Appendix A – Plans, Procedures and Relevant Documents

NORTHERN STAR RESOURCES LIMITED

CLEARING ACTIVITY PERMIT

PERMIT #

SITE DETAILS – APPLICANT TO COMPLETE	
Project: CDO TSF Cell 4 Clearing	Applicable Tenements:
Location of area to be cleared: West of existing TSF	
Department responsible for clearing:	
Proposed date of clearing:	Area to be cleared (Ha):
Reason for clearing: Construction of TSF Cell 4	
Method of clearing: Dozer	
Plan attached?	

CHECKS – ENVIRONMENTAL ONLY		
Applicable Clearing Permit or PoW No:	Area Authorised (Ha):	
Please tick:	Yes	No
Area to be cleared within Clearing Permit/PoW approved limit?	☐	☐
Area to be cleared within hatched area on Clearing Permit Plan?	☐	☐
Area to be cleared is within applicable tenements?	☐	☐
DMIRS approvals Received?	☐	☐
Notifications to pastoral holders is complete?	☐	☐
All other notifications complete?	☐	☐
All other approvals in place?	☐	☐
Regard for Guiding Principles:	☐	☐
▪ Avoid the clearing of native vegetation;	☐	☐
▪ Minimise the amount of native vegetation to be cleared; and	☐	☐
▪ Reduce the impact of clearing on any environmental value.	☐	☐
Does the 10Ha exception apply? If yes, provide details below:	☐	☐
Weed control completed?	☐	☐
Vegetation to be removed and stockpiled?	☐	☐
Topsoil to be removed and stockpiled?	☐	☐
Is vegetation present which must be avoided? If yes, provide details below:	☐	☐
Is significate sandalwood present within area to be cleared?	☐	☐
If yes, Forest Produces Commission has been contacted to arrange removal?	☐	☐
Cleared area greater than 50m from riparian vegetation or any watercourse or wetland?	☐	☐
Are Heritage sites present within the area to be cleared? If yes provide details of management:	☐	☐
Exploration program Project Management Plan (PMP) reviewed and addresses key environmental risks?	☐	☐

Any other special management conditions? If yes, provide details: See CEMP Table 1 and Table 8 summary attached	☐	☐

SURVEY CONTROL – ENVIRONMENTAL DEPT & APPLICANT TO COMPLETE		
Pegs required for cleared area?	Tape Colour:	Distance apart (m):
Lease boundary pegs required?	Tape Colour:	Distance apart (m):
Special notes:		

APPROVAL TO PROCEED		
Note: Only with these signatures is authorisation to proceed granted.		
Environmental Department Name:	Signature:	Date:
Department Manager/ Superintendent Name:	Signature:	Date:

CHECK-OPERATIONS MANAGER ONLY	
Checked:	Date:
Additional comments if required:	

SUMMARY (TO BE COMPLETED AFTER CLEARING) – ENVIRONMENTAL ONLY	
Actual date cleared:	Actual area cleared (Ha):

Please tick:	Yes	No
Clearing conducted according to plans?		
Vegetation removed and stockpiled?		
Topsoil removed and stockpiled?		
Location information available for annual report?		
Exploration Specific – all casing cut below ground and capped?		
Exploration specific-all litter, sample bags, hydrocarbon spills and other debris recovered?		

Provide details as required:

CDO TSF Cell 4 Project CEMP **Conditions** Summary	
Pre-clearing survey complete	
Malleefowl road traffic warning signs erected	
Active mounds are flagged with appropriately sized buffers (50m)	
Confirmation no active mounds present in area to be cleared	
Clearing boundary is marked using GPS and cleared first to prevent over-clearing	
Following boundary clearing, vegetation to be cleared in a systematic pattern allowing fauna to move into adjacent undisturbed vegetation to the north and west of the disturbance footprint	
Fauna spotter present – works to cease if spotter considers Malleefowl or other fauna are at risk and not commence until Malleefowl move away of their own volition, or other fauna either move away or are captured and relocated by the spotter	
Malleefowl sighted during clearing to be reported to Environment Department	
Feral animals to be reported to site Environment Department	
Water carts available	
Dozer speed limit 10km/hr	
Dozer to be checked for trapped animals each day prior to start-up	
Dozer has approved weed hygiene certificate	
Dozer has fire extinguisher in working order	
Clearing restricted to daylight hours	

Fauna Sightings Register				
Date	Location of **Sighting (Easting/Northing)**	Return to work	Comments	Sign Off (CDO Env Team)

WEED HYGIENE CERTIFICATE

Date:		Equipment Owner Name:	
Address:			
Phone No:		Northern Star Responsible Supervisor (Name):	
Description of Job to be Performed			

Equipment ID	Equipment Make	Equipment Model	Registration No.	Location of Last Works	Is Machine Clean and Free of all Weeds / Seeds?	Is Machine Free of Oil / Grease / Fuel Leaks?
					YES / NO (Machine must be Washed Down if No is selected)	YES / NO (Leaks must be repaired if No is selected)
					YES / NO (Machine must be Washed Down if No is selected)	YES / NO (Leaks must be repaired if No is selected)
					YES / NO (Machine must be Washed Down if No is selected)	YES / NO (Leaks must be repaired if No is selected)
					YES / NO (Machine must be Washed Down if No is selected)	YES / NO (Leaks must be repaired if No is selected)
					YES / NO (Machine must be Washed Down if No is selected)	YES / NO (Leaks must be repaired if No is selected)

Equipment Owner Certification- Compliance		Northern Star Responsible Supervisor Arrival Inspection- Compliance	
Name	.....	Name	.....
Signature	.....	Signature	.....
Position	.....	Position	.....
Date	.....	Date	.....

WEED AND FERAL ANIMAL CONTROL REGISTER							
Date	Time (24hr)	Location	Animal/Weed	Description/Species	Control Measure Taken	By Whom	Results
4/09/2014	900	CDO- East batter of ROM	Weed	Ruby Dock	Excavator scraped and buried	R.Mills	Still some remaining at top of batter, will require close monitoring and further action

1. PURPOSE

To ensure that the relevant statutory and regulatory requirements associated with clearing of vegetation for project development are met and to minimise the impact of clearing on the environment in line with Northern Stars's Environmental Policy.

Specific objectives are to:

- Minimise vegetation disturbance where reasonably practicable;
- Prevent disturbance of vegetation adjacent to areas of activity;
- Prevent disturbance of vegetation in areas not approved for clearing under Part V Section 51E;
- Prevent the spread of weeds;
- Ensure clearing is completed in accordance with statutory requirements; and
- Ensure adequate availability and integrity of topsoil for future rehabilitation.

This Work Instruction (WI) applies to all projects requiring clearing, including, but not limited to:

- New projects;
- Expansion of existing projects;
- Near mine Exploration (including grade control and sterilisation drilling); and
- Rehabilitation and closure projects where clearing is required.

Exploration activities carried out away from mining areas (active or on care and maintenance) approved under a POW are exempt.

2. SCOPE

3. ROLES AND RESPONSIBILITIES

Role	Key Responsibilities
Environmental Manager	▪ Ensure approvals are in place in line with the LOMP so clearing can be conducted as required. ▪ Ensure Environmental and Management personnel are suitably trained to manage clearing in line with approvals, and Northern Star Policies and Procedures. ▪ Notify the DMP of any breach of clearing conditions.
Environmental Personnel	▪ Be aware of approvals and studies (flora, fauna, surface water, Aboriginal Heritage) prior to clearing. ▪ Consult with relevant managers and attend daily meetings to determine status of projects that may require clearing. ▪ Communicate status of clearing related approvals to the Operations Manager, Managers, Superintendents and Supervisors. ▪ Authorise Clearing Activity Permits. ▪ Ensure clearing areas are surveyed and suitably marked with flagging tape/pegs, prior to commencement of clearing. ▪ Inspect clearing areas before and after clearing and notify environmental personnel of any breaches. ▪ Inspect clearing areas before and after clearing. ▪ Collect clearing data. ▪ Prepare and submit statutory reports with regard to clearing. ▪ Assist in the preparation of incident reports in the event of a clearing incident. ▪ Communicate this WI to Project Personnel and Contractors.
Operations Manager	▪ To ensure this WI is implemented on site.

	▪ Review and sign Clearing Activity Permits to ensure they are in line with the LOMP.
Managers	▪ Ensure that construction is in accordance with the relevant approval(s), supporting documentation, standards and guidelines. ▪ Awareness of relevant approvals, licences and permits and their conditions and requirements
Superintendants and Supervisors	▪ Awareness of relevant approvals, licences and permits and their conditions and requirements. ▪ Ensure clearing areas are surveyed and suitably marked with flagging tape/pegs the area to be cleared, prior to commencement of clearing. ▪ Inspect clearing areas before and after clearing and notify environmental personnel of any breeches. ▪ Communicate this WI to Project Personnel and Contractors.
Project Personnel and Contractors	▪ Comply with this WI. ▪ Minimise the disturbance of vegetation. ▪ Follow instructions from Superintendants and Supervisors.

4. PERFORMANCE INDICATORS

For Mining Activities:

- Site Clearing Activity Permits completed and signed for all clearing activities;
- Compliance with clearing approval limits and conditions;
- Minimise vegetation disturbance where reasonably practicable;
- Cleared vegetation and topsoil placed in separate stockpiles (where possible) for rehabilitation and protected from potential contamination; and
- Records of clearing updated monthly (survey).

For exploration activities:

- Clearing is in accordance with PoW or Mining Proposal approval;
- Site Clearing Activity Permits completed and signed for all clearing activities;
- Minimise vegetation disturbance where reasonably practicable;
- Records of clearing updated monthly (survey).

5. LEGISLATION, REGULATIONS AND STANDARDS

- Environmental Protection Act, 1986
- Environmental Protection (Clearing of Native Vegetation) Regulations, 2004
- Guidance for the Assessment of Environmental Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, Position Statement No. 51, EPA, 2004

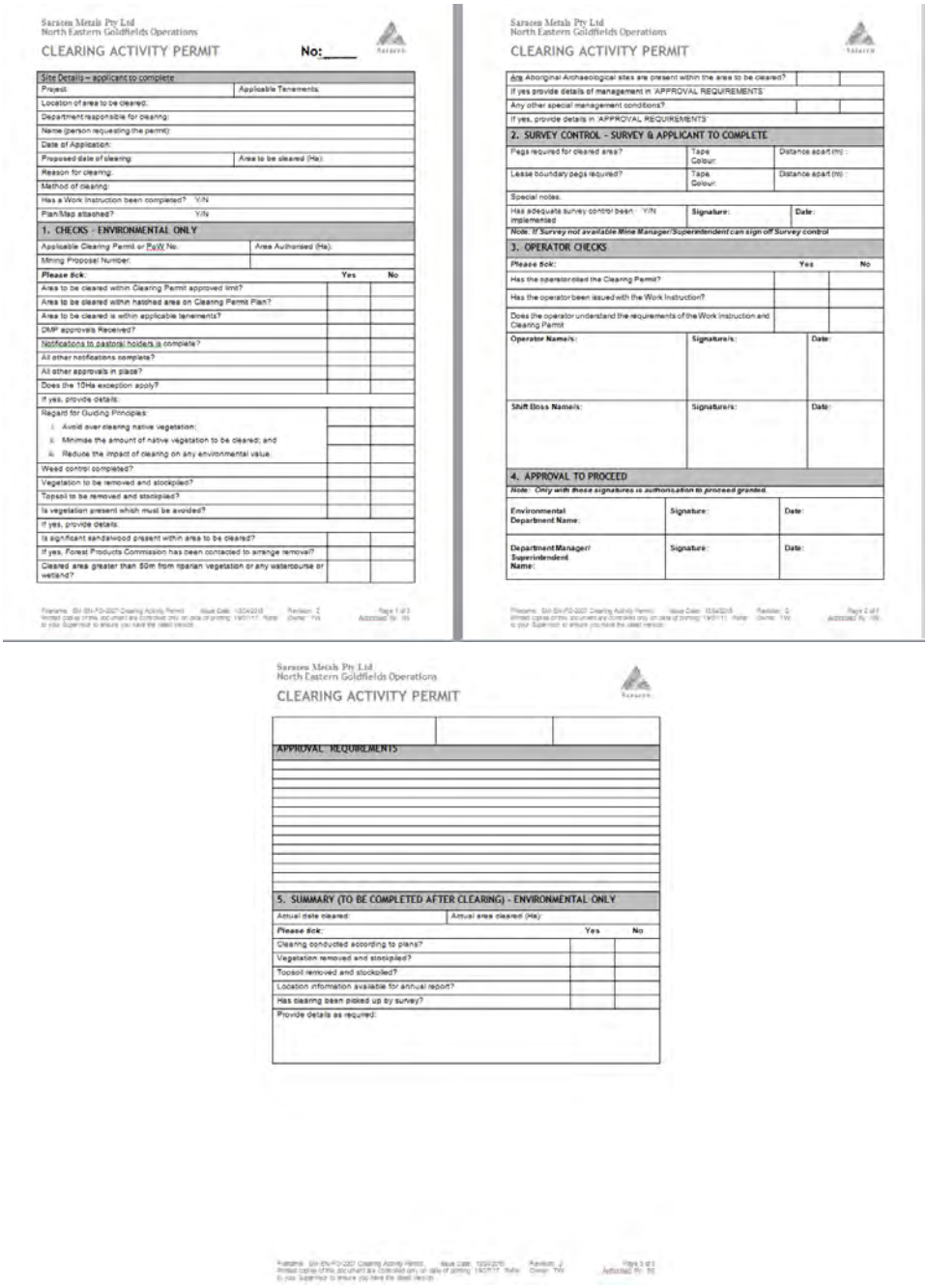
6. MANAGEMENT ACTIVITY

6.1 Approvals Required

Clearing of Native Vegetation in Western Australia is regulated under the *Environmental Protection Act 1986* and *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. The Department of Regulation (DER) has delegated authority to the Department of Mines and Petroleum (DMP) to approve clearing activities on Mining Tenements. All clearing (mining or exploration) on Northern Star tenements must be approved by the DMP via a Mining Proposal or Programme of Work (PoW).

In addition, Northern Star has an internal Clearing Activity Permit (SG-EN-FO-2001) that must be completed and approved prior to any clearing commencing (Figure 1). This form ensures the appropriate approvals are

in place prior to clearing and allows the Environment Department to track clearing as required under Northern Star's statutory obligations.



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North Eastern Goldfields Operations

CLEARING ACTIVITY PERMIT No:____

Site Details – applicant to complete:	
Project:	Applicable Tenements:
Location of area to be cleared:	
Department responsible for clearing:	
Name (person requesting the permit):	
Date of Application:	
Proposed date of clearing:	Area to be cleared (Ha):
Reason for clearing:	
Method of clearing:	
Has a Work Instruction been completed? Y/N	
Plan/Map attached? Y/N	

1. CHECKS - ENVIRONMENTAL ONLY		
Applicable Clearing Permit or PoW No:	Area Authorised (Ha):	
Mining Proposal Number:		
Please tick:	**Yes**	**No**
Area to be cleared within Clearing Permit approved limit?		
Area to be cleared within hatched area on Clearing Permit Plan?		
Area to be cleared is within applicable tenements?		
DMP approvals Received?		
Notifications to pastoral holders is complete?		
All other notifications complete?		
All other approvals in place?		
Does the 10Ha exception apply?		
If yes, provide details:		
Regard for Guiding Principles:		
i. Avoid over clearing native vegetation;		
ii. Minimise the amount of native vegetation to be cleared; and		
iii. Reduce the impact of clearing on any environmental value.		
Weed control completed?		
Vegetation to be removed and stockpiled?		
Topsoil to be removed and stockpiled?		
Is vegetation present which must be avoided?		
If yes, provide details:		
Is significant sandalwood present within area to be cleared?		
If yes, Forest Products Commission has been contacted to arrange removal?		
Cleared area greater than 50m from riparian vegetation or any watercourse or wetland?		

Saracen Metals Pty Ltd
North Eastern Goldfields Operations

CLEARING ACTIVITY PERMIT

Are Aboriginal Archaeological sites are present within the area to be cleared?		
If yes provide details of management in 'APPROVAL REQUIREMENTS'		
Any other special management conditions?		
If yes, provide details in 'APPROVAL REQUIREMENTS'		

2. SURVEY CONTROL - SURVEY & APPLICANT TO COMPLETE		
Pegs required for cleared area?	Tape Colour:	Distance apart (m) :
Lease boundary pegs required?	Tape Colour:	Distance apart (m) :
Special notes:		
Has adequate survey control been implemented Y/N	Signature:	Date:

Note: If Survey not available Mine Manager/Superintendent can sign off Survey control

3. OPERATOR CHECKS			
Please tick:		Yes	No
Has the operator read the Clearing Permit?			
Has the operator been issued with the Work Instruction?			
Does the operator understand the requirements of the Work Instruction and Clearing Permit			
Operator Name/s:	**Signature/s:**	**Date:**	
Shift Boss Name/s:	**Signature/s:**	**Date:**	

4. APPROVAL TO PROCEED		
Note: Only with these signatures is authorisation to proceed granted.		
Environmental Department Name:	**Signature:**	**Date:**
Department Manager/ Superintendent Name:	**Signature:**	**Date:**

Saracen Metals Pty Ltd
North Eastern Goldfields Operations

CLEARING ACTIVITY PERMIT

APPROVAL REQUIREMENTS

5. SUMMARY (TO BE COMPLETED AFTER CLEARING) - ENVIRONMENTAL ONLY		
Actual date cleared:	Actual area cleared (Ha):	
Please tick:	Yes	No
Clearing conducted according to plans?		
Vegetation removed and stockpiled?		
Topsoil removed and stockpiled?		
Location information available for annual report?		
Has clearing been picked up by survey?		
Provide details as required:		

Figure 1 SGM Clearing Activity Permit

6.2 Site Requirements – Prior to Clearing

All personnel are to complete the Site Environmental Induction (specific to each area such as Carosue Dam and Thunderbox). Minimising disturbance of vegetation will be emphasised in the Environmental Induction, including the requirement for all vehicles and machinery to use designated tracks and roads, park only in designated locations and prevent the spread of weeds.

On completion of the Environmental Induction presentation, the Environmental Induction Questionnaire (SG-EN-TR-2152 Environmental Induction Questions and SM-EN-TR-2135 Environmental Induction Questions) will be completed by all personnel to ensure that they have an understanding of environmental requirements whilst working for or on behalf of Northern Star.

Prior to commencing any clearing activity, a Northern Star Clearing Activity Permit (SG-EN-FO-2007 Clearing Activity Permit and SM-EN-FO-2007 Clearing Activity Permit) needs to be reviewed, approved and signed by the Environmental Department. Clearing cannot commence without this permit. The permit details key job specifics including clearing management controls (flagging tape), approved area and respective notifications (DMP/pastoral). The operator must first liaise with either the SGM environmental coordinator/officer regarding the task specifics.

6.3 Clearing for Exploration activity (away from mine sites)

Clearing must be conducted in accordance with the Guideline for Mineral Exploration / Rehabilitation Activities (2007) available on the DMP website, unless otherwise approved under the PoW.

Prior to commencing any clearing activity, a Northern Star Clearing Activity Permit (SG-EN-FO-2007 Clearing Activity Permit and SM-EN-FO-2007 Clearing Activity Permit) needs to be reviewed, approved and signed by the Environmental Department. Clearing cannot commence without this permit. The permit details key job specifics including clearing management controls (flagging tape), approved area and respective notifications (DMP/pastoral). The operator must first liaise with either the SGM environmental coordinator/officer regarding the task specifics. Clearing should only be undertaken by suitably trained staff or approved contractors. All contractors must be adequately supervised to ensure site policy and procedures are adhered to.

6.4 Records and Reporting

The Environmental Department maintains an electronic database of clearing approvals and site Clearing Activity Permits, as well as a digital database of spatial data relating to clearing (in Arc GIS). All clearing is reported in the monthly report. The Survey Department are responsible for picking up cleared areas on a monthly basis, which are then sent to all site Environmental Department staff at the end of the month. Records of clearing are then saved on the environmental drive, located at:

X:\04_Environmental\GIS\Disturbance Database\Monthly Clearing Pickups from Survey

Clearing data will be included in the Annual Environmental Reports required under Northern Star's approvals to operate.

6.5 Unauthorised Clearing

Unauthorised clearing works fall under the following categories:

- Clearing of native vegetation or rehabilitated areas without Part V approval;
- Clearing of native vegetation or rehabilitated areas with a SGM Clearing Activity Permit;
- Clearing outside of the approved boundary;
- Clearing conducted by a person deemed to be not competent or inducted; and
- Clearing or disturbance to known heritage sites/artefacts.

In the event of any unauthorised clearing or clearing conducted inappropriately resulting in a breach of Northern Star procedures, an Incident Report shall be completed and thorough investigation completed to address the root cause. Penalties for breaches of this procedure will be negotiated between the General Manager- Operations and the Environmental Manager. Should clearing be outside an approved area or amount, the DMP will be notified at the discretion of the Environmental Manager. Advice on remediation procedures will be obtained from the relevant authorities if required.

7. RELATED DOCUMENTS

Document Name	Document Number
Clearing Activity Permit	
Topsoil Management Work Instruction	
Biodiversity Environmental Management Plan	
Weed and Feral Animal Control Work Instruction	
Weed Hygiene Certificate	

1. PURPOSE

To minimise the impact of weeds and feral animals on the natural environment located within and surrounding Northern Star Tenements.

This work instruction covers the management of weeds and feral animals on all tenements owned by Northern Star.

2. LEGISLATION AND REGULATIONS

- Biodiversity Conservation Act 2016
- Environmental Protection Act 1986
- Commonwealth Environment Protection and Biodiversity Conservation Act 1999
- Mining Act 1978 (applicable to weed management)
- Conservation and Land Management Act 1984
- Animal Welfare Act 2002

3. DEFINITIONS AND ACRONYMS

Weed	Environmental weeds are non-indigenous or non-locally occurring plants that invade native ecosystems and adversely affect the survival of indigenous flora and fauna.
Feral Animal	An introduced fauna species which poses a threat to native flora and fauna.

4. SAFETY REQUIREMENTS

Care must be taken when working with feral animals and chemicals/herbicides. At no time should Northern Star personnel put themselves at risk of direct contact with feral animals and chemicals. Appropriate risk management tools must be utilised before conducting works involving feral animals and chemical handling. These include:

- Northern Star Smart Start cards and/or Risk Assessments;
- Material Safety Data Sheets (MSDS) requirements are to be adhered to in relation to the storage, handling and disposal of chemicals and
- Appropriate personal protective equipment (PPE), shall be worn at all times in accordance with those identified in the aforementioned tools.

5. PERFORMANCE INDICATORS

- Current weed populations are maintained and any new outbreaks are managed promptly and appropriately.
- All machinery will utilize a designated washdown facility.
- New machinery to site will be inspected, a weed and seed inspection. Machinery expected to be clean before arriving onto Northern Star tenements.
- Any machinery completing earthworks in a weed infested area should be brushed down in-situ before moving to washdown facility.
- Feral animals are kept under control, with no new sightings on completion of management activities.

6. MANAGEMENT ACTIVITY

6.1 Monitoring Schedule – Feral Animals

Feral animal sightings are to be reported to the Environmental Department. The trapping of feral cats and foxes should be undertaken on a campaign basis when sightings have been confirmed by the Environmental Department. Contact may be made, as required, with relevant landowners to gauge the extent of feral animal populations and whether trapping is required in regional areas.

6.2 Monitoring Schedule - Weeds

Weed infestations are to be reported as hazards through the Northern Star site incident reporting system. Actions are to be sent out on INX to ensure controls are followed up. The Environmental Department are responsible for controlling introduced weed species on Northern Star tenements. Weed checks are included whilst conducting monthly inspections (SG-EN-FO-2126 Environmental Workplace Inspection) throughout the different work areas. Weed maps to be updated annually to ensure any new areas or spread has been highlighted. Weeds are also to be a part of the scope of annual waste dump monitoring conducted by a qualified consultant.

6.3 Control Methods – Feral Animals

6.3.1 Cats and Foxes

As a response to reported sightings and general feral animal control, site based environmental personnel are responsible for setting traps and euthanasia. Routine trapping events are to be scheduled for the late afternoon/early evening. Locations for trapping are to be identified using information from environmental hazard reports and reported sightings. Landfill areas and camps are also to be targeted on occasions, as these areas are likely to attract these animals due to possible food sources.

To set cage traps, follow the steps below:

- Cable tie a piece of raw fish or raw chicken to the base of the trap near the back of the cage, behind the foot trigger plate. Do not allow the bait to touch the sides of the cage.
- Place the cage on flat ground, in a position that is hidden from general view (if possible). Try to block the sides, roof, base and rear of the cage with rocks or other materials so that animals cannot access these areas and bump the cage (which could set the trigger off).
- Set the cage by opening the front door latch, then carefully adjusting the trigger latch so that any weight on the foot trigger pedal will cause the latch to be pulled back, thus allowing the door to close and lock (Figure 1).

Figure 1- Cat trap in set position

- The cage is to be left overnight.
- Return to each cage location as soon as possible the following morning (before 7am). If the cage is empty, remove and dispose of the bait into a general waste bin and close the cage to prevent native fauna access. Do not re-set the cage until the following afternoon/early evening.
- In the event a feral cat or fox has been trapped, place riggers gloves on and carefully pick up the cage by the ready made handle on the top (which is fitted with a guard to prevent animals scratching through the mesh). Ensure the cage is held firmly as the animal may run from side to side in the cage making it hard to hold.
- To calm the animal down and avoid the animal from trying to escape in transit, cover the cage with a towel or large rag. A cable tie may be used to lock the cage front door shut in the event the locking pin accidentally pops open. Place the cage securely in the tray of a utility light vehicle. Continue to check remaining traps.
- Once all cages have been checked, keep animals covered and set up the Euthanasia chamber inside the sea container.
- Place absorbent matting in the bottom of the red bin (gas chamber). This will absorb any urine.

- Inspect hoses to ensure integrity is intact.
- Hook up the CO2 inlet, let the gas run for approximately 5 minutes.
- Place one cage at a time (with the trapped animal inside) into the red wheelie bin located in the Environmental Sea Container (Figure 2).

Figure 2 - Euthanasia gas chamber

- Close the lid of the wheelie bin and place a weight on top of the lid (something >10kg).
- Exit the sea container once the lid is secure.
- After five to 10 minutes, return to the bin and listen for noise. If any noises from the animal can be heard, leave the gas on and allow it to run for a further 5 minutes.
- If nothing can be heard, then turn the gas off and open the lid of the bin. Inspect the animal for any signs of life. If none, remove the cage from the bin.
- Shake the dead animal from the cage into a green drill bag.
- If any signs of life are seen, repeat the euthanizing process until the animal has expired.
- Once all animals have been euthanized, drive the light vehicle to the putrescible landfill trench and dispose of the animal.
- If any signs of life are seen, repeat the euthanizing process until the animal has expired.
- Wash down the cage to remove any scent of the cat/fox.
- Wash your hands thoroughly with disinfectant or soap after handling the cage or dead animal(s). If scratched or bitten, see the Site Paramedic as soon as possible to report and have the wound cleaned and treated.
- Enter the number of animals trapped, location and action taken into the Weed and Feral Animal Control Register (SG-EN-REG-2010 Weed and Feral Animal Control Register).

6.3.2 Goats

Carosue Dam operations overlap with a number of pastoral stations. Gindalbie, Pinjin and Edjudina are all the Pastoral leases shared with Carosue Dam. Management of feral goats on Northern Star tenements must be conducted with the permission and mutual agreement of these stations. Approval from the General Manager-Operations is required before approaching associated pastoralists. A plan and including a risk assessment for management of feral goats must be developed via direct consultation with the pastoralist.

6.4 Control Methods – Weeds

6.4.1 Declared Weeds

Known infestations of declared weeds are to be assessed to determine the most efficient and cost effective means of control. In most cases, application of a herbicide, such as glyphosate and water, will be the preferred option. Depending on the size and distribution of the weed infestation, follow up applications/treatments will likely be required each season to ensure sufficient control and ultimate eradication.

There is a backpack sprayer in the environmental storage sea container (Figure 3) which can be used to apply the herbicide; this is to be used in line with the manufacturers' instructions and safety requirements of the SDS. Care is to be taken when spraying and risks are to be managed through a risk assessment prior to commencing. Notable hazards and other considerations include, but are not limited to:

- Heat/Environmental conditions for hydration;
- Ground conditions;
- PPE;
- Impending weather, wind speed and direction;
- Exposure to chemicals;
- Application method and frequency of application (i.e. seasonal);
- Access to locations; and
- Emergency preparedness in remote areas.

Figure 3 - Backpack sprayer

7. RELATED DOCUMENTS

Document Name	Document Number
Biodiversity Management Plan	
Weed and Feral Animal Control Register	

1. PURPOSE

To ensure that the following is adhered to during construction and operation of haul roads associated with Northern Star Operations:

- Disturbance to vegetation is minimised;
- Native fauna habitat is protected;
- The surrounding soil and water is not contaminated by saline water, hydrocarbons or other chemicals;
- Sites of cultural or natural heritage significance are protected;
- Visual impact is minimised;
- Disturbance to natural drainage is minimised;
- The spread of weeds is prevented; and
- Topsoil and vegetation are removed and managed correctly for respreading during rehabilitation of the road.

2. SCOPE

3. ROLES AND RESPONSIBILITIES

Role	Key Responsibilities
Environmental Personnel	▪ Communicate requirements of this WI to Managers, Superintendents and Supervisors, Project Personnel and Contractors. ▪ Communicate requirements of all relevant approvals including Mining Proposal Commitments, Clearing Permits, Works Approvals and Licences to Mangers, Superintendants and Supervisors. ▪ Conduct routine inspections during construction and operation. ▪ Conduct rehabilitation monitoring and data recording.
Operations Manager	▪ To ensure this WI is implemented on site.
Managers	▪ Ensure the requirements of this plan are implemented. ▪ Communicate requirements of this WI to Superintendents and Supervisors, Project Personnel and Contractors. ▪ Be aware of the requirements of all relevant approvals including Mining Proposal Commitments, Clearing Permits, Works Approvals and Licences.
Superintendants and Supervisors	▪ Ensure the requirements of this plan are implemented. ▪ Communicate this WI to Project Personnel and Contractors. ▪ Be aware of the requirements of all relevant approvals including Mining Proposal Commitments, Clearing Permits, Works Approvals and Licences. ▪ Ensure that mandatory inspections and monitoring is completed and forwarded to Environmental Personnel. ▪ Ensure haul road infrastructure is maintained.
Project Personnel and Contractors	▪ Comply with this WI. ▪ Follow instructions from Superintendants and Supervisors. ▪ Assist with inspections. ▪ Report damaged bunds, pipeline leaks. hydrocarbon spills or potentially damaging practices. ▪ Maintain road infrastructure.

4. PERFORMANCE INDICATORS

- Clearing completed in accordance with the SG-EN-WI-2005 Clearing Management Work Instruction.
- Clearing completed in accordance with the SG-EN-WI-2007 Topsoil Management Work Instruction;
- Clearing completed in accordance with the SG-EN-WI-2003 Weed and Feral Animal Control Work Instruction;
- Gates or livestock grids installed where required;
- Borrow pits not visible from the road;
- No visible silting of areas outside haul road;
- Spoon drains, bunds and sumps contain saline water runoff;
- Natural surface drainage flows through the haul road areas maintained;
- Appropriate signage in place at intersections with public roads;
- Gravel pits progressively rehabilitated;
- Performance of ore haulage contractor (number of incidents);

5. MANAGEMENT ACTIVITY

5.1 Planning

All haul road routes will be selected after consultation with relevant pastoral leaseholders, stakeholders and the Environmental Department to avoid Environmental Sensitive Areas (ESAs), Aboriginal archaeological and ethnographic sites and to minimise drainage disturbance, route length and clearing. Existing fence lines and tracks will be utilised where reasonably practicable.

Where ESAs, Threatened and Priority Ecological Communities (TECs and PECs) and Heritage Sites cannot be avoided then the appropriate approvals shall be obtained. Refer to the Environmental Legal Register and the Environmental Department to determine the relevant approval.

Environmental performance and systems will be considered prior to selecting the road construction contractor. Relevant information will be provided to the contractor prior to commencement.

