



Application for Works Approval

Part V Division 3 of the *Environmental Protection Act 1986*

Works Approval Number	W6739/2022/1
Applicant	FQM Australia Nickel Pty Ltd
Trading as	Ravensthorpe Nickel Operations Pty Ltd
ACN	135 761 465
File number	DER2022/000488
Premises	Ravensthorpe Nickel Operations JERDACUTTUP WA 6346 Legal description – Part of mining tenements M74/54, M74/108, M74/114, M74/115, M74/116, M74/123, M74,142, M74/144, M74/145, M74/167, M74/168, M74/173, M74/174, M74/175 and G74/08 As defined by the premises maps attached to the issued works approval
Date of report	4 May 2023
Decision	Works approval granted

Manager, Resource Industries

an officer delegated under section 20 of the *Environmental Protection Act 1986* (WA)

Table of Contents

1. Decision summary	1
2. Scope of assessment	1
2.1 Regulatory framework	1
2.2 Application summary and overview of premises	1
2.3 Description of proposed activity	2
2.3.1 Construction	2
2.3.2 Time limited operations	3
2.4 Mining Proposal	3
2.5 Part IV of the EP Act	3
3. Risk assessment	4
3.1 Source-pathways and receptors	4
3.1.1 Emissions and controls	4
4. Receptors	18
4.1 Risk ratings	23
4.2 Risk assessment – Seepage of contaminated water	32
4.2.1 Overview of risk event	32
4.2.2 Analysis of groundwater monitoring data	32
4.2.3 Additional groundwater monitoring infrastructure	33
4.2.4 Seepage management strategies	33
4.2.5 Additional regulatory requirements	34
5. Consultation	34
6. Conclusion	35
References	35
Appendix 2: Groundwater monitoring infrastructure arrangement	36
Appendix 3: Seepage recovery arrangement	37
Appendix 4: Standing water level (SWL) line graphs	39
Appendix 5: Electrical conductivity (EC) line graphs	45
Appendix 6: SWL and Ni concentration – TSF2 eastern monitoring wells	49
Appendix 7: Application validation summary	50
Table 1: Proposed construction phase activities	2
Table 2: Proposed time limited operations	3
Table 3: Proposed applicant controls	5
Table 4: Sensitive human and environmental receptors and distance from prescribed activity (including risk assessment consideration)	18

Table 5: Risk assessment of potential emissions and discharges from the premises during construction and time-limited operations	24
Table 6: Consultation	34
Figure 1: Map demonstrating location of groundwater monitoring infrastructure (groundwater monitoring wells and vibrating wire piezometers (VWP)	36
Figure 2: Map demonstrating location of newly installed seepage recovery bores.....	37
Figure 3: Map demonstrating location of additional seepage recovery bores proposed to be installed.....	38
Figure 4: SWL – TSF2 northern monitoring wells	39
Figure 5: SWL – TSF2 western monitoring wells.....	40
Figure 6: SWL – TSF2 eastern monitoring wells	41
Figure 7: SWL – TSF2 southern monitoring wells	42
Figure 8: SWL – EP monitoring wells	43
Figure 9: SWL – monitoring wells downstream of TSF2 and EPs.....	44
Figure 10: EC – TSF2 northern monitoring wells.....	45
Figure 11: EC – TSF2 western monitoring well	46
Figure 12: EC – TSF2 eastern monitoring wells	47
Figure 13: EC – TSF2 southern monitoring wells	48
Figure 14: SWL and Ni concentration – TSF2 eastern monitoring wells	49

1. Decision summary

This decision report documents the assessment of potential risks to the environment and public health from emissions and discharges during construction and time limited operations for the premises. As a result of this assessment, works approval W6739/2022/1 has been granted.

2. Scope of assessment

2.1 Regulatory framework

In completing the assessment documented in this decision report, the Department of Water and Environmental Regulation (the department; DWER) has considered and given due regard to its regulatory framework and relevant policy documents which are available at <https://dwer.wa.gov.au/regulatory-documents>.

2.2 Application summary and overview of premises

On 14 September 2022, FQM Australia Nickel Pty Ltd (the applicant) submitted an application for a new works approval to the department under section 54 of the *Environmental Protection Act 1986* (EP Act). The application is to undertake construction and time limited operations relating to embankment raises (Stages 4 and 5) on the existing TSF2 using downstream construction techniques.

The applicant currently holds licence L8008/2004/3 for categories 5, 31, 52 and 54 and works approval W6578/2021/1¹ for category 5 under Part V of the EP Act. The premises is approximately 3 km west of the town of Jerdacuttup and 30 km east-south-east of the town of Ravensthorpe.

The premises consists of three nickel laterite deposits named Halley's, Hale-Bopp and Shoemaker-Levy and produces a mixed nickel-cobalt hydroxide product (MHP)². The premises was placed into care and maintenance in October 2017 and transitioned to operational status in early 2020 with mining completed in Halley's Pit and construction and development now occurring for the Shoemaker-Levy deposit.

Tailings deposition into TSF2 commenced around 30 May 2021, with deposition being undertaken periodically during construction of the TSF2 Stage 1 embankment raise, which was completed on the 10 September 2021. Tailings deposition into TSF1 ceased on 12 September 2021, when the facility reached its full storage capacity. Time limited operations tailings deposition into the TSF2 (combined Stage 2 and 3) embankment raise commenced on the 21 January 2023, with tailings deposition into TSF2 currently ongoing³.

Supernatant water and stormwater from all three TSF cells are pumped via existing high-density polyethylene (HDPE) pipelines to the evaporation ponds (EPs) for storage or to the process

¹ Works approval W6578/2021/1 (granted on 23 May 2022) for the construction and time limited operations relating to embankment raise (combined Stage 2 and 3) on the existing TSF2.

² The process plant and associated infrastructure includes primary crushing, beneficiation, pressure acid leaching and atmospheric leaching, primary neutralisation, decantation, secondary neutralisation, mixed hydroxide precipitation, acid production, power generation, reagent storage, limestone crushing, combined tailing storage facility (TSF) infrastructure (TSF1 West Cell, TSF 1 East Cell and TSF2), EPs and storage and transport.

³ Deposition occurs via existing HDPE pipelines with spigots (connected to slotted Polyvinyl chloride (PVC) dropper pipes) at centreline spacings of approximately 60 m along entire TSF2 perimeter.

plant for re-use (WSP Golder 2022a; WSP Golder 2022b). The EPs are considered critical infrastructure in managing seepage risks from TSF2; therefore, the department has determined to include this infrastructure within the scope of this new works approval application.

The premises for this works approval relates to the category and assessed production capacity under Schedule 1 of the *Environmental Protection Regulations 1987* (EP Regulations), which are defined in works approval W6739/2022/1. The infrastructure and equipment relating to the premises category and any associated activities which the department has considered in line with *Guideline: Risk assessments* (DWER 2020b) are outlined in works approval W6739/2022/1.

2.3 Description of proposed activity

2.3.1 Construction

Table 1 provides an overview of the proposed construction phase activities for Category 5: Processing or beneficiation of metallic or non-metallic ore.

Table 1: Proposed construction phase activities

Stage 4	Stage 5
<ul style="list-style-type: none"> • temporary storage of embankment construction material on south-west, south and south-east corners of TSF2; <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that these proposed stockpile areas are located on previously cleared land and will be rehabilitated on completion of the works.</i> <ul style="list-style-type: none"> • TSF2 Stage 4 footprint area conditioned and compacted prior to construction of embankment raises; • 3 m downstream embankment raise (using mine waste materials from Hale-Bopp and other suitable borrow materials) to RL 129.7 m (Stage 4) on the existing eastern, southern and portion of the western TSF2 embankments; • raising existing TSF2 decant access causeway; • excavation and backfilling of a cut-off trench along the proposed extension of the western embankment and tying it to the existing cut-off trench to reduce shallow seepage; • relocating tailings deposition pipework to the upstream crest margin of the raised TSF2 (Stage 4) embankments; • construction of a safety bund on the outer crest margin and a 2% inward crossfall on the embankment crest to direct surface water and/or spilled liquor from tailings distribution pipelines back into the TSF2 basin; and • construction of safety windrows on the raised 	<ul style="list-style-type: none"> • temporary storage of embankment construction material on south-west, south and south-east corners of TSF2; <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that these proposed stockpile areas are located on previously cleared land and will be rehabilitated on completion of the works.</i> <ul style="list-style-type: none"> • TSF2 Stage 5 footprint area conditioned and compacted prior to construction of embankment raises; • 3 m downstream embankment raise (using combination of reject stream materials from the processing plant and Hale-Bopp mine waste materials) to RL 132.7 m (Stage 5) on the existing eastern, southern and portion of the western TSF2 embankments; • raising existing TSF2 decant access causeway; • excavation and backfilling of a cut-off trench along the proposed extension of the western embankment and tying it to the existing cut-off trench to reduce shallow seepage; • relocating tailings deposition pipework to the upstream crest margin of the raised TSF2 (Stage 5) embankments; • construction of a safety bund on the outer crest margin and a 2% inward crossfall on the embankment crest to direct surface water and/or spilled liquor from tailings distribution pipelines back into the TSF2 basin; • construction of safety windrows on the raised

Stage 4	Stage 5
embankment crests.	embankment crests; and <ul style="list-style-type: none"> construction of a series of catchment paddocks that run along the external perimeter toe of TSF2 to capture any run-off of reject stream material and/or contaminated water from the Stage 5 embankment slope.

2.3.2 Time limited operations

Table 2 provides an overview of the proposed time limited operations for Category 5: Processing or beneficiation of metallic or non-metallic ore.

Table 2: Proposed time limited operations

Stage 4	Stage 5
<ul style="list-style-type: none"> deposition of tailings into TSF2 following the Stage 4 embankment raise; and supernatant water and rainfall on TSF2 pumped (turret pumps connected to the pump's suction hose) via existing HDPE pipelines to the HDPE-lined EPs for storage or to the process plant for re-use. 	<ul style="list-style-type: none"> deposition of tailings into TSF2 following the Stage 5 embankment raise; supernatant water and rainfall on TSF2 pumped (turret pumps connected to the pump's suction hose) via existing HDPE pipelines to the HDPE-lined EPs for storage or to the process plant for re-use; any reject stream material, contaminated water and/or stormwater runoff from the Stage 5 embankment slope is proposed to be collected within the series of catchment paddocks and pumped to HDPE-lined EPs or left within the catchment paddock(s) to evaporate; and during significant rainfall events, mobile pumps will be used to pump the contained run-off stored within catchment paddock(s) onto TSF2.

2.4 Mining Proposal

FQM Australia Nickel Pty Ltd submitted a Mining Proposal (Reg ID 114152) to the Department of Mines, Industry Regulation and Safety (DMIRS), in relation to these embankment raises. The application was granted on 5 April 2023.

2.5 Part IV of the EP Act

The Ravensthorpe Nickel Project has been assessed under Part IV of the EP Act by the Environmental Protection Authority (EPA). It is subject to the requirements of Ministerial Statement 633 (MS 633) which was published on 5 September 2003.

MS 633 includes conditions to minimise impacts to the following:

- priority flora species within the project area, in particular *Eucalyptus purpurata ms*, *Spyridium glaucum*, *Dampiera deltiodea* and *Kunzea similis*;
- significant vegetation communities within the project area, in particular *Eucalyptus flocktoniae* – *Melaleuca coronicarpa* 'gorse' and *Eucalyptus purpurata ms* woodland; and
- fauna within the project area and the adjacent Bandalup corridor, in particular Heath Rat

(*Pseudomys shortridgei*) and the Western Mouse (*Pseudomys occidentalis*).

Potential impacts to the above, including any requirements of monitoring in relation to these, have not be considered within the Part V assessment given these have been considered under MS 633.

The applicant has stated that TSF2 Stages 4 and 5 raises will not involve clearing of conservation significant flora as the TSF2 footprint will be restricted to the cleared land within the MS 633 development envelope.

Schedule 2 of MS 633 provides commitments to develop management plans, including in relation to the following aspects:

- surface hydrology;
- groundwater;
- flora and vegetation;
- priority flora;
- fauna;
- heritage and Aboriginal sites;
- dust and particulates; and
- noise.

The Delegated Officer notes that the above management plans are not intended to address all Part V prescribed activity emissions and discharges and that there are no specific conditions listed within MS 633 that directly relate to the management or control of Part V prescribed activity emissions and discharges.

Considering the above, all emissions and discharges related to Part V prescribed activities will be considered and risk assessed under this new works approval application.

3. Risk assessment

The department assesses the risks of emissions from prescribed premises and identifies the potential source, pathway and impact to receptors in accordance with the *Guideline: Risk assessments* (DWER 2020b).

To establish a risk event there must be an emission, a receptor which may be exposed to that emission through an identified actual or likely pathway, and a potential adverse effect to the receptor from exposure to that emission.

3.1 Source-pathways and receptors

3.1.1 Emissions and controls

The key emissions and associated actual or likely pathway during premises construction and time limited operations, which have been considered in this decision report are detailed in Table 3 below. Table 3 also details the control measures the applicant has proposed to assist in controlling these emissions, where necessary.

