CALLEJA GROUP
Innovation in Waste Management

Project	**Star Colliery Dam**
Subject	Rehabilitation and Environmental Management Plan
Site	181 Cummings Road, Maddingley, VIC 3340
Version	**Rev 1**
Date	7 April 2021
Author	Calleja Group / Maddingley Brown Coal Pty Ltd

Document

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Contents

Abbreviations

Abbreviation	Description
CHMP	Cultural Heritage Management Plan
EMP	Environmental Management Plan
EPA	Environment Protection Authority
GGF	Growling Grass Frog
Landfill BPEM	Best Practice Environmental Management, Siting, Design, Operation and Rehabilitation of Landfills, EPA Publication 788.3
MBC	Maddingley Brown Coal Pty Ltd
MSC	Moorabool Shire Council
PASS	Potential Acid Sulphate Soil
SUZ	Special Use Zone
TPZ	Tree Protection Zone
R&EMP	Rehabilitation & Environmental Management Plan

1. Introduction

The rehabilitation of the Star Dam site consists of the following elements:

- Importation of fill and profiling of the existing dumps to create a stable final landform.
- Weed and vermin control program to reduce the concentration of weeds on site and reduce the available habitat for rabbits.
- Increase the area of the site immediately adjacent to the current cropping area for agricultural purposes.
- Revegetate the remainder of the site for a variety of end uses including agroforestry and local provenance native vegetation.

Key considerations in the Environmental Management Plan (EMP) include the identification of key environmental risks and mitigation measures associated with the rehabilitation works.

2. Existing assessment and management plan

2.1 PASS Environmental Management Plan

Vic EPA approved MBCs Potential Acid Sulphate Soil (PASS) Environmental Management Plan (EMP) on 7 May 2019. The PASS EMP outlines environmental objectives to protect human health and the environment from identified risks associated for the acceptance and management of PASS within the Colliery Star Dam and clean fill within the designated areas on-site. The PASS EMP is outlined in ANNEX C.

2.2 Proposed works plan

Davidson Design Studios developed a Proposed Works Plan (Davidson, 2020) for the management and rehabilitation of the site. Rehabilitation works will be undertaken in general accordance with the following items outlined by Davidson (2020):

- The continued use of Star Colliery Dam for management of PASS.
- Audit process to document the movement of fill.
- Management of dirt/ sediment transported underneath vehicles and on tyres.
- Rehabilitation of identified areas into a eucalypt woodland.
- The remediation of the landscape adjacent to Parwan Creek with the Star Colliery Dam site.
- The creation and specification of Growling Grass Frog (GGF) habitat within the Star Colliery Dam.
- Planting schedule to create a buffer zone between on-site works and the frontage of the Star Colliery Dam site with Cummings Rd and Smith St.
- Ongoing management of land.

The staging plan outlined by Davidson has since been revised as per that shown in ANNEX A.

2.3 Ecological assessment – Growling Grass Frog

An existing conditions assessment of the Star Colliery Dam was undertaken to determine the suitability of the historical mining pit/ dam, including the import of clean fill and management of PASS, as a Growling Grass Frog habitat.

The assessment indicated the Sar Colliery Dam will provide a significantly enhanced habitat for the Growling Grass Frogs (GGFs) than the existing unrehabilitated water-filled former coal mining void. Key activities during and post rehabilitation works at the Star Colliery Dam are outlined to provide a habitat that will be significantly enhanced for GGFs.

See ANNEX C for the Growling Grass Frog Management Plan (Zone, 2019).

2.4 Cultural heritage assessment

A Cultural Heritage Assessment was undertaken by Andrew Long & Associates (Long, 2018) for the rehabilitation of the Star Colliery Dam site. The report concluded that the Star Colliery Dam site is considered unlikely that Aboriginal cultural heritage places remain within the defined activity area or will be impacted by the rehabilitation of the site. The planned works on-site does not contain an area of Aboriginal cultural heritage significance and therefore a mandatory CHMP is not required.

2.5 Traffic engineering assessment

A traffic engineering assessment was undertaken for the rehabilitation earthworks at the Star Colliery Dam site by TraffixGroup (2018). The assessment reviewed access routes to the site and high-level traffic impacts on surrounding roads with regards to the rehabilitation earthworks. The assessment indicated:

- The level of traffic likely to be generated by rehabilitation earthworks is low, spread throughout the day and will not have a detrimental impact on the surrounding road network and intersections.
- The traffic engineering assessment did not identify risks that were considered likely to prevent the relevant traffic planning permits required for the rehabilitation earthworks.

Upgrade works were not recommended as part of the TraffixGroup (2018) assessment report.

2.6 Traffic management plan

A Traffic Management Plan (TMP) was prepared for proposed rehabilitation and earthworks as part of the proposed works plan for the site by TraffixGroup (2021).

TMP provides identification and assessment of the local road network, predicted traffic generation, likely vehicular travel routes, potential traffic impacts and internal traffic management.

The TMP (see ANNEX C) outlines:

- Heavy vehicle traffic associated with the proposal is generally expected to travel to/ from various sites across Melbourne, therefore likely that vehicle movement will be predominantly generated to and from the east of the site.
- There are alternative routes between Melbourne and the site.
- The haul route to/ from the Western Freeway will be via Woolpack Road.
- The most direct and convenient route for heavy vehicles between the site and the Western Freeway is via Cummings Road > Geelong-Bacchus Marsh Road > Woolpack Road > Bacchus Marsh Road > Hopetoun Park Road (Melbourne-bound only) > Western Freeway. For arrival trucks from Melbourne a freeway exit connection is provided directly with Bacchus Marsh Road. This route is expected to be the quickest, shortest and most direct route and avoids travelling through the Bacchus Marsh town center and is consistent with VicRoads guidelines as suitable for heavy vehicles (B-Doubles) to utilize.
- Non-locally generated site traffic would generally be distributed via the wider road network between destinations including Melbourne (to/ from the east), Ballarat (to/ from the west) and Werribee/ Geelong (to/ from the south), see Figure 1.
- Vehicles accessing the site to/ from the south (expected to occasionally occur) may elect to utilize Smiths Road or School Lane to access Cummings Road from Geelong-Bacchus March Road given the shorter travel distance. These are considered suitable alternative travel routes for the occasional truck movement given that only a limited number of properties take access via these roads and therefore associated existing traffic volumes are low. Whilst School Lane has a carriageway that accommodates simultaneous two-way traffic, Smiths Road only accommodates a single lane of two-way traffic.

Nevertheless, Smiths Road has a wide gravel/ grass shoulder on both side which allows for vehicles to pull over and pass during the unlikely situation where vehicles are travelling along this road at the same time.

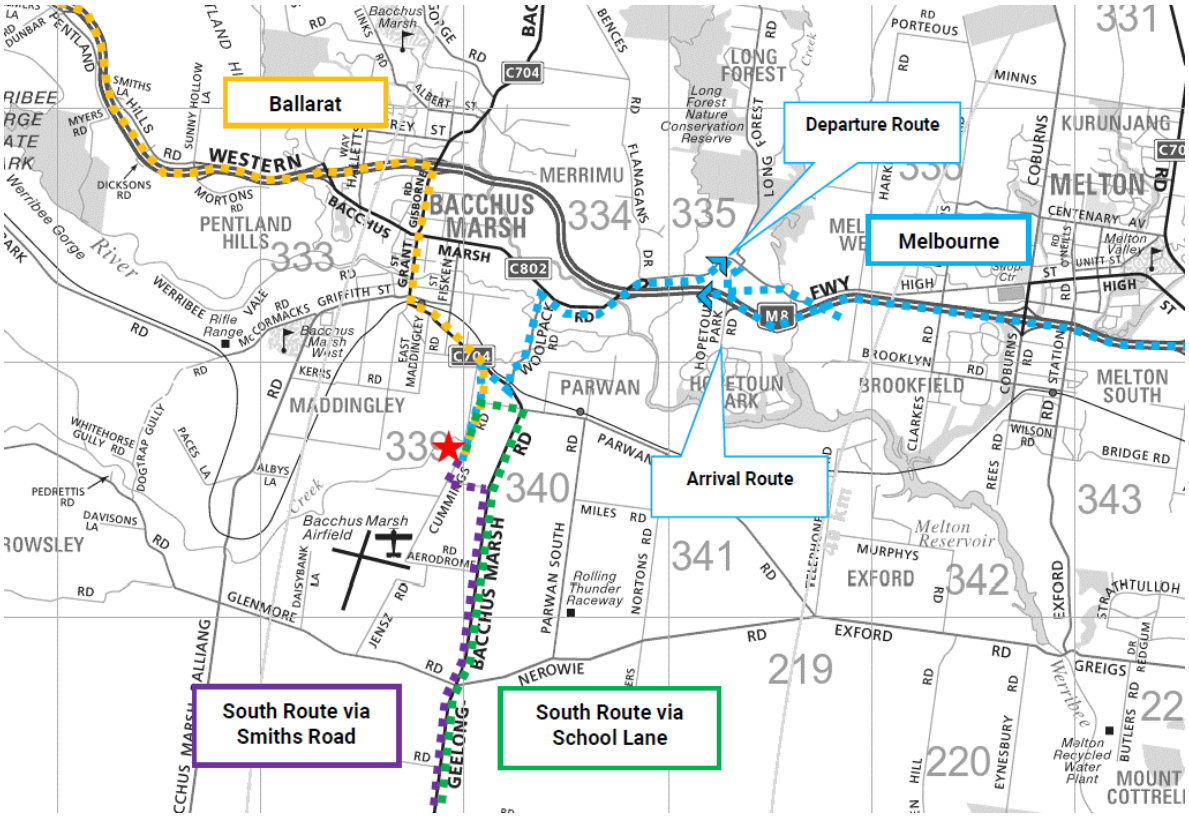


Figure 1 Likely Travel Routes (from TraffixGroup [2021] TMP).

Most (if not all) of the projected traffic generated by the proposal will utilise the intersection of Geelong-Bacchus Marsh Road/ Cummings Road considering the likely travel routes outlined above. The level of traffic generated as a result of the proposal is expected to be low, spread throughout the day and have no detriment to the operation of the Geelong-Bacchus Marsh Road/ Cummings Road intersection and the surrounding road network and intersections (TraffixGroup, 2021).

The size of the site allows for internal management of fill placement, significant opportunities along for internal vehicle accessways for truck queue's and/ or parking. The TMP therefore recommends that there is no additional requirement for a truck queuing area on- or off-site on external road network(s). In addition, no internal traffic management plan was recommended due to the available space on-site.

The TMP concluded:

- A maximum of 20 trucks/ day undertaking two trips each per day in any given week, during operating hours.
- The level of traffic generated because of the proposed work plan is low, spread throughout the day and is not predicted to have a detrimental impact on the surrounding road network and intersections.
- Due to the size of the site available for management of the proposed work plan, an internal traffic management plan was not considered necessary to manage queueing trucks.

- There are no traffic engineering reasons why an amended planning permit for the proposed rehabilitation and earthworks at the site should be refused.

Further information regarding likely travel routes, traffic impacts and internal traffic management are outlined in ANNEX C, see TMP (TraffixGroup, 2021).

3. Proposal design

3.1 Rehabilitation work

Clean fill and existing overburden at the Star Dam will be placed at the site to produce a stable landform that will improve the water quality in Parwan Creek and the environmental and amenity value of the area once filling is complete. Only clean fill that meets relevant EPA criteria for clean fill will be brought to the site.

The key issues to be managed while filling the site are:

- Protection of Parwan Creek from sediment runoff.
- Minimising impact of surface water runoff to Star Dam.
- Staging of fill placement.
- Minimising dust generation.
- Weed and vermin management.
- Long term revegetation strategy.
- Truck movement controls.
- Safe operations.

Fill placement will be staged in a manner to allow for clean fill to be safely placed onsite while minimising any on site or offsite environmental and amenity impacts. At the commencement of fill placement, the site will be graded to allow safe truck access in areas where fill is to be placed.

3.2 Fill staging plan

Fill will be placed across the site in stages to allow for the progressive rehabilitation of the site to occur. Each staging area is described in Table 1.

Table 1 Staging area descriptions

Area	Staging
Area A	Located in the south west corner of the Star Dam site this area contains the upper-level mine spoil dump and the highly eroded spoil scarp between the upper level and Parwan Creek. Consistent with the Proposed Works Plan (Davidson, 2020), the upper section will be profiled to allow for a mix of farming and native vegetation planting to occur. The spoil scarp area will be treated by battering back the top of the slope and filling from the base to provide a less steep slope that can be planted out in accordance with the Davidson proposed works plan.
Area B	Located in the north west corner of the fill placement area will be levelled to allow this site to be used as a staging area for storage of rock for placement into the Star Dam to facilitate Growling Grass Frog habitat development. The top back of Parwan Creek will be contoured so as direct runoff from this area into the Star Dam rather than Parwan Creek.
Areas C, D, E and F	To be filled sequentially commencing with C and ending with F. The staging of filling in this manner is to allow for each zone to be filled to final height prior to filling the adjacent zone. The former quarry void will be filled last to allow for rock suitable for Growling Grass Frog habitat construction to won from overburden and oversized rock dumped in this location.

Area G	To be filled last as filling of this stage will restrict truck movements to other parts of the site. The portions of area G that are not to be filled will be revegetated in accordance with the proposed work plan (Davidson, 2020).

Approximately 1 million cubic meters of fill will be required to be imported to the site to assist in the site re-profiling, this is in addition to the 67,000 cubic meters of cut and fill of existing material on the site. Approximate cut fill depths and volumes are provided for each staging area in Figure 3, ANNEX A.

3.3 Projected staging plan timeline

The projected timeline required to accept approximately one million cubic meters of clean fill to complete stages A to G of the rehabilitation earthworks is 10 years. An additional two years has been assumed to undertake site preparation and complete vegetation/ soil stabilization works as outlined in this document. Therefore, the estimated timeframe for the proposed work plan is approximately 12 years.

Assumptions used to calculate the projected timeline for the proposed works plan is detailed in Table 2.

Table 2 Projected timeline for proposed works

Item	Assumptions
Fill volume	Cut/ fill volumes shown in Figure 3 ANNEX A: Fill: 1,067,783 m^3 Cut: 66,568 m^3 Balance: 1,001,215 m^3 of fill required for rehabilitation earthworks.
Fill mass	1,001,215 m^3 multiplied by 1.65 T per m^3 is equal to 1,652,005 T of clean fill material required.
Tonnes per single truck haulage	33 T per truck.
No. of trucks	1,652,005 T of clean fill material divided by 33 T per truck equals 50,061 truck loads of clean fill required.
Trucks per day	TraffixGroup (2021) assumes approximately 20 to 30 truck trips will be undertaken on any given operational day.
Projected timeline	At a rate of 20 trucks per day, the rehabilitation earthworks would require (50,061 truckloads divided by 20 trucks trips) 2,503 operational days, 501 weeks, or 9.6 years to import 1,652,005 T of clean material to the site. An additional two years of site works have been estimated throughout the projected timeline for additional works (i.e., site preparation and vegetation works).

3.4 Melbourne Water design guidelines

An Environmental Management Plan in general accordance with the design principles to establish hazards, consequences and subsequent protection measures during rehabilitation works and ongoing land management is outlined in Section 5.

A key driver for the rehabilitation works is to improve quality of runoff (i.e., reduce sediment load from poorly stabilized ground conditions) from highly degraded sections of former mine workings.

Where possible surface water will be managed onsite for the duration of the works using temporary bunds to direct runoff towards Star Colliery Dam. Where this is impractical, silt fences (as a minimum) and vegetation works will be incorporated.

The design outlined by Davison (2020) outlines a general reduction of gradient along the embankment of Parwan Creek. Paired with the proposed vegetation, improved ground stabilization works aims at increasing soil stability, reduction in erosion, increase in flood plain area and a subsequent improvement in water quality.

No rehabilitation earthworks are proposed to occur within Parwan Creek. The only rehabilitation works proposed within Parwan Creek include weed management (removal) and vegetation works (as per Davidson [2020]).

3.5 Soil hazard categorization and management

Acceptance of fill material for remedial earthworks must be tested and classified as clean fill (below chemical threshold limits [TC0]) in accordance with:

- Vic EPA Publication IWRG621 – Industrial Waste Resource Guidelines (IWRG) *Soil Hazard Categorization and Management* (June 2009).

Material assessed as Category C, Category B or Category A as per IWRG621 will not be accepted at the Star Colliery Dam site.

The acceptance and management of PASS within the Star Colliery Dam must be managed in accordance with the Vic EPA approved:

- *Star Colliery Dam – Potential Acid Sulfate Soil Environmental Management Plan (R01)*, Maddingley Brown Coal dated 19 February 2019.

Management of fill material quality imported to site is required to protect the health of on-site workers and protect key environmental receptors from detrimental impacts from potentially contaminated material.

3.6 Solid industrial waste

Site operations, waste generators and transporters of industrial waste must assess, classify, and manage industrial waste as per:

- Vic EPA Publication 1624 – *Industrial Waste Fact Sheet* (May 2016).

Material classified as solid industrial waste, as per Vic EPA Publication IWRG631, will not be accepted on-site.

Transporters will be notified (as reasonably practicable) that all vehicles transporting material to site must be in good condition and reasonable effort is required to prevent soil leaking from transport vehicles. Key management methods reinforced will include tarp systems covering loaded vehicles.

3.7 Pre-receipt

Pre-receipt procedures for soil, which includes assessment and/ or analysis that provides sufficient evidence fill material is clean, will be required as per IWRG621, Vic EPA Publication 1624 and the PASS EMP (MBC, 2019).

Records of soil acceptance and records of fill deposition based on dates/ staged areas operational will be kept as part of the adopted audit process to document the movement of fill.

3.8 Load inspection procedure

Material destined for the site must be transported in vehicles which are in good condition as outlined in Vic EPA Publication 1624.

Clean fill will be required to follow a load inspection procedure. Prior to unloading on-site, material transporters will need to complete a MBC Clean Fill Declaration Form and submit to a load inspection procedure.

3.9 Managing soil disturbance and topsoil

Works planned within or adjacent the Parwan Creek will be undertaken in accordance with:

- Vic EPA Publication 1894– *Managing soil disturbance* (September 2020).

Existing site material is known to be covered with historical fill (i.e., ex-situ material). All earthworks undertaken as part of rehabilitation activities are therefore not expected to have a detrimental impact on the 'natural' soil landscape (see cut/ fill isopach shown in Figure 3 ANNEX A). Additional mitigation measures (i.e., continual cropping and land management of agroforestry areas, and implementation of vegetation plans near Parwan Creek, surrounding the Star Colliery Dam and across the undulating plains of the site) are planned to improve the ground stability and reduce storm water runoff that is likely to decrease embankment stability.

The management of topsoil will be achieved by undertaking control measures associated with items outlined in Vic EPA Publication 1896.

Soil compaction will be undertaken to improve the management of soil disturbance during rehabilitation earthworks, and, limit erosion of top soil prior to the establishment of vegetation works.

3.10 Working within or adjacent to waterways

Works planned within or adjacent the Parwan Creek will be undertaken in accordance with:

- Vic EPA Publication 1896 – *Working within or adjacent to waterways* (September 2020).

Rehabilitation works aim to implement sediment control measures (silt fencing, multiple sediment settlement basins, specific staging plan) to assist in managing the risk of increased erosion, sedimentation of Parwan Creek and Star Colliery Dam, and detrimental of release of material into waterways/ riparian areas adjacent the site.

3.11 Site security

The Star Colliery Dam site will be securely fenced to prevent unauthorized access. The entry exit location will be located on Cummings Rd, see Figure 4 ANNEX A.

3.12 Traffic management

Vehicles will be required to drive from the weighbridge at MBC, along Tilleys Rd, east Geelong-Bacchus Marsh Rd and south down Cummings Rd to the entrance of the site. Enter via existing access point on Cummings Road. A heavy-duty rumble grid will be located at this access point to remove dirt from vehicles (e.g., underside of trucks, tyres) entering the site.

The access roads across the site will change as staging across the site is undertaken. Entry/ exit locations will remain consistent as long as reasonably practicable. TraffixGroup (2021) did recommended that an internal TMP is unlikely to be required.

Additional traffic management measures were not identified based on assessment undertaken by TraffixGroup (2018, 2021), see Section 2.5 and 2.6.

3.13 Storm water runoff and sediment

At the commencement of operations at the site surface water controls will be put in place that will remain for the duration of works. These include the following:

- Construction of cutoff drains at the top of the slopes above the overburden dumps leading down to Parwan Creek in the south west portion of the site. This is to prevent runoff from the southern section of the site further eroding the overburden placed in this location.
- Construction of silt fences below the works area above Parwan Creek.
- Inspection of Parwan Creek banks and placement of bunds as required to direct surface water runoff where possible into Star Dam.
- Construction of diversion drains and two sediment basins above Star Dam to divert and treat surface water runoff into Star Dam.

These surface water controls will be maintained for the duration of the filling operations.

Establishment of farming crops in the southern third of the site and of vegetation as recommended by Davidson (2020) will be undertaken to reduce erosion/ deposition of excess sediment in Parwan Creek by improving soil stabilization.

