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#### **Submission details**

Issue	
Reference and page number (if known)	
Comment	
Attach any documents that support your submission	Bird in Hand Gold Project Submission - Phil Schmidt.pdf

## BIRD IN HAND GOLD PROJECT

### SUBMISSION

Phil Schmidt  
11 South Ridge Road  
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Writing in black – Chapter, Section, page and description from the proposal.

Writing in red – my comments.

#### 1 Introduction

1-6 The Project will generate a total positive impact on Gross State Product of an estimated \$222 million over 8 years

This includes \$185 million of estimated wages and salaries

Excluding wages and salaries the total impact on Gross State Product is only \$37 million.

#### 1.4 OVERVIEW OF THE BIHGP

1-16 Benefits from the proposed BIHGP and reinstatement of the processing facilities at the AZM will include positive impacts to the community, with local spend and local employment policies, as well as positive impacts for both the broader regional and state economy, providing employment opportunities through construction and operation, and economic diversification for the Adelaide Hills. This project has the opportunity to provide professional career paths for young South Australians, as well as provide family oriented mining opportunities close to Hills communities.

No mention of detrimental effects of the proposal on tourism and the community and the resulting decreased spend from these areas.

#### 1.5 OVERVIEW OF THE PROJECT SITE AND LOCALITY

1-18 The town is surrounded by agricultural pursuits, including beef cattle, dairies, and horticulture including orchards and vineyards, with the occasional berry growing operation.

And tourism with cellar doors, restaurants and function centres surrounding the lease site.

#### 2.1.1 THE 30-YEAR PLAN FOR GREATER ADELAIDE

2-6 The state also has 'Environment and Food Production Areas' under the Planning, Development and Infrastructure Act 2016 which were "introduced to help protect our vital food and agricultural lands." Woodside is within these areas.

#### 2.1.3 ADELAIDE HILLS COUNCIL DEVELOPMENT PLAN

2-7 The zone's objectives and principles of development control, aim to prevent development that may lead to deterioration in the quality of surface or underground water within the Mount Lofty Ranges Watershed and also maintain land for primary production.

The proposed mine goes against these objectives and principles by threatening the water table.

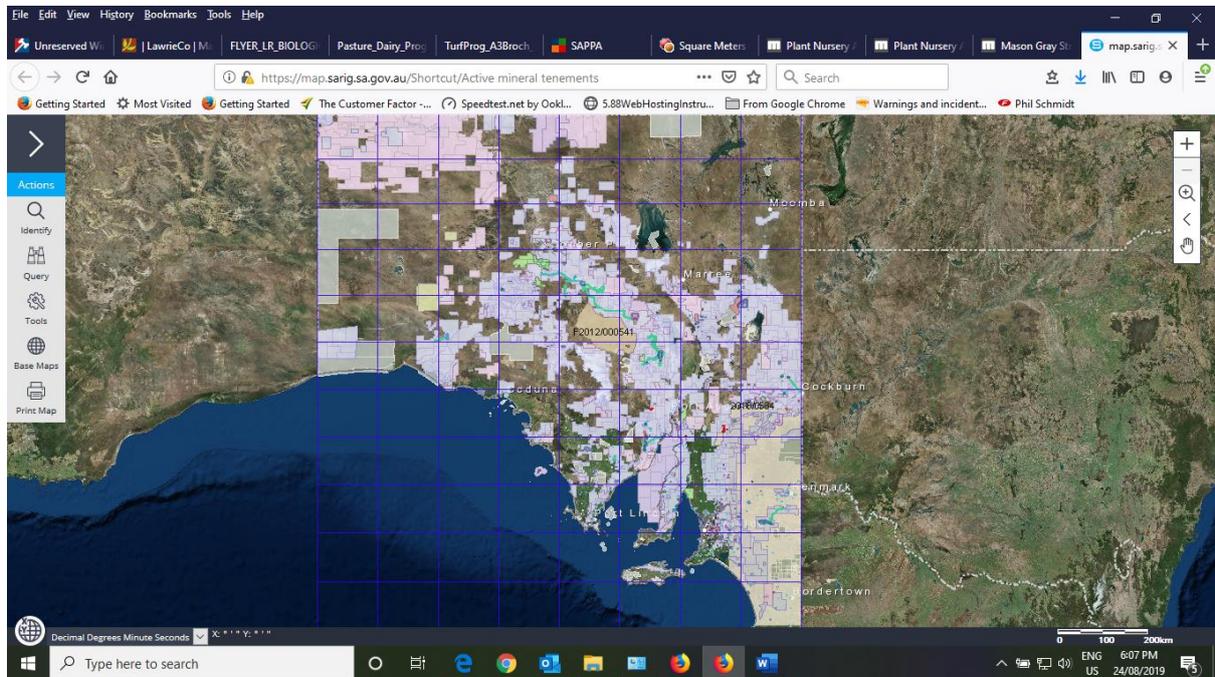
## 2.1.4 SOUTH AUSTRALIA'S MULTIPLE LAND USE FRAMEWORK

2-8 Less than 1% of the State is currently under mineral and petroleum production tenements (SARIG, 2018)

This is totally false! It is much closer to 50% without taking into account petroleum tenements.

<https://map.sarig.sa.gov.au/Shortcut/Active%20mineral%20tenements>

Whereas the total arable land area is less than 4.5% of the state.



## 3 DESCRIPTION OF THE PROPOSED MINING OPERATIONS

3-21 The Project will generate a total positive impact on Gross State Product of an estimated \$222 million over 8 years

This includes \$185 million of estimated wages and salaries

Excluding wages and salaries the total impact on Gross State Product is only \$37 million.

