility's activities do not cause environmental pollution we are required to have detailed documentation systems in place to help us manage and track our environmental performance. These systems are referred to as Environmental Management Systems (EMS). We review our EMS every year and set up-to-date **environmental goals** to continually improve our environmental performance.

The information below sets out the environmental goals for our facility to help us prevent environmental pollution and reduce our impact on the environment. Target dates for completing each goal and progress towards achieving the goal are outlined in Table 1.

Table 1 Environmental Goals

Environmental Goal	Target Date	Progress
Continue to monitor the TMF to ensure that it is operating to design specification	On Going	On Track
Continue to seek solutions to Improve non compliances at SW1	On Going	On Track

Add rows as necessary

Comment

Lisheen is no longer in production, the Environmental Management System comprises of a monitoring programme that is in place as part of the Aftercare phase.

The aftercare plan is reviewed annually to ensure it meets the requirements of the site. An annual TMF audit is completed to ensure the TMF is performing as designed to perform.

Beyond Compliance

Explanation
We are legally required to comply with our environmental licence. However, the EPA realise that some sites go further than just complying with their environmental licence requirements. Some projects carried out at facilities can have long term positive impacts on the environment and local communities.
The EPA's beyond compliance initiative is encouraging us to identify and report on these environmental and sustainability projects. For example, the project could involve renewable energy, biodiversity, water conservation or exemplar community engagement.

Did any project completed on your site in the reporting year go beyond your licence requirements?

Yes [ ] No [x]

If yes, provide details of one case study in Appendix III that demonstrates how the project went beyond compliance of your licence.

3) Energy & Water

Energy

Explanation
Fossil fuels such as coal, gas and oil are non-renewable resources. As a result, our EPA licence requires that we measure our energy use and set targets to improve the energy efficiency of our activities and reduce our overall use, where possible. Where we have the means and technology on-site to generate energy, this is also captured in this report.

The information below summarises the energy used this year compared to the previous year and includes renewable and non-renewable energy types.

Table 3 Energy Used

Energy Used	Quantity (GJ)	% Increase/ decrease on previous year
Electricity	NA	
Heavy Fuel Oil	NA	
Light Fuel Oil	NA	
Natural Gas	NA	
Coal / Solid Fuel	NA	
Peat	NA	
Renewable Biomass	NA	
Renewable Energy Generated On-site	NA	
Total Energy Used	NA	

Comment

There was no energy consumed by on-site processes relevant to licensed activities as no mining activities have occurred since the Mine ceased production in 2015 and Closure activities ceased in 2018.
The staff member is working from home since 2021

The information below summarises the energy we generated on our site this year with specific focus on renewable energy generation.

Table 4 Energy Generated

Energy Generated	**Quantity (GJ)**	**% Increase/ decrease on previous year**
Renewable Energy	NA	
Total Energy Generated		

Comment

The Lisheen Mine site does not generate energy from site.

Water

Explanation
Water is a natural resource and we are required by our EPA licence to identify ways to reduce our use where possible. Water used in industry can be extracted from groundwater, rivers and lakes (surface water), taken from public water supplies (Irish Water), recycled from the facility's processes or harvested from rainwater.

The information below summarises and compares the quantity of water used this year compared to the previous year.

Table 5 Water Used

Source of Water Used	**Quantity (m^3/year)**	**% Increase/ decrease on previous year**
Groundwater	NA	
Surface Water	NA	
Public Supply	NA	
Recycled Water	NA	
Rainwater	NA	
Total Water Used	NA	

Comment

The 1 employee is working from home

4) Environmental Complaints

Explanation
Our EPA licence requires that activities do not cause environmental nuisance such as odour, dust or noise. Our licence also requires that we have procedures in place to record, investigate and respond to environmental complaints if or when they arise.
We have an environmental complaints procedure in place where you can contact us[4] directly. You can also contact the EPA[5] if you wish to make an environmental complaint, confidentially or not.

See the information below for a summary of **all** the environmental complaints relating to our activities made directly to us and to the EPA this year.

Table 6 Summary of All Environmental Complaints Received in

Type of Complaint	Number of Complaints	Number Closed
Odour / Smells	0	
Noise	0	
Dust	0	
Water Quality	0	
Air Quality	0	
Waste	0	
Litter	0	
Vermin/Flies/Birds	0	
Soil Contamination	0	
Vibration	0	
Other	0	

[4] See Section 1, Introduction – Contact Us

[5] If you wish to contact the EPA to make an environmental complaint about an EPA licenced facility, please go to https://lema.epa.ie/complaints

Comment

There were no environmental complaints received throughout 2024

5) Environmental Incidents

Explanation
It is our responsibility as an EPA licensed facility to ensure we have systems in place to prevent incidents that have the potential to cause environmental pollution. If an incident occurs, we are required to report it to the EPA, investigate the cause and fix the problem.
The EPA classify environmental incidents into 5 categories based on the potential impact on the environment:

- Minor
- Limited
- Serious
- Very Serious
- Catastrophic

See Table 6 for the number of the environmental incidents we reported to the EPA this year.