3.14 Noise and dust

Dust emissions will be controlled by:

- Restricting truck movements to haul roads and use of a water cart as required as per standard management and operating procedures.
- Sowing a suitable temporary plant cover such as sterile Rye grass on areas that are at final height but are not ready for revegetation.
- Restricting operations in exposed locations on high wind days as per standard management and operating procedures.

3.15 Flora and fauna

Due to the highly disturbed nature of much of the site, control of weeds in some locations will not be possible until the site has been filled to the final profile. In other locations weed removal and revegetation in accordance Davidson (2020) will occur earlier in the site rehabilitation process.

Removal of rabbits will be undertaken by a combination of removal of habitat by burrow ripping and other techniques in coordination with a licence pest controller.

The long-term revegetation strategy will use a staged approach to revegetation. Much of the revegetation activities cannot occur until after the filling of the site has been completed and rabbit numbers controlled. Planting of native vegetation will be done in consultation with qualified flora and fauna specialists. There will be challenges with excluding rabbits and kangaroos and wallabies from revegetation zones that will require use of strategies to minimise the impact of grazing on the revegetation zones.

Other zones that can be revegetated earlier in the process such as some of the Cummings Road frontage will have revegetation activities in the first one to two years of site rehabilitation process.

A weed control program will be coordinated with the earthworks as much of the site is currently inaccessible to weed control equipment. The site has weeds present that are typical of the location such as boxthorns, scotch thistle, and serrated tussock. A combination of mechanical and chemical control methods will be employed on site for weed control.

A small extension of the area available for cropping will be possible once overburden removal and weed control has been completed.

3.16 Ongoing land management

Ongoing land management post rehabilitation earthworks include:

- Weeding activities to remove invasive plant species on a quarterly basis.
- Continual vegetation works across the site to support the implementation of programs outlined by Davidson (2020).
- Regular (bi-annual) review/ survey of vegetation success rate and establishment to inform any additional vegetation works required.
- Establishment of a quarterly baiting program to provide control of pest species.
- Establishment of a cropping in the agroforestry area to the south dependent on preferred crop established (to be determined based on local advice).

5. Environmental Management Plan

Key activities, potential hazards, assessment of associated risk and subsequent control measures are outlined in the EMP outlined in Table 3. An outline of the risk classification adopted as part of this EMP, including qualitative measures for likelihood, consequence, and risk, is provided in ANNEX B.

Table 3 Assessment of key project activities and subsequent mitigation measures based on assessed risk.

Activity	Potential Hazards	Likelihood	Consequence	Risk	Control Measures	Residual Risk
A.1 Management of contaminated soil from off-site sources above clean fill acceptance criteria (IWRG621 and/or IWRG631).	Health impacts to on-site workers	E - Rare	3 - Moderate	Moderate	1) Assessment of all material in accordance with IWRG621, IWRG631 and PASS EMP (MBC, 2019) prior to accepting material on-site. 2) Adoption of established audit processes and utilization of existing infrastructure (weighbridge, and facilities/ resources to process material accepted on-site) by MBC at adjacent landfill site at 11 Tilleys Rd, Maddingley.	Moderate
	Contamination of underlying soils	E - Rare	3 - Moderate	Moderate		Moderate
	Contamination of underlying groundwater resource	E - Rare	3 - Moderate	Moderate		Moderate
	Contamination of Parwan Creek bed sediments and surface water	E - Rare	3 - Moderate	Moderate		Moderate
	Contamination caused by illegal dumping by unauthorised third parties.	D – Unlikely	3 – Moderate	Moderate	3) Survey, re-instatement and/ or construction of boundary fence line to limit accessibility of vehicles to site to prevent illegal dumping of non-assessed material. 4) Securely locked entrance to site to control vehicular access. 5) Restrict entry/ exit points to one lockable location (as often as practicable during earthworks) to increase access control by authorised persons.	Low
A.2 Crop production near Parwan Creek (>80 m).	Increased erosion, sediment and dust release into waterways and riparian areas.	D - Rare	3 – Moderate	Moderate	6) Rehabilitation of area between cropping areas and Parwan Creek (within site boundary) to be undertaken as part of rehabilitation of the *Parwan Creek surrounds* zone as outlined in the proposed work plan (Davidson, 2020). 7) Establishment of farming cross in the southern portion of the site as outlined by Davidson (2020).	Moderate
	Altered waterway flow.	D – Rare	4 – Minor	Low	Management with standard operating procedures.	Low
	Uncontrolled release of nutrients, minerals, heavy metals, chemicals, hydrocarbons, and waste.	D – Unlikely	4 – Minor	Low	Management with standard operating procedures.	Low
	Uncontrolled generation of dust.	D – Unlikely	4 – Minor	Low	Management with standard operating procedures.	Low
A.3 Removing invasive vegetation near Parwan Creek (adjacent in some areas).	Increased erosion, sediment and dust release into waterways and riparian areas.	E - Rare	4 – Minor	Low	Management with standard operating procedures.	Low
	Altered waterway flow.	E - Rare	4 – Minor	Low	Management with standard operating procedures.	Low
	Uncontrolled release of nutrients, minerals, heavy metals, chemicals, hydrocarbons, and waste.	E - Rare	4 – Minor	Low	Management with standard operating procedures.	Low

Activity	Potential Hazards	Likelihood	Consequence	Risk	Control Measures	Residual Risk
	Uncontrolled generation of dust.	E - Rare	4 – Minor	Low	Management with standard operating procedures.	Low
	Removal of protected native trees.	E - Rare	3 – Moderate	Moderate	8) Physical demarcation of Tree Protection Zones already established (see Figure 4 ANNEX A).	Moderate
A.4 Rehabilitation of former mining infrastructure, Star Colliery Dam, to develop a wetland (approximately >30 m from Parwan Creek at its closest point).	Increased erosion, sediment and dust release into waterways and riparian areas.	E – Unlikely	3 – Moderate	Moderate	9) Rehabilitation of areas surrounding Star Colliery Dam (within site boundary) to be undertaken as part of rehabilitation of the *wetland margin* zone as outlined in the proposed work plan (Davidson, 2020). 10) Installation of silt fencing prior to earthworks adjacent/ down-gradient of Parwan Creek. Implementation of standard dust management procedures during earthworks.	Moderate
	Altered waterway flow.	D – Unlikely	3 – Moderate	Moderate	11) Installation of silt fencing prior to earthworks adjacent/ down-gradient of Parwan Creek. 12) Detailed design and construction of the overflow weir as per Davidson (2020).	Moderate
	Uncontrolled release of nutrients, minerals, heavy metals, chemicals, hydrocarbons, and waste.	E - Rare	4 - Minor	Low	Management with standard operating procedures.	Low
	Uncontrolled generation of dust.	D – Unlikely	4 – Minor	Low	Management with standard operating procedures.	Low
	Detrimental impact on known Growling Grass Frog (GGF) habitat.	E – Rare	2 – Moderate	Moderate	13) Continual placement of PASS as per established PASS EMP (MBC, 2019). 14) Establishment of GGF habitat vegetation, rock piles, grass, and shrub cover within designed areas of the Star Colliery Dam site as outlined by Davidson (2020) and Zone (2019). 15) Management of sediment loading during rehabilitation earthworks by directing site stormwater runoff through two sedimentation ponds and associated reed beds (see Figure 4 ANNEX A). 16) Installation of overflow weir from Star Colliery Dam to Parwan Creek as outlined by Davidson (2020) and Zone (2019).	Moderate
A.5 Rehabilitation of historical rock quarry stage F (<250 m from Star Colliery Dam and <160 m from Parwan Creek).	Increased erosion, sediment and dust release into waterways and riparian areas.	D – Unlikely	3 – Moderate	Moderate	17) Stormwater runoff from historical rock quarry area to be managed during rehabilitation earthworks (as per fill staging plan) to remain on-site (i.e., away from Parwan Creek). Existing and proposed final levels both generally direct stormwater towards Star Colliery Dam, refer Figure 3 ANNEX A. 18) Runoff from stage F to be directed to two settlement ponds and outlets consisting of filter beds to be constructed during rehabilitation earthworks at the edge of the Star Colliery Dam (see Figure 4, ANNEX A) to assist in managing any sediment runoff from the site into Star Colliery Dam.	Moderate
	Altered waterway flow.	E – Rare	4 – Minor	Low	Management with standard operating procedures.	Low
	Uncontrolled release of nutrients, minerals, heavy	E - Rare	4 - Minor	Low	Management with standard operating procedures.	Low

Activity	Potential Hazards	Likelihood	Consequence	Risk	Control Measures	Residual Risk
	metals, chemicals, hydrocarbons, and waste.					
	Uncontrolled generation of dust.	D – Unlikely	4 – Minor	Low	Management with standard operating procedures.	Low
	Detrimental impact to currently unknown cultural heritage artefacts.	E – Rare	2 – Significant	High	19) Assessment undertaken by Long (2018) indicated the presence of cultural heritage places within the site was unlikely, and, planned works onsite does not contain an area of Aboriginal cultural heritage significance. It was recommended a CHMP is not required therefore standard operating procedures will be adopted.	Low
A.6 Earthworks associated with re-establishing proposed final level including importation of 'clean fill' (as per IWRG621).	Increased erosion, sediment and dust release into waterways and riparian areas.	C – Probable	3 - Moderate	High	20) Silt fencing to be installed between earthwork areas adjacent to Parwan Creek during rehabilitation works in each stage (see Figure 3 ANNEX A). 21) Staging of rehabilitation earthworks priority is stage A, B and C (see Figure 3 ANNEX A) first to establish an extended buffer to Parwan Creek (prior to undertaking stages D, E, F and G). 22) Staging of rehabilitation earthworks (from A to G) to be undertaken in a manner that stormwater runoff will be directed towards Star Colliery Dam. 23) Runoff from stages A to G to be directed to two settlement ponds and outlets consisting of filter beds to be constructed during rehabilitation earthworks at the edge of the Star Colliery Dam (see Figure 4, ANNEX A) to assist in managing any sediment runoff from the site into Star Colliery Dam. 24) Rehabilitation of embankments once proposed final design level (see Figure 3 ANNEX A). 25) Construction of cut-off drains at the top of steep slopes along Parwan Creek above overburden dumps in the south-west portion of the site to prevent runoff from southern section of the site further eroding. 26) Inspection of Parwan Creek banks and placement of bunds (where required) to direct surface water runoff where possible into Star Colliery Dam.	Moderate
	Altered waterway flow.	D – Unlikely	4 – Minor	Low	Management with standard operating procedures.	Low
	Uncontrolled release of nutrients, minerals, heavy metals, chemicals, hydrocarbons, and waste.	D – Unlikely	4 – Minor	Low	Management with standard operating procedures.	Low
	Uncontrolled generation of dust.	C – Probable	4 – Minor	Moderate	27) Adoption of MBC dust suppressant management procedures. 28) Inclusion of the site as part of MBC's daily amenity monitoring procedure to assess potential daily changes to dust suppressant activities (as required).	Low
	Removal of protected native trees.	E – Rare	3 – Moderate	Moderate	29) Physical demarcation of Tree Protection Zones already established in staged areas A, B and Z (see Figure 4 ANNEX A).	Moderate
	Noise disturbance to nearby residences/ properties by vehicles/	E – Rare	3 – Minor	Moderate	30) Strict adoption of operational hours as outlined in permit issued for proposed rehabilitation plan.	Moderate

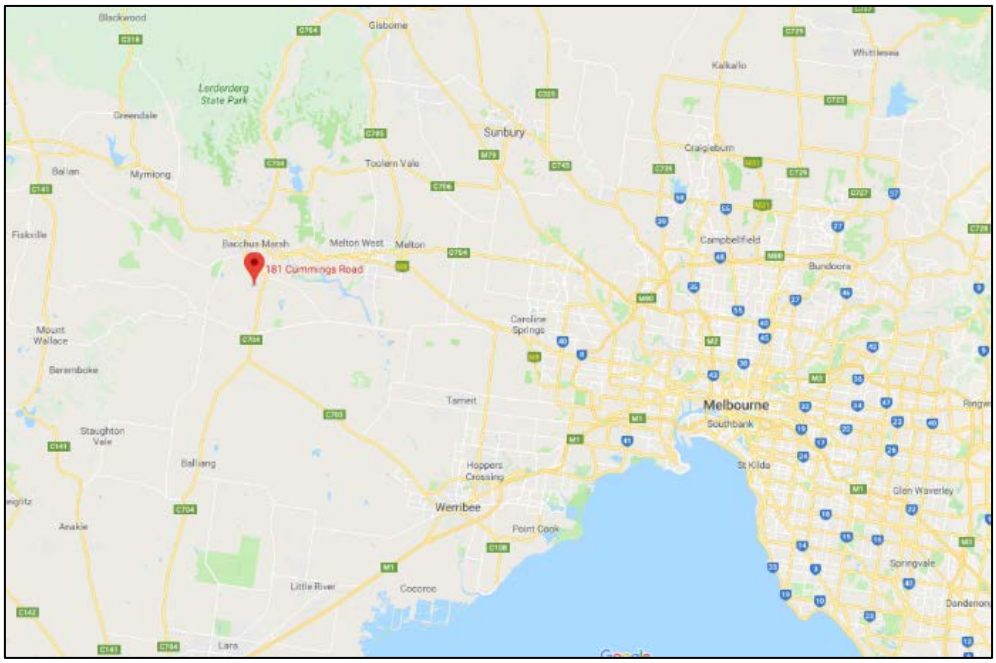
Activity	Potential Hazards	Likelihood	Consequence	Risk	Control Measures	Residual Risk
	plant operating on-site outside of permitted hours.				31) Restriction of site access to be managed by established MBC practices	
	Detrimental impact to currently unknown cultural heritage artefacts.	E – Rare	2 – Significant	High	32) Assessment undertaken by Long (2018) indicated the presence of cultural heritage places within the site was unlikely, and, planned works onsite does not contain an area of Aboriginal cultural heritage significance. It was recommended a CHMP is not required therefore standard operating procedures will be adopted.	Low
	Detrimental amenity impacts to surrounding land users	C – Probable	4 - Minor	Moderate	33) Implementation of Cummings Road and Smith Street frontage vegetation plan as outlined by Davidson (2020) to establish a visual barrier during construction works.	Low
A.7 Earthworks, landscaping, land preparation	Loss of embankments along Parwan Creek and Star Colliery Dam due to erosion of non-stabilised soils.	D – Unlikely	3 – Moderate	Moderate	34) Implementation of a vegetation plan including a eucalypt-dominated woodland and native shrubs and grasses across the site as described by Davidson (2020). The native vegetation plan aims to stabilise the ground plane to reduce runoff and erosion from occurring. 35) Silt fencing between rehabilitation earthworks and Parwan Creek will remain in place until the ground stabilisation from planned vegetation works is sufficient to protect the existing condition of Parwan Creek.	Low
A.8 Movement/ transport of spoil/ 'clean fill' (as per IWRG621) to site.	Deposition of material on public roads (i.e., Cummings Rd) from the underside of departing vehicles/ machinery.	C – Probable	4 – Minor	Moderate	36) Construction of rumble grid at site exit location on Cummings Rd, see Figure 4 ANNEX A. 37) Inclusion of the site entry location as part of MBC's daily amenity monitoring procedure to assess potential daily changes to dust suppressant activities (as required). 38) Inclusion of the site entry intersection with Cummings Rd into MBC's weekly street sweeping contract.	Low
	Contamination of site by acceptance of non-conforming loads.	E - Rare	2 – Significant	High	39) Implementation of a clear refusal of non-conforming load procedure should transported material arrive at MBC.	High
	Deposition of wind-blown material/ leaking wet material from vehicles not tarped/ unsecure/ inadequately sealed loads.	C – Probable	4 – Minor	Moderate	40) Notify all vehicles with loads scheduled for deposition on-site to ensure loads are always tarped (where practicable). Existing signs erected near weighbridge, additional sign to be erected at entry/ exit of Star Colliery Dam site.	Low
	Danger to public traffic due to site related rehabilitation works and/ or ongoing operation of proposed work plan.	D – Unlikely	4 – Minor	Low	41) Standard management practices regarding movement of heavy vehicles, plant and/ or machinery. No identified risks indicated traffic upgrade works were required for proposed works (TraffixGroup, 2018).	Low
	Noise disturbance to nearby residences/ properties by vehicles accessing site outside of permitted hours.	E – Rare	3 – Minor	Moderate	42) Strict adoption of operational hours as outlined in permit issued for proposed rehabilitation plan. 43) Restriction of site access to be managed by established MBC practices	Moderate
A.9 Ongoing land management	Spread of invasive plant species.	C – Probable	4 – Minor	Moderate	44) Implementation of native revegetation plan across the site to decrease opportunity for invasive pest species to thrive (Davidson, 2020).	Low

Activity	Potential Hazards	Likelihood	Consequence	Risk	Control Measures	Residual Risk
					45) Undertake weeding works as required to promote the establishment of native species.	
	Erosion of embankments causing increased silt loads in Parwan Creek/ Star Colliery Dam.	C – Probable	4 – Minor	Moderate	46) Implementation of native revegetation plan across the site to decrease opportunity for invasive pest species to thrive (Davidson, 2020). 47) Regular review/ survey of revegetation plan success rate and subsequent additional planting works until vegetation appears to be established.	Low
	Provision of a breeding ground of pest/ vermin species to flourish.	C – Probable	4 – Minor	Moderate	48) Establishment of a regular pest baiting program to control pest/ vermin species using the rehabilitated Star Colliery Dam site for an undisturbed breeding ground.	Low.
	Degradation of agroforestry area (southern portion of the site) caused by intense farming/ cropping in agroforestry area	D – Unlikely	4 – Minor	Low	Management with standard operating procedures.	Low

References

Reference	Source
PASS EMP, 2019.	*Star Colliery Dam – Potential Acid Sulfate Soil Environmental Management Plan* (R01), Maddingley Brown Coal, dated 19 February 2019.
Davidson, 2020.	*Proposed Works Plan* (Doc. Ref.: 200510), Davidson Design Studio for Maddingley Brown Coal, dated 15 July 2020.
Long, 2018.	*Star Dam Site Rehabilitation Plan – Cultural Heritage Assessment and Implications for Development*, letter report, Andrew Long & Associates for Maddingley Brown Coal, dated 29 March 2018.
Zone, 2019.	*Growling Grass Frog Management Plan – Star Dam Cummings Road Maddingley*, Zone Environmental for Calleja Transport, dated February 2019.
TraffixGroup, 2018.	*Traffic Engineering Assessment – Proposed Earthworks at 181 Cummings Road, Parwan* (Doc. Ref.: G24384R-01B), TraffixGroup for Maddingley Brown Coal, dated 9 October 2018.
TraffixGroup, 2021.	*Traffic Management Plan – Proposed rehabilitation and Earthworks – 181 Cummings Road, Parwan* (Doc. Ref.: G24384R-01D), Traffix Group for Shinboners Pty Ltd, dated March 2021.
IWRG621.	*Industrial Waste Resource Guidelines (IWRG) Soil Hazard Categorization and Management*, Publication IWRG621, Vic EPA dated June 2009.
Vic EPA, 2016.	*Publication 1624 – Industrial Waste Fact Sheet*, Vic EPA dated May 2016.
IWRG631.	*Industrial Waste Resource Guidelines (IWRG) Solid Industrial Waste Hazard Categorization and Management*, Publication IWRG631, Vic EPA dated June 2009.
Vic EPA, 2020.	*Working within or adjacent to waterways,* Publication 1896, Vic EPA dated September 2020.
Vic EPA, 2020.	*Managing soil disturbance,* Publication 1894, Vic EPA dated September 2020.

ANNEX A. Figures



MADDINGLEY BROWN COAL PTY LTD

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STAR COLLIERY DAM
181 CUMMINGS ROAD, MADDINGLEY

Figure 1 – Locality Plan

Image sourced from: https://www.google.com

Site Boundary

N

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T: (03) 5367 3211 **E:** contactmbc@callejatransport.com.au **ABN:** 63 604 564 597

STAR COLLIERY DAM
181 CUMMINGS ROAD, MADDINGLEY

Figure 2 – Site Plan

NORTH

Star Dam

PROPOSED DESIGN CONTOURS

CUMMINGS ROAD

Existing farm land

Farwan Creek valley and surrounds

B
FILL 34,017m³
CUT 5,227m³
AREA 28,151m²

C
FILL 227,381m³
CUT 856m³
AREA 30,245m²

D
FILL 267,555m³
CUT 155m³
AREA 31,657m²

E
FILL 197,970m³
CUT 23,687m³
AREA 36,434m²

F
FILL 204,635m³
CUT 249m³
AREA 19,386m²

G
FILL 93,687m³
CUT 4,185m³
AREA 49,303m²

A
FILL 42,538m³
CUT 32,209m³
AREA 53,606m²

TOTAL SITE FILL 1,067,783m³
TOTAL SITE CUT 66,568m³

CUT / FILL ISOPACH DEPTHS	MAX CUT / FILL DEPTHS
15 -	STAGE A - CUT 5m, FILL 5m
10 -	STAGE B - CUT 1m, FILL 5m
5 -	STAGE C - CUT 1m, FILL 15m
0 -	STAGE D - CUT 1m, FILL 15m
-5 -	STAGE E - CUT 5m, FILL 15m
	STAGE F - CUT 1m, FILL 15m
	STAGE G - CUT 1m, FILL 15m

NOTE: DATUM - AMG 66 SHIFTED VIA STN52 AND STN51
SURVEY DATE: 4TH OF JUNE 2020
NEAMAP IMAGERY FROM 15TH MAY 2020

ISSUE	APP'D	DATE	AMENDMENT
E			
D			
C			
B			
A	-	-	-

MADDINGLEY BROWN COAL
Landfill & Resource Recovery Operations
www.maddingleybrowncoal.com.au Ph: (03) **5367 3211**

BGL SURVEYING
Gisborne, Victoria 3437
Tel: 0414 857 620
Email: grant@bglsurveying.com.au
www.bglsurveying.com.au

DESIGN	-
DRAWN	G.LEBBINK
CHECKED	-
DATE	23 Mar 2021

PROJECT
STAR DAM
181 CUMMINGS ROAD, MADDINGLEY

DETAILS
PROPOSED STAGES CU/FILL ISOPACH

SCALE OF METRES H 0 25 50 V

SHEET	PAPER
1 OF -	A3
DRAWING No. -	REV -
FILE NAME .	