Table 3: Proposed applicant controls

Emission	Source	Potential pathways	Existing and proposed applicant controls
General			
Hydrocarbons (e.g. hydraulic oil or diesel) and chemicals	Operation of mobile equipment (e.g. light vehicles, heavy equipment)	Direct discharge/overland flow (spills or leaks to ground and infiltration to groundwater)	<p><u>Applicant's existing operational controls:</u></p> <ul style="list-style-type: none"> • hydrocarbons managed in accordance with Australian Standard AS 1940 – <i>The storage and handling of flammable and combustible liquids</i>; • refueling and vehicle maintenance activities conducted within the existing workshop areas in accordance with existing site operational procedures; • no maintenance activities, refueling or storage of fuel will occur within the vicinity of TSF2; and • on site spill response equipment available and personnel appropriately trained in their use.
Construction			
<p>Dust (general construction materials and reject stream material with enriched metals and metalloids e.g. arsenic, bismuth, cobalt, chromium, nickel, selenium and tellurium)</p> <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>Potential reject stream material dust is only associated with the proposed Stage 5 embankment raise construction works.</i> 	Mobile equipment (e.g. light vehicles and heavy equipment)	Air/Wind dispersion	<p><u>Existing operational controls (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> • condition 2.4.1 for the visual inspection of the combined TSF infrastructure for fugitive dust emissions from 1 November to 30 April, when the meteorological station located at the site (DDG4) measures an average wind speed equal to or more than 15 m/s between 0900 hours and 1600 hours for more than 30 consecutive minutes; • condition 3.5.1 for the monitoring of ambient air quality of particulate matter (Total Insoluble Solids) at the monitoring locations specified in Table 3.5.1; and • condition 3.6.1 for the meteorological monitoring to be undertaken at DDG4 to collect data on wind speed, wind direction and air temperature in relation to condition 2.4.1. <p><u>Applicant proposed construction activity controls:</u></p> <ul style="list-style-type: none"> • processes implemented to minimise dust generation, including: <ul style="list-style-type: none"> ○ disturbance will be managed to ensure that areas are only disturbed where required; ○ ground disturbance activities will not be undertaken during periods of strong winds;

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<ul style="list-style-type: none"> ○ control of vehicle movements; ○ restricted speed limits; ○ roads/tracks maintained and graded; and ○ water trucks readily available on site for dust suppression purposes. <p><u>Existing monitoring regime (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> ● condition 4.2.1 requires the submission of an annual environmental report (AER) containing the following: <ul style="list-style-type: none"> ○ monitoring of ambient air quality; and ○ meteorological monitoring. <p><u>Applicant proposed monitoring regime:</u></p> <ul style="list-style-type: none"> ● daily inspections of construction areas undertaken to ensure dust control measures are being implemented and are effective.
<p>Contaminated stormwater (sediment laden – general construction materials and reject stream material with enriched metals and metalloids e.g. arsenic, bismuth, cobalt, chromium, nickel, selenium and tellurium)</p> <p><i>For noting:</i></p> <ul style="list-style-type: none"> ● <i>Potential stormwater laden with reject stream material is only associated with the proposed Stage 5 embankment raise construction works.</i> 	<p>Loose material during construction of TSF2 embankment raises and cut-off trench and relocation of tailings deposition pipework (including shaped/bunded corridor with catch pits/dump ponds)</p>	<p>Overland runoff during rainfall events</p>	<p><u>Existing infrastructure design controls (works approval W6578/2021/1):</u></p> <ul style="list-style-type: none"> ● conditions 1 and 11 provide design, construction and maintenance requirements for the existing stormwater diversion drain installed along the northern and western perimeters of the combined TSF infrastructure. The stormwater diversion drain includes a sedimentation/siltation trap at the drain outlet, this is designed to collect silt and debris run-off during rainfall events.
Time limited operations			
<p>Hydrocarbons (e.g. hydraulic oil or diesel) and chemicals</p>	<p>Operation of mobile equipment (e.g. light vehicles, heavy equipment)</p>	<p>Direct discharge/overland flow (spills or leaks to ground and infiltration to groundwater)</p>	<p>Refer to construction activities as controls remain unchanged.</p>

Emission	Source	Potential pathways	Existing and proposed applicant controls
<p>Tailings (enriched with metals and metalloids e.g. chromium, nickel and selenium), hypersaline water contaminated with enriched metals and metalloids (e.g. cobalt, nickel and manganese), run-off of reject stream material with enriched metals and metalloids (e.g. arsenic, bismuth, cobalt, chromium, nickel, selenium and tellurium) and/or contaminated stormwater</p>	<p>TSF2 (additional emissions associated with stage 4 and 5 embankment raises)</p>	<ul style="list-style-type: none"> • Increased seepage of contaminated water through base and embankments of TSF2 to soil, groundwater and root zone of vegetation • Increased seepage of contaminated water through base and embankments of TSF2 to collection trench (surface seepage interception trench) • Overland runoff of salts, metals and metalloids from the TSF2 (Stage 5 embankment) during rainfall events with infiltration to groundwater 	<p><u>Existing infrastructure design controls (works approval W6578/2021/1):</u></p> <ul style="list-style-type: none"> • conditions 1 and 11 provide design, construction and maintenance requirements for the existing stormwater diversion drain installed along the northern and western perimeters of the combined TSF infrastructure. The stormwater diversion drain includes a sedimentation/siltation trap at the drain outlet, this is designed to collect silt and debris run-off during rainfall events; • condition 1 provides design and construction requirements for vibrating wire piezometers (VWPs) to be installed in foundation and buttress along the southern embankment of TSF2. <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>There are 25 existing VWPs installed in the vicinity of TSF2:</i> <ul style="list-style-type: none"> ○ <i>11 VWPs were installed in 2022 that terminate within the foundation:</i> <ul style="list-style-type: none"> - VWP-13A - VWP-14A - VWP-15A - VWP-16A - VWP-17A - VWP-18A - VWP-19A - VWP-20A - CPTu-8 - CPTu-9 - CPTu-12 ○ <i>8 VWPs were installed in 2022 that terminate within the embankment:</i> <ul style="list-style-type: none"> - VWP-13B - VWP-14B - VWP-15B - VWP-16B

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<ul style="list-style-type: none"> - VWP-17B - VWP-18B - VWP-19B - VWP-20B o 6 VWPs were installed in 2023 that terminate within the embankment: <ul style="list-style-type: none"> - PZ07 - PZ08 - PZ09 - PZ10 - PZ11 - PZ12 • condition 1 provides design and construction requirements for the tailings distribution system. <i>For noting:</i> <ul style="list-style-type: none"> • <i>the applicant has advised that the:</i> <ul style="list-style-type: none"> o <i>existing tailings deposition pipeline configuration includes HDPE pipelines fitted with spigots at centreline spacings of approximately 60 m along entire TSF2 perimeter. Each spigot off-take is equipped with a knife gate valve with each dropper pipe fitted with a section of Polyvinyl chloride (PVC) to direct tailings slurry onto the TSF2 beach; and</i> o <i>relocated tailings deposition pipework for Stages 4 and 5 will be in accordance with the existing design controls as stated above.</i> • condition 1 provides design and construction requirements for the seepage collection system. <i>For noting:</i> <ul style="list-style-type: none"> • <i>the applicant has advised that:</i> <ul style="list-style-type: none"> o <i>a seepage collection system was installed during the Stage 3 embankment raise for TSF2. The system is comprised of a collection trench along a section of the southern TSF2 embankment and a collection sump near the south-west corner of TSF2, where seepage is</i>

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<p><i>collected and then pumped to the HDPE-lined EPs; and</i></p> <ul style="list-style-type: none"> ○ <i>this seepage collection infrastructure is located downstream of the Stage 4 and 5 embankment toe and will therefore remain operational during the proposed works approval activities.</i> <p><u>Applicant proposed infrastructure design controls:</u></p> <ul style="list-style-type: none"> • Stages 4 and 5 TSF2 footprint areas will be conditioned and compacted prior to construction of embankment raises; • embankment raise construction materials have been analysed and geochemical laboratory results provided; • both Stages 4 and 5 embankment construction materials will be placed along the downstream of the existing embankment in layers not exceeding 500 mm in compacted thickness. A vibratory pad-foot roller will be used to provide compaction to a minimum target density of 95% standard maximum dry density (SMDD) and compaction control tests will be undertaken; <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that for Stage 5, the bulk of the downstream section will be constructed with reject stream material.</i> • for Stage 5, the upstream section as well as the crest will be constructed with clay rich low permeability material (mine waste) to provide a low permeability zone adjacent to the deposited tailings within TSF2 (along the upstream side of the Stage 5 embankment raise). The mine waste portion will be at least 5 m wide adjacent to the deposited tailings, and will be at least 1 m thick at the crest surface; • both Stages 4 and 5 include the excavation and backfilling of a cut-off trench along the proposed extension of the western embankment and tying it to the existing cut-off trench to reduce shallow seepage; • both Stages 4 and 5 embankments will include a safety bund on the outer crest margin and a 2% inward crossfall on the embankment crest to direct surface water and/or spilled liquor from tailings distribution pipelines back into the TSF2 basin; and • the Stage 5 design includes the installation of a series of catchment paddocks that run along the external perimeter toe of TSF2 to capture any run-off of reject stream material and/or contaminated water from the Stage 5 embankment slope. General catchment paddock design includes:

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<ul style="list-style-type: none"> ○ constructed using mine waste materials compacted in maximum 500 mm layers to a minimum target density of 95% SMDD; ○ nominally 1 m high; and ○ base lined with compacted clay (mine waste) to achieve a hydraulic conductivity of 1×10^{-7} m/s or less. <p><u>Existing operational controls (works approval W6578/2021/1):</u></p> <ul style="list-style-type: none"> • condition 11 requires decant water to be pumped back to the processing plant for re-use. <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that all three TSF cells have centrally located decant structures that collect supernatant water and stormwater, which is pumped (turret pumps connected to the pump's suction hose) via existing HDPE pipelines to the HDPE-lined EPs for storage or to the process plant for re-use.</i> <p><u>Applicant's existing operational controls:</u></p> <ul style="list-style-type: none"> • tailings will continue to be deposited sub-aerially and at low velocity via the existing tailings pipeline deposition configuration; • tailings slurry delivered to TSF2 will continue to have a solid content of approximately 35%, which aligns with the TSF2 (Stages 4 and 5) design criteria (WSP Golder 2022a). <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that 2022 data indicates an average tailings slurry concentration of 32.7% and that concerted efforts are being made to increase the tailings slurry solids concentration, with the TSF operations manual proposed to be updated in 2023.</i> <ul style="list-style-type: none"> • decant pond maintained around the decant infrastructure and kept remote from the TSF2 embankments; • continue to operate TSF2 decant pond size at approximately 10% of the tailings beach area; and <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that the maximum operating pond size allowed for the Stages 4 and 5 TSF2 design is 20% of the tailings beach area.</i>

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<ul style="list-style-type: none"> • following significant rainfall events, excess water stored on TSF2 removed as early as possible. <p><u>Applicant proposed operational controls:</u></p> <ul style="list-style-type: none"> • any reject stream material, contaminated water and/or stormwater runoff from the Stage 5 embankment slope is proposed to be collected within the series of catchment paddocks and pumped to HDPE-lined EPs or left within the catchment paddock(s) to evaporate; and • during significant rainfall events, mobile pumps will be used to pump the contained run-off stored within catchment paddock(s) onto TSF2. <p><u>Existing monitoring regime (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> • condition 1.3.4 requires inspection (daily during operations or weekly during care and maintenance) of the tailings decant/supernatant ponds to assess the pond size and location; • condition 1.3.8 requires an annual assessment of standing water levels (SWL) and groundwater quality in groundwater bores surrounding TSF1 and TSF2 and to evaluate the results against modelled predictions; • condition 3.4.1 requires monitoring of the cumulative volumes of decant recovered from TSF1 and TSF2; • condition 3.5.1 requires ambient groundwater SWL and quality monitoring to be undertaken on quarterly basis in accordance with Table 3.5.2; and • condition 4.2.1 requires the submission of an AER containing the following: <ul style="list-style-type: none"> ○ annual assessment of groundwater mounding due to seepage in the vicinity of TSF1 and TSF2; ○ monitoring of tailings deposition and decant water recovered during operations; and ○ ambient groundwater monitoring. <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>since submitting the new works approval application, the applicant has installed additional groundwater monitoring wells to the west (MB66 and MB67), south (MB65 and MB68) and east (MB64) of TSF2 and new seepage recovery bores south (TSFRB01 and TSFRB02) of TSF2. This additional infrastructure was installed in late September 2022. Further details on this</i>

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<p><i>infrastructure has been provided in sections 4.2.3 and 4.2.4.</i></p> <p><u>Applicant's existing monitoring regime:</u></p> <ul style="list-style-type: none"> • routine reconciliation of tailings discharge tonnage and solids concentration; • routine monitoring of pond water levels and process plant return water rates; • quarterly field evaluation of tailings density reconciliation; • annual audit of TSF2 undertaken by qualified geotechnical engineers; • daily inspections (shift-based) to include checking for: <ul style="list-style-type: none"> ○ integrity of TSF2 embankments (including seepage, cracking, instability, depressions, erosion); ○ sediment build-up within the stormwater diversion drains and sedimentation/siltation trap; ○ changes to items of concern (e.g. cracking, seepage) identified during previous inspections; ○ serviceability of pipelines to and from TSF2, condition of pipework, damage to pipelines, excessive movement of pipelines, pipeline or spigot blockages, pipeline leaks/uncontrolled discharges and leak detection; ○ decant operation (including pond size and location, clarity of decant water, decant pumping, capacity and operation of decant ponds); and ○ tailings deposition (including location of open spigots, flow rate at spigots, beach formation, beach freeboard, beach erosion and low points). • monthly inspections to include checking for: <ul style="list-style-type: none"> ○ detailed inspection of embankments and all ancillary infrastructure; ○ tailings characteristics; ○ tailings beach development; ○ decant pond level and location; ○ decant and return water system operation; and ○ surveillance of all monitoring installations.
		<ul style="list-style-type: none"> • Overtopping of TSF2 and direct 	<p><u>Applicant proposed infrastructure design controls:</u></p> <ul style="list-style-type: none"> • the applicant has advised that TSF2 Stages 4 and 5 were designed in

Emission	Source	Potential pathways	Existing and proposed applicant controls
		<p>discharge of tailings, hypersaline water and/or contaminated stormwater to land with infiltration to groundwater</p>	<p>accordance with:</p> <ul style="list-style-type: none"> ○ design 'Category 1' of the Department of Mines and Petroleum (DMP), <i>Guide to the Preparation of a Design Report for Tailings Storage Facilities</i>, dated August 2015 to accommodate inflows from 1:100 year 72 hours rainfall event, atop normal operating pond, whilst maintaining 500 mm total freeboard; and ○ design category 'High C Spill Consequence Category' Australian National Committee on Large Dams (ANCOLD), <i>Guidelines on Tailings Dams; Planning, Design, Construction, Operation and Closure</i>, dated May 2012 to accommodate inflows from 1:100 year 72 hours rainfall event, atop normal operating pond, whilst maintaining 500 mm total freeboard and wave run up from 1:10 annual exceedance probability (AEP) wind. <ul style="list-style-type: none"> • the applicant has advised that hydrological analysis results indicate that TSF2 can retain the 6-hour probable maximum flood (PMF) with a further 4.1 Mm³ (Stage 4) and 4.3 Mm³ (Stage 5) of additional storage capacity. <p><u>Existing operational controls (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> • condition 1.3.3 requires TSF1 and TSF2 to maintain an operational freeboard of 300 mm. <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that a minimum 500 mm freeboard will be maintained on TSF2.</i> <p><u>Existing operational controls (works approval W6578/2021/1):</u></p> <ul style="list-style-type: none"> • condition 11 requires decant water to be pumped back to the processing plant for re-use. <p><i>For noting:</i></p> <ul style="list-style-type: none"> ○ <i>All three TSF cells have centrally located decant structures that collect supernatant water and stormwater, which is pumped (turret pumps connected to the pump's suction hose) via existing HDPE pipelines to the HDPE-lined EPs for storage or to the process plant for re-use.</i> <p><u>Applicant's existing operational controls:</u></p> <ul style="list-style-type: none"> • decant pond maintained around the decant infrastructure and kept remote from the TSF2 embankments; and • continue to operate TSF2 decant pond size at approximately 10% of the tailings

