Water Management Plan

Water Management will be regulated by the DWER Part V Operating Licence (Surface Water) and RIWA Act (Groundwater) for the Western Extension.

Surface Water

Surface Water Discharge and Quality will be issued with the Part V licence amendment. Surface Water Management strategies can be found in the Surface Water Assessment attached below.

Groundwater

Groundwater is managed via a Groundwater Licence Operating Strategy (GLOS) provided to, and approved by DWER. Please find the GLOS attached after the Surface Water Assessment below.

Keysbrook Mineral Sands Mine
Surface Water Assessment for Western Extension

Prepared for:

Doral Mineral Sands

August 2023

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1.1. INTRODUCTION

1.1. Background

Doral operates the Keysbrook Mineral Sands Project (the Project), located 58 km south of Perth and 22 km east of Mandurah, in Western Australia. The Project is managed by Keysbrook Leucoxene Proprietary Limited (KLPL), which is a subsidiary of Doral.

The Project is located on privately owned land that is used for grazing and other rural land uses. It operates under Ministerial Statement No. 810 and No. 1089. The currently approved area of disturbance is 1,532 ha, within a 3,015 ha Environmental Protection Authority (EPA) Development Envelope. This has approval for 9 years of mining from October 2015 with the mine areas being progressively mined, backfilled to pre-disturbance contours, and rehabilitated within 2 years of mining (Doral, 2022).

Based upon the current mining schedule, the ore reserve within the approved mine area, as defined in MS810, is due to be exhausted in 2023. AQ2 has previously completed surface water and groundwater assessments (2022a, 2022b) on the active mining area within Part Lot 63 that Doral has submitted with an amendment to proposal under Section 45C of the Environmental Protection Act 1986 (EP Act). It should be noted that the Part Lot 63 amendment is still under assessment by the Department of Water and Environmental Regulation (DWER).

1.2. Purpose of this Document

To facilitate the continuation of the mine and workforce, Doral seeks to further amend the Project to include Part Lots 20, 62, 63, 64, 201, 507 and 508 under Section 40AA of the EP Act as shown on Figure 1.1. The amendment area, referred to as the Western Extension, is mostly located within the existing EPA Development Envelope and includes a disturbance (mine) area of 518 ha, consisting primarily of cleared pasture and up to 21.5 ha of degraded native vegetation. Mining the amendment area will produce an additional heavy mineral concentrate and result in approximately 65 months (5.5 years) of additional mining for the Project.

Under current approvals for the operations (MS810), any surface water runoff which flows across a disturbed (non-rehabilitated) area of the Project must be collected, added to the Site Water Management System and added to the process water circuit. Areas that do not require capture of runoff include diverted upstream flows and stream corridors, and runoff from completely rehabilitated areas.

Doral are required to submit a request for a change to proposal under Section 40AA of the Environmental Protection Act 1986. The following information is required to support this, which is presented within this SW assessment:

4. *Provide details of any detrimental effects the proposed change/s might have on the environment, considering:*
   - *the values, sensitivity and quality of the environment which is likely to be impacted*
   - *the extent (intensity, duration, magnitude and geographic footprint) of the likely impacts*
   - *the resilience of the environment to cope with the impacts or change.*
5. *Describe whether the detrimental environmental effects of the change are additional to, or different from, any detrimental environmental effects of the original proposal.*

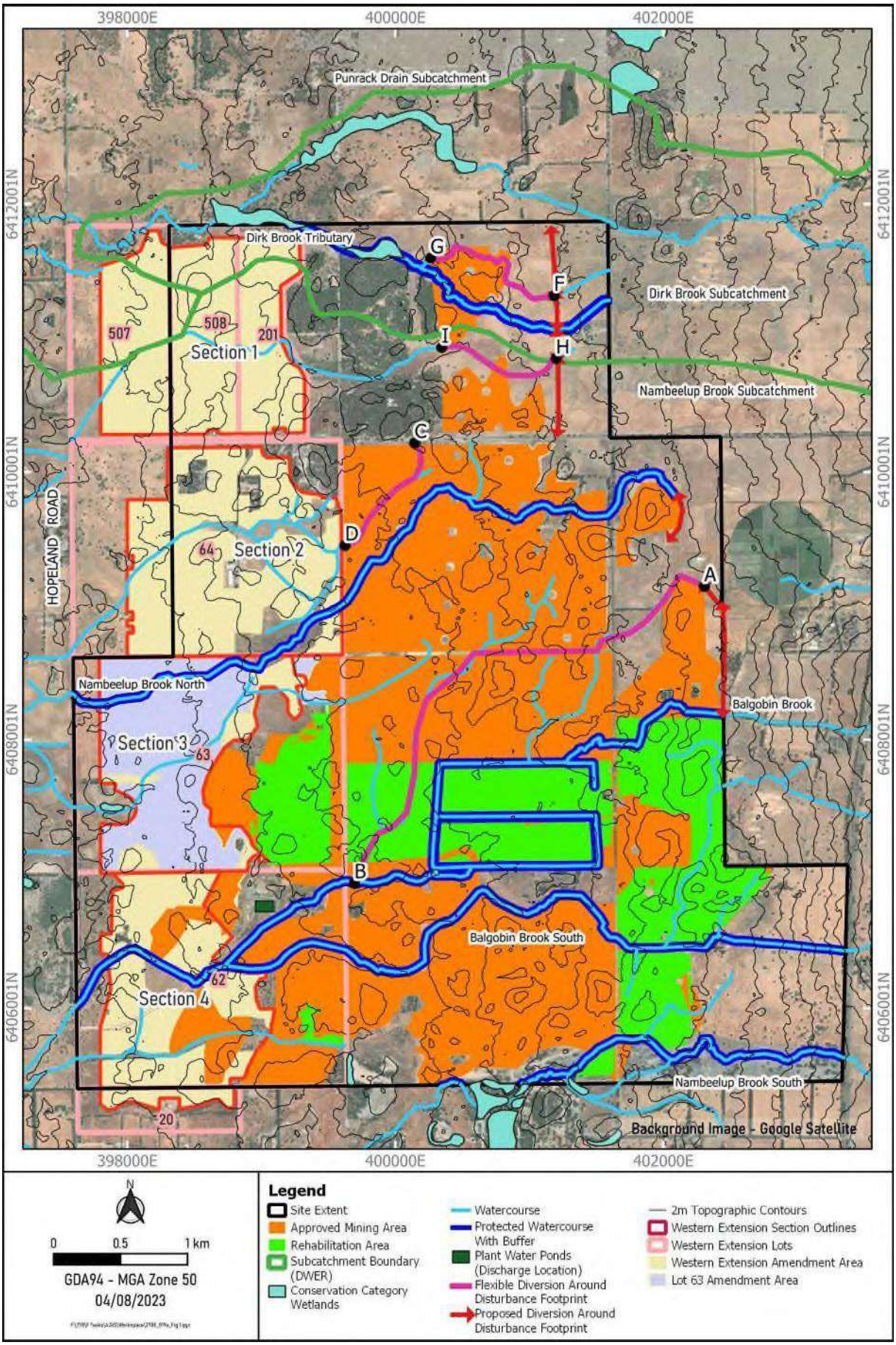

Figure 1.1 Proposed Western Extension

2. PROPOSED DISTURBANCE FOOTPRINTS

The proposed Western Extension, as shown on Figure 1.1, is mostly located within the existing EPA Development Envelope and, for the purposes of this report, will be broken down into the following sections, which cover an overall proposed mining period.

Table 2.1 Proposed Western Extension Components

Section	Part Lots	Proposed Mining Period	Approximate Proposed Disturbance (Mine) Area (ha)
1	201, 507, 508	January 2026 to February 2028	203
2	64	February 2028 to December 2029	177
3	63	December 2029 to May 2030, & May 2031	25
4	62, 20	May 2030 to April 2031	113

To date, the approved mining operation has involved progressively clearing and mining about 30 ha of active open pit at any one time, plus progressive backfilling and rehabilitation as the mine progresses. It is assumed that the area of active mining within the proposed expansion would be consistent with this approach (i.e., maximum 30 ha of active open pit).

3. HYDROLOGY

3.1. Regional Hydrology

At a regional level, all surface drainage from the Project area ultimately flows to the Peel Inlet (Peel-Harvey Estuary). Streams from the Darling Scarp and foothills flow from east to west through the mine area (MBS, 2006). MBS (2006, 2015) provide details of regional streamflow monitoring stations.

3.2. Local Hydrology

The mine area and surrounds are characterised by low relief topography that results in a landscape that becomes flatter and increasingly poorly draining westward from the scarp. In the pastured areas, most of the low-lying areas, creeks and wetlands have been cleared and drained. Downstream of the Project, west of Hopelands Road, the low relief is even more pronounced, resulting in a wetland chain all the way to Peel Inlet (MBS, 2006).

The watercourses flowing through, and adjacent to, the Project are discussed in MBS (2006) and shown on Figure 1.1. The northern part of the Project is located within the Dirk Brook Subcatchment, which flows to the Serpentine River and into Goegrup Lake and the Peel Inlet. The majority of the Project is located within the Nambeelup Brook Subcatchment, which discharges to several lakes in the Serpentine River Catchment System and then into the Peel Inlet. The western section of Lot 507 drains into the Punrack Drain Subcatchment, which flows into Lake Amarillo, one of the Serpentine Lakes.

The watercourses associated with each Section of the Western Extension are discussed below.

3.2.1. Section 1

Two unnamed tributaries of Dirk Brook flow in a westerly direction as well-defined watercourses to the north of the proposed areas of disturbance within Section 1, but do not fall within their extent. A small unnamed stream flows through the southern half of the Section and continues to the west to converge with other tributaries of Nambeelup Brook.

3.2.2. Section 2

Nambeelup Brook North Tributary flows through the south-eastern corner of Section 2 and continues to the west to converge with other tributaries and form Nambeelup Brook. A smaller unnamed tributary of Nambeelup Brook flows west through the centre of the Section.

3.2.3. Section 3

Nambeelup Brook North Tributary flows from Section 2 and continues south-westerly through the northern part of Section 3. A smaller unnamed tributary of Nambeelup Brook flows south-westerly through the Section.

3.2.4. Section 4

The largest tributary of Nambeelup Brook that crosses the Project, Balgobin Brook, flows westerly through Section 4, joining with Balgobin Brook South close to the centre of the Section which also flows westerly through the southern half of Section 4. A smaller unnamed tributary of Balgobin Brook flows westerly through the southern half of the Section.

3.2.5. Conservation Category Wetlands and Environmentally Sensitive Areas

A number of Conservation Category Wetlands (CCWs) (DBCA, 2022) and associated Environmentally Sensitive Areas (ESAs) (DWER, 2021) are located to the north and west of the proposed Western Extension, as shown on Figure 3.1. A summary of those that are located downslope of mine disturbance areas and potentially impacted by the Western Extension is provided in Table 3.1 and more information can be found in Rockwater (2021) and Ecoedge (2021, 2022), all of which report that areas of CCW they had monitored were degraded due to clearing. It should be noted that the accuracy of this assessment of affected CCWs is based on limited topographical data for determining surface water flowpaths.

Rockwater (2021) did however report that the vegetation condition within wetland 14807 (Yangedi Swamp) improved from degraded to good in 2021. At this site, vegetation condition improves during wetter periods when surface water suppresses germination of many exotic terrestrial herbs, and declines in response to the presence of aggressive weed species in drier years and during drier stages in the wetland hydroperiod. This wetland is located within Bushland Forever Site 77, where vegetation on freehold land is managed for conservation purposes.

Hydrogeological and environmental monitoring data collected during 2020 suggest that mining activities at Keysbrook have not resulted in changes to the water regime that have the potential to impact the health of groundwater dependent vegetation at wetland monitoring sites (Rockwater, 2021).

Table 3.1 Summary of Conservation Category Wetlands Potentially Impacted by the Western Expansion

Section	Subcatchment	CCW ID	Type	Management Category
1	Dirk Brook Catchments	14850	Dampland	Seasonally waterlogged
	Punrack Drain	14760 7000	Palusplain	Seasonally waterlogged
	Nambeelup Brook North	14825 14763	Palusplain	Seasonally waterlogged
		14798	Dampland	Seasonally waterlogged
2	Nambeelup Brook North	14807	Sumpland	Seasonally inundated
		14795	Palusplain	Seasonally waterlogged
3	Nambeelup Brook North	14870	Palusplain	Seasonally waterlogged
4	-	-	-	-

An assessment of the contours supplied by Doral and publicly available SRTM and satellite imagery suggests that the proposed Western Extension does not impact on the catchment of other local CCWs, such as 14887, 14772, 14894, 14802, 14803, 14805 and 14831. A number of Resource Enhancement wetlands are also located within Sections 1-3, as shown on Figure 3.1.

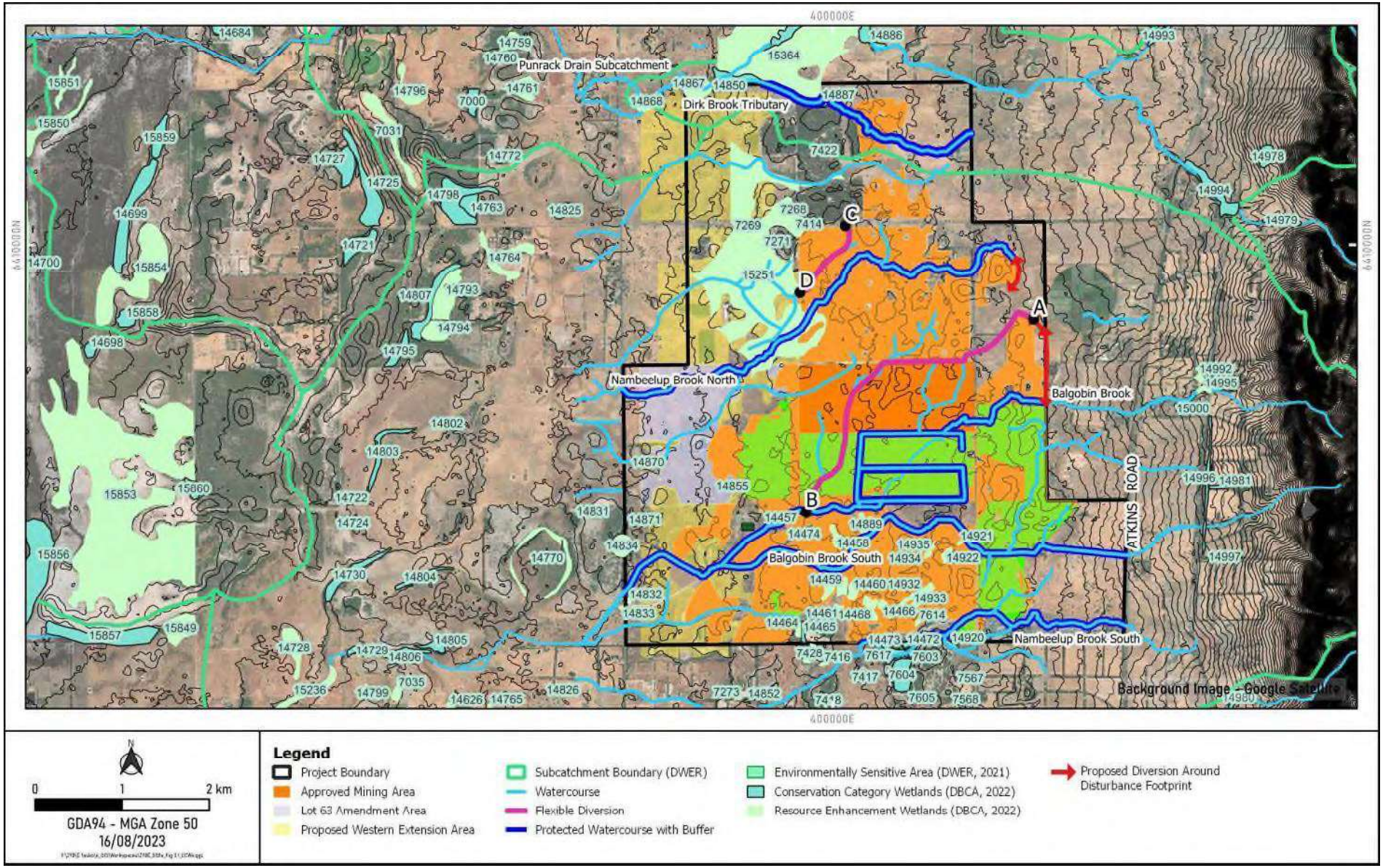

Figure 3.1 Conservation Category Wetlands

3.3. Threatened and Priority Ecological Communities

As reported by Ecoedge (2022), ecological communities are defined as "*…naturally occurring biological assemblages that occur in a particular type of habitat. They are the sum of species within an ecosystem and, as a whole, they provide many of the processes which support specific ecosystems and provide ecological services*". Threatened Ecological Communities (TECs) may be listed under one of three conservation categories: Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). Priority flora is under consideration for future declaration as "Threatened flora", dependent on more information. Species classified as Priority One to Three (referred to as P1, P2 and P3) require further survey to determine their status. Priority Four (P4) species are adequately known rare or Threatened species that require regular monitoring.

A summary of Threatened and Priority Ecological Communities and Threatened and Priority flora located within and/or downstream of each Section of the Western Extension is provided in Table 3.2, based on Figures 3.2 and 3.3 from Ecoedge (2022). Figure 3.2 and Figure 3.3 show that there is one TEC (SCP15), which includes one P4 priority flora located downstream of Section 1 to the west, within the Nambeelup Brook catchment. Although not shown on these figures, there is one TEC (SCP FCT 3c) in good condition, located to the east of the south-eastern corner of the same Section, but the topographical data available suggests that they are not connected in terms of surface water flows (up-gradient).

Table 3.2 TEC and Priority Flora Communities Downstream of the Western Extension

Section	Community Classification	Description
1	TEC (SCP15)	Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain (SCP15)
	P4	None provided
2	P1, P2, P3	None provided
3	-	-
4	P2	None provided

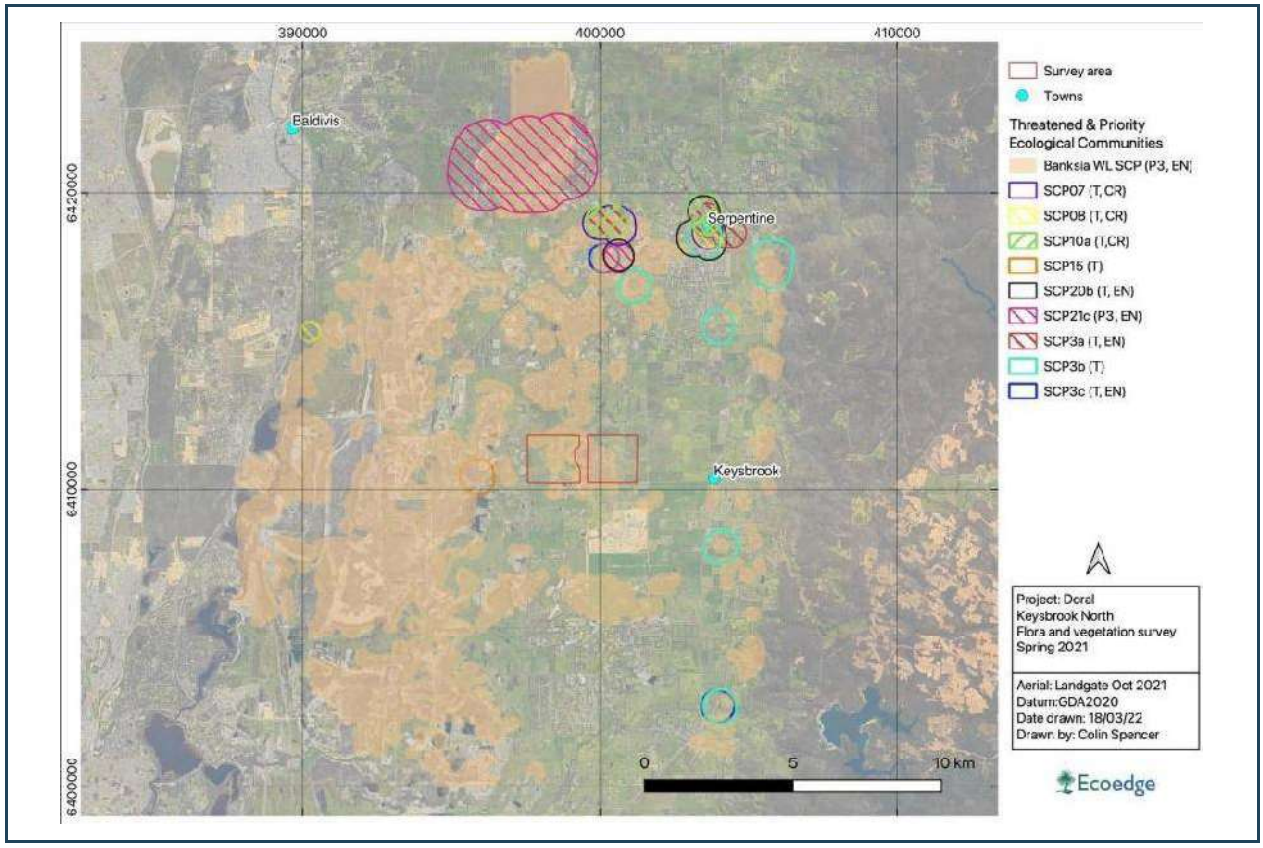

Figure 3.2 Desktop Search Results of TEC's and PEC's (Ecoedge, 2022)

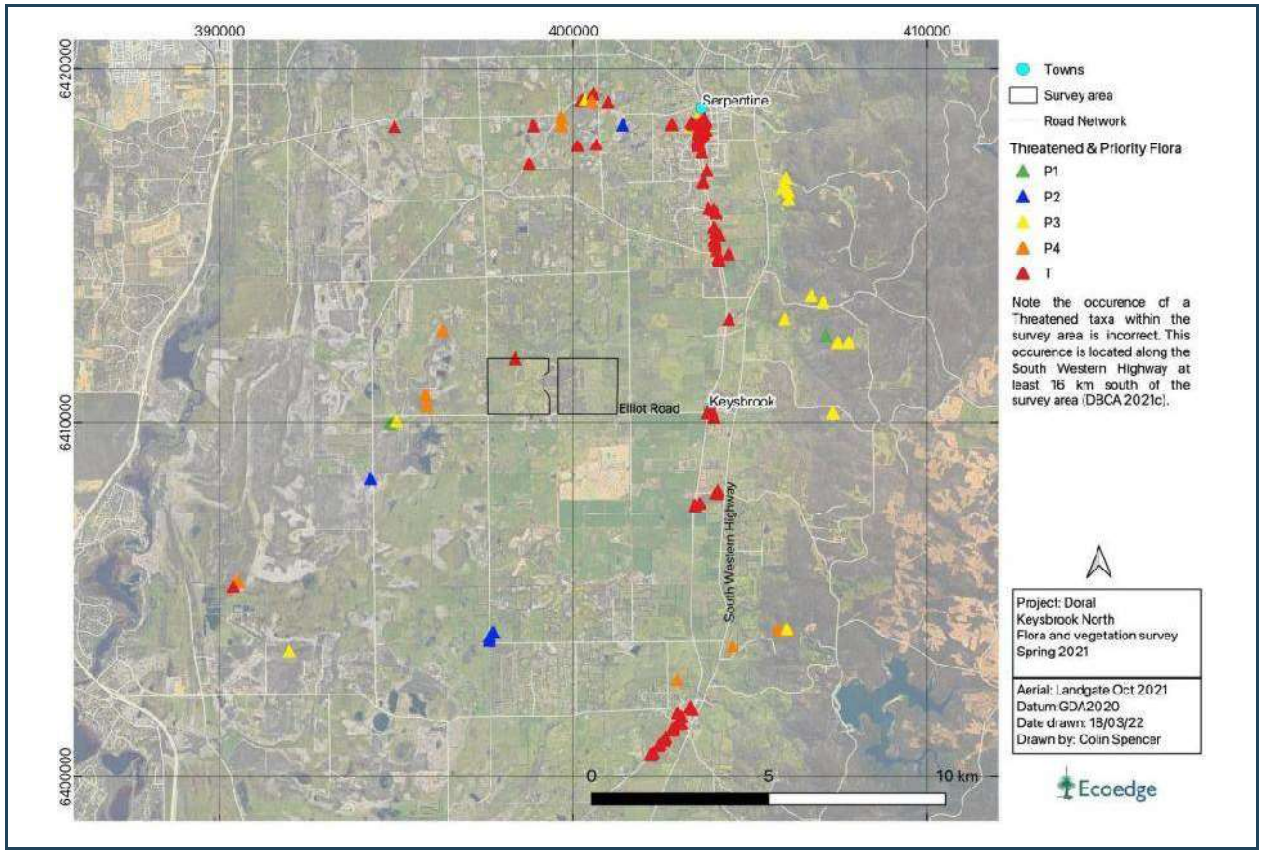

Figure 3.3 Desktop Search Results of Threatened and Priority Flora (Ecoedge, 2022)

4. SURFACE WATER MANAGEMENT

4.1. Management of Watercourses Crossing the Project

As per the WMP (MBS, 2015), inflows from external catchments will either be diverted as clean water away from the disturbed mining area and back into a watercourse downstream, or flow through the mine site but remain separate from it. Other minor creek lines will be included in the mining activities, but then reinstated during rehabilitation.

4.1.1. Watercourse Classifications

Watercourse classifications reported by MBS (2006, 2015) are presented in Table 4.1, along with their management philosophies which are discussed in more detail in the following sections.

Table 4.1 Watercourse Classifications (MBS, 2006 2015)

Watercourse Category	Peak flows (m^3/s)	Watercourses	Management Philosophy	Section
Major	2-5	Balgobin Brook North Dandalup River Tributary	Watercourse buffers	4 -
Medium	1-2	Dirk Brook Tributary Nambeelup Brook North Tributary Balgobin Brook South Tributary Nambeelup Brook South Tributary	Watercourse buffers	1 2, 3 4 -
Minor	<1	Unnamed	Diversion of upstream catchments	All

4.1.2. Watercourse Buffers

Watercourses categorised as Major and Medium, with peak flows greater than one cubic metre per second, will have 10 m buffers (MBS, 2006) and be bunded off and protected from disturbed mine areas.

4.1.3. Diversion of Upstream Catchments

Minor Watercourses passing through the Project with peak flows of less than one cubic metre per second are generally shallow and poorly defined (MBS, 2006, 2015). Flow in minor watercourses and sheet flow in between watercourses can be managed by bunding of the operational areas and construction of diversion drains; only minimal earthworks will be necessary due to the low flows carried by these watercourses. These diversions are to ensure that inflows from the upstream catchments do not contribute runoff to the 'Disturbance Footprint' inflows.

Where practical, these diversions should be constructed to ensure minimum erosion potential and to direct drainage back to its natural drainage line downstream at a velocity and depth that can be accommodated without increased scour. Diversions should be in place for the minimum time necessary and removed as soon as possible as part of progressive rehabilitation. During landform restoration, drainage will be re-established along original drainage lines. Contours of the restored landforms and drainage lines will be returned to pre-mining levels as closely as possible. (MBS, 2015).

MBS (2006) determined that the effects of drainage diversions on runoff volumes and flow rates at the regional scale are expected to be minor because:

- Only a small proportion of the total Project area catchments will be disturbed at any time.
- Surface water diverted around an active mine pit will be redirected back into the natural drainage line downstream.

4.1.4. Section Requirements

A summary of the watercourse management requirements for each Section is provided in Table 4.2 and presented on Figure 4.1 and Figure 4.2. Diversions for upstream catchments are proposed on the Figures, however the shape of the mine footprints within Sections 3 and 4 in particular do not allow for Life of Mine diversions to be proposed. It is recommended that progressive diversions are used around the mine footprint development in the areas indicated on Figure 4.2.

Table 4.2 Western Extension Watercourse Management

Section	Watercourse	Management (refer Figure 4.1)
1	Unnamed stream	Diversion J-K
2	Nambeelup Brook North Tributary	Buffer
	Unnamed stream	Diversion D-E
3	Nambeelup Brook North Tributary	Buffer
	Unnamed stream	Diversion L-M
4	Balgobin Brook Balgobin Brook South	Buffer
	Unnamed stream	Buffer*

* No buffer has been directly recommended for this watercourse however the mine disturbance area footprint appears to include one.