5.2 Construction

Clearing shall be conducted as described in the Clearing Management Work Instruction (SG-EN-WI-2005).

The Weed and Feral Animal Control Work (SG-EN-WI-2003) Instruction shall be implemented prior to clearing. Road construction material will not be sourced from weed infested areas.

Should any Aboriginal archaeological sites be discovered during construction, work shall cease immediately and the site reported to the Environmental Department who will then notify the Department of Aboriginal Affairs (DAA).

Clearing for the Haul Road will be minimised where practicable, with the final road width about 20m (and a running width of 10m). Construction material will be sourced from designated locations and gravel sourced from borrow pits along the route. Existing material will be used where available.

Haul roads will be constructed using competent material in a manner that maintains natural surface flows and to minimise disturbance to the natural drainage,. Low-profile floodways will be installed where the road crosses significant drainage lines to minimise impacts on creeks and surface water through flow.

No windrows or mounds of soils will remain where the haul road crosses broad drainage lines.

Spoon drains, bunds and collection sumps will be installed to contain saline water runoff used for dust suppression. Adequate drainage mechanisms will be installed to minimise erosion and generation of sediment.

Should the road intersect an existing fence, a gate or livestock grid is to be installed.

During construction, vehicle and machinery movements will be restricted outside of the delineated envelope of disturbance. Information will be provided to all personnel and contractors during the environmental induction.

Roads will be constructed to ensure all traffic will give way to vehicles on public roads.

5.3 Borrow Pits

Borrow pits for road base will be located so as to reduce visibility from the road, with a single access track. If necessary, a dogleg or zigzag will be introduced into the entry track so a there is no direct line of sight line from the road to the borrow pit.

Not Recommended Recommended

Prior to the removal of gravel, topsoil will be removed and stored for future rehabilitation. A layer of gravel at least 15cm in depth will be retained in the gravel pit to provide permeable subsoil for rehabilitation.

5.4 Rehabilitation

All areas disturbed during construction are to be rehabilitated as soon as practical. All temporarily disturbed areas and all materials and waste will be removed.

Gravel pits will be rehabilitated as soon as possible, with the excavation shaped (walls battered 17°), stored topsoil spread to an optimum depth of 100mm and the area scarified to create conditions which will enhance the establishment of self sustaining native vegetation. Other disturbed areas will be scarified and stored cleared vegetation material will be respread where available.

Gravel pits will be monitored annually until rehabilitation is established and acceptable to the DMP. Rehabilitation photographic monitoring will be recorded on the Rehab Data Sheets and stored under Records within the EMS.

Rehabilitation of haul roads at completion of operations is to be completed in line with the applicable Mining Proposal and Closure Plan Commitments.

5.5 Ore Haulage

Environmental performance and systems will be considered prior to selecting the ore haulage contractor. These will include adequate systems and storage facilities and equipment maintenance regimes to prevent hydrocarbon leaks.

All leaks and unplanned discharges shall be reported as an Environmental Incident.

Runoff from the roads will be directed to table drains or sumps designed to trap saline runoff for low to moderate rain events. These sumps will be designed to overflow during significant rainfall events to take advantage of dilution effects due to large volumes of water.

The road shall be maintained to ensure that it is safe for the purpose that it is constructed. This will mean that following rainfall the Haul Road access may be subject to closure conditions.

Active operational areas within the Carosue Project Area will be clearly sign posted to provide a warning the public.

6. RELATED DOCUMENTS

Document Name	Document Number
Clearing Activity Permit	
Clearing Management Work Instruction	
Topsoil Management Work Instruction	
Weed and Feral Animal Control Work Instruction	
Weed Hygiene Certificate	
Licence Register	

1. PURPOSE

To minimise disturbance or damage to the biodiversity of the land on which Northern Star operate by minimising the impacts on the flora, fauna and the soil that supports biodiversity through operating and in environmentally responsible manner.

This is achieved by:

- Conduct surveys where required to understand the local flora, fauna and soil;
- Identify, monitor and minimise impact on rare or endangered flora and fauna;
- Minimise clearing of flora and fauna habitat to that absolutely necessary for mine development;
- Minimised the introduction and spread of weeds and feral animals;
- Ensure our operation do not pose an threat to fauna;
- Manage clearing and topsoil storage in a manner that preserves soil structure and function as much as possible; and
- Rehabilitate areas with topsoil, local flora and encourage fauna recolonization.

2. SCOPE

3. REGULATORY FRAMEWORK

In the state of Western Australia in which the Northern Star's current operations are located the primary legislation for the protection of biodiversity is the Environmental Protection Act 1986 and Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Which required Northern Star to obtain and abide by the conditions of a Native Vegetation Clearing Permit for all clearing not prescribed under Section 51C Environmental Protection Act.

The EPA under part 4 of the Environmental Protection Act have a set of technical guidance statements for Flora and Fauna studies which set the standard for Flora and Fauna surveys required to be conducted by Northern Star in order to gain approval for mining under Mining and Environmental Protection Acts.

Rare and Endangered Flora and Fauna are also protected under the federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Topsoil is not managed under any particular act however DMP Guidelines for Programmes of Work (PoW's), Mining Proposals (MP's), Annual Environmental Reports (AER's) and Mine Closure Plans (MCP's) under the Mining Act 1978 have requirements regarding the characterisation of topsoils, removal and storage of topsoil during clearing for use in post mining rehabilitation, recording the qualities of topsoil available for rehabilitation and use of topsoil in rehabilitation of post mining landscapes. These requirements must be addressed in POW and MP applications, AER's and MCP's submission for each of Northern Star sites in order to gain approval and maintain ongoing compliance under the Mining Act 1978.

4. ASSESSMENT OF RISK

A risk assessment has been conducted.

RISK ASSESSMENT												
					RISK REDUCTION INPLACE				Required Further Actions		
		Current Risk				Tolerable Risk					
		(5) Catastrophic	(A) Almost Certain	RISK SCORE		(5) Catastrophic	(A) Almost Certain	RISK SCORE			
		(4) Major	(B) Likely	Extreme	Extreme	(4) Major	(B) Likely	Extreme			
		(3) Moderate	(C) Possible	High	High	(3) Moderate	(C) Possible	High			
		(2) Minor	(D) Unlikely	Medium	Medium	(2) Minor	(D) Unlikely	Medium			
		(1) Insignificant	(E) Rare	Low	Low	(1) Insignificant	(E) Rare	Low			
Requirement	Unwanted Event	Consequence	Likelihood	Current Risk	Action to mitigate 'Extreme' or 'High' Current Risk Score	Consequence	Likelihood	Residual Risk	Actions Required	Assigned to	Date
Flora Fauna and Clearing											
Environmental Protection Act 1986, Division 2 Section 51, Schedule 5 & 6	Non Compliance	(3) Moderate	(A) Almost Certain	Extreme	Biodiversity EMP Compliance EMP Flora & Fauna Surveys, Topsoil characterisation studies Clearing Permits and applications and conditions Clearing Management Work instruction, Clearing Activity Permit	(3) Moderate	(D) Unlikely	Medium			
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Non Compliance	(3) Moderate	(A) Almost Certain	Extreme		(3) Moderate	(D) Unlikely	Medium			
DMP - 10 Ha Exemption (if approved under the Mining Act)	Non Compliance	(3) Moderate	(A) Almost Certain	Extreme	Mining Proposal Commitments Clearing Management Work instruction, Clearing Activity Permit	(3) Moderate	(D) Unlikely	Medium			
Clearing permits	Non Compliance	(3) Moderate	(B) Likely	High	Compliance EMP Clearing Permits and applications and conditions Clearing Management Work instruction, Clearing Activity Permit	(3) Moderate	(D) Unlikely	Medium			
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (managed under bilateral Agreement with WA Department of Environment and Conservation)	Reporting Threatened Species (i.e Mallee Fowl mounds)	(3) Moderate	(A) Almost Certain	Extreme	SGC-EN-PL-2020 Compliance EMP Referral of Proposed Action to EPBC SM/SG-EN-WI -2005 Clearing Management Work instruction, SM/SG-EN-FM-Clearing Activity Permit	(3) Moderate	(D) Unlikely	Medium			
Weeds											

Biosecurity and Agriculture Management Act 2007 & Regulations (Declared and Prohibited Species) Pinjin: Bathurst burr (Xanthium spinosum) Tarmoola: Coral Cactus (Cylindropuntia fulgida var. mamillata)	Non Compliance	(2) Minor	(E) Rare	Low	Liaison with Pastoralist - main responsibility for control	(2) Minor	(E) Rare	Low	nil		
Environmental Protection (Clearing of Native Vegetation) Regulations 2004 - Declared weeds required to be identified in Clearing permit Applications	Non Compliance	(2) Minor	(E) Rare	Low	Flora Surveys	(2) Minor	(E) Rare	Low	nil		
DMP - Rehabilitation outcomes - weeds inconsistent with ecological function outcomes	Non Compliance	(3) Moderate	(B) Likely	High	SM/SG-EN-WI-2172 Weed and Feral Animal Control Work Instruction Certificate	(3) Moderate	(C) Possible	High	Despite controls still have weeds on site - Weed Database and list, consider sponsoring research into Ruby Doc naturalisation		
Feral Animals											
Dog Act 1976 Section 32 (2) owner or occupier of land may lawfully shoot dogs to											
Topsoil											
Programme of Work, Mining Proposal, Annual Environmental Report and Closure Plan Requirement	Non-Compliance	(4) Major	(B) Likely	Extreme	SGC-EN-PL-2010 Biodiversity EMP SGC-EN-PL-2020 Compliance EMP SG/SM-EN-PL-2008 Topsoil Work Instruction	(3) Moderate	(C) Possible	High			

5. MANAGEMENT ACTIVITY

5.1 Pre-Mining

Pre mining activities are the responsibility of the Environmental Department within put from Managers, Supervisors and staff involved in planning operation for input into mine plans.

Project Scoping (Project Scoping Work Instruction) should be carried out at the earliest stages of a project to determine if Flora, Fauna and Topsoil characterisation surveys exist and meet the standard required approvals, if they do not exist or do not meet standard, new surveys will be required to be conducted in accordance with EPA (Flora and Fauna) and DMP (Topsoil characterisation) Guidelines.

If Declared Rare (DRF) and priority Flora or Fauna are identified during Surveys or from previous reports mine plans may need to be modified to avoid or minimise impacts on the DRF or priority species and or approvals sought destroy (i.e. Mallee fowl nests).

Appropriate statutory and internal approvals to clear native vegetation should be applied for and granted prior to any disturbance to native vegetation or fauna habitat.

Topsoil characterisation result need to be considered when planning proposed clearing, storage and rehabilitation of areas to ensure topsoil is suitable for rehabilitation purposes and is removed, stored and managed in a manner that preserved soil heath for future rehabilitation, commitment in regard to Topsoil management are required to be included in POW and Mining Proposal applications (Compliance EMP).

Note Flora, Fauna and topsoil characterisation studies may be under taken at the Exploration stage of a project if the exploration takes place in an areas of know DRF or Priority flora or the exploration project develops to resource definition stage requiring a high level of disturbance

5.2 Mining

Once all Environmental Approvals are in place (Project Approvals Work Instruction), mining activities can commence in accordance with the requirements of the EMS. It is the responsibility of the Environmental Department, General Manager and all Department Managers, Supervisors and staff involved to ensure the requirements of the EMs are compiled. In accordance with Northern Star's Environmental Policy all staff and contractors need to be aware of their environmental responsibilities. The areas below relate specifically to the management and protection of biodiversity.

5.2.1 Clearing

All clearing (including exploration clearing) is to be conducted under a internal Clearing Activity Permit (Clearing Activity Permit) that must be completed and approved prior to any clearing commencing. This form ensures the appropriate approvals are in place prior to clearing and allows the Environment Department to track clearing as required under Northern Star statutory obligations. Further details on this form and the requirements of conducting clearing on Northern Star group tenements can be found in the Clearing Management Work Instruction. It is the responsibility of the Department initiation the clearing to ensure a Clearing Activity Permit has been granted prior to any clearing taking place.

The Weed and Feral Animal Control Work Instruction is to be implemented prior to clearing.

5.2.2 Topsoil Management

Topsoil removal and management will be undertaken in accordance with the Topsoil Management Work Instruction and Mining Proposal Commitments.

5.2.3 Flora

The clearing of Flora for project development including the death or destruction of flora though contamination with saline water or other mining related activities will be minimised to that absolutely necessary for the safe operation of mining activities and will be conducted in accordance with the Clearing Management Work Instruction and internal Clearing Activity Permit system.

The presence of rare and priority flora will be assessed prior to vegetation clearing. Information about Declared Rare (DRF) and priority flora will be provided to all personnel and contractors during the General Environmental Induction.

Exploration drillholes or access tracks are to avoid areas of Declared Rare Flora (DRF) and priority flora.

Habitat trees will be avoided where possible and marked for retention prior to clearing.

5.2.4 Fauna

No pets or firearms are permitted on any Northern Star tenement.

Information about threatened fauna, protecting local fauna and feral animals in the project area will be provided to all personnel and contractors during the environmental induction. Information can also be found in the Weed and Feral Animal Control Work Instruction. A register of feral Animals and their locations is kept in the Weed and Feral Animal Control Register.

5.2.5 Weeds

Vehicle access will be restricted to clearly defined roads and tracks to prevent disturbance to vegetated areas and fauna habitat. Details of restricted areas will provided to all personnel during inductions. Information can also be found in the Weed and Feral Animal Control Work Instruction. A register of Weeds and their locations is kept in the Weed and Feral Animal Control Register.

Any machinery brought to Northern Star sites must also be inspected and Weed Hygiene Certificate issues before it is allowed to commence work on site

6. RELATED DOCUMENTS

Document Name	Document Number
Environmental Policy	
Environmental Management System (EMS) Framework	
Environmental Training Needs Analysis	
Environmental Training Records (STEMS)	
Biodiversity EMP	
Land Disturbance Environmental Managements Standard	
Clearing Management Work Instruction	
Clearing Activity Permit	
Clearing Activity Permit Register	
Clearing Awareness Presentation	
Weed and Feral Animal Control Work Instruction	
Weed Hygiene Certificate	
Weed and Feral Animal Control Register	
Topsoil Management Work Instruction	
Fauna Presentation - Snakes	
Compliance EMP	
Exploration EMP	

Contents

1. PURPOSE

The safe operation of equipment at Carosue Dam operations is to be achieved by compliance with this traffic management plan. This plan defines the classification for each type of road with minimum requirements for equipment, operation and competence for drivers/ operators. Traffic management at Carosue Dam is achieved through adequate signage, speed limits, operational and maintenance requirements in line with information, instruction and training.

2. SCOPE

This traffic management plan applies to all Carosue Dam personnel, contractors and sub-contractors who are required to use road / haulage ways to access areas within the mining operation with the appropriate induction and competencies required.

3. ROLES AND RESPONSIBILITIES

Role	Key Responsibilities
Site Senior Executive	Has ultimate responsibility for the implementation of the Traffic Management Plan, and must ensure that any material changes in road traffic management at Carouse Dam Operations are reflected in this document, and communicated to the workforce.

4. DEFINITIONS AND ACRONYMS

Auxiliary Vehicles	Graders, Dozers, Loaders, Boggers, Jumbos, Excavators and Tracked Drill rigs.
Bus	Any vehicle which is designed to carry 13 or more passengers
Heavy Vehicles	Including but not limited to; Haul trucks, Water Tucks, Rigid Trucks, Floats, Road trains, and buses.
Infrastructure Roads	Roadways connecting work areas or structures such as workshops, processing plants, and administration buildings
Light Vehicles	All vehicles under 4.5T GVM not included as Heavy or Auxiliary vehicles
Mine Haul Roads	A road on which haul trucks travel to transport waste rock, or ore, inclusive of roads to tipping areas, stockpiles, and pit access roads.
Mining Equipment	All mobile equipment, including light vehicles that are used for the drilling, loading or haulage of material e.g. jumbo's, loaders, graders, trucks etc.
SSE	Site Senior Executive
Tracks/Other Roads	Narrow roads, used infrequently. Heavy equipment shall not be permitted access along tracks without the development of a JHA.
VOC	Verification of Competence

5. PRINCIPAL HAZARD STANDARD

Principal Hazard Standard: Vehicles and Driving sets out the minimum standards for operating vehicles at Carosue Dam. The Standard details the mandatory requirements relating to:

- Vehicle condition, maintenance, and inspections
- Competency of drivers
- Mandatory vehicle specifications
- General traffic rules including; the wearing of seatbelts, towing, and communicating with other operators.

6. TRAINING AND COMPETENCE

Equipment shall only be operated by persons who are trained and assessed as competent for that particular type and model, and who have received authorisation to operate in the area concerned.

All training will be conducted as per the requirements detailed in Training and Assessment Performance Standard.

7. TRAFFIC CHANGE MANAGEMENT

Changes to traffic flows, signage, speeds, or any other aspect of the operating environment that have a material effect on how vehicles are operated in the area, will be risk assessed and the changes shall be communicated to the affected personnel in a timely manner using a notification of traffic management form.

8. TRAFFIC CONTROL

8.1 Signage

All road traffic control devices should be installed and maintained in accordance with AS 1742.2:2009 - Manual of uniform traffic control devices.

Adherence to all traffic signs is mandatory.

8.2 Site Speed Limits

- Mine Haul roads: 90km/h or as signposted
- Mine Site Access roads: 90km/h or as signposted
- Pedestrian Areas (Administration, Workshop, Fuel Facility, Warehouse): 10km/h or as signposted
- Underground: 30km/h
- Camp access road speed varies as sign posted

Where adverse weather or road conditions exist, vehicle speed and driving behaviour should be moderated in order to ensure control is maintained over the vehicle.

8.3 50/20 Rule

A minimum distance of 50 metres must be maintained between vehicles.

If a person must move to within a 50m radius of an operating heavy machine (whether on foot or in a vehicle) they must make positive contact with the machine operator, via the two-way radio.

If a person is required to go within a 20 metre radius of an operating heavy machine (whether on foot or in a vehicle) they must notify the machine operator, via the two-way radio and gain a positive response.

The machine must be in parking mode with implements lowered before you can approach.

8.4 Horn Signals

The following horn signals are to be used for all heavy equipment;

- One blast – Engine starting
- Two Blasts – Moving forward
- Three Blasts – Reversing

After sounding the horn a delay of five seconds is to be observed before start up or movement.

8.5 Overtaking

No vehicle shall overtake working Heavy Vehicles without the driver first making positive radio contact and gaining permission. The driver of a vehicle may then overtake provided it is safe to do so and that:

- The speed limit is not exceeded
- There is sufficient visibility of the road ahead
- The vehicles are well clear of a road intersection
- The action does not endanger other road users
- Indicator lights are used, where fitted
- The manoeuvre is not conducted on a ramp

8.6 Escorting Vehicles

Oversize equipment (excluding water carts and graders) which impedes the flow of traffic due to physical size or speed must be escorted when travelling outside the operational mining area. Where any vehicle exceeds 4.5m in width one escort vehicle shall be used front and rear, unless the road has been specifically designed to accommodate the wider vehicle.

Escort vehicles must have an orange flashing beacon and wherever practicable radio contact with the vehicle being escorted (hazard lights are not considered flashing beacons). The driver of an escort vehicle must be site inducted or under the direction of a person who is.

Where escort vehicles are used they shall be at a distance to give other road users adequate warning of the hazard.

8.7 Breakdowns

Any vehicle that is broken down should be moved off the roadway, provided it can be done safely. Where equipment requires maintenance on the roadside flashing lights and/or cones shall be used to illuminate the equipment, and the wheels must be chocked. In addition the hazard should be communicated through the radio system to warn other road users.

No person can work where they are at risk of being hit by passing traffic unless a second person either slows passing traffic or acts as a spotter to warn the person conducting the maintenance.

9. PARKING AREAS

9.1 Light Vehicle Parking Areas

The following are minimum requirements for light vehicle parking areas;

- All parking areas shall be designed for drive through or reverse parking.
- Parking bays are to be provided with a back stop or v drain which will allow for safe pedestrian access behind the vehicle.
- Walkways will be provided and delineated to allow safe access to and egress from the car park.
- Parking areas shall be lit if used at night.

9.2 Heavy / Auxiliary Vehicle Parking Areas

Heavy / Auxiliary vehicle parking areas shall be designed in accordance with the following;

- All permanent parking areas should be constructed with a V-drain, back stop or similar.
- No light vehicles shall park in Heavy / Auxiliary vehicle parking areas.
- Safe pedestrian access must be provided with appropriate delineation and signage.
- Parking areas must be lit if used at night.

10. PEDESTRIANS, CYCLISTS AND MOTORCYCLES

Pedestrians are not permitted on or beside roads where heavy equipment is travelling, without a handheld radio and positive communication with operators in the area. Pedestrians shall not wear music earplugs or similar portable electronic devices when in operational areas.

Bicycles and Motorcycles are not permitted on roadways.

11. BUSES

11.1 Onsite Bus Driving Competency

Personnel driving buses on site are required to hold the appropriate heavy vehicle licence, i.e. Light Rigid (LR), Medium Rigid (MR), or Heavy Rigid (HR) according the vehicle class, and be deemed competent under the site VOC process.

11.2 Offsite Bus Driving Competency

To operate a bus offsite the driver must meet the requirements of 11.1 above, and have an 'F Extension' on the state driver's licence.

11.3 Bus Passengers

All persons must be seated and wearing seatbelts. Where buses do not have operational seat belts those seats will not be occupied and a plan must be developed outlining when the requirement for seat belts will be met.

Buses must only stop where passengers can disembark safely and where appropriate bus stops are designated.

The driver has the right to refuse any person to travel on the bus that may be impaired or pose a threat to safety of other passengers.

Where overhead racks are fitted on the bus a barrier must be installed behind the driver. Loose items, bags etc. are not to be stored in the isle.

12. AREA SPECIFIC TRAFFIC MANAGEMENT

12.1 Operational Surface Mining Areas

12.1.1 Ramps and Haul Roads

- Minimum 50m clearance is to be maintained in front of and behind haul trucks at all times.
- 'U' turns are not permitted on ramps.
- Under no circumstances are gears to be changed while travelling on a pit access ramp.
- Parking on sloping ground shall be carried out with the wheels facing into the wall or windrow to prevent uncontrolled roll-away.
- Drive to conditions –engage 4WD prior to entering the Pit Ramp
- All Personnel must tag on to the relevant section of the tag board prior to entering the Pit Ramp
- CALL UP POINT on VHF CH5 when entering the Pit Ramp
- CALL UP POINT on VHF CH5 above and below the switchback
- 30 km/hr speed limit from pit entrance down

12.1.2 Tipping and Stockpile Areas

Tipping areas and stockpiles shall be clearly delineated and be illuminated when in use at night.

Where there is a potential for the vehicle to drive/reverse over the tipping edge there shall be a system established which:

- Determines the safe tipping distance from the edge, and
- Provides a method to identify this point

Note: In complying with this provision a spotter alone is not a sufficient control.

12.1.3 ROM Pad

- The ROM pad shall be constructed with appropriate traffic controls.
- Loader operators shall monitor the designated radio channel for the ROM. Personnel wishing to enter the ROM areas including light vehicles, underground, and surface haulage shall call up the loader driver and state which ramp they are intending to use and their intended destination. The loader operator shall acknowledge the call and permit that person to proceed to their destination. The same rules are to be adhered to when departing the ROM.
- Underground trucks have right of way over surface road haulage vehicles when accessing from underground workings.

12.1.4 Wash Pad/Workshop

- 10 km/hr speed limit in the immediate workshop area and Go/No Go Lines
- 30 km/hr speed limit in all other areas around the workshop - Refer Figure 12
- Wash pad entry is one way only
- Light vehicles attending workshop for non-repair reasons are to park in the LV parking area

12.1.5 Laydown / Waste Dump

- Long Term laydown area (eastern) is part of exclusion zone. Authorised personnel only, and must tag on to tag board to enter this area
- Waste Dump, Laydown yards and access road north of waste dump access is a 30 km/hr zone
- South of Waste Dump access towards the magazine is a 50 km/hr zone
- Waste Dump access has right of way for access to and from the north. Vehicles travelling from the south on the magazine road must stop
- All Delivery Roadtrains going to Laydown Area to leave site via the Rom Pad

12.2 Underground Mining Areas

All personnel travelling within the confines of the Underground workings shall either be fully inducted and deemed competent or have completed a visitors induction and shall be escorted by a person deemed competent, the appropriate minimum PPE is to be worn at all times whilst in the vehicle/underground workings, no person/s shall enter the underground working or pit area (as appropriate) without first placing their identification tag the on the tag board known as 'Tagging on'.

Itinerants must first gain permission from the shift supervisor and stating their intentions to travel into the mine.

All personnel must announce their presence to other underground personnel and machinery within the underground workings using VHF radio on the underground site specific channels.

Whilst travelling underground personnel shall drive to the conditions. Vehicle will be fit for purpose whilst having selected low range 4 wheel drive with the hubs 'locked in' where applicable.

When exiting the underground workings personnel shall remove their tag from the tag board known as 'Tagging Off'.

General Underground traffic requirements:

- Light vehicles shall give way to all other traffic.
- Flashing lights must be left on at all times when the vehicle is left unattended underground.
- No person shall climb on or off moving equipment.
- No operator shall leave the controls unless implements are supported or on the ground.
- No piece of equipment shall be left running and unattended. Where applicable there may be an exception such as drills and charging vehicles but only when park brake has been applied and all jacks are down on the ground supporting the machinery.
- Where engine timers are used the equipment must be incapable of moving before the operator leaves the equipment.
- No person shall operate any equipment whilst using any type of electronic entertainment device that is inserted or attached directly to ears.
- Trucks are not to be loaded on slopes unless a JHA has been completed.
- Minimum of 50 metres travelling distance between vehicles.
- Where vehicles are required to pass on the decline, one vehicle must pull into a stockpile or level access to allow space for the other to pass.
- There shall be no parking parallel to the decline in level accesses or stockpiles.
- Where a 'bogging in progress' sign and red flashing light are displayed, no other vehicle or pedestrian access is permitted without first making positive communications with the loader operator on the level.
- Maximum Speed limits – Refer Figure 5. 30 km/hr on main access roads and 10km/hr on Fuel Bay road and parking areas around Tagboard
- Fuel Bay Road is two way
- HV Parking area is one Way
- Light Vehicle (LV) parking area is one Way traffic flow with central parking
- All Personnel must tag on to the Tag Board prior to entering the Pit Ramp or any exclusion area
- Fuel Delivery Roadtrains to enter through fuel bay road and exit through ROM Pad

13. EMERGENCY RESPONSE

In the event of a vehicle-related emergency, NSR emergency response processes shall be activated as outlined in *Emergency Management Plan*

14. RELATED DOCUMENTS

Document Name	Document Number
Principal Hazard Standard: Vehicles and Driving	
Training and Assessment Performance Standard	
Fitness for Work Performance Standard	
Emergency Management Plan	

15. REFERENCES

- AS 1742.2:2009 – Manual of uniform traffic control devices
- AS 1743:2001 – Road sign specifications