NORTH

Existing farm land

Parwan Creek valley and surrounds

Star Dam

CUMMINGS ROAD

TPZ

TPZ

TPZ

TPZ

INDICATIVE LOCATION OF STORMWATER FILTER BEDS

INDICATIVE LOCATION OF STORMWATER FILTER BEDS

PROPOSED DESIGN CONTOURS

INDICATIVE LOCATION OF STORMWATER SETTLEMENT POND

INDICATIVE LOCATION OF STORMWATER SETTLEMENT POND

RUMBLE GRID

NEW EXIT LANE

ENTRY LANE

A
FILL 42,538m³
CUT 32,209m³
AREA 53,606m²

B
FILL 34,017m³
CUT 5,227m³
AREA 28,151m²

C
FILL 227,381m³
CUT 856m³
AREA 30,245m²

D
FILL 267,555m³
CUT 155m³
AREA 31,657m²

E
FILL 197,970m³
CUT 23,687m³
AREA 36,434m²

F
FILL 204,635m³
CUT 249m³
AREA 19,386m²

G
FILL 93,687m³
CUT 4,185m³
AREA 49,303m²

TOTAL SITE FILL 1,067,783m³
TOTAL SITE CUT 66,568m³

NOTE: CUT/FILL VOLUMES EXCLUDE STORMWATER SETTLEMENT PONDS AND FILTER BEDS. VOLUMES PENDING FINAL DESIGN

CUT / FILL ISOPACH DEPTHS	MAX CUT / FILL DEPTHS
15 -	STAGE A - CUT 5m, FILL 5m
10 -	STAGE B - CUT 1m, FILL 5m
5 -	STAGE C - CUT 1m, FILL 15m
0 -	STAGE D - CUT 1m, FILL 15m
-5 -	STAGE E - CUT 5m, FILL 15m
	STAGE F - CUT 1m, FILL 15m
	STAGE G - CUT 1m, FILL 15m

NOTE: DATUM - AMG 66 SHIFTED VIA STN52 AND STN51
SURVEY DATE: 4TH OF JUNE 2020
NEAMAP IMAGERY FROM 15TH MAY 2020

ISSUE	APP'D	DATE	AMENDMENT
E			
D			
C			
B			
A	-	-	-

MADDINGLEY BROWN COAL
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DESIGN	-
DRAWN	G.LEBBINK
CHECKED	-
DATE	23 Mar 2021

PROJECT
STAR DAM
181 CUMMINGS ROAD, MADDINGLEY

DETAILS
PURPOSE SITE LAYOUT PLAN

SCALE OF METRES H 0 25 50 V

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1 OF 1	A3
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FILE NAME .	

ANNEX B. Risk classification

Table C.1 Qualitative Measures of Likelihood

Level	Likelihood	Frequency
A	Almost certain	Is expected to occur almost all the time.
B	Likely	Is expected to occur most of the time.
C	Probable	Might occur.
D	Unlikely	Might occur but not expected.
E	Rare	Only expected to occur under exceptional circumstances.

Table C.2 Qualitative Measures of Consequence

Level	Indicator	Description
1	Severe	Death, substantial offsite impacts to broader environment, long-term environmental damage, extensive clean-up required, complete failure of environmental protection controls.
2	Significant	Hospitalisation required, offsite impacts to a segment of the environment, medium-term environmental damage, offsite clean-up required, breach of environmental legislation.
3	Moderate	Medical attention required, some offsite, temporary impacts, moderate onsite impacts.
4	Minor	First aid required, minimal onsite impacts immediately contained, no discernible offsite impacts, no external complaints received.
5	Negligible	No health impacts, negligible onsite impacts, no offsite impacts.

Table C3 Qualitative Risk Analysis Matrix

Consequence	Likelihood				
	A - Almost Certain	B - Likely	C - Probable	D - Unlikely	E - Rare
1 – Severe	VH	VH	VH	VH	H
2 - Significant	VH	VH	VH	H	H
3 – Moderate	VH	H	H	M	M
4 – Minor	H	H	M	L	L
5 - Negligible	H	M	L	L	L

VH = Very high risk; immediate action required.

H = High risk; management required from senior staff.

M = Moderate risk; specify required management.

L = Low risk; management with standard operating procedures.

ANNEX C. Management plans

Proposed Works Plan, Davidson Design Studio dated 15 July 2020.

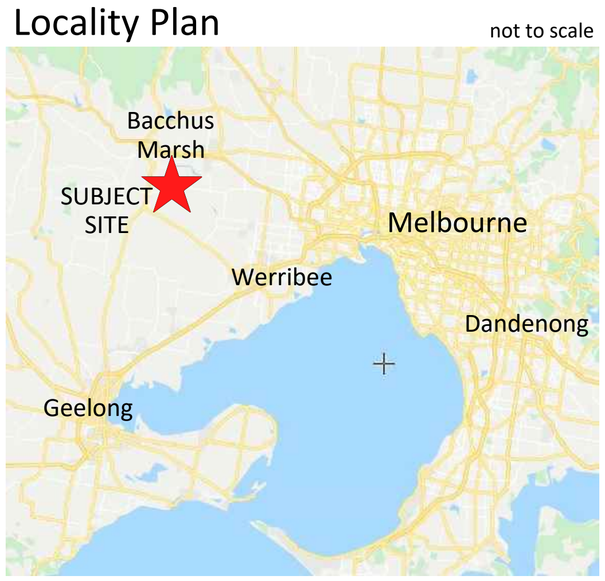
Star Colliery Dam – Potential Acid Sulfate Soil Environmental Management Plan (R01), Maddingley Brown Coal dated 19 February 2019.

Growling Grass Frog Management Plan – Star Dam Cummings Road Maddingley, Zone Environmental for Calleja Transport, dated February 2019.

Traffic Management Plan – Proposed Rehabilitation and Earthworks, 181 Cummings Road, Parwan (Doc. Ref.: G24384R-01D), TraffixGroup for Shinboners Pty Ltd, dated March 2021.

Locality Plan

not to scale



Site Overview

181 Cummings Road in Maddingley measures approximately 70 hectares in size and is located 47 kilometres west of Melbourne. The site is bordered by Parwan Creek and the currently operating Maddingley Coal Mine to the north, rural properties to the south, Cummings Road and rural properties to the east and Parwan Creek and rural properties to the west. Historically, the northern third of the site operated as an open cut coal mine from 1950 until 1979. Once operations at the mine were ceased, the mine void was filled with water and turned into an artificial dam. A basalt quarry and sand mine were operational on the central part of the land from 1985 until 2006. The southern third of the site has been used for pastoral farming since the 1860's. Significant past alteration of the landform, the hydrology and soil composition in conjunction with vegetation clearance and severe erosion has resulted in a degraded and dilapidated site. The proposed works represent a valuable opportunity to remediate land that has been degraded for some time. The proximity of the site to Parwan Creek reiterates the need for a holistic approach to any works undertaken on the land. Erosion, weed management, pest animals, surface water runoff and ongoing land management are essential considerations to any remediation works.

The Proposal

An open, eucalypt woodland to 15m tall occupying poorly drained, fertile soils on flat or gently undulating plains would have occurred across most of the land prior to European settlement and the mining operations. The land adjacent to the Parwan Creek would have also been a eucalypt-dominated woodland to 15m tall but with a scattered shrub layer. The implementation of fill, re-grading of the ground plane and remediation of the former quarry void, mines and surrounds, and the land adjacent to the Parwan Creek will aid in soil stabilisation, reduce the quantity of run-off and sediment entering the Creek, assist with managing downstream flooding and provide habitat to local fauna including the nationally threatened Growling Grass Frog (*Litoria raniformis*). These works, in association with ongoing management, will ensure establishment of the revegetation species, reduce the presence of pest plant and animal species, provide habitat to local fauna and reduce water runoff from the site and erosion.

Photo overlooking site towards Star Dam and coal mine

Photo looking past gully erosion towards Parwan Creek

Photo illustrating former mining activities on the site

Site Plan

Movement of Fill Audit Process

The Star Dam site will operate under the management and systems of the Maddingley Brown Coal Landfill site, directly to the north of the site, across the Parwan Creek. Clean fill destined for the Star Dam site will have to complete a Maddingley Brown Coal Clean Fill Declaration Form and come over the weighbridge at the Maddingley Brown Coal Landfill Site. Non-conforming loads identified by weighbridge personnel are managed under the Maddingley Brown Coal Non-conforming Procedure and will not arrive at Star Dam. Conforming loads will traffic from the Maddingley Brown Coal Landfill site to the Star Dam.

Fill and Remediation Process

Conforming loads of clean fill from the Maddingley Brown Coal Landfill site will enter the Star Dam site from the existing access point on Cummings Road. To remove dirt from the tyres and underside of trucks and other vehicles, a heavy duty rumble grid will be located at this existing site access point. This will aid in keeping nearby roads free from dirt and debris and create a safer and cleaner work site. A staging plan is contained on Page 2. As the rehabilitation works progress, the layout of temporary access routes across the site will change. Trucks will enter, traverse and tip the clean fill in the appropriate working area before exiting the site over the rumble grid. Trucks will enter and exit the site at same point, at the existing northern access gate.

Image: Example of truck traversing a rumble grid. Source: Google

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REVISION	DATE	DESCRIPTION	BY
-	-	-	-

DRAWN: AJD
REFERENCE: 200510
SCALE: 1:2500
DATE: 15.07.2020
PAPER SIZE: A1
REVISION: - SHEET: 1 of 3

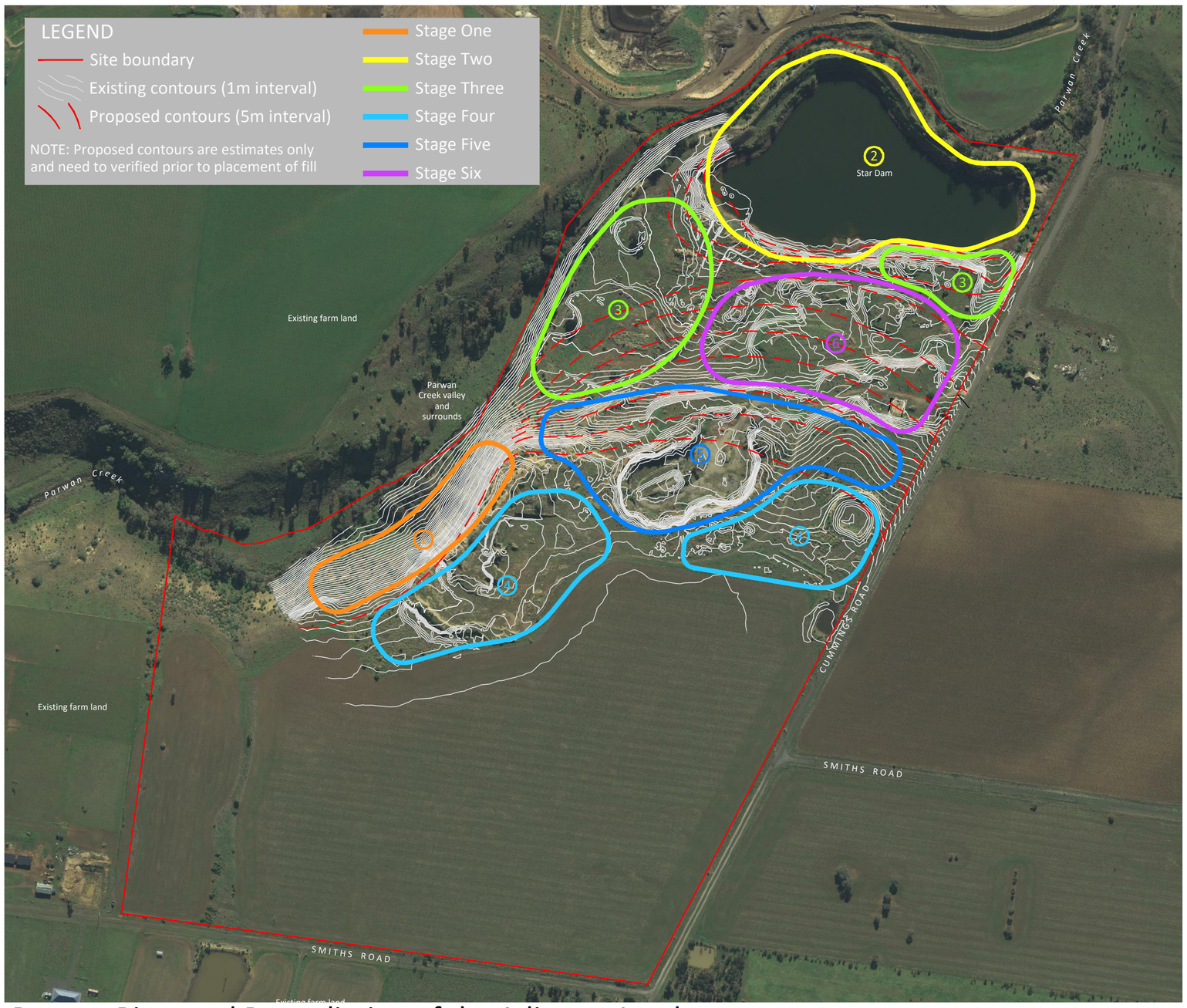
0 25 50 75 100 125 metres
Scale 1:2500 @ A1

CLIENT: Maddingley Brown Coal
ADDRESS: 181 Cummings Road, Maddingley
MUNICIPALITY: Moorabool Shire Council

TOWN PLANNING ISSUE
NOT TO BE USED AS WORKING DRAWING

Proposed Works Plan

Existing Contours (1m interval), Proposed Contours (5m interval) and Staging Plan



Parwan River and Remediation of the Adjacent Landscape

The soils adjacent to the Parwan Creek are shallow with a stiff clay subsoil admitting low water infiltration. The topsoil becomes saturated during heavy rains and, combined with historic land use including clearing and heavy grazing, is washed away. The channelling of water across the then exposed soil results in the extensive gully erosion evident on site. The best methods of stabilising soil and protecting against gully erosion includes stabilising the ground plane and reducing runoff. The regrading of the existing soil profile and the introduction of fill will aid in stabilising the site whilst revegetation with suitable indigenous species is an excellent method of reducing run off and suppressing weeds. In accordance with the Catchment and Land Protection Act (1994), noxious weed species including the present Common Prickly Pear, Serrated Tussock and African Box-thorn, must be controlled. Precision control methods that minimise off-target kills should be used in environmentally sensitive areas such as adjacent to the Parwan Creek and in proximity to Star Dam.

Creekline Revegetation Plant Schedule

VICTORIAN VOLCANIC PLAIN BIOREGION ECOLOGICAL VEGETATION CLASSES
CREEKLINE GRASSY WOODLAND (EVC 68)
AREA: 35,300m²

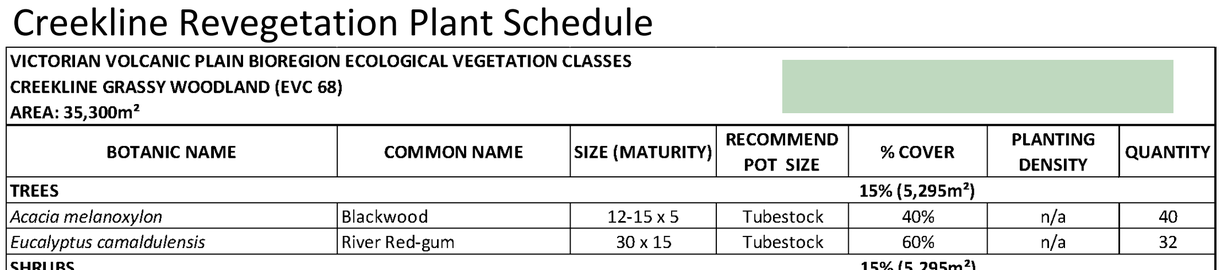
BOTANIC NAME	COMMON NAME	SIZE (MATURITY)	RECOMMEND POT SIZE	% COVER	PLANTING DENSITY	QUANTITY
TREES				**15% (5,295m²)**		
Acacia melanoxylon	Blackwood	12-15 x 5	Tubestock	40%	n/a	40
Eucalyptus camaldulensis	River Red-gum	30 x 15	Tubestock	60%	n/a	32
SHRUBS				**15% (5,295m²)**		
Acacia retinodes	Wirilda	4-6 x 4	Tubestock	100%	0.2 per 1m²	1,059
GRASSES				**65% (22,945m²)**		
Austrodanthonia caespitosa	Common Wallaby-grass	1 x 1	Seed	35%	1 per 1m²	8,031
Austrodanthonia racemosa var. racemosa	Stiped Wallaby-grass	1 x 1	Seed	35%	1 per 1m²	8,031
Poa labillardierei	Common Tussock-grass	1 x 1	Seed	20%	1 per 1m²	4,589
Phragmites australis	Common Reed	1 x 1	Seed	10%	1 per 1m²	2,295
GROUNDCOVERS / CLIMBERS				**5% (1,765m²)**		
Glycine cladestina	Twining Glycine	climber	Seed	33%	2 per 1m²	1,177
Microlaena stipoides var. stipoides	Weeping Grass	0.1 x prostrate	Seed	33%	4 per 1m²	2,353
Oxalis perennans	Grassland Wood-sorrel	0.2 x prostrate	Seed	33%	4 per 1m²	2,353

Creekline Verge Revegetation Plant Schedule

VICTORIAN VOLCANIC PLAIN BIOREGION ECOLOGICAL VEGETATION CLASSES
CREEKLINE GRASSY WOODLAND (EVC 68) AND PLAINS GRASSY WOODLAND
AREA: 62,000m²

BOTANIC NAME	COMMON NAME	SIZE (MATURITY)	RECOMMEND POT SIZE	% COVER	PLANTING DENSITY	QUANTITY
TREES				**15% (9,300m²)**		
Acacia melanoxylon	Blackwood	12-15 x 5	Tubestock	40%	n/a	45
Eucalyptus camaldulensis	River Red-gum	30 x 15	Tubestock	60%	n/a	65
SHRUBS				**15% (9,300m²)**		
Acacia retinodes	Wirilda	4-6 x 4	Tubestock	40%	0.2 per 1m²	744
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	0.5-1.0 x 1.0	Seed	10%	1 per 1m²	930
Hymenanthera dentata	Tree Violet	4-6 x 3-4	Seed	40%	0.2 per 1m²	744
Rubus parvifolius	Small-leaf Bramble	1 x 1	Seed	10%	1 per 1m²	930
GRASSES				**65% (40,300m²)**		
Austrodanthonia caespitosa	Common Wallaby-grass	1 x 1	Seed	35%	1 per 1m²	14,105
Austrodanthonia racemosa var. racemosa	Stiped Wallaby-grass	1 x 1	Seed	35%	1 per 1m²	14,105
Poa labillardierei	Common Tussock-grass	1 x 1	Seed	20%	1 per 1m²	8,060
Phragmites australis	Common Reed	1 x 1	Seed	10%	1 per 1m²	4,030
GROUNDCOVERS / CLIMBERS				**5% (3,100m²)**		
Microlaena stipoides var. stipoides	Weeping Grass	0.1 x prostrate	Seed	100%	4 per 1m²	12,400

Creekline Verge Revegetation Planting Palette



Eucalyptus camaldulensis | *Acacia retinodes* | *Hymenanthera dentata* | *Rubus parvifolius* | *Austrodanthonia caespitosa* | *Poa labilliardierei* | *Phragmites australis*

Soil Additives and Soil Conditioning

The imported soils for the planting zones (top metre of fill) will have additives to best match the soil drainage, aeration and moisture retention requirements of the proposed species. The species have been taken from ecological vegetation classes that group plants that would have likely occurred together prior to settlement and land clearing. These plants have similar soil requirements. Additives for inclusion are gypsum, greensand, peat, manure, sand and compost.