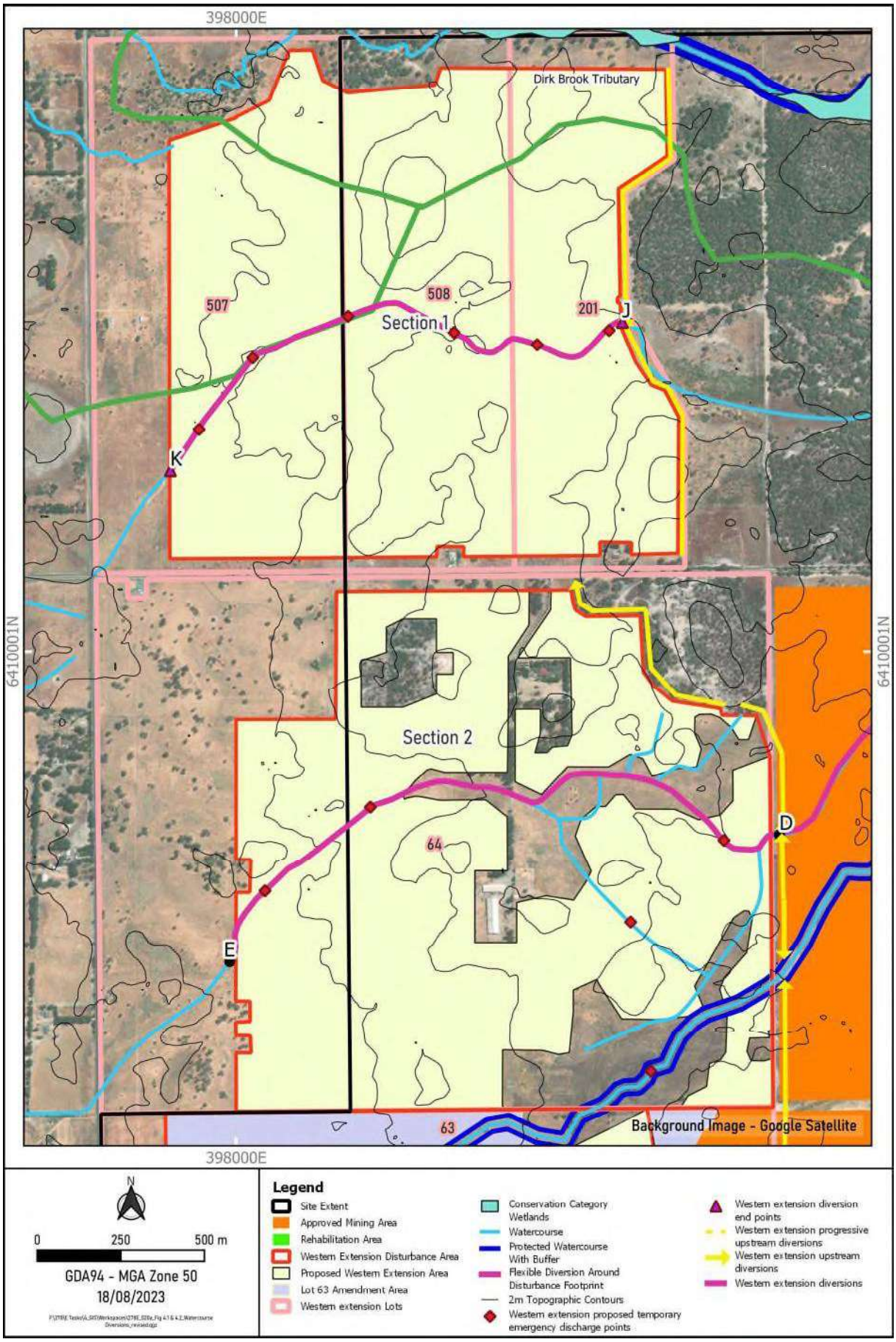

Figure 4.1 Western Extension Watercourse Management – Sections 1 and 2

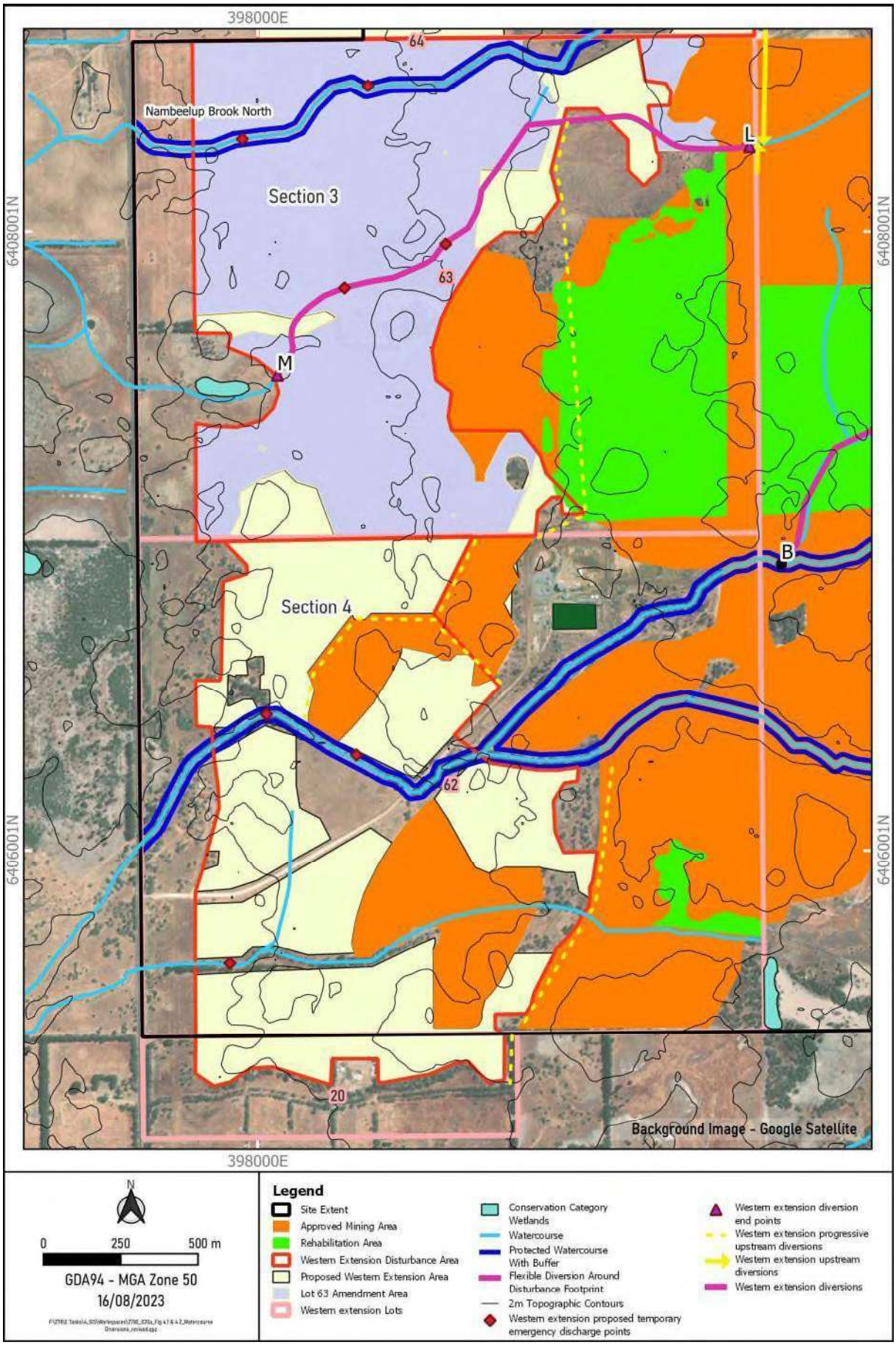

Figure 4.2 Western Extension Watercourse Management – Sections 3 and 4

4.2. Mine Catchment Runoff and Discharge Points

Runoff from the Project area will continue to be collected in the Process Water Dam (a series of 3 dams with overflow channels between them and a combined capacity of 74ML), located near the primary processing plant, as discussed in AQ2 (2020) and MBS (2015); Doral will ensure that this has sufficient capacity to accommodate the Western Extension.

Consistent with previously approved areas, it is assumed that runoff from within the Western Extension is to be captured in a 'return water settling pond' prior to being pumped via the dewatering system to be harvested and stored in the Process Water Dam. If a rainfall sequence causes runoff from the disturbed areas to be in excess of water demand requirements, (i.e., where pumping to the Process Water Dam would cause levels to rise above normal operating levels), pumping to local emergency discharge locations is proposed instead. In the event of surplus water volumes being released into the environment, any surplus water discharged off the site at the local emergency discharge locations would have naturally entered the waterways anyway and changes in flooding regime (other than minor local effects) are unlikely to occur. The mitigation measures required are those at the overflow release points into the environment.

To keep any emergency discharge returning to the same tributary as per the existing hydrological regime, Doral have proposed an additional 10 temporary emergency discharge points, as shown on Figure 4.1 and Figure 4.2, to allow for progression as the mining front moves in stages across the Western Extension. It should be noted that 8 temporary emergency discharge points within Section 3 have already been proposed as part of the Lot 63 amendment and are shown on Figure 4.2. The operation of any of these would be the same as has been applied to date and the receiving environment of adjacent points would be the same whichever is adopted. Some of the proposed discharge points are into minor watercourses which will be progressively diverted during mining, however they may be used prior to the diversion.

4.3. Management of Mine Water

The WMP (MBS, 2015) defines the approach to be adopted for management of mine water and it is assumed that this will continue to be applied within the Western Extension. The WMP states that mining areas will have ring drains installed with a sump on the pad perimeter. Tails decant sumps will be installed in tailing areas within the mine void. Water from these sumps will be transferred to the process circuit. The mine void will be bunded to prevent surface inflows from adjacent areas. 'V' drains will be installed to divert surface flows around assets and operating areas.

MBS (2006) recommended that surface water quality impacts can be minimised by the following measures:

- Isolating infrastructure areas that have the potential to contaminate surface water.
- Constructing sediment sumps, silt and oil traps where necessary to remove sediments or pollutants from runoff before water enters local drainage.
- Immediate clean-up of any spills of contaminants, such as oil or fuel.

The major water quality issue in the area is the high levels of nutrients. Mining is unlikely to have any effect on nutrient levels in runoff, but care should be taken in rehabilitation activities to minimise actions that could raise nutrient levels such as use of excessive fertiliser.

As a result of heavy rainfall events, there is the potential for increased turbidity from recently rehabilitated areas that are not yet fully stabilised. Sedimentation basins should be constructed where required to reduce turbidity before release to the environment. The Water and Rivers Commission Water Quality Protection Guideline 11 lists criteria for TDS and total suspended solids (TSS) in mine discharge water to not cause an increase above 10% of seasonal background levels.

4.4. Water Quality

The existing regional water quality relative to the Project was discussed by MBS (2006, 2015). The Statewide River Water Quality Assessment (DoW 2007) shows water quality data for Nambeelup Brook (Site 614063), located 10 kilometres downstream (southwest) of the Project was of neutral pH, with very high nitrogen and phosphorus concentrations and high turbidity. This shows water quality has been affected by historic and existing land uses prior to any mining taking place.

As noted in the DWER Licence Appendix, the process ponds act as sedimentation basins, settling suspended solids prior to overflow. Based on monitoring undertaken in relation to the Project as a whole, a pH and a TSS exception was recorded in comparing the pond water quality with the water quality in the environment. In general, the measured background and pond water quality values reflect the disturbed nature of the receiving environment. As such, the consequence of captured water released into the environment is considered to be local only, with no significant impact on water quality (AQ2, 2020).

Figure 4.3 shows existing surface water monitoring sites that were proposed by previous studies, along with new locations proposed for the Western Extension, which should be monitored for the same parameters and at the same frequency as the existing sites. The proposed sites are located either upstream of proposed mine disturbance areas (Sections 1 and 4) or downstream at the western edge of the Lot boundaries.

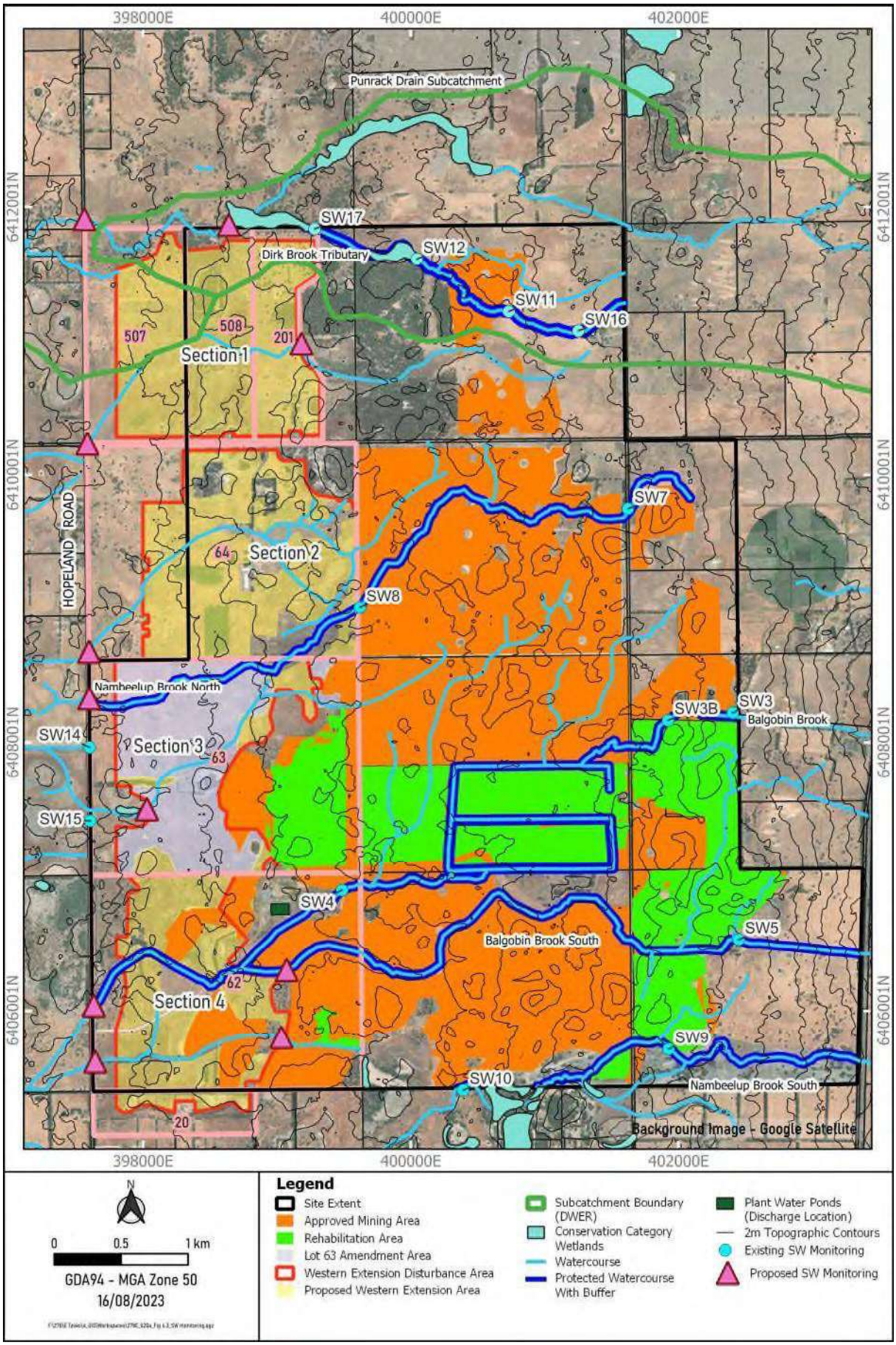

Figure 4.3 Surface Water Monitoring

5. POTENTIAL IMPACTS ON TECS AND CCWS

The WMP (MBS, 2015) discusses potential impacts of the Project on CCWs and native vegetation, including lowering of the water table, changes to water quality and reduced health and condition. Due to the requirement to capture and retain water onsite, a reduction in flow to these areas should also be considered.

The 0.5m and 2m contour information provided by Doral has been used to delineate the surface water catchments for CCWs/TEC that are potentially impacted by the Western Extension (refer to Figure 5.1). The potential reductions in catchment areas due to mine disturbance are presented in Table 5.1. Note that the accuracy of the delineated catchments is limited by the available topographic data and there is potentially considerable uncertainty in their sizes.

Based on the limited topographic data available, the proposed mining area of Section 1 has the most significant impact on downstream CCWs as all of the disturbance area sits within CCW catchments. It causes approximately 21% reductions in the catchments of 14825 and 17% of the combined area of 14763/14798. The proposed additional mining area of Lot 63 (Section 3) does not cause any additional reduction in the catchment of 14870. It should be noted that the catchment delineations suggests that no TECs are impacted by the proposed Western Extension development (Figure 5.1).

This assessment takes into consideration areas that are being coincidentally backfilled and/or restored and are therefore also removed from the catchment.

Table 5.1 Possible Reductions in CCW and TEC Catchment Areas

Section	CCW/TEC	Total Catchment Area (km^2)	Total Possible Mining Area in Catchment (km^2)	Reduction in Catchment Area (%)
1	7000	0.9	0.1	12
	14825	6.5	1.4	21
	14850	23.9	0.04	<1
	14763 14798	7.9	1.4	17
	14760	26.5	0.2	1
2	14825	6.5	0.3	4
	14763 14798	7.9	0.3	3
	14807 14795	3.7	0.1	3
3	14870	0.7	0.2	0
4	-	-	-	-

Given these potential reductions in catchment area it is therefore recommended that, in addition to the SW monitoring recommended above, in line with the WMP (MBS, 2015), the presence or absence of standing surface water in the CCWs potentially impacted by the project should be recorded monthly. The WMP also makes recommendations relating to vegetation monitoring of the small Dirk Brook CCW.

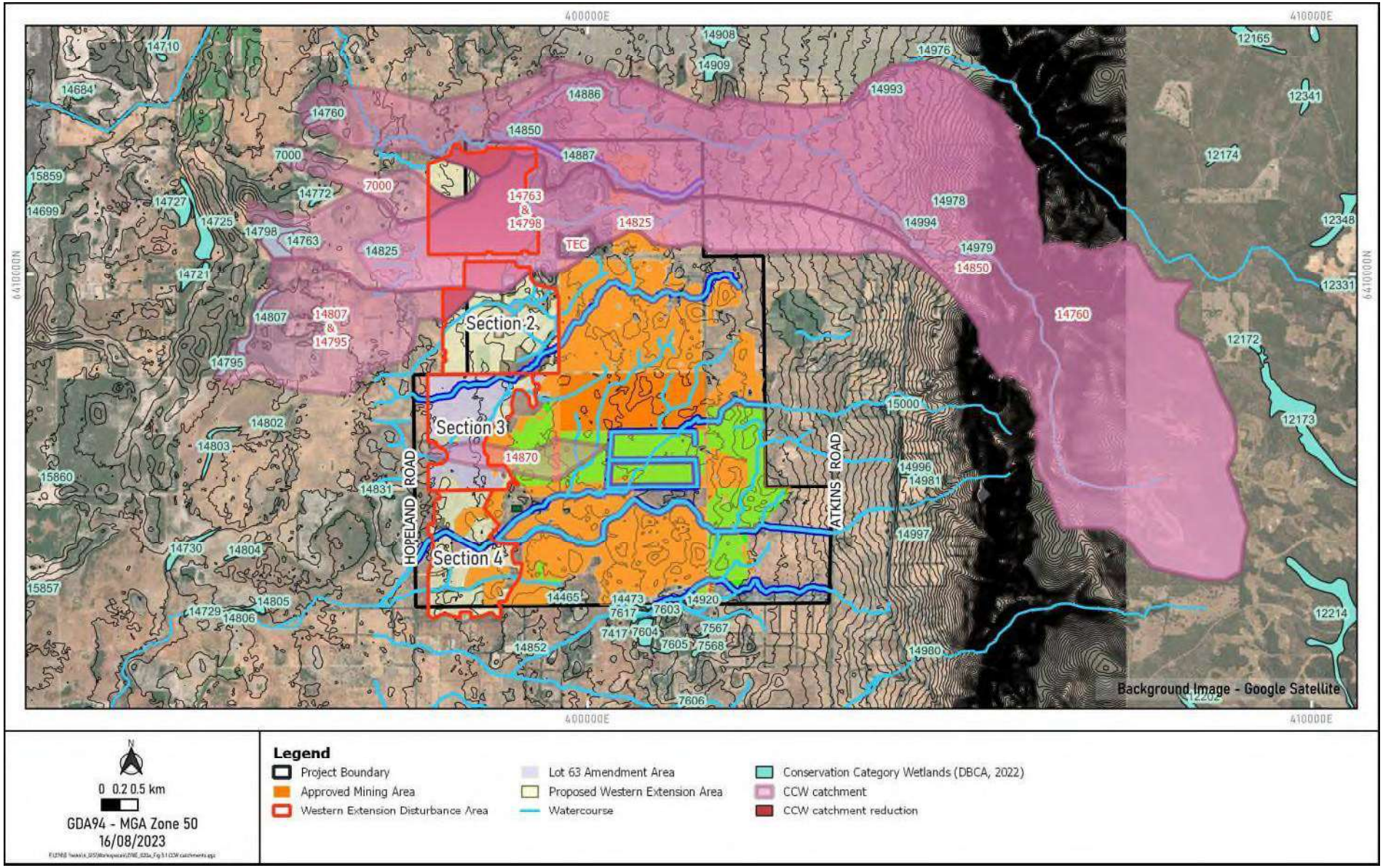

Figure 5.1 CCW and TEC Catchments

6. CONCLUSIONS

This assessment considers the potential changes to the surface water environment as a result of the proposed Western Extension of the Project, which has been broken down into four progressively mined Sections. It has been assumed that the surface water management philosophy of the Project has remained unchanged from that reported in the WMP (MBS, 2015) and by AQ2 (2020). As a result, the buffer zone surrounding Major and Medium watercourses will continue to apply, protecting them from disturbance. The smaller watercourses flowing across the Western Extension will be diverted around mining areas and subsequently restored, minimising the impact on downstream flows.

Any surface water runoff from disturbed areas within the mine site will be collected and added to the process water circuit. Ten temporary emergency discharge locations for the Western Extension have been suggested by Doral. Where release of surface water to the environment does occur, there is unlikely to be material change to the flooding regime downstream, as the discharge of water to the environment is returning catchment yield to the natural downstream hydrological environment, which had been removed by the development. Monitoring within the existing operations indicates the water quality in the mine ponds is similar to the background water quality in the receiving environment and release of the water would therefore not have a significant impact on downstream water quality.

The main potential impact of the expanded mining area is due to the removal of catchment runoff that would have previously reached the CCWs downstream, particularly due to Sections 1 and 2. There is no potential impact to any TECs identified due to reduction in catchment area. Recommendations have been made for additional SW monitoring locations to monitor the effects of operations within the Western Extension and identify potential impacts on the CCWs, along with monthly observations of the presence or absence of water within them.

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KEYSBROOK MINERAL SANDS MINE

GROUNDWATER LICENCE OPERATING STRATEGY – V9

11-NOV-25

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April 2012	3	Revision – Whole document	DR (RW)	MM (MZI)
Nov 2012	4	Revision – Whole document	BK (RW)	MM (MZI)
Mar 2013	5	Revision – As per DoW comments	MT (RW)	MM (MZI)
Jan 2020	6	Revision as per Triennial Review and addition of new mining areas	DO (Doral)	CB (Doral)
Nov 2020	7	Updated as per DWER comments	DO (Doral)	CB(Doral)
May 2024	8	Revision after DWER review of GWL Trigger levels and addition of Lot 63 and Lot 56 approvals (addendum approved)	JE (Doral	CB (Doral)
November 2025	9	Amended to include Keysbrook Western Extension	JE (Doral)	CB (Doral)

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INTRODUCTION

Doral Mineral Sands Pty Ltd (Doral) owns and operates the Keysbrook Mineral Sands Project (Keysbrook) located 70 km south of Perth between Pinjarra and Serpentine. Mining (day time only) and processing occur 24 hours per day, 7 days per week, with periodic shutdowns for maintenance. Operations commenced in late 2015, with the processing plant reaching mechanical completion in October 2015 and practical completion on 11 December 2015. The project was acquired from MZI Resources Ltd (formerly the parent company of KLPL) by Doral Mineral Sands on 1 July 2019. The Project is within the Shire of Murray and the Shire of Serpentine-Jarrahdale. Approvals to date are outlined below:

- On 19 October 2009 the WA Minister for the Environment granted approval for the Keysbrook Mineral Sands Mine through the publication of Ministerial Statement 810 under Part IV of the Environmental Protection Act 1986 (EP Act).
- On 14 October 2019, Lots 101, 103, 104 and 105 Westcott Rd were approved for mining under section 45C of the Environmental Protection Act 1986.
- On 18 September 2023, Lot 56 Westcott Rd was approved for mining under section 45C of the Environmental Protection Act 1986.
- On 16th October 2023, an additional area for Lot 63 was approved for mining under section 45C of the Environmental Protection Act 1986.

The proposed Western Extension to the Keysbrook Mineral Sands Mine was submitted to DWER 25th September 2024 and is currently under EPA assessment.

The Project footprint spans part of the Serpentine and Murray Groundwater Management Areas. Water is required for primary mineral processing, dust suppression, potable purposes and equipment washdown and is obtained from the Lower Leederville aquifer, retained localised runoff and from seasonal dewatering of the shallow Superficial aquifer.

Four 5C licences to take groundwater were issued to the project covering water supply from the Leederville aquifer and localised dewatering of the Superficial aquifer with a combined annual allocation of 2.4 GL. The 5C licences expired in December 2022 with renewals granted by the Department of Water and Environmental Regulation (DWER) in August 2023.

As part of the renewal assessment, DWER requested Doral undertake a detailed review of the current groundwater level and water quality monitoring trigger levels, which are set out in Keysbrook's Groundwater Licence Operating Strategy (GLOS). The trigger levels have generally been reviewed annually since the initial levels were set in 2013, with formal adjustments to the levels made in 2015 and 2020. A DWER initiated review was requested by the DWER to:

- Better understand how the groundwater trigger levels for both drawdown and water quality have evolved over time, and confirm which of the trigger levels are still appropriate.
- Make recommendations as to which trigger levels might require adjustment as part of the 5C licence renewals.
- Include a review of the trigger level management contingency actions, so as to better manage future water level and water quality changes.

V8 of the GLOS was based on revised trigger levels developed in consultation DWER and Groundwater Resource Management, updating groundwater monitoring locations to better reflect current operations, the inclusion of additional area in mining Lot 63 (GWL209028) and rectifying errors in Table 8. Whilst V8 was not formally approved an addendum to the V7 GLOS was approved by DWER in November 2023.

This revised Groundwater Licence Operating Strategy V9 was prepared in accordance with the Guidelines for producing a basic water resource operating strategy associated with a water licence (DWER 2019) and refers to groundwater abstraction from both the Superficial and Leederville aquifers. V9 is submitted to include the proposed Western Extension monitoring bores recently installed and currently monitored in preparation for the project expansion and includes groundwater quality triggers.

1. ADMINISTRATIVE REQUIREMENTS

1.1. GROUNDWATER LICENCES

Abstraction permitted under the groundwater licences listed in **Table *1*** are the subject of this operating strategy.

Table 1: Project Groundwater Licences

GWL	Groundwater Area	Water Resource	Annual Entitlement (kL/annum)	Location of Water Source	Authorised Activities	Date of Issue	Date of Expiry
164007(3)	Murray	Lower Leederville	1,800,000	Lot 31-34, 63	Mineral ore processing and other mining purposes	16 Aug 23	15 Aug 33
176404(3)	Murray	Superficial Swan	200,000	Lot 31-34	Mineral ore processing and other mining purposes	17 Aug 23	15 Aug 33
177296(4)	Serpentine	Superficial Swan	200,000	Lot 101, Lot 103 - Lot 105, Lot 57	Mineral ore processing and other mining purposes	17 Aug 23	15 Aug 33
209028(1)	Serpentine	Superficial Swan	200,000	Lot 63	Mineral ore processing and other mining purposes	16 Aug 23	15 Aug 33

1.2. STAGED DEVELOPMENT OF WATER LICENCE

The Project has been in operation since October 2015. There is no planned future, staged demand on local groundwater resources due to the nature of mining and progressive rehabilitation and no proposed changes to processing practices.

Superficial groundwater licences are likely to be amended in the future to include Western Extension lots (20, 64, 201, 507 and 508) and remove lots previously mined and rehabilitated for the existing project.

1.3. HYDROGEOLOGICAL AND ENVIRONMENTAL INVESTIGATIONS

Reports of key investigations into the local water resources and monitoring outcomes since implementation of the Project are summarised in **Table *2***.

Table 2: Key hydrogeological and environmental investigations

Report	Year Published	Summary
Rockwater Pty Ltd Keysbrook Area Hydrogeological Assessments, 2006/2007	2006/2007	• Dewatering for mining activities is expected to have no detrimental impact on water levels on water levels in the Superficial Aquifer; and, • Abstraction from the Leederville production bores is expected to have no significant effects on the Leederville aquifer or any other Leederville bores in the area.

Report	Year Published	Summary
Groundwater Resource Management Pty Ltd Annual Groundwater Monitoring Review 2015	2016	• No detrimental impact on the Superficial or Leederville aquifers to date.
Groundwater Resource Management Pty Ltd Annual Groundwater Monitoring Review 2016	2017	• No material impact on the Superficial or Leederville aquifers to date.
Rockwater Pty Ltd Wetland Vegetation Monitoring Spring 2016	2017	• No impacts on wetland vegetation condition to date.
Rockwater Pty Ltd Wetland Vegetation Monitoring Autumn 2017	2017	• No impacts on wetland vegetation condition to date.
Groundwater Resource Management Pty Ltd Triennial Groundwater Monitoring Report 2015 – 2017	2018	• No material impact on the Superficial or Leederville aquifers to date.
Rockwater Pty Ltd Wetland Vegetation Monitoring Autumn 2018	2018	• No impacts on wetland vegetation condition to date.
Rockwater Pty Ltd Wetland Vegetation Monitoring Spring 2018	2018	• No impacts on wetland vegetation condition to date.
Groundwater Resource Management Pty Ltd Annual Groundwater Monitoring Review 2019	2020	• No material impact on the Superficial or Leederville aquifers to date.
AQ2 Surface Water Assessment for the proposed Keysbrook Heavy Mineral Sands Project	2020	• Revised modelling to determine the amount of water intercepted during mining of Lot 57 and provisions for emergency discharge points.
Rockwater Pty Ltd Wetland Vegetation Monitoring Spring 2019	2020	• No impacts on wetland vegetation condition to date.
Groundwater Resource Management Pty Ltd Annual Groundwater Monitoring Review 2020	2021	• No material impact on the Superficial or Leederville aquifers to date.
Groundwater Resource Management Pty Ltd Annual Groundwater Monitoring Review 2021	2022	• No material impact on the Superficial or Leederville aquifers to date.
Groundwater Resource Management Pty Ltd	2023	• No material impact on the Superficial or Leederville aquifers to date.

Report	Year Published	Summary
Annual Groundwater Monitoring Review 2022		
AQ2 Surface Water Assessment for the proposed Keysbrook Heavy Mineral Sands Project	2023	• Revised modelling to determine volume of water intercepted during mining of Lot 63 and provisions for emergency discharge points.
AQ2 Keysbrook Mineral Sands Mine Surface Water Assessment for Western Extension	2023	• Revised modelling to determine volume of water intercepted during mining of Lot 63 and provisions for emergency discharge points • Surface water management will remain as for the current project.
AQ2 Keysbrook Mineral Sands Mine Groundwater Assessment for Western Extension	2023	• Groundwater data of current mine suggests minimal impact as a result of mining • Minimal localised changes in the area of mining for the Western Extension
Groundwater Resource Management Pty Ltd Annual Groundwater Monitoring Review 2023	2024	No material impact on Superficial or Leederville aquifers to date.
Groundwater Resource Management Pty Ltd Annual Groundwater Monitoring Review 2024	2025	Continued cyclical seasonal variability with no drawdown compliance triggers met

1.4. DURATION OF THE OPERATING STRATEGY

This revised version of the GLOS is intended to apply for the duration of the groundwater licences, to August 2033. Amendments to the GLOS may be made annually as part of the Groundwater Monitoring Summary or Triennial Groundwater Monitoring Report, or as necessary to address any changes to the water-supply borefield, or monitoring program, or to respond to monitoring data or regulatory changes.

1.5. PERSON RESPONSIBLE

Julie Edwards
Environmental Superintendent
Keysbrook Leucoxene Pty Ltd
1424 Hopeland Road
North Dandalup WA 6207
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1.6. REPORTING

Water meter readings will be submitted to DWER within 30 days of the end of the water year.

A Groundwater Monitoring Summary will be submitted to the Department of Water and Environmental Regulation (DWER) within 90 days of the end of the water year (i.e. by 31 March each year). The reporting period (the water year) is 12:00 am 1 January to 12:00 midnight 31 December. This report will present monitoring data from the previous year and will not require an assessment of impacts unless there are breaches of triggers or GLOS commitments. It will also detail amendments to the GLOS.

A Triennial Groundwater Monitoring Report will be prepared that will assess the impacts of the abstraction from the previous three years and make recommendations for any required changes to the GLOS. This report will be prepared by a groundwater professional in accordance with the DWER Operational Policy No.5.12 – Hydrogeological Reporting associated with a Groundwater Well Licence, November 2009. The first Triennial Groundwater Monitoring Report was submitted in March 2018, with the next report due in March 2027.

KLPL also has reporting obligations for water and Conservation Category Wetlands under Ministerial Statement 810 (issued under Part IV of the *Environmental Protection Act 1986*), as well as surface and groundwater under licence L8918/2015 (issued under Part V of the Environmental Protection Act).