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<p>beach area; and</p> <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that the maximum operating pond size allowed for the Stages 4 and 5 TSF2 design is 20% of the tailings beach area.</i> • following significant rainfall events, excess water stored on TSF2 removed as early as possible. <p><u>Existing monitoring regime (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> • condition 1.3.4 requires inspection (daily during operations or weekly during care and maintenance) of the: <ul style="list-style-type: none"> ○ tailings decant/supernatant ponds to assess the pond size and location; and ○ embankment freeboard to assess capacity. <p><u>Applicant's existing monitoring regime:</u></p> <ul style="list-style-type: none"> • annual audit of TSF2 undertaken by qualified geotechnical engineers; • daily inspections (shift-based) to include checking for: <ul style="list-style-type: none"> ○ integrity of TSF2 embankments (including seepage, cracking, instability, depressions, erosion); ○ sediment build-up within the stormwater diversion drains and sedimentation/siltation trap; ○ changes to items of concern (e.g. cracking, seepage) identified during previous inspections; ○ decant operation (including pond size and location, clarity of decant water, decant pumping, capacity and operation of decant ponds); and ○ tailings deposition (including location of open spigots, flow rate at spigots, beach formation, beach freeboard, beach erosion and low points). • monthly inspections to include checking for: <ul style="list-style-type: none"> ○ detailed inspection of embankments and all ancillary infrastructure; ○ tailings beach development; ○ decant pond level and location; ○ decant and return water system operation; and

Emission	Source	Potential pathways	Existing and proposed applicant controls
			<ul style="list-style-type: none"> tailings and return water pipelines.
Supernatant (hypersaline water contaminated with enriched metals and metalloids e.g. cobalt, nickel and manganese), and/or contaminated stormwater	EPs	<ul style="list-style-type: none"> Increased seepage of supernatant and/or contaminated stormwater through base and walls of HDPE-lined EPs to soil, groundwater and root zone of crops/vegetation 	<p><u>Existing design controls (works approval W6578/2021/1):</u></p> <ul style="list-style-type: none"> condition 6 required synthetic liners of EPs 9, 12, 13 and 16 to be repaired and the installation of wave breakers in EPs 9, 12, 13 and 16 to reduce wave action against embankment walls. <p><i>For noting:</i></p> <ul style="list-style-type: none"> the applicant has advised on the following EPs repair works undertaken to date: <ul style="list-style-type: none"> the HDPE-liner for EP9, EP13 and EP16 have been repaired to achieve a seepage rate of 10^{-9} m/s or less and wave breakers have been installed within these EPs to reduce wave action against embankment walls: <ul style="list-style-type: none"> EP16 repair works completed in October 2021; EP13 repair works completed in December 2021; and EP9 repair works completed in March 2022. <p>All above EPs were brought back online following completed repair works.</p> <i>the applicant has advised that repair works for EP12 are scheduled for early 2023.</i>
		<ul style="list-style-type: none"> Overtopping of EPs and direct discharge of supernatant and/or contaminated stormwater to land with infiltration to groundwater 	<p>Refer to above line item as EP design controls remain unchanged.</p> <p><u>Existing operational controls (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> condition 1.3.3 requires a 300 mm minimum top of embankment operational freeboard for all EPs; and condition 1.3.4 requires inspection (daily during operations or weekly during care and maintenance) of the freeboard for EPs.
Tailings (enriched with metals and metalloids e.g. chromium, nickel and selenium), supernatant (hypersaline	Pipelines	Leak/rupture of pipeline transporting tailings, supernatant	<p><u>Existing infrastructure design controls (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> condition 1.3.1 requires that all pipelines containing tailings, process liquors

Emission	Source	Potential pathways	Existing and proposed applicant controls
water contaminated with enriched metals and metalloids e.g. cobalt, nickel and manganese), and/or contaminated stormwater		and/or contaminated stormwater and contents discharged to land with infiltration to groundwater	<p>including decant water or saline water are either:</p> <ul style="list-style-type: none"> ○ equipped with telemetry systems and pressure sensors along pipelines to allow the detection of leaks and failures; ○ equipped with automatic cut-outs in the event of a pipe failure; or ○ provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections. <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>the applicant has advised that:</i> <ul style="list-style-type: none"> ○ <i>tailings delivery and return water pipelines are equipped with flow meters and shut off valve and are located within a shaped/bunded corridor with catch pits/dump ponds constructed at the lowest points along the pipeline route to contain spillage in the event of a pipeline failure; and</i> ○ <i>relocated tailings deposition pipework for Stages 4 and 5 will be in accordance with this existing design.</i> <p><u>Proposed infrastructure design controls:</u></p> <ul style="list-style-type: none"> • both Stages 4 and 5 embankments will include a safety bund on the outer crest margin and a 2% inward crossfall on the embankment crest to direct surface water and/or spilled liquor from tailings distribution pipelines back into the TSF2 basin. <p><u>Existing monitoring regime (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> • condition 1.3.4 requires integrity inspections (daily during operations) of the pipelines (tailings, seawater and return water). <p><u>Applicant's existing monitoring regime:</u></p> <ul style="list-style-type: none"> • daily inspections (shift-based) to include checking for serviceability of pipelines to and from TSF2, condition of pipework, damage to pipelines, excessive movement of pipelines, pipeline or spigot blockages, pipeline leaks/uncontrolled discharges and leak detection.
Dust (dried tailings with elevated metals and metalloids e.g. chromium, nickel and selenium and with potential to contain asbestos) lift-off from the surface of TSF2 following tailings	TSF2	Air/Wind dispersion	<p><u>Existing operational controls (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> • condition 2.4.1 for the visual inspection of the combined TSF infrastructure for fugitive dust emissions from 1 November to 30 April, when the meteorological station located at the site (DDG4) measures an average wind speed equal to or

Works Approval: W6573/2021/1

Emission	Source	Potential pathways	Existing and proposed applicant controls
<p>deposition for Stages 4 and 5 operations</p> <p><i>For noting:</i></p> <ul style="list-style-type: none"> asbestos is known to occur in the ore body at the premises and may also be present within the tailings. <p><i>Fibre characterisation by scanning electron microscopy (SEM) with elemental analysis by energy dispersive spectroscopy (EDS) was carried out on two samples collected from the tailings beach in 2012. The results of one of the tests identified a fibre comprising 'possible riebeckite or crocidolite with the morphology suggesting riebeckite' (WSP Golder 2022b).</i></p>			<p>more than 15 m/s between 0900 hours and 1600 hours for more than 30 consecutive minutes;</p> <ul style="list-style-type: none"> condition 3.5.1 for the monitoring of ambient air quality of particulate matter (Total Insoluble Solids) at the monitoring locations specified in Table 3.5.1; and condition 3.6.1 for the meteorological monitoring to be undertaken at DDG4 to collect data on wind speed, wind direction and air temperature in relation to condition 2.4.1. <p><u>Applicant's existing operational controls:</u></p> <ul style="list-style-type: none"> tailings deposited into TSF2 maintained in a wet to moist condition; and wet tailings deposited in sequences to maintain wet beach. <p><u>Existing monitoring regime (licence L8008/2004/3):</u></p> <ul style="list-style-type: none"> condition 4.2.1 requires the submission of an AER containing the following: <ul style="list-style-type: none"> monitoring of ambient air quality; and meteorological monitoring. <p><u>Applicant's existing monitoring regime:</u></p> <ul style="list-style-type: none"> daily inspections (shift-based) to include checking for dust generation on TSF2.

4. Receptors

In accordance with the *Guideline: Risk assessment* (DWER 2020b), the Delegated Officer has excluded the applicant's employees, visitors, and contractors from its assessment. Protection of these parties often involves different exposure risks and prevention strategies and is provided for under other state legislation.

Table 4 below provides a summary of potential human and environmental receptors that may be impacted because of activities upon or emission and discharges from the prescribed premises (*Guideline: Environmental siting* (DWER 2020a)).

Table 4: Sensitive human and environmental receptors and distance from prescribed activity (including risk assessment consideration)

Sensitive receptors	Distance from proposed category 5 (processing or beneficiation of metallic or non-metallic ore) operations	Risk assessment consideration
Human receptors		
Roads (residents and tourists driving along roads)	<ul style="list-style-type: none"> Jerdacuttup Road located approximately 2.5 km south of TSF2 and runs parallel along the entire southern boundary of the premises; and South Coast Highway located approximately 5.5 km north-east of the combined TSF infrastructure and runs parallel along the entire north-eastern boundary of the premises. 	Residents and tourists driving along these roads have potential to be impacted during construction activities and time limited operations. Therefore, these sensitive receptors have been considered in the risk assessment (refer to Table 5).
Rural farmlands, primarily agriculture (wheat) and sheep farming (with potential for rural residential housing and groundwater abstraction bores for livestock drinking water)	Rural farmlands located approximately: <ul style="list-style-type: none"> 1 km east of the EPs and 3 km east of TSF2; 2.5 km south of TSF2 and 2 km south-south-west of the EPs; 1 km south of the EPs and 3 km south-south-east of TSF2; and 2 km south-east of the EPs 5 km south-east of TSF2. 	All rural farmlands have potential to be impacted during construction activities and time limited operations. Therefore, these sensitive receptors have been considered in the risk assessment (refer to Table 5).
Homesteads <i>For noting:</i> <ul style="list-style-type: none"> Review of DWER GIS system's (Geocortex) did not demonstrate any residential buildings at these specified homestead locations; and 	<ul style="list-style-type: none"> Wyena homestead located approximately 3.5 km south-west of TSF2; and Cambridge Downs homestead located approximately 4.5 km south-east of TSF2. 	Distance of proposed category 5 activities to these homesteads and with the consideration that these homesteads may no longer exist are sufficient to inform that project activity impacts are not foreseeable. Human receptors at these homesteads are not considered to be impacted during construction activities and time

Sensitive receptors	Distance from proposed category 5 (processing or beneficiation of metallic or non-metallic ore) operations	Risk assessment consideration
<ul style="list-style-type: none"> The applicant did not list any homestead sensitive receptors within the works approval application. 		limited operations and therefore not further considered in the risk assessment.
Town of Jerdacuttup (including Jerdacuttup Primary School)	Located approximately 6 km east-south-east of TSF2.	<p>Distance of proposed category 5 activities to this town are sufficient to inform that project activity impacts are not foreseeable.</p> <p>Human receptors in this town are not considered to be impacted during construction activities and time limited operations and therefore not further considered in the risk assessment.</p>
Environmental receptors		
Threatened or Priority flora	<p>The following conservation significant flora species may occur between 700 m and 3 km of the TSF2 footprint (DWER Geocortex):</p> <ul style="list-style-type: none"> <i>Acrotriche orbicularis</i> (Threatened) – north of TSF2; <i>Allocasuarina hystrix</i> (Priority 4) –north and south-west of TSF2; <i>Beyeria cockertonii</i> (Threatened) – west of TSF2; <i>Eucalyptus stoatei</i> (Priority 4) – south and south-west of TSF2; <i>Goodenia phillipsiae</i> (Priority 4) – west of TSF2; <i>Grevillea punctata</i> (Priority 3) – west and north-west of TSF2; and <i>Micromyrtus navicularis</i> (Priority 3) – west of TSF2. 	Threatened, Priority flora and TECs have potential to be impacted during construction activities and time limited operations. Therefore, these sensitive receptors have been considered in the risk assessment (refer to Table 5).
Threatened Ecological Community (TEC)	<p>TEC described as 'Proteaceae dominated kwongkan shrubland' (Endangered) occurring (DWER Geocortex):</p> <ul style="list-style-type: none"> north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 	

Sensitive receptors	Distance from proposed category 5 (processing or beneficiation of metallic or non-metallic ore) operations	Risk assessment consideration
	footprint; and <ul style="list-style-type: none"> • north-west, west and south of the EPs and situated between 160 m and 900 m of the EPs footprint. 	
Threatened or Priority fauna	<p>The following conservation significant fauna species have been sighted (DWER Geocortex):</p> <ul style="list-style-type: none"> • Chuditch, western quoll (<i>Dasyurus geoffroi</i>) (considered Threatened - Vulnerable at a State level and Vulnerable at a Federal level): <ul style="list-style-type: none"> ○ approximately 1 km west of TSF2 (2017); and ○ approximately 2 km north and north-west of TSF2 (2017); • Quenda, southwestern brown bandicoot (<i>Isodon fusciventer</i>) (considered Priority at a State level): <ul style="list-style-type: none"> ○ approximately 1.5 km north of TSF2 (2000). • Western brush wallaby (<i>Notamacropus irma</i>) (considered Priority 4 at a State level): <ul style="list-style-type: none"> ○ approximately 2 km north of TSF2 (2000); • Western whipbird (western mallee) (<i>Psophodes nigrogularis oregon</i>) (considered Priority 4 at a State level): <ul style="list-style-type: none"> ○ approximately 1.5 km north of TSF2 (2000); <p>Previous fauna surveys have identified the following additional protected or threatened fauna species within the greater project area (WSP Golder 2022a):</p> <ul style="list-style-type: none"> • Carnaby's Black Cockatoo (<i>Calyptorhynchus latirostris</i>); • Eula's Planthopper (<i>Budginmaya eulae</i>); • Heath Mouse (<i>Pseudomys shortridgei</i>); • Malleefowl (<i>Leipoa ocellata</i>); 	<p>The tailings and contaminated water being discharged to TSF2 is hypersaline at approximately 250,000 TDS; therefore, unlikely to attract wildlife.</p> <p><i>For noting:</i></p> <ul style="list-style-type: none"> • <i>Hypersalinity (>50,000 mg/L TDS) provides a natural barrier for wildlife exposure to the mine dewater because at this salinity the solutions are outside the physiologically safe drinking range of wildlife and wildlife seek to avoid its ingestion while foraging (MERIWA 2018).</i> <p>Considering the above, Threatened, Priority and native fauna are unlikely to gain access to TSF2 where tailings and contaminated water is discharged. These sensitive receptors are not deemed to be impacted during construction activities or time limited operations and therefore not further considered in the risk assessment.</p>