Table 7 Number of Environmental Incidents

Incident Category	Minor	Limited	Serious	Very Serious	Catastrophic
Abatement Equipment Offline	0	0	0	0	0
Breach of Ambient ELV	0	0	0	0	0
Breach of Emission Limit	1	0	0	0	0
Explosion	0	0	0	0	0
Fire	0	0	0	0	0
Monitoring Equipment Failure	0	0	0	0	0
Odour	0	0	0	0	0
Spillage	0	0	0	0	0
Breach of trigger Level	0	0	0	0	0
Uncontrolled Release	0	0	0	0	0

Incident Category	Minor	Limited	Serious	Very Serious	Catastrophic
Other	0	0	0	0	0

Comment

Emission limit value exceedances were consolidated into 1 reportable incident during the year. These breaches occurred at SW1 and are related to TMF discharge water.

Non-compliances were of BOD, COD, Lead & zinc

The zinc non-compliance rate improved on previous years. COD did have multiple non-compliance (thought to be associated with the peat used in the cap of the TMF), the concentration of COD in the discharge water was typically lower than the concentration in the receiving water.

The metal exceedances were for concentration. The mass emission from the site is complying, and the Drish river is unaffected (e.g., metal concentrations are below the 2009 Surface Water Quality Objectives values, SI-272 of 2009 as amended).

6) Our Environmental Emissions

Explanation

We are required to ensure the emissions from our activities do not cause environmental pollution.

We are required to monitor any of the following emissions that we make:

- Storm water
- Waste water
- Air
- Groundwater
- Noise

We regularly test any such emissions for specific pollutants and materials to ensure they do not contain levels of pollution that exceed emission limit values (ELVs) or cause environmental pollution. If monitoring of an emission indicates an ELV is exceeded, we are required to report this to the EPA[6].

The next sub-sections of this report summarise our compliance with any ELVs set in our EPA licence. Some emissions monitored do not have specific ELVs, but we still carry out monitoring and report all incidents that may give rise to environmental pollution.

[6] See section 5, Incidents

Storm Water

Explanation
Storm water is rain water run-off from roof and non-process areas of a facility, e.g. carparks, and generally shall not contain any pollution.
Storm water is usually released into a local water body after a basic form of treatment. Our EPA licence requires that we manage storm water to ensure no polluting substances or materials are released into the environment.

The information below summarises how the storm water from our facility is treated, where it is released and the results of monitoring this year.

1. **Storm water from our facility is managed prior to release by;**

Storm water from the tailings pond is treated in a wetland from where it goes to an attenuation pond before discharge.

2. **Storm water from our facility is released into the following water bodies:**

Drish River

Table 8 Summary of Storm Water Monitoring

Parameter measured	No. of Samples	% Compliant	Comment
COD	**21**	**33%**	
Ammonia	**21**	**100%**	
Sulphate	**21**	**100%**	
BOD	**21**	**76%**	
Orthophosphate as P	**21**	**100%**	
Nickel	**21**	**86%**	
Lead	**21**	**100%**	
Zinc	**21**	**43%**	
Suspended Solids	**21**	**100%**	
Arsenic	**21**	**100%**	
Cadmium	**21**	**100%**	
Aluminium	**21**	**100%**	

Add rows as necessary

Comment

Discharge from the TMF, which is due to precipitation, under the storm water section.

The minor incidents reported are all related breaches of the ELV's at SW1 and are related to TMF discharge water.

Non-compliances were of COD, BOD Zinc & Nickel.

Waste Water

Explanation

There are two types of waste water that can be produced:

- Process waste water produced from the activities and;
- Sanitary waste water from toilets, washrooms and canteens.

Our EPA licence requires us to manage our waste water on or off-site and ensure that it does not cause environmental pollution when discharged into the environment.

The information below summarises how we treat the waste water produced from our activities, where it is released and the results of monitoring this year.

1. **Waste water produced by our activities is treated as follows before discharge to a receiving waterbody**;

There is no process wastewater produced from our current activities.

2. **Treated waste water from our facility is released into the following water bodies:**

NA

Table 9 Summary of Waste Water Monitoring

Parameter measured	No. of Samples	% Compliant	Comment

Add rows as necessary

Comment

NA

Air

Explanation
Generally, three types of air emissions are monitored from industry in Ireland: gases, dust (particulates) and odour. Our EPA licence requires us to ensure that any air emissions from our activities do not cause air pollution or create an odour nuisance.