### 2.2.1 WOODSIDE AMENITIES

2-10 Quiet, calm, less stress than living in Adelaide; Clean air, natural environment (rolling hills), aesthetics; Minimal heavy vehicle traffic (farm traffic goes largely unnoticed or is seasonal);

The proposed project seeks to expand upon and contribute to these identified topics.

How – by creating noise and light pollution, by putting near neighbours under huge stress, adding to the dust problem, giving us an ugly mine and mullock hill to look at and increasing heavy vehicle traffic!

### 2.2.3 REGIONAL VISITATION

2-12 Specific tourism points of interest include the various wineries and cellardors

Specifically Bird in Hand, Petaluma and Artwine who are all on exempt land within 400 metres of the Mining Lease!

### 2.3.2 EXEMPT LAND AND WAIVERS OF EXEMPTION

2-17 It is Terramin's intention to negotiate access to all land as defined as exempt

Even though a number of parties have indicated that they are not prepared to negotiate.

Terramin has been able to obtain agreements through exploration

By taking some parties to court.

### 3.1.3.1.6 MAGAZINE LOCATION – SURFACE VS UNDERGROUND

It was decided that the explosives required to establish the mine could be stored at the Angas licensed magazines and brought to site as required.

Explosives will be regularly transported between Strathalbyn and Woodside.

### 3.3.5 EQUIPMENT REQUIRED TO UNDERTAKE EXPLORATION ACTIVITIES

3-77 Prior to the commencement of mining, the priority exploration objective will be to grout historic drillholes, undertake sterilisation drilling and convert the upper Inferred portion of the BiH Resource to Indicated. This is likely to be achieved through the use of at least two drilling rigs. To minimise disturbance of neighbours at night, surface exploration drilling and earthworks will only be undertaken on day shifts.

It is impossible to be using 2 drilling rigs on the site and to remain under the noise requirements.

Drilling from underground may make use of both diamond and percussion drilling and is likely to operate both day and night shifts.

Even underground it is unlikely that these forms of drilling will remain under the noise requirements.

### 3.3.7 REHABILITATION METHODS FOR EXPLORATION WORKS (INCLUDING THAT NOT YET REHABILITATED FROM PREVIOUS TENURE)

3-82 In accordance with section 62(1) of the Mining Act a rehabilitation bond of \$20,000 has been lodged with Mining Registrar to cover rehabilitation of surface exploration works undertaken to date by Terramin.

This bond would need to be substantially increased – 200 fold minimum – to cover the proposed works.

### 3.4.2.7.1 PRE-EXCAVATION GROUTING

3-130 In summary, the pre-excitation grouting process will follow an established procedure, which will evolve over time as experience is gained in changing ground conditions

Changing ground conditions would indicate that the modelling is not accurate. If the modelling is inaccurate the risks to the aquifer are too great!

### 3.4.2.7.2 POST EXCAVATION GROUTING

3-131 Post excavation grouting is used in cases where unexpected water inflows occur. These cases can occur during/after a blast or a seismic event; in cases where drilling intercepts an unknown aquifer; or with an increase in aquifer water pressure.

This indicates that the modelling is not and cannot be accurate. If the modelling is inaccurate the risks to the aquifer are too great!

#### 3.4.2.7.4 WHERE GROUTING WILL OCCUR

3-132 Post-grouting will be used in cases where water inflows occur unexpectedly.

This indicates that the modelling is not and cannot be accurate. If the modelling is inaccurate the risks to the aquifer are too great!

#### 3.4.2.7.5 CASE STUDIES FOR GROUTING ERNEST HENRY, QUEENSLAND

3-135 "In early 2011 the pilot hole for the 1625 to 1475 FAR on the eastern side on the orebody intersected water approximately 15m from breakthrough. The water flow was estimated at 10L/s at its collar and it was considered too risky to drill the hole to breakthrough as the quantity of water that could be released was unknown and potentially uncontrollable. As a result the hole was stopped and the raise bore removed from the hole"

Further evidence that all water structures cannot be modelled for. If the modelling is inaccurate the risks to the aquifer are too great!

3-136 "Feasibility study estimates of predicted water flow, being 20 litres per second (l/s) and doubled to 40l/s as a contingency (Anon, 1992), did not prepare the operation for the actual water inflows encountered.

Yet more evidence that all water structures cannot be modelled for. If the modelling is inaccurate the risks to the aquifer are too great!

3-137 "In spite of systematically drilling pilot holes, a steeply dipping, water bearing fault zone went undiscovered during a shaft sinking operation at the Francoeur Mine.

And again - more evidence that all water structures cannot be modelled for. If the modelling is inaccurate the risks to the aquifer are too great!

3-138 "In practice, ground water was encountered at a higher level than anticipated

And again - more evidence that all water structures cannot be modelled for. If the modelling is inaccurate the risks to the aquifer are too great!

#### 3.4.3 MATERIAL MOVEMENTS

3-144 The expected life of the mine is 5 years from the commencement of the decline, with ore production commencing in month 14 (Year 2). There are exploration activities planned for down dip of the known ore body (below 450m below surface), as well as for the nearby reefs of Bird Extended, Ridge Mine, Brind Mine etc.

Although they state that the mine will only be for 5 years this shows that Terramin's clear intention is to expand the mine.