2. WATER SOURCE DESCRIPTION

2.1. GROUNDWATER

The Keysbrook mineral sands deposit is situated on the Swan Coastal Plain, about three kilometres west of the Darling Scarp. The site is underlain by about 10 to 15 m of Superficial formations (Quaternary age), comprising the Bassendean Sand and the Guildford Formation. These formations unconformably overlie about 50 to 130 m of Leederville Formation (Wanneroo and Mariginiup Members) of Cretaceous age. In the western part of the project area the Leederville Formation conformably overlies the South Perth Shale and in the eastern part it unconformably overlies the Cattamarra Coal Measures.

Prior to commencement of mining in 2015, two production bores (KL2P and KL3P) and seven monitoring bores were constructed in the Mariginiup Member of the Leederville Formation. Additionally, 40 shallow monitoring bores were constructed into the Superficial formations to monitor potential water level change in the Superficial aquifer due to abstraction from the Leederville aquifer production bores, seasonal dewatering and recharge from deposition of sand/clay tailings in slurry form into the mine void. Other superficial aquifer monitoring bores are used to monitor for any impacts adjacent to seasonal wetlands.

Due to the progression of mining, Doral request to amend the current monitoring regime to remove the monitoring requirement for 18 bores related to past mining areas and include 18 newly drilled bores in the vicinity of current and future mining.

Locations of the production and monitoring bores are shown in Figure 1 and bore details are summarised in Table 3.

Table 3: Production and Monitoring Bores

Bore ID	Date Completed	Coordinates (MGA)		Collar RL	Drill Depth	Casing ID	Casing Type	Cased Depth	Top of Casing	Depth to top of casing	Slotted Interval
		m E	m N	(m AHD)	m bgl	mm		m bgl	m agl	m	m bgl
SUPERFICIAL AQUIFER MONITORING BORES											
KL1S	May 2007	401628	6406792	33.86	3	50	uPVC	3	0.43	3.43	0 - 3
KWT1D	May 2007	400948	6405488	32.70	6	50	uPVC	6	0.59	6.59	5 - 6
KWT1E	May 2007	400965	6405441	32.37	4	50	uPVC	4	0.58	4.58	0 - 4
KWT2D	May 2007	400948	6405488	32.7	6	50	uPVC	6	0.59	6.59	0.- 3
KWT2E	May 2007	399395	6406856	28.28	6	50	uPVC	6	0.49	6.49	5 - 6
KWT3A	20/06/2012	398784	6405459	25.79	4.0	53.7	uPVC	4.0	0.40	4.40	1.0 - 4.0
KS 8	24/02/2012	400269	6405426	29.91	2.8	53.7	uPVC	2.8	0.40	3.20	0.8 - 2.8
KS 9	19/06/2012	399622	6405417	28.21	4.5	53.7	uPVC	4.0	0.40	4.40	1.0 - 4.0
KS 11	18/06/2012	398069	6405835	23.50	4.5	53.7	uPVC	4.3	0.42	4.72	1.3 - 4.3
KS 12	18/06/2012	398548	6406514	27.52	5.8	53.7	uPVC	5.8	0.40	6.20	2.8 - 5.8
KS 13	15/06/2012	397986	6406614	23.80	5.0	53.7	uPVC	5.0	0.40	5.40	2.0 - 5.0
KS 14	18/06/2012	398691	6407014	26.06	4.5	53.7	uPVC	4.0	0.30	4.30	1.0 - 4.0
KS 16	20/06/2012	398950	6407,86	28.01	4.0	53.7	uPVC	3.0	0.37	3.37	1.0 - 3.0
KS 17	21/06/2012	399580	6408635	31.25	4.5	53.7	uPVC	3.8	0.40	4.20	0.8 - 3.8
KS18	31/03/2017	399611	6407849	30.95	4.0	50	uPVC	4.0	0.45	4.00	3.0 - 4.0
KS23	14/02/2020	399601	6409479	30.622	3	50	uPVC	2.4	0.6	3	0.4-2.4
KS24	14/02/2020	399593	6410229	30.82	3	50	uPVC	2.8	0.6	3.4	0.4-2.8
KS25	14/02/2020	401048	6410243	35.476	3	50	uPVC	2.8	0.6	3.4	0.4-2.8
KS26	14/02/2020	401603	6408651	35.71	3	50	uPVC	2.5	0.5	3	0.4-2.5
KS27	-	400400	6410385	33.6	3	-	-	-	-	-	-
KS28	-	400360	6411205	35.5	6.7	-	-	-	-	-	-
KS29	14/03/22	401200	6411016	36.5	9	50	CL18 uPVC	8.6	0.5	9.1	3.0-8.6
KS30	15/03/22	400050	6411850	32.4	9	50	CL18 uPVC	9	0.5	9.5	3.0-9.0
KS31	15/03/22	401160	6411865	36.9	9	50	CL18 uPVC	9	0.5	9.5	3.0-9.0
KS32	31/10/24	399345	6410700	36.9	7	50	CL18 uPVC	4	0.5	7.5	4.0-7.0
KS33	31/10/24	397240	6414225	30.56	7	50	CL18 uPVC	4	0.5	7.5	4.0-7.0
KS34	10/05/23	397630	6407025	36.07	4	50	CL18 uPVC	4	0.5	4.5	1.0-4.0
KS35	10/05/23	397630	6407025	22.81	9	50	CL18 uPVC	9	0.5	9.5	1.0-9.0
KS36	10/05/23	397965	6407540	22.97	4	50	CL18 uPVC	9	0.5	9.5	1.0-9.0
KS37	10/05/23	397620	6407785	22.47	9	50	CL18 uPVC	9	0.5	9.5	1.0-9.0
KS38	10/05/23	397615	6408595	22.57	4	50	CL18 uPVC	4	0.5	4.5	1.0-4.0
KS39	10/05/23	398560	6408616	24.97	9	50	CL18 uPVC	9	0.5	9.5	1.0-9.0
KS40	31/10/24	399302	6411828	30.12	5	50	CL18 uPVC	2	0.5	5.5	2.0-5.0
KS41	31/10/24	398621	6411843	26.46	6	50	CL18 uPVC	2	0.5	6.5	2.0-5.0
KS42	21/05/25	397584	6411466	24.38	4	50	CL18 uPVC	1	0.5	4.5	1.0-4.0
KS43	1/11/24	397586	6410114	23.52	6	50	CL18 uPVC	3	0.5	6.5	3.0-6.0
KS44	1/11/24	397595	6409422	23.78	6	50	CL18 uPVC	3	0.5	6.5	3.0-6.0
KS45	21/05/25	397589	6410844	23.85	4	50	CL18 uPVC	1	0.5	4.5	1.0-4.0
KS46	1/11/24	397640	6405410	21.6	6	50	CL18 uPVC	3	0.5	6.5	3.0-6.0
LEEDERVILE AQUIFER PRODUCTION BORES											
KL2P	01/04/07	399190	6406893	28.10	144	203	uPVC/Ss screens	139	0.598	139.6	58 - 94, 118 - 136
KL3P	01/04/07	398779	6405436	25.96	150	203	uPVC/Ss screens	122.4	0.552	122.9	70.6 - 97.6, 122.4 - 146.4
LEEDERVILE AQUIFER MONITORING BORES											
KL1 Obs	01/03/07	401625	6406792	34.00	90	67	uPVC	83	0.57	83.57	47 - 83
KL2 Obs	01/03/07	399186	6406766	27.64	144	67	uPVC	108	0.44	108.44	42 - 48, 54 - 60, 66 - 96
KL3 Obs	01/04/07	398778	6405465	26.10	156	67	uPVC	150	0.63	150.63	72 - 102, 120 - 150
KL 3	13/06/12	397639	6405465	21.95	26.0	53.7	uPVC	24.0	0.40	24.40	19 - 25
KL4	17/06/2012	400850	6405429	31.75	31.0	53.7	uPVC	30.3	0.42	30.72	24.3 - 30.3
KL 7	11/06/12	397986	6406940	24.15	37.0	53.7	uPVC	30.0	0.40	30.40	24 - 30
KL 8	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC

MGA = Map Grid Australia (Zone 50)

m agl = metres above ground level

m bgl = metres below ground level

m AHD= metres above Australian Height Datum

m btoc = metres below top of collar

2.2. WATER DISTRIBUTION NETWORK

Water is used for mineral processing, conveying ore and sand/clay tailings in slurry form, dust suppression and other sundry uses such as equipment washdown. Groundwater is used predominantly during the summer and autumn months to make up for water lost from the circuit through evaporation, infiltration to the Superficial aquifer and as residual moisture in heavy mineral concentrate exported from the site. Groundwater is sourced from two production bores in the Lower Leederville aquifer and in-pit sump(s) (Superficial aquifer) and stored in tanks and a process water dam. Surplus water collected from the mine area during the wetter months is stored in several clay-lined, decommissioned tailings cells and drawn down in preference to groundwater abstraction as the operation moves to water deficit, typically around November – December each year.

Pipelines between the production bores and facilities at the Wet Concentrator Plant (tanks, process water dam) are in fixed locations. The orebody is shallow and thin and consequently mining moves relatively quickly across the land. Pumps and pipes associated with the delivery of ore to the Wet Concentrator Plant and return of tailings to the mine void are regularly relocated to track the mining operation.

3. IDENTIFYING AND MANAGING IMPACTS

A summary of key risks relating to groundwater abstraction, management objectives, monitoring and responses is presented in **Table *4***. These risks are managed via a program of monitoring, review/evaluate and adaption. This is described in Sections 6 and 7.

Table 4: Identification, Measurement and Management of Environmental Risks

Risk	Management Objective	Measurement	Management Controls
Sustainability of supply	Annual abstraction is maintained within licence limits	Totalising meters installed and abstraction volumes measured in production bores.	Track abstraction volumes. Control pumping rates. Water recycling, conservation and storage measures to minimise demand on the production bores.
Excessive drawdown in the Leederville aquifer affecting other users	No excessive drawdown. No other users impacted.	Water levels monitored and reviewed.	Reduce and redistribute pumping demand.
Excessive drawdown in the Superficial aquifer affecting other users, or seasonal wetlands.	No excessive drawdown. No other users impacted.	Water levels monitored and reviewed.	Reduce and redistribute pumping demand.
Superficial aquifer water level and quality	No significant impact on the superficial water regime or water quality.	Water level and water quality measured in shallow monitoring bores across the site	Hydrogeologist to examine groundwater levels/quality relationship. Abstraction modified as warranted. Supplemental recharge considered as warranted.
Wetland water level and quality	No significant impact on wetland water regime or water quality	Water level and water quality measured in shallow monitoring bores adjacent to wetland	Hydrogeologists to examine groundwater levels/quality relationship. Abstraction modified as warranted. Supplementation recharge considered if warranted.

4. OPERATING RULES AND WATER MANAGEMENT

4.1. RECOMMENDED OPERATING SCHEMES

Seasonally the site transitions from a water surplus in winter months, to a water deficit during summer months. During winter months water intercepted on the mining footprint via mining activities is retained onsite. During periods of sustained high rainfall, water is discharged into Balgobin Brook South tributary, via the Process Water Pond spillway, which is managed as per DWER Licence L8918/2015.

Surface water

4.1.1. OPERATIONAL WATER SOURCES

The site receives/obtains water from a number of sources:

- Incidental rainfall;
- Intercepted shallow groundwater and local runoff (winter/spring);
- In pit dewatering sump(s) in the Superficial aquifer (winter/spring);
- Leederville production bores (summer/autumn); and,
- Local storage tailings cells ('shoulder' period).

The recommended production bore and sump-operating scheme is listed in **Table *5***. Operational water demand is influenced by the volume and temporal distribution of rainfall, spatial extent and location of the mine footprint.

Table 5: Production Bore and In–Pit Sump Operating Schedule

Bore Name	Recommended Pumping Rate (kL/d)	Annual Abstraction (GL/a)	Operating Protocols	Abstraction Strategy
Superficial aquifer				
In-Pit Sump(s)	548	0.4	Principal Sumps	Seasonal, operating as required for dewatering Sumps also used for tailing water return operating 24 hrs, 7 days per week (data 2015 – 2023 indicate net recharge of Superficial aquifer from tailings placement)
Leederville aquifer				
KL2P (-32.470606, 115.927238)	2,460	0.9	Principal Bore Abstraction load shared with KL3P	Seasonal and intermittent, operating 24 hrs, 7 days per week in periods of peak demand.
KL3P (-32.483719, 115.922709)	2,460	0.9	Principal Bore Abstraction load shared with KL2P	Seasonal and intermittent, operating 24 hrs, 7 days per week in periods of peak demand.

The water drawn from in-pit sumps is a combination of tailings return water, seasonal shallow groundwater inflow (Superficial aquifer) into the mined pit and localised surface runoff. Rates of pumping from in-pit sump(s) is significantly influenced by rainfall intensity and run-off from the operating mining area.

A totalising flow water meter has been installed at each production bore and in-pit sump to measure abstraction volumes. Figure 2 shows the method for calculating nett water abstraction from the Superficial aquifer. The volume of pit inflows including tailings water (w1) and surface run-off (x) that enters the mine pit and tailings areas is estimated and deducted from the total abstraction volume (y) collected from the in-pit sump(s) to estimate a true volume of groundwater abstraction from the Superficial aquifer (z).

Daily rainfall is recorded to assist in interpretation of site water balance estimations.

4.1.2. SURFACE WATER SOURCES AND MANAGEMENT

Surface water assessment was undertaken by AQ2 for the Western Extension which has been broken down into four progressively mined Sections. It has been assumed that the surface water management philosophy of the Project has remained unchanged from that reported in the WMP (MBS, 2015) and by AQ2 (2020). As a result, the buffer zone surrounding Major and Medium watercourses will continue to apply, protecting them from disturbance. The smaller watercourses flowing across the Western Extension will be diverted around mining areas and subsequently restored, minimising the impact on downstream flows.

Any surface water runoff from disturbed areas within the mine site will be collected and added to the process water circuit. Ten temporary emergency discharge locations used in a staged approach adjacent to the active mine area, have been included for the Western Extension. Where release of surface water to the environment does occur, there is unlikely to be material change to the flooding regime downstream, as the discharge of water to the environment is returning catchment yield to the natural downstream hydrological environment, which had been removed by the development. Monitoring within the existing operations indicates the water quality in the mine ponds is similar to the background water quality in the receiving environment and release of the water would therefore not have a significant impact on downstream water quality.

The main potential impact of the expanded mining area is due to the removal of catchment runoff that would have previously reached the CCWs downstream, particularly due to Sections 1 and 2. There is no potential impact to any TECs identified due to reduction in catchment area. See Appendix 1 for proposed Surface Water diversion management.

5. MONITORING PROGRAM

5.1. PURPOSES OF THE GROUNDWATER MONITORING PROGRAM

KLPL implements a monitoring program to achieve the following objectives:

- Measure abstraction volumes (and water levels) in the production bores to assess whether the bores operate within their pumping capacities and that the total annual abstraction is within the licence limit;
- Measure abstraction volumes of the in-pit sump(s) to inform assessments of total abstraction /recharge and evaluation against licence limits;
- Measure water levels in the production and monitoring bores to allow for assessment of impacts on the Superficial and Leederville aquifers, the environment, and other groundwater users;
- Measure water quality data in the production and monitoring bores to allow for an assessment of the influence of abstraction on groundwater quality;
- Describe water quality variations in salinity, major ions and pH over time; and
- Measure water levels associated with proximal Conservation Category wetlands

The program has been revised based on progression of mining to include the Western Extension, discussion with DWER and Groundwater Resource Management.

5.2. WATER USE MONITORING

A totalising flow meter is installed at each production bore and in-pit sump and is read monthly. Commitments for water use monitoring are detailed below and summarised in ***Table 6***:

- Flow meters are used in accordance with the *Rights in Water and Irrigation (Approved Meters) Order 2009*;
- Flow data will be recorded monthly; and
- Flow meter maintenance will be undertaken annually, and calibration will be carried out as requested or to meet the manufacturer's specifications.

Table 6: Pumpage Monitoring program

Draw Point (Bore ID)	Installation Date	Meter Serial number, make size and type	Co-ordinates of meter	Meter Maintenance/ Calibration Schedule	Frequency of Recording Meter Data
KL2P	01/01/2015	Serial No: 1407002223/ S5GB03016744 Make: Octave Size: 100mm Type: Ultrasonic Initial meter reading: 0	-32.470601, 115.927233	Maintenance and Calibration – As specified by manufacturer	Monthly
KL3P	01/10/2015	Serial No: 1407002336 Make: Octave Size: 100mm Type: Ultrasonic Initial meter reading: 0	-32.483713, 115.922709		
In-Pit	20/03/2025	Serial No.: 248018382	Pump moves relative to void		

Draw Point (Bore ID)	Installation Date	Meter Serial number, make size and type	Co-ordinates of meter	Meter Maintenance/ Calibration Schedule	Frequency of Recording Meter Data
Sump No.1		MakeOctave 8" SST High Flow DN200 Size: 200mm Type: Ultrasonic Initial meter reading: 0	being dewatered		

5.3. WATER LEVEL MONITORING

The groundwater monitoring program is set out in **Table 7** below. In addition to groundwater monitoring undertaken by KLPL on the project area, data from regional DWER Leederville bores AM63, AM63A, AM66 and AM66A will be obtained from the DWER on an annual basis and included in the annual reports to provide a regional perspective.

Field equipment used for water level readings is maintained and checked before each use and according to manufacturers' recommendations.

Table 7: Water Level Monitoring Program

Bore Type	Bore Name	Monitoring Purpose	Monitoring Frequency
Production Observation Bores (Lower Leederville)	KL1OBS, KL2OBS & KL3OBS	Evaluation of effect of groundwater abstraction in close proximity to site production bore	Monthly, when production wells are operational.
Lower Leederville Monitoring Bores	KL3, KL4, KL7 & KL8	Evaluation of regional effect, if any, of groundwater abstraction	Monthly
Superficial Monitoring Bores	KWT (KWT1D, KWT2E and KWT3A only)	Evaluation of effect of groundwater abstraction in close proximity to site production bore	Monthly
	KS8, KS9, KS11–KS14, KS16-KS18, KS26-KS46 and KPD0064	Evaluation of regional effect, if any, of groundwater abstraction	Monthly
Superficial Monitoring Bores	KWT (KWT1E, KWT2D)	Evaluation of effect, if any, of groundwater abstraction on Conservation Category Wetlands	Monthly
DWER Monitoring Bores Superficial and Leederville aquifer	T610 (3089), T670 (3098), T570 (3105) & T620 (3111) AM63, AM63A, AM66 and AM66A	Evaluation of regional effect of groundwater abstraction	Annual evaluation of DWER recorded levels

5.4. WATER QUALITY MONITORING

The proposed water quality monitoring program is given in **Table *8*: Water Quality Monitoring Schedule**

Table 8: Water Quality Monitoring Schedule

Monitoring Frequency	Site Name	Analysis	
		Field	Laboratory
Fortnightly	In-Pit Sump(s)	Schedule C	Schedule D
Monthly	In-Pit Sump(s)	Schedule C	Schedule D
	Production bores	Schedule A	n/a
	Production observation bores	Schedule A	n/a
	KL	Schedule A	n/a
	KS plus KPD0064	Schedule A	n/a
	KWT (KWT1A, KWT2A and KWT3A only)	Schedule A	n/a
Quarterly	Production bores	Schedule A	Schedule B
	In-Pit Sump(s)	Schedule C	Schedule D
	KS plus KPD0064	Schedule A	Schedule B plus TTA
	KWT (KWT1A, KWT2A and KWT3A only)	Schedule A	Schedule B
	KL	Schedule A	Schedule B
	DWER Bores - Superficial	DWER Monthly Desktop SWL Data Review	n/a
Annually	KS	Schedule A	Suite 8 metals, TPH, NH4, gross alpha activity, gross beta (where TTA ≥ 40mg/L)
	DWER Bores – Superficial - Annual evaluation of DWER recorded levels		

Water samples will be collected from the monitoring sites at the frequency identified in ***Table 8*** and analysed for the parameters listed in Schedules A to D (***Table 9***). Samples collected under Schedule B and D will be submitted to a NATA-registered laboratory for analysis. A chain of custody form will be used for the collection, transport and delivery of all water samples.

Table 9: Summary of Analytical Parameters, Schedule A to D

Groundwater		Superficial Dewatering	
Schedule A	**Schedule B**	**Schedule C**	**Schedule D**
Field Based	Laboratory Based	Field Based	Laboratory Based
Standing Water Level pH Electrical Conductivity Total Dissolved Solids Temperature	pH Electrical Conductivity Total Dissolved Solids Total Acidity, Total Alkalinity Iron (Total and soluble) Manganese Major Ions (K, Ca, Na, Mg, HCO3, Cl & SO_4) Aluminium Hardness ($CaCO^3$ equivalent) Total Nitrogen, Nitrate, Soluble Reactive Phosphate Total Phosphorus	pH Electrical Conductivity Total Dissolved Solids TTA Temperature	pH Electrical Conductivity Total Acidity Total Alkalinity Total Suspended Solids Total Dissolved Solids Turbidity Total Phosphorus Nitrate Total Nitrogen

5.5. SURFACE WATER MONITORING

Surface water monitoring includes upstream and downstream monitoring of streams and the Process Water Pond. Monitoring will be undertaken as per DWER Licence L8918/2015 and includes water quality discharge limits.

6. CONTINGENCY MEASURES

A series of contingency measures have been defined for circumstances where an adverse trend or environmental impact is identified through the monitoring program.

Groundwater management level and trigger levels have been revised for groundwater levels based on groundwater modelling in consultation with DWER. More recently drilled monitoring bores KS27-KS46 groundwater triggers were developed by a consulting hydrogeologist (AQ2). See Section 6.1 and Table *10*.

Groundwater Quality Triggers have also been developed by AQ2 using historical and more recent data for recently drilled bores. See section 6.2 and Table *11* and Table *12* for detail.

6.1. GROUNDWATER TRIGGER LEVEL REVIEW

Drawdown triggers were first defined for a total of 43 monitoring bores in the project's original 2013 GLOS which was prepared by Rockwater in 2013 and were developed prior to commencement of mining in 2015. The trigger levels were based on the minimum annual water level for each bore (measured in the previous years), less an applied drawdown limit value. The drawdown triggers were first reviewed and updated in an addendum to the GLOS in 2015 when the number of monitoring bores had been reduced to 28. These trigger levels were further revised, based on results of groundwater modelling undertaken in 2017 and 2020.

During the 2023 revision of the GLOS the number of compliance monitoring bores was reduced to 23. The results found most of the compliance bores required no change to trigger values except:

- Bore KWT1F should be removed from the schedule as it has been destroyed.
- Remove bore KS20 from the schedule as no data has been collected since mid-2022 due to landowner access denial. Also, the bore is located in a rehabilitated area that is now well away from current (and planned) mining.
- Consider re-establishing bore KLS1 as a compliance monitoring bore if monitoring bores KS4 to KS7 are removed from the monitoring schedule (discussed further in the Recommended GLOS changes section below).
- Leederville aquifer bore KL4 should have its water level trigger increased by 1 m to 19.7 mAHD as its water level is historically sensitive to nearby abstraction.
- Bore KS11 should have its water level trigger reduced to 20.30 mAHD, as the previous trigger level was possibly influenced by errors in the data.

The 2023 groundwater licence and associated trigger values were approved by DWER.

Between 2022 and 2025 further monitoring bores were installed for the Lot 63 and Western Extension developments increasing the monitoring program to 48 monitoring bores.

Triggers values for KS27-KS46 were developed by AQ2 consulting hydrologists for the Western Extension using draw down below lowest low values for each bore. KS42 and KS45 values have been extrapolated using nearby bore data using lowest recorded groundwater levels. The triggers are interim triggers as there is limited data available at the time of development and will be updated annually (prior to being in proximity to mining) in order to determine the lowest groundwater level observed prior to mining.

Appendix 2 contains hydrographs and associated 2 tier groundwater trigger levels for bores with sufficient data. The trigger levels are detailed in *Table 10* below.

Table 10: Standing Water Level Trigger Levels

Bore ID	Management Trigger Level (mAHD) (investigate cause)			Action Trigger Level (mAHD) (alter or cease pumping)		
	Drawdown below lowest low (m)	mAHD	mbtoc	Drawdown below lowest low (m)	mAHD	mbtoc
Superficial Aquifer Monitoring Bores						
KWT1D	0.2	29.12	4.17	0.3	29.02	4.27
KWT1E	0.2	29.43	3.52	0.3	29.33	3.62
KWT2E	0.5	25.73	3.04	0.8	25.43	3.34
KWT3A	1.0	23.08	3.11	1.3	22.78	3.41
KS8	0.8	27.64	2.67	0.8	27.34	2.97
KS9	0.5	25.38	3.23	0.8	25.08	3.53
KS11	0.5	21.02	2.9	0.8	20.72	3.2
KS12	0.5	23.34	4.58	0.8	23.04	4.88
KS13	0.5	21.3	2.9	0.8	21	3.2
KS14	0.5	23.43	2.93	0.8	23.19	3.17
KS16	0.5	25.6	2.78	0.8	25.3	3.08
KS17	0.5	28.56	3.09	0.8	28.26	3.39
KS18	0.5	28.27	3.08	0.8	27.97	3.38
KS23	0.5	28.46	2.75	0.8	28.16	3.05
KS24	0.5	28.04	3.37	0.8	27.74	3.67
KS25	0.5	31.30	4.77	0.8	31.00	5.07
KS26	0.5	33.26	2.45	0.8	32.96	2.75
KS27	0.5	29.77	3.83	0.8	29.47	4.13
KS28	0.5	29.14	6.36	0.8	28.84	6.66
KS29	0.5	31.18	5.32	0.8	30.88	5.62
KS30	0.5	28.30	4.10	0.8	28.00	4.40
KS31	0.5	30.78	6.12	0.8	30.48	6.42
KS32	0.5	27.46	3.60	0.8	27.16	3.90
KS33	0.5	25.99	5.60	0.8	25.69	5.90
KS34	0.5	20.00	2.71	0.8	19.70	3.01
KS35	0.5	20.00	2.71	0.8	19.70	3.01
KS36	0.5	20.49	2.48	0.8	20.19	2.78
KS37	0.5	20.30	2.17	0.8	20.00	2.47
KS38	0.5	20.57	2.00	0.8	20.27	2.30
KS39	0.5	21.59	3.38	0.8	21.29	3.68
KS40	0.5	24.89	5.99	0.8	24.59	6.29
KS41	0.5	23.2	3.85	0.8	22.9	4.15
KS42	0.5	21.32	2.50	0.8	21.02	2.80
KS43	0.5	21.34	2.30	0.8	21.04	2.60

Bore ID	Management Trigger Level (mAHD) (investigate cause)			Action Trigger Level (mAHD) (alter or cease pumping)		
	Drawdown below lowest low (m)	mAHD	mbtoc	Drawdown below lowest low (m)	mAHD	mbtoc
KS44	0.5	20.32	3.84	0.8	20.02	4.14
KS45	0.5	21.62	2.30	0.8	21.32	2.60
KS46	0.5	18.96	2.92	0.8	18.66	3.22
Leederville Aquifer Monitoring Bores						
KL1 Obs	2.5	25	9.57	3	24.5	10.07
KL2 Obs	8	17.77	10.31	10	15.77	12.31
KL3 Obs	12	12.67	14.06	15	9.67	17.06
KL1S	0.5	31.63	2.66	0.8	31.33	2.96
KL3	2	18.16	3.79	3	17.16	4.79
KL4	2	21.7	10.05	3	20.7	11.05
KL7	2	19.37	4.78	3	18.37	5.78
KL8	2	TBC	TBC	3	TBC	TBC

Note : KS 27-KS42 Trigger values for all other bores as agreed with DWER 10 Jan 2024 via email response.

6.2. GROUNDWATER QUALITY DEVELOPMENT

There is no pre mining water quality data available for bores prior to 2015 therefore trigger levels were established based on data from 2015 onwards using AQ2 judgement of the data set (including mine schedule) which would best represent background data. Time series plots of water quality parameters are also used to identify any adverse trends in water quality. Triggers for recently drilled bores for the Western Extension are interim triggers and will be refined once sufficient pre mining data has been collected.