16. APPENDICES

Appendix I - Carosue Dam Main Administration and Mill Area

Appendix II - Deep South Operations Administrative Area

Appendix III - Deep South Tag Board Area

Appendix IV - Deep South ROM Pad Area

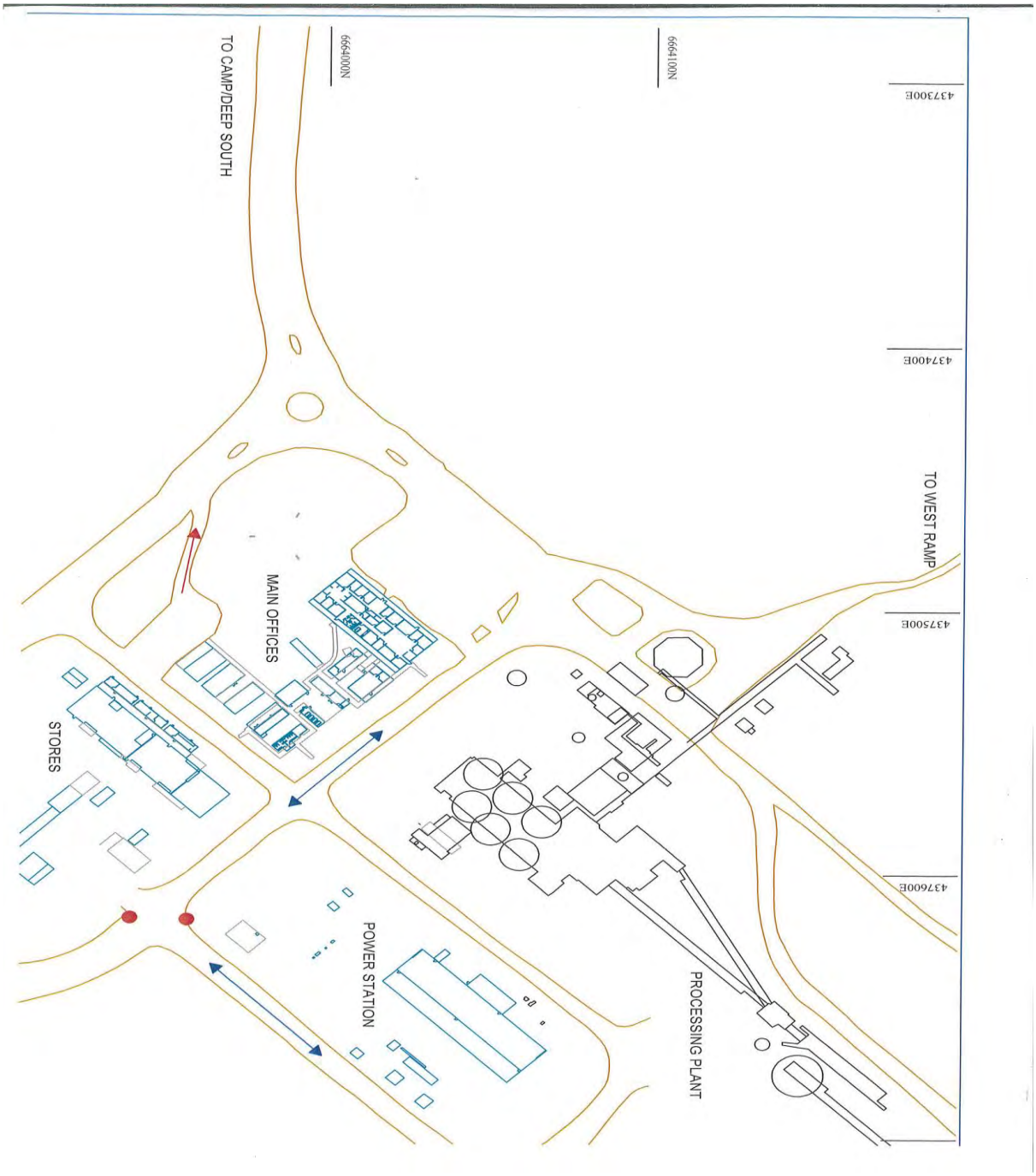
Appendix V - Deep South Open Pit Ramp

Appendix VI - Deep South Laydown Yard

Appendix VII - Main Administration and Workshop area of Red October Operations

Appendix VIII - Red October Workshop Area

16.1 Appendix I - Carosue Dam Main Administration and Mill Area



16.2 Appendix II - Deep South Operations Administrative Area

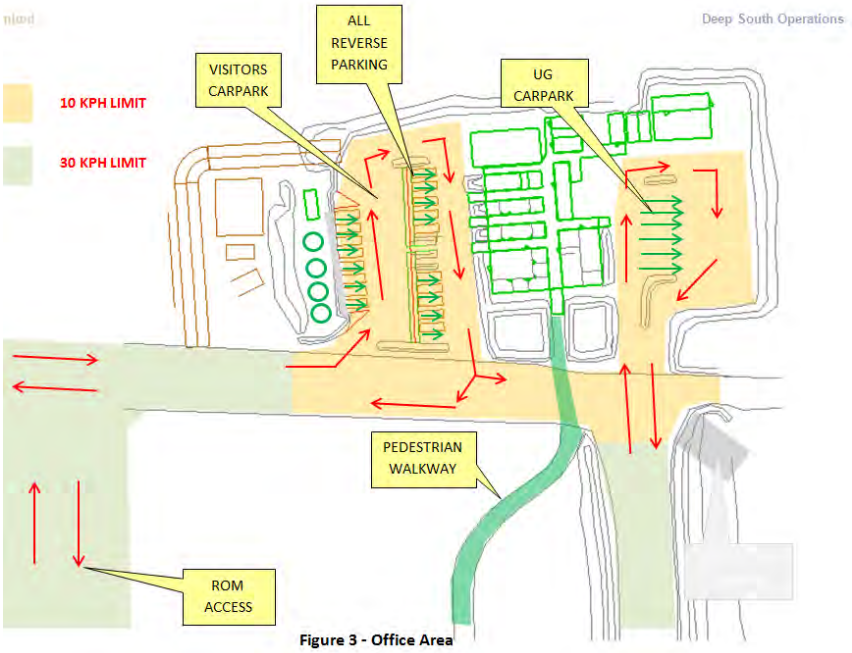


Figure 3 - Office Area

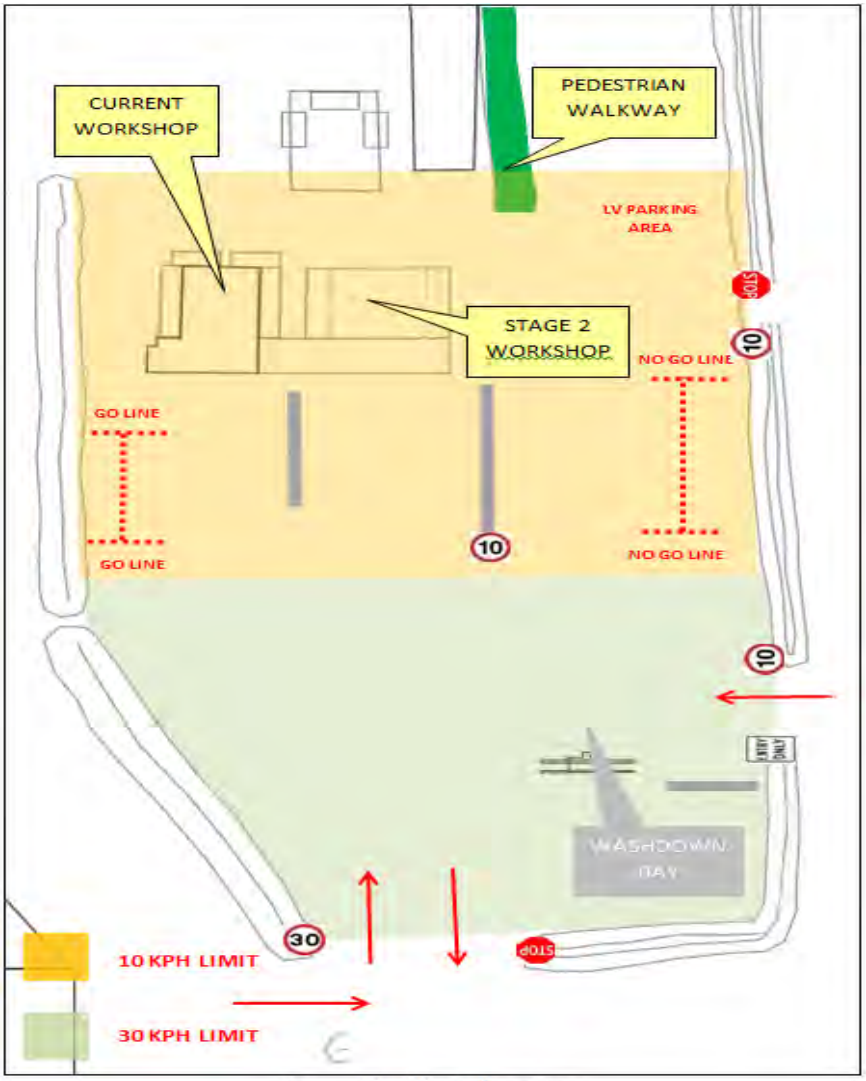
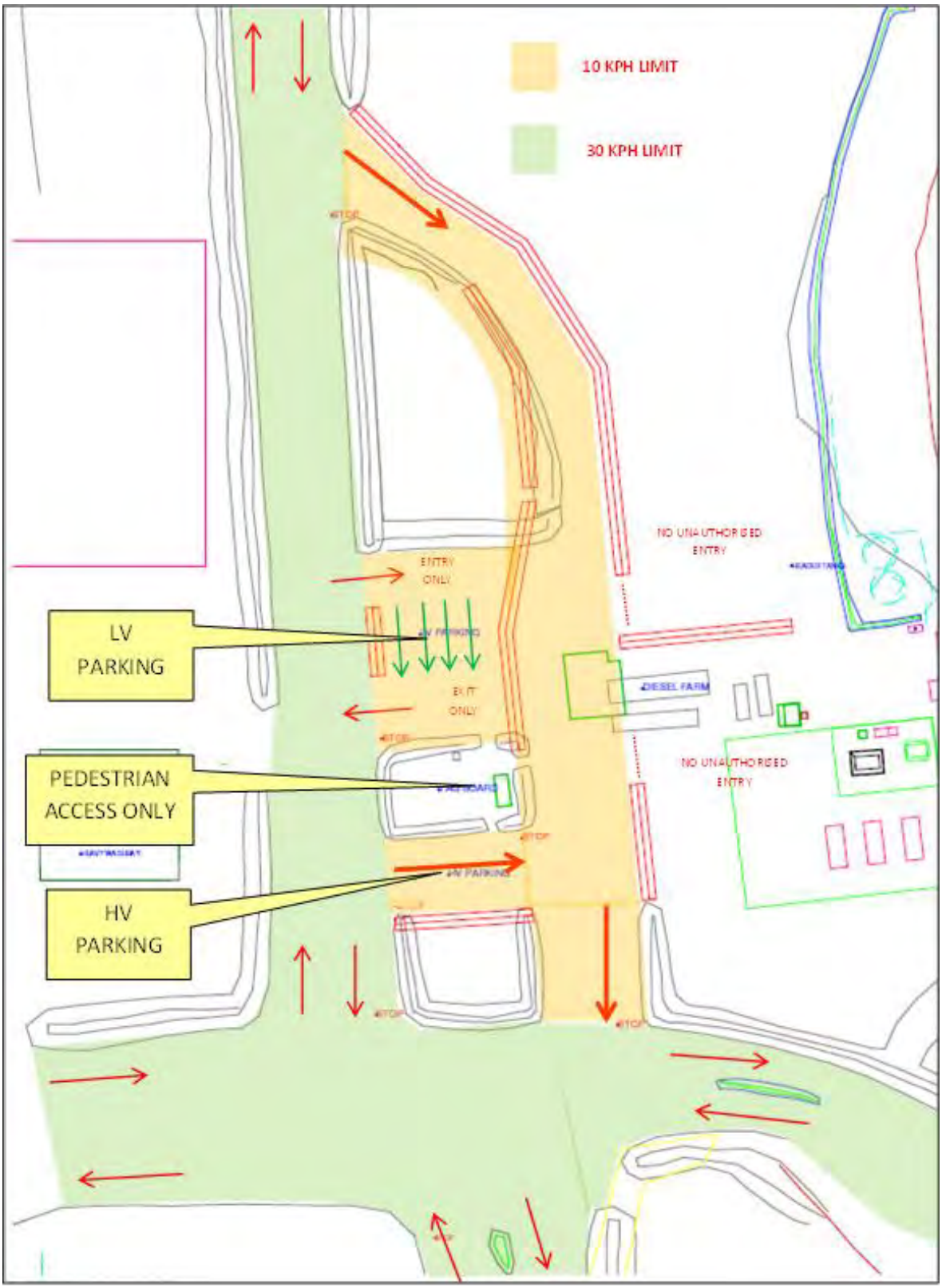
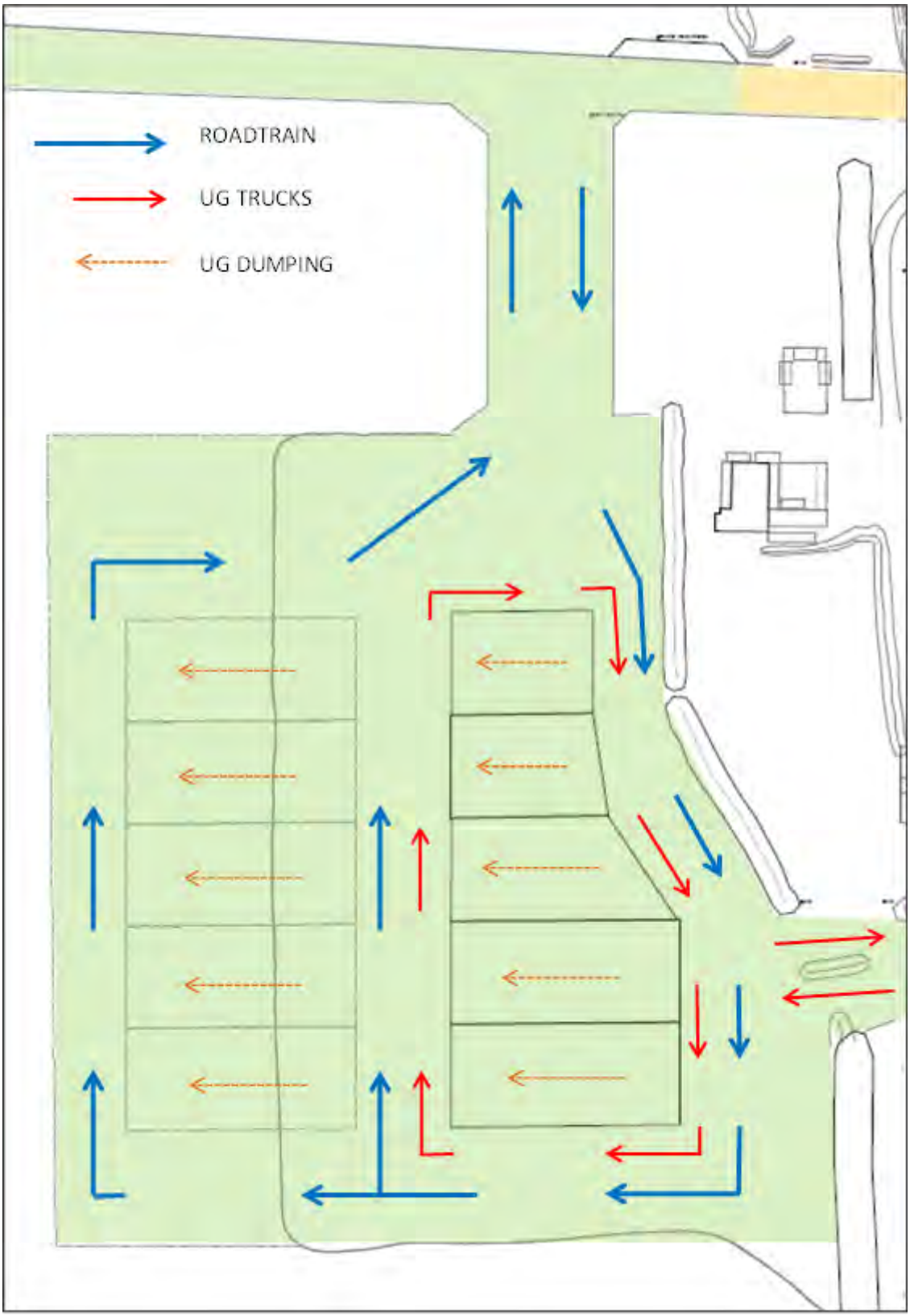


Figure 12 - Workshop Area

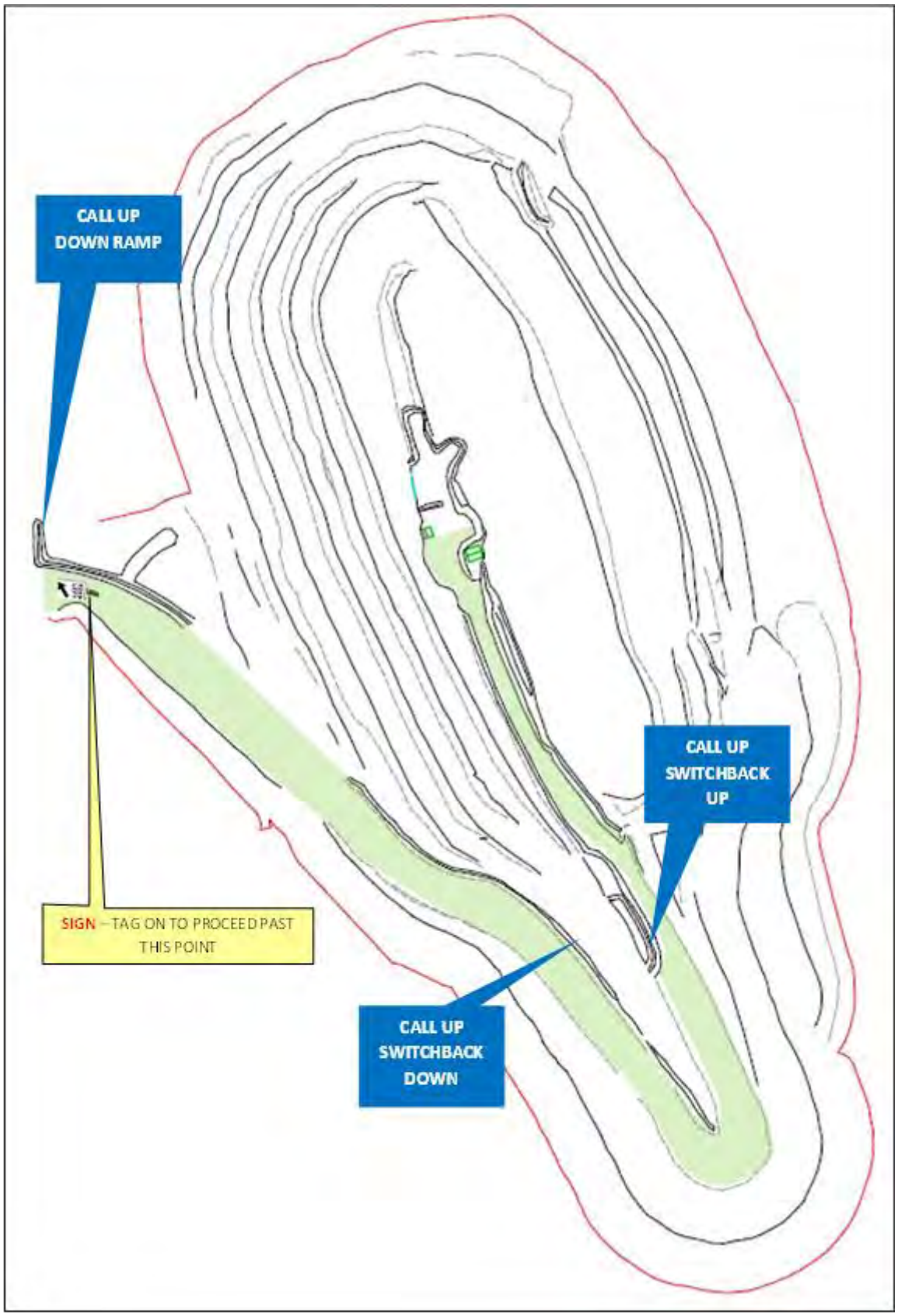
16.3 Appendix III - Deep South Tag Board Area



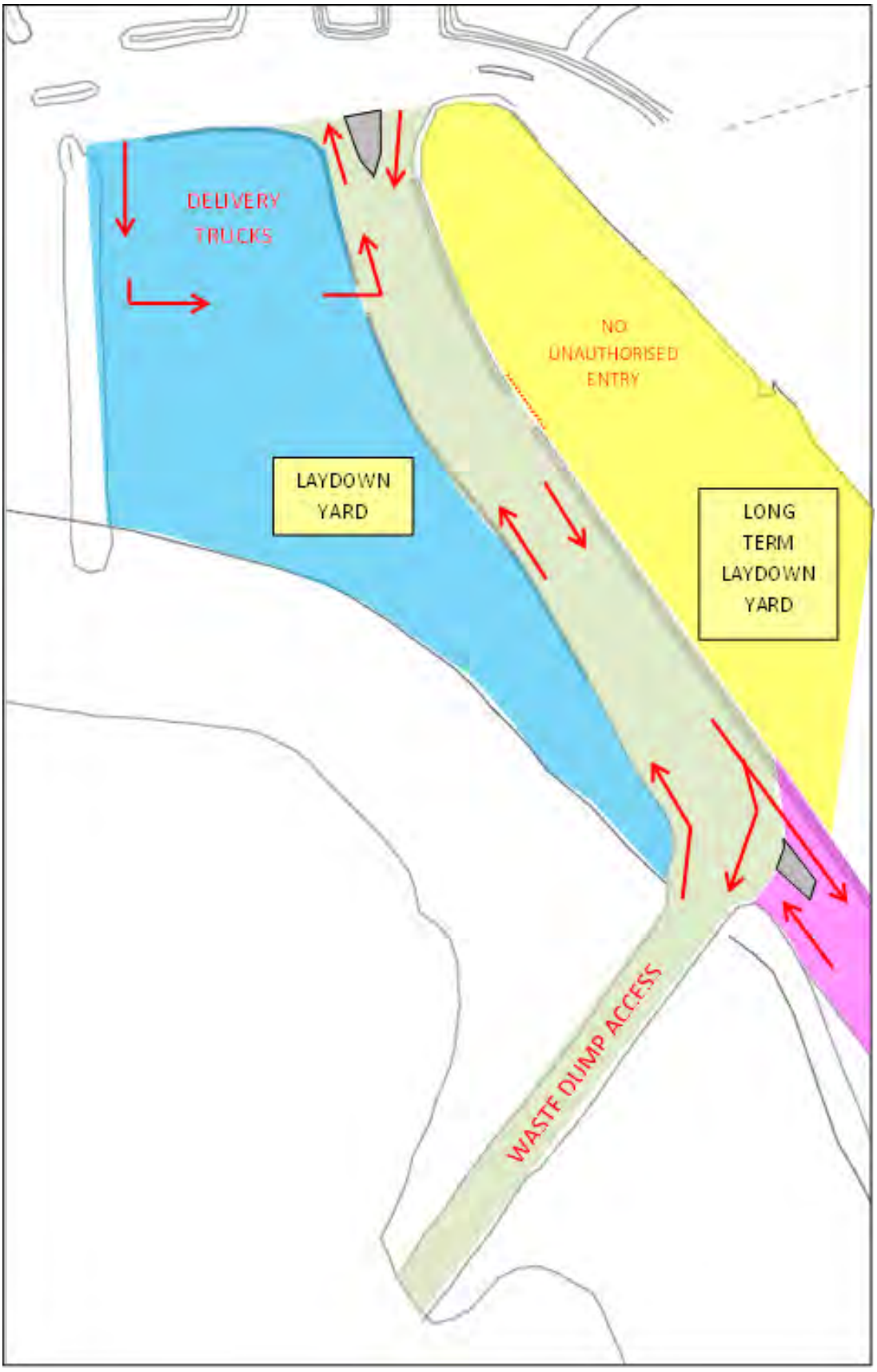
16.4 Appendix IV - Deep South ROM Pad Area



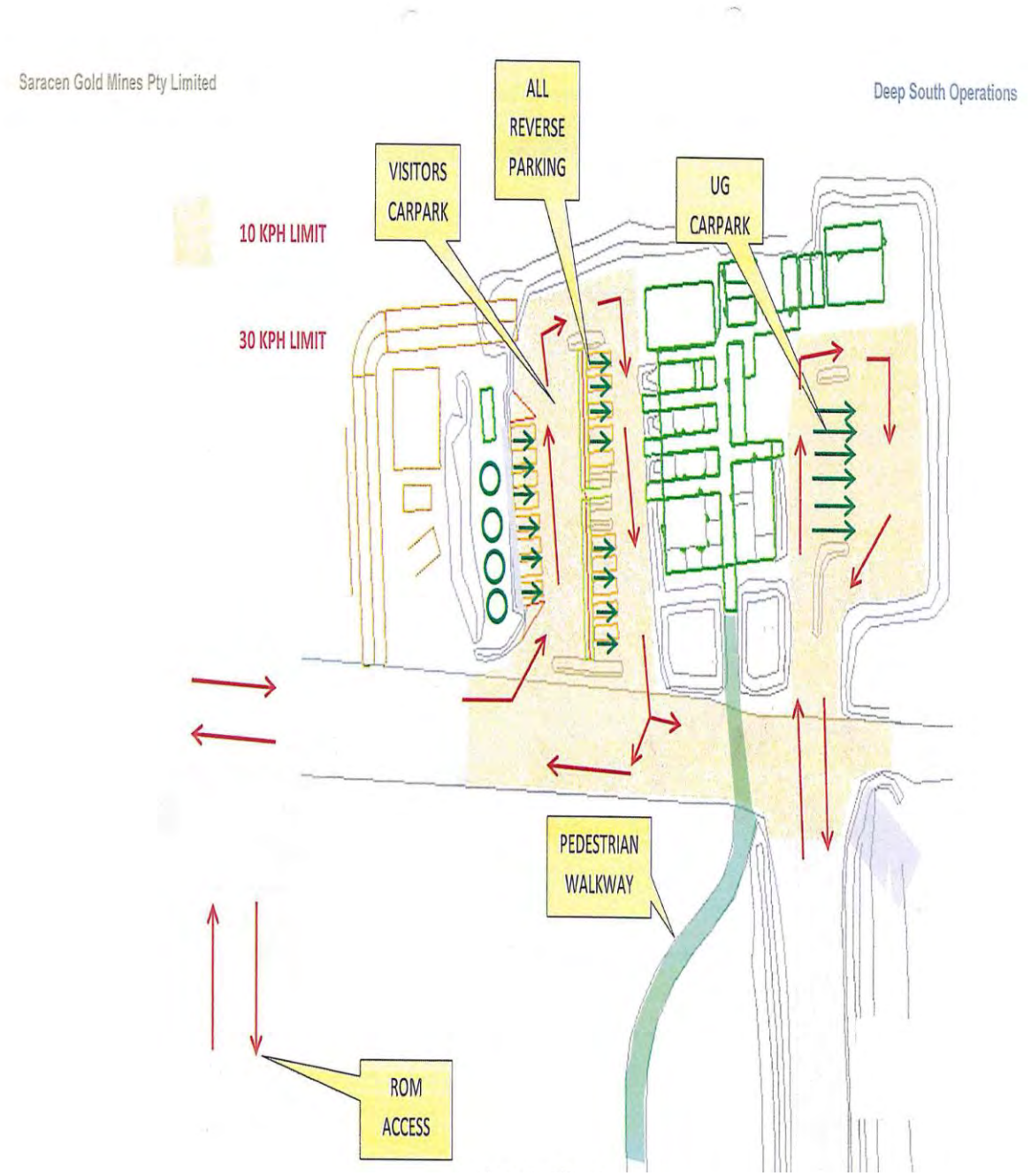
16.5 Appendix V - Deep South Open Pit Ramp



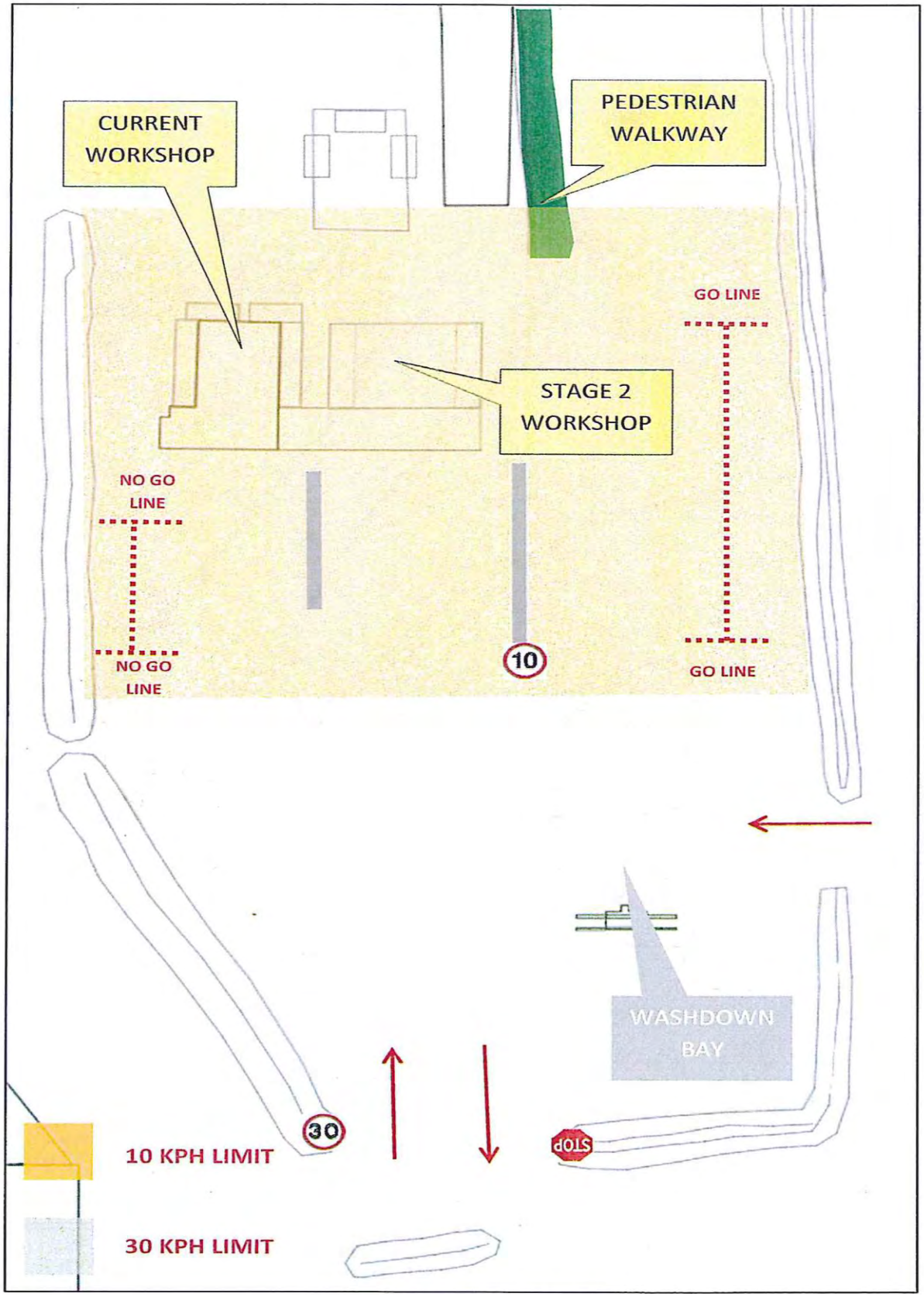
16.6 Appendix VI - Deep South Laydown Yard



16.7 Appendix VII - Main Administration and Workshop area of Red October Operations



16.8 Appendix VIII - Red October Workshop Area



1. PURPOSE

This Standard establishes a uniform approach to environmental incident reporting across Northern Star Resources Limited's (Northern Star or the Company) operations that will:

- ensure timely and accurate information to the appropriate level within the Company;
- provide an appropriate response and effective resolution to prevent a reoccurrence; and
- minimise potential negative financial, reputational or regulatory impacts to the Company.

2. SCOPE

This Standard is applicable to Northern Star's owned and managed operations.

3. STANDARD

3.1 Reporting and Investigation

All environmental incidents will be entered into the Company's approved incident reporting systems as per site procedures.

Guidelines or procedures on the types of environmental incidents to be reported will be established at each site and be consistent with Appendix 1.

A monthly summary of the significant incidents or complaints from each site will be reported in the Environment and External Relations Monthly Report (NSR-ER-005-REP) and must be delivered to the Environment Manager no later than the seventh day of the following month.

Significant environmental incidents will be investigated using appropriate Company tools and methodologies to ensure the root cause(s) are identified, effectiveness of controls are reviewed and corrective and preventative actions are implemented.

Any corrective or preventative actions resulting from an incident investigation will be recorded and tracked in the Company's incident reporting system to ensure actions are closed out in a timely manner.

3.2 Notifications

The Department Managers, site General Manager, Corporate Environmental Manager, Relevant Executives and the Company Board will be notified of any incident or non-compliance as per Appendix 1.

Regulatory agencies and relevant external Stakeholders will be notified of incidents or non-compliances consistent with applicable legal obligations. The Environment Manager will review all notifications prior to them being sent to external parties. Advice from the legal team will also be sought, where appropriate.

4. DEFINITIONS AND ACRONYMS

Incident	An event that causes actual environmental or social harm/impact or a non-compliance with applicable legal obligations.
INX (InControl)	The Company's reporting system utilised for managing incidents, hazards and associated actions, and other events such as audits, inspections or meetings.
Non-Compliance	Non-fulfilment of a legal requirement or obligation as specified in licences, permits, legislation or regulations.
Northern Star	Northern Star Resources Limited and its wholly owned subsidiaries.

5. RELATED DOCUMENTS

Document Name	Document Number
Environment and External Relations Monthly Report	NSR-ER-005-REP
Incident Reporting Standard	NSR-OHS-008-STA
Risk Matrix	NSR-OHS-026-MAT

6. APPENDIX 1: INTERNAL NOTIFICATION REQUIREMENTS FOR ENVIRONMENTAL AND SOCIAL RESPONSIBILITY INCIDENTS

Classification	Definition	Notification Requirements (within 24 hours of Incident occurring)			
		Department Manager / Environment Department	General Manager / Environment Manager	Corporate / Relevant Executive(s), **COO's and** GMs	Board
5 Insignificant	Localised environmental impact, contained, with no regulator reporting. No negative socioeconomic impact or inconvenience to the community, no media attention.	☐	☐		
4 Minor	Minor onsite environmental impact, reportable/notifiable to regulators. Minor negative socio-economic impact or disturbance to the community, local media attention.	☐	☐	☐	☐
3 Moderate	Moderate environmental impacts extend beyond site boundary, or regulatory violations with fines. Negative socioeconomic impact or disturbance to the community, or negative local media attention with enquiries from NGOs	☐	☐	☐	☐
2 Major	Serious medium term environmental impacts, or major regulatory violation. Major negative socioeconomic impact and serious community relations impact, or negative national headline media coverage with high levels of NGO attention.	☐	☐	☐	☐
1 Catastrophic	Severe irreversible environmental impacts, or severe breach of regulations with operation suspended. Loss of social licence to operate with disastrous community relations impacts, or negative international media headlines.	☐	☐	☐	☐

KEY:

✓ Notification via direct communication – eg. phone call, email or fax.

○ Notification via INX (InControl) – Company reporting system.

✧ Notification via Environment and External Relations Monthly Report (NSR-ER-005-REP)

1. PURPOSE

To prevent pollution by disposing of waste material and recyclable waste materials in an environmentally responsible manner and to comply with the requirements of the Landfill Waste Classification and Waste Definitions 1996 (As amended December 2009), the Environmental Protection (Rural Landfill) Regulations 2002 and all current Northern Star Operating Licences.

This management procedure relates to the management of all waste streams that stem from Northern Star operating Projects. The management plan is broken into project areas, to customize requirements for each if required.

2. DEFINITIONS AND ACRONYMS

General Waste (Class 1 Inert)	Vegetation offcuts, building and demolition waste (concrete), non-recyclable packaging, comingled non-recyclable wastes, broken pallets (untreated timber), etc.
Putrescible Waste	Component of the waste stream likely to become putrid (in most cases food scraps)
Controlled Waste	Any waste matter which is listed under Schedule 1 of the Environmental Protection (Controlled Waste) Regulations 2004
Industrial Waste	General waste (generally broken pallets, non-recyclable packaging, comingled recyclables/non-recyclables)
Waste Tip	Landfill trench

3. SAFETY REQUIREMENTS

Construction and maintenance of landfill trenches must be completed under the controls of a Job Hazard Analysis (JHA) risk assessment, which is to be completed by the Northern Star personnel and/or contractor responsible for the earthworks prior to commencing.

Personal safety is paramount when storing, handling, transporting and disposing of wastes. All employees and contractors are responsible for ensuring their own safety at all times.