Star Dam and Creation of Growling Grass Frog Habitat

Sites for safe management of naturally occurring Possible Acid Sulphate Soil (PASS) materials are required to support significant infrastructure projects in Victoria. A safe way of managing PASS material is to prevent exposure to air that can result in the oxidisation of pyrite within the soils and formation of acid. Placing PASS material below the water table in a void such as the Star Dam is a safe management method for these materials. The nationally threatened Growling Grass Frog (*Litoria raniformis*) was once common and widespread throughout much of south-eastern Australia. Habitat loss has seen a significant decline in the populations of the species. Growling Grass Frogs require still or slow-moving water with emergent vegetation around the edges and mats of floating or submerged plants. The placement of PASS and the rehabilitation of the surrounds will produce a habitat that will be significantly enhanced for Growling Grass Frogs. Key enhancements will include a greater range of water depth to provide microclimates within the dam, more vegetation for food and cover from predators, rock banks for basking and localised water warming. In addition, the banks will be more resistant to wave erosion and support a greater range of aquatic and emergent vegetation.

Growling Grass Frog Habitat Vegetation

Tall emergent vegetation provides protection to adult frogs from predation while submerged and floating attached vegetation protects tadpoles and eggs. Rock piles, grass and shrub cover on the banks protects emerging froglets from predators.

Growling Grass Frog Habitat Vegetation

MELBOURNE WATER CONSTRUCTED WETLAND SYSTEMS - DESIGN GUIDELINES
PERMANENT WATER BODY - BASALTIC SOILS
AREA: 45,400m²

BOTANIC NAME	COMMON NAME	PLANTING DENSITY	RECOMMEND POT SIZE	% COVER OF ZONE
SUBMERGED MARSH - 0.4-0.9m BELOW NORMAL TOP WATER LEVEL				
Potamageton ochreatus	Blunt Pondweed	2 per 1m²	Tubestock	50%
Vallisneria americana	Eel-grass	2 per 1m²	Tubestock	50%
DEEP MARSH - 0.2-0.4m BELOW NORMAL TOP WATER LEVEL				
Eleocharis sphacelata	Tall Spike-rush	4 per 1m²	Tubestock	25%
Schoenoplectus tabernaemontani	River Club-rush	4 per 1m²	Tubestock	25%
Triglochin procerum	Water Ribbons	4 per 1m²	Tubestock	25%
Vallisneria americana	Small-leaf Bramble	4 per 1m²	Tubestock	25%
SHALLOW MARSH - 0-0.2m BELOW NORMAL TOP WATER LEVEL				
Baumea articulata	Jointed Twig-rush	4 per 1m²	Tubestock	25%
Bolboschoenus medianus	Marsh Club-rush	4 per 1m²	Tubestock	25%
Juncus semisolidus	Rush	4 per 1m²	Tubestock	25%
Schoenoplectus pungens	Sharp Club-rush	4 per 1m²	Tubestock	25%

Star Dam Wetland Margin Plant Schedule

MELBOURNE WATER CONSTRUCTED WETLAND SYSTEMS - DESIGN GUIDELINES
EPHEMERAL MARSH AND WETLAND MARGIN - BASALTIC SOILS
AREA: 13,400m²

BOTANIC NAME	COMMON NAME	PLANTING DENSITY	RECOMMEND POT SIZE	% COVER OF ZONE
EPHEMERAL MARSH - ABOVE NORMAL WATER LEVEL, TEMPORALLY INNUNDATED DURING HIGH FLOWS				
Carex tereticaulis	Basket Sedge	6 per 1m²	Seed	33%
Eleocharis acuta	Common Spike-sedge	6 per 1m²	Seed	33%
Poa labillardierei	Common Tussock-gra	6 per 1m²	Seed	33%
EPHEMERAL WETLAND - ABOVE NORMAL WATER LEVEL, FREQUENTLY INNUNDATED				
Carex appressa	Tall Sedge	6 per 1m²	Tubestock	33%
Juncus semisolidus	Rush	6 per 1m²	Tubestock	33%
Poa labillardierei	Common Tussock-gra	6 per 1m²	Tubestock	33%
WETLAND MARGIN				
Carex appressa	Tall Sedge	6 per 1m²	Tubestock	25%
Carex tereticaulis	Basket Sedge	6 per 1m²	Tubestock	25%
Juncus semisolidus	Rush	6 per 1m²	Tubestock	25%
Microlaena stipoides var. stipoides	Weeping Grass	6 per 1m²	Tubestock	25%

Star Dam Planting Palette

Eleocharis acuta | *Carex appressa* | *Juncus semisolidus* | *Poa labillardierei* | *Carex tereticaulis* | *Microlaena stipoides var. stipoides*

Cummings Road and Smith Street Frontage Plant Schedule

Buffer planting is proposed to the Cummings Road and Smith Street frontages of the site. Suitable plants have been selected from the Plains Grassy Woodland (#55) and Plains Grassland (#132) Ecological Vegetation Classes. This planting will provide a visual break between the road verge and the existing/proposed farming land.

VICTORIAN VOLCANIC PLAIN BIOREGION ECOLOGICAL VEGETATION CLASSES
PLAINS GRASSY WOODLAND (EVC 55) & PLAINS GRASSLAND (EVC 132)
AREA: 14,200m²

BOTANIC NAME	COMMON NAME	SIZE (MATURITY)	RECOMMEND POT SIZE	% COVER	PLANTING DENSITY	QUANTITY
TREES				**15% (2,130m²)**		
Acacia melanoxylon	Blackwood	12-15 x 5	Tubestock	30%	n/a	15
Acacia pycnantha	Golden Wattle	4-8 x 4	Tubestock	30%	n/a	15
Eucalyptus camaldulensis	River Red-gum	30 x 15	Tubestock	40%	n/a	20
SHRUBS				**25% (3,550m²)**		
Acacia paradoxa	Hedge Wattle	2-3 x 3-4	Tubestock	40%	0.3 per 1m²	473
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	0.5-1.0 x 1.0	Seed	10%	1 per 1m²	355
Hymenanthera dentata	Tree Violet	4-6 x 3-4	Seed	40%	0.2 per 1m²	284
Pimelea humilis	Common Rice-flower	0.3 - 0.6 x 0.5	Seed	10%	2 per 1m²	710
GRASSES				**50% (7,100m²)**		
Austrodanthonia caespitosa	Common Wallaby-grass	1 x 1	Seed	15%	1 per 1m²	1,065
Poa labillardierei	Common Tussock-grass	1 x 1	Seed	35%	1 per 1m²	2,485
Themeda triandra	Kangaroo Grass	1 x 1	Seed	50%	1 per 1m²	3,550
GROUNDCOVERS / CLIMBERS				**10% (1,420m²)**		
Dichondra repens	Kidney Weed	prostrate	Seed	50%	4 per 1m²	2,840
Microlaena stipoides var. stipoides	Weeping Grass	0.1 x prostrate	Seed	50%	4 per 1m²	2,840

Cummings Road Frontage Planting Palette

Acacia melanoxylon | *Acacia pycnantha* | *Enchylaena tomentosa var. tomentosa* | *Pimelea humilis* | *Themeda triandra* | *Dichondra repens* | *Microlaena stipoides var. stipoides*

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PAPER SIZE: A1
REVISION: -
SHEET: 2 of 3

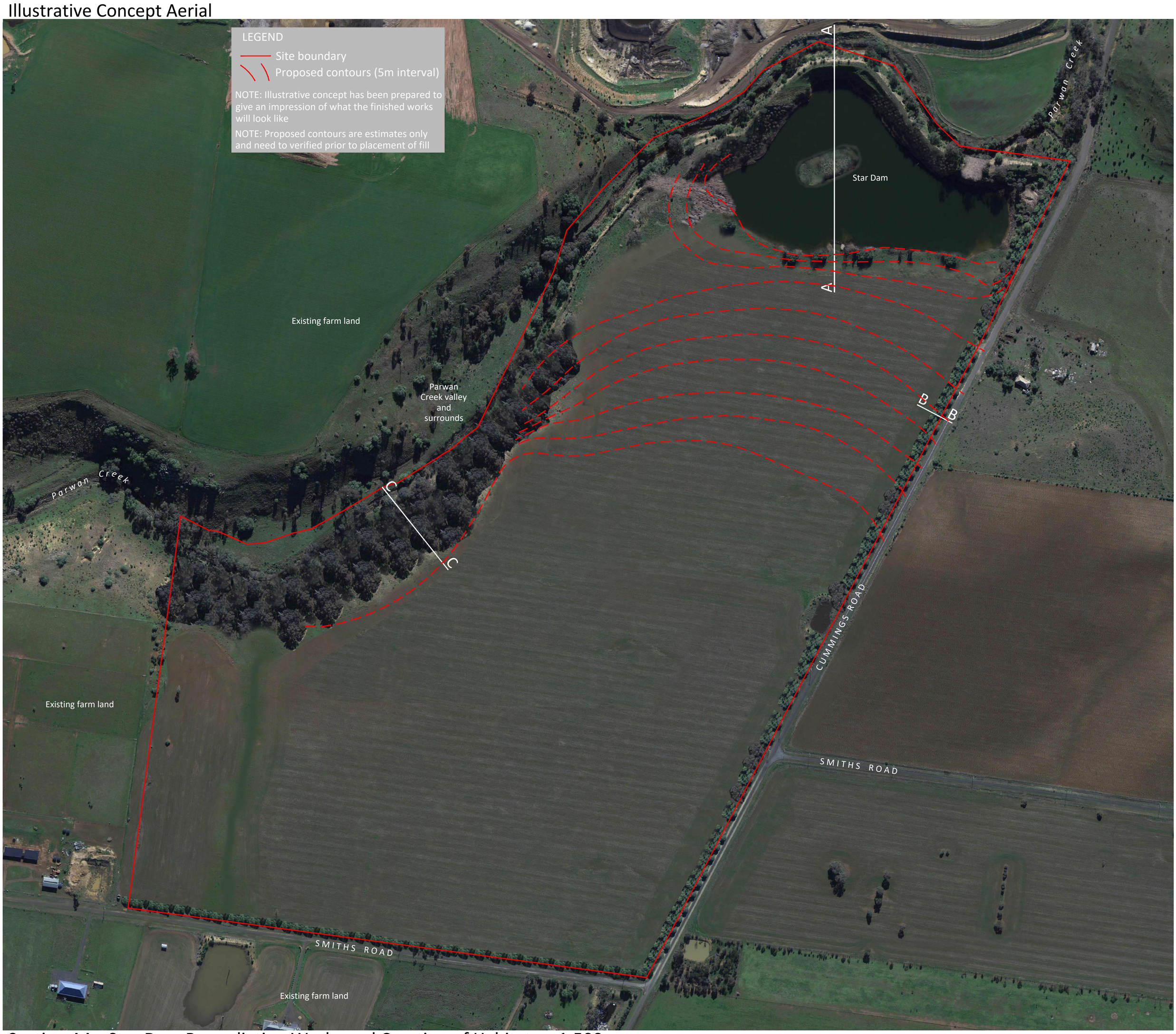
0 50 100 150 200 metres
Scale 1:4000 @ A1

CLIENT: Maddingley Brown Coal
ADDRESS: 181 Cummings Road, Maddingley
MUNICIPALITY: Moorabool Shire Council

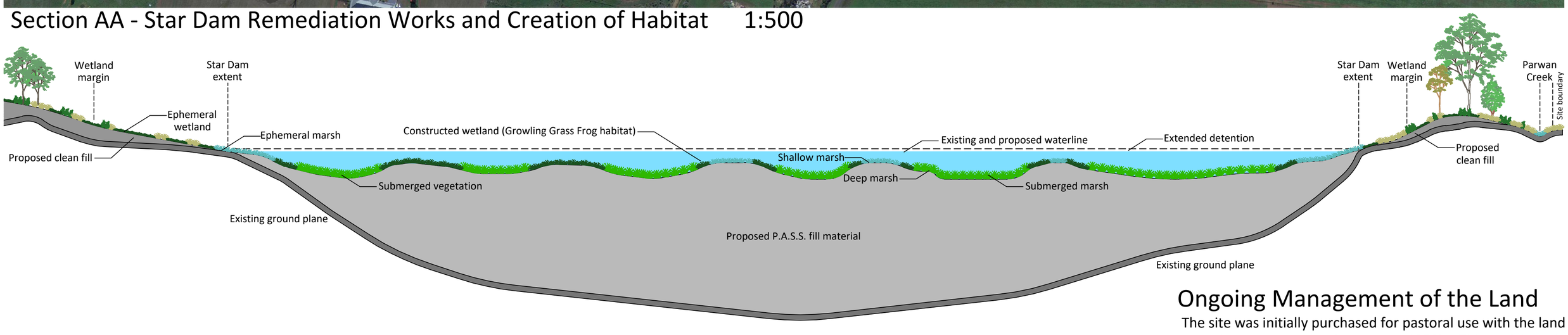
TOWN PLANNING ISSUE
NOT TO BE USED AS WORKING DRAWING

Proposed Works Plan

Illustrative Concept Aerial



Section AA - Star Dam Remediation Works and Creation of Habitat 1:500



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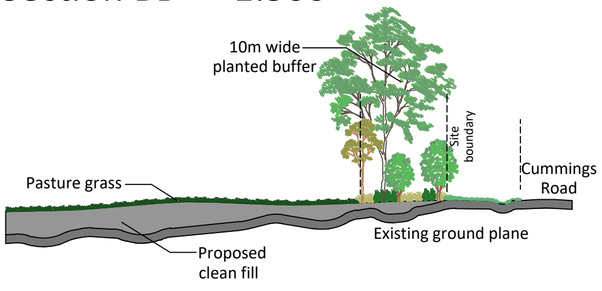

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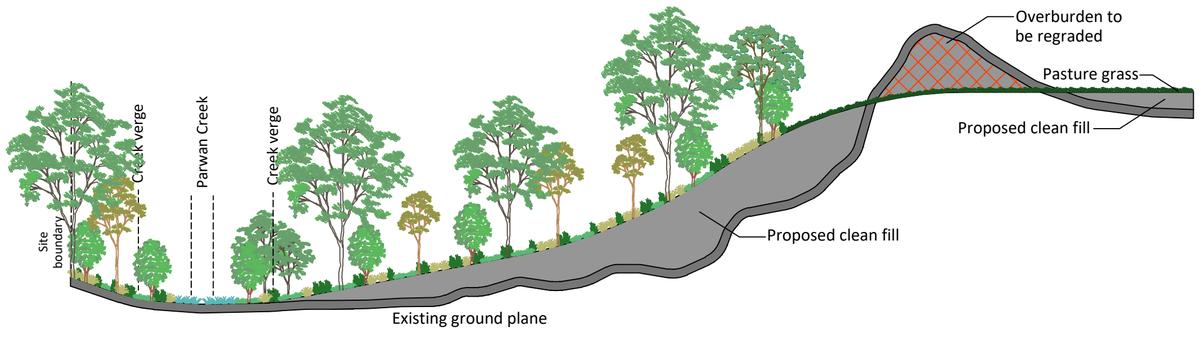

Ongoing Management of the Land

The site was initially purchased for pastoral use with the land grazed and cropped prior to the 1950's. This activity still occurs on the southern third of the site. The landscape in this location is more stable, generally devoid of the pest plant species evident elsewhere on site and there is reduced gully and tunnel erosion. The proposal for the land south of Star Dam and west of graded land adjacent to Parwan Creek is the reprofiling of degraded land to a gently undulating ground plane. As outlined on the plan, sensitive areas of the landscape (roadside verges, land adjacent to the creek, etc) will be vegetated with suitable indigenous species. The less sensitive areas of the site will be sown with pasture grasses and cropped as part of ongoing management. Access routes will be defined and managed accordingly while the management strategies outlined in the Growling Grass Frog Management Plan prepared by Zone Environmental will be in place. Protection measures will be executed during the remediation works.

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0 25 50 75 100 125 metres
Scale 1:2500 @ A1
0 5 10 15 20 25 metres
Scale 1:500 @ A1

CLIENT: Maddingley Brown Coal
ADDRESS: 181 Cummings Road, Maddingley
MUNICIPALITY: Moorabool Shire Council

TOWN PLANNING ISSUE
NOT TO BE USED AS WORKING DRAWING

Proposed Works Plan

Growling Grass Frog Management Plan
Star Dam Cummings Road Maddingley

February 2019

Prepared for:
Calleja Transport

Report by:
Zone Environmental

DISTRIBUTION

Growling Grass Frog Management Plan
February 2019

No	Recipient
1	Hemla Reddy Calleja Transport

This document was prepared for the sole use of Calleja Transport and the regulatory agencies that are directly involved in this project, the only intended beneficiaries of our work. No other party should rely on the information contained herein without the prior written consent of Calleja Transport.

By

Zone Environmental

David Maltby

CONTENTS

1 INTRODUCTION

The Maddingley Brown Coal (MBC) mine has operated since 1948, with landfill activities commencing in 1978. The Calleja Group has owned and managed the MBC site located in Bacchus Marsh since acquisition in 1990. There are currently three main activities on site: Excavating of brown coal and other landscape supplies, solid waste landfill deposited in the historic quarry void, and materials recycling. The MBC site was recently designated by the Victorian Government as a waste-hub of State significance due to the large buffers, potential capacity and acceptance of metal recycling residues. MBC has established itself as a company responsive to changing community and environmental needs with the development of sustainable waste manage options with new projects to generate electricity from methane gas extraction and Waste to Energy and biological processing for municipal landfill diversion alternatives.

The Calleja Group recently acquired the Star Dam site to protect the southern buffers of the landfill and for the potential development of the Star Dam (old coal mining pit) for Potential Acid Sulphate Soil (PASS) disposal on the site at 181 Cummings Road, Maddingley. Sites for safe management of PASS materials are required to support significant public transport infrastructure projects that will generate substantial volumes of naturally occurring PASS materials. While the “Star Dam” is not actually a “dam” the name is in common usage and will be kept to avoid confusion.

The purpose of this paper is to outline the MBC management plan for the development of Growling Grass Frogs (GGFs) habitat enhancement as part of this development.

Key references guiding this proposal are:

- DELWP Growling Grass Frog Habitat Design Standards, Melbourne Strategic Assessment, 2017. (the guideline).
- Star Dam Growling Grass Frog Survey Report, Jan 2019 commissioned by MBC and provided by Water Technology consultants.
- Star Colliery Dam Site Potential Acid Sulphate Soil (PASS) Environmental Management Plan.

2 POTENTIAL ACID SULPHATE SOIL MANAGEMENT

Potential Acid Sulphate soils are soils that formed under waterlogged conditions when oxygen was not readily available. PASS material must be managed in accordance with the EPA Victoria Industrial Waste Management Policy (Waste Acid Sulphate Soils). The EPA has developed a guideline for management of acid sulphate soils (Publication 655.1) that sets out procedures and controls for the classification of both actual acid sulphate soils and potential acid sulphate soils.

Actual acid sulphate soils will not be accepted at the Star Dam site. PASS material once identified in an excavation may either be managed onsite or if necessary, taken offsite to a site such as the Star Dam that has an EPA approved Environment Management Plan for the acceptance of PASS material.

A safe way of managing PASS material is to store them in such a fashion so as to prevent exposure to air that can result in the oxidisation of pyrite within the soils and formation of acid. Placing PASS material below the water table in a void such as the Star Dam is a safe management method for these materials.

3 EXISTING SITE SETTING

The Star Dam site is comprised of a former coal mining pit surrounded by overburden dumps to the south and Parwan Creek to the north and west. The former coal mining void is characterised by generally steep sided banks that terminate at the base of mining void at up to 20 metres below the water surface. The coal mine was developed by the removal of approximately 8 metres of overburden soil that has been dumped to the south of the pit. The coal faces in the Star Dam are assumed to be consistent with the faces within the MBC mine that have a terminal face of approximately 75^{o} from horizontal. There is limited wetland type vegetation within the Dam excavation except where placement of overburden has allowed the establishment of reeds.

3.1 Wetland Types

The current site is a steep sided water body with mainly very deep water across the entire pit. There are limited zones with reed growth and no rocky banks. Much of the water perimeter has exposed brown coal that does not appear to support significant vegetation growth.

3.2 Size

The Star Dam has a perimeter of approximately 1,000 m and a surface area of 5 ha.

3.3 Shape

The Star Dam has an irregular shape that follows the course of Parwan Creek to the north and west. The water body is bounded by Cummings Road to the east and has a more linear final profile on the south. The maximum dimensions of the dam are approximately 400 m width and 200 m in length.

3.4 Depth, gradients and water level variation

Current depth of the Star Dam is largely greater than 10 metres. There are some shallower zones in the south eastern corner where a ramp has allowed for the placement of fill material. Similarly, along the southern boundary there are zones where overburden dumping from the bank appears to have occurred reducing the depth in sections close to the edge of the bank.

The water level in the pit fluctuates with seasonal conditions. Higher evaporation in the summer months together with lower surface water and groundwater inflows leads to lower water levels than winter months. Seasonal variation is in the range of approximately one metre.

A very small percentage of the pit has water levels less than 5 metres. At the end of the summer dry period much of the vegetated zone is completed located above the water as the steep drop-offs combined with the coal face is unsuitable for establishment of emergent vegetation.

3.5 Hydroperiod

The Star Dam is a permanent water body.