Groundwater chemistry site-specific trigger values have been developed for each of the Superficial aquifer groundwater monitoring bores, by comparing baseline data to DWER guideline values (DWER, 2015). The bore specific chemical triggers have been determined using background data and were based on the mean +/- 2x standard deviations of the background set

Bore specific groundwater quality physio-chemical triggers and trigger criteria developed by AQ2 are attached below as ***Table 11*** and **Table *12.***

Table 11: Groundwater Chemistry Bore Specific Trigger Values

Bore ID	Eastings	Northings	Bore Data Used for WQ triggers	Field pH	Total alkalinity (mg/L)	Sulphate: Chloride ratio	Chloride: Sulphate ratio	Dissolved Aluminum (mg/L)	Field Electrical Conductivity (uS/cm)	Total Dissolved Solids (mg/L TDS)	Total acidity (mg/L)	Chloride (mg/L)	Sulphate (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)
			DWER Default Triggers	<5	<10	>0.5	<2	>1	> Any baseline value PLUS Cl: SO4 Ratio OR All Trigger						
KWT1D	400948	6405488	KWT1D from April 2020	<4.96	<10	>0.5	<2	>1	>1238	>593	>52	>310	>96	>1.10	ND[2]
KWT1E	400965	6405441	KWT1E from April 2020	<4.8	<10	>0.5	<2	>2.56	>1769	>853	>96	>566	>98	>10.19	ND[2]
KWT2E	399395	6406856	KWT2E from April 2020	<5	<10	>0.5	<2	>1	>2439	>1259	>62	>630	>90	>3.42	>0.30
KWT3A	398784	6405459	KWT3A from April 2020	<5	<10	>0.5	<1.2	>1.91	>2806	>1396	>78	>780	>209	>9.43	>1.20
KS8	400269	6405426	KS8 from April 2020	<5	<10	>0.5	<1	>1	>2951	>1513	>64	>617	>364	>0.02	>0.69
KS9	399622	6405417	KS9 from April 2020	<5	<10	>0.5	<1	>5.14	>1977	>1055	>83	>480	>175	>10.08	ND[2]
KS11	398069	6405835	KS11 from April 2020	<5	<10	>0.5	<2	>1.17	>10806	>5622	>110	>3723	>492	>0.39	>0.40
KS12	398548	6406514	KS12 from April 2020	<5	<10	>1.2	ND[1]	>9.91	>2289	>1208	>147	>425	>271	>72.50	>9.11
KS13	397986	6406614	KS13 from April 2020	<4.86	<10	>0.5	<2	>1.58	>7818	>3989	>77	>1786	>300	>1.22	>0.28
KS14	398691	6407014	KS14 from April 2020	<5	<10	>0.5	<1.3	>1.58	>6105	>3230	>68	>498	>92	>1.44	>0.19
KS16	398950	6407886	KS16 up to Dec 2019	<4.79	<11	>0.5	<2	>1	>6452	>3942	>116	>1994	>194	>2.77	>2.25
KS17	399580	6408635	KS17 up to Dec 2019	<2.65	<42	>1	ND[1]	>2.51	>606	>426	>46	>37	>25	>2.26	>0.56
KS18	399611	6407849	KS17 up to Dec 2019	<4.84	<13	>1.5	<0.3	>19.18	>882	>557	>67	>132	>153	>23.22	>0.29
KS23	399601	6409479	KS23	<3.28	<10	>0.6	<1.8	>9.07	>1409	>720	>91	>381	>137	>0.58	>0.24
KS24	399593	6410229	KS24	<4.49	<10	>0.8	ND[1]	>4.33	>559	>346	>36	>80	>47	>0.33	>0.32
KS25	401048	6410243	KS25	<4.57	<10	>0.6	<0.8	>1	>494	>257	>45	>86	>30	>0.14	>0.03
KS26	401603	6408651	KS26	<5	<24	>0.6	<1.7	>4	>497	>268	>10	>63	>37	>0.47	ND[2]
KS27	400400	6410385	KS27	<5	<19	>0.6	<1.9	>1	>305	>188	>59	>256	>114	>5.30	>1.34
KS28	400360	6411205	KS28	<5	<10	>0.8	ND[1]	>1	>368	>186	>36	>296	>49	>0.23	ND[2]
KS29	401200	6411016	KS29	<5	<10	>2.5	<1.8	>1	>688	>357	>24	>174	>45	ND[2]	>0.14
KS30	400050	6411850	KS30	<5	<69	>2.5	<0.3	>1	>992	>488	>33	>126	>199	>2.20	>0.10
KS31	401160	6411865	KS31	<5	<10	>0.5	<2	>1	>578	>345	>20	>111	>26	ND[2]	>0.11
KS32^	399342	6410701	field KS32/ lab KS24 (up to April 2022)	<5	<10	>0.8	ND[1]	>4.33	>482	>248	>36	>80	>47	>0.33	>0.32
KS33^	399307	6411465	field KS33/lab KS30	<5	<69	>2.5	<0.3	>1	>1814	>899	>33	>126	>199	>2.20	>0.10
KS34	397630	6407025	KS34	<5	<10	>0.5	ND[1]	>1	>1709	>829	>63	>412	>186	>0.60	>0.09
KS35	397630	6407025	KS35	<5	<27	>0.5	ND[1]	>18.69	>1906	>1242	>38	>538	>186	>0.97	ND[2]
KS36	397965	6407540	KS36	<5	<27	>0.60	ND[1]	>2.49	>1417	>759	>173	>336	>157	>13.55	>4.19
KS37	397620	6407785	KS37	<5	<36	>1.10	ND[1]	>1	>1836	>923	>53	>407	>217	>9.21	>2.48
KS38	397615	6408595	KS38	<5	<70	>0.5	<2	>1.53	>2364	>1530	>42	>656	>230	>4.22	>0.15
KS39	398560	6408615	KS39	<5	<30	>0.71	<0.5	>3.73	>1178	>553	>30	>261	>121	>4.09	>0.33
KS40^	399303	6411831	field KS40/lab KS30	<4.02	<69	>2.5	<0.3	>1	>1400	>695	>33	>126	>199	>2.20	>0.10
KS41^	398621	6411844	field KS41/lab KS30	<5	<69	>2.5	<0.3	>1	>983	>490	>33	>126	>199	>2.20	>0.10
KS42^	397602	6411453	field KS41/lab KS30	<5	<69	>2.5	<0.3	>1	>983	>490	>33	>126	>199	>2.20	>0.10
KS43^	397585	6410117	field KS43/lab KS38	<5	<70	>0.5	<2	>1.53	>1365	>679	>42	>656	>230	>4.22	>0.15

KS44^	397590	6409430	field 44/lab KS38	<5	<70	>0.5	<2	>1.53	>344	>176	>42	>656	>230	>4.22	>0.15
KS45^	397602	6410825	field KS43/lab KS38	<5	<70	>0.5	<2	>1.53	>1365	>679	>42	>656	>230	>4.22	>0.15
KS46^	397632	6405404	field KS46/lab KS11	<5	<10	>0.5	<2	>1.17	>2038	>1016	>110	>3723	>492	>0.39	>0.40

ND[1] – not determined due to high variability in the dataset (i.e. values are far from the mean)

ND[2] – not determined due to values below limit of detection

^ Interim trigger values

Table 12Error! Reference source not found.: Groundwater Chemistry Trigger Criteria

Groundwater Parameter	Trigger Criteria
Field pH	<5.0
Total alkalinity	<10 mg$CaCO_3$/L
Dissolved Aluminum	>1 mg/L PLUS Cl: SO_4 Ratio <2 OR Baseline condition trigger (EC, Total acidity, TDS, SO_4, Cl, Fe or Mn)
Chloride: Sulphate Ratio	<2 PLUS Dissolved Aluminum >1 mg/L OR Baseline condition trigger (EC, Total acidity, TDS, SO_4, Cl, Fe or Mn)
Total Acidity	> Any baseline value (as per Table 1) PLUS Cl: SO_4 Ratio OR All Triggers
Field Electrical Conductivity	
Total Dissolved Solids	
Sulphate	
Chloride	
Dissolved Iron	
Dissolved Manganese	

"Management Trigger Response":

If EC, TDS, Chloride, Sulfate, Total acidity Fe and Mn are in excess of the corresponding baseline triggers in conjunction of at least one other trigger. The initial response to the exceedance will be:

- Then samples are re-tested for metals,
- An internal review is undertaken,
- DWER is notified within 14 days of the trigger event results becoming known,
- The frequency of groundwater monitoring in the triggering bore (s) is to be increased to fortnightly until the analytes return to non-triggering levels or advice is received by DWER that monitoring can return to monthly.

Table *13* details investigative and management actions to be taken in the event of an adverse trend or impact being identified. The actual actions to be implemented will be dependent on the nature and scale of the issue and the findings of initial investigations.

Table 13*: Summary of Contingency Actions*

Trigger	Management Trigger Level		Action Trigger Level	
	Trigger Description	**Actions**	**Trigger Description**	**Actions**
Groundwater level falls below trigger level	Water level trigger is reached in two consecutive monthly measurements in any one, or more monitoring bores	Confirm trigger reached through follow up monitoring	Should other groundwater users be affected, or adverse environmental impacts are identified	For Other Users:- Cease groundwater abstraction and/or "make good" their supply
		Review water level data in surrounding bores		For Environmental Impacts:- Cease groundwater abstraction
		Consider reduction in pumping to allow aquifer to recover to above the trigger level		Other actions may include; Adjusting the tailings placement plan
		Advise DWER within 14 days of the second consecutive monthly trigger level breach		Notify DWER within 7 days of any of the above actions require implementation
Adverse water quality trend is identified	Adverse water quality trend is confirmed in consecutive quarterly laboratory analyses in any one, or more monitoring bores	Confirm adverse trend through follow up field and laboratory sampling	Analysis of data indicates that groundwater quality of other users, or the environment is at risk of being negatively impacted by mine dewatering or abstraction	For Other Users:- Cease groundwater abstraction and/or mine dewatering
		Review water quality data in surrounding bores		For Environmental Impacts:- Cease groundwater abstraction and/or mine dewatering
		Advise DWER within 14 days of an adverse water quality trend being confirmed in consecutive quarters.		Other actions may include; Adjusting the tailings placement plan; Lime dosing of tails (if adverse pH trend)
				Notify DWER within 7 days of any of the above actions require implementation
Water Meter Malfunction	Monthly inspections of water meters to ensure accuracy and condition		Notify DWER within seven days of detecting a malfunction of the meter.	

7. WATER EFFICIENCY

Key water use efficiency measures implemented at the Keysbrook site include:

- Retention and storage of water in retained tailing cells during periods of excess or surplus localised runoff. Stored water is subsequently drawn into the process circuit in preference to groundwater abstraction;
- Switch in 2018 to co-disposal technique for sand and clay tailings placement which facilitates improved water recovery (and reduced evaporative losses);
- Use of clay/water mix for sealing surfaces to act as a dust suppressant (reduces water consumption for dust suppression); and,
- Regular checks on water infrastructure integrity and remedial actions as required.

8. REPORTING

8.1. GROUNDWATER

- Annual Groundwater Monitoring Summary submitted to DWER by 31 March annually.
- Triennial Groundwater Monitoring Review submitted to DWER by 31 March (2027, 2030).
- Meter readings are reported annually to DWER by 30 January each year.

8.2. SURFACE WATER

- Annual Environmental Report submitted to DWER for requirements of the Projects Part V *Environmental Protection Act 1986* approval (L8918/2015) by 1st March annually.

9. SUMMARY OF COMMITMENTS

Table 14: Summary of commitments

Relevant Section	Commitment
Administrative Requirements	1) This GLOS will apply to December 2033, which is the term of the current groundwater licences. 2) The GLOS will be reviewed annually at the time of the annual reporting and adjustments made as appropriate in light of monitoring results and any regulatory changes. 3) The following reporting schedule will be met: • Annual Groundwater Monitoring Summary submitted to 31 March annually. • Triennial Groundwater Monitoring Review submitted by 31 March (2027, 2030). • Meter readings reported annually to DWER by 30 January each year.
Monitoring Program	1) The monitoring and analysis program detailed in Tables 7 – 9 will be implemented. 2) Production bore meters and in-pit sump meters will be read monthly with results submitted to DWER annually. 3) Flow meter maintenance will be undertaken annually, and calibration will be carried out as requested or to meet the manufacturer's specifications 4) Instruments for measuring water quality will be calibrated before each use according to manufacturer's recommendations
Operating Rules	1) Production bores will be managed so that the recommended pumping rates and licence allocations are not exceeded. 2) Bores and reticulation infrastructure will be checked regularly to ensure integrity. 3) DWER will be notified within 7 days of detecting a malfunction of the meter.

FIGURE 1 – MONITORING LOCATIONS

LEGEND

2025 GLOS GW Bores
- Superficial
- Leederville
- Leederville Production

Water courses (with 10m buffer)

Minor tributaries

Western Extension Development Envelope

Mining area

N

398000 400000 402000

6412000 6410000 6408000 6406000 6404000

KS41 KS40 KS30 KS31
KS42 KS33 KS28 KS29
KS45 KS32 KS27
T570 KS25
KS43 KS24
KS44 KS23
KS38 KS39 KS 17 KS26
KS37 KS 16 KS18 KL8 (Replacement)
KS36
KS35 KS34 KL 7 KS 14 KL2P KWT2E T620
KL2 Obs KL1 Obs KL1S
KS 13 KWT2D
T610 KS 12
KS 10
KS 11
KL 3 KS46 KWT3A KL3P KS 9 KS 8 KWT1E KWT1D KPD0064
KL3 Obs KL 4

0 500 1,000 1,500 2,000 m

Doral

DORAL MINERAL SANDS - KEYSBROOK
GLOS WATER MONITORING LOCATIONS 2025

GDA94 / MGA zone 50
Scale: 1:25000 @ A3
File Name: 2025 GLOS
Printed at: 11/11/2025
Drawn By: JE

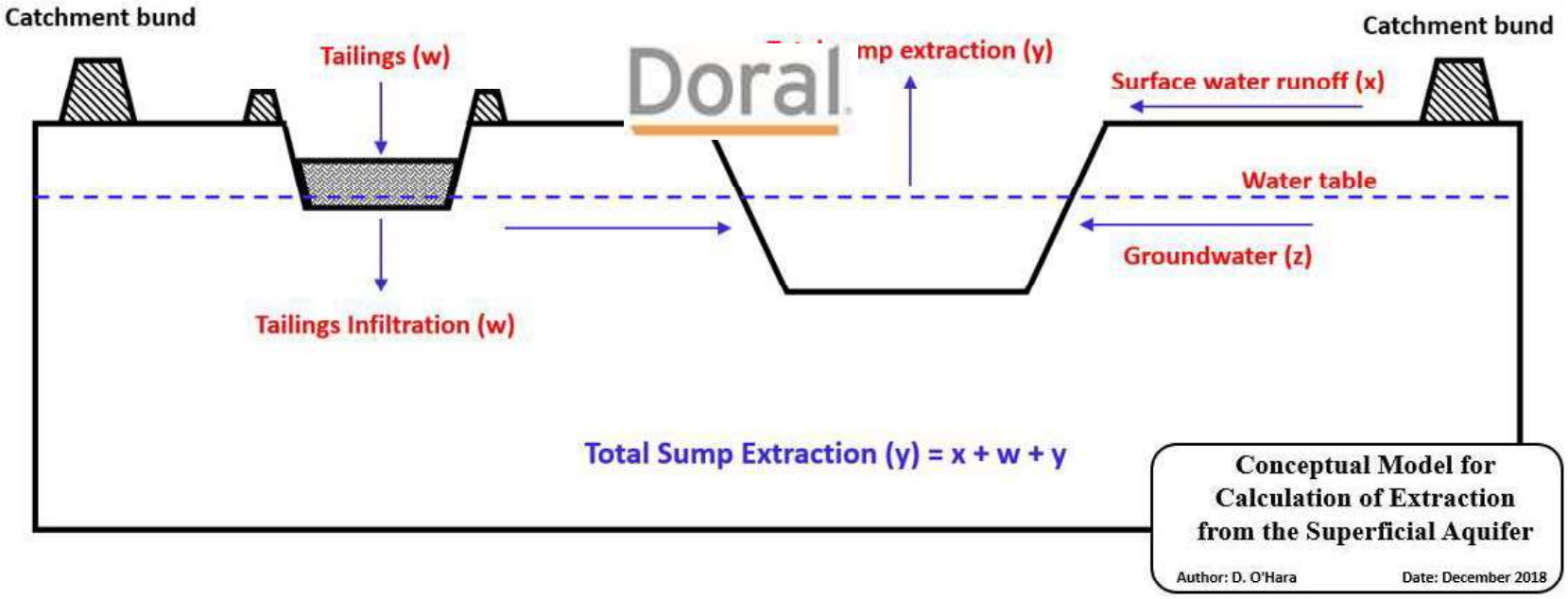
FIGURE 2 – NETT WATER CALCULATION

CONCEPTUAL MODEL FOR CALCULATION OF EXTRACTION FROM THE SUPERFICIAL AQUIFER

Groundwater extraction from the Superficial Aquifer (z) =

Total Sump Extraction (y) – { Tailings (w) + Surface Water Runoff (x) }

z = y – (w + x)



APPENDIX 1 - SURFACE WATER ASSESSMENT

Keysbrook Mineral Sands Mine
Surface Water Assessment for Western Extension

Prepared for:

Doral Mineral Sands

August 2023

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DOCUMENT STATUS

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1.1. INTRODUCTION

1.1. Background

Doral operates the Keysbrook Mineral Sands Project (the Project), located 58 km south of Perth and 22 km east of Mandurah, in Western Australia. The Project is managed by Keysbrook Leucoxene Proprietary Limited (KLPL), which is a subsidiary of Doral.

The Project is located on privately owned land that is used for grazing and other rural land uses. It operates under Ministerial Statement No. 810 and No. 1089. The currently approved area of disturbance is 1,532 ha, within a 3,015 ha Environmental Protection Authority (EPA) Development Envelope. This has approval for 9 years of mining from October 2015 with the mine areas being progressively mined, backfilled to pre-disturbance contours, and rehabilitated within 2 years of mining (Doral, 2022).

Based upon the current mining schedule, the ore reserve within the approved mine area, as defined in MS810, is due to be exhausted in 2023. AQ2 has previously completed surface water and groundwater assessments (2022a, 2022b) on the active mining area within Part Lot 63 that Doral has submitted with an amendment to proposal under Section 45C of the Environmental Protection Act 1986 (EP Act). It should be noted that the Part Lot 63 amendment is still under assessment by the Department of Water and Environmental Regulation (DWER).

1.2. Purpose of this Document

To facilitate the continuation of the mine and workforce, Doral seeks to further amend the Project to include Part Lots 20, 62, 63, 64, 201, 507 and 508 under Section 40AA of the EP Act as shown on Figure 1.1. The amendment area, referred to as the Western Extension, is mostly located within the existing EPA Development Envelope and includes a disturbance (mine) area of 518 ha, consisting primarily of cleared pasture and up to 21.5 ha of degraded native vegetation. Mining the amendment area will produce an additional heavy mineral concentrate and result in approximately 65 months (5.5 years) of additional mining for the Project.

Under current approvals for the operations (MS810), any surface water runoff which flows across a disturbed (non-rehabilitated) area of the Project must be collected, added to the Site Water Management System and added to the process water circuit. Areas that do not require capture of runoff include diverted upstream flows and stream corridors, and runoff from completely rehabilitated areas.

Doral are required to submit a request for a change to proposal under Section 40AA of the Environmental Protection Act 1986. The following information is required to support this, which is presented within this SW assessment:

4. *Provide details of any detrimental effects the proposed change/s might have on the environment, considering:*
   - *the values, sensitivity and quality of the environment which is likely to be impacted*
   - *the extent (intensity, duration, magnitude and geographic footprint) of the likely impacts*
   - *the resilience of the environment to cope with the impacts or change.*
5. *Describe whether the detrimental environmental effects of the change are additional to, or different from, any detrimental environmental effects of the original proposal.*

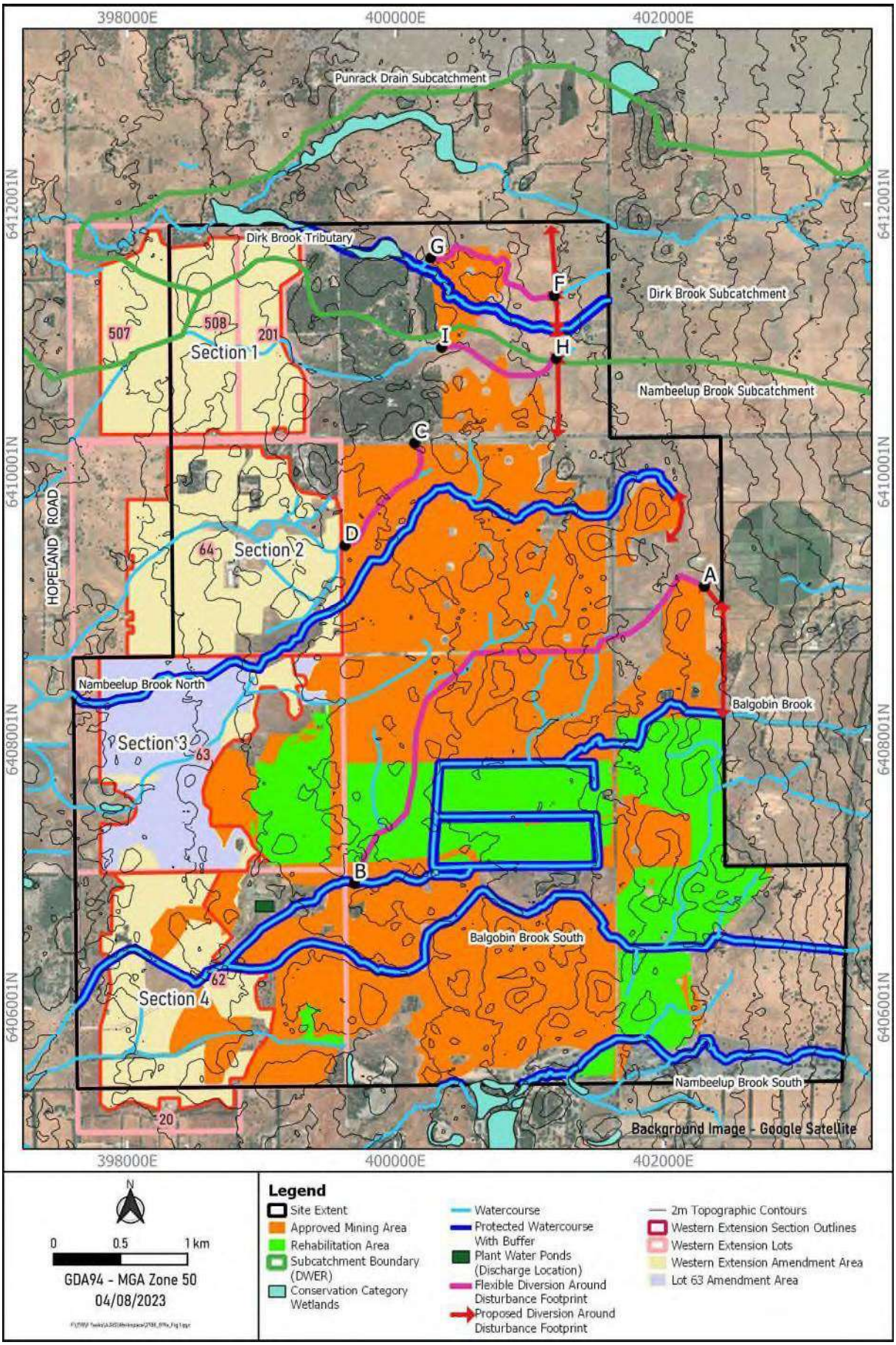

Figure 1.1 Proposed Western Extension

2. PROPOSED DISTURBANCE FOOTPRINTS

The proposed Western Extension, as shown on Figure 1.1, is mostly located within the existing EPA Development Envelope and, for the purposes of this report, will be broken down into the following sections, which cover an overall proposed mining period.

Table 2.1 Proposed Western Extension Components

Section	Part Lots	Proposed Mining Period	Approximate Proposed Disturbance (Mine) Area (ha)
1	201, 507, 508	January 2026 to February 2028	203
2	64	February 2028 to December 2029	177
3	63	December 2029 to May 2030, & May 2031	25
4	62, 20	May 2030 to April 2031	113

To date, the approved mining operation has involved progressively clearing and mining about 30 ha of active open pit at any one time, plus progressive backfilling and rehabilitation as the mine progresses. It is assumed that the area of active mining within the proposed expansion would be consistent with this approach (i.e., maximum 30 ha of active open pit).

3. HYDROLOGY

3.1. Regional Hydrology

At a regional level, all surface drainage from the Project area ultimately flows to the Peel Inlet (Peel-Harvey Estuary). Streams from the Darling Scarp and foothills flow from east to west through the mine area (MBS, 2006). MBS (2006, 2015) provide details of regional streamflow monitoring stations.

3.2. Local Hydrology

The mine area and surrounds are characterised by low relief topography that results in a landscape that becomes flatter and increasingly poorly draining westward from the scarp. In the pastured areas, most of the low-lying areas, creeks and wetlands have been cleared and drained. Downstream of the Project, west of Hopelands Road, the low relief is even more pronounced, resulting in a wetland chain all the way to Peel Inlet (MBS, 2006).

The watercourses flowing through, and adjacent to, the Project are discussed in MBS (2006) and shown on Figure 1.1. The northern part of the Project is located within the Dirk Brook Subcatchment, which flows to the Serpentine River and into Goegrup Lake and the Peel Inlet. The majority of the Project is located within the Nambeelup Brook Subcatchment, which discharges to several lakes in the Serpentine River Catchment System and then into the Peel Inlet. The western section of Lot 507 drains into the Punrack Drain Subcatchment, which flows into Lake Amarillo, one of the Serpentine Lakes.

The watercourses associated with each Section of the Western Extension are discussed below.

3.2.1. Section 1

Two unnamed tributaries of Dirk Brook flow in a westerly direction as well-defined watercourses to the north of the proposed areas of disturbance within Section 1, but do not fall within their extent. A small unnamed stream flows through the southern half of the Section and continues to the west to converge with other tributaries of Nambeelup Brook.

3.2.2. Section 2

Nambeelup Brook North Tributary flows through the south-eastern corner of Section 2 and continues to the west to converge with other tributaries and form Nambeelup Brook. A smaller unnamed tributary of Nambeelup Brook flows west through the centre of the Section.

3.2.3. Section 3

Nambeelup Brook North Tributary flows from Section 2 and continues south-westerly through the northern part of Section 3. A smaller unnamed tributary of Nambeelup Brook flows south-westerly through the Section.

3.2.4. Section 4

The largest tributary of Nambeelup Brook that crosses the Project, Balgobin Brook, flows westerly through Section 4, joining with Balgobin Brook South close to the centre of the Section which also flows westerly through the southern half of Section 4. A smaller unnamed tributary of Balgobin Brook flows westerly through the southern half of the Section.

3.2.5. Conservation Category Wetlands and Environmentally Sensitive Areas

A number of Conservation Category Wetlands (CCWs) (DBCA, 2022) and associated Environmentally Sensitive Areas (ESAs) (DWER, 2021) are located to the north and west of the proposed Western Extension, as shown on Figure 3.1. A summary of those that are located downslope of mine disturbance areas and potentially impacted by the Western Extension is provided in Table 3.1 and more information can be found in Rockwater (2021) and Ecoedge (2021, 2022), all of which report that areas of CCW they had monitored were degraded due to clearing. It should be noted that the accuracy of this assessment of affected CCWs is based on limited topographical data for determining surface water flowpaths.

Rockwater (2021) did however report that the vegetation condition within wetland 14807 (Yangedi Swamp) improved from degraded to good in 2021. At this site, vegetation condition improves during wetter periods when surface water suppresses germination of many exotic terrestrial herbs, and declines in response to the presence of aggressive weed species in drier years and during drier stages in the wetland hydroperiod. This wetland is located within Bushland Forever Site 77, where vegetation on freehold land is managed for conservation purposes.

Hydrogeological and environmental monitoring data collected during 2020 suggest that mining activities at Keysbrook have not resulted in changes to the water regime that have the potential to impact the health of groundwater dependent vegetation at wetland monitoring sites (Rockwater, 2021).

Table 3.1 Summary of Conservation Category Wetlands Potentially Impacted by the Western Expansion

Section	Subcatchment	CCW ID	Type	Management Category
1	Dirk Brook Catchments	14850	Dampland	Seasonally waterlogged
	Punrack Drain	14760 7000	Palusplain	Seasonally waterlogged
	Nambeelup Brook North	14825 14763	Palusplain	Seasonally waterlogged
		14798	Dampland	Seasonally waterlogged
2	Nambeelup Brook North	14807	Sumpland	Seasonally inundated
		14795	Palusplain	Seasonally waterlogged
3	Nambeelup Brook North	14870	Palusplain	Seasonally waterlogged
4	-	-	-	-

An assessment of the contours supplied by Doral and publicly available SRTM and satellite imagery suggests that the proposed Western Extension does not impact on the catchment of other local CCWs, such as 14887, 14772, 14894, 14802, 14803, 14805 and 14831. A number of Resource Enhancement wetlands are also located within Sections 1-3, as shown on Figure 3.1.

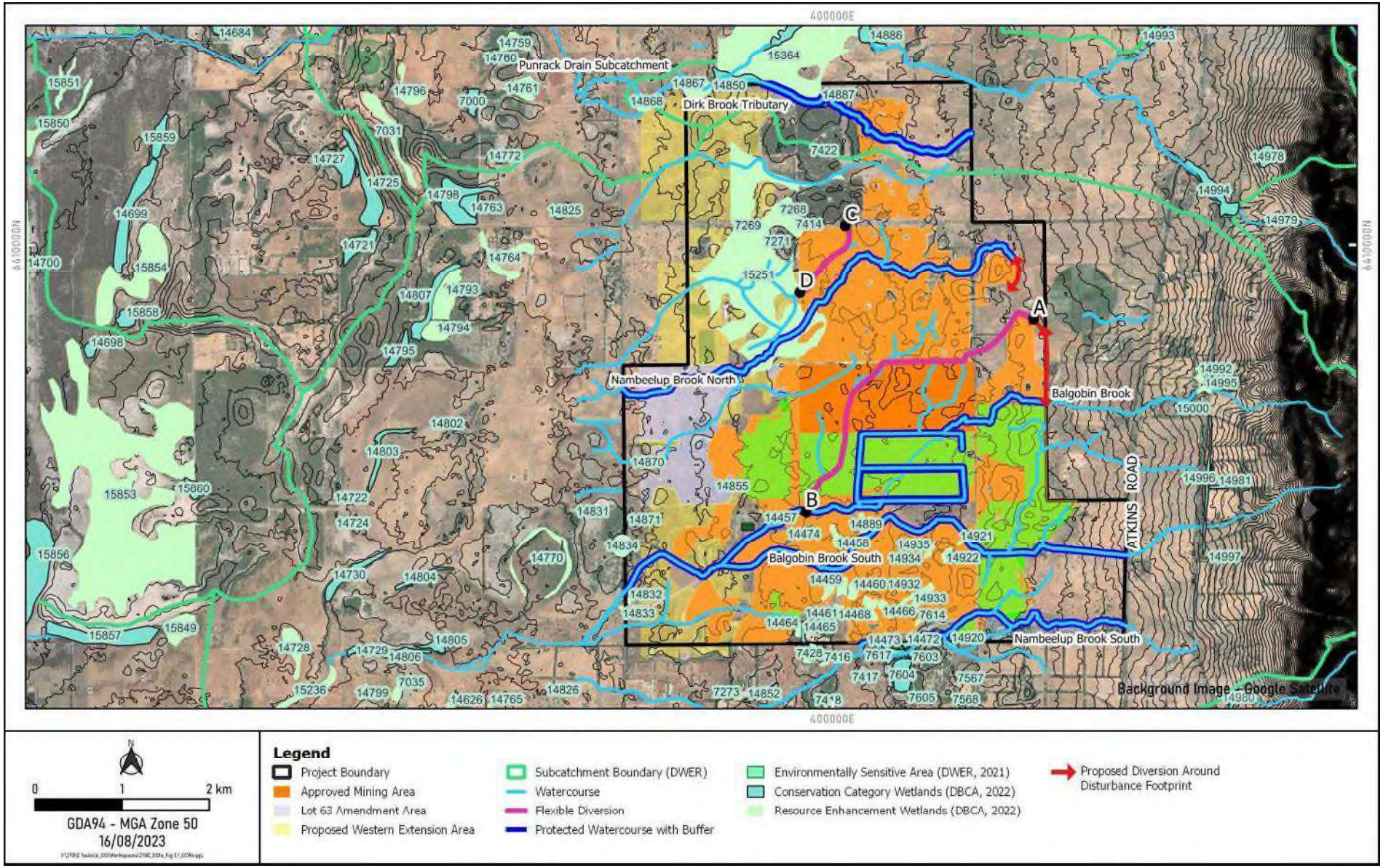

Figure 3.1 Conservation Category Wetlands

3.3. Threatened and Priority Ecological Communities

As reported by Ecoedge (2022), ecological communities are defined as "*…naturally occurring biological assemblages that occur in a particular type of habitat. They are the sum of species within an ecosystem and, as a whole, they provide many of the processes which support specific ecosystems and provide ecological services*". Threatened Ecological Communities (TECs) may be listed under one of three conservation categories: Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). Priority flora is under consideration for future declaration as "Threatened flora", dependent on more information. Species classified as Priority One to Three (referred to as P1, P2 and P3) require further survey to determine their status. Priority Four (P4) species are adequately known rare or Threatened species that require regular monitoring.