#### 3.4.4.1 USE OF EXPLOSIVES

3-155 With respect to blasting activities and the vibration and overpressure impacts, the typical compliance limits, based on Australian Standards, that the Bird in Hand Mine would be required to comply with are as follows:

- Ground Vibration – Not to exceed 5mm/s for 95% of occasions, with an upper limit of 10mm/s
- Air Overpressure – Not to exceed 115dB for 95% of occasions, with an upper limit of 120dB

115dB while you are sitting down a few hundred meters away having a sip of wine!

#### 3.4.4.3 TIMING AND FREQUENCY OF BLASTING

3-156 The initial blasts occurring at BIH will be close to the surface, so these will be limited to daytime hours as needed in order to comply with noise limits on site.

115dB while you are sitting down a few hundred meters away having a sip of wine!

3-156 Once the mining progresses further underground, and the risk of disturbance due to noise and overpressure to receptors is reduced, development firings will be undertaken over a 24-hour period, generally at the end of each shift, subject to safety and operational considerations at the time. Any larger firings, such as ventilation rises, ore passes or other required mining voids would be fired during daytime hours.

115dB while you are sitting down a few hundred metres away having a sip of wine, and a bit less while you are trying to sleep.

#### 3.4.4.4 SIZE OF BLASTS

3-157 The majority of blasts at BIH will generally be development type blasts due to the nature of the mining method selected (cut and fill). These blasts are expected to require ~250kg equivalent of ANFO explosives per face. Larger blasts may be required during the mining of capital infrastructure such as internal ore passes and ventilation raises. These are likely to use larger holes (76mm-102mm) and larger blasts (~600kg based on quantities used at AZM for one firing of ventilation rises).

That is a lot of large explosions with residences and tourists a few hundred metres away.

#### 3.4.4.5.1 AZM MAGAZINES

3-158 Daily quantities of explosives required at the BIH will be transported via road vehicles to the BIH on a “just in time” basis, following the same route as the ore haulage trucks.

Based on the above quantities – that is tonnes of explosives being transported on public roads! Daily.

#### 3.4.4.6 BLASTING LOCATIONS AT BIH SURFACE

3-159 Mechanical excavation methods are expected to be sufficient for the proposed earthworks and excavations on the surface, however should harder material be encountered, surface blasting may be required

115dB while you are sitting down a few hundred meters away having a sip of wine!

3-167 TABLE 3-19 | NOISE SOURCE SOUND POWER LEVELS – SURFACE CONSTRUCTION PHASE (APPENDIX O3)

Shows that all 13 types of equipment for surface construction phase has a sound level of 98 – 114 dB

<https://chchearing.org/noise/common-environmental-noise-levels/>

Continued exposure to noise above 85 dBA (adjusted decibels) over time will cause hearing loss.

According to the National Institute for Occupational Safety and Health, the maximum exposure time at 85 dBA is eight hours. At 110 dBA, the maximum exposure time is one minute and 29 seconds.

### 3-168 TABLE 3-20 | NOISE SOURCE SOUND POWER LEVELS – UNDERGROUND DEVELOPMENT AND ORE PRODUCTION PHASES

Shows 23 noise sources that range from 73 to 113dB

#### 3.4.6.2.1 SENSITIVITY ANALYSIS

3-180 Contingencies are required to manage any unexpected water intrusions effectively from both an environmental and safety aspect.

This is because modelling is just that – a model. It is an indicator but not reality. Therefore the risk to the aquifer is too great.

#### 3.4.6.7 CONTINGENCY MEASURES

3-188 Contingencies are required to manage any unexpected water intrusions effectively from both an environmental and safety aspect.

This is because modelling is just that – a model. It is an indicator but not reality. Therefore the risk to the aquifer is too great.

#### 3.5.2.2 PREFERRED HAULAGE ROUTE

3-201 The preferred route selected initiates at the mine site access point, travels along Pfeiffer Road, the Nairne Road into the Nairne Township.

The Nairne Intersection is a known blackspot with traffic regularly banking up to past the railway crossing.

3-202 As part of the route assessment, it was identified that some of the intersections did not suit existing traffic requirements

3-203 Terramin are concerned that the Pfeiffer Road/Nairne Road intersection is currently not fit for purpose

This is less of a problem than the Nairne intersection.

### 3-209 TABLE 3-33 | SUMMARY OF THE NUMBER OF VEHICLE MOVEMENTS PER TYPE OF VEHICLE (APPENDIX F1)

Assumes 7am – 5pm mine operation and states 1 truck every 25 minutes. However when you take into account school pick up and drop off times this is closer to 1 truck every 15 minutes.

#### 3.5.3.1.1 NOISE SOURCES

3-211 Standard and alternative idler roll designs, referred to as “low noise” and “super low noise” conveyors produce sound power levels of 107 dB(A) and 101dB(A) per 100 m respectively.

Hardly quiet.

### 3.5.4.3 INTEGRATED MULLOCK LANDFORM (IML)

3-220 As a result, the IML has a height constraint for visual amenity of 10m

Which will be visible for miles.

#### 3.5.4.3.1 LOCATION, SIZE, SHAPE AND HEIGHT

3-221 The area will be cut down 5m into the existing surface. The cut material will be used to construct a surrounding 5m high visual bund above the existing landform to minimise the visual impact of the IML. This area will be effectively screened using earthen landscape amenity bunding and vegetation to reduce visual impact as well as assist in noise and dust management.

5m of subsoil and rock is not going to grow any vegetation to screen anything in the short to medium term and as such will add to the eyesore.

#### 3.5.4.3.2 POTENTIALLY ACID FORMING MATERIAL (PAF)

3-232 In order to ensure that any unexpectedly encountered PAF material is managed

Which will happen when the modelling is shown to be incorrect.