3.6 Wetland Lining and Substrate for vegetation

The Star Dam is below a groundwater water table feature and as such does not require a liner. However, the coal exposed along most of the bank perimeter is unsuitable for emergent vegetation.

The two following images show typical bank substrates, the first shows exposure of coal down to the water with slopes overly steep for vegetation establishment. The second shows a layer of coal at the water edge that has no vegetation but with reeds above on a narrow shelf above the coal. Club rushes can be observed on the bank above the reeds these club rushes tend to grow where seepage from the overlying unconfined Fyansford aquifer into the pit is occurring.

3.7 Thermal properties

The Star Dam is a deep steep sided pit with limited shallow zones. As such warmer zones are limited to a couple of locations where spoil material has been previously dumped. There are no sections of rocky banks. The water in the pit has limited exposure to warming from the sun in the summer.

3.8 Water source

The Star Dam water is a combination of groundwater and surface water inflows. The total dissolved solids concentration in the water suggests that the groundwater inflow is a significant contributor to water present on site.

3.9 Water quality

The water quality on the Star Dam is brackish with total dissolved solids concentration of 6,600 mg/litre

3.10 Aquatic vegetation

There is established vegetation on sections of the Star Dam where fill placement has occurred. The vegetation where present is largely dominated by the Common Reed (Phragmites Australis).

3.11 Predators

There is limited information on the presence of predatory fish in the Star Dam. There are aquatic birds that could potentially prey on GGFs in the dam.

3.12 Terrestrial Habitat

No significant alteration to the terrestrial habitat surrounding the dam is proposed. The terrestrial vegetation is dominated by invasive weed species such as a serrated tussock, boxthorns and scotch thistles. There are remnant river red gums located south of the dam and in Parwan Creek. MBC will use existing weed control contractors to reduce infestations of invasive weeds in particular, boxthorns, scotch thistles and serrated tussock.

4 PROPOSED DESIGN

4.1 Proposed Actions

It is planned to improve the habitat of the Star Dam by the importation and placement of a combination of PASS, clean fill, structural fill and boulders. The methodology proposed is to create ramps into the dam at the south eastern corner and south western section of the dam. Utilising these ramps trucks will import fill material that will be placed into the dam to reduce the depth of the dam. PASS material will only be placed in the deeper section of the pit and no higher than 2 metres below the minimum summer water elevation. Some deeper sections of dam will remain with water depth up to 5 metres.

Clean fill will then be placed around the perimeter of the dam where practicable. Clean fill and boulders will be used to fill up the bank and below the water line to create a more gently sloping back profile that will support vegetation and be less susceptible to erosion and slope failure. The clean fill will be used to create a sequence of shallow and steep banks, around the perimeter of the dam. Onsite boulders will be placed at strategic locations around the dam to create basking sites for the GGFs. A photo of suitable boulders existing onsite in the old quarry follows.

4.2 Wetland Types

The Growling Grass Frogs require a range of habitats to provide food, shelter, allow breeding and egg-laying, tadpole development, and for chytrid fungus control (the disease chytridiomycosis caused by waterbourne pathogen Batrachochytrium dendrobatidis).

Favourable habitat conditions include:

- Permanent water in the ponds with seasonal hydroperiods.

- Ponds with still or slow-moving water with both warm shallow and deeper water, with steep drop offs to escape predators.
- Rock piles near the margins and in the shallows of the pool with minimal tree canopy coverage
- Abundant and appropriate aquatic (submerged and emergent) and terrestrial vegetation for shelter, calling, breeding and egg deposition, safe movement between water sources.
- An acceptable quality water source not likely to introduce pollutants, pesticides, excess nutrients or heavy metals.
- Conditions identified for chytrid fungus control; warm, shallow waters with stable surface water temperatures; moderate salinity; rock piles to allow sun basking.

The proposed actions will provide habitat that meets all the above criteria.

4.3 Size

Constructed wetlands should be designed to be as large as is practicable, taking into account the site's constraints. This protects from the effects of drought, increasing the likelihood of a permanent body of water. Larger wetlands can contain a greater quantity and diversity of food and shelter types.

The Star dam size will be reduced only a few percent below the current 5 ha by the proposed actions.

4.4 Shape

The GGF guidelines state that wetlands should be shaped wide enough to maximise the area of deep water for submerged and floating vegetation and must not be too narrow which would impact on depth capacity. The size of the Star Dam is such that shallow water depth is not an issue.

Islands in wetlands are not permitted as they would attract excessive birds increasing contamination and predation.

While the creation of causeways could potentially create islands if that is considered desirable, the decision to create islands or leave causeways connected to land so as to allow land-based predators to access nesting birds will be made subject to consultation with relevant agencies at the completion of the filling.

4.5 Depth, gradients and water level variation

Water depth is important as it determines aquatic vegetation structure and composition, supporting a dense cover of submergent and floating vegetation and preventing domination by emergent aquatic plants such as Common Reed (Phragmites australis) and bulrushes (Typha spp.) which tend to choke shallow wetlands.

The emergent vegetation zone must incorporate a littoral zone that is subject to fluctuating water levels due to seasonal evaporation rates and rainfall variation. This is important for nutrient cycling and growth of aquatic plants and the zone is used by the GGF to ambush prey on bare soil/exposed mud and to perch on rocks and ground cover vegetation at the water's edge.

The guideline state:

- The deep water submergent vegetation zone is preferably 60-70 % of the total wetland surface area at normal water level (minimum 50%).
- The water depth in the submergent zone must be maintained at greater than 1.5m. Wetlands with greater depths are desirable.
- The emergent vegetation zone should occupy 30-40% of the wetland area and should include a littoral zone with fluctuating water levels (eg from normal levels to summer draw down).
- A variety of slopes must be incorporated into the bank design, including steep drop offs.

The proposed works will meet or exceed all these guideline requirements.

4.6 Hydroperiod

Extinction risk for Growling Grass Frog populations is lower in wetlands with a permanent hydroperiod. Designs should aim for permanent hydroperiod or one that is as long as practicable given constraints (size and water supply).

Timing is important as wetlands need to contain water during the breeding season (Sept to February [around Melbourne]). Eggs are laid in Spring (mostly in October November) and tadpoles develop over several months with most tadpoles having emerged as frogs by the end of May.

Ideally water levels should draw down naturally over later summer and autumn.

The Star Dam will remain a permanent water body with seasonally fluctuating water levels.

4.7 Wetland Lining and Substrate for vegetation

Lining material used to cover coal will be comprised of PASS at depth and clean fill soils in the zone where water levels fluctuate and down to 2 metres. As the water level in the dam is below surrounding groundwater elevations a liner is not required to reduce seepage.

4.8 Thermal properties

The guideline states:

- Wetlands must be large and deep to provide thermal inertia (resistance to temperature change).
- Wetlands must incorporate extensive, shallow permanently inundated emergent zone where water temperatures will be elevated due to sun radiation.
- Warm waters (up to 27 degrees Celsius pg 3) with moderate salinity has been found to lower the rates of chytrid fungus infection and frog mortality compared to colder, fresher water. Most Growling Grass Frog wetlands should therefore be designed to achieve “anti-chytrid” thermal properties in at least 20% of their perimeter with jumbled piles of rocks extending into the wetland at least one meter from normal water level. In basalt regions aim to incorporate more margin with rocks (up to 50% margin, budget allowing) – where excavated rock is freely available for use on site. Designs should include rock piles in the shallows to act as heat banks as rocks warm under the sun and transfer heat to shallow pond waters. Using a variety of rock sizes 10 cm-1 m diameter.

- To prevent shading, shallows should be free of dense emergent aquatic plants (typha spp.) and shrubs and trees.
- To cut prevailing winds embankments would be useful and can be constructed from excavated material.

Shallows are warmer due to solar radiation, which accelerates vegetation growth and tadpole development. The hatching of tadpoles depends on the water temperature, with 18-24C being optimal. Lower water temperatures can mean tadpoles take up to 5 days to hatch.

Warm shallows potentially increases the invertebrate food sources available to the frogs and has been shown to supress chytrid fungus.

The proposed works at the Star Dam will provide both deep and extensive shallow zones and will incorporate zones of basalt rock boulders both above and below the shoreline. These works will significantly increase the habitat value for GGFs.

4.9 Water source

Growling Grass Frogs require water for at least 6 months of the year over the breeding season.

Threats to the species include changed hydrological regimes including timing, frequency, volume and speed of flows, and lowering of groundwater through pumping of aquifers.

The guideline state:

- Groundwater is generally preferred where feasible.

The proposed works at the site will not significantly alter the water quality, elevation or seasonal water level elevations within the pit.

4.10 Water quality

Moderate to low salinity is preferred. Poor water quality including nutrients, turbidity, pollutants such as pesticides, detergents and heavy metals threatens species survival. High nutrient levels increase algae and plant growth, starving the tadpoles of supportive oxygen levels.

Fresh (non-saline) water from rainwater, stormwater is less effective for reducing chytrid.

The water in the Star Dam is saline. The following table shows the water quality in the pit compared to guidelines. The salinity of the pit water could be reduced if water was pumped from the pit prior to winter rainfall events that would tend to dilute the water in the dam. MBC will investigate the possibility of the draw down of small volumes of water each year to reduce the tendency for increases in salinity from evaporative concentration.

Parameter	Target Value	Star Dam	Comment
Dissolved Oxygen	To be determined	6.26mg/L	Well oxygenated
Total Nitrogen(mg/L)	<1.0	0.1	(Nitrate)
Ammonia (mg/L)	<0.01	<0.01	
pH	6.0 – 8.5	8.1	Alkaline
Salinity (us/cm)	<5000	10980	Saline
Turbidity (NTU's)	<40		Visually Clear

In order to manage suspended solid levels and thus turbidity within the dam, Fill will only be placed in a small section of the dam at any given period. The dam area is approximately 5 ha and fill placement will be confined to zones no greater than 500 m^2 or less than 1% of the dam area.

4.11 Aquatic vegetation

Tall emergent vegetation such as reeds and rushes provide protection to adult frogs from predation.

Submerged and floating attached vegetation protects tadpoles and eggs. Females lay up to 4,000 eggs in foamy jelly rafts which sink into submerged vegetation within 12 hours. Tadpoles hide in the aquatic vegetation or move to deeper water if disturbed

Grass and shrub cover on the banks protects emerging froglets from predators.

Favourable habitat features abundant aquatic vegetations, and rock piles around the margins and in the shallows.

Growling Grass Frogs are 'sit and wait' predators, eating a wide range of insects and small lizards, fish, tadpoles and frogs.

Short open vegetation allows Growling Grass Frogs to catch insects for food.

The guideline states:

- If conditions are suitable initial plantings should spread quickly so the whole wetland does not need to planted out:
  - Plant submergent species on the slopes rather than the maximum depth.
  - The proportion of wetland planted will be determined during planning phase

- Planting density aims to establish 50% cover of submergent/floating vegetation in the deep water zone and patches of emergent vegetation within several years. Emergent plantings of generally 4-6 plants per square metre. Less plants per square metre for submergent plants.
- A diversity of vegetation is highly desirable. Select species from Appendix 1 (as determined by water salinity/local water quality).
- In the deep water, submergent/floating species must include Water Ribbons (Cycnogeton procerum) and a species form the genus Potamogeton (if brackish water Fennel Pondweed (Stuckenia pectinate).
- Do not use exotic species.
- Common Reed (Phragmites Australis) and bulrushes (Typha ssp) do not need to be planted as they are likely to establish naturally over time.

The filling works will take decades to complete and much of the bank improvement works can only be achieved once filling of the lower sections of the pit has been completed. Vegetation of the pit will occur in the latter stages of the rehabilitation program.

Vegetation will be selected from DELWP design standards or chosen in consultation with Melbourne Water and the Parwan Landcare Group. Small test plots will be trialled in the shallow section of the Star Dam ensuring that only non-invasive species will be selected for trials.

4.12 Predators

Growling Grass Frogs are active in the warmer months (September to March), in the sun on mild sunny days. They usually call, feed and move around after dark.

Several native and introduced fish, feed on eggs and tadpoles. Introduced fish such as Eastern Gambusia (Mosquito Fish), often found in stormwater systems. Also Carp and Redfin, the salinity if the Star Dam reduces the likelihood of the presence of freshwater fish.

The guideline states:

- Grass and shrub cover on the banks protects emerging froglets from predators.
- Islands in wetlands are not permitted as they would attract excessive birds increasing contamination and predation.
- New wetlands should be offline. Those in floodplain should incorporate bund walls to decrease fish incursion
- Incorporate fish exclusion filter in hydraulic connection system between source (storm water or river) and wetland
- Other:
    - Depth requirements assist with predator avoidance
    - Hydroperiod – dry out maintenance capability to control predators
    - Vegetation refuge for tadpoles (and eggs – submerged and floating attached vegetation)

4.13 Terrestrial Habitat

During winter Growling Grass Frogs are mostly inactive and shelter on the land under rocks, fallen, logs or thick vegetation, in ground crevices or debris. They are often away from water bodies and sometimes shelter communally.

Movement between breeding sites (water bodies) is crucial, allowing temporal variation in habitat use and/or recolonisation of sites following local extinction, and maintains genetic diversity.

Adult frogs move across open ground (for example grasslands) to access local foraging resources and breeding sites.

The guideline states:

- Minimum 50 metre buffer from development/major roads/car parks/buildings.
- 30 m buffer plus from normal water level of breeding wetland to minor infrastructure such as shared use paths, passive recreation, stormwater assets.
- Within 10 metre of wetlands normal water level there must be 50% of the area. maintained as low grassy vegetation up to 10 cm in height.

- If tussock forming grasses and sedges are used in the grassy zone planting, density should be no more than 20% cover when mature.
- 50 m buffer from wetland for any mulch used.
- 10 m buffer from normal water level for any shrubs planted.
- Rock pile at least 1 metre deep constructed adjacent to wetland margin using a variety of rock sizes 10cm-1 m diameter.
- Where possible areas between 10 m to 100 m should primarily be short mown grass with open structure (20% cover). They do not need to be native grasses – mown pasture grass or lawn are acceptable.
- Tree cover within 100 m of wetland should not exceed 10%.
- A patchy arrangement of denser plantings of tussock forming species is encouraged and offer potential terrestrial shelters.
- Do not use invasive plant species.

Rehabilitation activities of the land areas around the Star Dam will be consistent with guideline requirements. MBC will use existing weed control contractors to reduce infestations of invasive weeds in particular, boxthorns, scotch thistles and serrated tussock.

5 SUMMARY

The rehabilitation of the Star Dam will provide a significantly enhanced habitat for Growling Grass Frogs (GGFs) that the current unrehabilitated water-filled former coal mining void. The key activities that will be undertaken include:

- Construction of a ramp to allow safe vehicular access to the pit.
- Importation of PASS material and placing of PASS material to a maximum of 2 metres below the lowest seasonal water level in the pit.
- Importation of clean fill and use of existing overburden material on site to fill and shape the Star Dam banks to cover exposed coal and to a allow for a bank profile that is less susceptible to erosion and that will support vegetation growth.
- Stabilisation of banks that are failing due to wave action.
- Importation of boulders to the dam to provide sunning platforms for GGFs and to provide refuges from predators.
- Monitoring of PASS material and dam water quality in accordance with the EPA approver PASS EMP.
- Undertaking of weed control to reduce infestation of endemic and noxious invasive weeds.
- Trialling of suitable local aquatic and emergent vegetation species at the site to determine suitable species.
- Investigate the periodic discharge of water from the dam to reduce the potential of salt from evaporative concentration.
- Removal of truck ramps at the conclusion of fill placement.

The rehabilitation works at the Star Dam will produce a habitat that will be significantly enhanced for Growling Grass Frogs. Key enhancements will include a greater range of water depth to provide microclimates within the dam, more vegetation for food and cover from predators, rock banks for basking and localised water warming. In addition, the banks will be more resistant to wave erosion and support a greater range of aquatic and emergent vegetation.

Traffix Group

Traffic Management Plan

Proposed Rehabilitation and Earthworks

181 Cummings Road, Parwan

Prepared for
Shinboners Pty Ltd

March 2021

G24384R-01D

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Document Control

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A	Draft	3/10/18	T. Amanatidis/L. Hall	B. Chisholm
B	Final	9/10/18	T. Amanatidis	B. Chisholm
C	Amended Permit - Draft	26/02/21	K. Bullock	B. Chisholm
D	Amended Permit – Final	05/03/21	K. Bullock	B. Chisholm

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1. Introduction

Traffix Group has been engaged by Shinboners Pty Ltd to prepare a Traffic Management Plan for the Proposed Rehabilitation and Earthworks at 181 Cummings Road, Parwan.

In particular, this report provides a broad overview of the traffic routes that are available to and from the site, and a high-level assessment of the traffic impacts on the surrounding road network and intersections for trucks associated with the proposed earthworks.

This report has been prepared to address the requirements of Condition 8 of the Request for Further Information (RFI) issued by Moorabool Shire Council.

2. Existing Conditions

2.1. Subject Site

The subject site, addressed as 181 Cummings Road, is located at the west side of Cummings Road between Smiths Road and School Lane in Parwan as shown in the locality plan at Figure 1.

The site has a frontage to Cummings Road to the east and Smiths Road to the south as shown in the aerial photograph at Figure 2.

A dam known as 'Star Dam' is located toward the northern end of the site adjacent to the Parwan Creek. We understand that the dam was previously an open cut coal mine. This use ceased a number of years ago and the dam is permanently inundated with water. Vehicle access to the site is provided via three connections to Cummings Road along the site's eastern boundary.

The subject site is zoned Special Use Zone (SUZ) under the Moorabool Planning Scheme, as shown in the land zoning map at Figure 3. Land zoning in the immediate vicinity of the site comprises a mixture of special use and farming zones.

We understand that Planning Permit No. PA2018/319 (issued on 7 August 2019) applies to the site and allows for rehabilitation and earthworks in association with Star Dam.