A summary of Threatened and Priority Ecological Communities and Threatened and Priority flora located within and/or downstream of each Section of the Western Extension is provided in Table 3.2, based on Figures 3.2 and 3.3 from Ecoedge (2022). Figure 3.2 and Figure 3.3 show that there is one TEC (SCP15), which includes one P4 priority flora located downstream of Section 1 to the west, within the Nambeelup Brook catchment. Although not shown on these figures, there is one TEC (SCP FCT 3c) in good condition, located to the east of the south-eastern corner of the same Section, but the topographical data available suggests that they are not connected in terms of surface water flows (up-gradient).

Table 3.2 TEC and Priority Flora Communities Downstream of the Western Extension

Section	Community Classification	Description
1	TEC (SCP15)	Forests and woodlands of deep seasonal wetlands of the Swan Coastal Plain (SCP15)
	P4	None provided
2	P1, P2, P3	None provided
3	-	-
4	P2	None provided

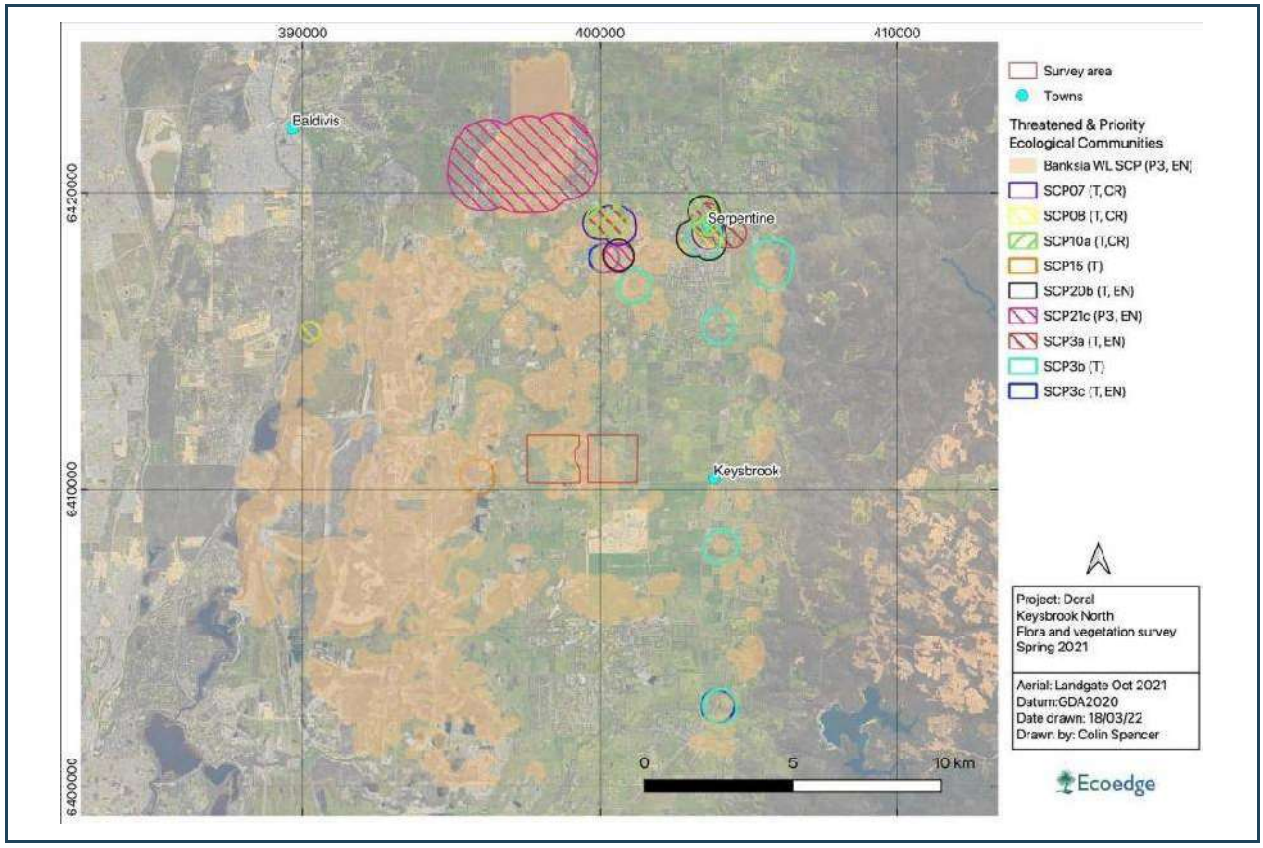

Figure 3.2 Desktop Search Results of TEC's and PEC's (Ecoedge, 2022)

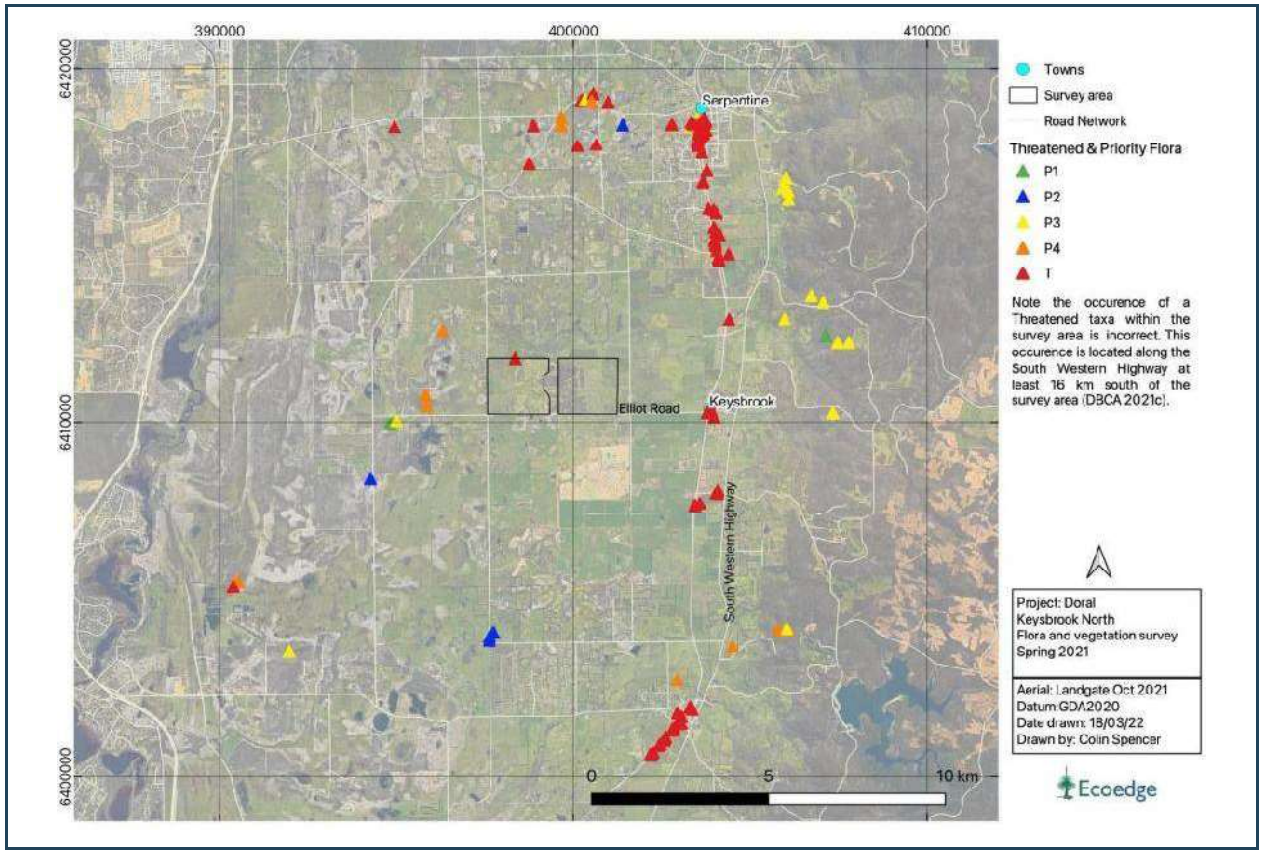

Figure 3.3 Desktop Search Results of Threatened and Priority Flora (Ecoedge, 2022)

4. SURFACE WATER MANAGEMENT

4.1. Management of Watercourses Crossing the Project

As per the WMP (MBS, 2015), inflows from external catchments will either be diverted as clean water away from the disturbed mining area and back into a watercourse downstream, or flow through the mine site but remain separate from it. Other minor creek lines will be included in the mining activities, but then reinstated during rehabilitation.

4.1.1. Watercourse Classifications

Watercourse classifications reported by MBS (2006, 2015) are presented in Table 4.1, along with their management philosophies which are discussed in more detail in the following sections.

Table 4.1 Watercourse Classifications (MBS, 2006 2015)

Watercourse Category	Peak flows (m^3/s)	Watercourses	Management Philosophy	Section
Major	2-5	Balgobin Brook North Dandalup River Tributary	Watercourse buffers	4 -
Medium	1-2	Dirk Brook Tributary Nambeelup Brook North Tributary Balgobin Brook South Tributary Nambeelup Brook South Tributary	Watercourse buffers	1 2, 3 4 -
Minor	<1	Unnamed	Diversion of upstream catchments	All

4.1.2. Watercourse Buffers

Watercourses categorised as Major and Medium, with peak flows greater than one cubic metre per second, will have 10 m buffers (MBS, 2006) and be bunded off and protected from disturbed mine areas.

4.1.3. Diversion of Upstream Catchments

Minor Watercourses passing through the Project with peak flows of less than one cubic metre per second are generally shallow and poorly defined (MBS, 2006, 2015). Flow in minor watercourses and sheet flow in between watercourses can be managed by bunding of the operational areas and construction of diversion drains; only minimal earthworks will be necessary due to the low flows carried by these watercourses. These diversions are to ensure that inflows from the upstream catchments do not contribute runoff to the 'Disturbance Footprint' inflows.

Where practical, these diversions should be constructed to ensure minimum erosion potential and to direct drainage back to its natural drainage line downstream at a velocity and depth that can be accommodated without increased scour. Diversions should be in place for the minimum time necessary and removed as soon as possible as part of progressive rehabilitation. During landform restoration, drainage will be re-established along original drainage lines. Contours of the restored landforms and drainage lines will be returned to pre-mining levels as closely as possible. (MBS, 2015).

MBS (2006) determined that the effects of drainage diversions on runoff volumes and flow rates at the regional scale are expected to be minor because:

- Only a small proportion of the total Project area catchments will be disturbed at any time.
- Surface water diverted around an active mine pit will be redirected back into the natural drainage line downstream.

4.1.4. Section Requirements

A summary of the watercourse management requirements for each Section is provided in Table 4.2 and presented on Figure 4.1 and Figure 4.2. Diversions for upstream catchments are proposed on the Figures, however the shape of the mine footprints within Sections 3 and 4 in particular do not allow for Life of Mine diversions to be proposed. It is recommended that progressive diversions are used around the mine footprint development in the areas indicated on Figure 4.2.

Table 4.2 Western Extension Watercourse Management

Section	Watercourse	Management (refer Figure 4.1)
1	Unnamed stream	Diversion J-K
2	Nambeelup Brook North Tributary	Buffer
	Unnamed stream	Diversion D-E
3	Nambeelup Brook North Tributary	Buffer
	Unnamed stream	Diversion L-M
4	Balgobin Brook Balgobin Brook South	Buffer
	Unnamed stream	Buffer*

* No buffer has been directly recommended for this watercourse however the mine disturbance area footprint appears to include one.

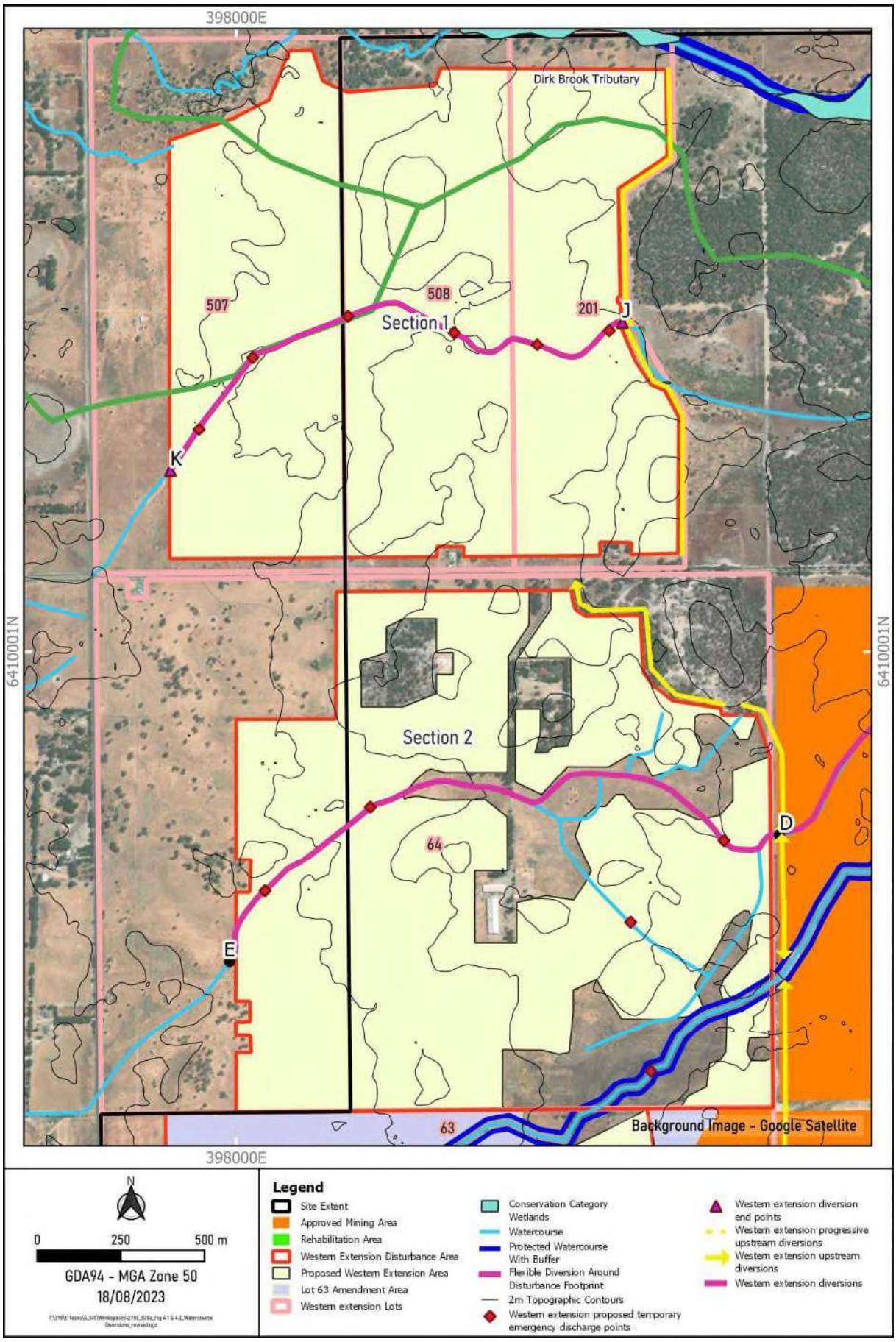

Figure 4.1 Western Extension Watercourse Management – Sections 1 and 2

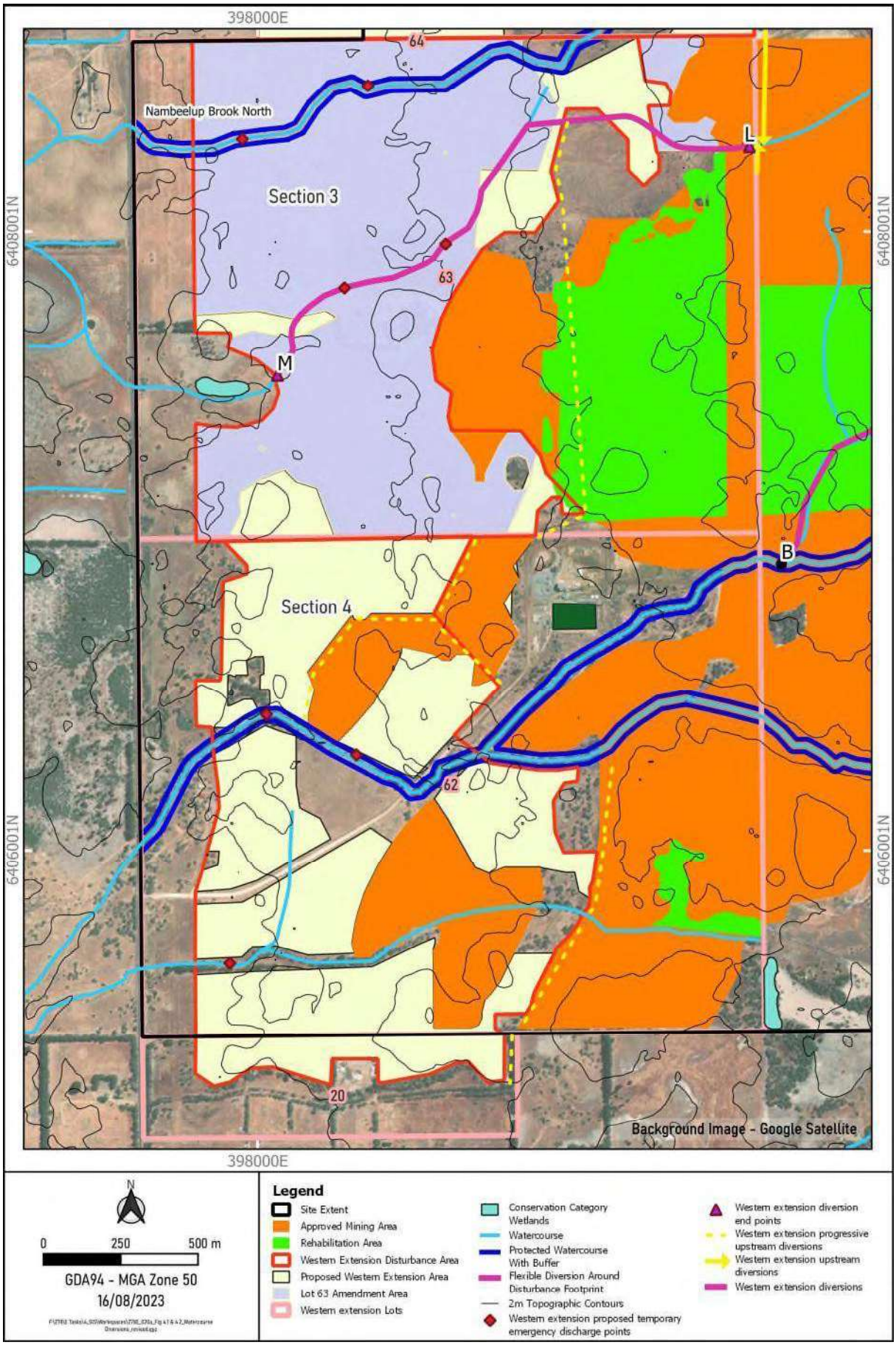

Figure 4.2 Western Extension Watercourse Management – Sections 3 and 4

4.2. Mine Catchment Runoff and Discharge Points

Runoff from the Project area will continue to be collected in the Process Water Dam (a series of 3 dams with overflow channels between them and a combined capacity of 74ML), located near the primary processing plant, as discussed in AQ2 (2020) and MBS (2015); Doral will ensure that this has sufficient capacity to accommodate the Western Extension.

Consistent with previously approved areas, it is assumed that runoff from within the Western Extension is to be captured in a 'return water settling pond' prior to being pumped via the dewatering system to be harvested and stored in the Process Water Dam. If a rainfall sequence causes runoff from the disturbed areas to be in excess of water demand requirements, (i.e., where pumping to the Process Water Dam would cause levels to rise above normal operating levels), pumping to local emergency discharge locations is proposed instead. In the event of surplus water volumes being released into the environment, any surplus water discharged off the site at the local emergency discharge locations would have naturally entered the waterways anyway and changes in flooding regime (other than minor local effects) are unlikely to occur. The mitigation measures required are those at the overflow release points into the environment.

To keep any emergency discharge returning to the same tributary as per the existing hydrological regime, Doral have proposed an additional 10 temporary emergency discharge points, as shown on Figure 4.1 and Figure 4.2, to allow for progression as the mining front moves in stages across the Western Extension. It should be noted that 8 temporary emergency discharge points within Section 3 have already been proposed as part of the Lot 63 amendment and are shown on Figure 4.2. The operation of any of these would be the same as has been applied to date and the receiving environment of adjacent points would be the same whichever is adopted. Some of the proposed discharge points are into minor watercourses which will be progressively diverted during mining, however they may be used prior to the diversion.

4.3. Management of Mine Water

The WMP (MBS, 2015) defines the approach to be adopted for management of mine water and it is assumed that this will continue to be applied within the Western Extension. The WMP states that mining areas will have ring drains installed with a sump on the pad perimeter. Tails decant sumps will be installed in tailing areas within the mine void. Water from these sumps will be transferred to the process circuit. The mine void will be bunded to prevent surface inflows from adjacent areas. 'V' drains will be installed to divert surface flows around assets and operating areas.

MBS (2006) recommended that surface water quality impacts can be minimised by the following measures:

- Isolating infrastructure areas that have the potential to contaminate surface water.
- Constructing sediment sumps, silt and oil traps where necessary to remove sediments or pollutants from runoff before water enters local drainage.
- Immediate clean-up of any spills of contaminants, such as oil or fuel.

The major water quality issue in the area is the high levels of nutrients. Mining is unlikely to have any effect on nutrient levels in runoff, but care should be taken in rehabilitation activities to minimise actions that could raise nutrient levels such as use of excessive fertiliser.

As a result of heavy rainfall events, there is the potential for increased turbidity from recently rehabilitated areas that are not yet fully stabilised. Sedimentation basins should be constructed where required to reduce turbidity before release to the environment. The Water and Rivers Commission Water Quality Protection Guideline 11 lists criteria for TDS and total suspended solids (TSS) in mine discharge water to not cause an increase above 10% of seasonal background levels.

4.4. Water Quality

The existing regional water quality relative to the Project was discussed by MBS (2006, 2015). The Statewide River Water Quality Assessment (DoW 2007) shows water quality data for Nambeelup Brook (Site 614063), located 10 kilometres downstream (southwest) of the Project was of neutral pH, with very high nitrogen and phosphorus concentrations and high turbidity. This shows water quality has been affected by historic and existing land uses prior to any mining taking place.

As noted in the DWER Licence Appendix, the process ponds act as sedimentation basins, settling suspended solids prior to overflow. Based on monitoring undertaken in relation to the Project as a whole, a pH and a TSS exception was recorded in comparing the pond water quality with the water quality in the environment. In general, the measured background and pond water quality values reflect the disturbed nature of the receiving environment. As such, the consequence of captured water released into the environment is considered to be local only, with no significant impact on water quality (AQ2, 2020).

Figure 4.3 shows existing surface water monitoring sites that were proposed by previous studies, along with new locations proposed for the Western Extension, which should be monitored for the same parameters and at the same frequency as the existing sites. The proposed sites are located either upstream of proposed mine disturbance areas (Sections 1 and 4) or downstream at the western edge of the Lot boundaries.

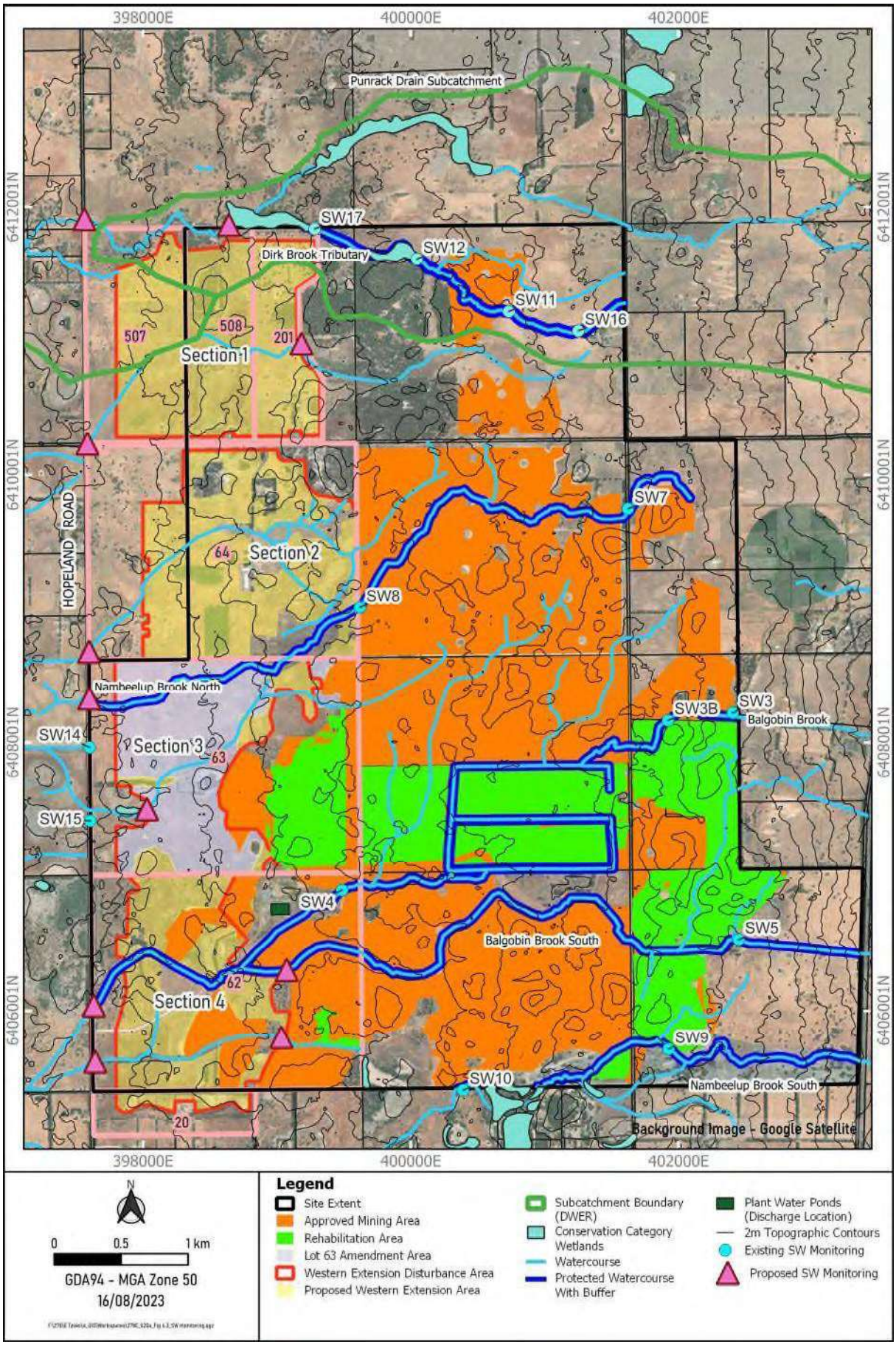

Figure 4.3 Surface Water Monitoring

5. POTENTIAL IMPACTS ON TECS AND CCWS

The WMP (MBS, 2015) discusses potential impacts of the Project on CCWs and native vegetation, including lowering of the water table, changes to water quality and reduced health and condition. Due to the requirement to capture and retain water onsite, a reduction in flow to these areas should also be considered.

The 0.5m and 2m contour information provided by Doral has been used to delineate the surface water catchments for CCWs/TEC that are potentially impacted by the Western Extension (refer to Figure 5.1). The potential reductions in catchment areas due to mine disturbance are presented in Table 5.1. Note that the accuracy of the delineated catchments is limited by the available topographic data and there is potentially considerable uncertainty in their sizes.

Based on the limited topographic data available, the proposed mining area of Section 1 has the most significant impact on downstream CCWs as all of the disturbance area sits within CCW catchments. It causes approximately 21% reductions in the catchments of 14825 and 17% of the combined area of 14763/14798. The proposed additional mining area of Lot 63 (Section 3) does not cause any additional reduction in the catchment of 14870. It should be noted that the catchment delineations suggests that no TECs are impacted by the proposed Western Extension development (Figure 5.1).

This assessment takes into consideration areas that are being coincidentally backfilled and/or restored and are therefore also removed from the catchment.

Table 5.1 Possible Reductions in CCW and TEC Catchment Areas

Section	CCW/TEC	Total Catchment Area (km^2)	Total Possible Mining Area in Catchment (km^2)	Reduction in Catchment Area (%)
1	7000	0.9	0.1	12
	14825	6.5	1.4	21
	14850	23.9	0.04	<1
	14763 14798	7.9	1.4	17
	14760	26.5	0.2	1
2	14825	6.5	0.3	4
	14763 14798	7.9	0.3	3
	14807 14795	3.7	0.1	3
3	14870	0.7	0.2	0
4	-	-	-	-

Given these potential reductions in catchment area it is therefore recommended that, in addition to the SW monitoring recommended above, in line with the WMP (MBS, 2015), the presence or absence of standing surface water in the CCWs potentially impacted by the project should be recorded monthly. The WMP also makes recommendations relating to vegetation monitoring of the small Dirk Brook CCW.