Sensitive receptors	Distance from proposed category 5 (processing or beneficiation of metallic or non-metallic ore) operations	Risk assessment consideration
	<ul style="list-style-type: none"> • Peregrine Falcon (<i>Falco peregrinus</i>); and • Western Mouse (<i>Pseudomys occidentalis</i>). <p>Based on regional data and habitats identified within the project area, three additional species were considered 'Possible' to occur (WSP Golder 2022a):</p> <ul style="list-style-type: none"> • Fork-tailed Swift (<i>Apus pacificus</i>); • Ravensthorpe range spider (<i>Lerista viduata</i>); and • Western Bristlebird (<i>Dasyornis longirostris</i>). 	
Native fauna	<p>The most recent fauna survey found a total of 45 fauna species (comprising of three amphibians, 32 birds, 12 mammals and 29 reptiles) within the greater project area. It is noted that the proposed TSF2 works area was not included within the survey area due to all infrastructure being located on previously cleared land (WSP Golder 2022a).</p>	
Groundwater	<p>Groundwater is considered saline to highly saline at 7,000 to 14,000 mg/L Total Dissolved Solids (TDS) (DWER Geocortex).</p> <p>Regional groundwater flow is generally to the south-east (WSP Golder 2022a).</p> <p>The below provides the SWL as of January 2023 (FQM 2023):</p> <ul style="list-style-type: none"> • SWL surrounding TSF2 between 4.5-19.8 mbgl; • SWL surrounding EPs between 12.2-18.1 mbgl; and • SWL downstream of TSF2 and EPs between 12.6-15.5 mbgl. <p>As of January 2023, the electrical conductivity (EC) surrounding TSF2 ranged between 20,000-70,000 uS/cm (FQM 2023).</p>	<p>Groundwater has potential to be impacted during construction activities and time limited operations. Therefore, this sensitive receptor has been considered in the risk assessment (refer to Table 5).</p>
Surface waters (creek lines)	<ul style="list-style-type: none"> • Minor creek lines located: <ul style="list-style-type: none"> ○ approximately 830 m north of 	<p>Minor creek lines located east, south-west and west of TSF2 and</p>

Sensitive receptors	Distance from proposed category 5 (processing or beneficiation of metallic or non-metallic ore) operations	Risk assessment consideration
	<p>TSF2 with TSF1 West located in-between TSF2 and this creek line;</p> <ul style="list-style-type: none"> ○ running parallel approximately 350 m east of TSF2 and 250 m west of the EPs; and ○ approximately 1.5 km south-west of TSF2. <ul style="list-style-type: none"> • Burlabup Creek line located approximately 1 km south of TSF2 and 320 m south of the EPs. <p>This creek system discharges into the Jerdacuttup River, which is located approximately 11.5 km south-west of TSF2 (WSP Golder 2022a).</p> <p>Surface water flow within the creek lines tends to be intermittent because of short term and high-rate runoff and the absence of significant aquifers to sustain baseflow. Runoff can occur at any time, but mainly occurs during the winter months due to storm events (WSP Golder 2022a).</p>	<p>Burlabup Creek have potential to be impacted during construction activities and time limited operations. Therefore, these sensitive receptors have been considered in the risk assessment (refer to Table 5).</p> <p>The location of TSF1 West in-between TSF2 and the minor creek line located north of TSF2 and the distance of proposed category 5 activities to this creek line are sufficient to inform that project activity impacts are not foreseeable.</p> <p>This minor creek line is not considered to be impacted during construction activities and time limited operations and therefore not further considered in the risk assessment.</p>
Aboriginal and other Heritage sites		
<p>Aboriginal Site: Gnamma Hole (ID 18950)</p>	<p>Located approximately 4 km north of TSF2.</p>	<p>Review of the topography of the area indicates that a higher landform is situated in-between TSF2 and the Aboriginal site, which would act as a buffer.</p> <p>The topography and distance of proposed category 5 activities to the Aboriginal site are sufficient to inform that project activity impacts are not foreseeable.</p> <p>The Aboriginal site is not considered to be impacted during construction or time limited operations and therefore not further considered in the risk assessment.</p>

4.1 Risk ratings

Risk ratings have been assessed in accordance with the *Guideline: Risk assessments* (DWER 2020b) for each identified emission source and considers potential source-pathway and receptor linkages as identified in Section 3.1. Where linkages are in-complete they have not been considered further in the risk assessment.

Where the applicant has proposed mitigation measures/controls (as detailed in Section 3.1), these have been considered when determining the final risk rating. Where the Delegated Officer considers the applicant's proposed controls to be critical to maintaining an acceptable level of risk, these will be incorporated into the works approval as regulatory controls.

Additional regulatory controls may be imposed where the applicant's controls are not deemed sufficient. Where this is the case the need for additional controls will be documented and justified in Table 5.

Works approval W6739/2022/1 that accompanies this decision report authorises construction and time-limited operations. The conditions in the issued works approval, as outlined in Table 5 have been determined in accordance with *Guidance Statement: Setting Conditions* (DER 2015).

A licence is required following the time-limited operational phase authorised under the works approval to authorise emissions associated with the ongoing operation of the premises i.e. operation of TSF2 (Stages 4 and 5) activities. A risk assessment for the operational phase has been included in this decision report, however licence conditions will not be finalised until the department assesses the licence application.

Table 5: Risk assessment of potential emissions and discharges from the premises during construction and time-limited operations

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
General									
<p>Source:</p> <ul style="list-style-type: none"> Operation of mobile equipment (e.g. light vehicles, heavy equipment) <p>Activities:</p> <ul style="list-style-type: none"> Damage to equipment causing leaks 	Hydrocarbons (e.g. hydraulic oil or diesel) and chemicals	Direct discharge/overland flow (spills or leaks to ground)	<p>Reduced quality or contamination of soil/sediment, groundwater and/or surface waters (creek lines)</p> <p>Poor Threatened/Priority flora and/or TEC health</p>	<p>Land/Soil</p> <p>Groundwater:</p> <ul style="list-style-type: none"> SWL surrounding TSF2 between 4.5-19.8 mbgl; SWL surrounding EPs between 12.2-18.1 mbgl; and SWL downstream of TSF2 and EPs between 12.6-15.5 mbgl. <p>Surface waters - creek lines (east and south-west of TSF2 and situated between 350 m and 1.5 km of the TSF2 footprint)</p> <p>Threatened/Priority flora (between 700 m and 3 km of the TSF2 footprint)</p> <p>TEC (north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 footprint)</p>	Refer to Table 1, section 3.1.1	C = Moderate L = Possible Medium Risk	No	<u>Condition 10, item 1, Schedule 3</u>	<p>The following additional regulatory requirements have been applied to support spill management processes:</p> <ul style="list-style-type: none"> maintain mobile equipment as per manufacturer's specifications; and contain and clean-up spills as soon as they occur. <p>The Delegated Officer notes that the general provisions of the EP Act, <i>Environmental Protection (Unauthorised Discharges) Regulations 2004</i> (UDRs), the <i>Dangerous Goods Safety Act 2004</i> and associated regulations apply in the regulation of discharges of environmentally harmful materials.</p>

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
Construction									
<p>Source:</p> <ul style="list-style-type: none"> Mobile equipment (e.g. light vehicles and heavy equipment) <p>Activities:</p> <ul style="list-style-type: none"> Transport and storage of construction materials and construction activities associated with the TSF2 embankment raises (Stages 4 and 5) 	<p>Dust (general construction materials and reject stream material with enriched metals and metalloids e.g. arsenic, bismuth, cobalt, chromium, nickel, selenium and tellurium)</p> <p><i>For noting:</i></p> <ul style="list-style-type: none"> <i>Potential reject stream material dust is only associated with the proposed Stage 5 embankment raise construction works</i> 	Air/Wind dispersion	Human health impacts	Rural farmlands with potential for rural residential housing (south, south-east and east of TSF2 and situated between 2.5 km and 5 km of the TSF2 footprint)	Refer to Table 1, section 3.1.1	C = Major L = Unlikely Medium Risk	Yes	Condition 3	<p>The Delegated Officer notes that:</p> <ul style="list-style-type: none"> the existing licence L8008/2004/3 includes regulatory requirements for the management of dust emissions from the combined TSF infrastructure; and section 49 of the EP Act applies in the regulation of dust emissions.
			Livestock health impacts and/or poor crop health	Rural farmlands with agriculture (wheat) and sheep farming (south, south-east and east of TSF2 and situated between 2.5 km and 5 km of the TSF2 footprint)		C = Moderate L = Unlikely Medium Risk			
			Poor Threatened/Priority flora and/or TEC health	Threatened/Priority flora (between 700 m and 3 km of the TSF2 footprint) TEC (north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 footprint)		C = Severe L = Rare High Risk			
			Reduced visibility may lead to injury or death	Residents and tourists driving along Jerdacuttup Road (2.5 km south of TSF2 footprint) and South Coast Highway (5.5 km south of TSF2 footprint)					

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
<p>Source:</p> <ul style="list-style-type: none"> Loose material during construction of TSF2 embankment raises and cut-off trench and relocation of tailings deposition pipework (including shaped/bunded corridor with catch pits/dump ponds) <p>Activities:</p> <ul style="list-style-type: none"> Stormwater migrating through construction areas 	<p>Contaminated stormwater (sediment laden – general construction materials and reject stream material with enriched metals and metalloids e.g. arsenic, bismuth, cobalt, chromium, nickel, selenium and tellurium)</p> <p><i>For noting:</i></p> <ul style="list-style-type: none"> <i>Potential stormwater laden with reject stream material is only associated with the proposed Stage 5 embankment raise construction works</i> 	Overland runoff during rainfall events	<p>Poor Threatened/Priority flora and/or TEC health</p> <p>Reduced quality or contamination of soil/sediment and/or surface waters (creek lines)</p>	<p>Threatened/Priority flora (between 700 m and 3 km of the TSF2 footprint)</p> <p>TEC (north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 footprint)</p> <p>Surface waters - creek lines (east and south-west of TSF2 and situated between 350 m and 1.5 km of the TSF2 footprint)</p>	Refer to Table 1, section 3.1.1	<p>C = Moderate</p> <p>L = Possible</p> <p>Medium Risk</p>	Yes	N/A	<p>The Delegated Officer notes that:</p> <ul style="list-style-type: none"> the existing licence L8008/2004/3 includes regulatory requirements for stormwater management for the combined TSF infrastructure; and the general provisions of the EP Act and UDRs apply in the regulation of discharges of environmentally harmful materials.
Time limited operations									
<p>Source:</p> <ul style="list-style-type: none"> TSF2 <p>Activities:</p> <ul style="list-style-type: none"> Disposal of tailings and contaminated water into TSF2; and Reject stream materials used in construction of the Stage 5 embankment raise 	<p>Tailings, hypersaline water contaminated with enriched metals and metalloids (e.g. cobalt, nickel and manganese), run-off of reject stream material with enriched metals and metalloids (e.g. arsenic, bismuth, cobalt, chromium, nickel, selenium and tellurium) and/or contaminated stormwater</p>	<ul style="list-style-type: none"> Increased seepage of contaminated water through base and embankments of TSF2 to soil, groundwater and root zone of vegetation Increased seepage of contaminated water through base and embankments of TSF2 to collection trench (surface) 	<p>Reduced quality or contamination of soil/sediment, groundwater and/or surface waters (creek lines)</p> <p>Groundwater mounding</p> <p>Poor Threatened/Priority flora and/or TEC health</p>	<p>Land/Soil</p> <p>Groundwater:</p> <ul style="list-style-type: none"> SWL surrounding TSF2 between 4.5-19.8 mbgl; SWL surrounding EPs between 12.2-18.1 mbgl; and SWL downstream of TSF2 and EPs between 12.6-15.5 mbgl. 	Refer to Table 1, section 3.1.1	<p>C = Major</p> <p>L = Possible</p> <p>High Risk</p>	No	<p>Condition 2 (Schedule 2)</p> <p>Conditions 4 and 5</p> <p>Condition 6</p> <p>Conditions 7 and 8</p> <p>Condition 9</p> <p>Conditions 10 to 13</p> <p>Condition 14</p> <p>Conditions</p>	<p>The following additional regulatory requirements have been applied in relation to construction activities:</p> <ul style="list-style-type: none"> borrow material used in construction needs to be non-acid forming (NAF); suitable NAF borrow material has been included as an allowable construction material for the Stage 5 embankment raise;

Works Approval: W6739/2022/1

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
		seepage interception trench) <ul style="list-style-type: none"> Overland runoff of salts, metals and metalloids during rainfall events 		Surface waters - creek lines (east and south-west of TSF2 and situated between 350 m and 1.5 km of the TSF2 footprint) Threatened/Priority flora (between 700 m and 3 km of the TSF2 footprint) TEC (north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 footprint)				<u>15-19</u>	and <ul style="list-style-type: none"> compaction control tests to be undertaken for the series of catchment paddocks (Stage 5). The following additional regulatory requirement has been applied for operations: <ul style="list-style-type: none"> monitoring and reporting of the of the water balance for the combined tailing storage facility infrastructure. Refer to section 4.2 for the detailed risk assessment for seepage of contaminated water and the justification for additional regulatory requirements applied. Some additional regulatory requirements apply to reporting and time limited operations commencement and duration.
		<ul style="list-style-type: none"> Overtopping of TSF2 and direct discharge of tailings and/or contaminated water to land 	Reduced quality or contamination of soil/sediment, groundwater and/or surface waters (creek lines) Poor Threatened/Priority flora and/or TEC health	Land/Soil Groundwater: <ul style="list-style-type: none"> SWL surrounding TSF2 between 4.5-19.8 mbgl; SWL surrounding EPs between 	Refer to Table 1, section 3.1.1	C = Moderate L = Unlikely Medium Risk	No	<u>Conditions 10-13</u>	Additional regulatory requirements have been applied to monitor water quality within the series of catchment paddocks (Stage 5). The Delegated Officer notes that: <ul style="list-style-type: none"> the existing licence L8008/2004/3

Works Approval: W6739/2022/1

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
				12.2-18.1 mbgl; and <ul style="list-style-type: none"> SWL downstream of TSF2 and EPs between 12.6-15.5 mbgl. Surface waters - creek lines (east and south-west of TSF2 and situated between 350 m and 1.5 km of the TSF2 footprint) Threatened/Priority flora (between 700 m and 3 km of the TSF2 footprint) TEC (north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 footprint)					includes regulatory requirements for the management of the combined TSF infrastructure; and <ul style="list-style-type: none"> the general provisions of the EP Act and UDRs apply in the regulation of discharges of environmentally harmful materials.
Source: <ul style="list-style-type: none"> EPs Activities: <ul style="list-style-type: none"> Supernatant water and contaminated stormwater on TSF2 pumped via existing HDPE pipelines to the HDPE-lined EPs for storage 	Supernatant (hypersaline water contaminated with enriched metals and metalloids e.g. cobalt, nickel and manganese), and/or contaminated stormwater	<ul style="list-style-type: none"> Increased seepage of supernatant and/or contaminated stormwater through base and walls of HDPE-lined EPs to soil, groundwater and root zone of vegetation Overtopping of EPs and direct discharge of supernatant 	Reduced quality or contamination of soil/sediment, groundwater and/or surface waters (creek lines) Groundwater mounding Poor Threatened/Priority flora and/or TEC health	Land/Soil Groundwater: <ul style="list-style-type: none"> SWL surrounding TSF2 between 4.5-19.8 mbgl; SWL surrounding EPs between 12.2-18.1 mbgl; and SWL downstream of TSF2 and EPs between 12.6- 	Refer to Table 1, section 3.1.1	C = Moderate L = Unlikely Medium Risk	Yes	N/A	The Delegated Officer notes that the existing licence L8008/2004/3 and works approval W6578/2021/1 includes regulatory requirements for operation and maintenance of the EPs.