#### 3.5.4.3.3 METHOD OF PLACEMENT

2-232 Mullock will be transported from the mine and placed on the IML by articulated ejector trucks.

Assuming 30t per dump this equates to 46,000 truck movements over the life of the mine.  
 $690,000\text{t Mullock heap divide by }30\text{t} = 23,000 \text{ trips} \times 2 \text{ (on the heap and the off the heap)} = 46,000$   
 $46,000 \text{ divided by } 5 \text{ years} = 9,200 \text{ divided by } 365 \text{ days/year} = 25 \text{ trips per day on average.}$

### 3.6.2.1.2 WASTEWATER

3-244 Brine waste from the Ion Exchange (IEX) system: Regeneration of the IEX resins will require the use of 1.5% to 3% (% w/w) sulphuric acid for the cation resin (co-current regeneration) and 10% (% w/w) brine for the anion resin (co-current regeneration). In each case, the regenerant will be passed at a controlled rate through the resin bed and then discharged as a waste stream into the Brine Waste Tank.

Table3-38 shows that the volume of brine waste produced per day is 12.5m<sup>3</sup>  
 $12.5 \times 365\text{days} = 4,562.5 \times 5 \text{ years} = 22,812.5\text{m}^3 \text{ over the life of the mine} = 22.81 \text{ Megalitres of brine waste!}$

3-245 The combined regeneration waste is expected to have a total concentration of cations and anions of approximately 5% (% w/w). It was considered whether the volume of this brine waste could be reduced further. However, RO units would only reduce volume by 50%, are not cost effective hence, reducing brine volume was not considered further. The suitability of this waste for site uses such as underground dust suppression should be investigated. If it is not suitable, it will be stored in the Brine Waste Tank and periodically trucked offsite to a suitable trade waste disposal facility.

That's a lot of tankers.

If this waste water is used for dust suppression it will turn the soil sodic (12-13)

3-245 Rinse water from IEX: On completion of each resin bed regeneration, rinsing of the resin beds with good quality water will be required to restore the resins to their duty condition. It has been calculated that each resin bed will be regenerated every 4 days. The cation beds will each require about 12 m<sup>3</sup> of rinse water while the anion beds will need about 7 m<sup>3</sup> of rinse water each time. The amount of rinse water produced every 4 days will total about 52 m<sup>3</sup>. The rinse water will be sent to the Wastewater Tank. The suitability of this waste for site uses such as underground dust suppression should be investigated through the PEPR stage. If it is not suitable, it will be stored in the Brine Waste Tank and periodically trucked offsite to a suitable trade waste disposal facility.

That's about the same amount as above AGAIN. That's double the amount of tankers!

#### 3.7.5.1 EARTH BUNDS

3-273 A trial bund to control stormwater off of the Bird in Hand Road and prevent erosion in the southwestern paddock was constructed in 2016. The bund is shown in Figure 3-152, a few months after construction and revegetation. The bund was spray seeded with native grass and a soil stabilising mulch. A variety of endemic native trees and shrubs sourced from a local nursery were planted as well. After 12 months the bund is fully covered with vegetation and supports the plan that earthen bunds can be built and revegetated in a timely manner to provide suitable incorporated visual barriers for the Project.

The Figure shows that after 12 months the spray seeding and mulch has not worked. The plantings are at best twice the height of the guards and shows that the landscaping of the bunds will not be effective for the life of the mine.

#### 3.7.5.2 VEGETATION

3-273 Figure 3-155 and Figure 3-156 illustrate the progress of one of these areas of plantings to date.

If you are going to give examples of progress you need to show the same area from the same angle. These 2 photos have nothing in common.

#### 3.7.6.3 WATER TREATMENT

3-278 Due to very low expected consumption of these dosing agents during operation, commonly used intermediate bulk containers (IBC's) will be used for transport and storage on-site.

By their previous figures they may need up to 25 IBC's a day!

#### 3.7.9.5.1 PRIMARY TREATMENT

3-310 The dam provides a location for additional settlement and will be equipped with floating wetland gardens. While the water treatment system could operate without these floating gardens, the use of plants to further treat water is well established and provides a naturally generated benefit to the water treatment system

Most native wetland species are dormant in winter and affected by the frost that occurs in the Woodside area.

### 3.7.9.6.2 EXAMPLES OF MAR IN MINING

#### 3-317 Cloudbreak Mine in Western Australia

Brackish aquifer in the middle of the Pilbarra with no other users of the aquifer, not a fully allocated fractured aquifer – not comparable.

#### Ophthalmia Dam in Western Australia

A dammed river, not a fully allocated fractured aquifer – not comparable.

Cobre Las Cruces is an open-pit copper mine located in south-west Spain

In a low permeability aquifer with water that is unfit for drinking or irrigation, not a fully allocated fractured aquifer – not comparable.

### 3.7.9.6.3 BENEFITS OF MAR

3-318 MAR has the potential to provide many benefits to mines. Conserving water is one such benefit; improving operational efficiencies is another, protection of environmental aquifer properties and landowner water assets is a key benefit.

Furthermore, MAR benefits the existing communities that surround mines. Water that is extracted as part of the dewatering process can be re-injected at locations where it can benefit other users and/or groundwater dependent ecosystems. MAR is a valuable tool for addressing the social pressures that could arise in nearby communities; maintaining the public's access to irrigation and environmental water helps offset concerns about the potential impact of dewatering on the groundwater resources in the area.