4. CONSTRUCTION OF LANDFILL TRENCHES

Industrial and Putrescible Landfill trenches are to be constructed with the following broad aims:

- Rectangular in shape, approximately 20m in length, but no longer than 29m (Figure 1);
- Approximately 3-5m in width;
- Approximately 5m in depth;
- Dumping face to be as steep as possible and constructed in competent material (which will not subside);
- Fauna egress to be maintained on one of the rear corners;
- Fenced boundary (applicable to the putrescible landfill);
- Safety windrow installed along the tipping face of the trench to half the height of the largest tyre which will be dumping in the area (usually a light vehicle);
- High windrows (>1m installed along the back and two sides of the trench to prevent wind infiltration;
- Construct the trench to maximize the available room (i.e. start the first trench at the back of the area designated for use and then dig a new trench in front of this once the first trench is full. Use the dirt from the new trench to cover waste in the previous trench.
- Putrescible landfill is to be constructed in a safe and easily accessible location for the current Catering Contractor to minimize vehicle interaction and keep separate from the industrial landfill.

Figure 1- Putrescible Landfill -25m width, safety windrow and boundary fence

5. CAROSUE DAM WASTE MANAGEMENT FACILITY

5.1 General Waste – Carosue Dam

General wastes are disposed of in dark GREEN mobile wheelie bins (Figure 2) and dark GREEN General Waste Skips (Figure 3) at Carosue Dam from the mining, maintenance, administration and processing work areas. Green mobile wheelie Bins are emptied into dark GREEN General Waste Skips when full or directly into the site industrial landfill trench. Each department is responsible for emptying bins in their work area into General Waste Skips. General waste Skips are periodically emptied at the site industrial landfill by a contractor utilising a marell truck to transport and empty the skips into the Industrial Landfill trench (Figure 4), located on the eastern side of the Karari waste dump. No recyclable items or controlled wastes are to be disposed of into the General waste bins or at the Industrial Landfill. Comingled recyclable wastes that cannot be practically separated may also be placed into general waste bins and at the industrial landfill. For hydrocarbon and chemical waste generated from areas such as workshops refer to SG-EN-WI-2703 Hydrocarbon and Hazardous Substance Work Instruction.

Figure 2- Dark Green General Waste Mobile Wheelie Bin

Figure 3- *Dark Green General Waste Skip*

General waste (dark green) wheelie bins at site crib huts and administration buildings contain mostly putrescible wastes. These bins are emptied by the current Catering Contractor; ESS. The internal plastic liner bags and associated waste is transported to the camp accommodation village for disposal inside of 1 tonne bulka bags, which are tied closed when full and disposed of at the site Putrescible Landfill (Figure 5). Only the incumbent Catering Contractor is permitted to access the Putrescible Landfill. Putrescible wastes are disposed of inside the bulka bags to prevent vermin, birds and flies from infesting the landfill. Windblown litter is also minimised through this process. For instruction on managing the industrial landfill refer to- SG-EN-WI-2907 Industrial waste and Landfill procedure.

Figure 4- *Industrial Landfill Trench*

Figure 5- Putrescible and Industrial Landfill Locations

5.2 Recycling-Carosue Dam

5.2.1 Domestic Recyclables

Blue mobile wheelie bins and skips (Figure 6 & Figure 7) are used to collect recyclable items at Carosue Dam. Blue bins are emptied into the larger blue waste skips, which are sent to Kalgoorlie to be emptied (contents recycled) and returned. The following items may be placed into blue bins and skips:

- Glass;
- Plastic bottles and containers with the recycling symbol 1-3;
- Milk and juice cartons (no foil liner);
- Paper/cardboard (clean);
- Aluminium/Steel food/drink cans and aerosols

Figure 6- *Recycle Mobile Wheelie Bin*

Blue skips are located in each work area. If recycling skips are full, it is the responsibility of the Department/Contractor Manager or representative from which the skip has/will be utilised, to contact the Northern Star Store/Supply Department to get approval to transport the skips to the Supply Department ready for transport to Kalgoorlie and/or pick up of new skips. If incorrect wastes are disposed of into blue bins or skips, it is the responsibility of the applicable Department/Contractor Manager to delegate persons from their department to rectify.

Blue mobile wheelie bins at crib huts and offices are the responsibility of the current catering contractor to empty into the larger blue skips.

Figure 7- *Recycle Skip*

5.2.2 Scrap Steel-Carosue Dam

Scrap steel is collected in each work area in light GREEN Skips (Figure 8). A recycling contractor supplies the bins to site and collects/empties the bins on a scheduled cycle, during the same run as the general waste skips. Full Scrap steel skips are taken into Kalgoorlie for recycling, the credit from which is used to pay for the disposal of hydrocarbon wastes that are sent in to the same contractor.

It is everyone's responsibility to ensure only steel is disposed of into the scrap skips. Steel must be free of hydrocarbons before disposal. It is the responsibility of the applicable Department/Contractor Manager to delegate persons from their department to rectify.

Scrap steel is also able to be stored at the site Scrap Steel Recycle Bay which is covered in Section 6.2.3. The other scrap steel skips located at the crusher and screen deck in the Process Plant are also emptied by the Scrap Steel Contractor at the site recycle bay. Scrap steel will accumulate over time until there is enough in stockpile for a load to be transported back to Kalgoorlie by the recycling contractor, this will be managed by the Environmental Department.

Figure 8- Scrap Steel Skip

5.2.3 Recycle Bays- Carosue Dam

A designated recycling area resides adjacent to the Waste Management Facility on the Karari Waste Dump (Figure 5). The area is segregated into a series of recycling bays on the right and one on the left hand side as you approach the ramp down to the lower section of the facility (Figure 9). These bays are designed to give personnel the opportunity to neatly offload any recyclable items before disposing of bulk wastes into the landfill trench. Any items in these bays are available for reuse by Northern Star personnel and contractors at any time on site. All personnel are responsible for ensuring that recyclable wastes are disposed of neatly and correctly at the recycle bays.

Figure 9- Entrance sign at Recycle Bays on Karari Waste Dump

The recycle bays are currently for the storage and collection of the following wastes:

- Poly Pipe- No steel parts or non-poly fittings;
- Waste Conveyor Belt- Rolled up neatly or stacked neatly, starting at the back of the cell;
- Waste Delcor Screens- Rolled up neatly and stacked neatly in cell;
- Waste Screen Decks and Matts- From the process plant, stacked neatly, starting at the back of the cell;
- Scrap Steel- No non-steel parts, starting at the back of the cell;
- Pallets- Unbroken, stacked neatly in the bay provided; and
- IBC 1000L Pods- Empty and clean, stacked neatly starting from the back of the cell.

6. RED OCTOBER WASTE MANAGEMENT

6.1 General Waste- Red October

General wastes are collected from dark Green mobile wheelie bins (Figure 2) at Red October from the mining, maintenance, administration and processing work areas. Each department is responsible for emptying bins in their work areas. These bins are taken to the Industrial Landfill, located on the Red October waste dump (Figure 13). No steel, poly pipe, hazardous waste or hydrocarbons are to be disposed of into the General waste bins or at the Industrial or Putrescible Landfills. Comingled recyclable and general wastes that cannot be practically separated may be placed into general waste bins and at the Industrial Landfill.

General waste bins at site crib huts and administration buildings are predominantly filled with putrescible wastes. These bins are emptied by the current Catering Contractor and are taken to the Red October accommodation village for disposal into 1 tonne bulka bags. These bags are then tied off and transported

to the site Putrescible Landfill (Figure 13) trench for disposal. Putrescible wastes are disposed of inside the bulka bags to prevent vermin, birds and flies from infesting the landfill. Windblown litter is also prevented through this process. In the unlikely event of windblown litter from the landfill, emu picks will occur on an as need basis, Environmental personnel will inspect this area regularly and organise collection of wind-blown waste.

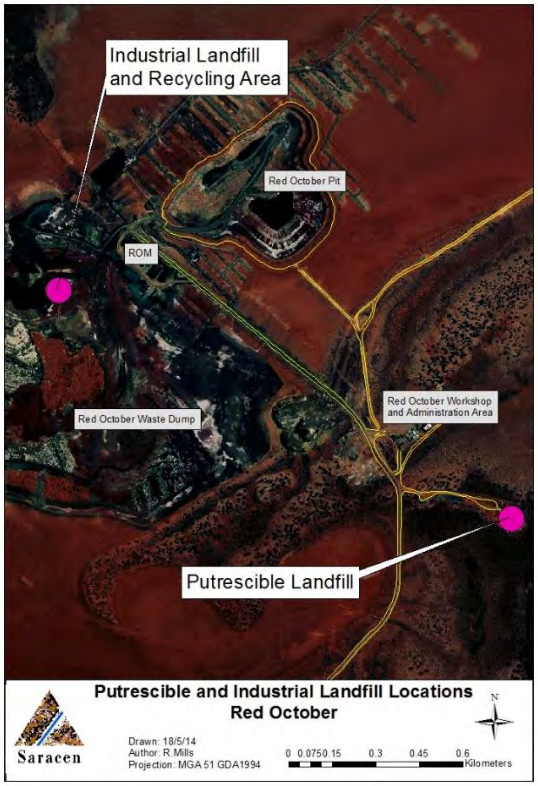


Figure 10- Red October Putrescible and Industrial Landfill Locations

Due to the isolated location of Red October, recycling of glass, aluminium/steel cans, plastic containers, paper and cardboard is not yet feasible. This will hopefully change in the future as new technologies and systems are developed.

7. DEEP SOUTH WASTE MANAGEMENT

7.1 General Waste- Deep South

General wastes are collected from dark Green mobile wheelie bins (Figure 2) at Deep South from the mining and maintenance work areas. Each department is responsible for emptying bins in their work areas. These bins are taken to the Industrial Landfill, located on the Deep South waste dump (Figure 14Error! Reference source not found.). No steel, poly pipe, hazardous waste or hydrocarbons are to be disposed of into the General waste bins or at the multi-use Landfill. Comingled recyclable and general wastes that cannot be practically separated may be placed into general waste bins and at the Industrial Landfill.

General waste bins at site crib huts and administration buildings are predominantly filled with putrescible wastes. These bins are emptied by the current Catering Contractor and are taken to the Deep South Industrial Landfill for disposal into 1 tonne bulka bags. These bags are then tied off and left next to the landfill trench for mechanical lifting into the trench (Figure 13). Putrescible wastes are disposed of inside the bulka bags to prevent vermin, birds and flies from infesting the landfill. Windblown litter is also prevented through this process.

Figure 11- Deep South Landfill Location

Due to the isolated location of Deep South, recycling of glass, aluminium/steel cans, plastic containers, paper and cardboard is not yet feasible. This will hopefully change in the future as new technologies and systems are developed.

7.2 Recycling- Deep South

Scrap steel and poly pipe offcuts are recycled at Deep South, in specially marked bays on the waste dump, directly adjacent to the Industrial Landfill (figure 14). The bays have been situated close to the industrial landfill so that personnel are given the opportunity to segregate these wastes into the bays, rather than disposing of them to the landfill. At the discretion of the Environmental Department, a recycling contractor will be engaged to visit site to collect the scrap steel and poly pipe, generating income for Northern Star. The Environmental Department engage a contractor to keep the recycle bays tidy, however it is the responsibility of all employees and contractors to ensure the correct wastes are placed in these areas in a neat and tidy fashion.

7.2.1 Hydrocarbon Contaminated Wastes- Deep South

Hydrocarbon skips are ordered by the Current Mining Contractor at Deep South and transported to site by the current Freight Contractor. When skips are full, they are loaded out on the current Freight Contractor's truck back to a licenced waste facility.

It is the responsibility of the incumbent Deep South Mining Contractor to request Hydrocarbon skips and send full skips back to Kalgoorlie. If incorrect wastes are disposed of into red bins or skips, it is the responsibility of the applicable Department/Contractor Manager to delegate persons from their department to rectify.

7.2.2 Hazardous Substance Wastes- Deep South

Hazardous substances must be handled, stored and disposed of in accordance with the corresponding Material Safety Data Sheet (MSDS). Removal of hazardous wastes for offsite disposal requires a Controlled Waste Tracking Form as per the *Environmental Protection (Controlled Waste) Regulations 2004.*

8. RELATED DOCUMENTS

Document Name	Document Number
Hydrocarbon and Hazardous Substance Work Instruction	
Industrial waste and Landfill procedure	
Waste Management Plan	
Carosue Dam Operating Licence	
Porphyry Operating Licence	
Mount Celia Operating Licence	
Red October Operating Licence	

Northern Star Resources Limited

Surface and Groundwater Hydrological Studies for Life of Mine TSF Expansion Project

Carosue Dam Operations

pennington scott
securing your water future

Northern Star Resources Limited

Surface and Groundwater Hydrological Studies for Life of Mine TSF Expansion Project

Carosue Dam Operations

2301 | Rev 3
18 January 2022

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REVISION	ISSUED	DESCRIPTION
Rev 0	11 Nov 2021	Issued for Client review
Rev 1	12 Nov 2021	Issued for Client review
Rev 2	18 Nov 2021	Issued to Client
Rev 3	18 Jan 2023	Reissued with drain cross sections

EXECUTIVE SUMMARY

Northern Star Resources (Carosue Dam) are currently completing a Life of Mine (10 year) TSF design review. This project will require an additional TSF Cell (TSF Cell 4) to be constructed to complement the existing two cell (Cell 1/2 & Cell 3) paddock facility. The footprint of TSF Cell 4 will overprint the existing surface water management and groundwater monitoring infrastructure of the current TSF. Pennington Scott were engaged to develop a new surface water and groundwater management strategy for the proposed expanded TSF facility to address the following criteria:

- Design appropriate surface water drains and bunds around TSF Cell 4 as necessary to ensure that a catchment runoff from up to a 100 year recurrence storm event is passively diverted around the TSF;
- Include in the stormwater infrastructure provision for a storage dam with enough capacity as necessary to intercept catchment runoff from up to a ten year recurrence storm, thereby reducing the threat of flooding through the downstream CDO plant and mining areas; and
- Design appropriate TSF seepage recovery as necessary to ensure that there is no risk of waterlogging (watertable less than 6 m below ground) or offsite TSF seepage migration off the NSR tenements.

The findings of these combined surface and groundwater investigations regarding the cumulative impacts and recommended water design considerations for TSF Cell 4 at CDO are as follows:

- The proposed TSF Cell 4 stormwater diversions and inclusion of a 100 ML drainage pond would reduce the frequency and magnitude of stormwater discharge through the CDO Plant and mining areas by about two thirds of what currently occurs, thereby significantly improving CDO's overall flood risk profile;
- The basecase numerical model simulations suggests that by the time TSF Cell 4 reaches its full height, vertical seepage in the order of 900 to 1,300 kL/day would generate a discernible groundwater mound around the TSF, creating a risk of waterlogging on the north western boundary of TSF Cell 4;
- Further simulations show that the introduction of low yield TSF recovery wells around the periphery of the TSF Cell 4 would be an effective solution to mitigate water table mounding and waterlogging around the TSF;
- Despite apparent extensive watertable mounding around the TSF, particle track modelling shows that groundwater migration from the TSF through the saprolite weathering profile would be slow. So much so that by the end of the 15 year life of mine, seepage from the TSF would have travelled about a kilometre from the edge of the TSF;
- There would be no risk seepage from the TSF migrating off the NSR mining tenements because all groundwater migration from the TSF is ultimately captured in the drawdown cone from the Whirling Dervish and Karari mine pits; and

- Hypersaline TSF seepage (anticipated to be up to 170,000 mg/L) would not reduce the beneficial use of the surrounding groundwater resource because the groundwater beneath the TSF is naturally hypersaline at around 40,000 to 70,000 mg/L.

In summary, provided the expanded TSF facility is constructed in accordance with the proposed surface and groundwater engineering provisions in this report, Pennington Scott foresee no unacceptable social or environmental risks associated with the proposed project.

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1. INTRODUCTION

Northern Star Resources (**NSR**) own and operate the 4.0 Mtpa Carosue Dam Operation (**CDO**) gold mine located approximately 110 km east northeast of Kalgoorlie, Western Australia. CDO comprises three mining districts, the Carosue Dam District, the Porphyry District and the Deep South District (**Figure 1**). Ore from all districts is trucked to the CDO Carbon in Leach (**CIL**) gold processing plant and tailings storage facility (**TSF**).

Northern Star Resources (Carosue Dam) are currently completing a Life of Mine (10 year) TSF design review. This project will require an additional TSF Cell (TSF Cell 4) to be constructed to complement the existing two cell (Cell 1/2 & Cell 3) paddock facility**.** The footprint of TSF Cell 4 will overprint the existing surface water management and groundwater monitoring infrastructure of the current TSF.

Pennington Scott (water consultants) were engaged to develop a new surface water and groundwater management strategy for the proposed expanded facility to address the following design criteria:

- Design appropriate surface water drains and bunds around TSF Cell 4 as necessary to ensure that a catchment runoff from up to a 100 year recurrence storm event is passively diverted around the TSF;
- Include in the stormwater infrastructure provision for a storage dam with enough capacity as necessary to intercept catchment runoff from up to a ten year recurrence storm, thereby reducing the threat of flooding through the downstream CDO plant and mining areas; and
- Design appropriate TSF seepage recovery as necessary to ensure that there is no risk of waterlogging (watertable less than 6 m below ground) or offsite TSF seepage migration off the NSR tenements.

The contained document is a recommended surface water and groundwater management strategy for the development of the proposed Life of Mine expansion of the TSF at the Carosue Dam Operations, together with environmental impacts assessment.

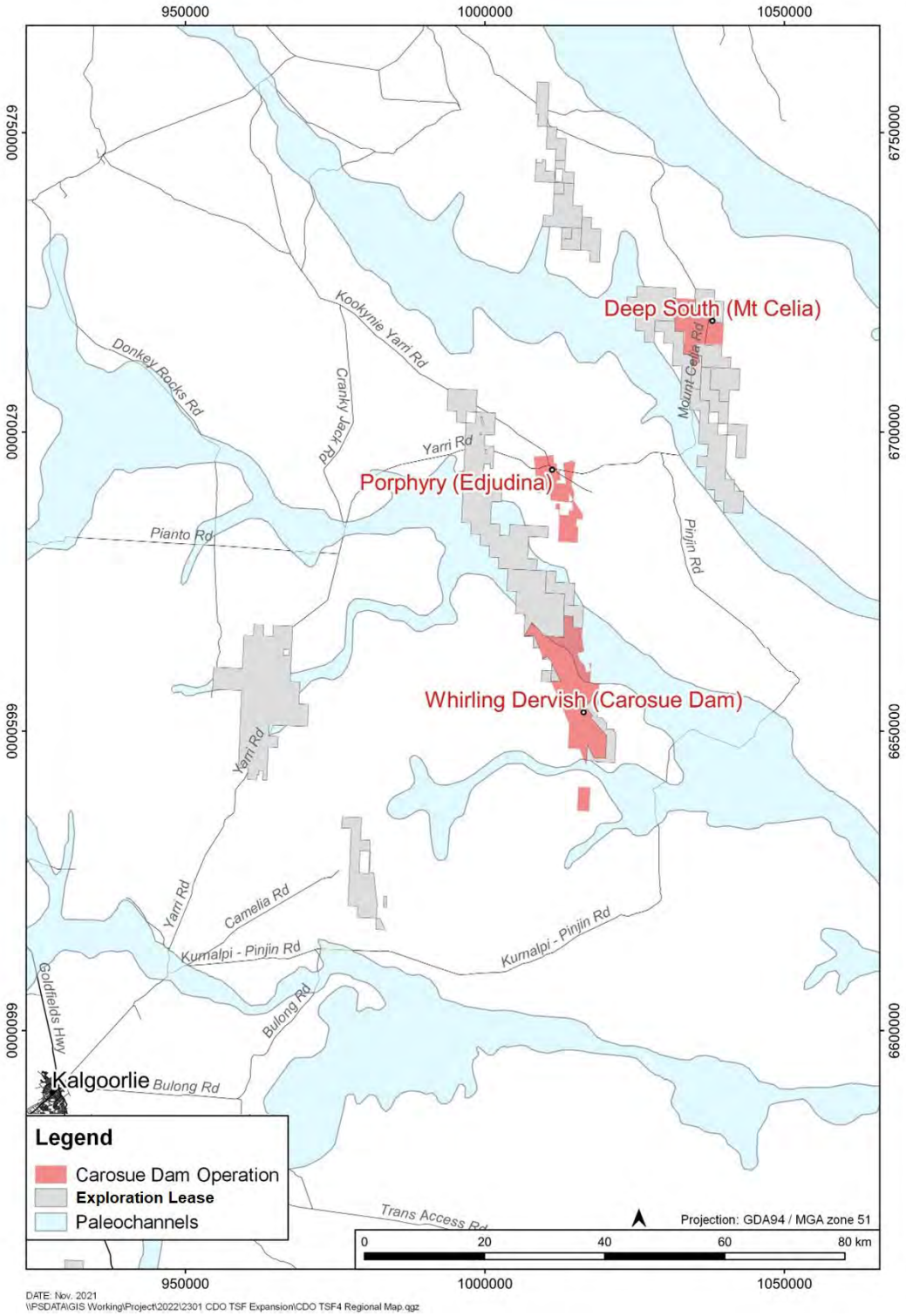

Figure 1 Carosue Dam Operations project areas

1.1 TSF Cell 4 Design

NSR are proposing to develop an additional 128-ha rectangular upstream TSF Cell (**TSF Cell 4**) to the west of Cell 3 (**Figure 2)**. The design of TSF Cell 4 is described by Tetra Tech Coffey (2021) and includes an 8 m-wide crest, upstream batter slopes of 1:2 (V:H) and downstream batter slopes of 1:2.75 (V:H). The starter embankment would be constructed from oxidised material sourced from new mine pits, while later wall raises may be sourced from a combination of oxidised rock and tailings from the current Cells.

TSF Cell 4 would be raised in six (6) stages with the 'starter' stage raised to a maximum of 9 m followed by an average rate-of-rise of 2 m per year, increasing the available tailings storage capacity by 18.1 Mt over 5.2 years.

At the same time as TSF Cell 4 is brought into operation, the three existing Cells (Cells 1 to 3) are to be merged into one (1) Super Cell, with their walls raised beyond the current limits. The new Super Cell would increase the tailings storage capacity by a further 19.8 Mt over 5.8 years.

Development of TSF Cell 4, together with the Super Cell would provide CDO with a total tailings storage capacity to last 10 to 11 years.

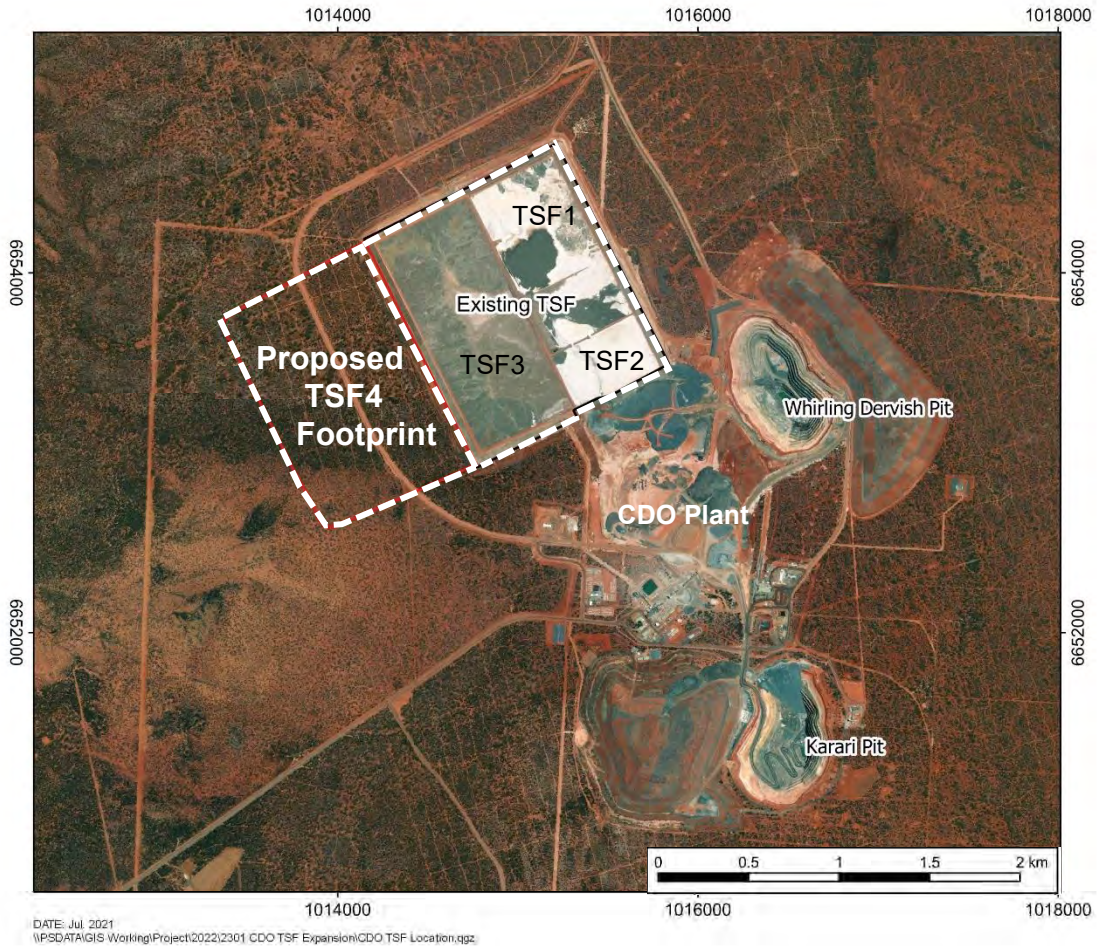

Figure 2 Existing CDO Tailings Storage Facility and Proposed Expansion (TSF Cell 4)

2. HYDROGEOLOGICAL SETTING

Pennington Scott (2021b) provides a comprehensive overview of the regional hydrogeological setting across all mining districts based on a review of all available water reports and investigations conducted at CDO, together with published relevant regional geology and hydrogeology. Detailed hydrogeological reports around the CDO plant and mining areas is provided in Pennington Scott (2012) and Carrick (2015). This section is a summary of hydrogeological aspects taken relevant to the assessment of TSF Cell 4.

2.1 Climate

The region experiences an arid to semi-arid climate. Monthly rainfall in the area is variable with most significant events occurring during the summer period as a result of remnant cyclones from northwest. The closest Bureau of Meteorology weather stations is the Kalgoorlie–Boulder Airport (Station No. 012038) and Laverton (Station No. 012045). **Figure 3** illustrates the actual monthly rainfall for the review period compared with the long-term mean rainfall and evaporation at the Kalgoorlie–Boulder weather station.

Data from these weather stations has recorded a long-term annual average rainfall of 266 mm from the Kalgoorlie–Boulder Airport station and 236 mm in Laverton. Annual rainfall for the 2020–21 period was recorded as 278.6 mm (BoM, 2021) which is slightly more than the 266 mm long-term annual average. Evaporation rates are greatest during the summer months between November to March.

Table 1 presents the probability or likelihood of a rainfall event occurring or being exceeded within any given year for the CDO area (BOM, 2016). Implications of the average recurrence interval (ARI) rainfall to the design of the new TSF are further discussed in the surface water management discussion in **Section 3.**

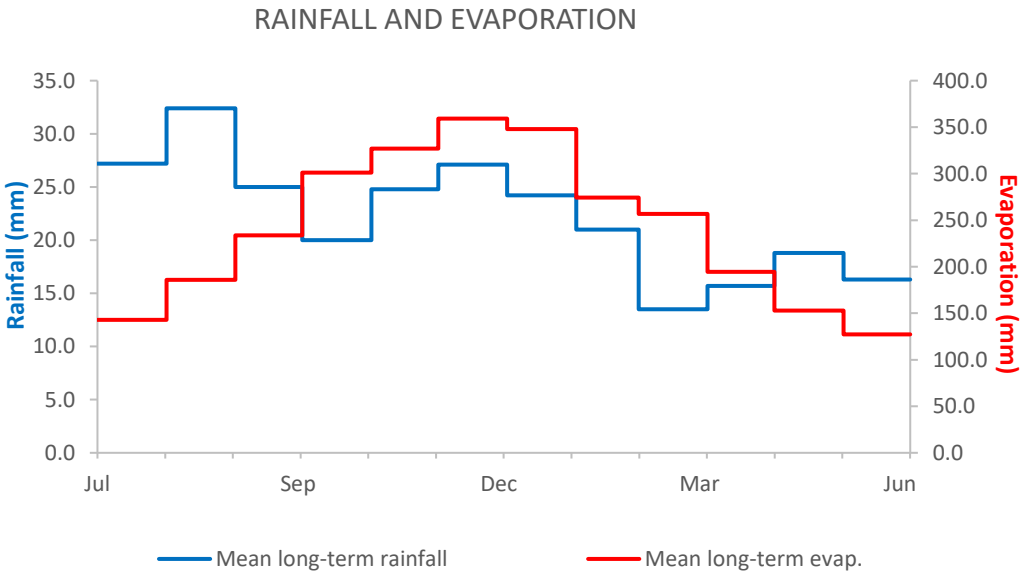

Figure 3: Rainfall vs Evaporation, Kalgoorlie–Boulder Airport (# 012038)

Table 1 Intensity–frequency–duration design rainfall intensities (mm/hr)

Duration ARI	Annual Exceedance Probability (AEP) 50% #	20% *	10% 1 in 10 years	5% 1 in 20 years	2% 1 in 50 years	1% 1 in 100 yrs
1 hour	13.7	21.8	28.0	34.8	44.9	53.5
12 hour	2.5	3.9	5.0	6.2	7.9	9.4
24 hour	1.5	2.4	3.1	3.8	4.9	5.9
48 hour	0.9	1.4	1.8	2.3	3.0	3.6
72 hour	0.6	1.0	1.3	1.7	2.2	2.7

The 50% AEP IFD **does not** correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.5 year ARI. * The 20% AEP IFD **does not** correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.5 year ARI.

2.2 Surface Water

The upstream sub catchment area draining into the existing TSF is shown in **Figure 4**. Surface water runoff from the sub catchment is currently diverted away from the existing TSF area by an approximately 1.1km long diversion channel constructed in late 2015. Construction of the new TSF facility will require removal of the existing diversion channel and so design of surface water management infrastructure to manage surface water runoff is required. The contributing sub catchment area to the TSF is approximately 2,037 ha of uncleared bushlands.