The information below details the number of air emission points we monitor, the results from testing the air emissions and any odour assessments carried out by us and the EPA this year.

1. **We monitor air emissions from the following number of emission points at our facility.**

NA

Table 10 Summary of Air Emissions Monitoring

Parameter measured	No. of Samples	% Compliant	Comment
NA			
NA			

Add rows as necessary

Comment

As there are no longer any mining activities being carried out, air emissions are no longer monitored.

Table 11 Summary of Odour Assessments Carried Out

Assessment Conducted By	No. of Odour Assessments	% Compliant[7]	Comment
Licence Holder	NA		
EPA	NA		

Add rows where necessary

Comment

Odour assessments are not a requirement of our IPCL.

[7] A compliant odour assessment is based on EPA Odour Impact Assessment Guidance available at Air Enforcement | Environmental Protection Agency (epa.ie)

Fugitive Solvent Emissions

Are you required to monitor fugitive solvent air emissions from your facility?

Yes [ ] No [X.]

Explanation
The use of solvents is regulated under Irish and European Union (EU) Regulations[8]. Solvents are chemicals that, by their nature, are volatile (evaporate readily under ambient conditions). Solvents can be found in many inks, glues and cleaning agents. Due to the volatility of solvents some emissions may be released into the atmosphere during our activities before being captured in our air treatment system. This type of emission is called a **fugitive solvent emission**.

The information below summarises the quantity of solvents used this year, the percentage of fugitive solvent emissions (% of total quantity used) and whether the percentage complied with the targets set in the EU Regulations.

Table 12 Summary of Fugitive Solvent Emissions

Quantity of Solvents Used (Kg)	% Fugitive Solvent Emissions	Compliant
NA	NA	NA

Comment

Lisheen is not required to monitor fugitive solvent emissions.

[8] See Annex VII of the Industrial Emissions Directive
https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm

Groundwater

Explanation
Groundwater is an important and sensitive resource in Ireland. Our EPA licence requires that we monitor groundwater to ensure our activities do not cause groundwater pollution.
Understanding how groundwater flows through soil and rock layers and eventually into surface and coastal waters is a complex science. Sometimes groundwater pollution that occurred in the past can take years and even decades to disappear. Therefore, it is important that experts help us monitor and interpret results from groundwater monitoring and testing.

The information below is a basic summary of the condition of the groundwater this year.

1. **Do you have a groundwater monitoring programme in place?**

Yes [X] No [ ]

2. **Have the groundwater monitoring results over the last 5 years indicated the presence of groundwater pollution?**

Yes [ ] No [X]

Table 13 List of Groundwater Pollutants Identified

Pollutants
It is not concluded that there is groundwater pollution at the Lisheen site, however work is ongoing to understand all groundwater data to provide assurance that there is no impact on regional groundwater

Add rows as necessary

3. Give details of the investigations and subsequent actions taken, where applicable, to manage the groundwater pollution.

Piteau Associates were retained by Lisheen to complete an analysis of the groundwater to determine its status and any potential impacts on downgradient receptors. Piteau concluded that TMF influence is minimal and there is no influence of groundwater from the mine workings as demonstrated in the regional groundwater well data.

Nickel at Compliance Well 1, which had been non-compliant against the closure goal concentration, continues to show improvement and is now typically compliant. An assessment was undertaken in 2020 in order to determine the reason for the elevated nickel. The conclusion was that it was not due to sampling or analytical error, or from seepage migration from the TMF. The available evidence suggests that nickel is naturally present in the groundwater due to local mineralisation anomalies. Compliance Well 2 is generally compliant for nickel but has had occasional minor exceedances.

Comment

It is believed there is no ground water pollution at the Lisheen site, however work is ongoing to understand all groundwater data to provide assurance that there is no impact on regional groundwater.

During the current Aftercare phase, a full groundwater monitoring programme is in place and reviewed often by external consultants and the Regulatory Authorities. This groundwater programme will continue in Aftercare.

The nickel issue at Compliance Well 1 is most likely due to naturally present nickel in the groundwater due to local mineralisation anomalies, as stated above 2023 & 2024 has seen an improvement in this.

Noise

Explanation
Our EPA licence requires that we monitor noise emissions from our facility. Noise monitoring can be conducted at the boundary of our facility and/or at locations beyond the boundary referred to as “noise sensitive locations”. Noise monitoring requires the use of special noise monitoring equipment. Our EPA licence requires that noise produced by our facility shall not exceed the noise limit values and/or give rise to nuisance.

The information below gives a summary of when and where we conducted noise monitoring this year and if results complied with our EPA licence limits.