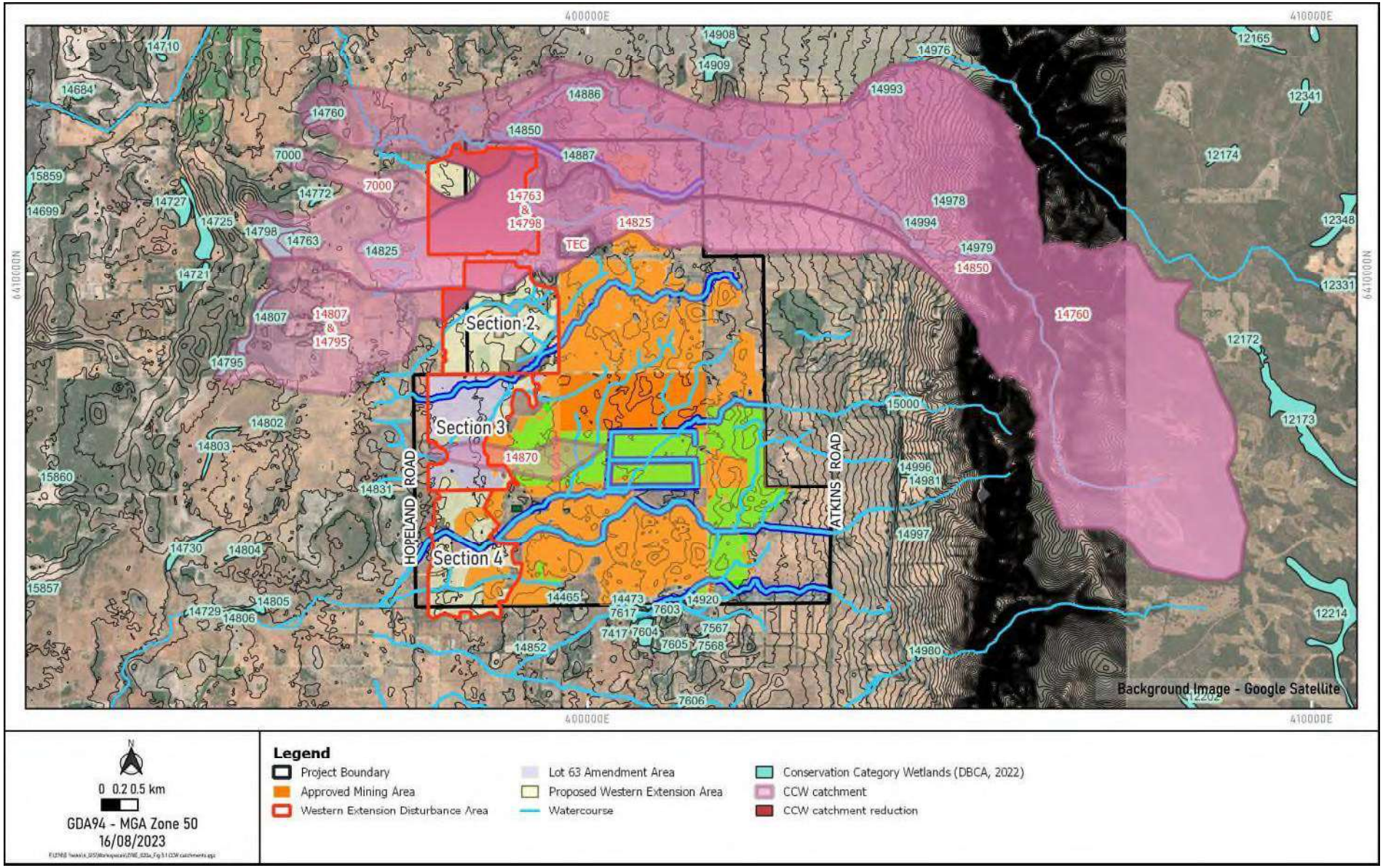

Figure 5.1 CCW and TEC Catchments

6. CONCLUSIONS

This assessment considers the potential changes to the surface water environment as a result of the proposed Western Extension of the Project, which has been broken down into four progressively mined Sections. It has been assumed that the surface water management philosophy of the Project has remained unchanged from that reported in the WMP (MBS, 2015) and by AQ2 (2020). As a result, the buffer zone surrounding Major and Medium watercourses will continue to apply, protecting them from disturbance. The smaller watercourses flowing across the Western Extension will be diverted around mining areas and subsequently restored, minimising the impact on downstream flows.

Any surface water runoff from disturbed areas within the mine site will be collected and added to the process water circuit. Ten temporary emergency discharge locations for the Western Extension have been suggested by Doral. Where release of surface water to the environment does occur, there is unlikely to be material change to the flooding regime downstream, as the discharge of water to the environment is returning catchment yield to the natural downstream hydrological environment, which had been removed by the development. Monitoring within the existing operations indicates the water quality in the mine ponds is similar to the background water quality in the receiving environment and release of the water would therefore not have a significant impact on downstream water quality.

The main potential impact of the expanded mining area is due to the removal of catchment runoff that would have previously reached the CCWs downstream, particularly due to Sections 1 and 2. There is no potential impact to any TECs identified due to reduction in catchment area. Recommendations have been made for additional SW monitoring locations to monitor the effects of operations within the Western Extension and identify potential impacts on the CCWs, along with monthly observations of the presence or absence of water within them.

7. REFERENCES

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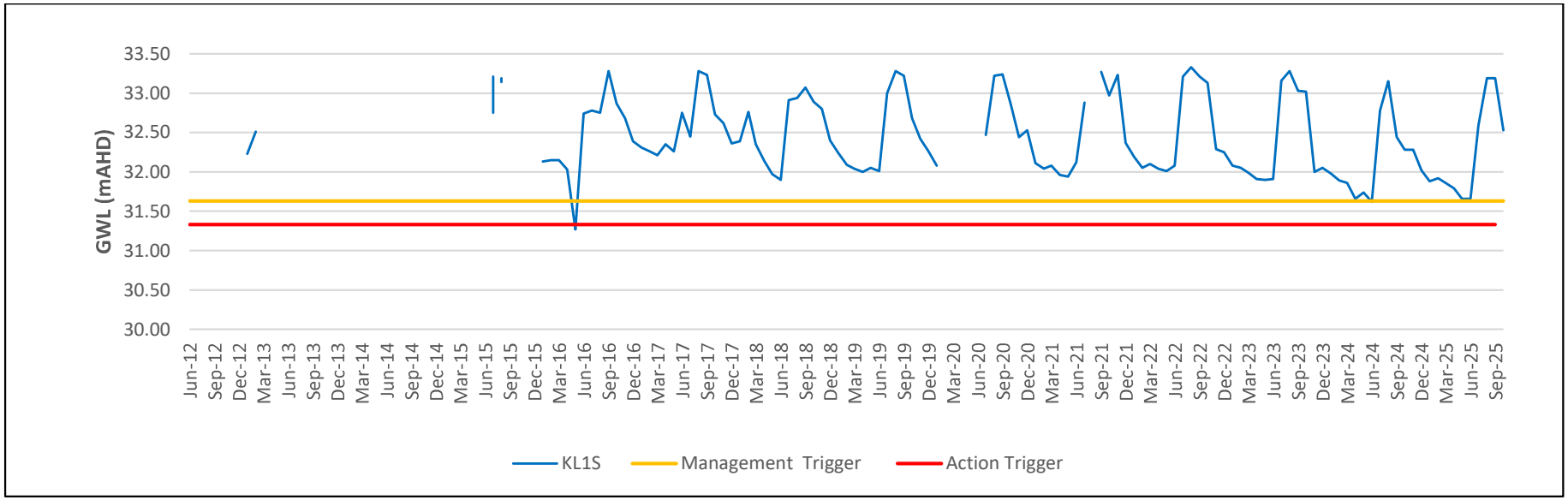
APPENDIX 2 – HYDROGRAPHS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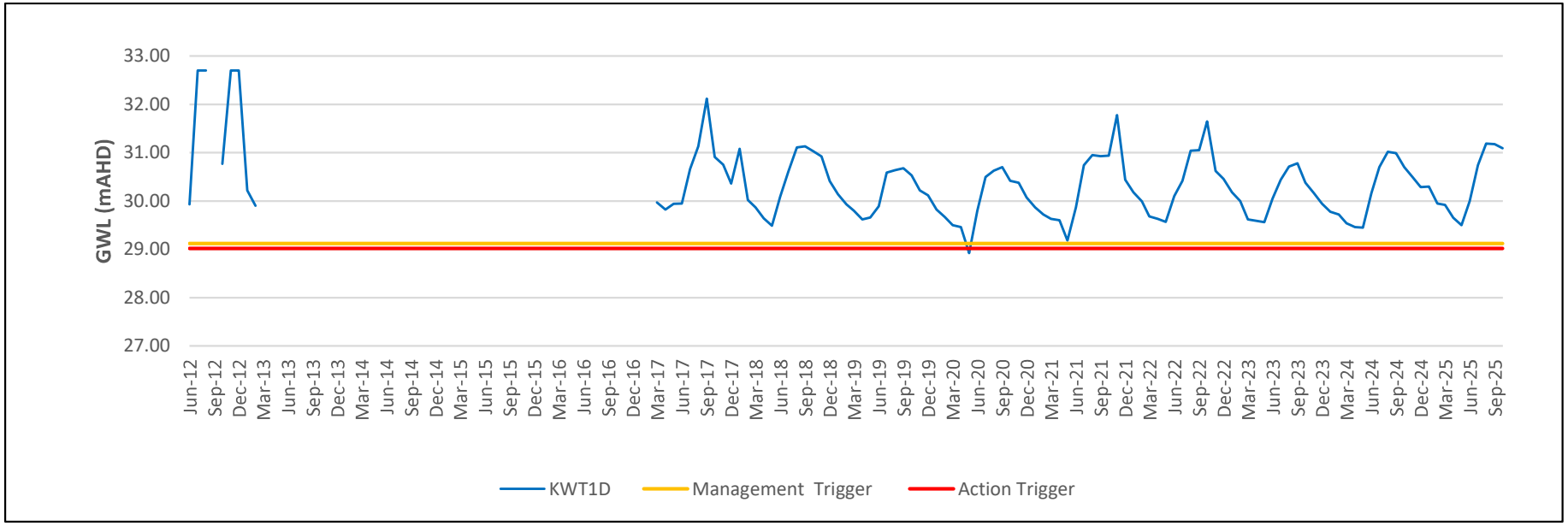
Action Trigger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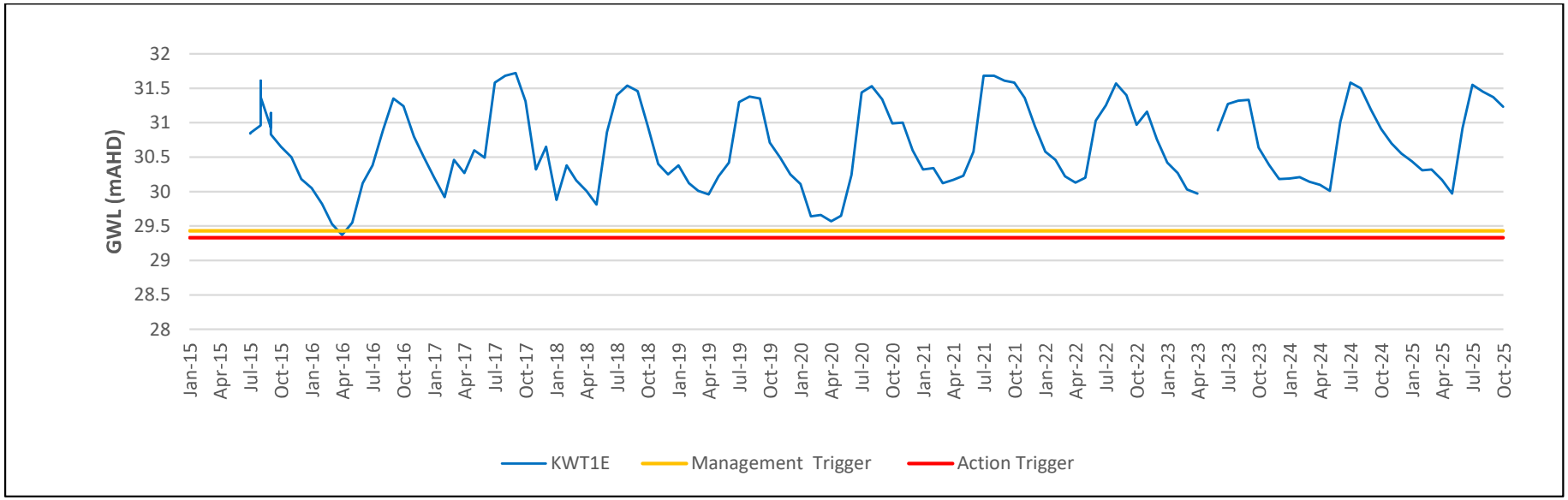
KWT1D
Management Trigger
Action Trigger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KWT1E
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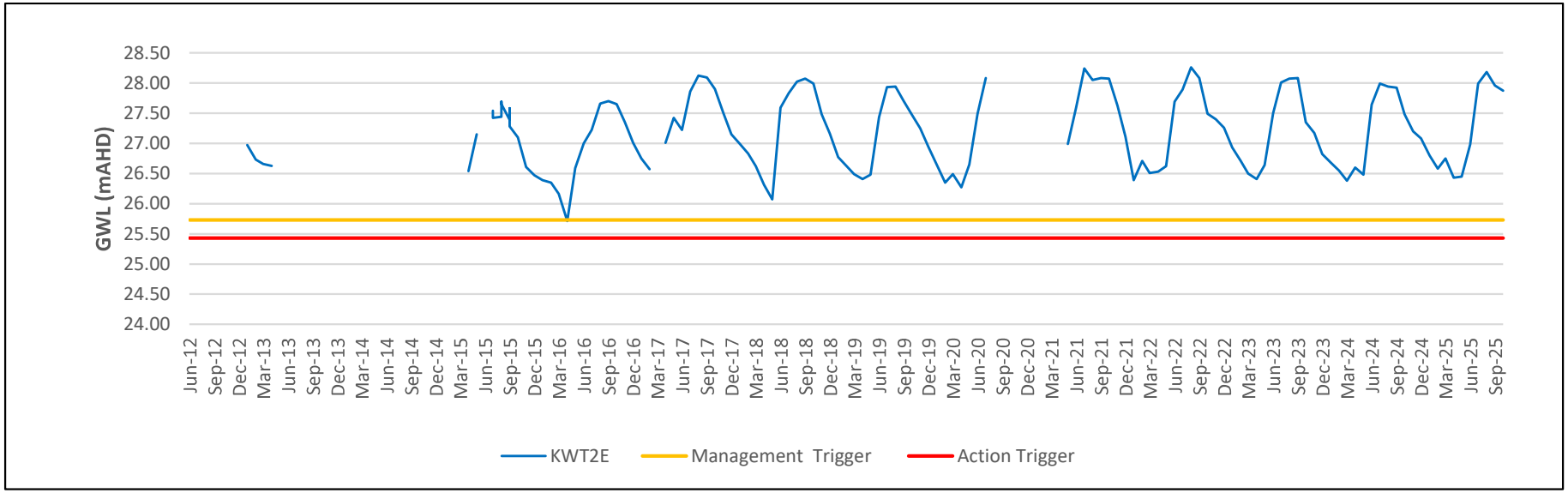
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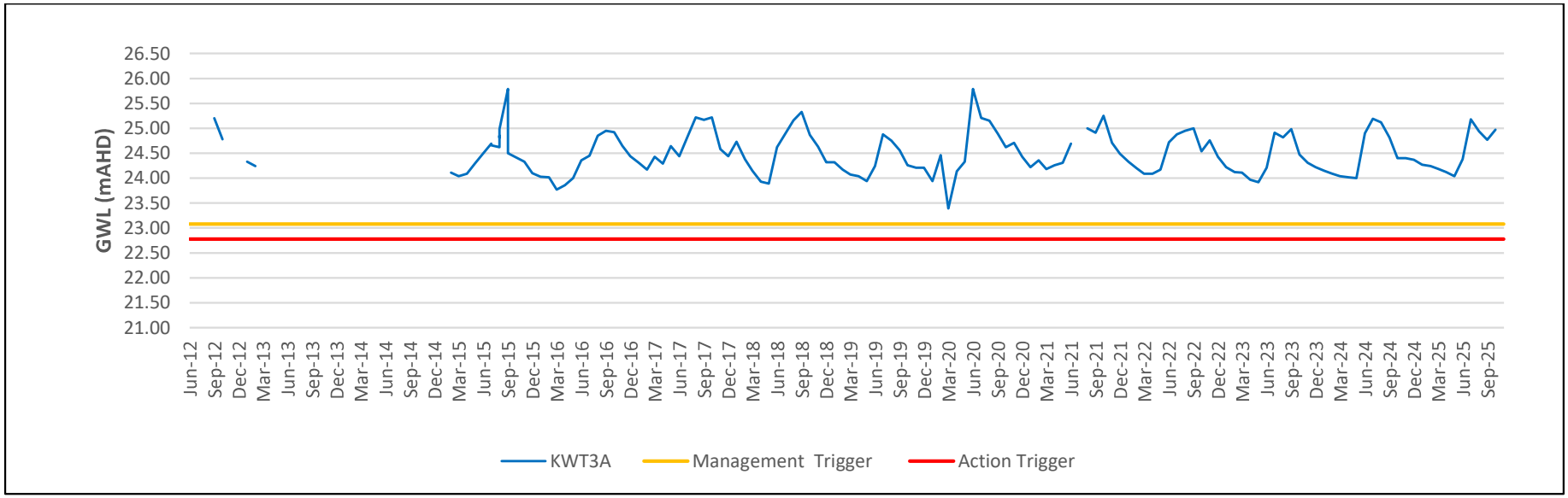
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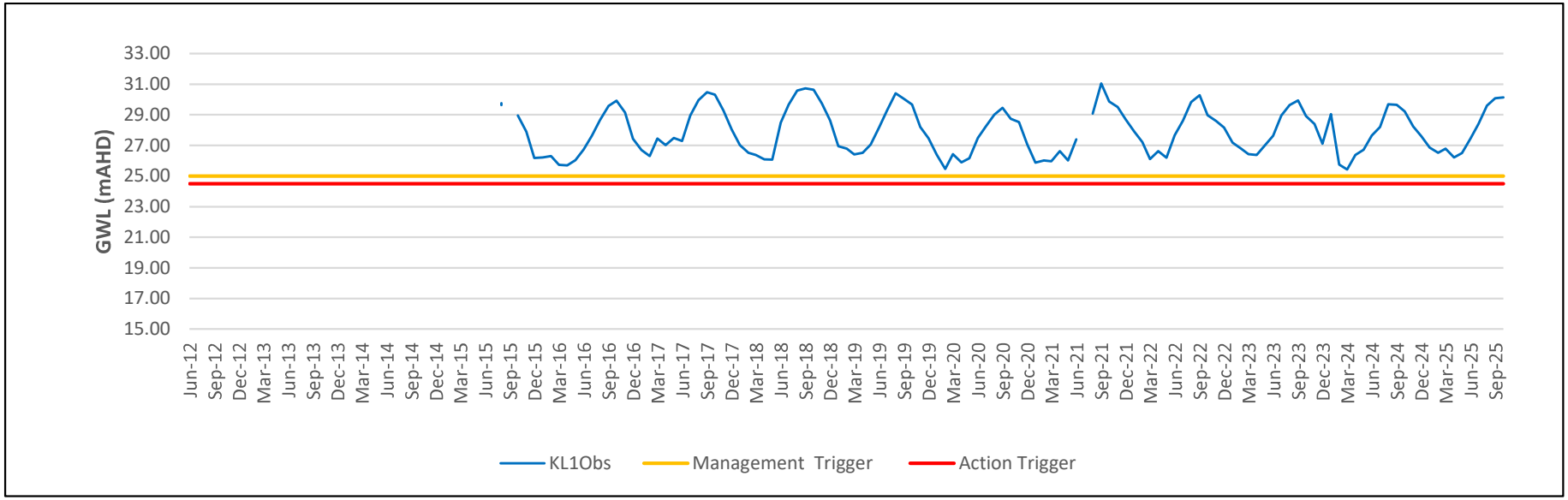
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KL1Obs
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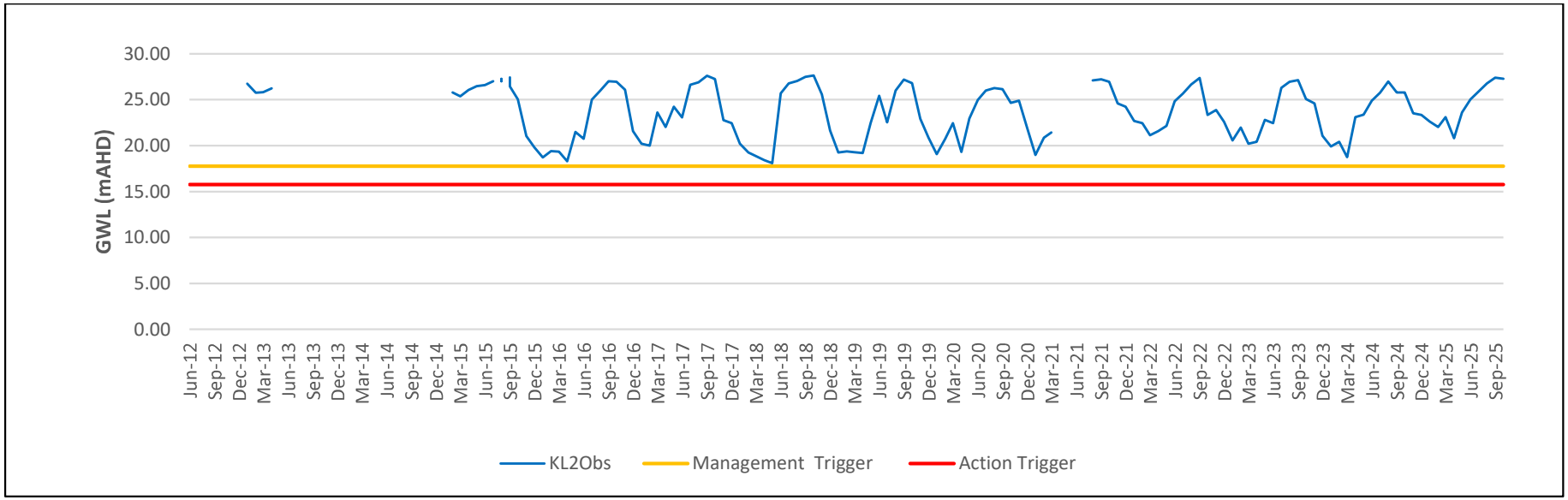
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KL2Obs
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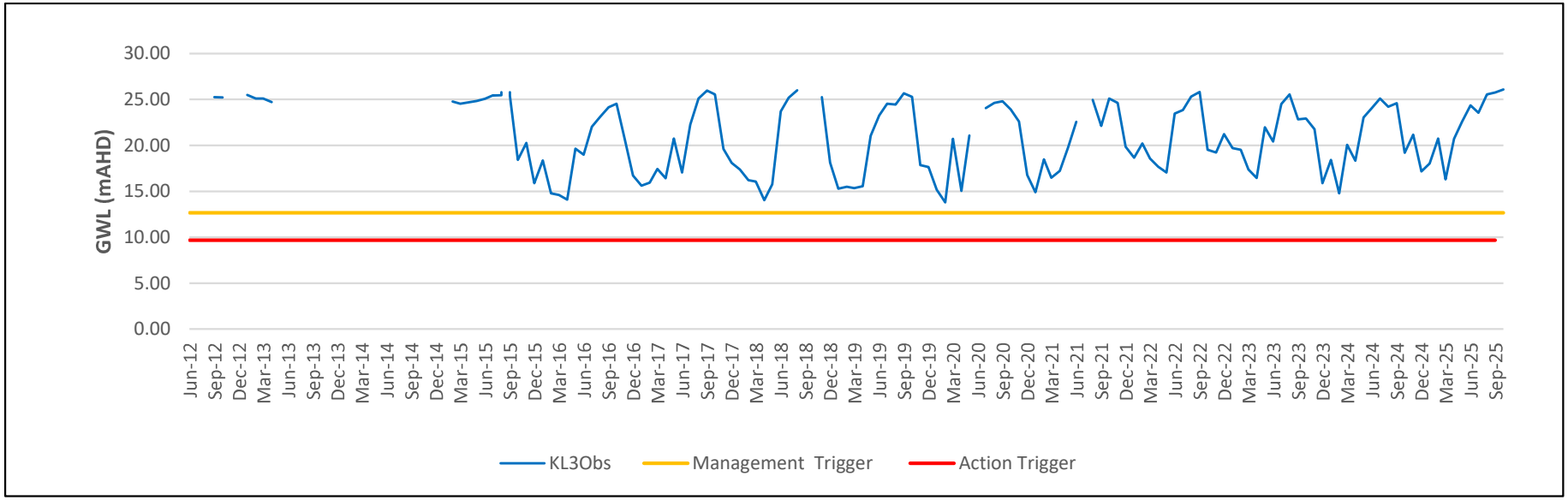
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KL3Obs
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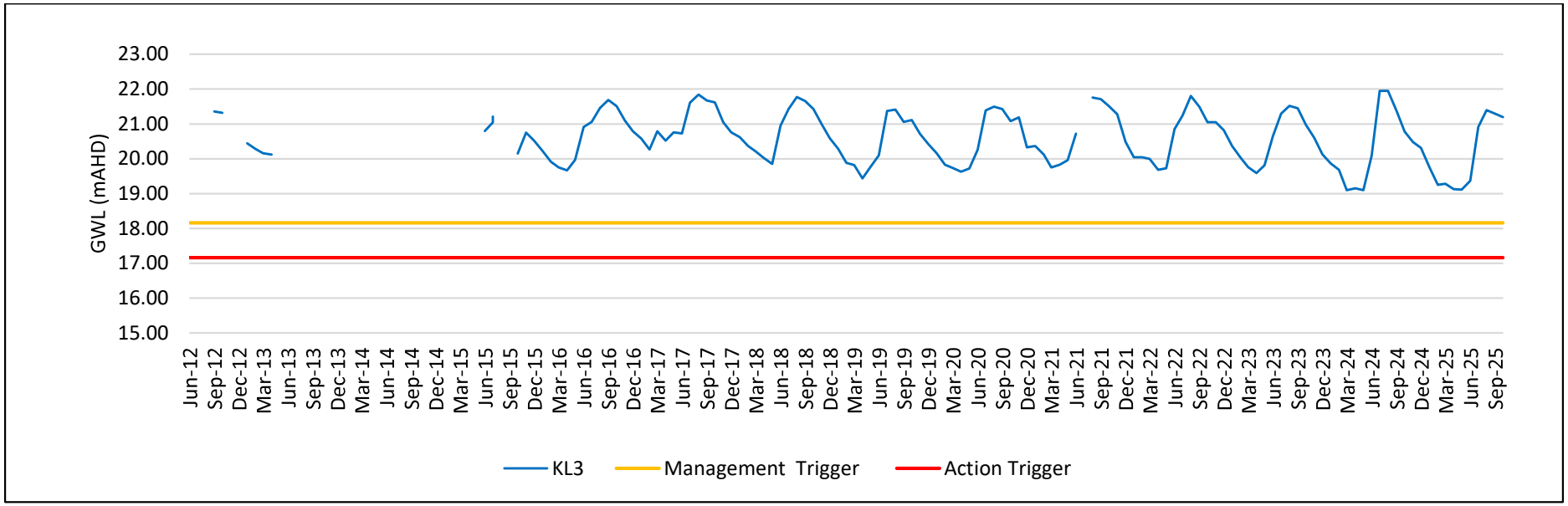
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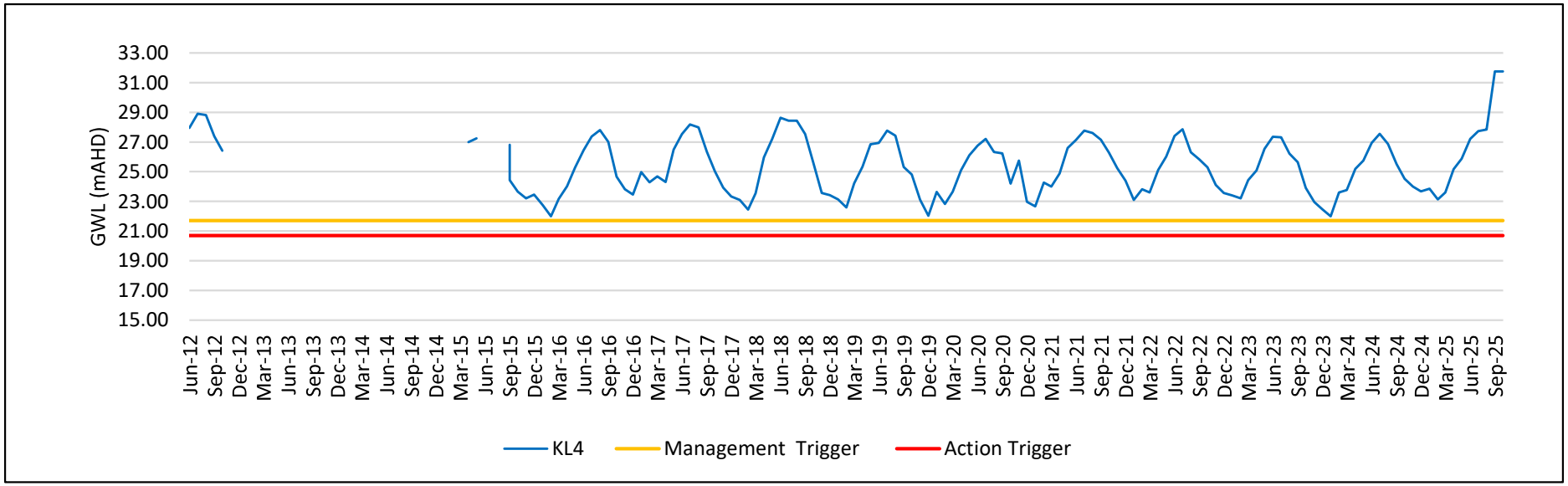
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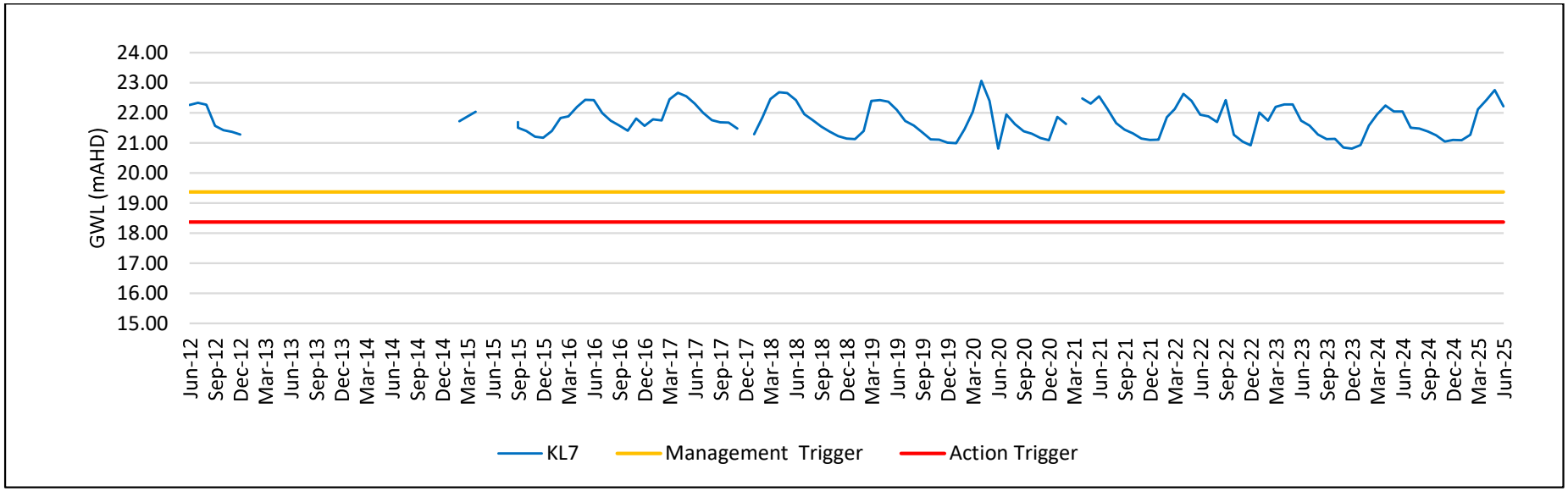
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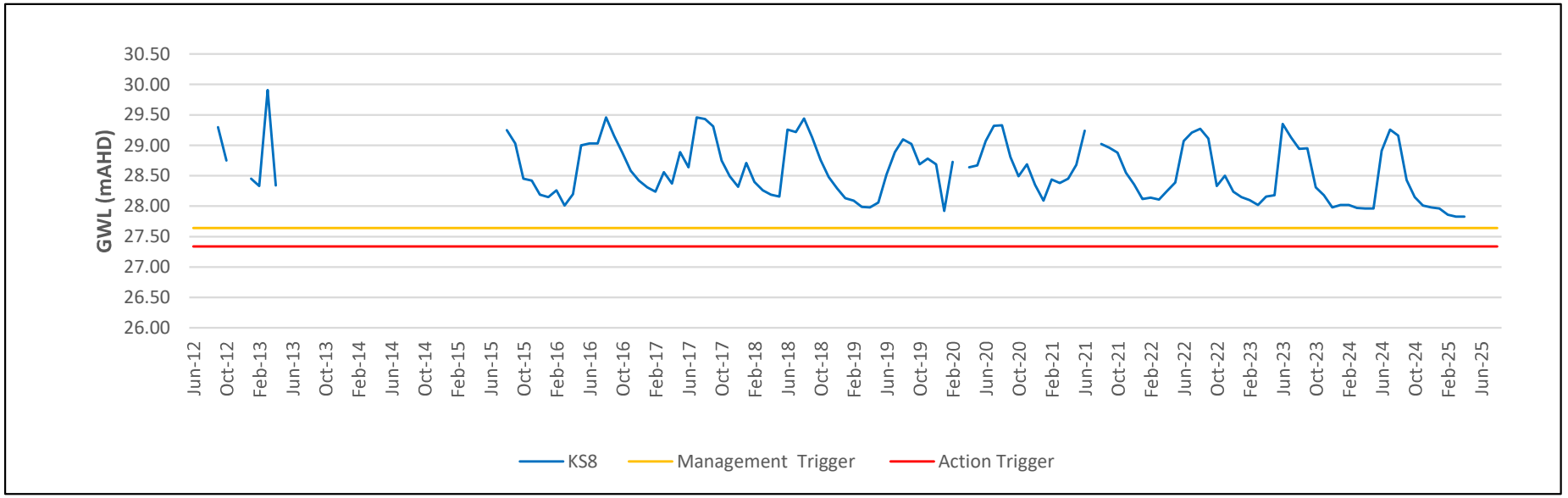
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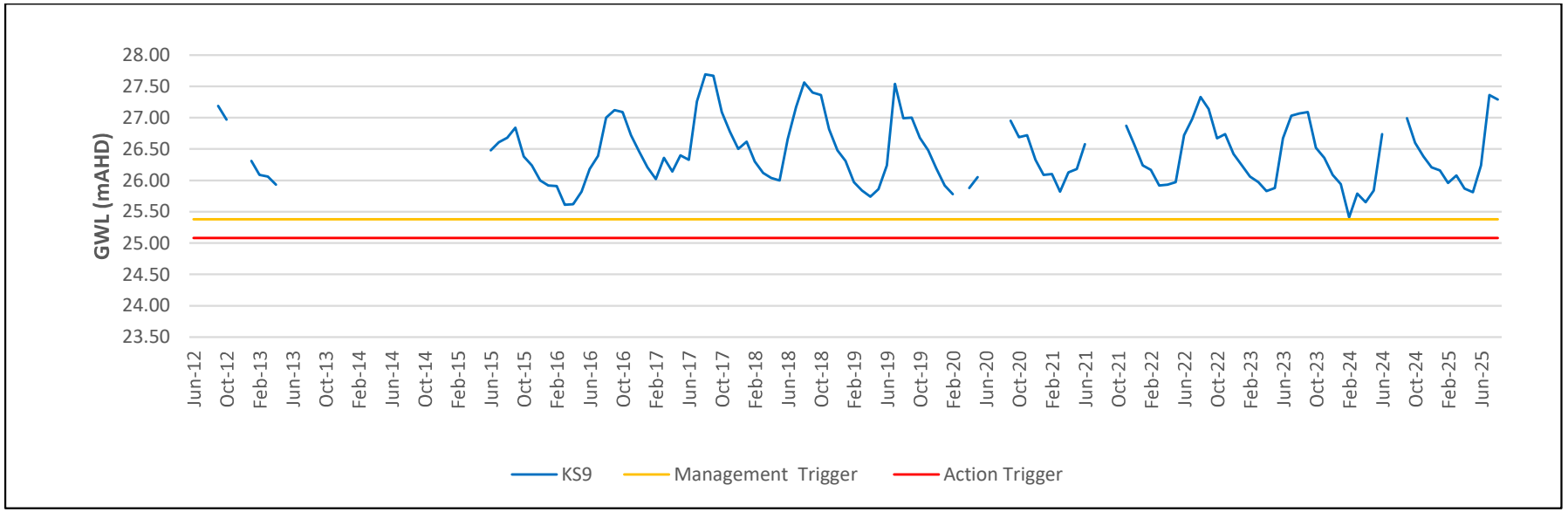
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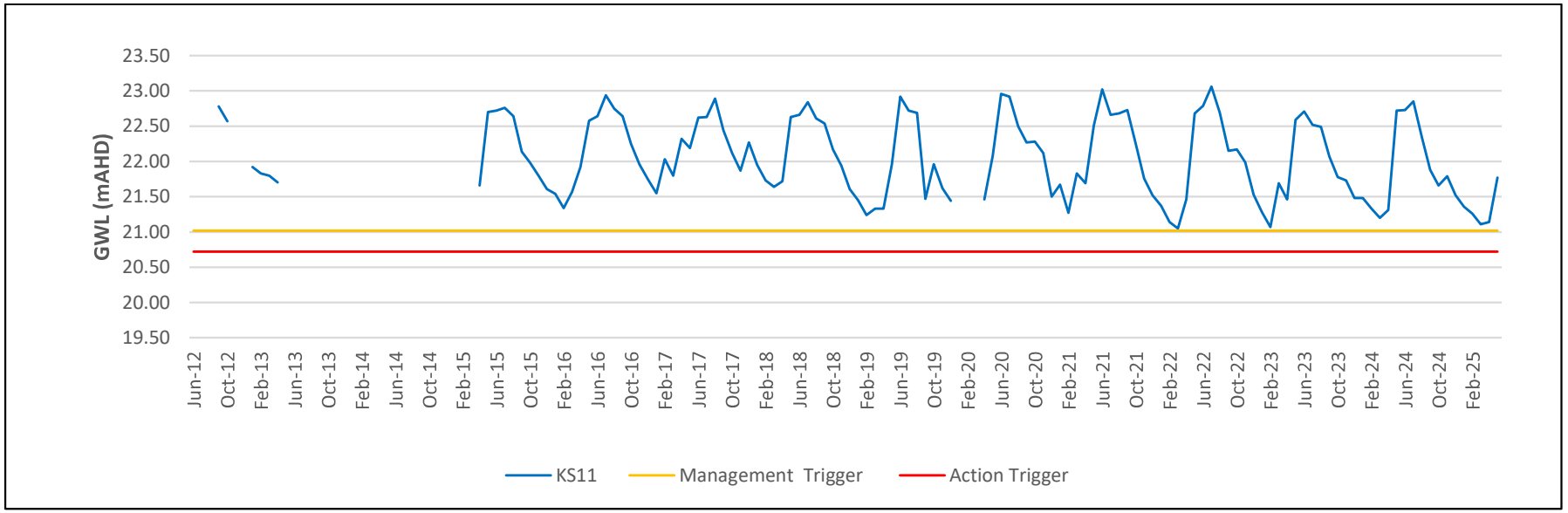
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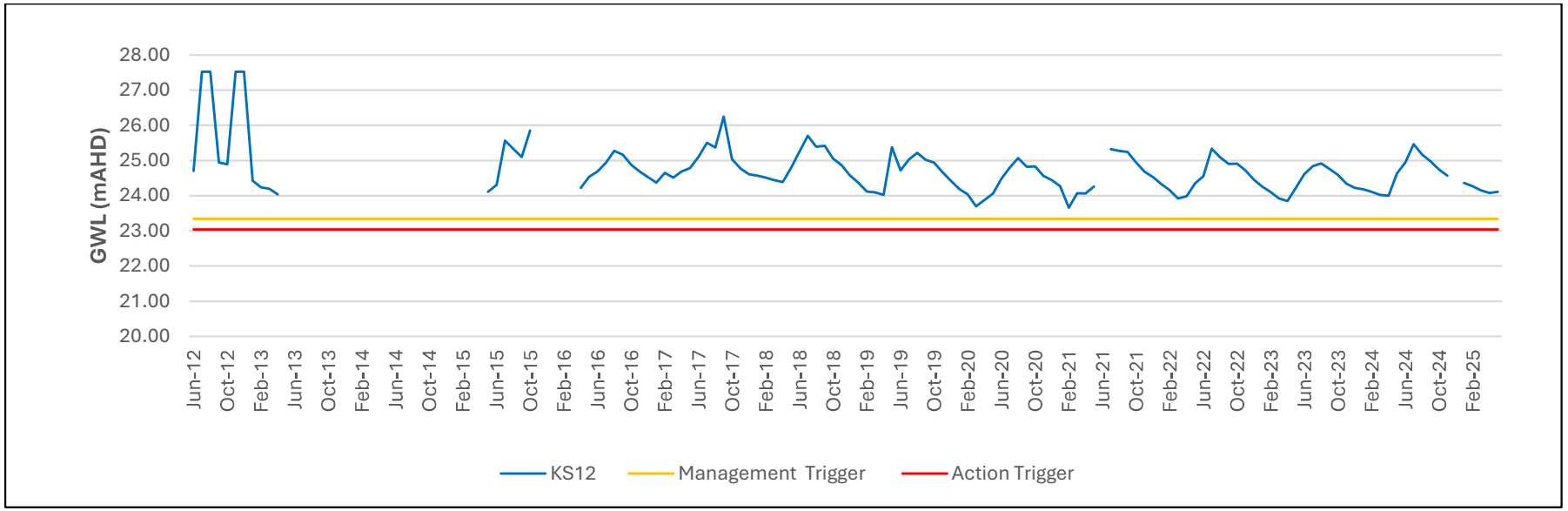
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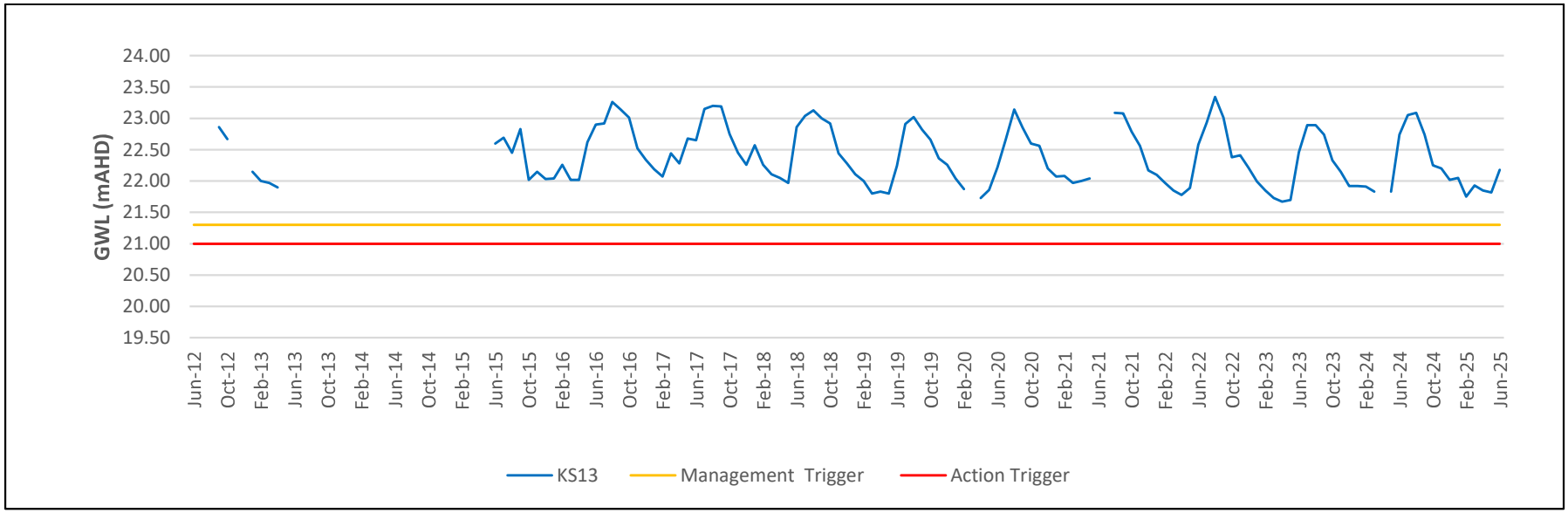
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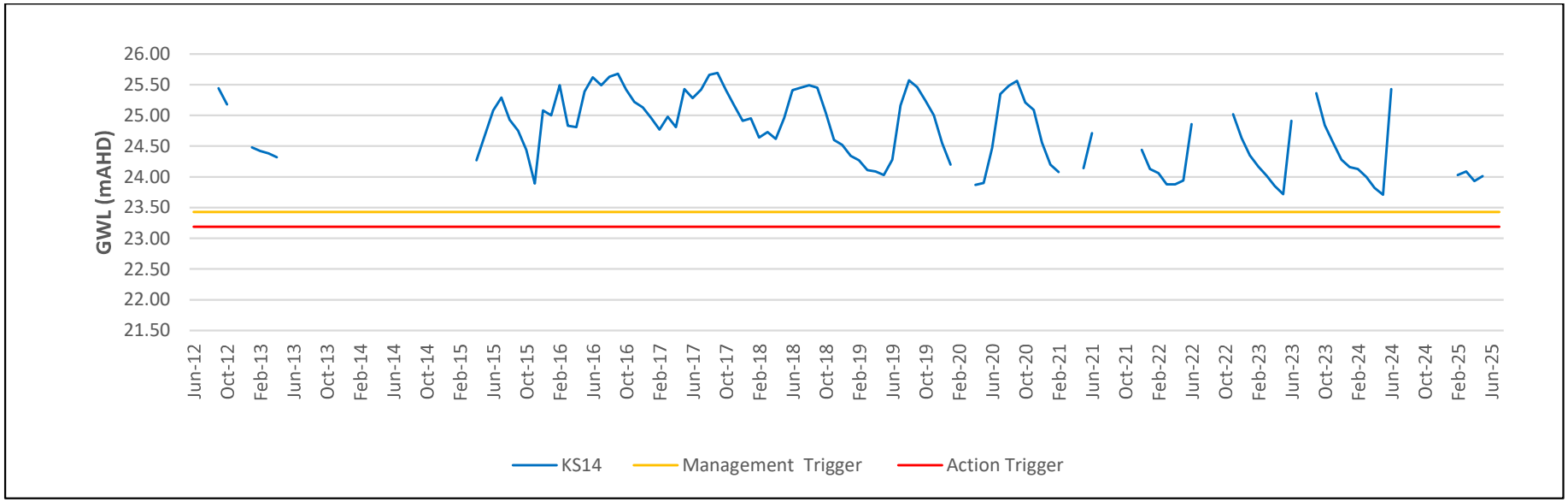
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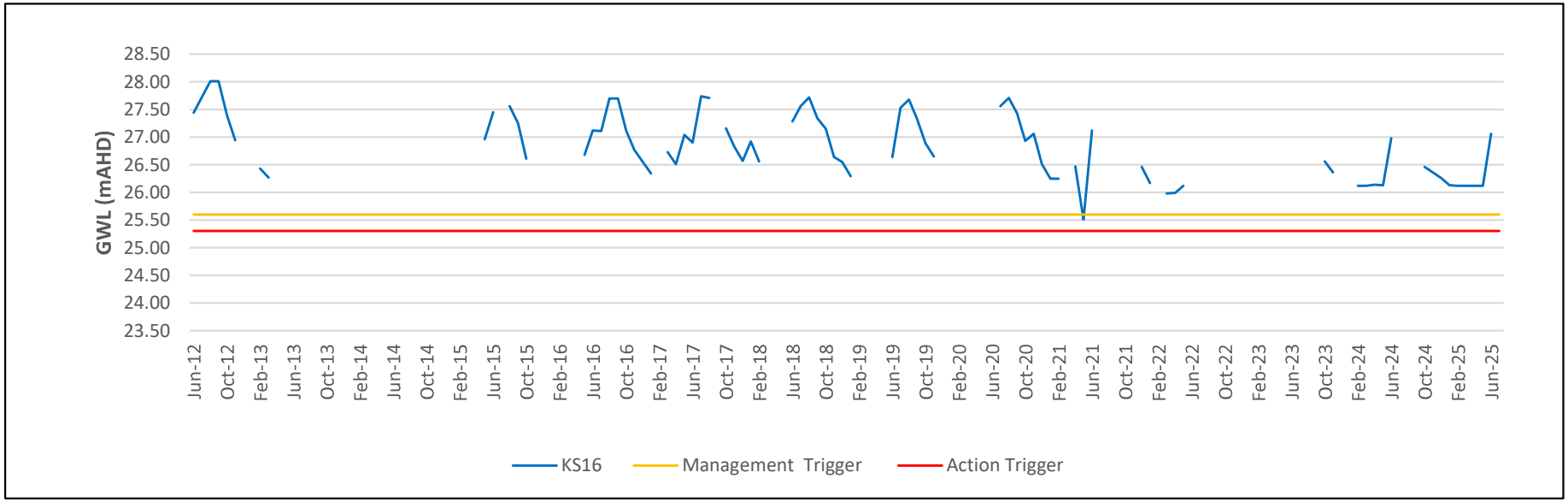
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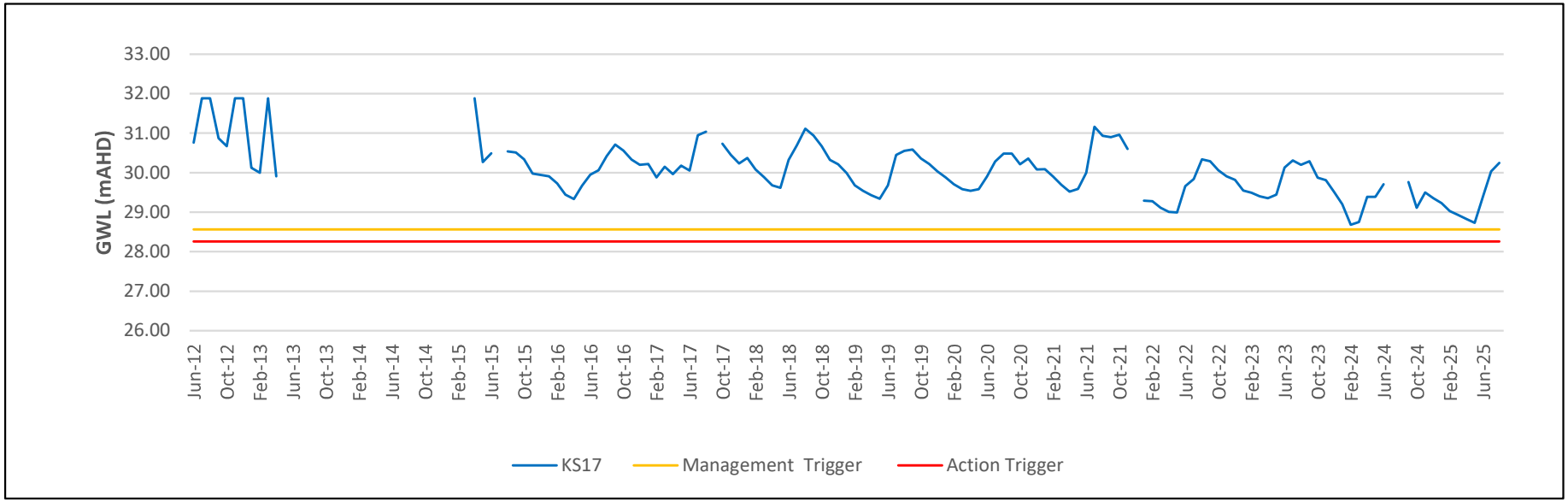
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Management Trigger
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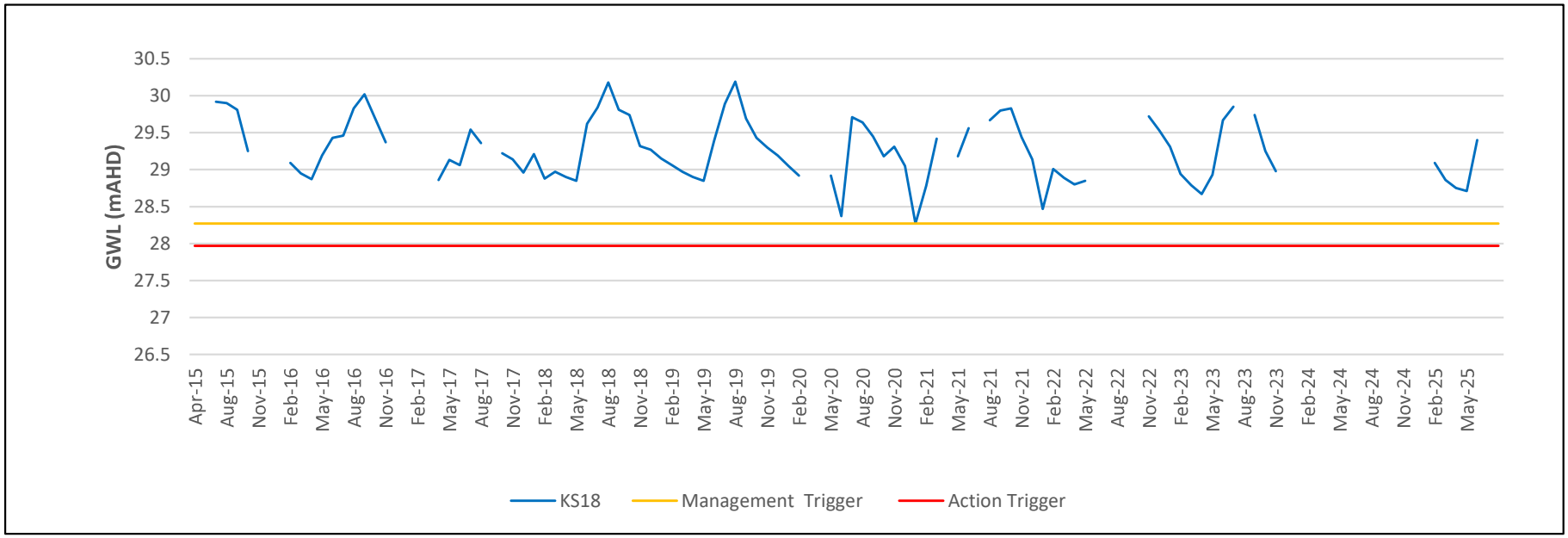
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Management Trigger
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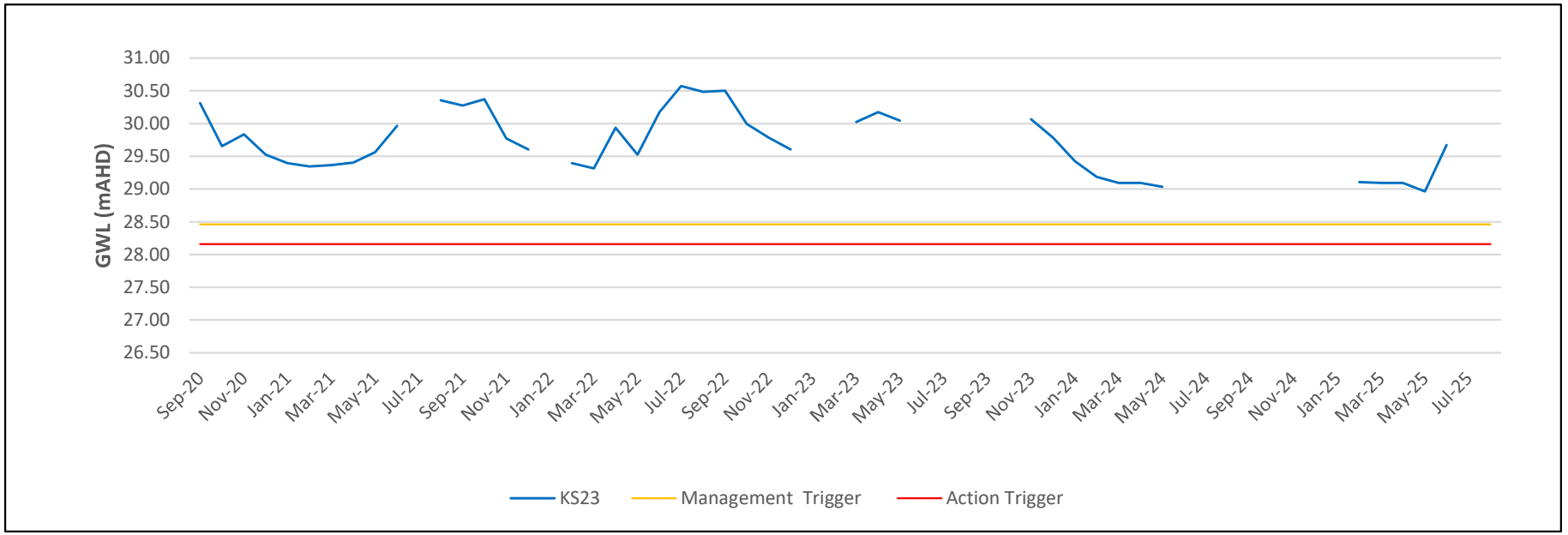
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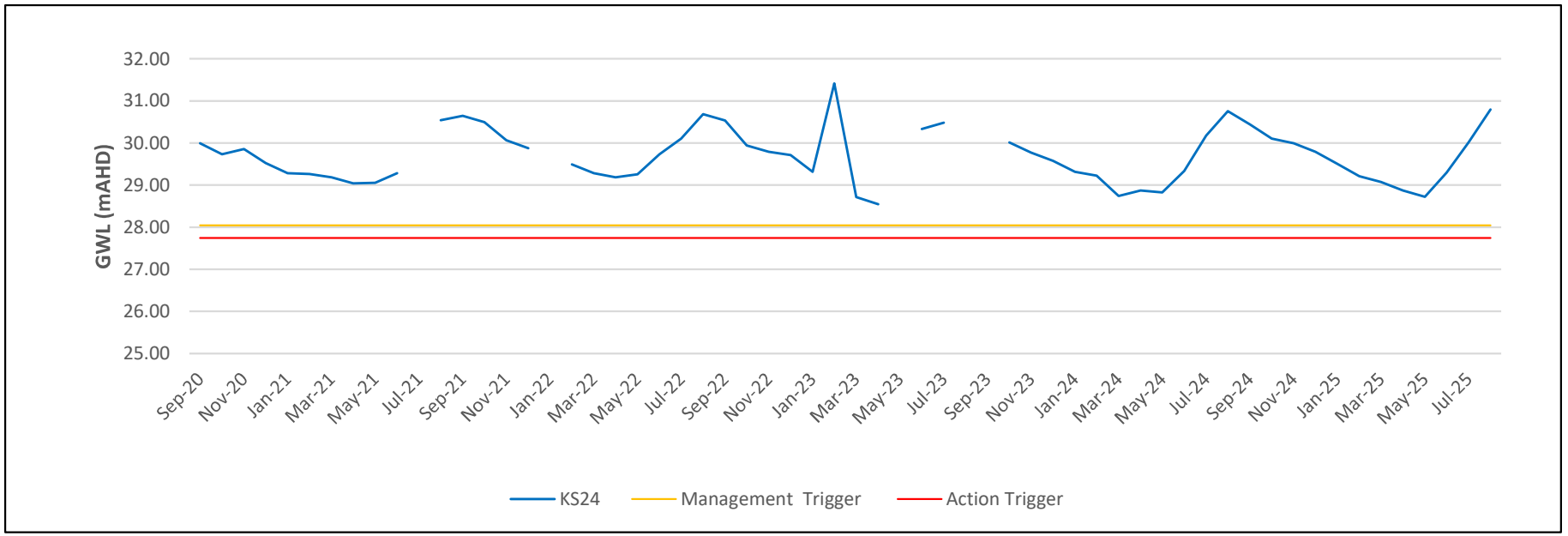
KS23
Management Trigger
Action Trigger