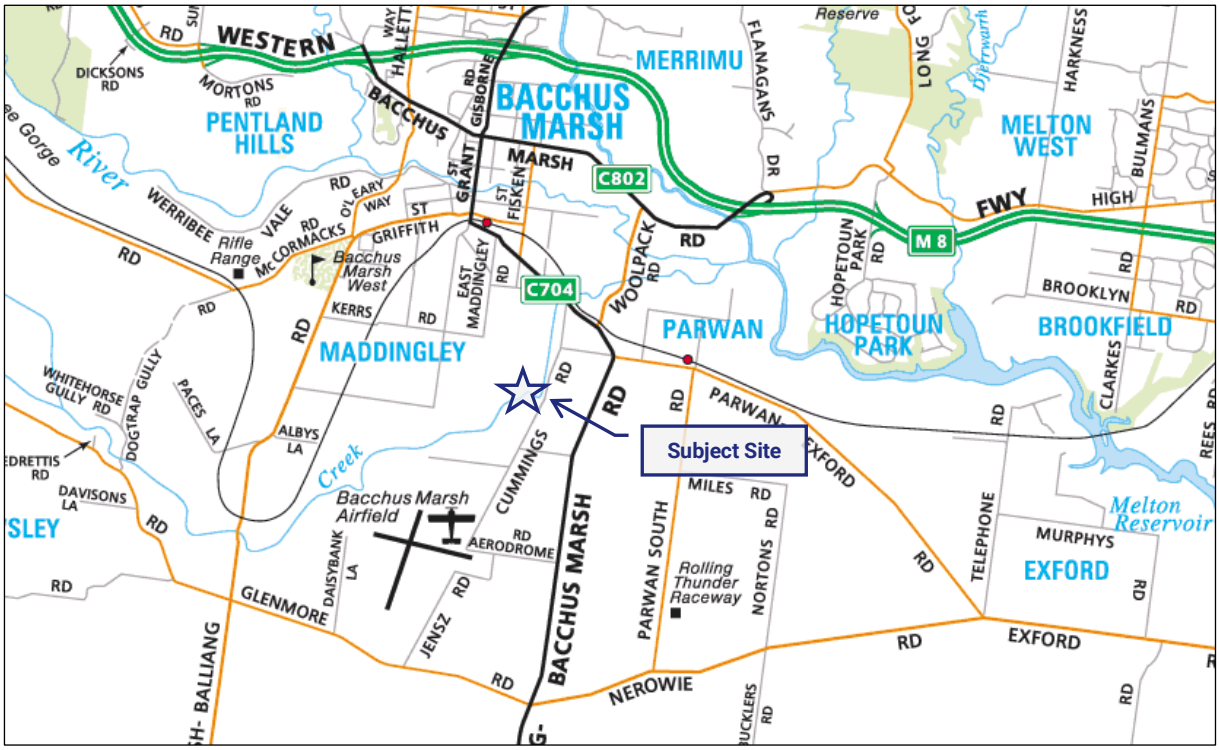
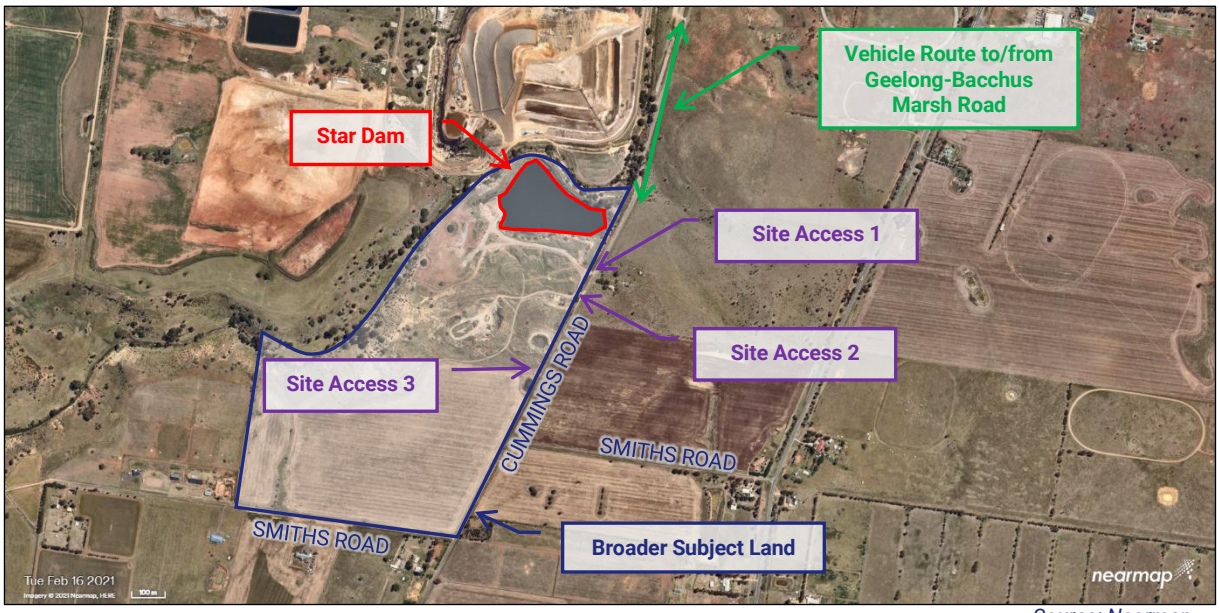
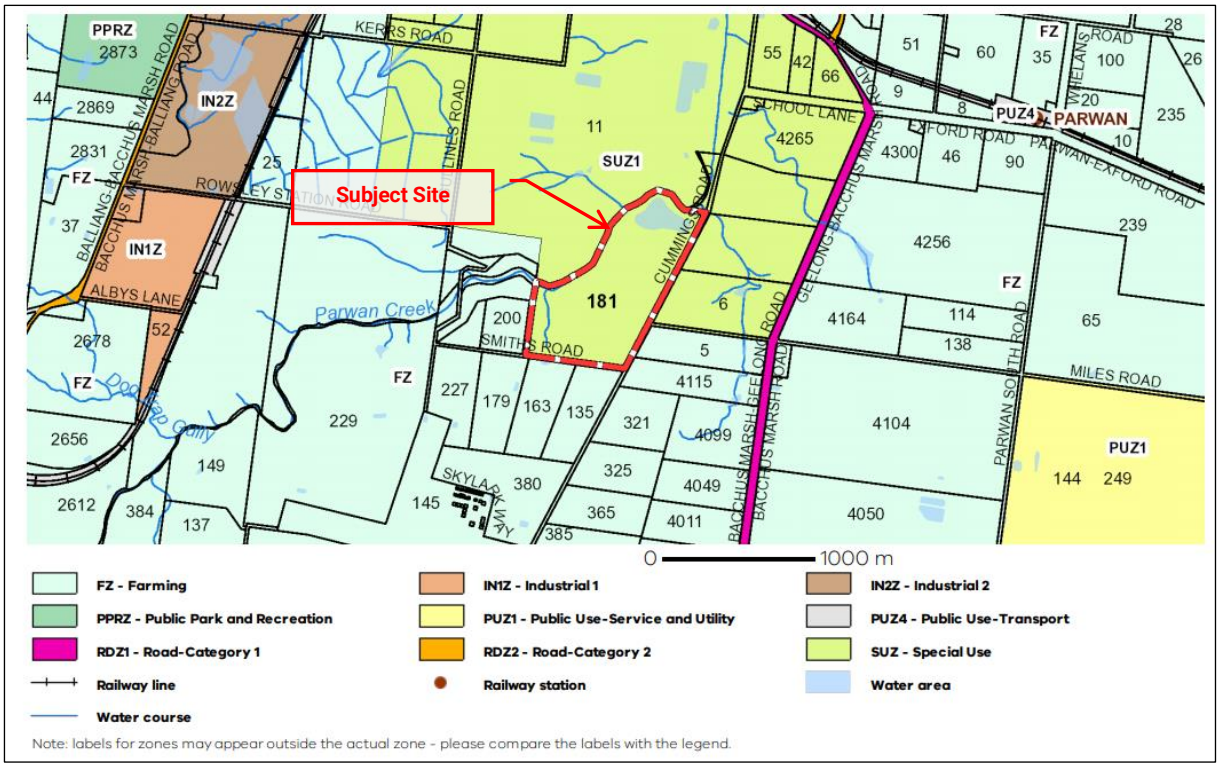


Figure 1: Locality Map *Reproduced with Permission of Melway Publishing Pty Ltd*



Source: Nearmap

Figure 2: Aerial Photograph



Source: VicPlan, https://mapshare.vic.gov.au/vicplan/

Figure 3: Planning Scheme Zoning Map

2.2. Road Network

Cummings Road is a local road under the control of Council and is aligned in a north-south direction along the eastern boundary of the site. Cummings Road provides a connection between Geelong-Bacchus Marsh Road to the north and Aerodrome Road to the south.

In the vicinity of the site, Cummings Road has a sealed carriageway that accommodates a single traffic lane in each direction and has gravel/grass shoulders on both sides.

The default rural speed limit of 100 km/h applies to Cummings Road in the vicinity of the site.

Geelong-Bacchus Marsh Road is an arterial road managed by VicRoads and is zoned 'Road Zone Category 1' under the Planning Scheme.

In the vicinity of Cummings Road, Geelong-Bacchus Marsh Road is aligned in a general northwest-southeast direction and accommodates a single traffic lane in each direction.

A speed limit of 80 km/h applies to Geelong-Bacchus Marsh Road in the vicinity of the site.

Smiths Road is a local road that is under the control of Council and is aligned in an east-west direction between Geelong-Bacchus Marsh Road to the east and Cummings Road to the west. Smiths Road provides a sealed carriageway approximately 3.6 metres wide and has gravel/grass shoulders on both sides.

The default rural speed limit of 100 km/h applies to Cummings Road in the vicinity of the site.

It is noted that a separate road also named Smiths Road which extends east from Cummings Road along the subject site's southern abuttal.

Woolpack Road is a Council arterial road that is zoned 'Road Zone Category 2' under the Planning Scheme and extends between Geelong-Bacchus Marsh Road to the south and Bacchus Marsh Road (The Avenue of Honour) to the north.

Woolpack Road provides a sealed carriageway accommodating a single lane of traffic in each direction.

A speed limit of 80 km/h applies to Woolpack Road.

Bacchus Marsh Road (The Avenue of Honour), located approximately 2 km to the north of the subject site, is an arterial road managed by VicRoads and is zoned 'Road Zone Category 1' under the Planning Scheme. Bacchus Marsh Road is aligned in a north-west to south-east direction, providing connections with the Western Freeway to both the east and west directions.

Bacchus Marsh Road generally accommodates a single lane of traffic in each direction and continues as Main Street through the Bacchus Marsh Town Centre.

A speed limit of 60 km/h applies to Bacchus Marsh Road, reducing to 50 km/h through Main Street.

Grant Street is an Arterial Road managed by VicRoads and is zoned 'Road Zone Category 1' under the Planning Scheme. Grant Street is aligned in a north-south direction between Parwan Road to the south and Main Street to the north. To the north of Main Street, Grant Street continues north as Gisborne Street and provides a connection with the Western Freeway.

Grant Street/Gisborne Street provides for a single lane of traffic in each direction and an additional lane of kerbside parking on both sides along certain sections of the road.

Speed limits of 60 km/h and 50 km/h generally apply to Grant Street and Gisborne Road respectively, however 40 km/h speed limits apply during school times along certain sections.

A roundabout forms the intersection of Grant Street/Gisborne Road/Main Street, and is provided with a semi-mountable island.

Figure 6 to Figure 11 provide views of the surrounding road network.

Figure 4: Cummings Road – View North

Figure 5: Cummings Road – View South

Figure 6: Geelong-Bacchus Marsh Road (near Smiths Road)– View North

Figure 7: Geelong-Bacchus Marsh Road (near Smiths Road) – View South

Figure 8: Geelong-Bacchus Marsh Road (near Cummings Road)– View West

Figure 9: Geelong-Bacchus Marsh Road (near Cummings Road) – View East

Figure 10: Smiths Road (east of Cummings Road) – View East

Figure 11: Smiths Road (east of Cummings Road) – View West

2.3. B-Double Road Network

The VicRoads heavy vehicle (B-Double) map, illustrated in Figure 12, sets out routes that have been assessed to be suitable for heavy vehicles to use. Proximate to the subject site, roads that would be appropriate for heavy vehicles to utilise include the following:

- Geelong-Bacchus Marsh Road,
- Woolpack Road,
- Bacchus Marsh Road (The Avenue of Honour),
- Grant Street,
- Gisborne Road,
- Old Western Highway, and
- Western Freeway.

Source: https://www.vicroads.vic.gov.au/

Figure 12: VicRoads B-Double Road Network Map

2.4. Bacchus Marsh Traffic Improvements Package

The Bacchus Marsh Traffic Improvements Package comprises a range of projects to improve the flow of traffic and road safety between Bacchus Marsh and the Western Freeway.

The Halletts Way Interchange Project was completed in August 2018, which involved the construction of new entry and exit ramps at Halletts Way to access the Western Freeway (Melbourne bound). This provides for a more direct and convenient route for residents and businesses who reside proximate to Halletts Way to access the Western Freeway, resulting in a reduction of vehicles having to travel through the Bacchus Marsh town centre.

The Gisborne Road/Western Freeway interchange upgrade was completed in the middle of 2018. This project involved upgrading the intersection of Gisborne Road and Holts Lane with the addition of new trafficable lanes and traffic lights, and providing a slip lane to the Melbourne-bound on ramp of the Western Freeway.

The Victorian Government is undertaking a planning study for a potential Eastern Link Road in Bacchus Marsh, in response to future urban growth and increasing congestion through the Bacchus Marsh town centre. The study intends to review the possible impacts of a north-south link, determine a route and seek approvals for land to be eventually integrated into the Moorabool Planning Scheme.

2.5. Traffic Surveys

Traffix Group previously commissioned traffic surveys at the intersection of Bacchus Marsh-Geelong Road and Cummings Road on Thursday 7 December, 2017 in the morning between 7:00-9:00am and the afternoon between 3:30pm-6:30pm.

The surveys established the morning peak hour as 7:45am-8:45am, and the afternoon peak hour as 3:45pm-4:45pm.

The peak hour movements recorded at the intersection for these peak periods are presented at Figure 13 with specific heavy vehicle volumes illustrated in Figure 14. For the purposes of these traffic surveys, 'heavy vehicles' refer to any 6.4 metre long truck (Small Rigid Vehicle) or larger.

The surveys found that there are very low existing traffic volumes along Cummings Road during weekday peak hours. We do not expect that traffic volumes on Cummings Road would have materially changed since the surveys were undertaken in December 2017.

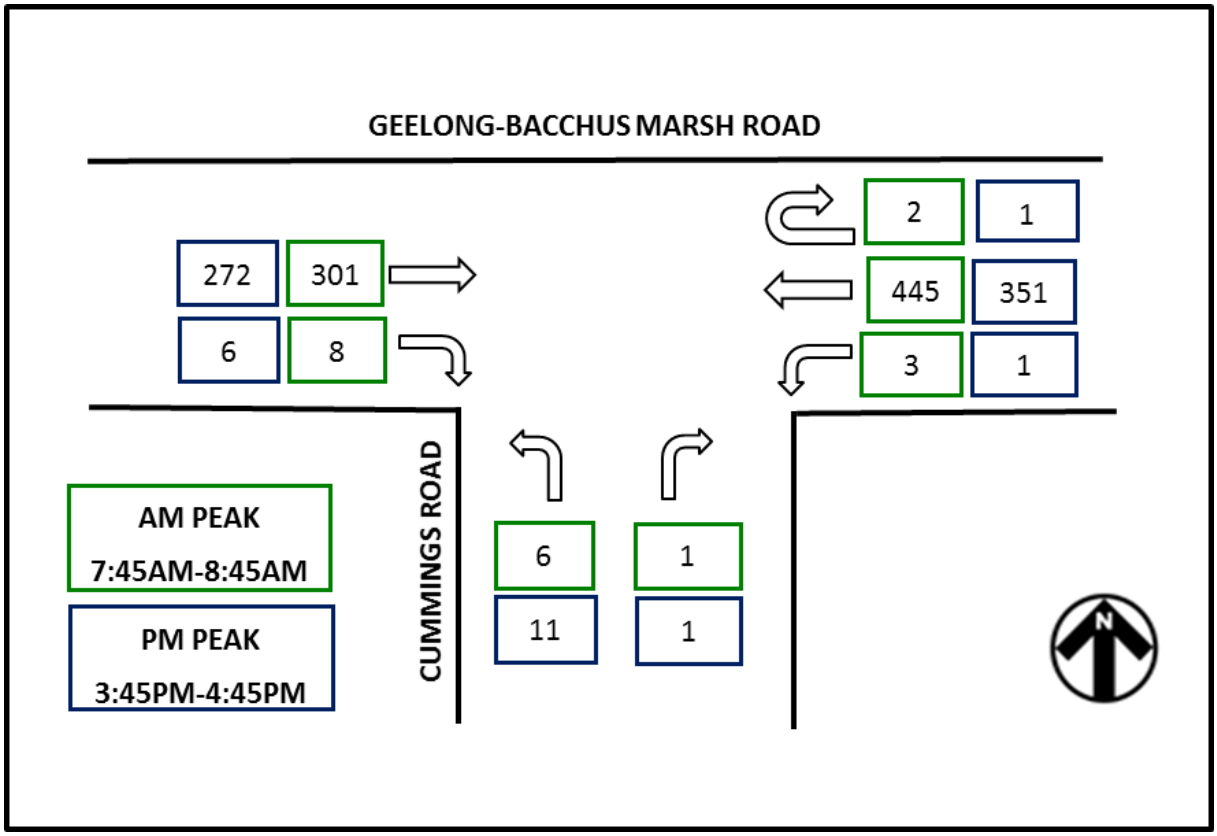


Figure 13: Existing Total Traffic Volumes Thursday 7 December, 2017

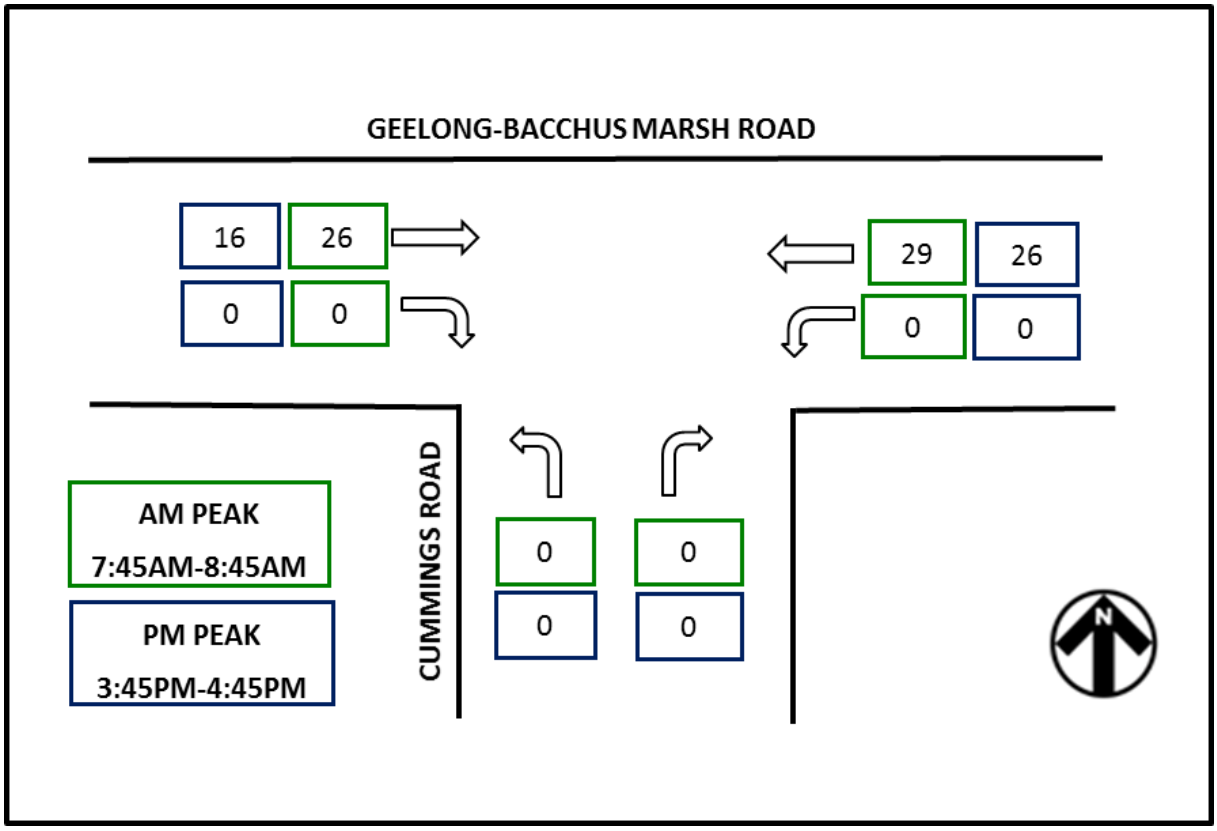


Figure 14: Existing Heavy Vehicle Volumes Thursday 7 December, 2017

2.6. Crash Review

A review was undertaken of the Department of Transport crash statistics database for the last five years of available data (last updated 30th June 2020). The crash investigation area captured Cummings Road (between Geelong-Bacchus Marsh Road and Smiths Road) and Smiths Road (between Geelong-Bacchus Marsh Road and Cummings Road) including intersections.

The data identifies that there were no crashes recorded within the subject area during this period.

3. Proposal

The proposal is for an amended planning permit to undertake rehabilitation and earthworks on the land at 181 Cummings Road, Parwan.

The proposed works will involve transport of approximately one million cubic metres of clean fill to the site for rehabilitation of the former mine and other disturbed areas. This equates to approximately 1.65 million tonnes of soil.

Over the life of the rehabilitation works on the site, an expected total maximum of 50,000 trucks are anticipated based on average load of 33 tonnes per truck.

We have been informed by the operator of the site that the filling process is expected to take between 10 and 12 years to complete, with an average of 20 trucks per day (truck and dog type). The maximum number of trucks per day could be up to 50% above the average over the short-term.

Trucks delivering material are proposed to enter and exit the site during the following times:

- Monday to Friday between the hours of 7am and 4pm, and
- Saturday between the hours of 7am and 1pm.

It noted that typical operations will be 5 days a week (Monday to Friday) and that operations on Saturdays are to allow for flexibility when needed.

The majority of heavy vehicle movements are anticipated to be to/from sites across Melbourne. The proposed haulage route will be generally via Woolpack Road to/from the Western Freeway.

Access is proposed via Cummings Road at the northernmost existing vehicle access connection located approximately 1.1km south of School Lane as shown in Figure 2.

An internal unsealed roadway will provide access to the dam. A rocked roadway or jetty is to be constructed out towards the centre of the dam to accommodate infill activities.

4. Traffic Generation and Travel Routes

4.1. Traffic Generation

Traffix Group has been advised by the operator of the site that the fill is estimated to take between 10 and 12 years to complete. For the purposes of our assessment, we have assessed the shortest timeframe being 10 years and associated average daily number of 20 trucks (truck and dog type) expected to enter and exit the site on each day of operation. Therefore, it is projected that the project will generate an average of 40 truck movements per day including 20 entry movements and 20 exit movements.

Daily truck movements to/from the site are expected to be spread across the nine hour operating period between 7am and 4pm on weekdays. This equates to an average of approximately 4 to 5 truck movements per hour, or one vehicle movement every 13.5 minutes on average. As noted previously, Saturdays are not proposed to be part of normal operations and therefore this assessment has considered 5 days of operation per week.

This level of traffic generation is relatively low in traffic engineering terms.

4.2. Likely Travel Routes

Traffix Group has been advised by the future operator of the site that heavy vehicle traffic associated with the proposal is generally expected to travel to/from various sites across Melbourne. Therefore, it is likely that all vehicle movements will be predominantly generated to and from the east.

There are a number of alternative routes between Melbourne and the site. Traffix Group has been advised by the future operator of the site that the haul route to/from the Western Freeway will be via Woolpack Road. The most direct and convenient route for heavy vehicles between the site and the Western Freeway would be:

- Via Cummings Road > Geelong-Bacchus Marsh Road > Woolpack Road > Bacchus Marsh Road > Hopetoun Park Road (Melbourne-bound only) > Western Freeway. For arrival trucks from Melbourne, a freeway exit connection is provided directly with Bacchus Marsh Road.