1. **We conducted noise monitoring on the following dates this year:**

NA

2. **Where was the noise monitoring carried out?**
   - i. **the boundary of our facility;**
   - ii. **noise sensitive locations off-site; or**
   - iii. **both.**

NA

3. **Were measured noise levels compliant with your EPA licence limits?**

Yes [ ] No [X]

If No, we took the following actions to address the noise level exceedances?

As there are no longer any mining activities being carried out, noise emissions are no longer monitored.

Comment

As there are no longer any mining activities being carried out, noise emissions are no longer monitored.

7) Waste

Waste Generated

Explanation
Our EPA licence requires us to manage the waste we generate in a manner that does not cause environmental pollution.
We manage, store and record hazardous, non-hazardous and inert waste we generate in accordance with our licence. We ensure that this waste is subsequently treated or disposed of in accordance with the relevant waste Regulations.

The information in Table 14 is a summary of waste we generated this year and the percentage increase or decrease on the previous year. The percentage recovery is the amount of total waste generated that was reused, recycled or recovered.

Table 14 Waste Generated

Type	Quantity (Tonnes)	% Increase/ decrease on previous year	% Recovery
Hazardous	0	0	0
Non-Hazardous	0	0	0
Inert	0	0	0
Total Tonnes	0	0	0

Comment

There was no waste transported off site in 2024.

Waste Accepted

Did you accept waste onto your facility for storage, treatment, recovery or disposal this year?

Yes [ ] No [X]

Explanation
Our EPA licence requires us to manage the waste we accept in a manner that does not cause environmental pollution.
We manage, store and record all incoming and outgoing hazardous, non-hazardous and inert waste. The waste we accept may be treated, recovered, disposed or stored at our facility depending on our licence requirements.

The information in Table 15 provides a summary of waste we accepted this year and the percentage increase or decrease on the previous year. The percentage recovery is the amount of total waste accepted that was reused, recycled or recovered.

Table 15 Waste Accepted

Type	Quantity (Tonnes)	% Increase/ decrease on previous year	% Recovery
Hazardous	0	0	0
Non-Hazardous	0	0	0
Inert	0	0	0
Total Tonnes	0	0	0

Comment

The Lisheen Mine does not accept waste from outside sources.	

8) Financial Provision

Explanation
Our EPA licence requires us to assess the risk our activities pose to the environment if we cease our activities or if an incident occurred. If we are identified as a high risk facility[9] by the EPA, we are required to put provision in place such as a financial bond or insurance to cover the cost of restoring our site to a satisfactory condition. This financial provision can then be used to cover the cost of managing the restoration or clean up should such an event occur.

1. Are you required to have an agreed financial provision in place?

Yes [X] No [ ]

2. What year was your Closure, Restoration and Aftercare Management Plan (CRAMP) last agreed by the Agency?

[ ]

3. What year was your Environmental Liability Assessment Report (ELRA) agreed by the Agency?

2023

4. Has there been any significant changes on your site since the last agreements?

Yes [ ] No [X]

If yes, have you submitted details to the EPA?

Yes [ ] No [ ] N/A [X]

[9] See Appendix II

Appendix I

Class of Activity

Industrial and waste facilities are classed into different sectors depending on the nature of their activity and its potential impact on the environment. The EPA Act 1992 as amended, outlines these as follows:

Class 1	Minerals and other materials
Class 2	Energy
Class 3	Metals
Class 4	Mineral fibres and glass
Class 5	Chemicals
Class 6	Intensive Agriculture[10]
Class 7	Food and drink
Class 8	Wood, paper, textiles and leather
Class 9	Fossil fuels
Class 10	Cement, lime and magnesium oxide
Class 11	Waste
Class 12	Surface Coatings
Class 13	Other Activities

[10] This reporting template is not applicable to the **intensive agriculture sector**. Their annual environmental reporting structure is different and can be found at Compliance & Enforcement: Licensees: Reporting Publications | Environmental Protection Agency (epa.ie)

Appendix II

High Environmental Risk Categories

If an industrial or waste licence falls into one of these categories it is deemed, by the EPA, as a high environmental risk. As a result, the licence holder is required to have financial provision in place. See section 8, Financial Provision.

1. Landfills
2. Non-Hazardous Waste Transfer Station
3. Incineration and Co-Incineration Waste Facilities
4. Category A – Extractive Waste Facilities
5. Upper and Lower Tier Seveso Facilities
6. Hazardous Waste Transfer Stations
7. High Risk Contaminated Land
8. Exceptional Circumstances

NOTE:

This list is subject to change.

See the link below for further information.

Compliance & Enforcement: Financial Provisions Publications | Environmental Protection Agency (epa.ie)

Appendix III

Beyond Compliance

The case study below shows how we went beyond the requirements of our licence in the reporting year.

250 word limit