As this mine is in a fully allocated aquifer none of these 'benefits' apply. All of these 'benefits' are for the mine itself.

For the mine to conserve water, to improve the mines operational efficiencies.

Without the mine the aquifer properties and water assets are protected. With the mine they are at great risk.

Without the mine and MAR the water is at locations where it benefits users and ecosystems. As it is fully allocated no additional users are allowed to access the water. There is no social pressure except for the mine. Concerns about dewatering would not be there if not for the mine.

**EQUALS = NO BENEFITS AT ALL!**

### 3.7.9.6.4 MAR SYSTEM PROPOSED

3-318 For MAR to be viable, the following site criteria must be fulfilled:

- the presence of a geological formation capable of receiving, storing and transmitting water with additional storage capacity

A fractured aquifer is not an ideal formation due to its fractured nature.

- a suitable source of water for recharge/injection

As the only good water in the district this aquifer is not suitable.

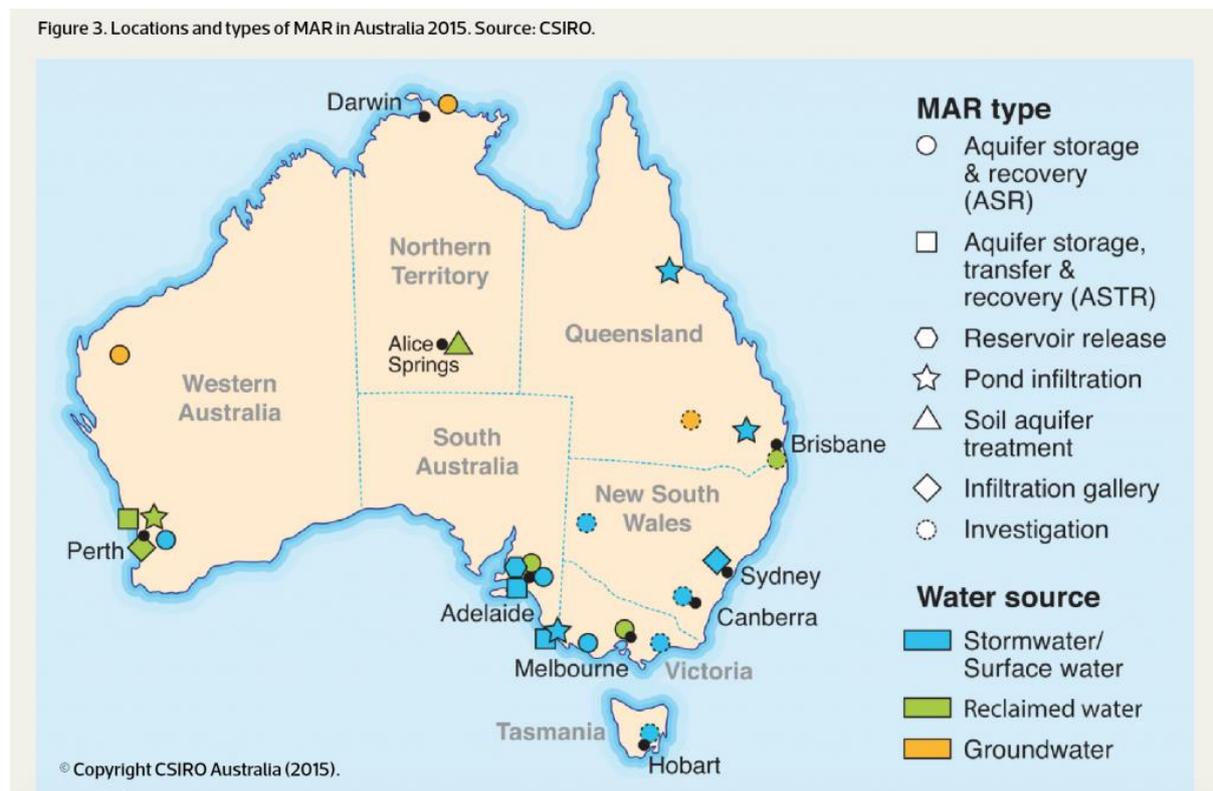
- an ongoing Existing demand or clearly defined environmental benefit (Waterhouse, Tuff, & Usher, 2017)

There is no ongoing existing or environmental benefit.

The following figure shows the locations and types of MAR in Australia 2015 (Waterhouse, Tuff, & Usher, 2017)

It shows that there are only 2 MAR mining projects being used in Australia that are using groundwater. Neither of these are in circumstances similar to the proposed system at this mine. The one in WA – Cloudbreak – is a brackish aquifer in the middle of the Pilbarra with no other users of the aquifer, not a fully allocated fractured aquifer – not comparable.

I have been unable to find details of the one in the Northern Territory however the geology there is very different to that in Woodside.



3-319 Lastly, there is clearly an ongoing existing demand or clearly defined environmental benefit to utilising a MAR system, as the area relies upon agricultural use of the groundwater, and the Inverbrackie Creek hosts several groundwater dependent springs. The area is located within a prescribed wells area, and is controlled by the Western Mount Lofty Ranges Water Allocation Plan.

Without a mine there is NO demand or benefit.

Has Terramin complied with all of the SA regulations that apply to MAR?