This route is expected to be the quickest, shortest and most direct route, and avoids travelling through the Bacchus Marsh town centre. Furthermore, this route is consistent with the routes set out by VicRoads that have been defined as suitable for heavy vehicles (B-Double) to travel along.

Non-locally generated site traffic would generally be distributed via the wider road network between a number of different routes and destinations including Melbourne (to/from the east), Ballarat (to/from the west), Werribee and Geelong (to/from the south). Figure 15 provides an illustration of the likely travel routes to and from the site.

Vehicles accessing the site to/from the south (which is expected to occur occasionally only) may elect to utilise Smiths Road or School Lane to access Cummings Road from Geelong-Bacchus Marsh Road given the shorter travel distance.

These are considered to be suitable alternative travel routes for the occasional truck movement given that only a limited number of properties take access via these roads and therefore associated existing traffic volumes are low. Whilst School Lane has a carriageway that accommodates simultaneous two-way traffic, Smiths Road only accommodates a single lane of two-way traffic. Nevertheless, Smiths Road has a wide gravel/grass shoulder on both sides which allows for vehicles to pull over and pass during the unlikely situation where vehicles are travelling along this road at the same time.

Accordingly, we are satisfied that above routes can adequately accommodate the traffic generated by the proposal without any noticeable impacts to the surrounding road network.

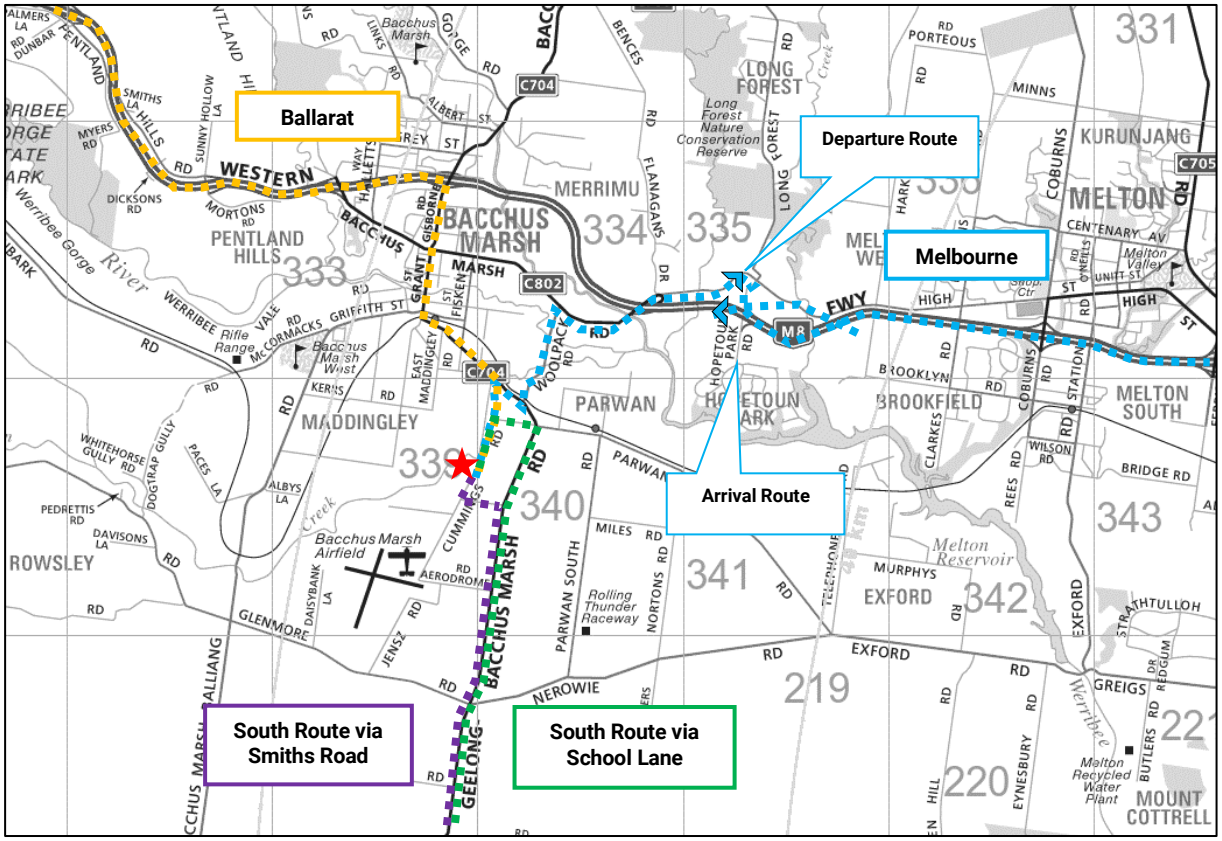


Figure 15: Likely Travel Routes

4.3. Traffic Impacts

With regard to the likely travel route identified above, it is projected that most (if not all) traffic generated by the proposal will utilise the intersection of Geelong-Bacchus Marsh Road/Cummings Road.

Upgrade works will not be required to the existing Geelong-Bacchus Marsh/Cummings Road intersection given that historically the site would have utilised this intersection to accommodate traffic generated by the previous coal mine operations including large trucks. The proposal intends to utilise 'truck and dog' type heavy vehicles which is presumably similar to the historical use of the site. Furthermore, the predicted vehicle movements associated with the proposal are relatively low and likely to be less frequent compared with the previous coal mine operation. Accordingly, we are satisfied that the existing intersection geometry of Geelong-Bacchus Marsh Road/Cummings Road can satisfactorily accommodate the turning movements of a 'truck and dog' type heavy vehicle.

We anticipate minimal traffic generated to the intersections of Smiths Road and School Lane with Geelong-Bacchus Marsh Road as a result of the proposal and accordingly any upgrade works are not necessary.

With regard to the wider road network, the proposed travel route is consistent with the nominated B-Double routes set out by VicRoads as discussed previously and therefore the route can adequately accommodate the traffic generated by the proposal without any adverse impacts to the surrounding road network. It is noted that Cummings Road is not a nominated B-Double route, however as discussed above, Cummings Road has historically been utilised to access the site and can satisfactorily accommodate 'truck and dog' vehicles.

Based on the above, the level of traffic generated as a result of the proposal will be low, spread throughout the day and have no detriment to the operation of the Geelong-Bacchus Marsh Road/Cummings Road intersection and the surrounding road network and intersections.

4.4. Internal Traffic Management

The site is very large and the area where fill is to be placed is extensive. Therefore, there will be significant opportunities along internal vehicle accessways where trucks can queue or park. Accordingly, there is no requirement for a specific truck queuing area. Furthermore, there is no need for trucks to queue on the external road network.

Based on the above, no internal traffic management plan is considered necessary to manage queueing of trucks.

5. Conclusions

Having prepared a traffic management plan the proposed earthworks at 181 Cummings Road, Parwan, we are of the opinion that:

a) the proposal will generate a maximum of approximately 20 trucks (40 total movements) to/from the site per day during normal operations between 7:00am-4:00pm Monday to Friday,

b) appropriate travel routes are available and are all B-Double approved except for Cummings Road which has historically accommodated heavy vehicle movements to/from Geelong-Bacchus Marsh Road,

c) the existing Geelong-Bacchus Marsh Road/Cummings Road intersection can satisfactorily accommodate the predicted truck and dog movements without any need for upgrade or improvement works,

d) the level of traffic generated as a result of this proposal is low, spread throughout the day and will not have a detrimental impact on the surrounding road network and intersections, and

e) there are no traffic engineering reasons why an amended planning permit for the proposed rehabilitation and earthworks at 181 Cummings Road, Parwan, should be refused.

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STAR COLLIERY DAM

181 CUMMINGS ROAD

Environmental Management Plan

181 Cummings Road
Maddingley,
VIC VIC 3340

Star Colliery Dam
Potential Acid Sulfate Soil Environmental Management Plan

Revision 01
19 February 2019

MBC

DISTRIBUTION

Title: Star Colliery Dam Site
Potential Acid Sulphate Soil (PASS)
Environmental Management Plan
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Tim Tillig
Environmental Manager
Maddingley Brown Coal Pty Ltd

EXECUTIVE SUMMARY

Potential Acid Sulfate Soils (PASS) have been accepted at the Maddingley Brown Coal Pty Ltd (MBC) site, located at 11 Tilleys Road, Maddingley and managed in accordance with the relevant EPA guidelines. MBC now plan to place PASS material at the MBC owned site located at 181 Cummings Road, Maddingley; to assist in the rehabilitation of the historic brown coal extraction areas. The aim of this *Environmental Management Plan (EMP)* is to provide the environmental management framework to minimise potential risk of harm to human health and the environment from the transport and disposal of Potential Acid Sulfate Soils at the Cummings Road site in accordance with the *Environment Protection Act 1970* and the *Industrial Waste Management Policy (Waste Acid Sulfate Soils) 1999.* The proposed site, refers to PASS material being deposited into the existing water-filled historic coal extraction void, known as the Star Colliery Dam. The site is located at 181 Cummings Road, Maddingley, Victoria, approximately 58 kilometres west of Melbourne's CBD.

This *Potential Acid Sulfate Soil EMP* is endorsed by Maddingley Brown Coal Pty Ltd, the owner and operator of the premises, and includes information on relevant inspection and monitoring programs, emergency containment, clean-up procedures, rehabilitation and staff training.

TABLE OF CONTENTS

ABBREVIATIONS

Abbreviation	*Description*
EPA	Environment Protection Authority
EMP	Environmental Management Plan
Landfill BPEM	Best Practice Environmental Management, Siting, Design, Operation and Rehabilitation of Landfills, EPA Publication 788.3
ASS	Acid Sulfate Soil
PASS	Potential Acid Sulfate Soil
AASS	Actual Acid Sulfate Soil
SUZ1	Special Use Zone – Schedule 1

1 INTRODUCTION

The Star Colliery Dam property (hereafter referred to as the site) is owned and operated by Maddingley Brown Coal Pty Ltd (MBC) and is located at 181 Cummings Road, Maddingley, Victoria, 3340. The site is approximately 58 kilometres (km) west of the Melbourne CBD. Refer to *Figure 1, Annex A* for a site locality plan.

The site is currently inactive. Historically it operated as a brown coal mine, basalt quarry, and visible attempts at sand mining can still be observed to the south of the site. MBC purchased the site in 2017 and propose to accept Potential Acid Sulfate Soils (PASS) into the water-filled former coal mine void, identified as *"Star Colliery Dam"*. Refer to *Figure 2*, *Annex A* for a site layout.

MBC currently own and operate the premises located at 11 Tilleys Road immediately to the north of 181 Cummings Road, as a licenced brown coal extraction and licenced solid inert landfill site. All landfilling activities operate under the EPA Licence No. 45288, issued 06 October 1978, last amended 14 June 2017.

MBC also own 55 Cummings Road, which is north-east to 181 Cummings Road, and directly to the west of the 11 Tilleys Road site. Currently the only activity at 55 Cummings Road consists of the long-standing Bacchus Marsh Motocross.

2 ENVIRONMENTAL OBJECTIVE

The environmental objective of this Environmental Management Plan (EMP) is to protect human health and the environment from risks that may be posed by PASS material deposited at the site, by ensuring the material is managed in an environmentally responsible manner, which is aligned with the Industrial Waste Management Policy - Waste Acid Sulfate Soils, referenced in full, in the section below.

3 LEGISLATIVE REQUIREMENTS

This EMP has been compiled in accordance with the following relevant documents:

- EPA, (1999). *Victoria Government Gazette, No. S125. Environment Protection Act 1970, Industrial Waste Management Policy (Waste Acid Sulphate Soils).* 18 August 1999. (Hereafter referred to as the Policy)
- EPA, (2009). *Acid Sulfate Soil and Rock.* Publication 655.1. July 2009.
- EPA, (2000). *Policy Impact Assessment, Managing Waste Acid Sulfate Soils – Industrial Waste Management Policy (Waste Acid Sulfate Soils) and Policy Impact Assessment.* January 2000.
- EPA, (2015). *Best Practice Siting, Design, Operation and Rehabilitation of Landfills.* Publication 788.3 August 2015. (Hereafter referred to as the Landfill BPEM)

All activities related to the deposition of PASS material at the site will be conducted under relevant permits from Moorabool Shire Council, under the Planning and Environmental Act 1987.

4 SITE DETAILS

The site address is 181 Cummings Road, Maddingley, Victoria, 3340 and is owned and operated by MBC. It is located in a rural/ farmland setting and is bounded by Cummings Road to the east. Land to the south, west and east (across Cummings Road) of the site comprises of grazing and agricultural activities. To the north is the MBC site, an active solid inert landfill and brown coal extraction operation.

The site consists of Lots 24, 24A and 39 and roughly rectangular, in a north-south orientation. The site is approximately 1.1 kilometres (km) long in a north-south orientation and approximately 517 m in width, with an area of approximately 680,000 m^2.

Gated access to the site is via 181 Cummings Road, approximately 1.7 km south of the Geelong-Bacchus Marsh Road and Cummings Road intersection.

The site is currently inactive with remnants of historic brown coal mining activities, minor basalt quarrying, and evidence of sand mining attempts are still visible. MBC propose to deposit PASS materials into the Star Colliery Dam, a void created from the historic brown coal extraction which was subsequently flooded. The void is located in the northern-most part of the site. Approximate dimensions at the longest lengths of the dam are 220 m north-south; 380 m east-west, with and approximate surface area of 47,800 m2. The depth and topography of the void in unknown.

The site is bounded by Parwan Creek to the north and western boundary, with the southern boundary along Smiths Road. To the east the site is bounded by Cummings Road. The site slopes generally to the north, with a steep western fall to the Parwan Creek bed. There are several stockpiles and various soils and rock across the site, which relate to the historic onsite activities. The only buildings/structures on the site are the derelict remnants of past activities.

4.1 Zoning

Under the Moorabool Shire Council Planning Scheme, in accordance the Victorian State Government Department of Environment, Land, Water and Planning, the site is classified as SUZ1 – Special Use Zone Schedule 1, with one overlay, namely the Environmental Significance Overlay – Schedule 2, along the corridor of the Parwan Creek. In response to this overlay, a vegetation assessment was completed for the site and concluded there is no remnant significant vegetation within the water-filled void proposed for the disposal of PASS material.

4.2 Surrounding Land Use

The current land uses surrounding the site is tabulated below.

Table 1 Surrounding Land Use

Direction relative to site	Current Land Use	Zoning
North	MBC licenced solid inert landfill and licenced brown coal extraction operation.	SUZ1
South	Smiths Road, agricultural	Farming Zone (FZ)
East	Cummings Road, agricultural	North-east – SUZ1 South-east - FZ
West	Parwan Creek, agricultural	North-west – SUZ1 South-west - FZ

5 SITE GEOLOGY AND HYDROGEOLOGY

Documentation on the site's history and/or detail was not provided on purchase of the property. However, inferring the underlying geology and hydrogeology from the neighbouring MBC site, on which extensive and detailed investigations and reporting have been completed, the sites geology and hydrogeology can be inferred and summarised as per the table below.

Table 2 Inferred site geology and hydrogeology from youngest (surface) to oldest

Formation	Description
Tertiary Fyansford Formation	Consists of marine silts, sands and marls. The Fyansford Formation is an unconfined aquifer.
Tertiary Maddingley Coal Seam (Upper Werribee Formation)	Brown coal, present in 30m thick coal seams, approximately 10 to 20m below ground surface. The Maddingley Coal Seam acts as a confining layer.
Tertiary Werribee Formation Lerderderg Formation (Lower Werribee Formation)	Consists of gravels, sand with minor sandy and silty clays. This formation underlies the Maddingley Coal Seam. The Lerderderg Formation is a confined aquifer.

6 WASTE DESCRIPTION

6.1 What is Acid Sulphate Soil (ASS)?

The Policy defines Acid Sulfate Soil (ASS) as:

"*any soil, sediment, unconsolidated geological material or disturbed consolidated rock mass containing metal sulphides which exceeds criteria for acid sulfate soils specified in Publication 655 entitled Acid Sulfate Soil and Rock, published by the Environment Protection Authority in 1999 as amended from time to time or republished by the Environment Protection Authority.*"

The metal sulphides are principally pyrite (FeS_2) and exposure of them to oxygen and water can generate sulfuric acid. This may result in acidification of soil, sediment, rock, surface water and groundwater. Run-off and leachate from acid sulfate soils can adversely impact aquatic communities, agricultural and fisheries practices and engineering works. Acidic leachate can dissolve aluminium, iron and other metals from soil and sediment, potentially impacting on the beneficial uses of the environment, established in State environment protection policies (SEPPs), (EPA Publication 655.1, 2009).

Potential Acid Sulfate Soils (PASS)

Acid Sulfate Soils which have not been oxidised by exposure to air are known as Potential Acid Sulfate Soils (PASS). While contained in a layer of waterlogged soil, the iron sulfides in the soil are stable and the surrounding soil pH is often weakly acid to weakly alkaline.

Potential acid sulfate soils can generally be characterised as follows:

- often have a pH close to neutral (6.5–7.5).
- contain unoxidised iron sulphides.
- are usually soft, sticky and saturated with water.
- are usually gel-like muds but can include wet sands and gravels.
- have the potential to produce acid if exposed to oxygen.

Actual Acid Sulfate Soils (AASS)

When PASS is disturbed or exposed to oxygen, the iron sulfides are oxidised to produce sulfuric acid and the soil becomes strongly acidic (usually below pH 4). These soils are then called Actual Acid Sulfate Soils (AASS) – that is, they are already acidic.

Actual Acid Sulfate Soils can generally be characterised as follows:

- have a pH of less than 4.
- contain oxidised iron sulphides.
- vary in texture.
- often contain jarosite (a yellow mottle • produced as a by-product of the oxidation process).

(web reference:https://www2.landgate.wa.gov.au/c/document_library/get_file?uuid=5dc8c72e-68da-48b6-8fd4-4583af6b14de&groupId=10136)

6.2 Risk to Human Health

There is very little information regarding the human health impacts of acid sulfate soils. Community concerns have focused upon risks posed by skin contact and ingestion of dust either through inhalation or by the acidification of drinking water stored in rainwater tanks. While both soils and drinking water have varying natural levels of acidity, any adverse health effects due to acidification of soils and waters by acidic leachate generated by acid sulfate soils would need to be evaluated on a case to case basis (EPA Publication 680, *Managing Waste Acid Sulfate Soils*, 2000).

6.3 Siting of PASS

The Landfill BPEM, *Section 5.1.3 Table 5.1,* states that potential sulfate soils are to be sited below the watertable. This is to ensure material remains waterlogged ensuring the stability of the metal sulphides therein. This will be ensured by the disposal of PASS material into the existing water-filled historic coal mining void, ie Star Dam to below two (2) metres of the long-term standing water level.

The disposal of PASS material at the site, given EPA approval of this PASS EMP will only commence under the appropriate permit under the Planning and Environment Act 1987 as issued by the Moorabool Shire Council, as the Responsible Planning Authority.

7 RISK MANANGEMENT FRAMEWORK

7.1 Risk Classification

The potential risk associated with PASS materials impacting human health and the environment is assessed using EPA Publication 1321.2 *Licence Assessment Guidelines – Guidelines for using a Risk Management Approach to assess Compliance with Licence Conditions.* June 2011, and is provided below.

Table 7-1 Qualitative Measures of Likelihood

Level	Indicator	Frequency
A	Almost certain	Is expected to occur almost all of the time.
B	Likely	Is expected to occur most of the time.
C	Probable	Might occur.
D	Unlikely	Might occur but not expected.
E	Rare	Only expected to occur under exceptional circumstances.

Table 7-2 Qualitative Measures of Consequence

Level	Indicator	Description
1	Severe	Death, substantial offsite impacts to broader environment, long-term environmental damage, extensive clean-up required, complete failure of environmental protection controls.
2	Significant	Hospitalisation required, offsite impacts to a segment of the environment, medium-term environmental damage, offsite clean-up required, breach of environmental legislation.
3	Moderate	Medical attention required, some offsite, temporary impacts, moderate onsite impacts.
4	Minor	First aid required, minimal onsite impacts immediately contained, no discernible offsite impacts, no external complaints received.
5	Negligible	No health impacts, negligible onsite impacts, no offsite impacts.

Table 7-3 Qualitative Risk Analysis Matrix

Consequence	Likelihood				
	A Almost certain	B Likely	C Probable	D Unlikely	E Rare
1 Severe	V	V	V	V	H
2 Significant	V	V	V	H	H
3 Moderate	V	H	H	M	M
4 Minor	H	H	M	L	L
5 Negligible	H	M	L	L	L

V = Very high risk; immediate action required.
H = High risk; management required from senior staff.
M = Moderate risk; specify required management.
L = Low risk; management with standard operating procedures.

7.2 Assessment of Risk

Assessment of risk related to the disposal of PASS into the existing onsite dam is presented in the table below.