Works Approval: W6739/2022/1

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
		and/or contaminated stormwater to land	surface waters (creek lines) Poor Threatened/Priority flora and/or TEC health	15.5 mbgl. Surface waters - creek lines (250 m west of EPs) TEC (north-west, west and south of the EPs and situated between 160 m and 900 m of the EPs footprint)					
<p>Source:</p> <ul style="list-style-type: none"> Pipelines <p>Activities:</p> <ul style="list-style-type: none"> Transport of tailings, supernatant and/or contaminated stormwater via pipelines 	Tailings, supernatant (hypersaline water contaminated with enriched metals and metalloids e.g. cobalt, nickel and manganese), and/or contaminated stormwater	Tailings, supernatant and/or contaminated water discharged to environment via pipeline leak/rupture	<p>Reduced quality or contamination of soil/sediment, groundwater and/or surface waters (creek lines)</p> <p>Poor Threatened/Priority flora and/or TEC health</p>	<p>Land/Soil</p> <p>Groundwater:</p> <ul style="list-style-type: none"> SWL surrounding TSF2 between 4.5-19.8 mbgl; SWL surrounding EPs between 12.2-18.1 mbgl; and SWL downstream of TSF2 and EPs between 12.6-15.5 mbgl. <p>Surface waters - creek lines:</p> <ul style="list-style-type: none"> east and south-west of TSF2 and situated between 350 m and 1.5 km of the TSF2 footprint; and 250 m west of EPs. <p>Threatened/Priority flora (between 700 m</p>	Refer to Table 1, section 3.1.1	C = Moderate L = Possible Medium Risk	No	<u>Condition 2 (Schedule 2)</u>	An additional regulatory requirement has been applied to ensure relocated pipelines meet Australian standards.

Works Approval: W6739/2022/1

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
				and 3 km of the TSF2 footprint) TEC: <ul style="list-style-type: none"> north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 footprint; and north-west, west and south of the EPs and situated between 160 m and 900 m of the EPs footprint. 					
Source: <ul style="list-style-type: none"> TSF2 Activities: <ul style="list-style-type: none"> Tailings stored within TSF2 	Dust (dried tailings with enriched metals and metalloids e.g. chromium, nickel and selenium and with potential to contain asbestos) lift-off from the surface of TSF2 following tailings deposition for Stages 4 and 5 operations <i>For noting:</i> <ul style="list-style-type: none"> <i>asbestos is known to occur in the ore body at the premises and may also be present within the tailings.</i> <i>Fibre characterisation by scanning electron microscopy (SEM) with elemental</i>	Air/Wind dispersion	Human health impacts	Rural farmlands with potential for rural residential housing (south, south-east and east of TSF2 and situated between 2.5 km and 5 km of the TSF2 footprint)	Refer to Table 1, section 3.1.1	C = Major L = Unlikely Medium Risk	Yes	Condition 3	The Delegated Officer notes that: <ul style="list-style-type: none"> the existing licence L8008/2004/3 includes regulatory requirements for the management of dust emissions from the combined TSF infrastructure; and section 49 of the EP Act applies in the regulation of dust emissions.
			Livestock health impacts and/or poor crop health	Rural farmlands with agriculture (wheat) and sheep farming (south, south-east and east of TSF2 and situated between 2.5 km and 5 km of the TSF2 footprint)		C = Moderate L = Unlikely Medium Risk			
			Poor Threatened/Priority	Threatened/Priority flora (between 700 m and 3 km of the					

Risk Event						Risk rating ¹	Applicant controls sufficient?	Conditions ² of works approval	Justification for additional regulatory requirements
Source/Activities	Potential emission	Potential pathways	Potential adverse impacts	Receptors	Applicant controls	C = consequence L = likelihood			
	<i>analysis by energy dispersive spectroscopy (EDS) was carried out on two samples collected from the tailings beach in 2012. The results of one of the tests identified a fibre comprising 'possible riebeckite or crocidolite with the morphology suggesting riebeckite' (WSP Golder 2022b).</i>		flora and/or TEC health	TSF2 footprint) TEC (north-east, east, south and west of TSF2 and situated between 100 m and 420 m of the TSF2 footprint)					

Note ¹: Consequence ratings, likelihood ratings and risk descriptions are detailed in the *Guideline: Risk assessments* (DWER 2020b).

Note ²: Proposed applicant controls are depicted by standard text. **Bold and underline text** depicts additional regulatory controls imposed by department.

4.2 Risk assessment – Seepage of contaminated water

4.2.1 Overview of risk event

The premises was placed into care and maintenance in October 2017 and transitioned to operational status in early 2020, with tailings being deposited into the combined TSF infrastructure.

Tailings deposition into TSF2 commenced around 30 May 2021, with deposition being undertaken periodically during construction of the TSF2 Stage 1 embankment raise, which was completed on the 10 September 2021. Tailings deposition into TSF1 ceased on 12 September 2021, when the facility reached its full storage capacity. Time limited operations tailings deposition into the TSF2 (combined Stage 2 and 3) embankment raise commenced on the 21 January 2023, with tailings deposition into TSF2 currently ongoing.

The applicant is now proposing to raise the embankment walls of TSF2 (Stage 4 and Stage 5) to allow for an increased volume of tailings sourced from the site's mining operations to be deposited into the existing TSF2.

This seepage risk assessment considers the potential for an increase in seepage emissions (hypersaline water contaminated with enriched metals and metalloids) and overland runoff of salts, metals and metalloids from disposal of tailings into TSF2 following each proposed embankment raise (Stage 4 and Stage 5).

Seepage of contaminated water through the base and embankments of TSF2 may result in the following:

- further groundwater mounding (with elevated total dissolved solids (TDS) and metal and metalloids) around TSF2;
- near surface seepage collecting within the toe drain surrounding the TSF2 perimeter and seepage collection, with potential to contribute to further groundwater mounding if the contaminated water is not continually removed from this infrastructure; and
- overland runoff of salts, metals and metalloids during significant rainfall events.

Key potential environmental impacts associated with the above aspects include:

- dieback of Threatened, Priority flora and Threatened Ecological Communities (TECs) due to hypersaline water migrating into root zones;
- dieback of native vegetation can result in subsequent loss of transpiration drawdown, with potential to extend duration of high-water table conditions during which surface evaporation and accumulation of salts can occur over an extended period of time leading to surface scalding;
- overland runoff from scalded areas risks transport of salts, metals and metalloids to downstream environments (Threatened, Priority flora and TECs and aquatic ecosystems in creek lines and the Jerdacuttup River system); and
- salinisation of shallow subsurfaces resulting in poor soil and sediment quality that can lead to complications with future mine rehabilitation works.

4.2.2 Analysis of groundwater monitoring data

Analysis of the monitoring data within the TSF2 groundwater monitoring wells was undertaken to assess the potential environmental impacts associated with the proposed TSF2 (Stage 4 and Stage 5) embankment lifts and increased volume of tailings proposed to be deposited in TSF2. Figure 1 demonstrates the groundwater monitoring infrastructure in proximity to TSF2 and the associated EPs.

According to DWER Geocortex, groundwater at the premises is considered saline to highly saline at 7,000 to 14,000 mg/L Total Dissolved Solids (TDS).

As demonstrated in Appendix 4 (Figure 4 to Figure 8), the standing water levels (SWL) of groundwater in the majority of groundwater monitoring wells surrounding TSF2 began rising in January 2014 following a 223 ha expansion of the existing TSF in 2013.

The most recent noticeable rise in SWL of groundwater in the groundwater monitoring wells located west (MB60), east (MB04 and MB63) and south (MB07, MB15, MB61, MB62 and RWC42) of TSF2 appears to coincide with the deposition of tailings into TSF2 (Figure 4 to Figure 8). As of January 2023, the shallowest groundwater levels were recorded immediately south of TSF2 with 4.5 mbgl at MB62 and 5.8 mbgl at RWC42, the electrical conductivity (EC) within these groundwater monitoring wells was 41,000 and 43,000 uS/cm respectively (Figure 13). The groundwater at these locations is therefore considered to be like that of brine with potential to impact native vegetation health if groundwater becomes shallow enough to reach zoot zones.

In a technical memorandum dated 21 December 2022, the applicant's consultant advised that:

- the rising groundwater could be attributed to the nearby TSF2 as the groundwater contours indicate that the general flow of groundwater in the area is from north to south; and
- that groundwater levels may reach 4 mbgl in June 2023 if the current rate of groundwater elevation increase continues (WSP Golder 2022c).

Appendix 5 provides graphs to demonstrate the EC trending in groundwater monitoring wells surrounding TSF2.

Appendix 6 (Figure 14) demonstrates elevated Nickel (Ni) concentrations in groundwater monitoring wells located east of TSF2 (MB04 and MB63). The department notes that the most recent noticeable rise in SWL of groundwater within these groundwater monitoring wells appears to coincide with the deposition of tailings into TSF2.

4.2.3 Additional groundwater monitoring infrastructure

The department notes that there is currently limited groundwater monitoring data available to the west of TSF2.

On 25 November 2022, the applicant advised that four additional groundwater monitoring wells (MB65, MB66, MB67 and MB68) were installed in October 2022 and that one additional groundwater monitoring well is proposed to be installed (MB64) (Figure 1). The additional groundwater monitoring wells are located to the south-east, south, south-west and west of TSF2. These additional groundwater monitoring wells will be incorporated into the existing groundwater monitoring regime for licence L8008/2004/3.

The two newly installed groundwater monitoring wells (MB66 and MB67) are located along the western perimeter of TSF2; therefore, these wells will be utilised to assess any seepage risks to the west of TSF2 once the groundwater monitoring data is available.

4.2.4 Seepage management strategies

The existing and applicant proposed seepage management controls are detailed in Table 3.

On 30 September 2022, the applicant installed two new seepage recovery bores (TSFRB01 and TSFB02) to the south of TSF2. These bores were intended to pump out mounding groundwater at an estimated maximum pumping rate of 5 L/s to reduce the rate of rising groundwater levels. The locations of the newly installed seepage recovery bores were selected following a geophysics assessment of the area downstream of TSF2 (WSP Golder 2022c).

On 19 January 2023, the applicant advised that their consultant had provided preliminary indication that the two newly installed seepage recovery bores (TSFRB01 and TSFB02) will not

be effective in the management of the local groundwater table as the airlift yields are around the 0.1 to 0.2 L/s. Test pumping of the two seepage recovery bores was proposed to be undertaken in late January 2023 to confirm these airlift figures. Additionally, advice from their consultant has been that drilling of additional recovery bores in the nearby vicinity of TSF2 will not achieve desired results as the low yielding lithology remains similar throughout the local area (WSP Golder 2022c).

Considering the above, the applicant is now investigating the below alternative groundwater recovery strategies:

- Firstly, installing two additional seepage recovery bores (GWR 01 and GWR 02), in between the recently installed seepage recovery bores (TSFRB01 and TSFB02) and the location of VWPs south of TSF2 (Figure 3). These additional seepage recovery bores are located within the vicinities of MB62 and RWC42, where the shallowest groundwater levels have been observed (Figure 7); and
- Secondly, the applicant may install either one or two groundwater and seepage interception trench(es) along the southern perimeter of TSF2 (Figure 3). This infrastructure is likely to be installed if the four seepage recovery bores do not prove successful in reducing the rate of groundwater rise within monitoring bores MB62 and RWC42 (WSP Golder 2022c).

4.2.5 Additional regulatory requirements

The department is currently undertaking an amendment to the existing licence L8008/2004/3. Considering the above, the department is re-assessing the existing regulatory requirements within licence L8008/2004/3 to determine their suitability in managing seepage risks. Any additional regulatory requirements to address the ongoing seepage issues will be incorporated as part of the current amendment to the existing licence L8008/2004/3.

In addition to the above, the department will re-assess regulatory requirements as required during the amendment to licence L8008/2004/3 to incorporate the operational aspects of works approval W6739/2022/1. The monitoring data obtained during time limited operations of works approval W6739/2022/1 will be reviewed as part of the respective licence amendment.

5. Consultation

Table 6 provides a summary of the consultation undertaken by the department.

Table 6: Consultation

Consultation method	Comments received	Department response
Application advertised on the department's website (28 November 2022)	None received	N/A
Local Government Authority advised of proposal on 28 November 2022	None received	N/A
Department of Mines, Industry Regulation and Safety (DMIRS) advised of proposal on 28 November 2022	DMIRS responded on 1 December 2022 advising that Ravensthorpe Nickel Operations Pty Ltd had submitted a Mining Proposal (Reg ID 114152) and that this application was currently under assessment.	N/A

<p>Applicant was provided with draft documents on 29 March 2023, this included a request for further information</p>	<p>On 11 April 2023, the applicant advised that they had no comments in relation to the draft documents and requested for the works approval to be issued following provision of the outstanding information.</p> <p>On 27 April 2023, the applicant provided the outstanding information.</p>	<p>N/A</p>
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6. Conclusion

Based on the assessment in this decision report, the delegated officer has determined that a works approval will be granted, subject to conditions commensurate with the determined controls and necessary for administration and reporting requirements.

References

1. Department of Environment Regulation (DER) 2015, *Guidance Statement: Setting Conditions*, Perth, Western Australia.
2. Department of Water and Environmental Regulation (DWER) 2020a, *Guideline: Environmental siting*, Perth, Western Australia.
3. DWER 2020b, *Guideline: Risk assessments*, Perth, Western Australia.
4. FQM Australia Nickel (FQM) 2023, *Response to Request for Further Information*, West Perth, Western Australia.
5. MERIWA 2018, Adams, M.D., Donato, D.B., Schulz, R.S. and Smith, G.B., 2008, *Influences of Hypersaline Tailings on Wildlife Cyanide Toxicosis; MERIWA Project M398 (II) 'Cyanide Ecotoxicity at Hypersaline Gold Operations' Final Report Volume 2 – Definitive Investigation*.
6. WSP Golder (2022a), *Works Approval Application – Ravensthorpe Nickel Operation – Tailings Storage Facility 2 Stages 4 and 5*, Perth, Western Australia.
7. WSP Golder (2022b), *Works Approval Application – Ravensthorpe Nickel Operations – TSF 2, Stages 4 and 5 Development, Supporting Document for Mining Proposal and Works Approval Application*, Perth, Western Australia.
8. WSP Golder (2022c), *Technical Memorandum, RNO TSF2 Groundwater Level Management Concept Design*, Perth, Western Australia.