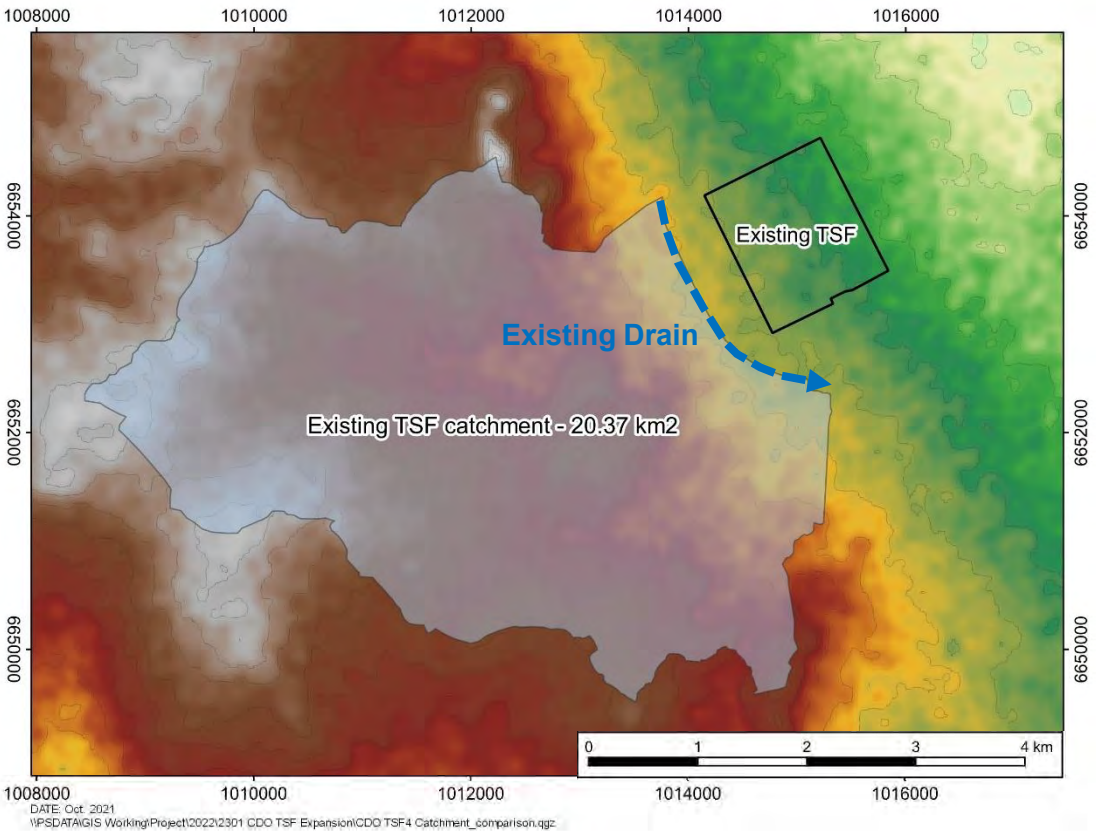

Figure 4 Surface water catchment area above the existing TSF

2.3 Saprolite profile

The CDO's tenements are located on the eastern margin of the Kalgoorlie Terrane of the Archaean Yilgarn Craton, which comprises a crystalline basement of granitoid rock and greenstone belts. As with other Archaean rocks in the Yilgarn, the aquifer storage and transmissivity of the bedrock is virtually non-existent and the rock is an exceptionally poor aquifer. However, the secondary porosity developed in fracture and fault defects, or within the deep weathering profile does create localised aquifers from 30–90m depth in the lower saprolite and saprock. **Figure 5** shows a typical saprolite weathering profile developed across the region, which is described below.

The **upper saprolite** refers to the zone immediately beneath the ferruginous hard cap where the rock has undergone complete chemical decomposition into heavy textured clay minerals, which may display remnant rock textures. The upper saprolite is mostly unsaturated but can form a slow seepage zone where water is present.

The transition into **lower saprolite** (the zone of joint oxidation) is characterised by a change from heavy textured clay to soft, decomposed, friable rock 10–20m thick. The lower saprolite zone is typically the most reliable water zone.

The **saprock** (the zone of broken fresh rock between the lower saprolite and the hard fresh rock) can also contain open water bearing defects, particularly within faults, shears and joints. These defects characteristically act as high permeability groundwater conduits but contain virtually no intrinsic groundwater storage.

2.4 Groundwater recharge

Groundwater recharge around CDO is very low due to a high average annual evaporation and low rainfall. Recharge, when it occurs, follows prolonged winter wet periods and very rare flood events following ex-tropical cyclone depressions. During storm events, rainfall percolates into the soil replenishing soil moisture lost through plant transpiration. Excess water percolates downward through the regolith recharging the water table contained in the fractured Achaean basement, causing it to rise. After each recharge event, the water table recedes as the mounded groundwater dissipates through the permeable lower saprolite.

Accurate estimation of recharge rates is always problematic, but a commonly used approach is the chloride mass balance method. The approach is based on assumptions that chloride is a non-reactive element in the environment, the main source of chloride is marine salt contained in rainfall, and any elevated chloride levels (above rainfall levels) are due to evaporative concentration in the soil prior to recharge. Chloride concentrations in rainfall are dependent on distance from the coast in the direction of prevailing winds.

Studies by CSIRO of typical chloride levels contained in rainfall through Western Australia have shown rainfall in the eastern Yilgarn to contain between 8 and 12 mg/L (Hingston and Gailitis 1976). Based on typical groundwater TDS values around Whirling Dervish of between 50,000 and 150,000 mg/L (equivalent to Cl concentrations of between 22,000 and 73,000 mg/L) the annual average groundwater recharge is calculated to be 0.03 mm (equivalent to about 0.01% of annual rainfall).

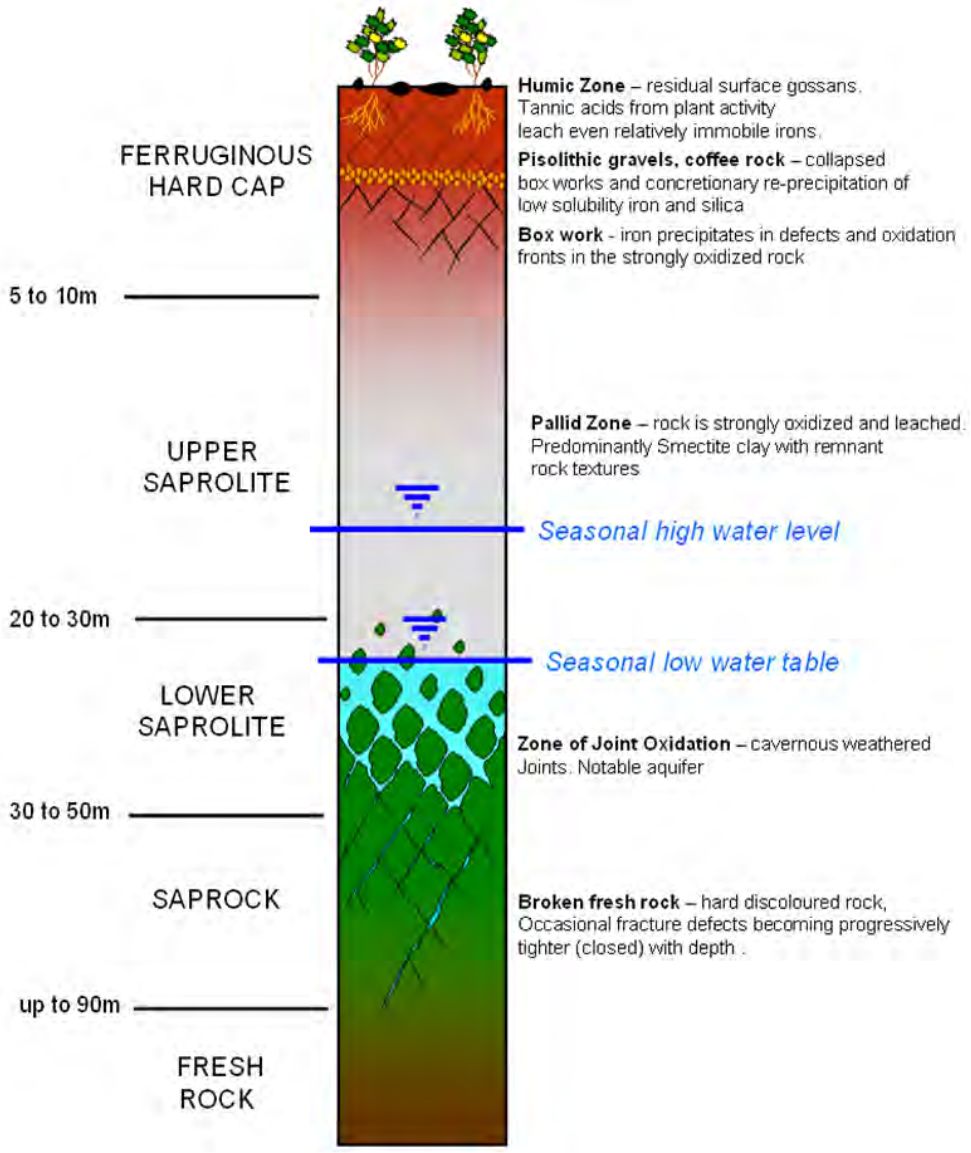

Figure 5 Typical saprolite weathering profile

2.5 Groundwater levels and flow directions

The pre-mining water table was initially observed around 19–22 metres below ground level (mBGL) within the weathering profile underneath the TSF, based on early investigations from the Whirling Dervish area (Rockwater 1999, 2000). **Figure 6** shows groundwater levels around the TSF measured in monitor bores between February to August 2020. Reference to this figure shows shallow groundwater around 8 mBGL beneath the northeast corner of the TSF and a groundwater depression of 199 mBGL in the nearby Whirling Dervish Pit. The water table mounding beneath the TSF indicates that there is at least some degree of leakage from the TSF into the underlying groundwater system, most of which would have ultimately migrated back to the Whirling Dervish pit and been recirculated through the dewatering system.

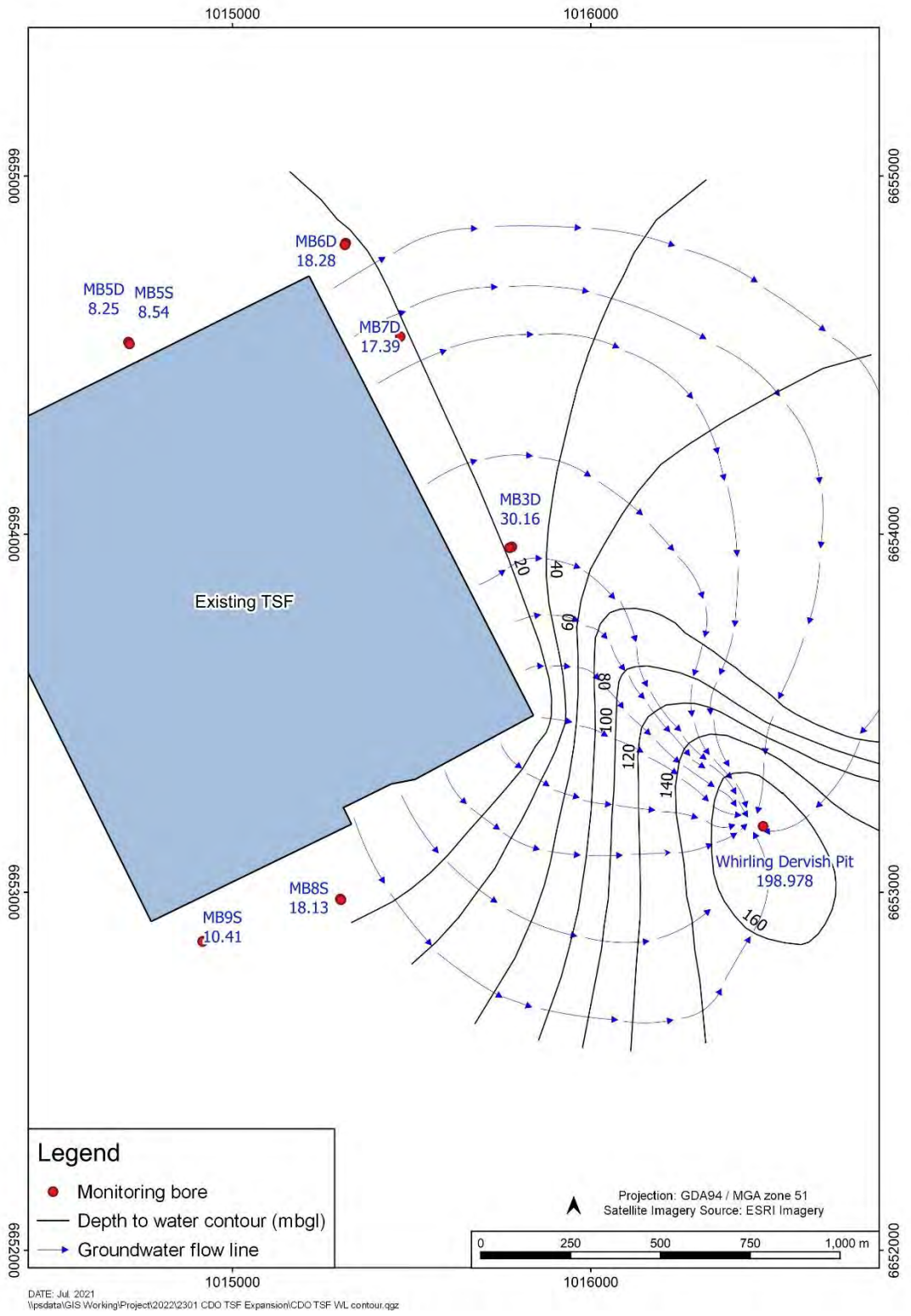

Figure 6: Depth to water contour around TSF and Whirling Dervish – February to August 2020

2.6 Aquifer parameters

Aquifer parameters in the saprolite profile under the Whirling Dervish area was previously summarised by Pennington Scott (2012) and summarised below. Both Rockwater (1999) and Aquaterra (2009) conducted a number of hydraulic tests on bores around Whirling Dervish to determine key permeability (hydraulic conductivity) and specific yield (Sy) parameters. The results of their tests are summarised in **Table 2**. The bores tested around Whirling Dervish provide a local transmissivity (T) estimate for the combined lower saprolite and saprock of between 10 and 30 m^2/day. These values equate to a bulk horizontal hydraulic conductivity (K) of between 0.06 and 0.3 m/day when measured over the screened section of the bores. Both consultants provided estimates for compressible storage (S) in the Lower Saprolite and Saprock ranging from $1x10^{-4}$ to $1x10^{-3}$. Although it was not possible to obtain a field measurement of the more important storage parameter, specific yield (Sy), from the short duration tests, the commonly accepted empirical value for Sy of the lower saprolite in the goldfields is between 0.5% and 1%.

Table 2 Measured hydraulic parameters around Whirling Dervish

Source	Bore ID	Date	Easting	Northing	Depth mBGL	Screened mBGL	Aquifer	T m^2/d	K m/d	Sy or S
Rockwater 1999	WDHY2P	1999	438100	6665032	128	54-60, 72-84, 114-126	L. Sap	36	1.0	-
	DB1	1999	-	-	-	-	Saprock	161	-	1.1×10^{-3}
	DB2	1999	-	-	-	-	L. Sap	36	-	7.6×10^{-4}
	DB3	1999	-	-	-	-	Saprock	134	-	5.3×10^{-3}
	DB4	1999	-	-	-	-	L. Sap	60	-	5.2×10^{-3}
	DB5	1999	-	-	-	-	-	-	-	-
	WDHY1	1999	438100	6665032	150	-	saprock	79	2.3	1.0×10^{-3}
	WDHY3	1999	438275	6664644	150	-	-	-	-	-
	WDDD001A	1999	-	-	-	-	Saprock	93	23.3	3.9×10^{-2}
Rockwater 2000	WDHY2P	1999	438100	6665032	128	54-60, 72-84, 114-126	-	-	-	-
	WDHY6P	1999	438242	6664702	150	93–106	-	-	-	-
	WDHY7P	1999	437770	6666544	128	92–114	-	-	-	-
	WDHY4M	1999	437979	6666521	150	66–135	-	-	-	-
	WDHY5M	1999	437944	6665428	156	78–126	-	-	-	-
	WDHY6M	1999	438236	6664710	106	84–96	-	-	-	-
	WDHY7M	1999	437775	6665442	150	90–138	-	-	-	-
Aquaterra 2009	WDWB1	2009	437939	6665468	144	2–72, 84–138	L. Sap, Saprock	3	0.02	-
	WDWB2	2009	438424	6665441	108	74–98	L. Sap	2	0.02	1.2×10^{-3}
	WDWB3	2009	438571	6665169	128	Not cased	Saprock	-	-	-

2.8 Groundwater Quality

Groundwater salinity (measured as total dissolved solids) in July 2020 from monitoring bores MB5S and MB9D along the northern and southern TSF boundaries range from 39,200 mg/L to 70,600 mg/L. In addition to the groundwater mounding around the TSF (**Section 2.5**), seepage from the TSF is evident at its north-eastern boundary where hypersaline groundwater up to 172,000 mg/L was recorded from MB7D. Water in the nearby Whirling Dervish pit is also similarly hypersaline at 109,000 mg/L in July 2020, but have been as high as 156,000 mg/L where evaporative concentration in the open water areas have increased groundwater salinity (Pennington Scott, 2021a).

3. SURFACE WATER STRATEGY

In late 2015, a 1.1 km long diversion drain was constructed around the southern side of the existing TSF capable of diverting the peak storm runoff from hundred-year recurrence storm in the 2,037 ha catchment around the southern side of the TSF (**Figure 4**). The footprint of the proposed TSF Cell 4 would now cover up this diversion drain, which means that NSR must revise the surface water management plan for TSF Cell 4.

However, NSR propose to use this revision of the surface water management plan as an opportunity to address other downstream drainage issues in the CDO plant, Whirling Dervish and Karari Pits. Historically, each of these facilities had their own surface water management plans (Pennington Scott 2012, 2017; Carrick 2015), but mine developments over the past several years have compromised the capacity of the downstream storm drains, such that there is a threat of production delays from nuisance flooding of the plant and mining areas during storm events. This flood risk is to be managed by including provision for an interception storage in the TSF Cell 4 diversion to limit the maximum flow through the plant area.

The following Sections provide the design calculations for the drains, bunds and interception storage.

3.1 TSF Cell 4 Drain Design

Currently all upstream catchment runoff is diverted around the southern side of TSF3. The TSF Cell 4 expansion would abut the western embankment of TSF3, resulting in an additional footprint of approximately 128 ha (**Figure 7**). Since TSF Cell 4 would be located over the top of the existing drain, the new drain around TSF Cell 4 would need to be split in two directions:

- **Western Drain** - runoff from the 1100 ha northern catchment would now be diverted around the in a NW direction around TSF3, which would require the slope of the existing drain to be reversed; and
- **The Southern Drain** – runoff from the 803-ha southern catchment would be diverted via a new 1.4 km long drain around southern boundary of TSF Cell 4.

Key upstream catchment parameters for both drains are shown in **Table 3**.

Table 3: Upstream Catchment Parameters

Catchment ID	Area (ha)	Perimeter (km)	Channel Length (km)	Channel slope (m/km)
Existing Catchment	2037	22.7	5	7.9
Western Drain	1120	14.9	5	7.9
Southern Drain	800	20.5	4.8	7.9

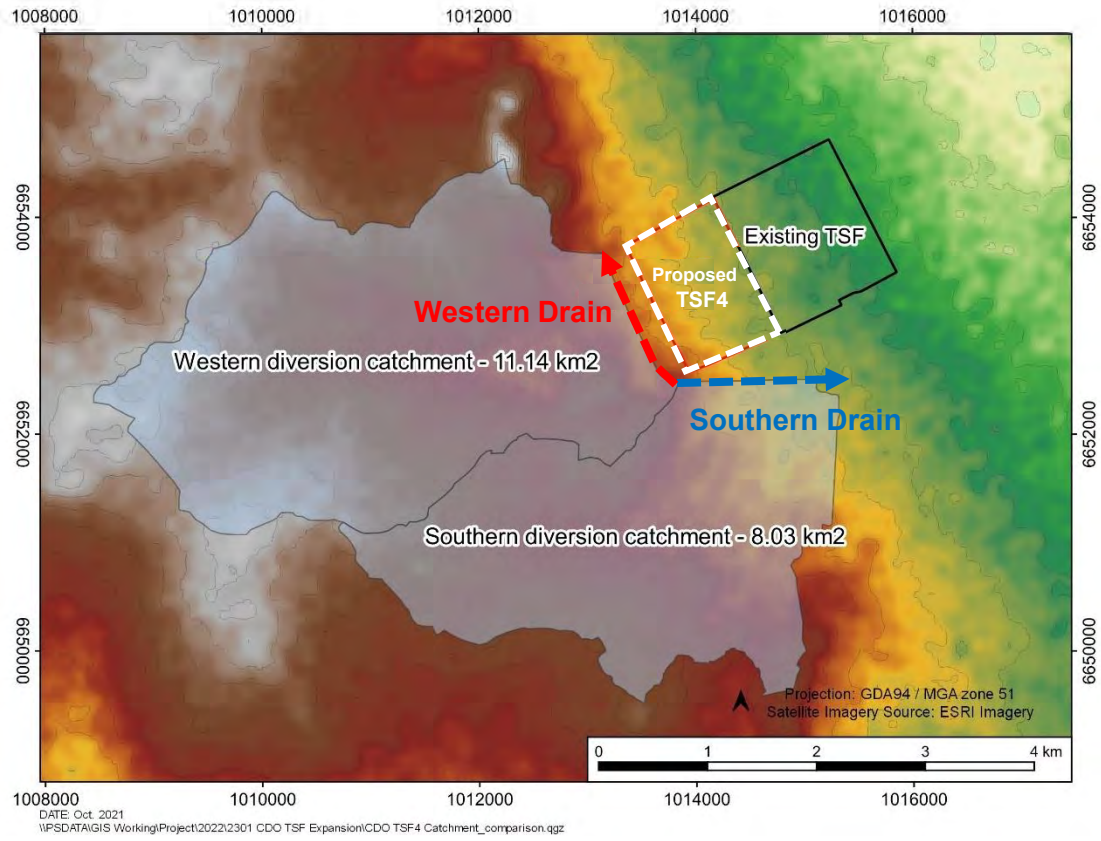

Figure 7 Proposed surface water drains and catchments around TSF Cell 4

3.2 Drain Design

The alignment of the 2.5 km long Western Drain and 1.4 km long Southern Drain will follow along the planned haul road around TSF Cell 4 (**Figure 8**). The peak flow in both drains in different ARI storm intensities are calculated using a Manning's roughness coefficient of 0.03, based on "*open pervious areas, minimal vegetation*" areas from the ARR guidelines (2019).

The drains have been conceptualised as dozer-cut channels with a nominal 3 m base-width, 2H:1V side slopes and a minimum channel slope of 0.25% designed to convey a 10 year ARI peak flow with 0.25 m minimum freeboard to road surface elevation. Conceptual design parameters for the diversion channels are summarised in **Table 4.**

Lateral seepage through the TSF Cell 4 walls will be captured in a toe drain around the perimeter of the TSF and will be physically separated from natural catchment runoff in the Diversion drains by soil stockpiles and the Haul Road alignment around TSF Cell 4.

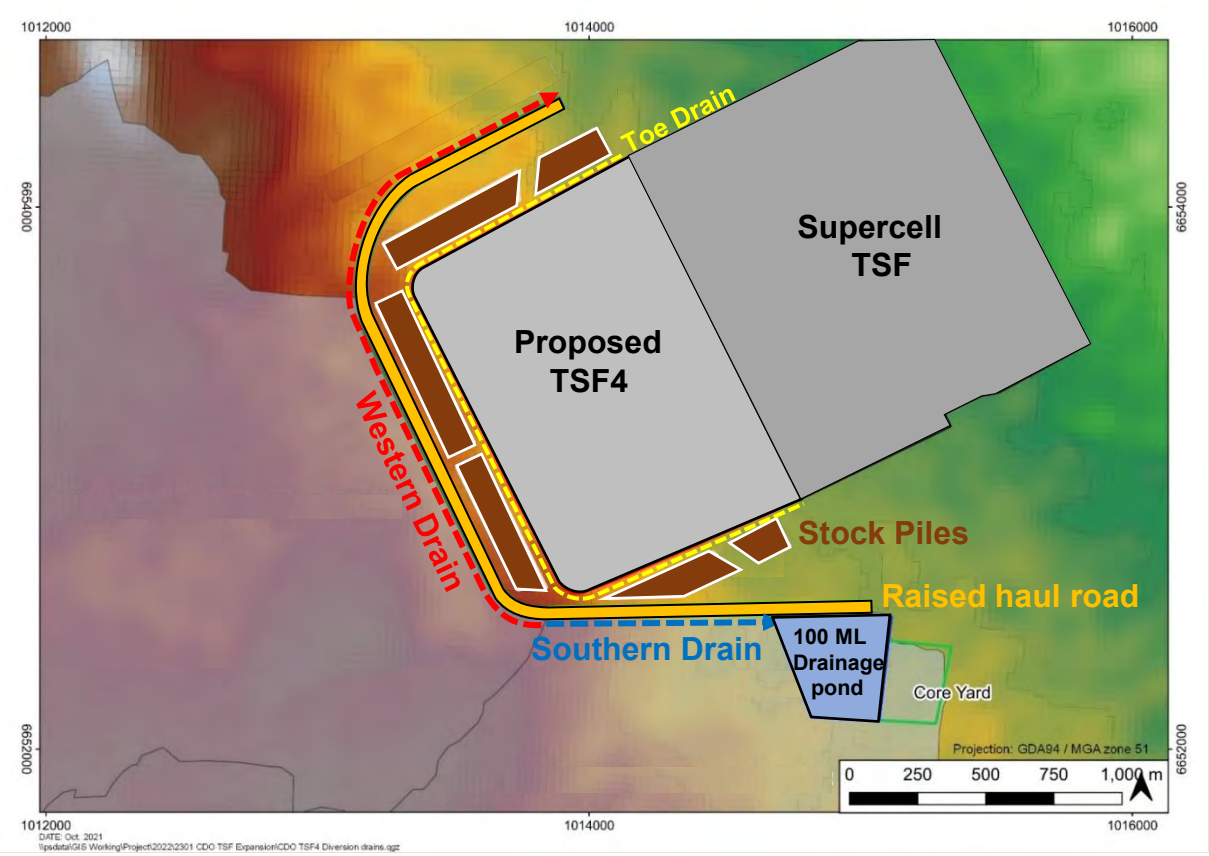

Figure 8 TSF Cell 4 stormwater management infrastructure

Table 4 : Conceptual design parameters of diversion channels

Design Parameter	Units	Western Diversion Channel	Southern Diversion Channel
10 year Peak Flow	kL/sec	9.9	7.9
Minimum Gradient	%	0.25	0.25
Length	m	2,550	1,380
Base Width	m	3.0	3.0
Side Slopes	H:V	2H:1V	2H:1V
10 year Peak Flow Depth	m	1.25	1.15
Freeboard Allowance	m	0.25	0.25
Channel Design Depth	m	1.5	1.4
Channel Top Width	m	9.0	8.8

Note: Hydraulic design assumes Manning Roughness “n” = 0.030.

3.2.1 Western Diversion Channel

The 2,550 m long Western Diversion Channel (

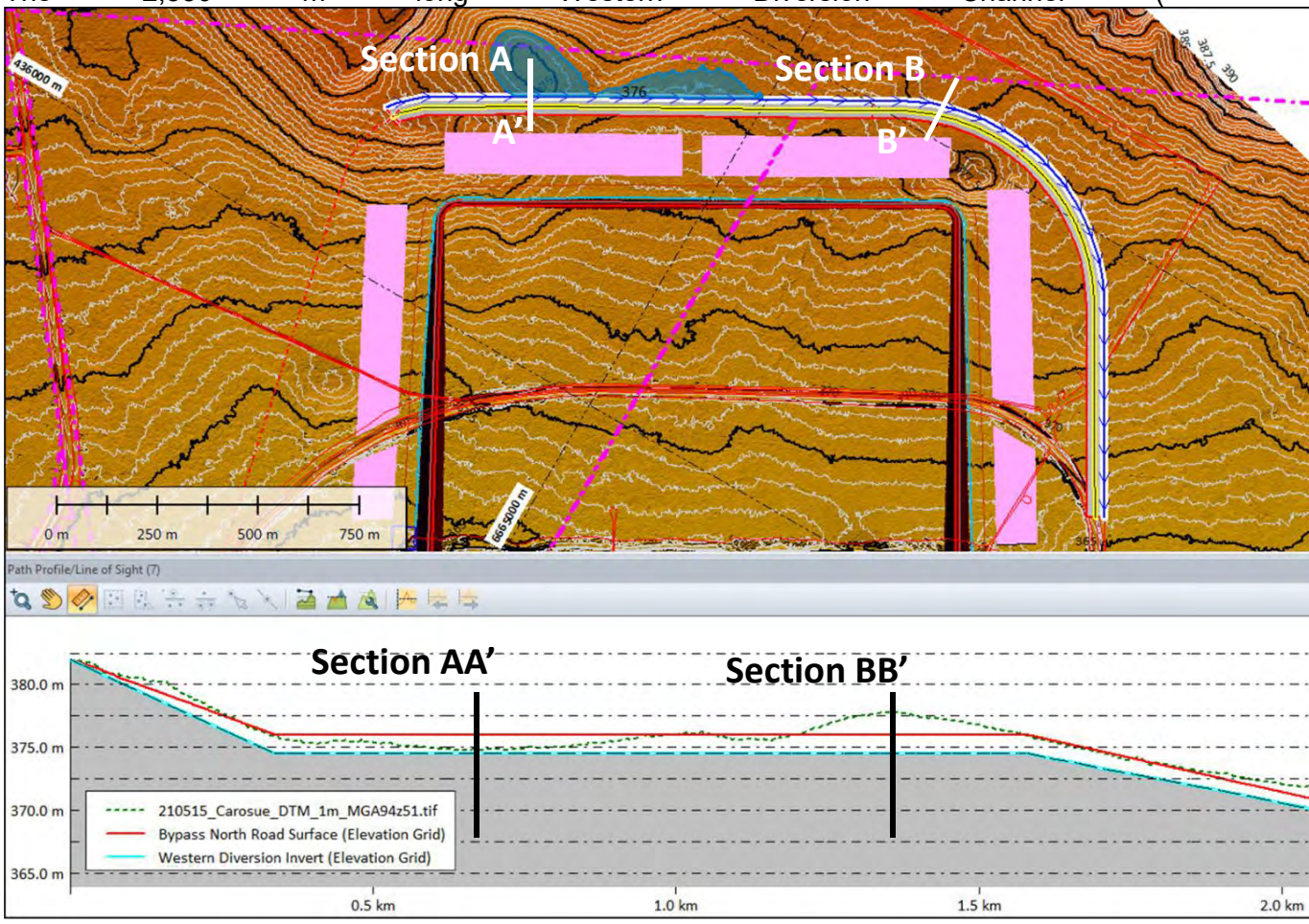

Figure 9) would be aligned from a high point at 382.0 mAHD at the southern corner of the proposed Bypass Haul Road and would continue in a north-westerly direction for some 1.3 km before turning northeast and discharging off-site with an outlet elevation of about 365.5 mAHD.

In order to minimise the required earthworks, the 1,240 m long central section of the Bypass Haul Road and Western Diversion Channel (between Ch 340 m & Ch 1580 m approximately) would both be graded flat with a road surface elevation of 376.0 mAHD and a channel invert elevation of 374.5 mAHD (**Figure 10**). As a result, a water detention storage pond will form on the upstream side of the road with a maximum top water level of 376.0 mAHD (subject to hydrologic/hydraulic modelling at detailed design stage). Water temporarily stored in this area will dissipate over a few days by passing along the channel to the north and also through seepage and evaporation.

The Western Diversion Channel gradient on either side of this flat central section will be approximately 2.2% to the south and 0.9% to the north. The outlet from the channel will be blended to match the existing drainage channel that is aligned along the northern side of the TSF. Under 10 year ARI peak flow conditions maximum velocities in the order of 2.3 m/sec

are anticipated and it may be necessary to line the northernmost section of the channel with a broken rock riprap to minimise scour erosion (subject to detailed design).

3.2.2 Southern Diversion Channel

The 1,380 m long Southern Diversion Channel (***Figure 11***) would be aligned from a high point at 382.0 mAHD at the southern corner of the proposed Bypass Haul Road and would continue in a generally easterly direction for its entire length before discharging to the area immediately west of the existing Core Yard with an outlet elevation of approximately 364.5 mAHD. It is recommended that a Water Harvesting Pond be constructed at the outlet location to minimise the passage of runoff through the CDO Mining/Processing area (the alternative would be to significantly improve the magnitude and level of maintenance of the existing drainage system downstream).