<https://www.environment.sa.gov.au/topics/water/resources/stormwater/managed-aquifer-recharge/mar-regulations>

MAR schemes in South Australia are regulated as follows:

The Natural Resources Management Act 2004 has specific provisions that primarily deal with water quantity issues, including prescription, control of use, development of catchment and water allocation plans and environmental flows. The Department for Environment and Water (DEW), under the objectives and principles within the NRM Act 2004, regional NRM Plans, and Water Management Plans, regulates water affecting activities, such as construction or modification of wells,

infrastructure works in watercourse or on flood plains or drainage or injection of water into aquifers where the EPA is not the relevant authority. This includes injection of water such as roof runoff through a closed system from a catchment area less than 1 ha in the Greater Adelaide Metropolitan area, groundwater or mains water anywhere across the state and stormwater or watercourse water in areas outside of the Greater Adelaide Metropolitan Boundary. The DEW and the Natural Resources Management boards are responsible for managing the quantity of water (the injection and extraction volumes) in relation to ensuring minimal negative impacts on natural water resources. This includes providing the scientific knowledge and technical assessment to ensure regulator decision making assists MAR schemes cause minimal or negligible impacts. The Environment Protection Authority SA is the main regulator of the quality of water drained or discharged into an aquifer. The Environment Protection Act 1993 requires that you obtain a works or development approval before you build a MAR scheme. It also requires that you gain an environmental authorisation before carrying out activities of 'environmental significance', including the 'discharge' of waters to aquifers. All MAR schemes, regardless of their size or geographical location, are required to adhere to the requirements of this Act and to the Environment Protection (Water Quality) Policy 2015 and other relevant policies.

The Public Health Act 2011 contains provisions for the protection of public health, including sanitation and water supply. Under this Act, the Public Health (Wastewater) Regulations 2013 provide details about the management of wastewater systems, including the reuse of the recycled water. SA Health manages the human health aspects of the use of recycled water, such as stormwater and treated wastewater after the water is extracted. Under the Public Health Act 2011 and the Public Health (Wastewater) Regulations 2013 approval is required for all uses of recycled water. Although no formal approval is required for use of recycled water, the EPA will refer an EPA licence application to SA Health for them to undertake an assessment. SA Health will assess applications and provide written confirmation if satisfied that the use of recycled water poses no significant risk to public health and will provide the EPA with conditions that are required to be applied to an EPA licence. The EPA then notifies SA Health if the application has been successful and an EPA licence has been issued. For further information see the South Australian Recycled Water Guidelines.

The Development Act 1993 provides for the consideration of any scheme that is deemed to be a 'development'. If your MAR scheme proposal is deemed to be a development, you may need to submit a development application form to the relevant planning authority. Contact your local council in the first instance for advice.

Further – Has Teramin complied with the Australian Guidelines for Water Recycling Managed Aquifer Recharge National Water Quality Management Strategy Document No 24 July 2009?

<https://www.waterquality.gov.au/sites/default/files/documents/water-recycling-guidelines-mar-24.docx>

From the above document:

1.1 Origin and purpose of national guidelines on managed aquifer recharge

Managed aquifer recharge is the purposeful recharge of water to aquifers for subsequent recovery or environmental benefit. It is not a method for waste disposal.

I would argue that Teramin is proposing to use managed aquifer recharge not for subsequent recovery or environmental benefit but purely as a method to remove waste water from its mine.

48 Table 4.1 8 Proximity of nearest existing groundwater users, connected ecosystems and property boundaries

Q8. Are there other groundwater users, groundwater-connected ecosystems or a property boundary within 100–1000 m of the MAR site?

If the answer is 'Yes', a high risk of impacts on users or ecosystems is possible, and this will warrant attention in Stage 2.

The answer is 'Yes' there is a high risk of impacts on users and ecosystems!

49 Table 4.4 11 Fractured rock, karstic or reactive aquifers

Q11. Is the aquifer composed of fractured rock or karstic media, or known to contain reactive minerals?

If the answer is 'Yes', a high risk of migration of recharge water is expected. An enlarged attenuation zone is needed, beyond which pre-existing environmental values of the aquifer are to be met. Dissolution of aquifer matrix and potential for mobilisation of metals warrant investigation in Stage 2.

The answer is 'Yes' so a high risk of migration of recharge water is expected with an enlarged attenuation zone which is not available in the tight restraints of the mine and the nearby residents and bores.

50 Table 4.4 13 Management capability

Q13. Does the proponent have experience with operating managed aquifer recharge sites with the same or higher degree of difficulty (see Table A1.2), or with water treatment or water supply operations involving a structured approach to water-quality risk management?

If the answer is 'No', there is a high risk of water-quality failure due to operator inexperience. The proponent should gain instruction in operating such systems (eg a MAR operator's course or ASR course), or engage a suitable manager committed to effective risk management in parallel with Stage 2, to reduce precommissioning residual risks to low.

Teramin does not have experience in a managed aquifer recharge site with the same or higher degree of difficulty as this type of MAR system has not been done before in a fully allocated, fractured rock aquifer with neighbours this close!

### 3.8.1.1 CONSTRUCTION ACTIVITIES

3-333 All construction activities would be constricted by the outcome and draft measurable criteria, which is proposed as 57d(B)A for daytime.

How will this be possible when nearly all of the vehicles to be used on the site produce more than 100d(B)A? Plus explosives?

Blasting utilised for site preparation (surface blasts) and well as early stages of decline development has proposed a draft measurement criteria of All blast times and charge weights will be recorded in a register to demonstrate all construction blasting exceeding [XXX] kg 6 charge weight will only be conducted between 10am and 6pm. This charge weight is proposed to be calculated as part of the final construction design specifications, however would need to comply with AS2187.2.2006 Use of explosives. These times have been chosen to reflect times where residents are less likely to be home.