GWL (mAHD)
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KS24
Management Trigger
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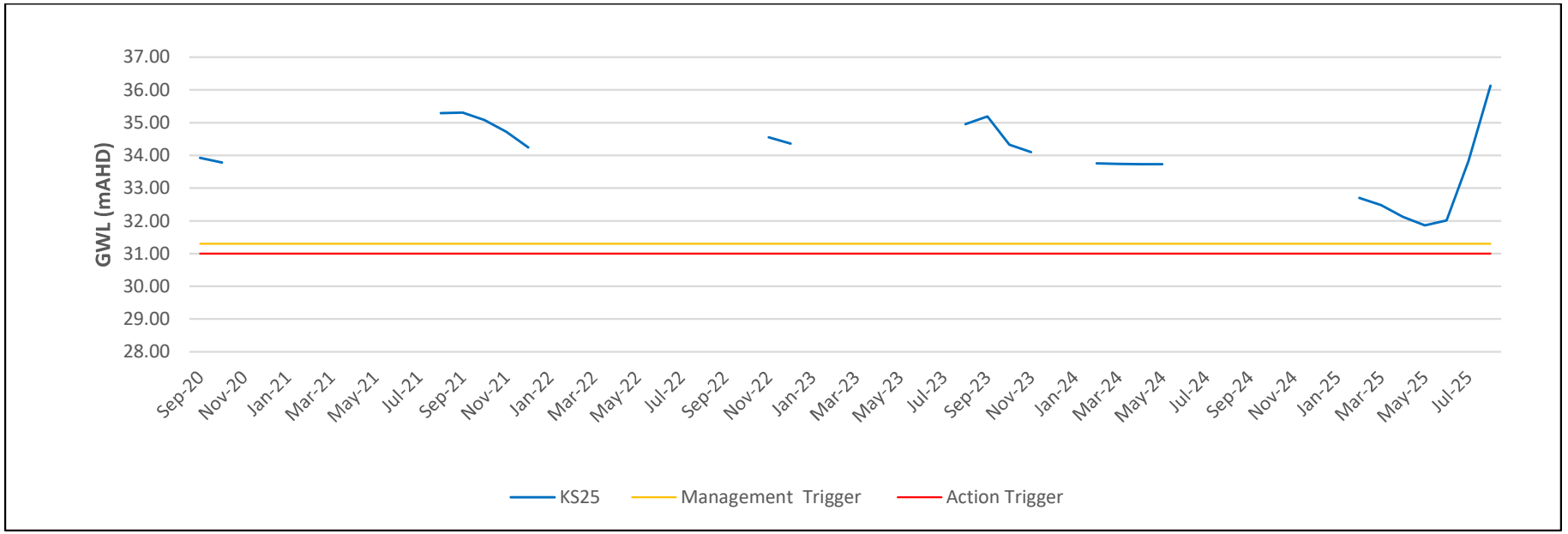
GWL (mAHD)
37.00
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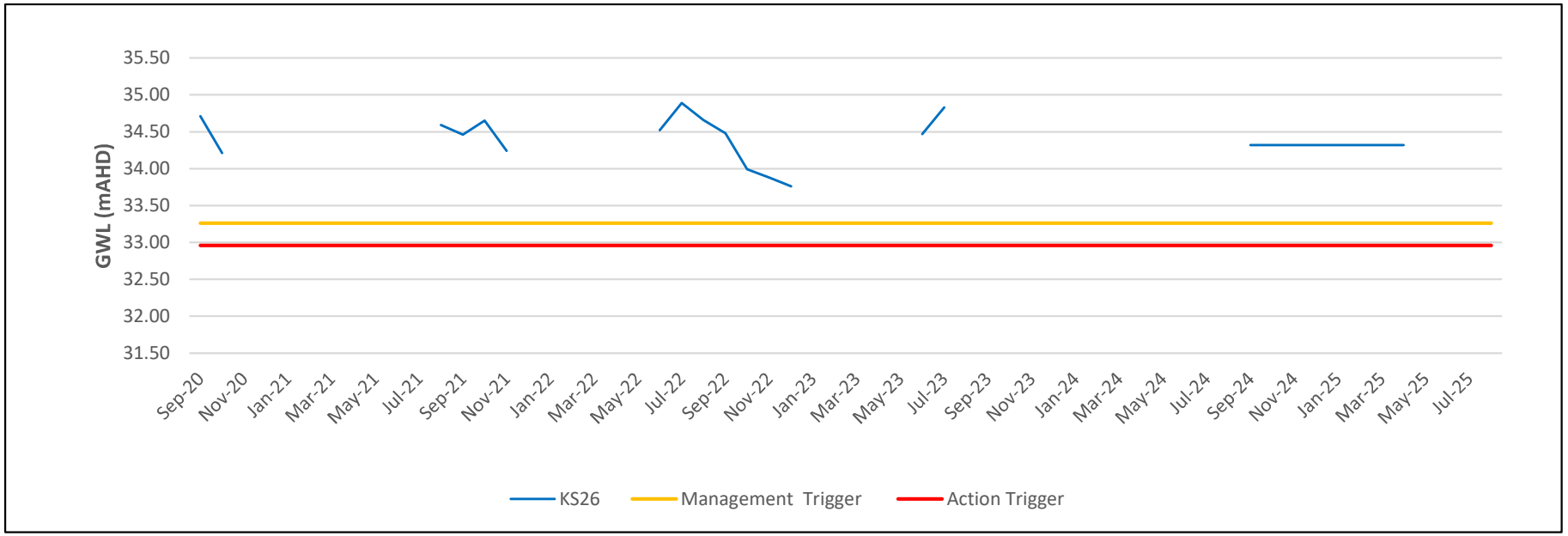
KS25
Management Trigger
Action Trigger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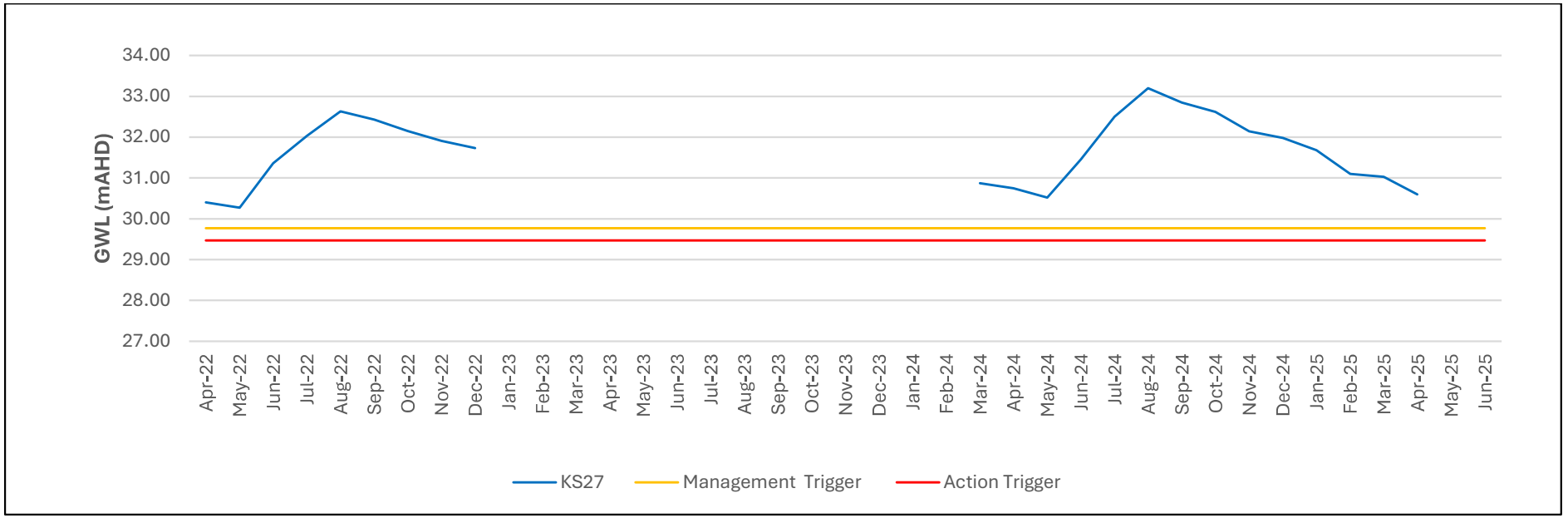
KS26
Management Trigger
Action Trigger