Appendix 2: Groundwater monitoring infrastructure arrangement

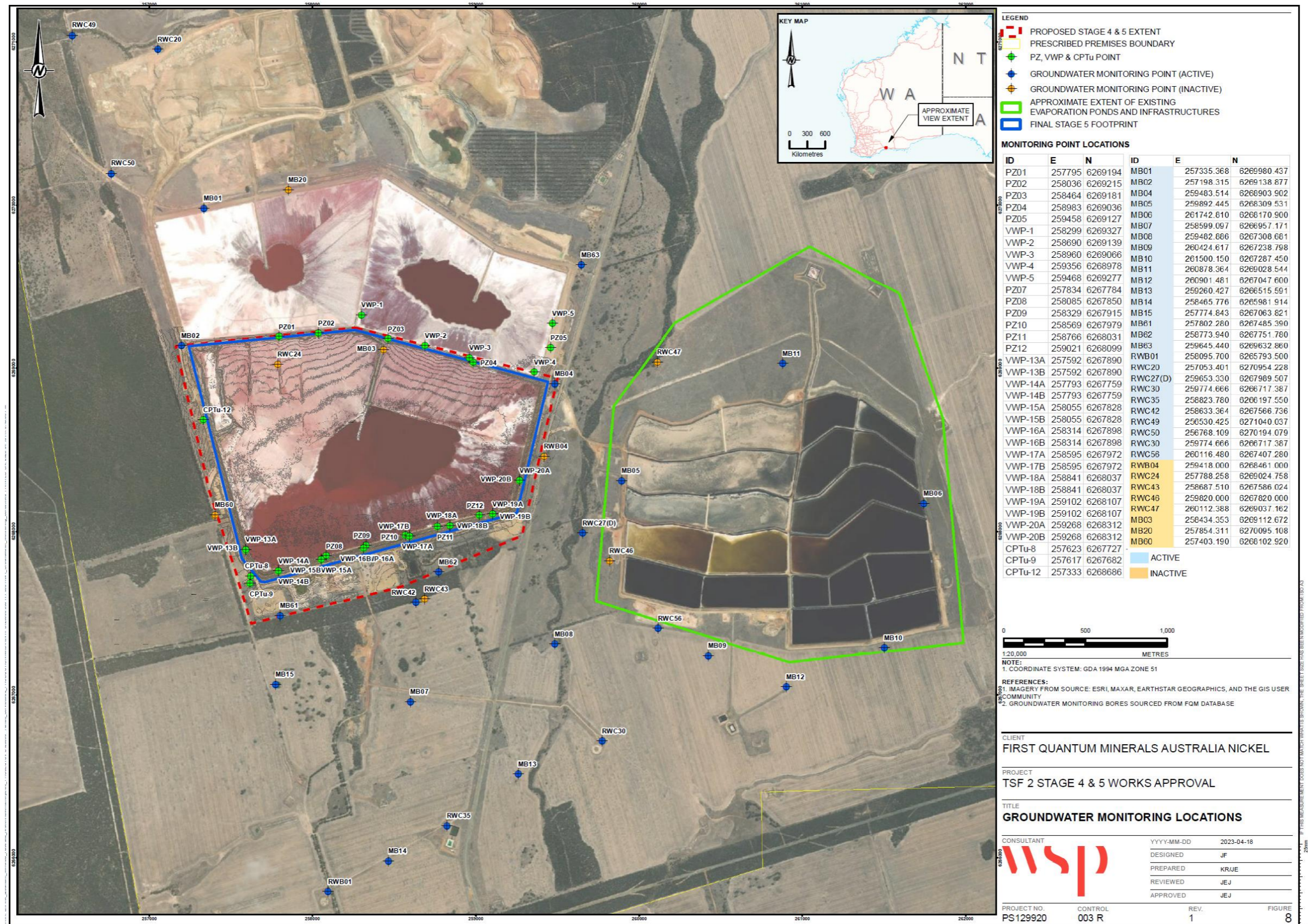


Figure 1: Map demonstrating location of groundwater monitoring infrastructure (groundwater monitoring wells and vibrating wire piezometers (VWP))

Works approval: W6739/2022/1

IR-T13 Decision report template (short) v3.0 (May 2021)

Appendix 3: Seepage recovery arrangement

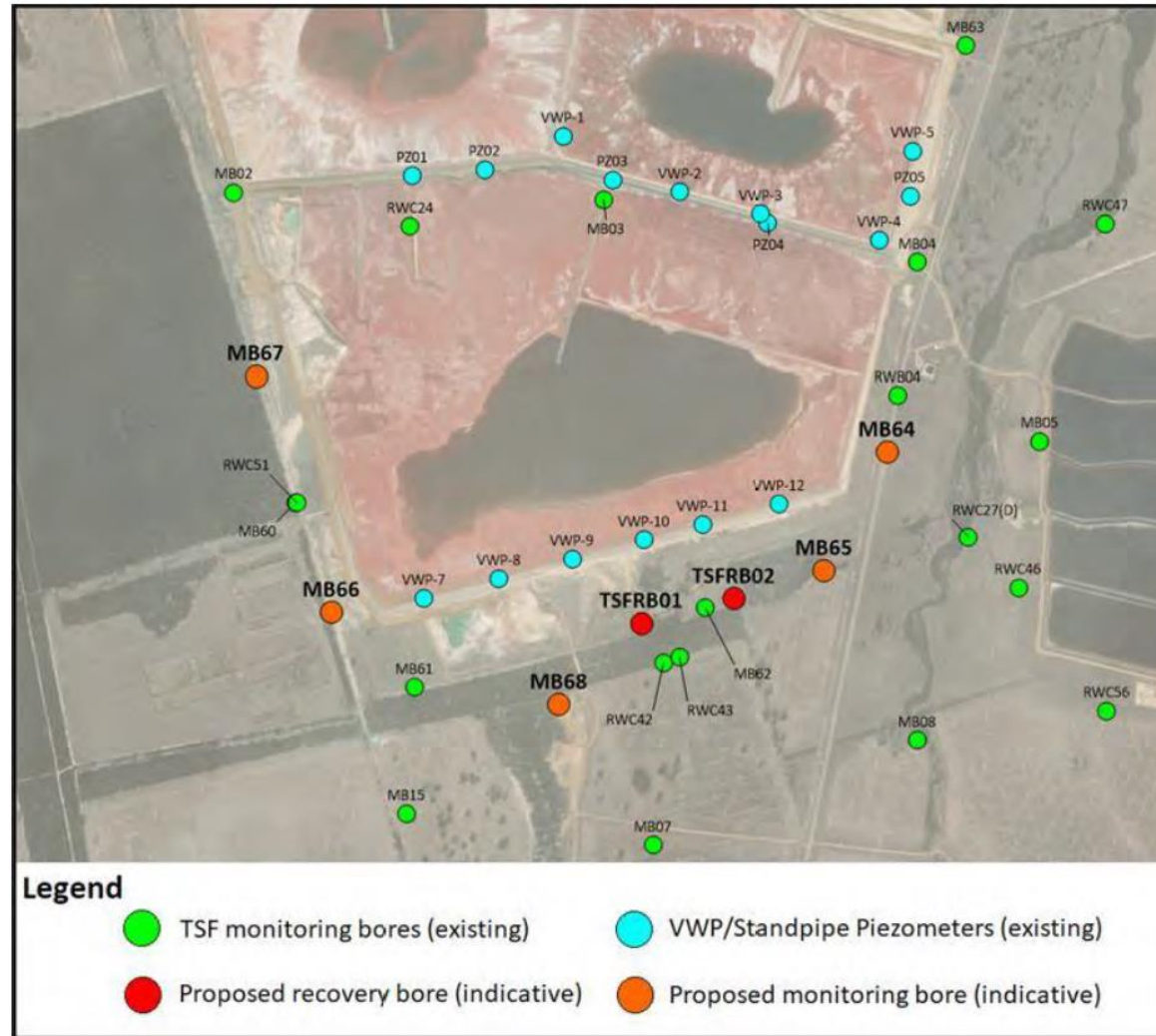


Figure 2: Map demonstrating location of newly installed seepage recovery bores

Works approval: W6739/2022/1

IR-T13 Decision report template (short) v3.0 (May 2021)

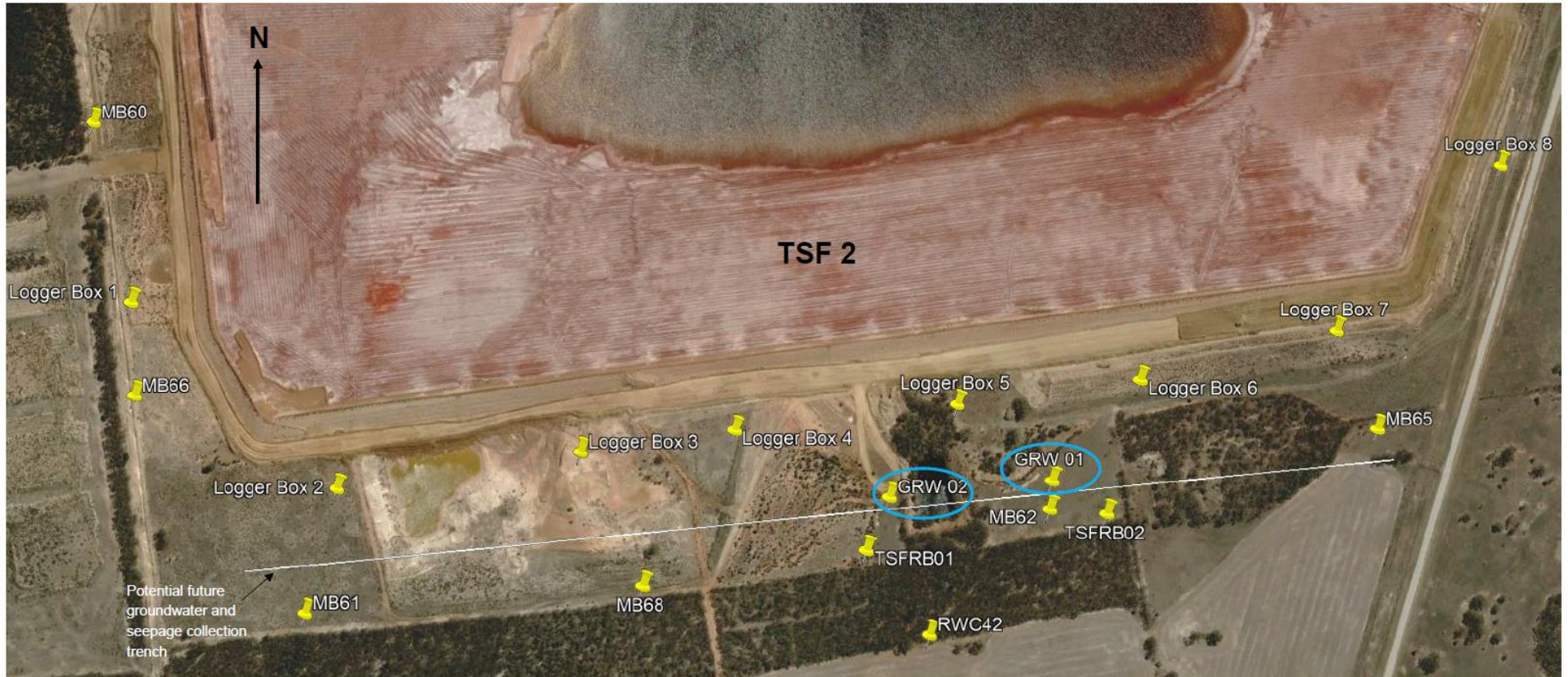


Figure 3: Map demonstrating location of additional seepage recovery bores proposed to be installed