Where possible, site deliveries, heavy maintenance work and potentially “noisy” activities schedule during day time periods, noting that some activities will be unplanned and may fall outside ideal times, i.e. in the case of emergencies.

All blasting and “noisy” activities will be done during the adjacent Cellar Doors opening hours within a few hundred metres of the patrons.

### 3.8.3 24 HOUR/7 DAY PER WEEK ACTIVITIES

3-334 Transport of material from the UG mine to either the IML and/or the ROM silo;

As dump trucks are used to form the IML there will be trucks operating on site 24/7

### 7.5 POTENTIALLY IMPACTING EVENTS

Confirmed source-pathway-receptor (S-P-R) relationships that have been identified and confirmed

Table 7-6 = 3 yes

Table 8-6 = 5 yes

Table 9-3 = 10 yes

Table 10-6 = 18 yes

Table 11-2 = 8 yes

Table 12-4 = 3 yes

Table 13-8 = 3 yes

Table 14-5 = 2 yes

Table 15-11 = 10 yes

Table 16-9 = 8 yes

Table 17-4 = 3 yes

Table 18-12 = 5 yes

Table 19-7 = 7 yes

Table 20-2 = 3 yes

Table 22-6 = 9 yes

Table 23-5 = 18 yes

Table 24-3 = 35 yes

A total of 150 confirmed Potentially Impacting Events.

These are just listed – no solutions just the list of events, phase, source, pathway and sensitive receptors.

### 9.6 CONTROL MEASURES TO PROTECT VISUAL AMENITY DESIGN AND MANAGEMENT MEASURES

9-29 Objective 2 – Colour, materials and lighting

All lighting to be in accordance with AS4282 – ‘Control of the obtrusive effects of outdoor lighting’ to reduce the potential for nuisance to surrounding residences and businesses at night time.

That’s it – the entire reference to one of the highest impacting amenity values. AS4282 is the same guidelines as are used to light football ovals – which is what this mine will look like at night. Richard from Terramin stated at the public meeting that no light would spill from the mine site and it would basically only be the mine opening that would be lit up. He might want to check his Occupational Health and Safety guidelines as I think that the area that will have to be lit to create a safe environment for the workers will be closer to a football field than an 5 x 5m opening.

## 9.9 FINDINGS AND CONCLUSIONS

9-49 Visual screening provided by the density of existing boundary planting and internal vegetation.

All of the soil bunds and new vegetation will not grow enough to hide anything in the life of the mine. No allowance has been made for the visual amenity at night which will happen all night, every night.

### 10.6.1.6 MANAGED AQUIFER RECHARGE

10-56/57 None of the examples given are relevant to the proposed MAR system. A MAR system of this type has never been done in a fully allocated, fractured rock aquifer of high quality ground water with neighbours and irrigators this close. If there were successful examples I am sure that Terramin would have used them. There are none because the risks of something going wrong with the system are too great. Modelling is just that – modelling. In every mine things happen or are found that were not predicted. In the middle of the Pilbarra using a saline aquifer that is not being used – the effects of a problem occurring are not necessarily serious. In the tight area that this proposal is working in, with surrounding businesses and people relying on this water resource the effects of any problems are likely to be catastrophic.

On the modelling – my property is 1000 metres from the lease site. I cannot get water on my property. I was told I would have to go down at least 100 metres and it would be too salty to use. I also have a waterhole on my property – at the highest point on the ridge – it has no catchment yet when we get 1 inch of rain I get 3 inches of water in the waterhole. I'm afraid that I doubt the model would have predicted that.

#### 10.6.1.6.4 BENEFITS OF MAR

10-59 The only benefits of the MAR system proposed are for the mine itself. There are zero environmental or other benefits otherwise.

### 10.7.1.7 BLASTING AND GROUNDWATER 10.7.1.7.5 CONCLUSION

10-84 Based on the available literature, Terramin do not expect any impacts on water supply or quality on existing groundwater irrigation users.

Yet none of the literature cited was based on the use of explosives in a fractured aquifer. Let alone the type of fractured aquifer found in this area.

### 13.6.1.6 PROBE DRILLING

13-39 Probe drilling campaigns will be utilised to identify areas where the development will likely intercept groundwater and/or existing voids. Due to the presence of a fractured rock aquifer, determining the location and extent of the fractures along the length of the decline path is beneficial to design with the intent to avoid these areas and plan development schedules. This will allow for preparation of pre-emptive ground support and groundwater management systems.

The fact that probe drilling is required is an admission that the modelling in a fractured aquifer cannot be accurate – otherwise the locations and nature of the fractures would be known and probes would not be required!

### 7.1.1.2 HISTORIC WORKINGS

Prior to the construction of the road the area between Blackbird and Dead Horse will be probe drilled to confirm that no voids are present in the area. If voids are identified beneath the proposed access they will be managed to ensure geotechnical stability and prevent any expression of subsidence on the surface.

Further evidence of unknowns.

### 15.6.2 MANAGEMENT STRATEGIES

15-26 A permanent sprinkler system is being proposed for the IML to reduce dust impacts associated with moving mullock both from the mine void, and also back into the mine void as backfill. No mitigation (correction factor) has been included in the model for dust coming off the IML. The addition of a water sprinkler on the IML is therefore not strictly necessary to achieve compliance with the Project Objectives (defined in Appendix N3); however, it shows good will on Terramin's behalf to assist in reducing potential high impact/ short term dust events. Water sprays are well known to be effective in controlling dust. The inclusion of one on the IML, regardless of design will reduce dust emissions further.