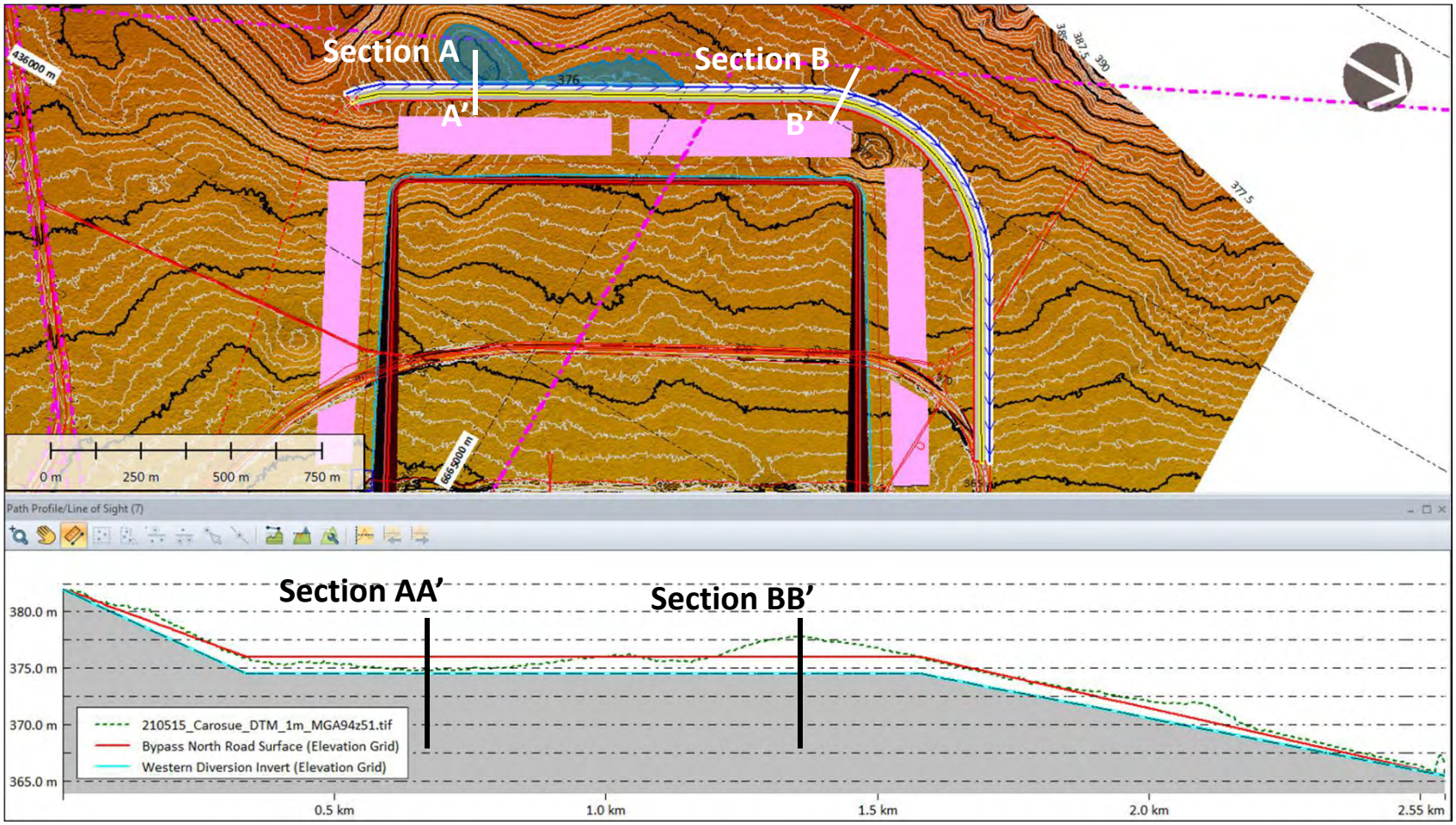

Figure 9 Western Diversion Channel - Plan & Profile (N.B. Plan view rotated)

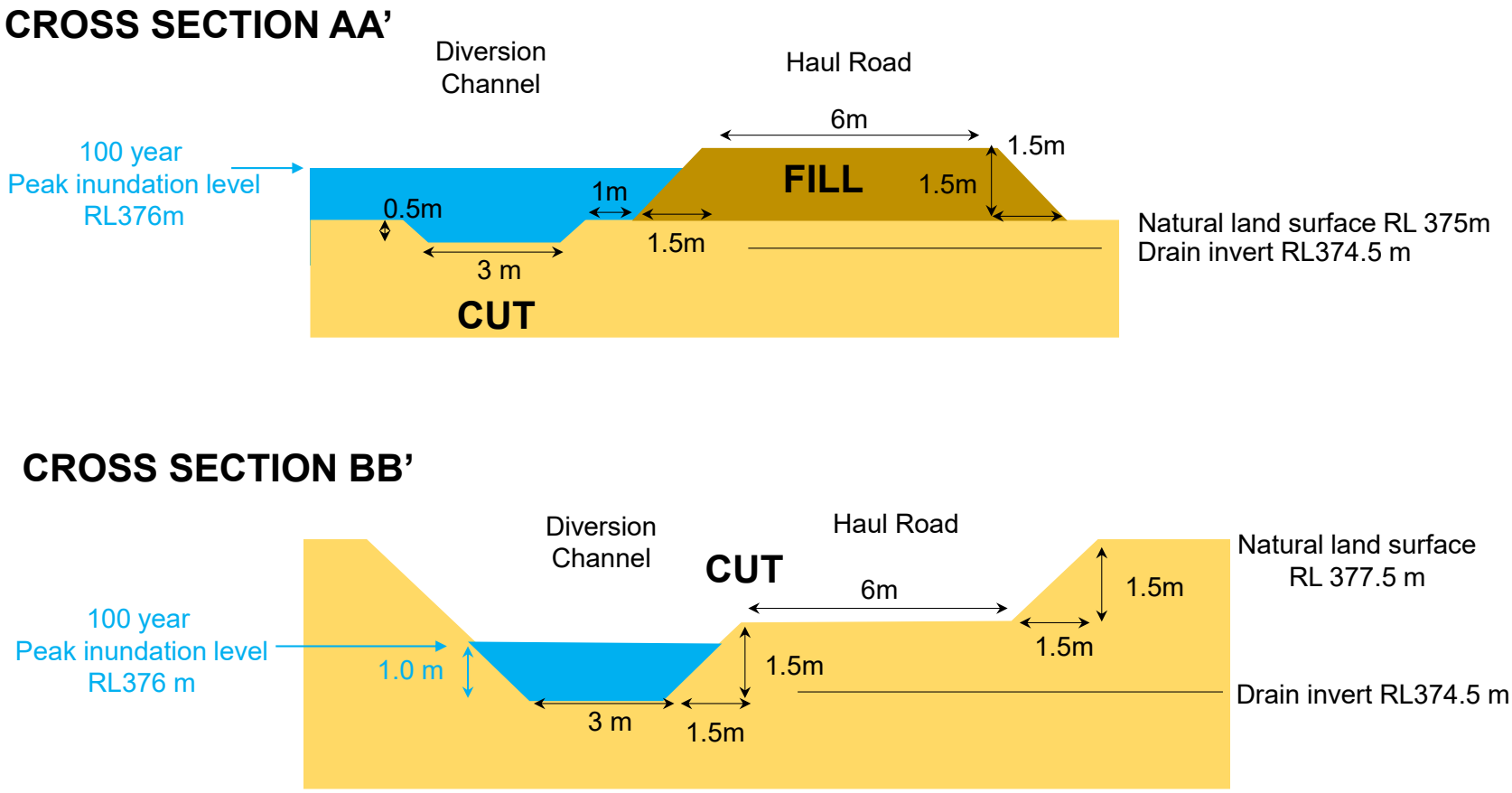

Figure 10 Cross sections through Western Drain

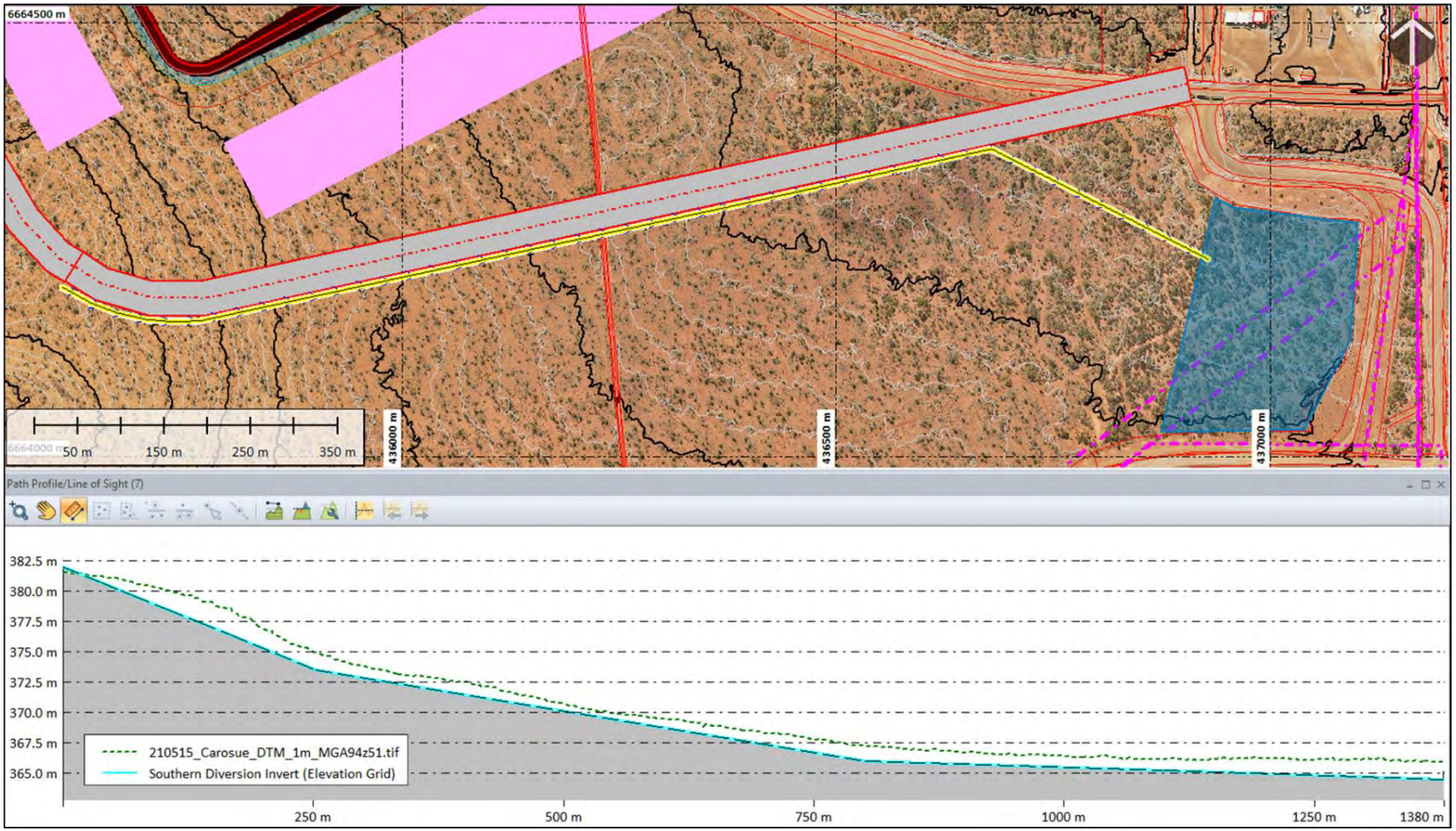

Figure 11 Southern Diversion Channel - Plan & Profile (N.B. Plan view rotated)

3.3 100 ML drainage pond

To mitigate the risk of flooding in and around the downstream plant and mining areas, NSR will construct a 100 ML drainage pond immediately upgradient of the core yard. The pond will be constructed on the southern Haul Road that will intercept runoff from the southern sub-catchment. An engineered spillway from the storage would permit excess runoff, above and beyond a 10-year recurrence 24-hour storm, to the existing stormwater drainage system past the site infrastructure to the north east. This residual flow from storm events beyond the first 100 ML is presented in **Table 5**.

While the drainage pond would be constructed using cut and fill methods, to mitigate the risk of embankment failure, water would only be captured in the below ground storage. This will require that after every pond filling event, water from the pond would be pumped out and stored in other dedicated water storage dams around the operation as the highest priority (providing reagent benefits for processing if used in the plant). The strategy would aim to empty the pond as quickly as possible and maximise its interception capacity for the next storm event. The harvested storm water in the pond is expected to have low salinity (potable quality) making it ideal for any operational uses. Furthermore, the low salinity of water poses almost no environmental risk and therefore the pond will not be lined.

***Table 5* Drainage Pond design parameters**

Parameter/Design Event	Fully In-Ground Facility
Storm recurrence volume	10 year-24 hour
Overall Length (m)	235
Overall Width (m)	115
Water Depth (m)	4
Minimum Freeboard (m)	0.5
Total Depth (m)	4.5
Water Capacity (ML)	100
Batter Slope (H:V)	1H:1V
Cut Earthworks (m^3)	115,000
Fill Earthworks (m^3)	nil

Note: Earthworks volumes assume flat existing ground surface.

3.4 Improved flood risk management through the CDO Plant and mining areas

The flood risk through the CDO Plant and mining area will be reduced through the development of TSF Cell 4 in two ways:

- Firstly, the catchment area that feeds the Southern Drain will be reduced to 2/5 of its current size from 2037 ha to 800 ha. The remaining 3/5 of the current flow will be rediverted into the Western Drain, and directed around the northern side of the TSF and away from the CDO Plant area; and

- Secondly, the first 100 ML of the flow from the Southern Drain will be intercepted by the drainage pond and diverted to other mine storages. The residual overflows from the drainage pond would then be distributed over a smaller proportion of time.

Table 6 summarises the reduction in flood risk through the CDO Plant from development of the proposed TSF Cell 4 stormwater management infrastructure, in terms of the discharge volume and the peak overflow rate from the drainage pond. Reference to this table shows that, based on the 72 hr storm duration, implementation of the TSF Cell 4 stormwater management measures would actually improve the flood risk through the CDO plant area from the current risk level in three ways, these being to:

a) Reduce the frequency of overflows through the Plant area such that no discharge would occur after a 2-year recurrence storm;

b) Reduce the total volume of discharges through the Plant area following different storm recurrences; and

c) More than halve the peak flow rates that currently occur after different storm recurrences.

Table 6: Comparison flood risk through CDO plant area before and after TSF Cell 4 measures

Storm recurrence event	Existing TSF water management		After implementation of TSF Cell 4 measures	
	flow volume ML	peak flow kL/sec	overflow volume ML	overflow peak kL/sec
2	219	4.7	nil	nil
10	448	15.7	75	3.3
50	721	37.7	180	12.9
100	862	53.9	240	19.1

4. GROUNDWATER MANAGEMENT

The expansion of the TSF would cause vertical leakage of tailings water through the floor of the TSF and contribute to mounding of the water table in the underlying saprolite aquifer, which in turn would enhance migration of TSF seepage within the local aquifer system.

A regional water table analysis suggests that most of the seepage from the existing TSF Cells currently flows to the east towards the pits, where it is captured by sumps and recycled in the processing plan and back to the TSF. Detailed measurements over the last five years suggest the average pumping rate from the pit sumps is about 3,000 kL/day or around 1 GL/year (Pennington Scott, 2021a).

In this Section, a 3D numerical groundwater model is developed to:

- Evaluate the likely future groundwater mounding caused by the progressive development of TSF Cell 4 and the SuperCell; and
- Evaluate the likely flow paths and rate of seepage migration from the expanded TSF of the life of mine.

The groundwater simulation model is built using the "FEFLOW" Finite Element numerical tool. This is an industry standard numerical environment that meets all the functional and performance criteria required to capture and successfully simulate the dynamics and characteristics of the existing and the proposed TSF and the associated mining operations.

4.1 Groundwater model design and boundary conditions

The model domain covers a rectangular area of about 30 x 24 km and extends to the surrounding surface water divides and major water features, at significant distance from the mining pit and the TSFs. The Mining operations are located at the centre of the mesh. Model boundaries along the northwest and southwest boundary are about 12 km from the TSF, while the boundaries along the northeast and southeast boundary are about 15 km from the TSF. The model design also honours the location of the major production wells, which can be included in modelling scenarios if required The southwest boundary of the model aligns with the local topographic divide, which is assumed coincides with the groundwater divide and is treated as no-flow boundary.

Groundwater level contours suggest that regional groundwater flow movement occurs from the southwest to the northeast towards the lake system, from groundwater heads of about 370 m AHD to 330 m AHD. Local variations are anticipated at the vicinity of pumping wells which, despite of local irregularities follow the regional gradients. Groundwater levels near the TSF are at about 340 m AHD with the current depth to the water table at TSF Cell 4 is at about 10 to 20 m below ground. The total area of the model domain is 720 km^2.

An adaptive finite element mesh was designed with element size of about 20 m within the TSFs and the pits, where higher resolution is required, expanding gradually to about 500m towards the periphery of the model area. For better mesh quality and numerical stability, an "advancing front" mesh generator was used to create the mesh design which resulted in more equilateral elements, with zero Delaunay violations over the entire mesh. The mesh design in the model domain is displayed in **Figure 12**, while details its vicinity of the TSF Cells and the pits are

shown in **Figure 13.** The south-western and part of the north-eastern boundary of the model (segment AF), as well as part of the south-eastern boundary (segment BC) are treated as no flow boundaries as they coincided with the surface groundwater divides or low K formations. Boundaries along segments (AB), (CD), (DE), and (EF) are treated as fixed-head boundaries with water levels taken from the closest observation bores. Based on the topography and groundwater level data, fixed water levels of 330 mAHD and 325 mAHD were assigned along boundaries (AD) and (EF) respectively to allow for some small hydraulic gradients form the southwest to the northwest, while a linear groundwater level variation between these heads was assigned along boundary (DE).

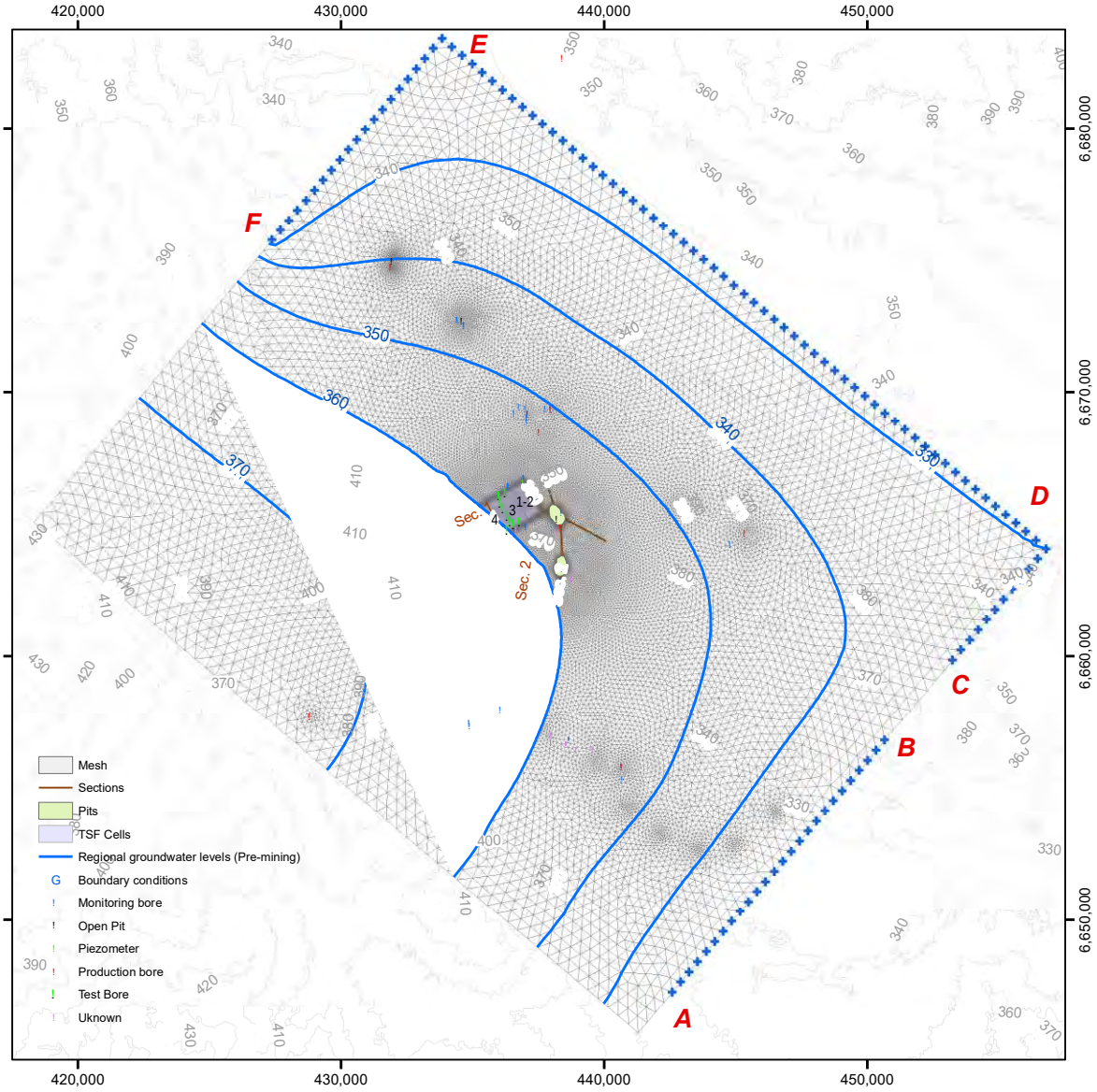

Figure 12 Model domain and boundary conditions, with (estimated) pre-mining water levels

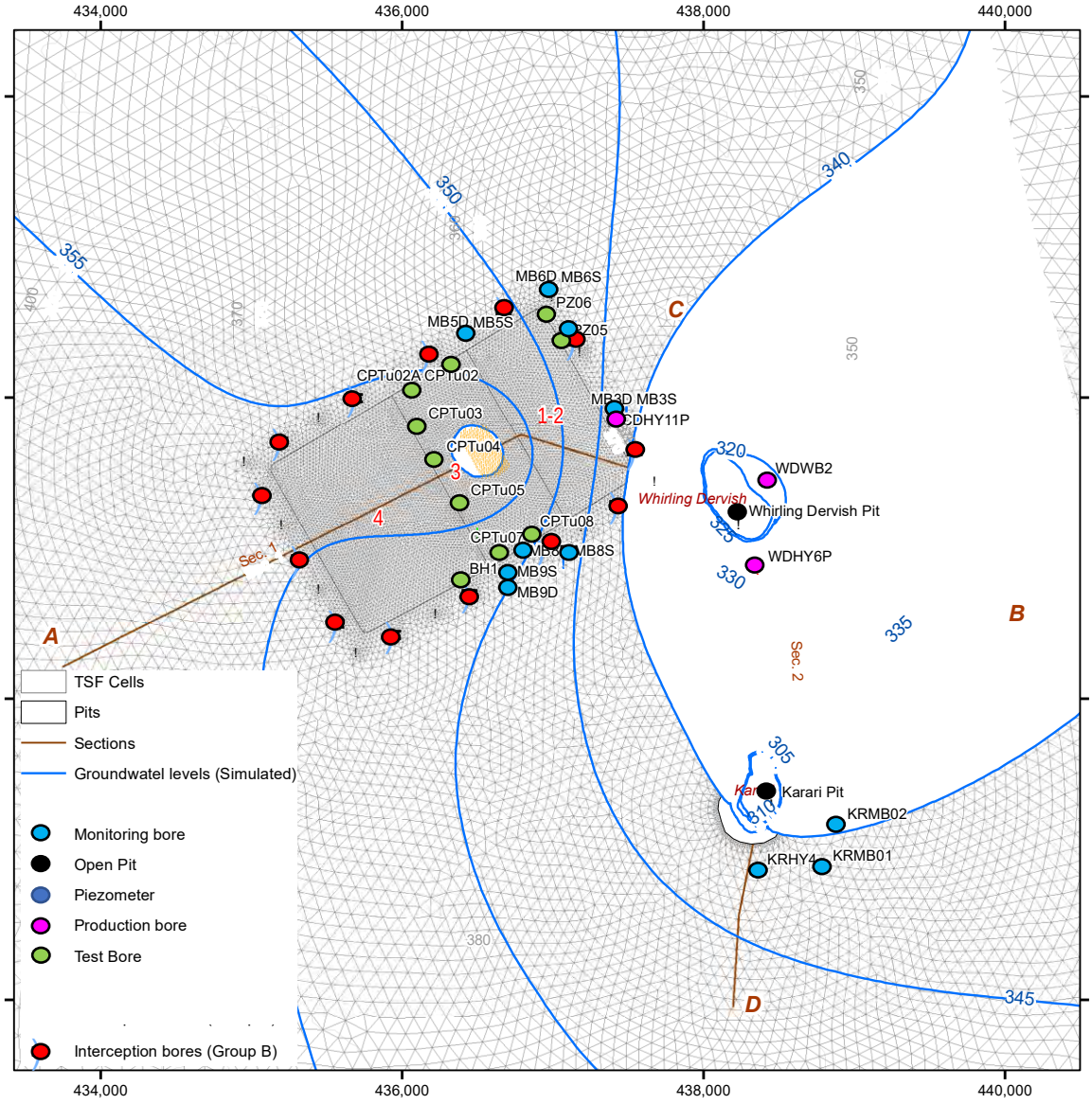

Figure 13 Details of the Finite Element mesh in the vicinity of the TSF Cells and the pits and calculated dynamic water levels.

The model area was spatially discretised into 65,704 elements per layer, 32,961 nodes per slice, and subdivided vertically into 8 model layers with total of 525,632 elements and 296,649 nodes. Details of the model mesh in the vertical direction are shown in selected sections in **Figure 15** and **Figure 15.**

- Model layer 1 was inserted on the top of the model structure to simulate separately the occurrence and the hydraulic properties of the TSF Cells and pinches out further away;
- Model layers 2, 3 and 4 are used to represent the saprolite layer as single physical layer separated numerically into upper or lower saprolite zone. Due to the lack of

data, a single physical layer was used to simulate the Saprolite unit, that for numerical stability and better resolution, was further subdivided into three numerical layers;

- Model layer 5 represents the Saprock layer; and
- Model layers 6 to 8 represent the fresh rock that, for numerical stability, was also subdivided into 3 model layers with increasing thickness with depth.

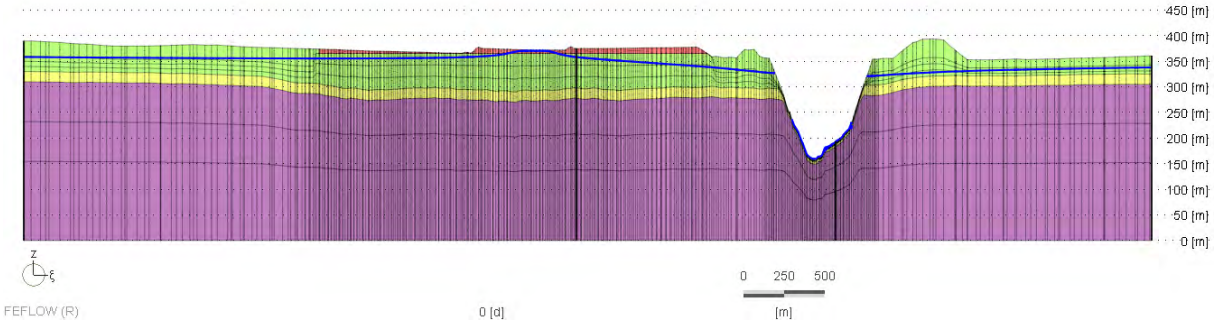

Figure 14 Details of the model mesh along section A-B

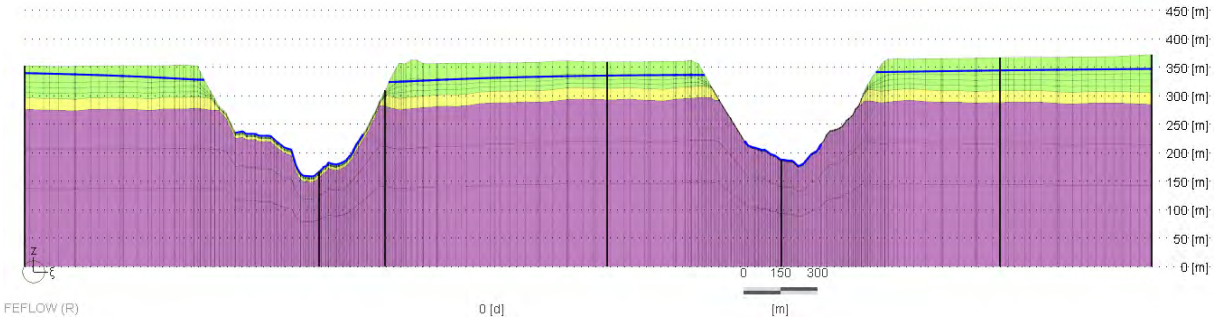

Figure 15 Details of the model mesh along section C-D

4.2 Model calibration

The groundwater level observation interwork comprises different types of bores which include, pumping wells, observation wells, piezometers and test wells. Groundwater model calibration process requires stress response data (i.e. together with water level data the corresponding time series of abstractions as well as monitoring of water level stage at the TSF ponds which are partially responsible for water level variations and mounding, especially at the vicinity of the TSF Cells). Flow rates at Whirling Dervish are typically between 2,000 and 3,000 kL/day, which is partially fed from the Saprolite and Saprock aquifers, and these can be used as calibration targets. Flow rate into the Karari Pit is significantly less (around 150 kL/day).

Most of water level data at the TSF area, were collected during geotechnical investigations, over the last couple of years. Test bores drilled in the periphery of TSF Cell 4 in 2021 were about 10 to 12 m deep but didn't intersect groundwater. In this case the water table was assumed to be about 20 mBGL. Falling head heads conducted in these bores yield low hydraulic conductivities, in the order of 10^{-4} m/day (10^{-8} m/sec) which may not be an accurate

representation because they were conducted in the unsaturated zone above the watertable. Due to a paucity of suitable transient water datasets, especially the pumping rates and the TSF water levels that created the measured water levels in bores, the model was calibrated with steady state calibration targets focusing mostly on reliable measured data from observation bores near the pit and the TSF. Suitable calibration targets for this scenario are the post-2020 water levels from the observation bores displayed in Figure 13, and the measured flow rates into the Whirling Dervish and Karari pits, which Pennington Scott (2021a) report as being 3000 kL/day during 2020.

The calibration scenario is a "dynamic – steady state" scenario which assumes operation of the SuperCell with the average ponding water level at about 370 mAHD that creates mounding conditions which are monitored at the available observation bores, as well as flow rates tow the Whirling Dervish and Karari pits of about 2000 and 160 kL/day respectively. Calibrated parameters were the hydraulic conductivities of the Upper saprolite, the Saprock and the underlying Bedrock. Based on the geotechnical investigations (Tetra Tech, 2021, p 724.) a vertical hydraulic conductivity of the tailings of 0.1 m/day (1.0 x10^{-6} m/sec) was adopted in the model.

As shown in **Figure 16**, an acceptable correlation between the calculated and observed water levels and calibration targets was achieved. The modelled flow rates into the Whirling Dervish and Karari pit sumps were 640 kL/day and 130 kL/day. The latter shows a good empirical matching between the modelled and measured flow rates; whist the former shows modelled flow rates err toward being lower than the measured rates. This suggests that dewatering rates at Whirling Dervish comprise additional discharges from the fractured bedrock that are not simulated in this study. Calibrated steady-state groundwater levels are shown in Figure 13.

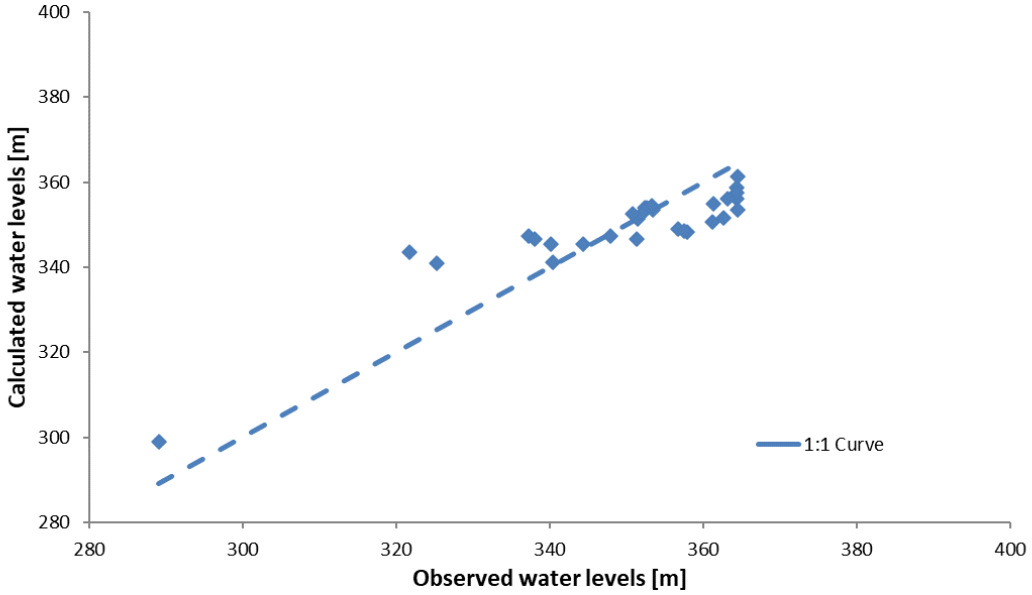

Figure 16 Modelled vs measured groundwater levels

Initial calibration attempts, by trial and error, indicated a tendency towards perched conditions between the water level in the existing TSF and the underlying groundwater level with the depth to the groundwater at the observation bores being at about 10 to 15 m. The model calibration was sensitive to the leakage rate from the existing TSF that was controlled from the vertical hydraulic conductivity of the tailings. Calibrated hydraulic parameters are shown in **Table 7**. Vertical anisotropy (K_z/K_h) of 0.1 was used for all model layers, and nearly zero rainfall recharge of 0.5 mm/year was adopted.