Appendix 4: Standing water level (SWL) line graphs

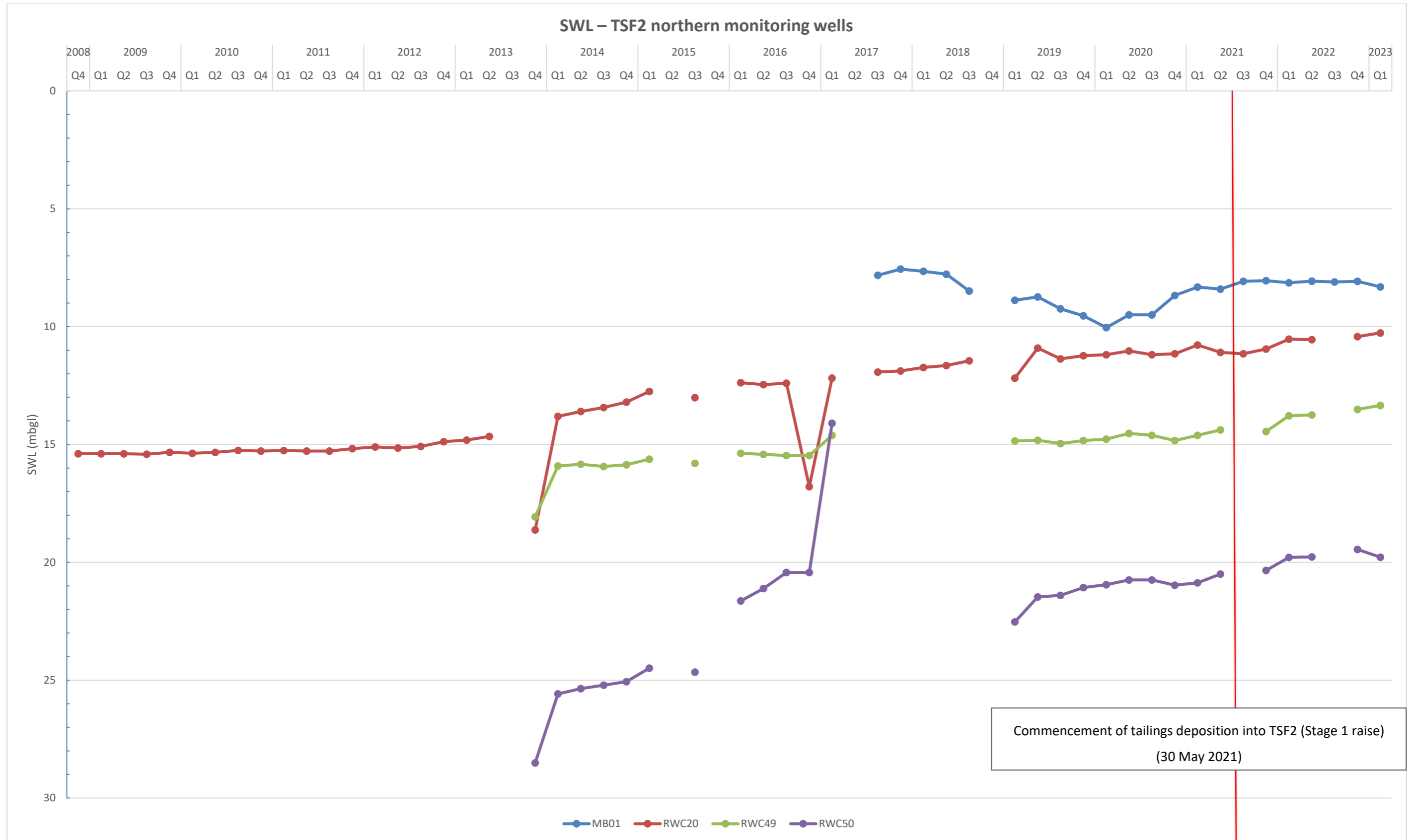


Figure 4: SWL – TSF2 northern monitoring wells

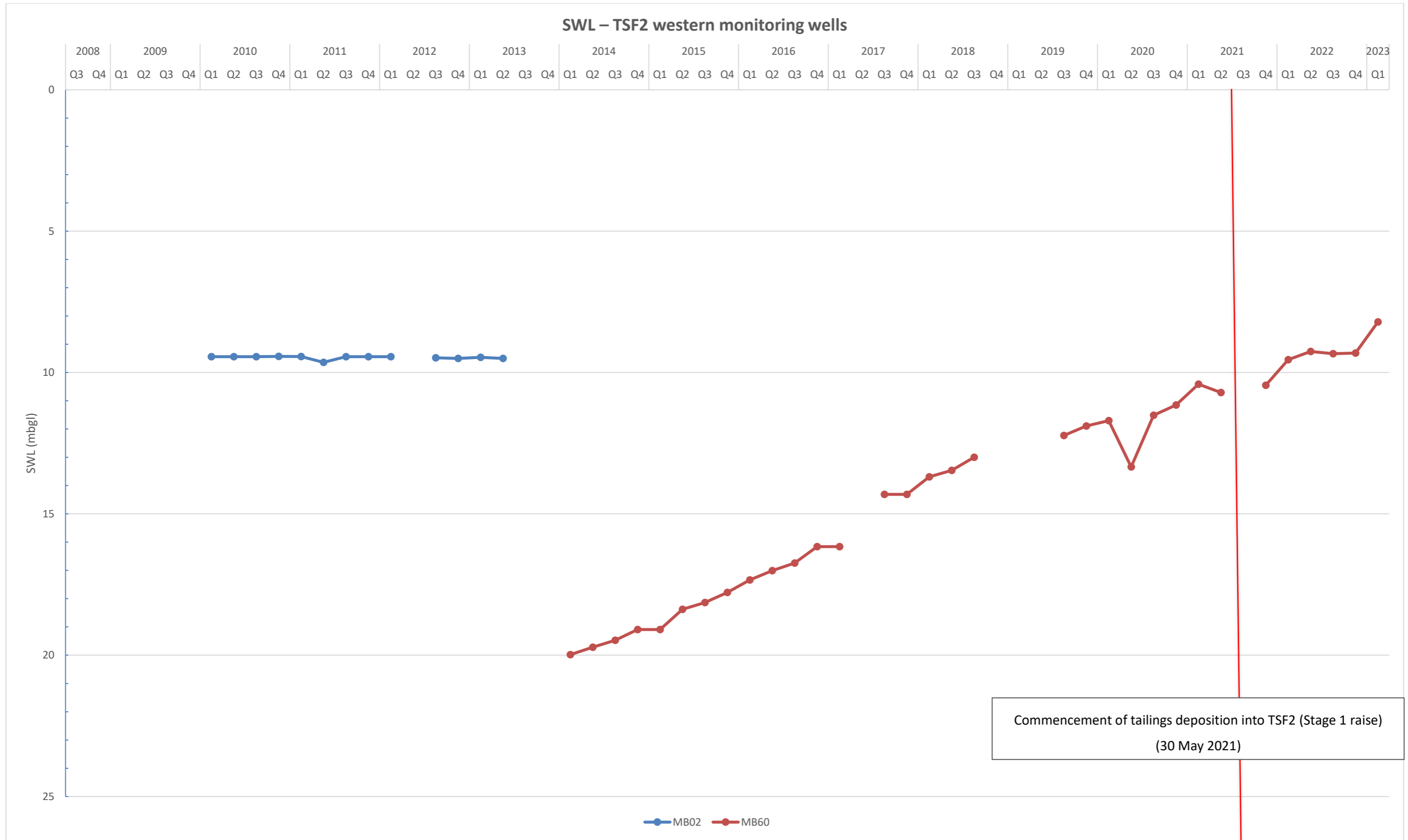


Figure 5: SWL – TSF2 western monitoring wells

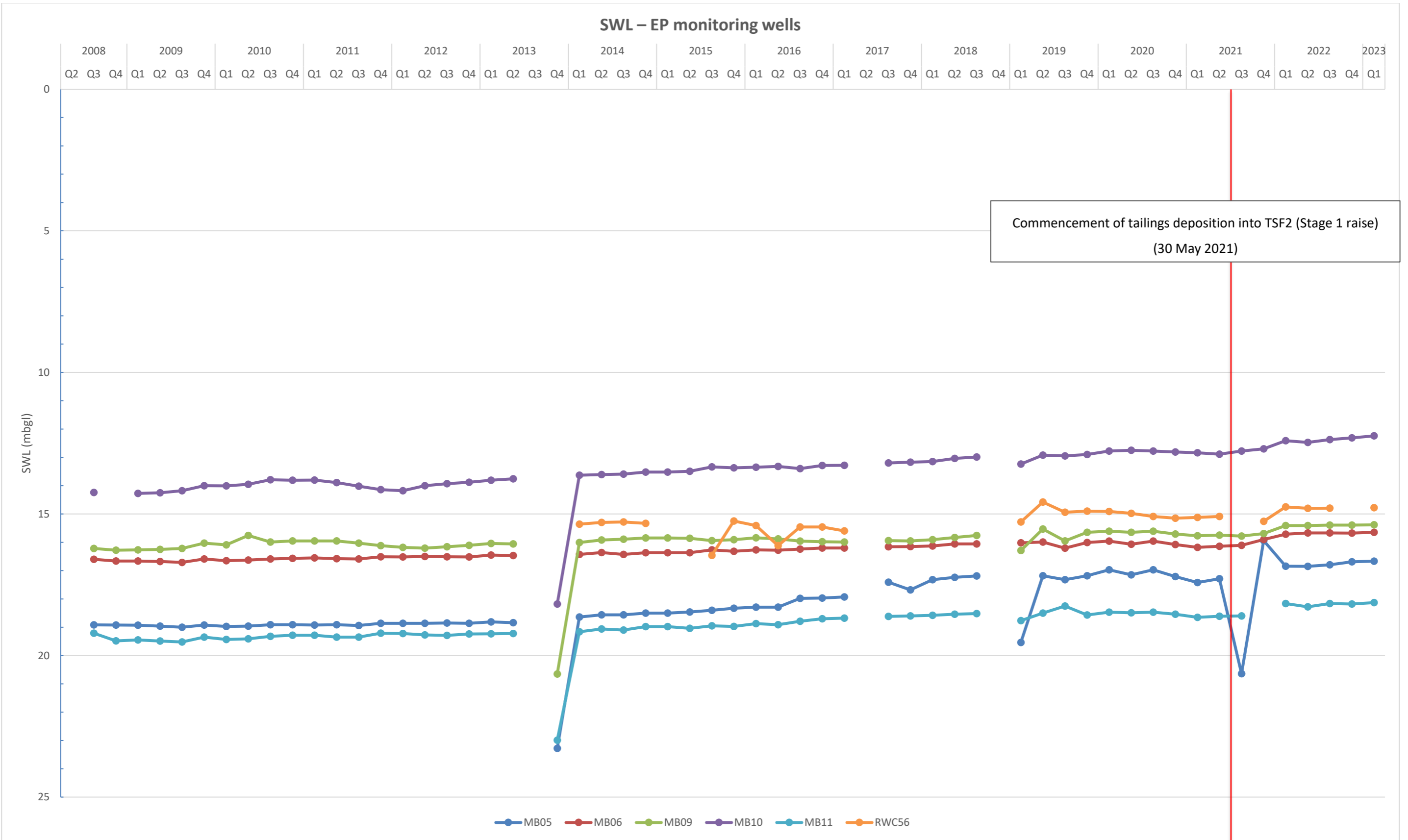


Figure 8: SWL – EP monitoring wells

SWL – Monitoring wells downstream of TSF2 and EPs

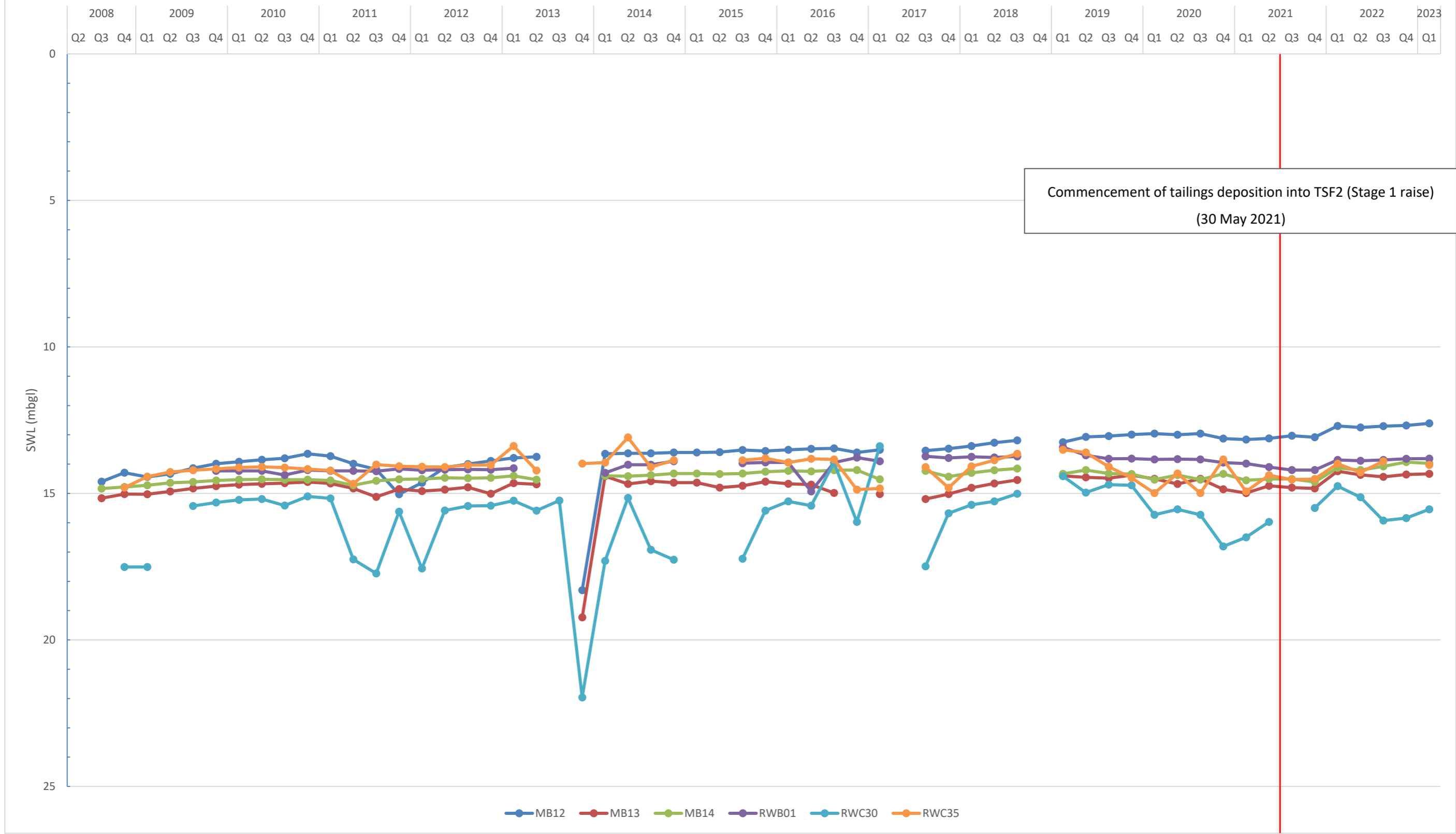


Figure 9: SWL – monitoring wells downstream of TSF2 and EPs

Appendix 5: Electrical conductivity (EC) line graphs

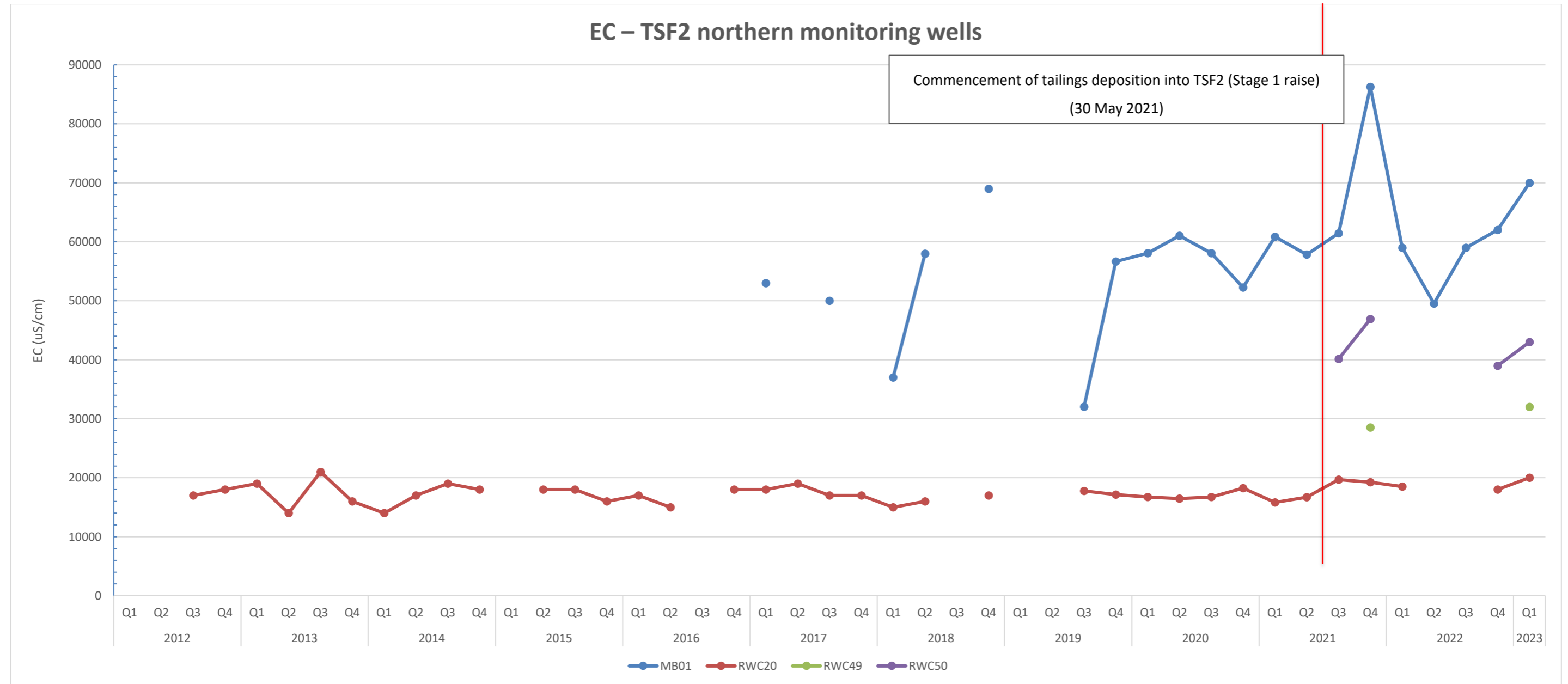


Figure 10: EC – TSF2 northern monitoring wells

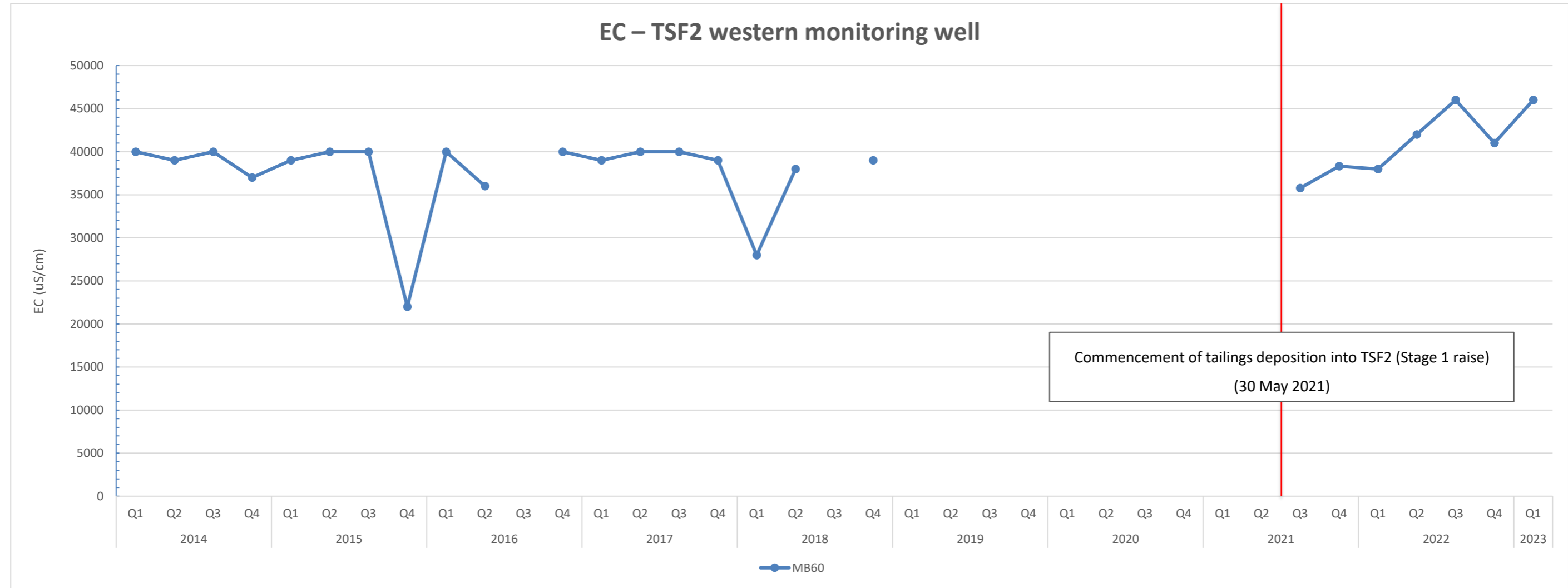


Figure 11: EC – TSF2 western monitoring well

EC – TSF2 eastern monitoring wells

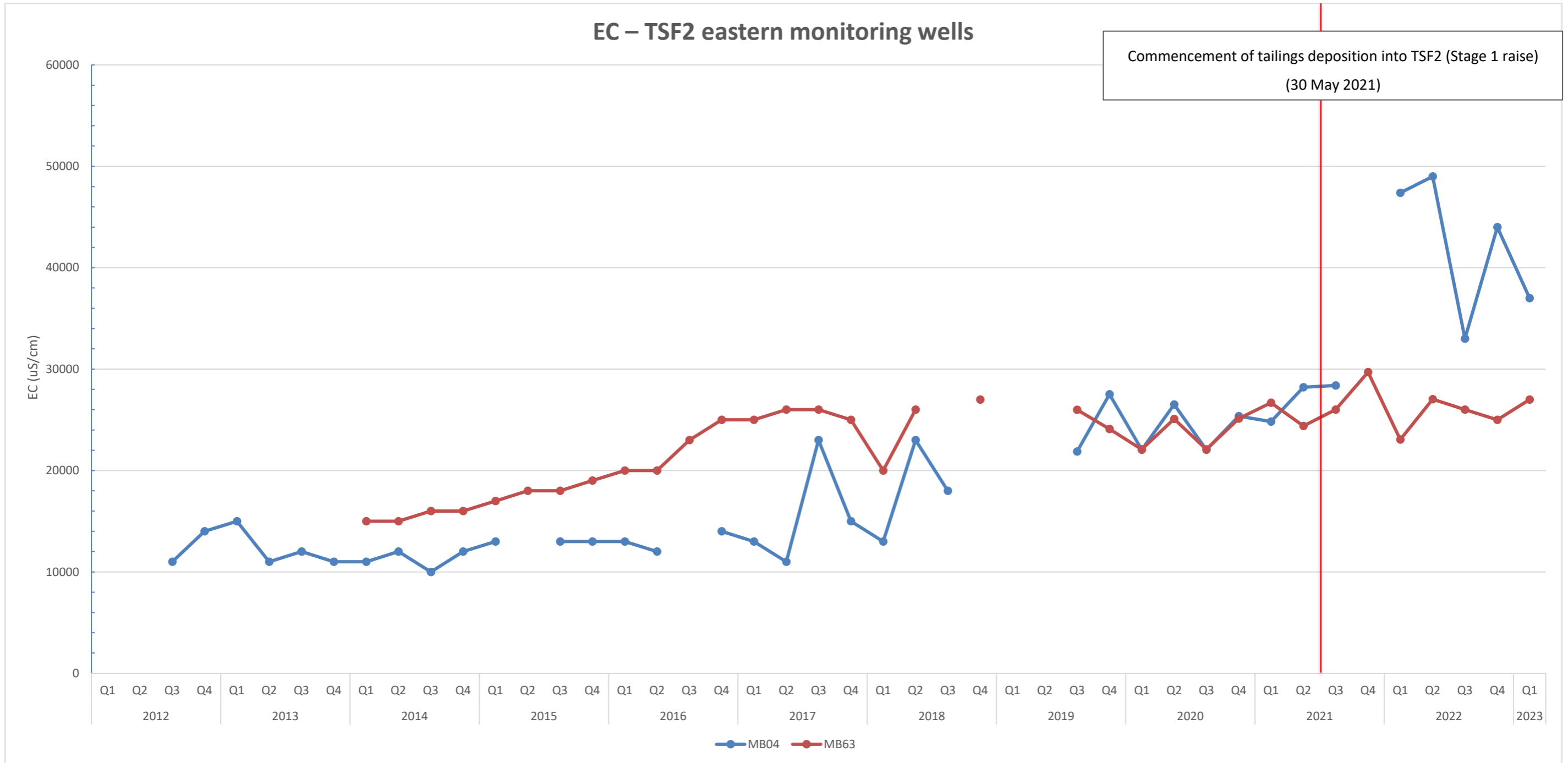


Figure 12: EC – TSF2 eastern monitoring wells

EC – TSF2 southern monitoring wells

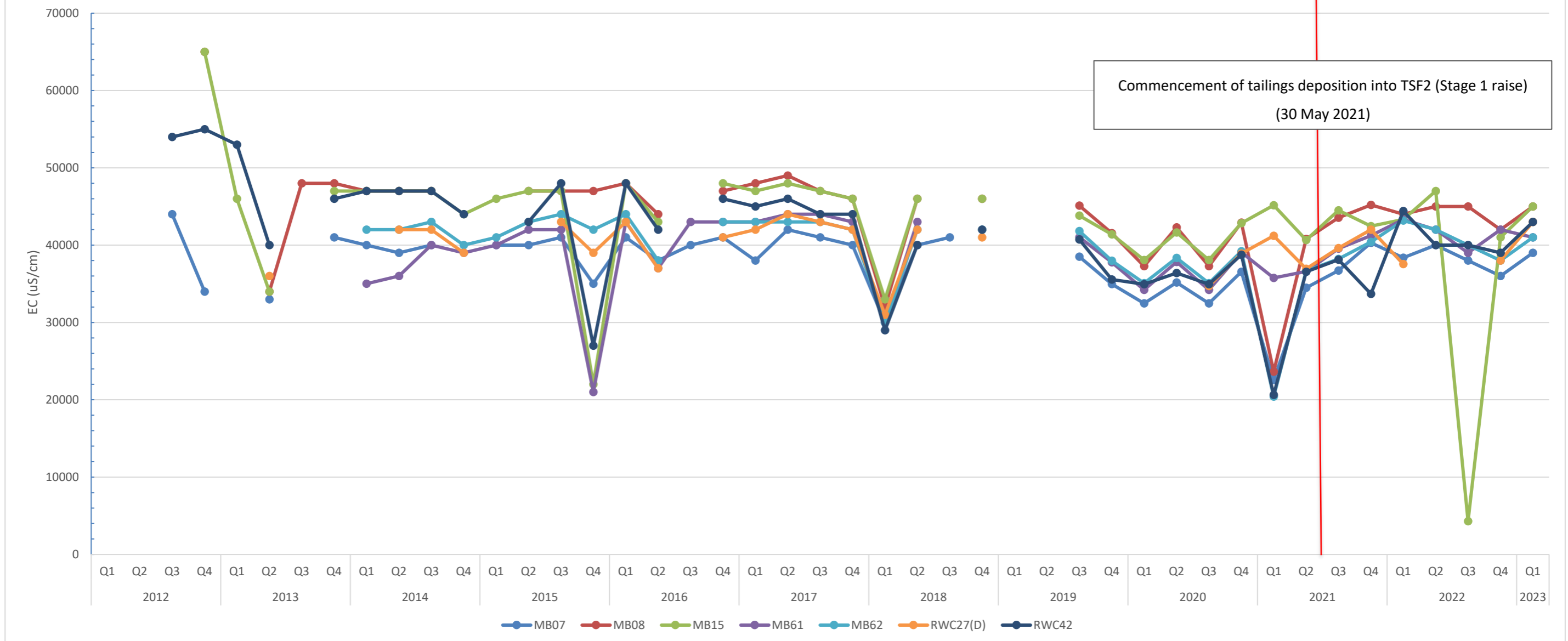


Figure 13: EC – TSF2 southern monitoring wells

Appendix 7: Application validation summary

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)		
Application type		
Works approval	<input checked="" type="checkbox"/>	
Date application received	14 September 2022	
Applicant and premises details		
Applicant name/s (full legal name/s)	FMQ Australia Nickel Pty Ltd (trading as Ravensthorpe Nickel Operations Pty Ltd)	
Premises name	Ravensthorpe Nickel Operations	
Premises location	Legal description – Part of mining tenements M74/114, M74/115, M74/116, M74/123, M74/144, M74/145, M74/173, M74/174 and M74/175. Jerdacuttup WA 6346	
Local Government Authority	Shire of Ravensthorpe	
Application documents		
HPCM file reference number:	DER2022/000488	
Key application documents (additional to application form):	<ul style="list-style-type: none"> Works Approval Application – Ravensthorpe Nickel Operation – Tailings Storage Facility 2 Stages 4 and 5, Northbridge, Western Australia. [DWERDT659169] Works Approval Application – Ravensthorpe Nickel Operations – TSF 2, Stages 4 and 5 Development, Supporting Document for Mining Proposal and Works Approval Application, Northbridge, Western Australia. [DWERDT659171] 	
Scope of application/assessment		
Summary of proposed activities or changes to existing operations.	As per sections 2.3.1 and 2.3.2 of this decision report.	
Category number/s (activities that cause the premises to become prescribed premises)		
Table 1: Prescribed premises categories		
Prescribed premises category and description	Assessed production or design capacity	
Category 5: Processing or beneficiation of metallic or non-metallic ore	<p>The increase in tailings storage capacity will not change the existing design capacity for TSF2, which will remain at 13,900,000 tonnes per annual period.</p> <p>Therefore, the assessed design capacity for category 5 operations will remain at 21,500,000 tonnes per annual period as per the existing licence L8008/2004/3.</p>	