Table 7-4 Risk Matrix

Description	Potential Impact	Likelihood	Consequence	Risk Assessment	Management Controls
Surface Water	Parwan Creek	Rare	Minor	**Low**	Potential overflow of the existing onsite void would be transferred to the MBC site to the north.
Groundwater	Groundwater	Rare	Minor	**Low**	The upward gradient of groundwater into the onsite void eliminates the potential risk of contamination to groundwater.
Soil	Flora and fauna	Rare	Minor	**Low**	Soil spilt from trucks onto the site surface will be cleaned up and disposed of in the appropriate manner. The regular onsite monitoring by management from MBC will ensure any spills are addressed in a timely manner.
Noise	Sensitive receptors	Rare	Negligible	**Low**	The site is zoned as SUZ1 with no sensitive receptors within 500 metres in all directions of the water-filled mine void.
Air	Sensitive receptors	Rare	Negligible	**Low**	
Odour	Sensitive receptors	Rare	Negligible	**Low**	

8 PASS MANAGEMENT STRATEGY

Activities relating to the disposal of PASS material at the 181 Cummings Road site will be restricted to the arrival of the soils in suitable haul trucks and the direct tipping of the material into the existing water-filled onsite mine void.

The direct tipping of PASS material into the waters of the existing void ensures the material is not exposed to air thereby removing the opportunity of the in-soil iron sulphides from oxidising and potentially posing a risk to human health and the surrounding environment. All onsite activities will be in accordance with procedures developed and in use at the MBC site, located directly to the north of the site, at 11 Tilleys Road, Maddingley.

Copies of all relevant procedures are available in *Annex B* of this EMP.

8.1 Waste Acceptance

All PASS material received and handled onsite will be in accordance with the following procedures:

- PASS P01.0 *Waste Acceptance Criteria Procedure*
- PASS P02.0 *Non-conforming Loads Procedure*

- PASS F01.0 *Declaration Form*
- PASS F01.0 *Corrective Action Form*

All sampling and classification of the PASS material will be completed by a suitably qualified person on behalf of the waste generator and provided to MBC prior to the material arriving onsite.

Material received onsite and subsequently deemed non-compliant to the PASS classification will be rejected under the appropriate procedure.

Copies of relevant operating procedures are provided in *Annex B* of this EMP.

8.2 Dust management

Dust on and around the site will be managed in accordance with MBC Procedure: *Dust Management MBC P017.00*.

8.3 Stormwater management

All stormwater received on the site is directed to the existing onsite void by the existing northerly grade of the site towards the Star Dam, ensuring the PASS material deposited into the void remains waterlogged maintaining the stability of the iron sulphides contained therein.

8.4 Haul road access

Access to the site will be via Cummings Road. Internal haul roads will be constructed to ensure safe access to the tipping points into the existing void. All works related to the internal access roads will be carried out MBC personal, as required.

8.5 Environmental monitoring and assessment

PASS material to be disposed of into the existing water-filled mine void will be pre-accepted with appropriate sampling, classification and reporting from suitably qualified persons from the waste generator, with non-conforming loads being rejected under site operating procedures.

There is an upward gradient of groundwater into the mine void from the Lower Werribee Confined Aquifer. The placement of PASS material will be below the current and long-term standing water level ensuring the PASS material will not be exposed to oxidisation.

Biannual monitoring of the mine void water for pH will commence on approval of the placement of PASS material and continue until the PASS material is no longer deposited at the site. Baseline conditions will be recorded and reported to EPA prior to the receipt of any material to the site. Waters will be monitored for pH and electro conductivity. A once off sample of water will be analysed for major anions and cations prior to the acceptance of PASS material at the site.

Prior to the end of the approval period all the data collected over the period will be incorporated into a hydrogeological assessment of the site by a suitably qualified person, with consideration given to the water balance ie evaporation rates and decreased precipitation encountered due to the effects of climate change.

8.6 Contingency

The outcome of the risk assessment of the related onsite activities has been assessed as LOW, see Chapter 7 above. As such, contingencies for unanticipated potential impact will be addressed by management and resources from the MBC site on a case by case basis.

In the event the approval period is subjected to severe drought conditions, as a possible contingency, MBC have the availability and capability to pump un-contaminated water from the MBC site to the mine void to maintain a two (2) metre water depth above the deposited material.

8.7 Reporting

MBC shall keep all relevant records of materials accepted for disposal at the site at the MBC site for several years.

8.8 Responsibilities

All PASS related activities will be under the supervision of the MBC Operations Manager. Should any potential risk to human health and/or the environment be observed; suitable, timely and appropriate action will be taken.

8.9 Review of the EMP

Any change in onsite activities that potentially increase the risk to human health and/or the environment will trigger an EMP review and update, as required. Subsequent revisions of this PASS EMP will be submitted to EPA.

8.10 Emergency Response Procedures

Any emergencies encountered at the site will be managed in accordance with MBC Procedures: *Fire Management MBC P021.00* and *Contingency Plans for Emergencies MBC P012.00.*

8.11 Operational Safety Procedures

All site safety procedures are in accordance with MBC *Employee Occupational Health, Safety & Welfare Handbook,* which is provided to all employees during their MBC inductions.

8.12 Community Engagement

In accordance with the EPA Publication 655.1 *Acid Sulfate Soil and Rock,* MBC have tabled the disposal of PASS material into the existing mine void at the site to the MBC Consultative Committee (MBCCC) on 14th February 2017. A copy of the minutes has been provided in *Annex C*.

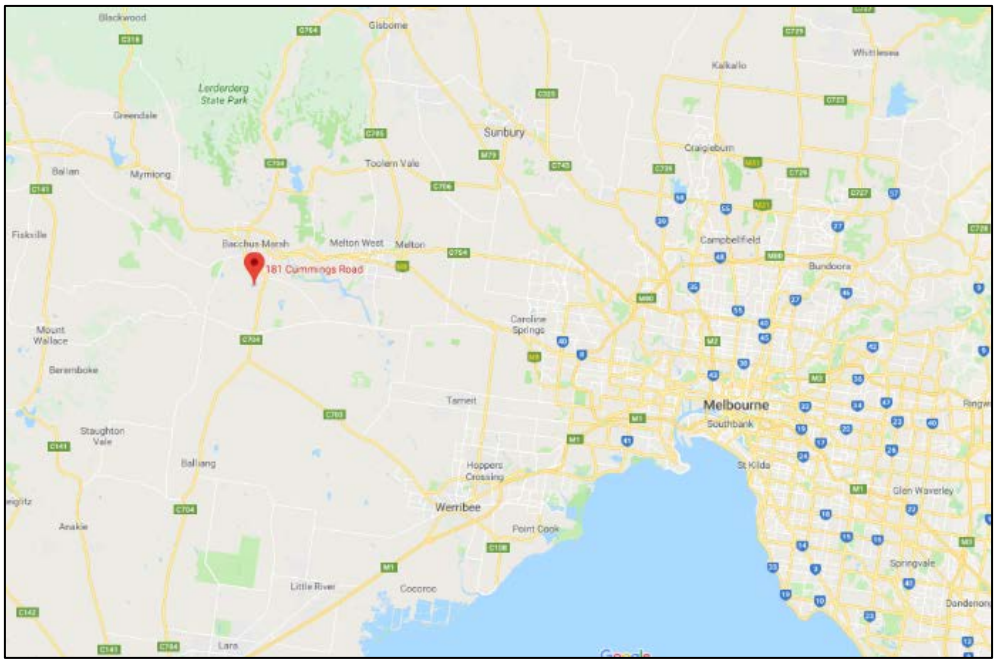
The MBCCC will be kept up to date to the satisfaction of EPA at the regular meetings conducted by MBC.

9 REHABILITATION

On completion of the disposal of PASS material into the existing onsite water-filled mine void, it is proposed that an aquatic fauna habitat be created in the central area of the void. Details of the habitat creation and criteria will be assessed and deigned by suitably qualified persons. Connectivity of the void with the underlying groundwater will ensure the sustained saturation of the PASS material, with drought contingencies as per above.

ANNEX A

Figure 1 – Locality Plan
Figure 2 – Site Plan



MADDINGLEY BROWN COAL PTY LTD

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STAR COLLIERY DAM
181 CUMMINGS ROAD, MADDINGLEY

Figure 1 – Locality Plan

Image sourced from: https://www.google.com

Site Boundary

N

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STAR COLLIERY DAM
181 CUMMINGS ROAD, MADDINGLEY

Figure 2 – Site Plan

ANNEX B

PASS P01.0 Waste Acceptance Criteria Procedure
PASS P02.0 Non-conforming Loads Procedure
PASS F01.0 Declaration Form
PASS F01.0 Corrective Action Form

Procedure Title:	PASS Waste Acceptance Criteria
Procedure No:	PASS P01.0

1. Purpose:

To ensure only acceptable wastes, ie PASS materials are deposited at EPA-approved locations.

2. Definitions:

Generator: The entity including, but not limited to land holders, contractors, Councils, or any person providing instruction to remove PASS material from origin to MBC.

PASS: Potential Acid Sulphate Soils

3. Legislation and Guidance:

Legislative guidelines used in the development of this procedure is listed as follows:

- EPA, (1999). Victoria Government Gazette, No. S125. Environment Protection Act 1970.
- Industrial Waste Management Policy (Waste Acid Sulphate Soils). 18 August 1999.
- EPA, (2009). Acid Sulfate Soil and Rock. Publication 655.1. July 2009.
- EPA, (2000). Policy Impact Assessment, Managing Waste Acid Sulfate Soils – Industrial.
- Waste Management Policy (Waste Acid Sulfate Soils) & Policy Impact Assessment, January 2000.
- EPA, (2015). Best Practice Siting, Design, Operation and Rehabilitation of Landfills. Publication 788.3 August 2015.

4. Management Strategy:

a. Pre-acceptance:

Prior to acceptance of the material onsite, PASS material generators must submit to MBC:

a. A soil classification report completed by suitably qualified person/s, confirming the material to proposed for disposal is PASS material.
b. MBC Form – PASS Declaration Form F01.0.

See attached, supporting form.

Review of the MBC PASS Declaration Form and accompanying soil classification report, by suitably qualified MBC staff will deem the material acceptable at the site or that the material requires additional screening.

b. Onsite acceptance:

Once onsite, a visual inspection of the truck via the weighbridge camera and confirmation from the driver that the load type is consistent with the pre-acceptance form, the load will be accepted. Should there be any indication of a non-conforming load, the truck will be directed off the weighbridge to a safe location for an inspection of the load by suitably qualified MBC personnel.

As an additional management measure to demonstrate waste acceptance compliance, random inspections of trucks post weighbridge processing will be completed by suitable qualified MBC staff at the discretion of the MBC Operations Manager.

Any load deemed as non-conforming is to follow MBC PASS Non-conforming Loads P02.0 procedure, recorded and directed offsite.

5. Responsibility:

Operations Manager

Environmental Manager

OHS Manager

6. Audit Records:

PASS F01.0 – PASS Declaration Form

Procedure Title:	PASS Non-conforming Loads
Procedure No:	PASS P02.0

1. Purpose:

To assess non-conformances with regard to waste acceptance and initiate and maintain corrective actions.

The PASS Waste Acceptance Criteria procedure calls for the pre-acceptance of the material prior to arrival on site, by means of a PASS Declaration Form signed by the generator and an accompanying soil classification report to the satisfaction of MBC staff. This procedure will be triggered should a pre-accepted load be deemed non-forming on arrival to site.

2. Definitions:

Non-conforming load:	Any load arriving onsite that does not comply with the MBC PASS Declaration Form and the accompanying soil classification report, as provided by the generator during the pre-acceptance process.
Generator:	The entity including, but not limited to land holders, contractors, Councils, or any person providing instruction to remove PASS material from origin to MBC.
PASS:	Potential Acid Sulphate Soils

3. Legislation and Guidance:

Legislative guidelines used in the development of this procedure is listed as follows:

- EPA, (1999). Victoria Government Gazette, No. S125. Environment Protection Act 1970.
- Industrial Waste Management Policy (Waste Acid Sulphate Soils). 18 August 1999.
- EPA, (2009). Acid Sulfate Soil and Rock. Publication 655.1. July 2009.
- EPA, (2000). Policy Impact Assessment, Managing Waste Acid Sulfate Soils – Industrial.
- Waste Management Policy (Waste Acid Sulfate Soils) & Policy Impact Assessment, January 2000.
- EPA, (2015). Best Practice Siting, Design, Operation and Rehabilitation of Landfills. Publication 788.3 August 2015.

4. Management Strategy:

Non-conforming loads:

- Should a load arriving to site conflict with the signed MBC PASS Declaration Form, by means of a visual observation from the weighbridge camera or information given by the truck driver etc, the weighbridge operator is to direct the truck to a safe location for de-tarping.
- The load is then inspected by a suitably qualified MBC employee.
- On inspection, if a non-conformance is confirmed, the load is immediately rejected.
- An MBC Corrective Actions Form then completed, copies are kept for MBC records and forwarded onto the generator.

Corrective and Preventative Actions:

- All non-conformances are to be rectified immediately and the action taken must be documented.
- The Operations Manager is to oversee the process, any recommended changes to prevent re-occurrences are to be implemented as required/necessary.

5. Responsibility:

Operations Manager

Environmental Manager

OHS Manager

6. Audit Records:

MBC PASS F02.0 – PASS Corrective Actions Form

MADDINGLEY BROWN COAL PTY LTD.

Environmental Management Systems

Form Title PASS Declaration Form
Form No. PASS F01.0

PART A - PASS GENERATOR

Name	Company
Date	Phone
Email	Fax

PART B - PASS ORIGIN & VOLUME *

Site address from which PASS was generated

No.	Street name		
Suburb / Town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

*If the material is generated from multiple sites please complete *PART B continued* over page

PART C - PASS COMPOSITION

Does the PASS material contain or exhibit any of the following characteristics?	YES	NO
Industrial wastes such as concrete, brick, asphalt, pipe, plastics, metal or wood	☐	☐
Organic matter (other than grass cover) e.g. branches, stumps, green waste	☐	☐

PART D - PASS CONTAMINATION

Does the PASS material currently contain (or has it previously contained) any of the following:	YES	NO
Municipal/domestic waste	☐	☐
Asbestos or asbestos-contaminated soil	☐	☐
Soil or waste with contaminant levels greater than fill material thresholds	☐	☐
Category A, B or C prescribed industrial waste	☐	☐
Acid sulfate soil or rock	☐	☐

PART E – SITE DETAILS

Are any of the following items applicable (historically, currently or proposed) to the site from which the PASS material is generated:	YES	NO
Underground or above ground storage tanks e.g. chemical, fuel, IBC	☐	☐
Environmental site assessment e.g. soil analysis / classification report / audit report	☐	☐
Staining or discolouration of site derived material	☐	☐
Odour emanating from site derived material - e.g. rotten eggs, chemical, hydrocarbon	☐	☐
Material sourced from industrial or commercial land use	☐	☐

PART F – FILL GENERATOR DECLARATION

By signing the declaration below, I confirm:

- **I am the PASS generator or person appointed by the PASS generator to complete this form and dispose of the PASS material.**
- **The information provided on this form is true and correct.**
- **The PASS material is not contaminated and there is no reason for me to believe that the PASS material is potentially contaminated.**

Signature **Name** **Date**

PART B - PASS ORIGIN & VOLUME *CONTINUED

Site address no. 2 from which PASS was generated

No.	Street name		
Suburb / town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

Site address no. 3 from which PASS was generated

No.	Street name		
Suburb / town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

Site address no. 4 from which PASS was generated

No.	Street name		
Suburb / town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

Site address no. 5 from which PASS was generated

No.	Street name		
Suburb / town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

Site address no. 6 from which PASS was generated

No.	Street name		
Suburb / town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

Site address no. 7 from which PASS was generated

No.	Street name		
Suburb / town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

Site address no. 8 from which PASS was generated

No.	Street name		
Suburb / town		State	Postcode
Fill volume (m3)	Truck Rego(s)		

Form Title:	PASS Corrective Actions – Non-conforming
Form No:	PASS F02.0

1. Non-conforming Load Details

Date:	
Time:	
Customer/Company Name:	
Vehicle Registration:	
Driver Name:	
Contact Name:	
Contact Number:	

2. MBC Pre-acceptance

(circle relevant answer)

MBC PASS Declaration signed prior to arrival onsite	Yes	No
Soil Classification Report received prior to arrival onsite	Yes	No

3. Non-conformance Verification:

(Tick relevant option/s)

Visual from weighbridge camera		Odour	
Information from driver			
Load inspection by MBC employee			
Other (details)			

4. Description of Non-Conforming Load:

5. Action Taken:

6. Follow Up Action:

(circle relevant answer)

Is further action required?	Yes	No

If Yes, detail:

7. Corrective Action to Prevent Reoccurrence:

8. Responsibility:

Operations Manager

Environmental Manager

OHS Manager

9. Audit Records:

PASS F02.0 – PASS Corrective Actions Form

ANNEX C

MBCCC Minutes 14 February 2017

MADDINGLEY BROWN COAL PTY LTD.

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14 February 2017

MBCCC Meeting 10 – minutes

1. **Attendance**

Chair Di McAuliffe (chair)
Rick Dickson
David Maltby
Michael Wheatland
Tim Tillig
David Marnie
Nick DeLeur
Kerren Clark (minutes)

2. **Apologies**

Hemla Reddy. Peter Thurn was a late apology due to work

3. **Minutes of the previous meeting**

Rick proposed approval of the minutes as circulated and the committee agreed.

4. **Matters arising from the minutes**

Rick asked whether Council had replied to the committee's letter of invitation and Di advised that they had not. It was agreed that Di would contact council advising of the change of meeting day and reiterating the invitation.

5. **EPA approvals**

The phytocap and cell plans have been submitted to the auditor for verification. Upon verification, they will be submitted to the EPA for formal approval. The EPA is required to respond in 28 days.

Pre-settlement and pre-capping contours for the cap were approved by council as part of the PA2011-338 omnibus planning permit. As the cell design has not yet been approved by EPA, the only preparatory work on site is cutting of the lower batters, construction may only commence under level 1 supervision following EPA approval of the cell design. Once the approvals are in place, development will take 18-24 months.

6. **Coal crusher permit application to Council**

Tim advised that Council has approved the location of the new crusher and associated works. During the approval process, as the works are regulated under the mine work plan, and fall within the mining licence boundary, council referred the application to DEDTJR PA2011-338 has been amended by council to include DEDJTR conditions (39 and 40). The conditions require MBC to obtain, and work in accordance, with a work plan variation through ERR. Condition 41 was added to the permit by council which specifies the requirement to decommission the old plant.

Tim is now working on the application to vary the work plan.

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7. Newly acquired land

David Maltby informed the committee that MBC bought the adjacent motocross track about six months ago. The land has been mined and is within the mine zone. In the medium term the motocross track will remain. In the long term, MBC aims to rehabilitate the site.

Rehabilitation plans are preliminary but they will start at the north of the site at the Little Lucifer dam. Should there be a demand to dispose of Potential Acid Sulphate Soils (PASS), the dam could be filled. Rick and David Marnie noted that the dam is a bit of a local landmark and some members of the community may be saddened by that proposal. David Maltby reiterated that these are long term plans and the committee noted that it will be important to be mindful of community sensitivities.

The discussion turned to PASS. Tim said that MBC has been managing PASS (EPA approved since 1999) and Actual ASS (ASS) for decades. He referred members to the EPA publication circulated with meeting papers. Acid sulphate soils are naturally occurring soils or sediments that are formed under waterlogged conditions. When they are wet, they are completely stable. However, when they completely dry out they become ASS. When ASSs contacts water, they produce sulphuric acid.

Rick asked if the acid is dangerous and David Maltby said not at all to humans. However, it is dangerous to small organisms in waterways so it is critical that run off never contacts waterways.

PASS are stored under water: this is why they would be deposited in the dam, which never dries out. ASS has to be deposited in landfill cells and managed like solid inert waste.

David Marnie enquired about demand to dispose of PASS and David Maltby said it is variable. Tim noted that projects such as the western Distributor would certainly unearth PASS and MBC would apply to the builder to receive PASS. Tim said that fees from the disposal of PASS would be needed to pay to rehabilitate the site.

The committee agreed that while PASS and ASS can safely be managed, their names sound dangerous so care needs to be taken when discussing them with the community.

David Marnie noted that the area around the Geelong Bacchus Marsh Road and Woolpack Road is an eyesore and covered with weeds. There was discussion that the area is in fact a gateway to Bacchus Marsh so it is a shame that it is an eyesore. Di noted that when she was on Council they did work on gateways and that area proved particularly difficult as it is as open and undefined area.

David Marnie acknowledged the difficulty but still made a plea for landscaping and clean up. As most of the land is Council's responsibility, Tim agreed to talk to the Council's landcare group to see if they will collaborate with MBC's rehabilitation plans.

8. Register of complaints

There were none. David Marnie asked whether the fence was working and Tim said that it is fantastic.

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9. General business

David Marnie briefed the committee about a meeting he had attended on the Bacchus March Urban Growth Framework and members thanked him for the update. He also added that while he was in Spain, there was a phytocap that had won a best practice award. He agreed to try and find details.

11. **Next meeting**

5.15pm on Tuesday 9 May 2017.

12. **Close**

The meeting closed at 6.10pm.