Table 7 Model calibrated hydraulic properties

zone	*Kh [m/day]*	*Kz[m/day]*	*Ss [-]*	*Sy [-]*
Saprolite	0.10	0.01	1 x 10^{-5}	1%
Saprock	0.20	0.02	1 x 10^{-5}	0.5%
Bedrock	0.001	0.0001	5 x 10^{-6}	0.1%
Tailings	0.86	0.086	1 x 10^{-5}	1%

4.3 Transient model – predictive simulations

The progressive development of TSF Cell 4 was incorporated in model layer 1 by inserting the geometry of the Cell at the appropriate location and modifying the slice geometry as per the TSF design (**Figure 17, Figure 20**). Time changing - fixed head boundary conditions were assigned over the ponding area of TSF Cell 4 that changed annually, in a step-wise manner, from the base land elevation of 375 mAHD to near the maximum crest water level of 383.5 mAHD (**Figure 18)**. Based on the design parameters, the total simulation time of the model was 15 years, starting with initial water level conditions from the steady state calibration. The base case vertical hydraulic conductivity of the tailings was 0.086 m/day (1x10^{-6} m/sec).

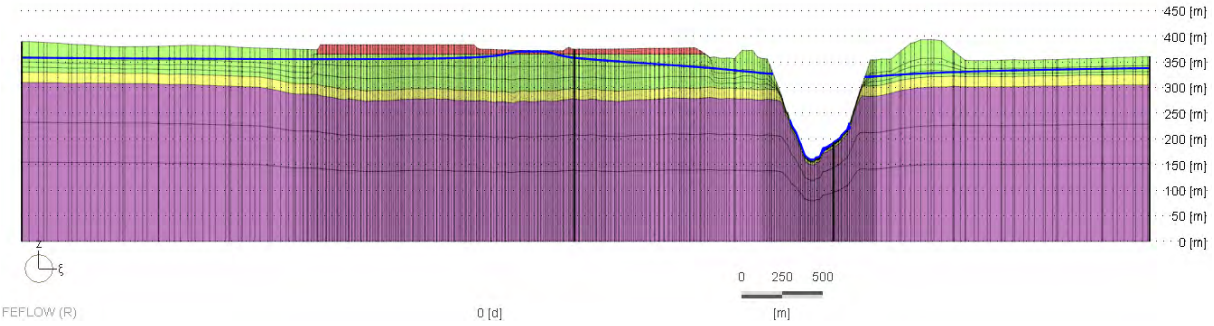

Figure 17 Calibrated current water level profile (AB) through TSF Cell 4 and SuperCell

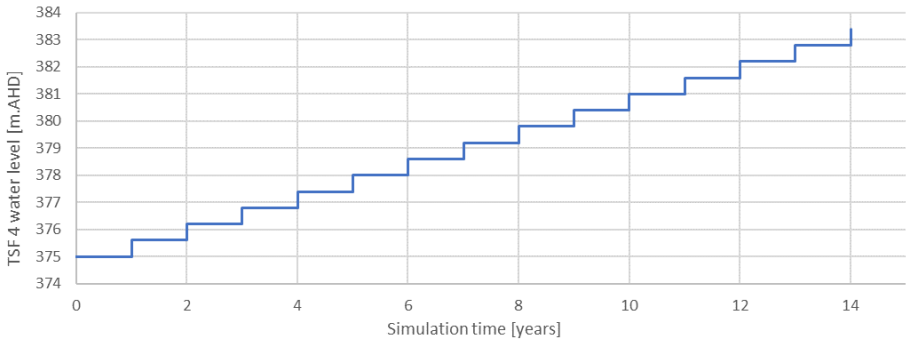

Figure 18 Water changes in TSF Cell 4 decant pool over a 15-year simulation (mAHD)

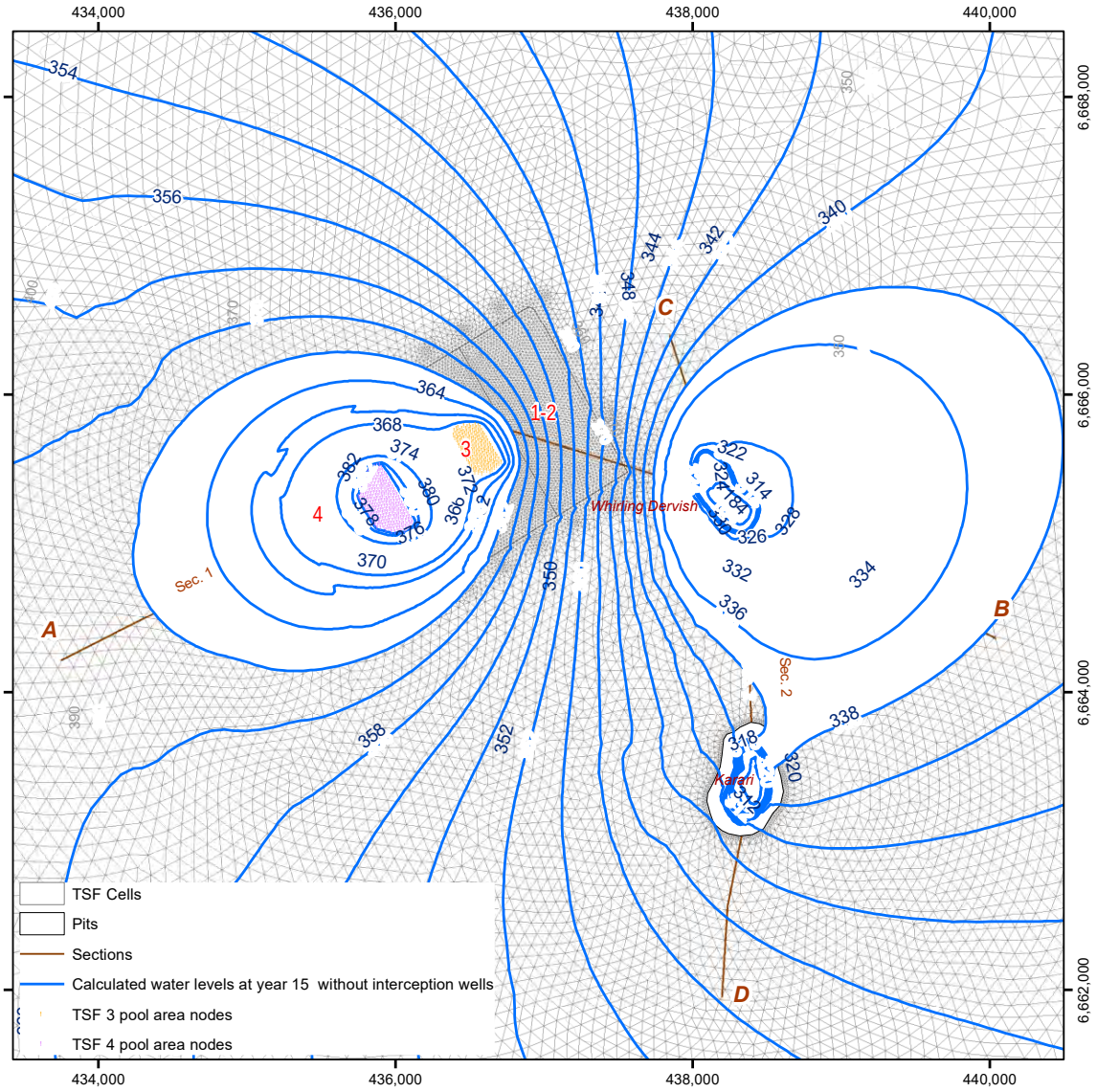

Figure 19 Modelled watertable contour map at the end of 15 years with both TSF Cell 4 and SuperCell operating without TSF recovery bores

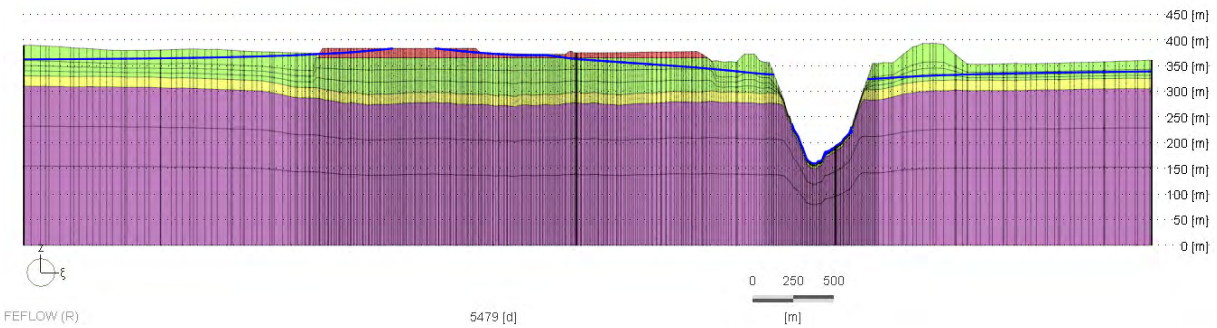

Figure 20 Modelled groundwater level profile (AB) through TSF Cell 4 and SuperCell at year 15 without TSF recovery bores

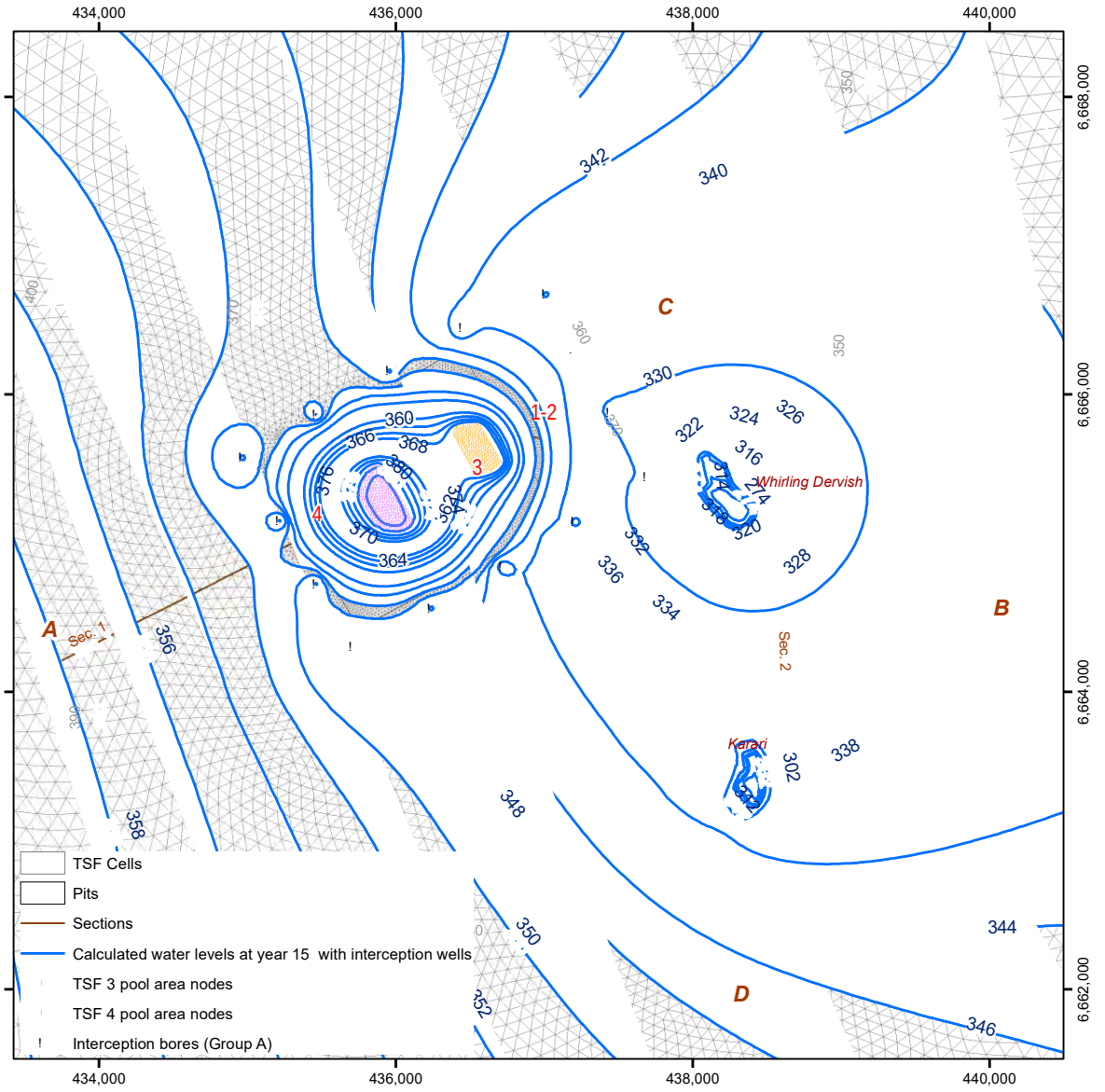

Figure 21 Modelled watertable contour map at the end of 15 year simulation with both TSF Cell 4 and SuperCell operating with TSF recovery bores

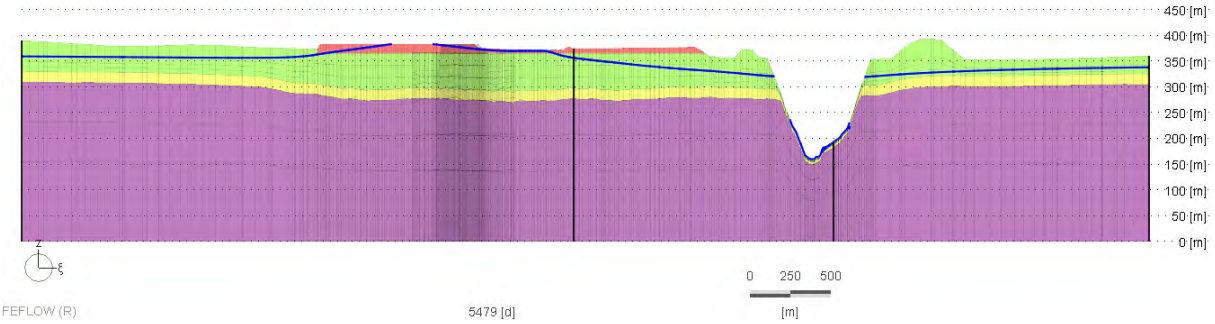

Figure 22 Modelled groundwater level profile (AB) through TSF Cell 4 and SuperCell at year 15 with both Cells and with TSF recovery bores operating

4.4 Waterlogging risk simulation

Using the calibrated model settings, two different groundwater mounding simulations were run:

- **Base Scenario** - TSF Cell 4 and the SuperCell both operating without any TSF recovery bores (decant pool water level at ~370 mAHD); and
- **TSF Recovery Scenario** – same as the Base Scenario, but with the addition of TSF recovery bores every 500 m around the TSF perimeter. Bores are operated at whatever flow rate is required to hold the bore water level at the base of Saprolite, with a maximum abstraction rate from any bore constrained to 2 L/sec.

Figure 23 shows the simulated water table elevation contours at the end of 10 years for the basecase without any TSF recovery bores, while **Figure 24** shows the resulting worst case depth to water table below ground level. Reference to these figures shows that the progressive raising of the TSF could cause mounding of the water table beneath the TSF, with a risk of waterlogging (i.e. a water table within 6 m of the ground surface) developing on the north-western boundary of TSF Cell 4.

In the event that water logging does develop, ***Figure 25*** shows the simulated mitigating influence of introducing low yield TSF recovery bores around the perimeter of the TSF, which would effectively hold the water table down to the base of the Lower Saprolite horizon. Total abstraction from the TSF recovery bores is anticipated to be in the order of 600 kL/day (+/-50%).

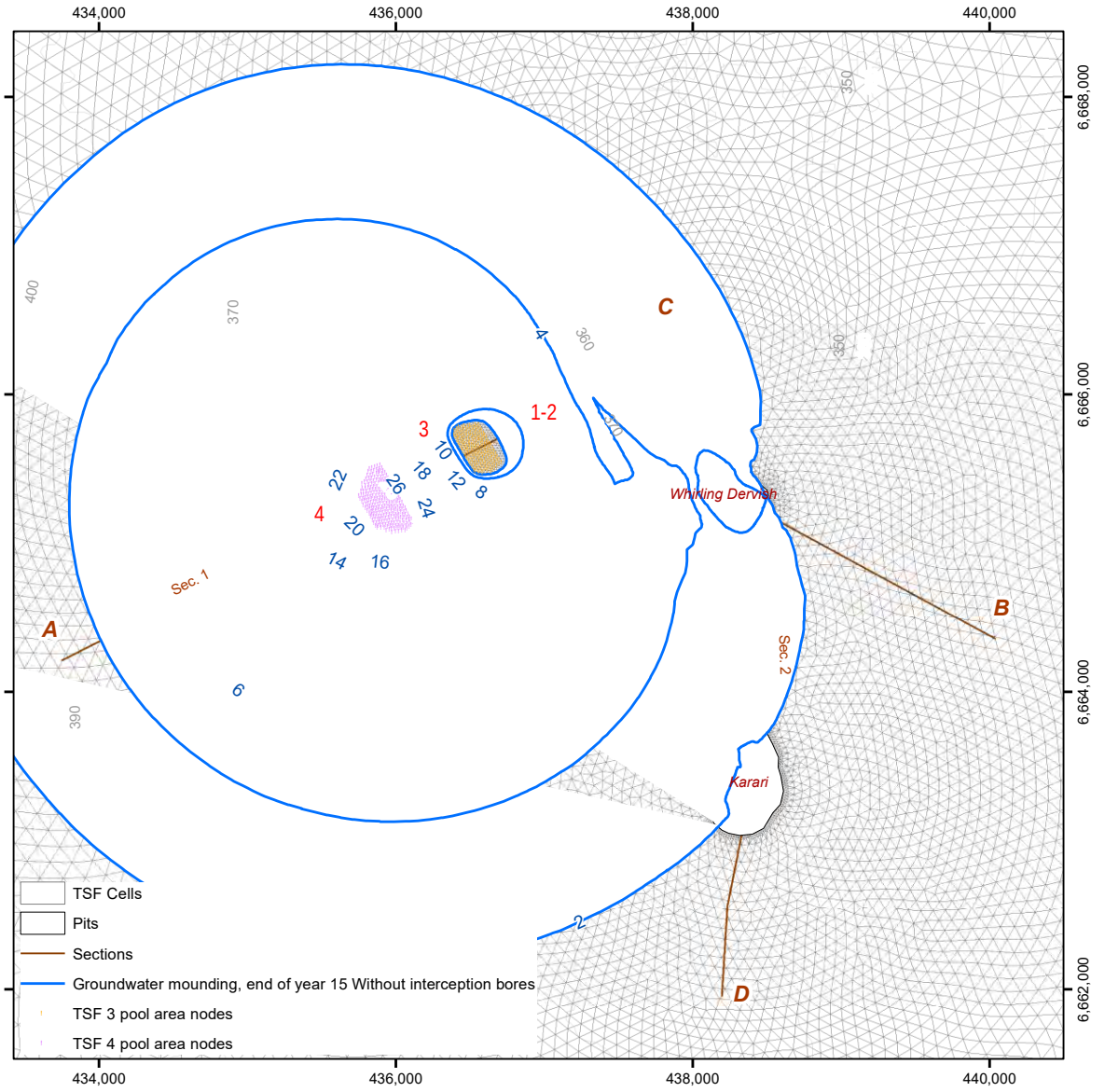

Figure 23 Simulated groundwater mounding at the end of 10 years without TSF recovery bores

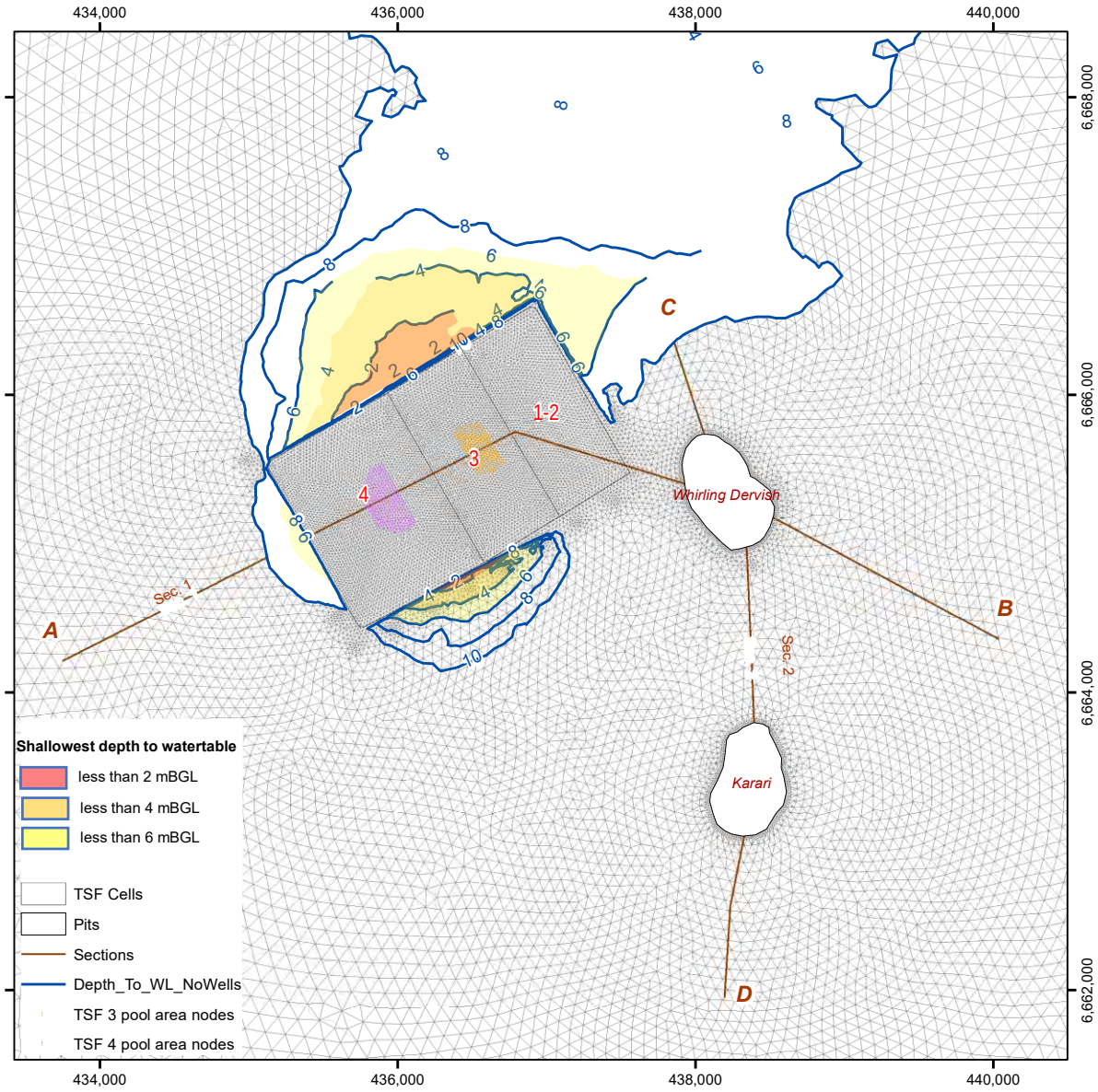

Figure 24 Waterlogging risk (watertable depth mBGL) at the end of 10 years with both TSF Cell 4 and SuperCell operating without TSF recovery bores

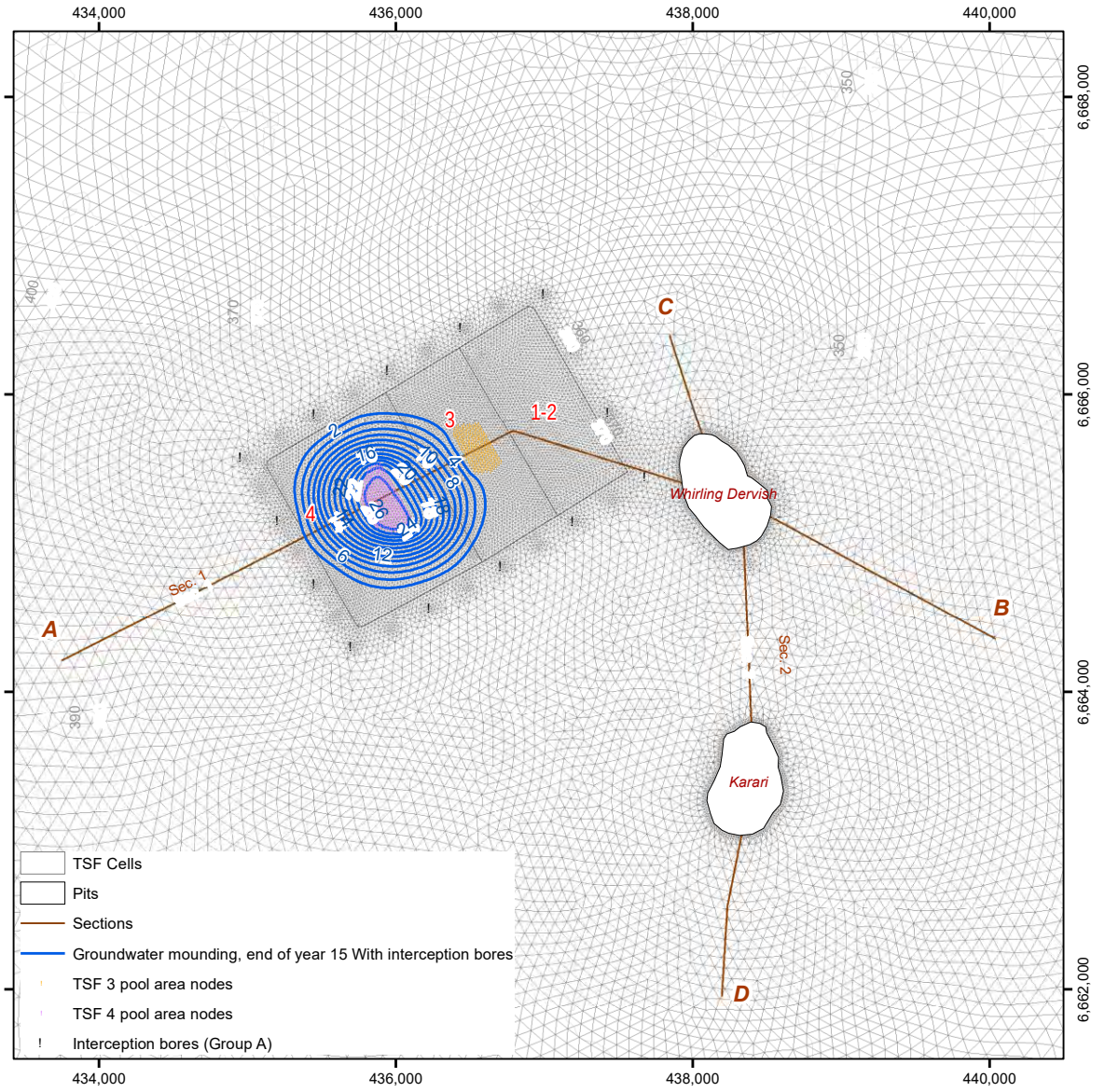

Figure 25 Simulated groundwater mounding at the end of 10 years with TSF recovery bores operating

4.6 TSF seepage rate and migration

Figure 27 and **Figure 27** show the modelled TSF seepage rates from the combined TSF Cell 4 and SuperCell at the end 15 years for both the Basecase and TSF Recovery simulations would peak at 900 kL/day and 1,300 kL/day respectively. Reference to these figures shows that the seepage rate in the latter scenario increases slightly towards the end of simulation due to the mitigation of mounding and increase of hydraulic gradients from the TSF to the underlying aquifer.

Simulations

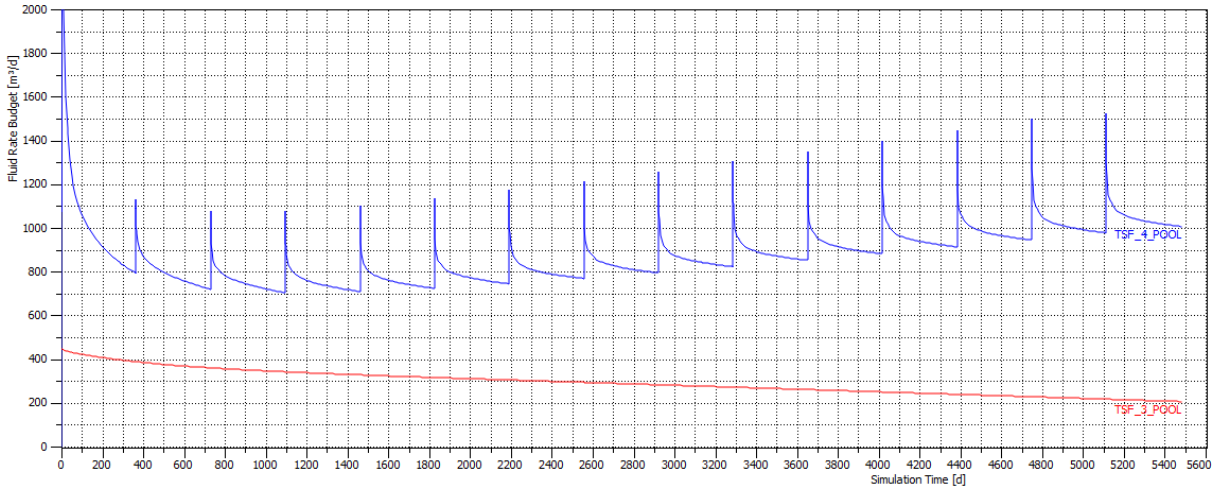

Figure 26 Simulated TSF seepage rates in the Basecase scenario (i.e. without TSF recovery bores – units kL/day)

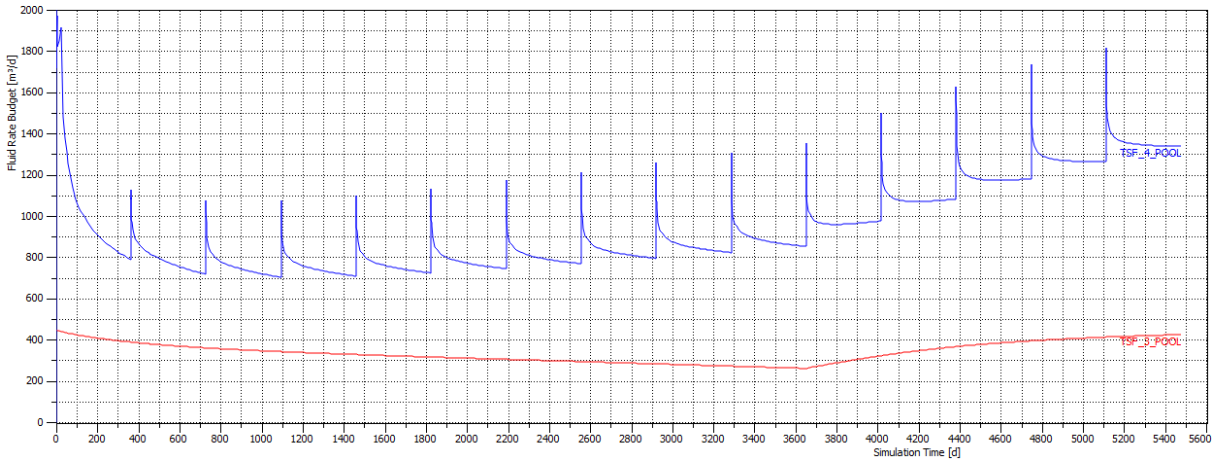

Figure 27 Simulated TSF seepage rates in the TSF Recovery scenario (i.e. with TSF recovery bores operating – units kL/day)

The migration of seepage from the TSF has been simulated in **Figure 29** and **Figure 30** using model "particle tracking" approach, where the trajectories and distances travelled by theoretical particles released into the groundwater beneath the TSF decant pond are simulated over an extended 15-year life of mine. Reference to these figures show the calculated particle tracks over 15 years without the use of interception wells and suggests that particles would reach a distance of about a kilometre from the edge of the TSF.