Legislative context and other approvals		
Has the applicant referred, or do they intend to refer, their proposal to the EPA under Part IV of the EP Act as a significant proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Referral decision No: Managed under Part V <input checked="" type="checkbox"/> Assessed under Part IV <input type="checkbox"/>

SECTION 1: APPLICATION SUMMARY (as updated from validation checklist)		
Does the applicant hold any existing Part IV Ministerial Statements relevant to the application?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Ministerial statement No: MS 633
Has the proposal been referred and/or assessed under the EPBC Act?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Reference No: EPBC 2001/172. The applicant has advised that a valid EPBC Act approval applies.
Has the applicant demonstrated occupancy (proof of occupier status)?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Mining tenements <input checked="" type="checkbox"/>
Has the applicant obtained all relevant planning approvals?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>	Premises located on mining tenements.
Has the applicant applied for, or have an existing EP Act clearing permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	The applicant has advised that all works are restricted to cleared land and that no native vegetation is to be cleared as part of the proposed works.
Has the applicant applied for, or have an existing CAWS Act clearing licence in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	The applicant has advised that all works are restricted to cleared land and that no native vegetation is to be cleared as part of the proposed works.
Has the applicant applied for, or have an existing RIWI Act licence or permit in relation to this proposal?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Licence/Permit not required.
Does the proposal involve a discharge of waste into a designated area (as defined in section 57 of the EP Act)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises situated in a Public Drinking Water Source Area (PDWSA)?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises subject to any other Acts or subsidiary regulations?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	<ul style="list-style-type: none"> • <i>Environmental Protection (Noise) Regulations 1997</i> • <i>Environmental Protection (Unauthorised Discharge) Regulations 2004</i> • <i>Mining Act 1978</i>
Is the Premises within an Environmental Protection Policy (EPP) Area?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises subject to any EPP requirements?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	N/A
Is the Premises a known or suspected contaminated site under the <i>Contaminated Sites Act 2003</i> ?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Classification: N/A / Date of classification: N/A