GWL (mAHD)
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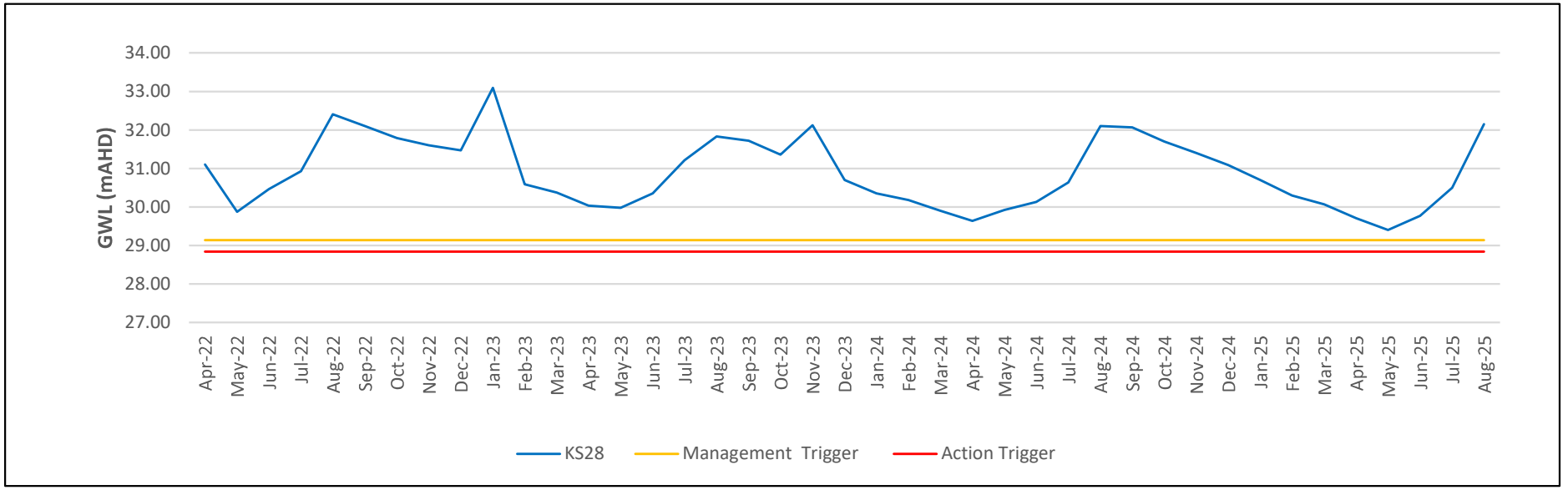
KS27
Management Trigger
Action Trigger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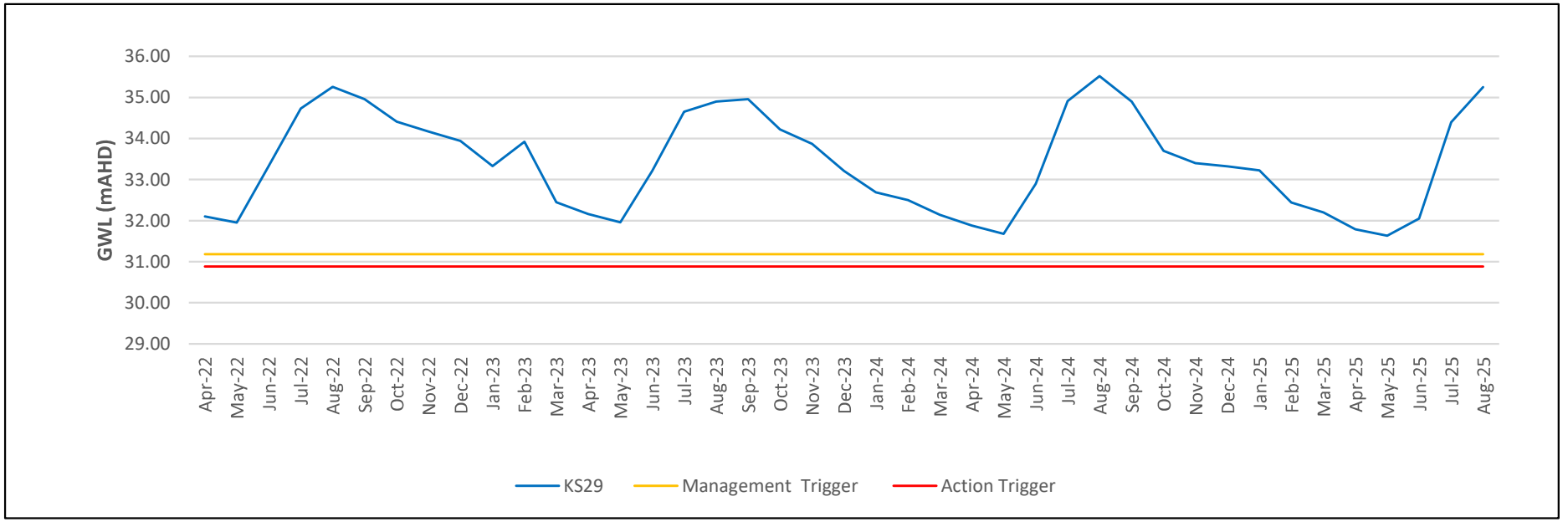
KS28
Management Trigger
Action Trigger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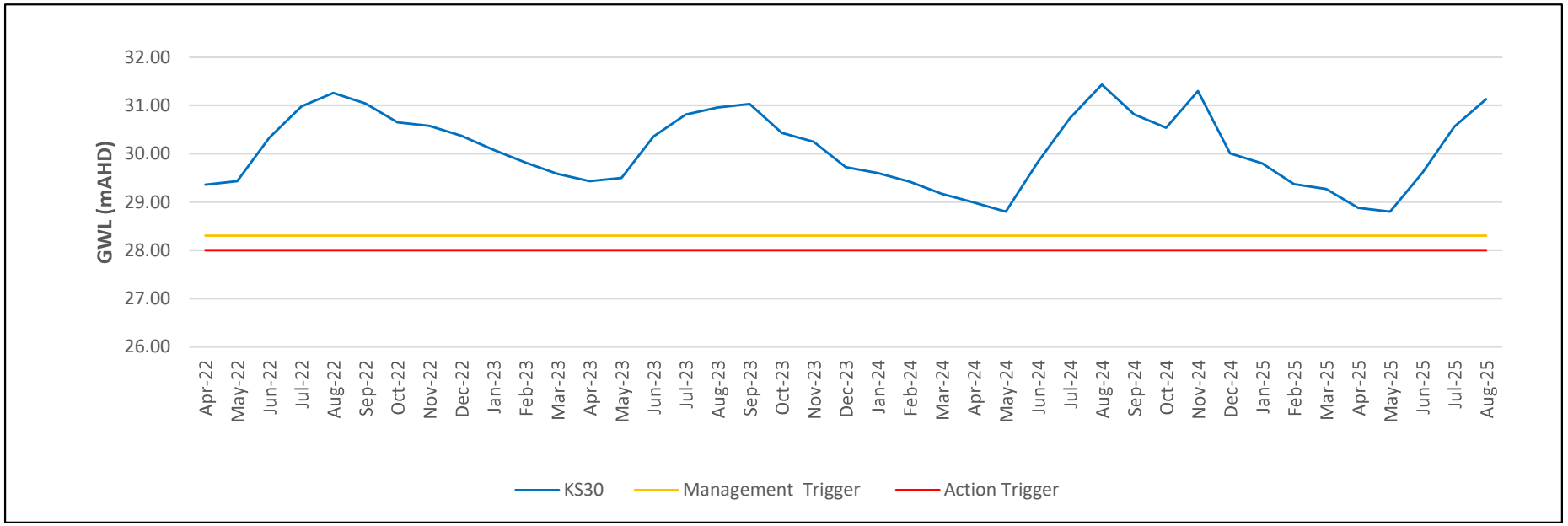
KS29
Management Trigger
Action Trigger


GWL (mAHD)
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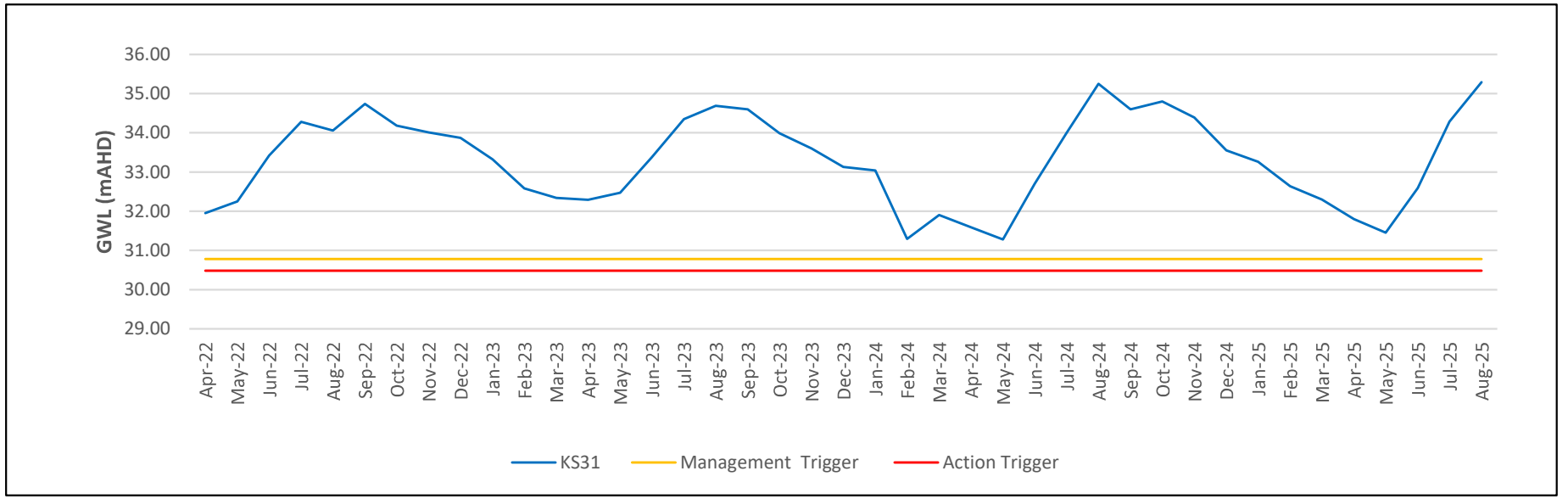
KS30
Management Trigger
Action Trigger


GWL (mAHD)
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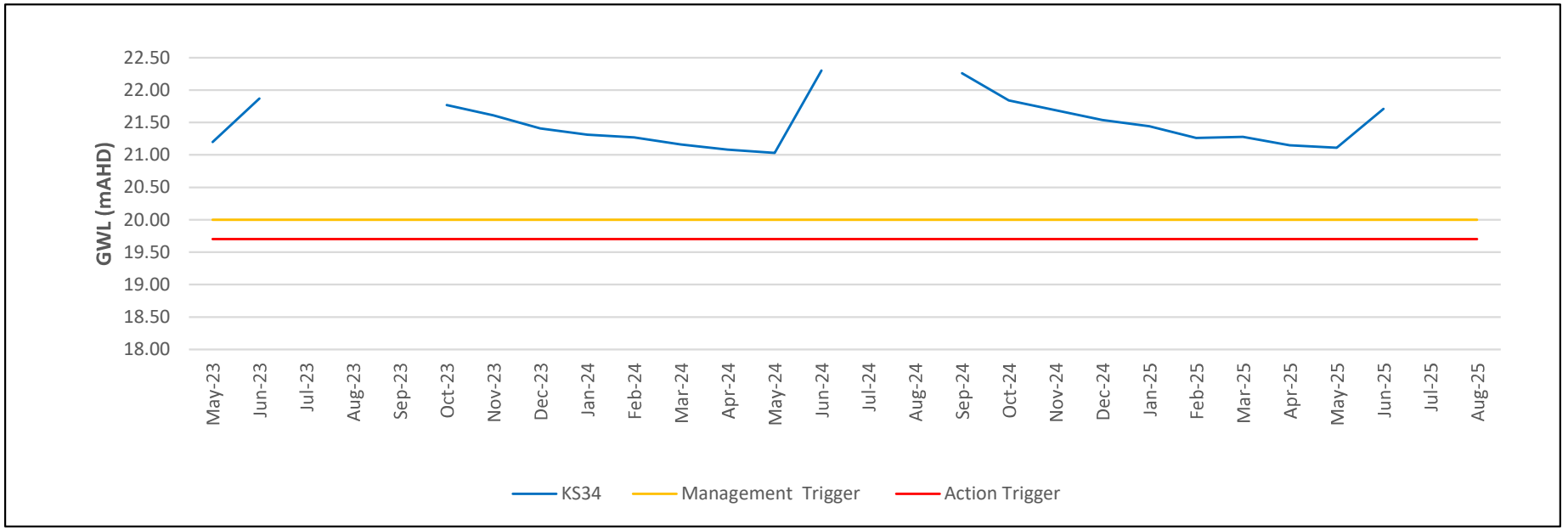
KS31
Management Trigger
Action Trigger


GWL (mAHD)
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KS34
Management Trigger
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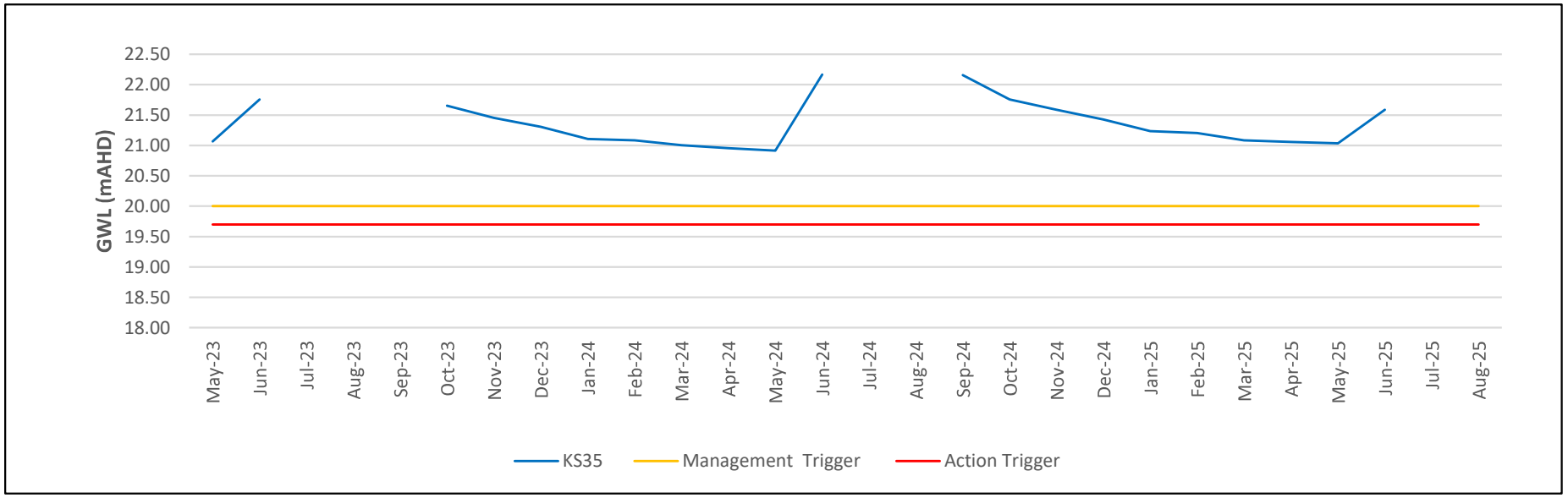
GWL (mAHD)
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KS35
Management Trigger
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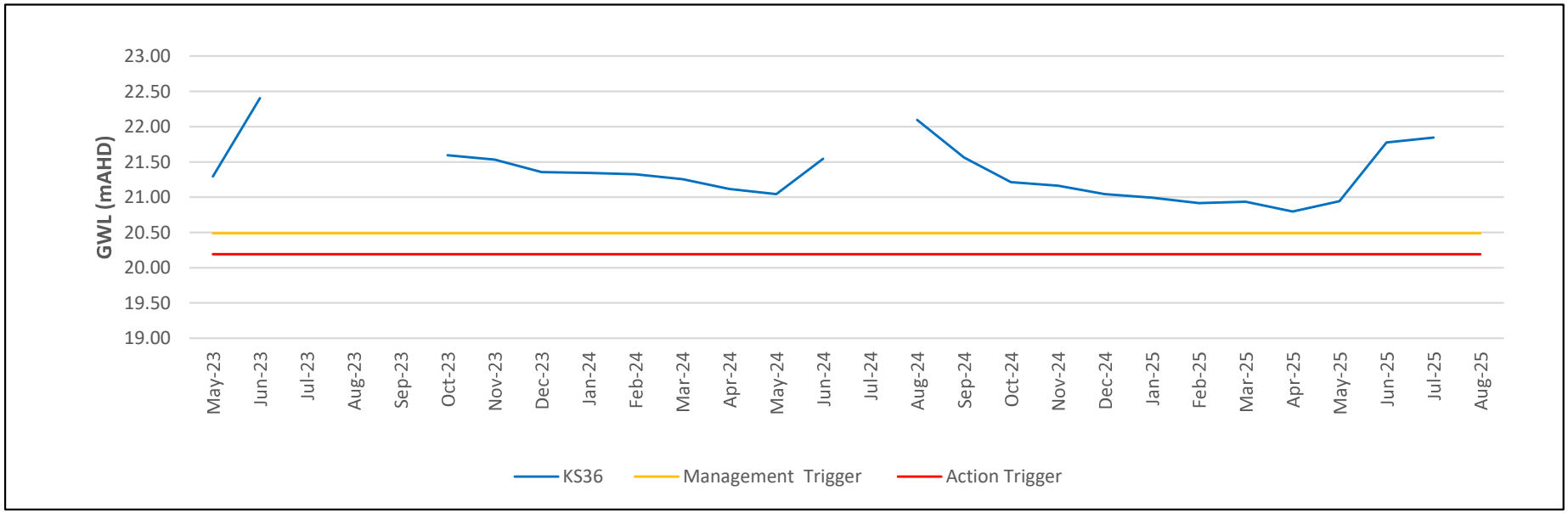
GWL (mAHD)
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KS36
Management Trigger
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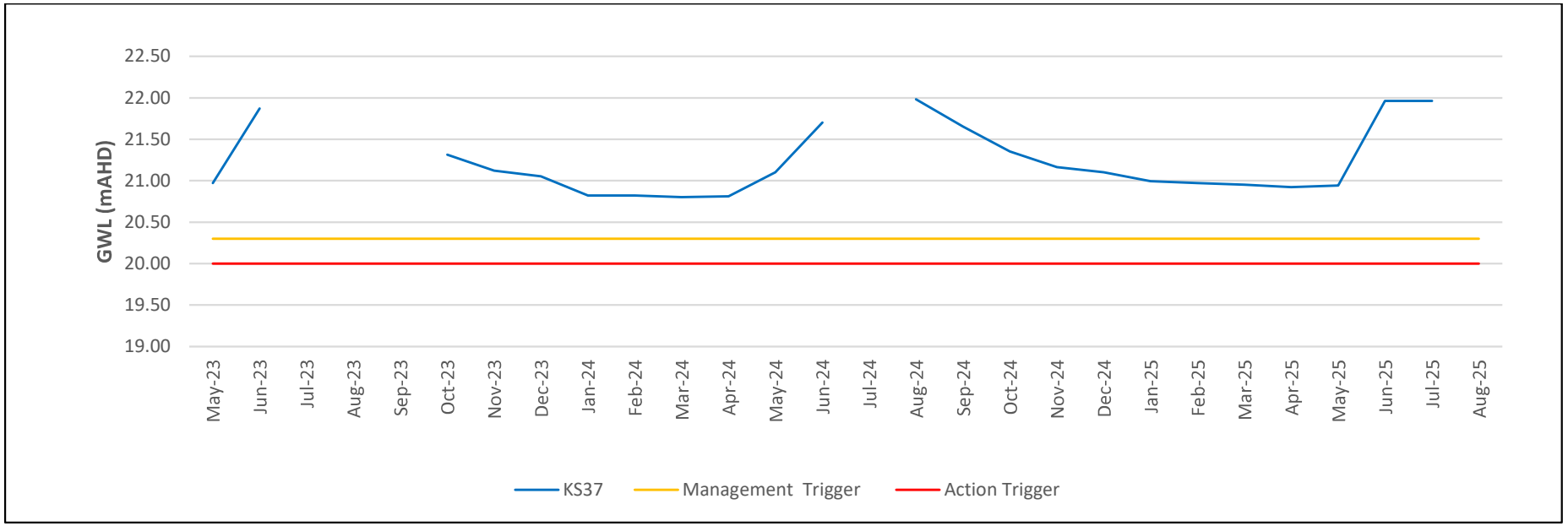
GWL (mAHD)
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KS37
Management Trigger
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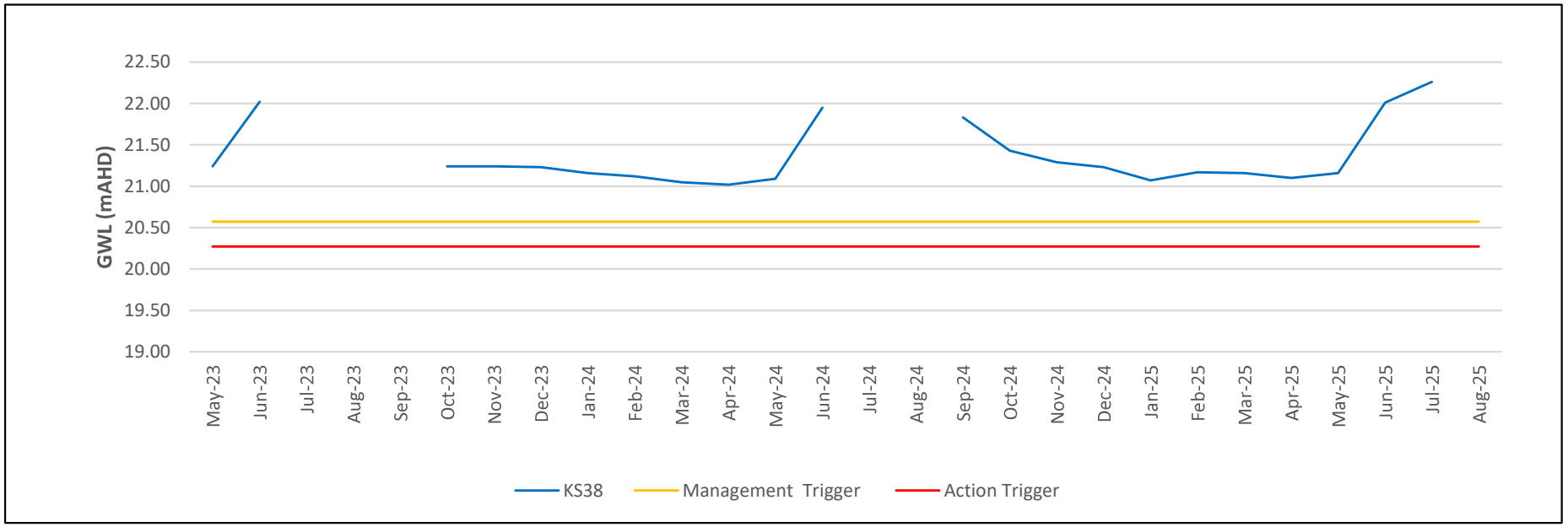
GWL (mAHD)
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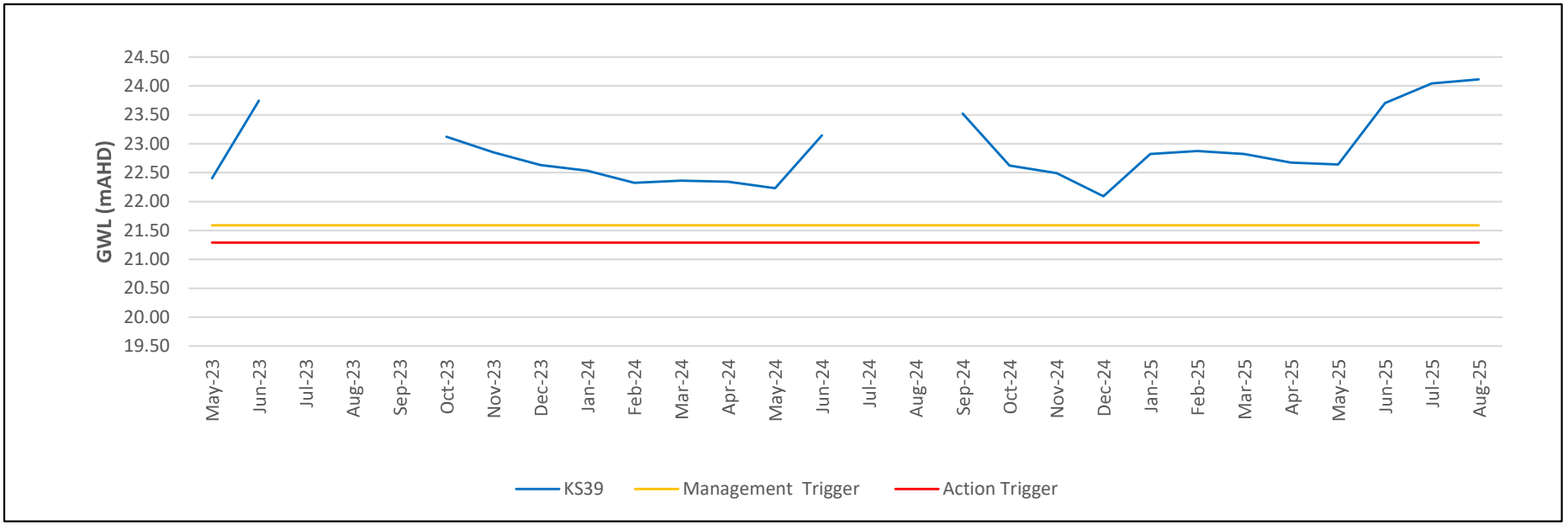
KS38
Management Trigger
Action Trigger


GWL (mAHD)
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KS39
Management Trigger
Action Trigger