Beyond 15 years, particles would continue to migrate following the groundwater gradients towards the edge of model domain. For completeness, **Figure 31** and **Figure 31** show where the particle trajectories would ultimately migrate over infinite time (i.e. the steady state scenario). Reference to these figures show that the development of TSF Cell 4 poses no risk of offsite migration of seepage from the TSF because even if there were no TSF recovery bores, all groundwater migration from the TSF would ultimately be captured in the drawdown cone from the Whirling Dervish and Karari mine pits.

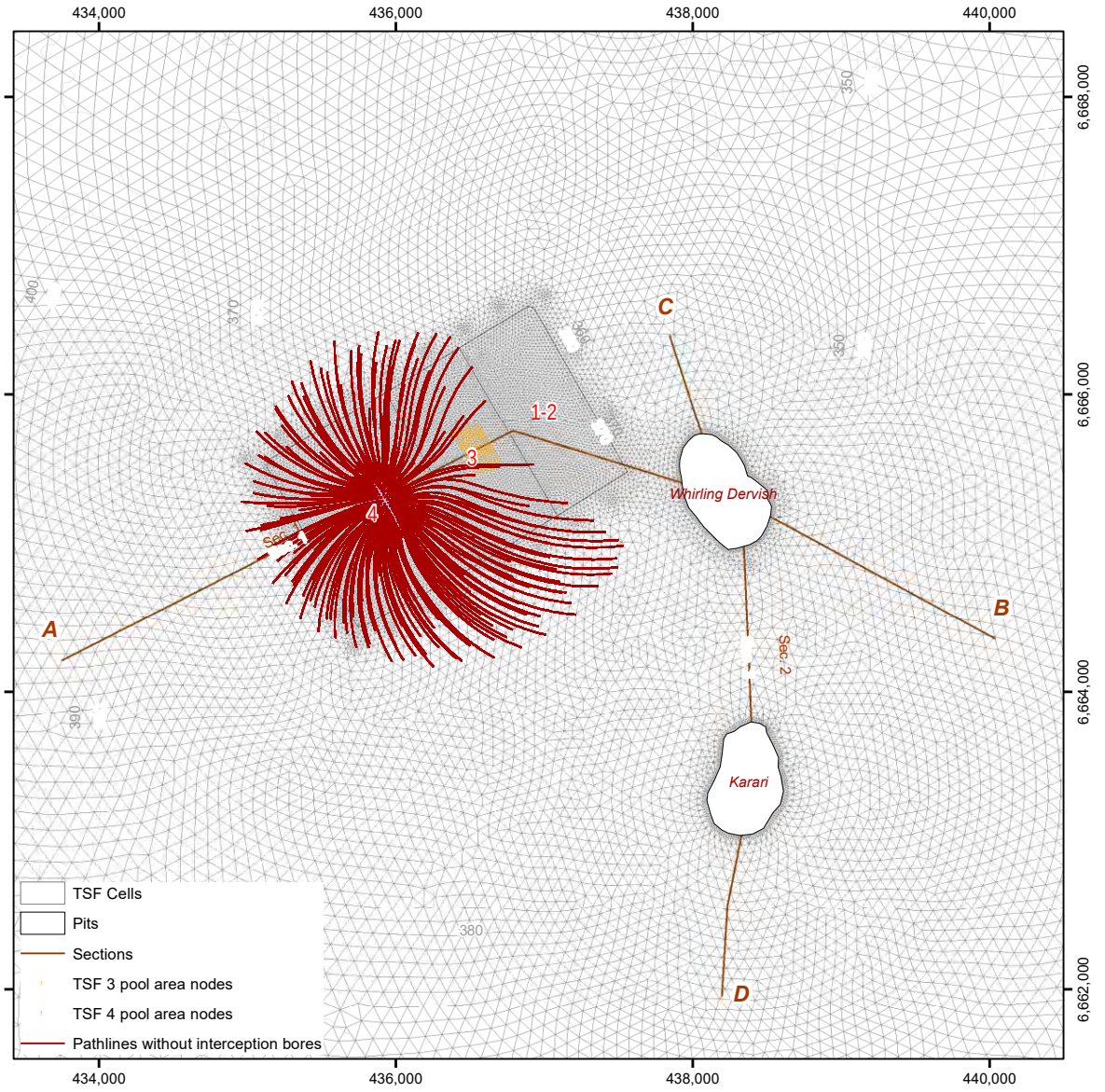

Figure 28 Modelled particle tracks from the TSF Cell 4 decant pond after 15 years of continuous TSF operation without TSF recovery bores

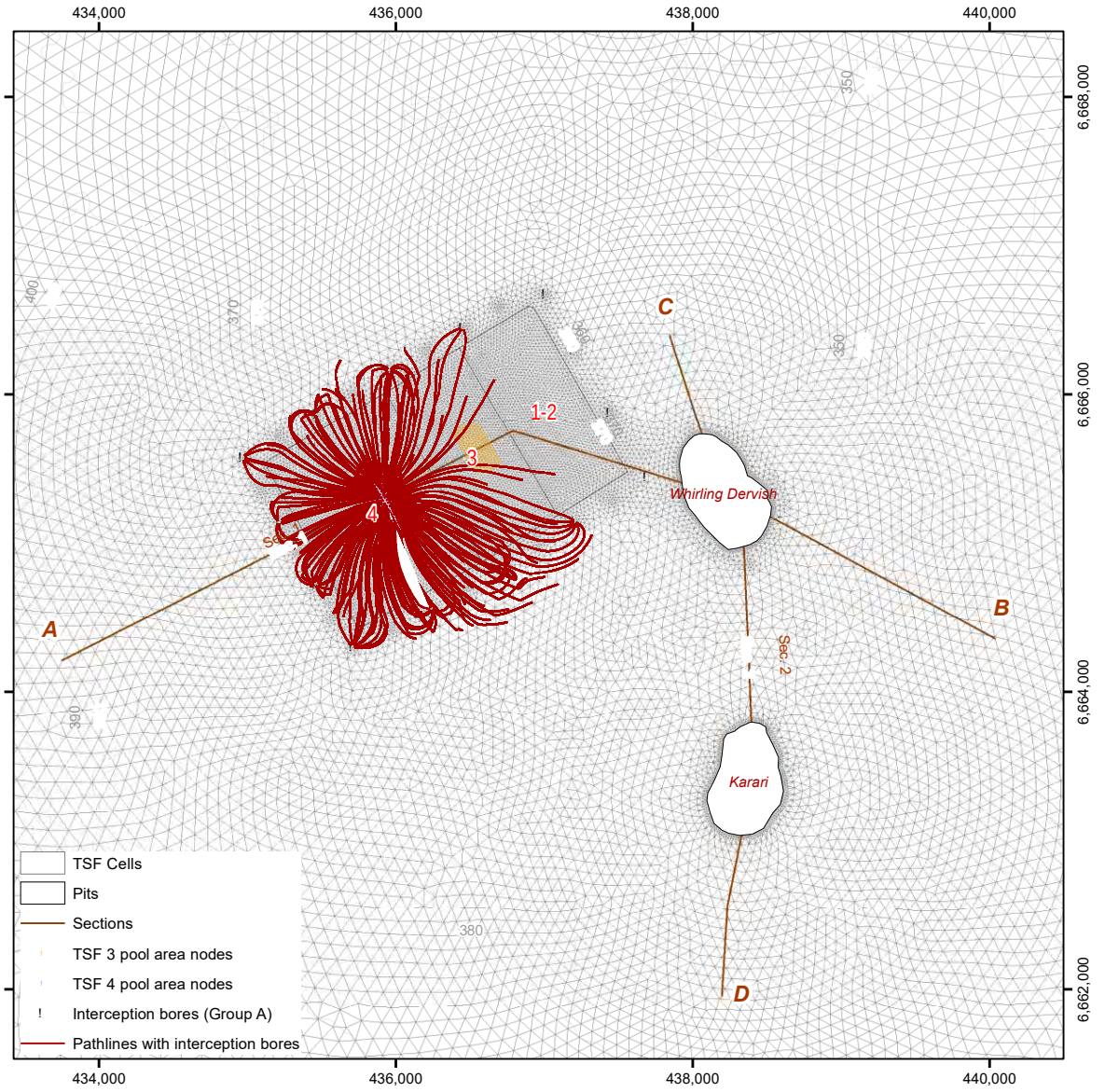

Figure 29 Modelled particle tracks from the TSF Cell 4 decant pond after 15 years of continuous TSF operation with TSF recovery bores

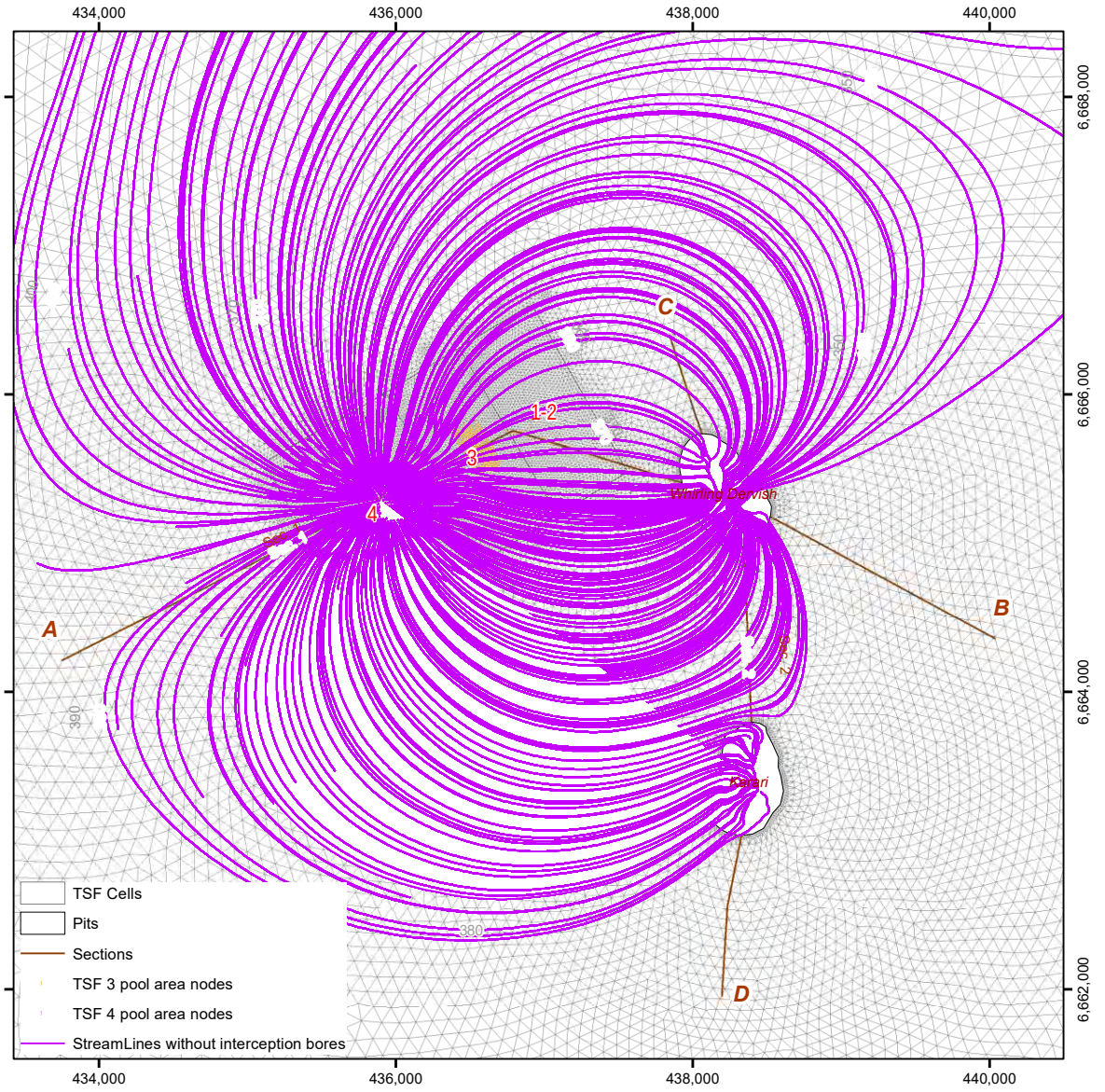

Figure 30 Modelled steady state streamlines from TSF Cell 4 without interception bores (i.e. over an infinite LOM)

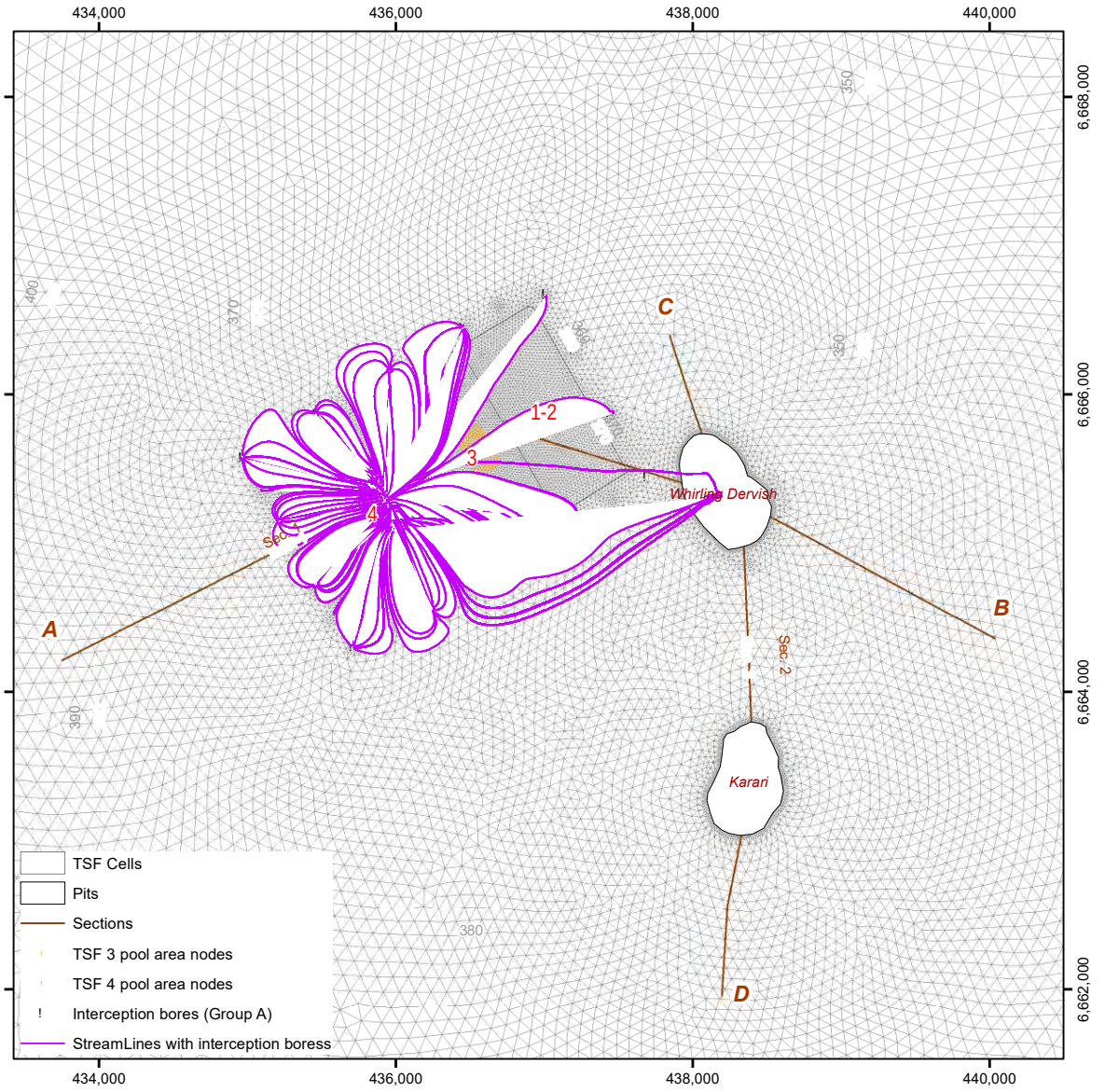

Figure 31 Modelled steady state streamlines from TSF Cell 4 with interception bores (i.e. over an infinite LOM)

4.7 Groundwater model assumptions and limitations

The model was developed based on calibrated hydraulic properties by making use of a limited number of observation bores, located mostly in the vicinity of the TSF. Hence the accuracy and validity of the model cannot be verified at higher distances away from the TSFs.

Salinity effects on groundwater flow were not simulated in this model, as variable density modelling is beyond the scope of this work. However, this is not expected to affect the modelling results presented in this report, since saline to hypersaline water is primarily used for processing.

5. CONCLUSIONS

Pennington Scott have developed a surface and groundwater management strategy for the proposed expanded TSF facility at Carosue Dam to address the following criteria:

- Design appropriate surface water drains and bunds around TSF Cell 4 as necessary to ensure that a catchment runoff from up to a 100 year recurrence storm event is passively diverted around the TSF;
- Include in the stormwater infrastructure provision for a storage dam with enough capacity as necessary to intercept catchment runoff from up to a ten year recurrence storm, thereby reducing the threat of flooding through the downstream CDO plant and mining areas; and
- Design appropriate TSF seepage recovery as necessary to ensure that there is no risk of waterlogging (watertable less than 6 m below ground) or offsite TSF seepage migration off the NSR tenements.

The findings of these combined surface and groundwater investigations regarding the cumulative impacts and recommended water design considerations for TSF Cell 4 at CDO are as follows:

- The proposed TSF Cell 4 stormwater diversions and inclusion of a 100 ML drainage pond would reduce the frequency and magnitude of stormwater discharge through the CDO Plant and mining areas by about two thirds of what currently occurs, thereby significantly improving CDO's overall flood risk profile;
- The basecase numerical model simulations suggests that by the time TSF Cell 4 reaches its full height, vertical seepage in the order of 900 to 1,300 kL/day would generate a discernible groundwater mound around the TSF, creating a risk of waterlogging on the northwestern boundary of TSF Cell 4;
- Further simulations show that the introduction of low yield TSF recovery wells around the periphery of the TSF Cell 4 would be an effective solution to mitigate water table mounding and waterlogging around the TSF;
- Despite apparent extensive watertable mounding around the TSF, particle track modelling shows that groundwater migration from the TSF through the saprolite weathering profile would be slow. So much so that by the end of an extended 15 year life of mine, seepage from the TSF would have travelled only about a kilometre from the edge of the TSF;
- There would be no risk seepage from the TSF migrating off the NSR mining tenements because all groundwater migration from the TSF is ultimately captured in the drawdown cone from the Whirling Dervish and Karari mine pits; and
- Hypersaline TSF seepage (anticipated to be up to 170,000 mg/L) would not reduce the beneficial use of the surrounding groundwater resource because the groundwater beneath the TSF is naturally hypersaline at around 40,000 to 70,000 mg/L.

In summary, provided the expanded TSF facility is constructed in accordance with the proposed surface and groundwater engineering provisions in this report, Pennington Scott foresee no unacceptable social or environmental risks associated with the proposed project.

6. REFERENCES

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Appendix B – Training and Awareness Material

MALLEEFOWL

Leipoa occellata

The Malleefowl (*Leipoa occellata*) is a large ground dwelling bird, slightly larger than a domestic hen and found in arid to semi-arid regions of Australia. This species is classified as vulnerable under the *Environmental Protection and Biodiversity Conservation Act 1999*.

The Malleefowl is a mound building species which dedicates 9 – 11 months of the year to building and maintaining a large mound of soil and leaf litter for the incubation of their eggs. There is only a 2% survival rate for Malleefowl chicks with the greatest threat being introduced predators (foxes, wild dogs and cats). Please report any sightings on site to help contribute to the management and conservation of this threatened species.

Please report any Malleefowl sightings to the Environment Department

Ext 519 or cdoenviro@nsrltd.com

PRIORITY FAUNA IDENTIFICATION CARD

MALLEEFOWL

Leipoa ocellata

The Malleefowl can be identified with the following features:

- Pale brown and grey bird roughly the size of a large chicken
- Cream lower breast and belly
- Black, white & chestnut barred or mottled upperparts
- Broad black marking down throat
- Ground-dwelling bird that generally freezes when disturbed
- Mounds are round at the base with trails of leaf litter and are usually over 1 m in diameter

Please Report Sightings to the Environment Department on 6229 9519 (EXT 9519) or cdoenviro@nsrltd.com

CDO - Site Specific Induction

CDO Site Specific Induction

Introduction

Emergency Procedures

General Site Safety Requirements

Assessment 1

CDO

Deep South

Porphyry

Assessment 2

Environment and Sustainability Management

Vehicles and Mobile Plant

Assessment 3

A Risk Based Approach

Signs, Tags & Barricading

Safe Systems of Work

Area Specific Information

Assessment 4

CONCLUSION

COURSE COMPLETION

Environment and Sustainability Management

Waste Management

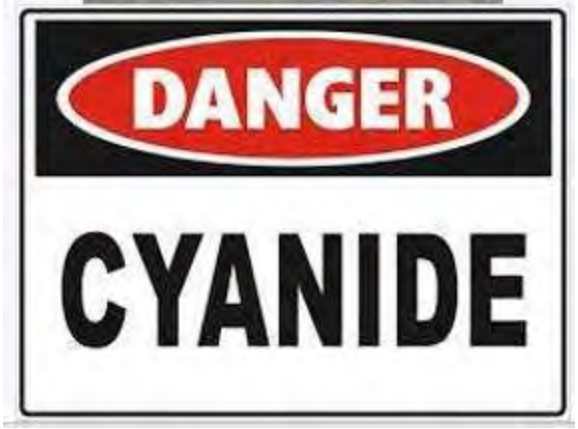
- Follow the 3 'R's
- Carry out waste disposal in an environmentally responsible manner

Waste

Environmental Protection (Controlled Waste) Regulations 2004

- Hydrocarbon Wastes (Fuels, Oils, lubricants, oily rags, oily hoses, oil/fuel filters, etc.);
- Hazardous Chemicals (Acids and Solvents);
- Hazardous Substances (Anything that has the potential to cause harm to personnel or the environment)

Do NOT dispose of these materials at the landfil



Controlled Waste

Chemical Wastes and Hazardous Substances:

- To be handled, stored and disposed of in accordance with the applicable Safety Data Sheet (SDS)

- To be disposed of on a case by case basis; contact the Safety or Environmental Departments for information regarding chemical and Hazardous Substance Management.

Controlled Waste - Hydrocarbons

Hydrocarbon Contaminated Wastes include:

- Anything oily or greasy;
- Oily rags;
- Oily hoses;
- Soaked spill absorbents/kitty litter;
- Oil filters; etc.

To be disposed of into Red wheelie bins and skips only. Skips are sent off site for licenced disposal. Bulk Fuel, oil and lubricant wastes are to be stored in drums or pods in bunded areas until transport can be arranged off site.


HYDROCARBON
CONTAMINATED
WASTE


Phone 1300 METALMAN
HYDROCARBON BIN

General Industrial Waste: Inert wastes

Inert Waste Materials to be disposed of into green bins and skips or directly to the site industrial landfill:

- Concrete rubble
- White Goods (degassed)
- Sample Bags/Core Trays
- Plastic Packaging
- Co-mingled wastes
- Clean/empty plastic drums
- Broken Pallets

DO NOT DISPOSE OF HYDROCARBONS OR HAZARDOUS SUBSTANCES AT THE LANDFILL

Putrescible Waste

Putrescible waste is waste which will become putrid through decomposition. Disposed of to green bins at camps or offices:

- Food Scraps
- Food Stained or Wet Cardboard
- General Office or Domestic wastes

Recycling - General

Domestic recyclable materials- place in blue bins and Skips:

- Glass;
- Clean Plastic;
- Paper;
- Aluminium Cans; and
- Cardboard

Blue recycling skips are sent into Kalgoorlie for distribution/recycling.

Contractors may utilise recycling skips from Northern Star stores after contacting Store-men and gaining permission to take new skips and bring back full skips.


RECYCLABLE
WASTES
Cardboard
Aluminium Cans
Glass
Plastic
Aerosols


NO BUILDING RUBBLE
NO CHEMICALS
NO HAZARDOUS WASTE
NO ASBESTOS
NO TYRES
PLEASE DO NOT PARK
IN FRONT OF
DO NOT ENTER
13 13 39

Landfill Locations

Carosue Dam Operations

- ESS Putrescible Landfill
- Landfill (General Waste & Scrap Steel)

NORTHERN STAR RESOURCES LIMITED

Date: 19/09/2022 | Author: HLindsay | Coordinate System: GDA 1994 MGA Zone 51 | Scale: 1:13,041 |

Water Management

Groundwater at Northen Star is hypersaline (200,000 – 300,000mg/l TDS) in almost all cases. Groundwater ranges between around 5–8 times saltier than seawater (seawater 40,000mg/l TDS).

Water of this salinity is toxic to almost all vegetation, if discharged into the natural environment, it will kill basically everything it comes into contact with. Northern Star therefore have to closely manage hypersaline water on site.

Management Measures to Prevent Saline Water Spill:

- All pipelines are set in V Drains
- Telemetry Pressure/Level Sensors
- Daily Operational Inspections
- Isolation Valves
- Catchment Sumps installed on roadsides

Report all leaks and spills ASAP

Northern Star has over 6 Turkeys Nest Dams available to provide hypersaline water for dust suppression on haul roads.

All water containment facilities must be operated with at least 300mm freeboard at all times, with the TSF also requiring 500mm of operational and beach freeboard. All Tailings Pipelines, Return water lines and TSF cells must be inspected every 12 hours for integrity. All turkeys nest dams must be lined or in the case of the TSFs, clay lined to specific permeability's.

Hydrocarbon Management

Hydrocarbons are fuels, oils and lubricants.

Hydrocarbons must be stored, handled and disposed of correctly to prevent soil and water contamination.

All hydrocarbons must be stored in bunded areas or on appropriately bunded pallets to provide secondary containment.

Servicing machines should preferentially be conducted on impermeable surfaces. Preventative spill measures must be put in place to catch spills before they occur (i.e. spill matting, catch trays, etc.) even if servicing on concrete pads.

Hydrocarbon Spills

Hydrocarbon Spills >5L must be reported and an incident report completed. All spills, no matter what volume must be cleaned up.

Spill Response

1. **CONTROL**
2. **CONTAIN**
3. **CLEAN UP**
4. **REPORT**

Spill Kit Content

Spill Kit Contents

All Hydrocarbons must be stored on Bunds

Spill Response Procedure - Bioremediation

If a spill of hydrocarbons occurs on land, then the contaminated soil must be excavated and taken to the site bioremediation Area for treatment.

The bioremediation area consists of a series of clay lined cells, contaminated soils are disposed of into the currently active cell, dumping from the back and working towards the front. Material is to be dumped in the active cell only as high as the surrounding cell walls.

Each operating project at Northern Star has a separate bioremediation area available for contaminated soils.

Hydrocarbon & Chemical Spills

Click on the cards below to determine which report to use for which type of spill.

Report all chemical spills

Event Incident Report

Report all hydrocarbon spills greater than 5L

Incident Report

Report all hydrocarbon spills less than 5L

Quick Spill Card

High risk Chemicals are stored onsite, some of these include:

- Sodium Cyanide
- Hydrochloric Acid
- Sodium Hydroxide
- Diesel
- Lime
- Silver Nitrate
- Degreasing Agents.

Chemical Management

Prior to any new chemical arriving onto site, the chemical request process must be completed by the department requiring the chemical and approved by OHS Department.

An SDS is a document which describes

- Whether the chemical is classified as hazardous – red, amber or green
- Ingredients
- First aid advice
- Risk controls
- Emergency Information

SDS's are available for each chemical used, mixed or produced onsite. The SDS is readily accessible to all employees.

Compliance - Environmental Protection Act 1986

- Licences apply to NSR Carosue Dam Projects;
- L7465/1999 is in place for Carosue Dam;
- Licence Conditions must be complied with AT ALL TIMES;
- Enforced under law therefore failure to comply:
    - Improvement Notice
    - Formal Letter of Warning
    - Fines up to $125,000 for Company and/or an individual
    - Licence Revoked
    - Copy of Licence accessible in all work areas: managers and supervisors must familiarise themselves with relevant sections

Government of Western Australia
Department of Water and Environmental Regulation

Licence

Licence number	L7465/1999/9
Licence holder	Northern Star (Carosue Dam) Pty Ltd
ACN	116 649 122
Registered business address	Level 1, 388 Hay Street SUBIACO WA 6008
DWER file number	DER2020/000690
Duration	1/11/2021 to 31/10/2041
Date of amendment	12 November 2021
Premises details	Carosue Dam Operations MENZIES WA 6436 Mining tenements M28/166-168, M28/245, M28/269, M31/208-210, M31/219-220, M31/295, L28/23, L28/24, L28/25, L28/26, L28/28, L28/29, L28/30, L28/31, L28/41, L31/37 and L31/40 As defined by the Premises map in Schedule 1

Prescribed premises category description (Schedule 1, Environmental Protection Regulations 1987)	Maximum production or capacity
Category 5: Processing and beneficiation of metallic or non-metallic ore	4,000,000 tonnes per annual period
Category 6: Mine dewatering	1,000,000 tonnes per annual period
Category 52: Electric power generation	28 MW
Category 54: Sewage facility	150 m^3/day
Category 63: Class I inert Landfill	3,500 tonnes per annual period
Category 64: Class II putrescible landfill	6,000 tonnes per annual period
Category 73: bulk storage of chemicals, etc.	1,400 m^3

Land Disturbance

Clearing of Native Vegetation regulated by Environmental Protection (Clearing of Native Vegitation) Regulations 2004

- “Minimise Disturbance” where possible
- NSR Clearing Activity Permit
    - Ensures area to be cleared is approved
    - Controls are in place to prevent unauthorised disturbance
    - Rehabilitation materials (topsoil and vegetation) are preserved
    - The spread of weeds is prevented

Environmental Incidents & Hazards must be reported to your supervisor immediately

Wildlife

- Please DO NOT feed any wildlife!
- Drive on designated roads and slow down for wildlife.
- For all environmental concerns call - 6229 9519
- If you hit an animal, stop and check it. If it is mortally wounded but not dead, please euthanise it if you are comfortable to do so and then remove it at least 10m off the road. If it is not severely injured and does not present a safety hazard, bring the animal back to the Environmental Department for assessment and treatment. If it is a kangaroo or a wallaby, check the pouch for a Joey.

Malleefowl (Vulnerable) EPBS Act 1999 are regularly sighted at CDO. All sightings must be reported to the Environmental Department

1 of 1

Community and Stakeholders

The main land use on and surrounding Northern Star leases is pastoralism. NSR Operations are located on three operating pastoral leases; Pinjin, Gindalbie and Edjudina.

Northern Star have a close relationship with these neighbours and this relationship must be maintained by NSR employees and contractors at all times. Any consultation with neighbouring pastoralists must be communicated to the Northern Star Environmental Department.

If you become aware of any pastoral related issues (injured stock, feral animals, broken fences, etc.) please report these to the Environmental Department.

Complete the content above before moving on.