How is a permanent sprinkler system going to work on a mullock heap that will rise up 10 metres? It is not physically possible to move that quantity of dirt without creating dust unless you turn it all into mud.

### 15.7 IMPACT ASSESSMENT 15.7.1 CONSTRUCTION

15-28 Modelled emission rates for the construction scenario were conservative

They were also obviously based on a still day. It would be interesting to see a model based on a summers day of 35 degrees or more with a strong north wind. None of the models shown are in any way realistic.

### 16.1 APPLICABLE LEGISLATION AND STANDARDS

16-6 Under Part 5, Section 20 of the Noise EPP, where a development application is being sought under the Development Act 1993 the predicted source noise level for the development should not exceed the relative indicative noise level from Section 5 (as outlined in Table 16-1), less 5 dB(A) (i.e. 52 dB(A) during the day and 47 dB(A) during the night).

Table 16-2 Shows that these figures will be exceeded for the first 2 years, day and night.

### 16.3.2.6 NOISE SOURCES

16-11 Table 16-3, Table 16-4, and Table 16-5 provide details of each noise source

TABLE 3-19 Shows that all 13 types of equipment for surface construction phase has a sound level of 98 – 114 dBL

So Table 16-3 - How can 13 vehicles at 98-114 dBL only add up to 52 dBL??? The same for the other Tables.

On a still night I can hear a cow from beyond that valley (and that is the only noise I can hear) – I am on the edge of the Woodside township. I would be able to hear the miners talking on those nights but I will not hear them for all of the other noise that will be generated all day, every day, day and night.

## 16.7 CONTROL MEASURES TO PROTECT ENVIRONMENT

16-19 Noise modelling of the control measures has demonstrated that even when every piece of equipment is operating, these noise objectives can be achieved through every phase of the project.

This is another example of Terramin's modelling not being based in reality! They are trying to tell us that running 13 trucks (each of which they have told us generates over 100 dBL) plus giant extractor fans, cement trucks, drilling rigs, air compressors, front end loaders, conveyor belts – oh and explosives! Wont generate more than 52dB(A)!

IMPOSSIBLE!

<https://sciencing.com/52-dba-7568637.html>

Every sound has a decibel level associated with it. If an item is 52 dB(A), then it has a sound similar in intensity to a electric fan, hair dryer, a running refrigerator and a quiet street. Other common sounds include a blender at 90 dB(A), diesel truck 100 dB(A) and a crying baby can reach 110 dB(A).

From the above – Terramin are actually trying to tell us that their mine will only be as loud as a running refrigerator! Even when their own tables show that they will be running 13 diesel trucks plus everything else.

### 16.8.1 SURFACE CONSTRUCTION NOISE EMISSIONS

#### 16-24 FIGURE 16-4 | DAYTIME SURFACE CONSTRUCTION NOISE CONTOUR MAP

This Figure along with Figures 16-5, 16-6, 16-7, 16-8, 16-9, 16-10 are all deceptive. They are deceptive because in each figure the noise contours completely cover the whole of Petaluma winery and cellar door. The deception is that they have used old photos prior to Petaluma being there for the background of these maps. In all other photos Petaluma is there. This is a deliberate act to hide the fact that even with their crazy modelling Petaluma would still be adversely affected by noise.

### 17.9.1 SURFACE BLASTING – CONSTRUCTION PHASE

Figure 17-10 details the extent of peak air-overpressure levels generated from blasting activities during the initial construction phase. Given the extent of the 115 dB(L) contour, this would indicate air overpressure levels would also be compliant at residences and cellar door facilities

I refer you to 16-19 above – “Noise modelling of the control measures has demonstrated that even when every piece of equipment is operating, these noise objectives can be achieved through every phase of the project.” That is under 52 dBL

Yet Figure 17-10 shows that there will be 115 dB(L) at residences and cellar doors

#### 17.9.1.1 HERITAGE FEATURES

17-23 Table 17-2, shows there are regular naturally occurring instances of overpressure being higher than 115dB(L), caused by wind or possibly human induced activities such as gas guns.

Terramin are actually trying to tell us that the wind is louder than their explosives .

I think I'd rather be sipping my wine at a cellar door in the wind than having an explosion a few hundred metres away.

## 17.9.2 DECLINE DEVELOPMENT

Significantly, hospitality businesses located in the region are expected to experience ground vibration which is less than 1 mm/s. In context, this is similar to the vibration from a person walking alongside another person, as discussed earlier in Section 17.2.

I wouldn't be able to make this stuff up. Their modelling is actually trying to tell us that an explosion a few hundred metres away is the same as a person walking alongside another person. Nothing to see here. We'll just blast away – you won't feel a thing.

## 21.3.5 APPLICABLE EXEMPT LAND BASED ON PROPOSED MINING ACTIVITIES

21-9 Figure 21-2 to Figure 21-6 presents conceptually the potential exemption zone based on surface infrastructure. Table 21-5 presents potential land which may require the negotiation and registration of a waiver of exemption based on section 9 of the Mining Act due to the nature of activities, buildings, water sources and infrastructure located on the properties listed below. Figure 21-2 to Figure 21-14 | Proposed surface infrastructure and underground workings with features identified under s. 9 (1) (d) (ii) (B) – Water (Part D) are taken from the MC 4473 Application for this project

There are actually 114 triggers invoking exempt land within this Mineral Claim. 19 of these are residences within 400 metres of the claim. These figures show the overlapping exempt areas and look like a complicated spirograph drawing completely covering the lease area.

It was confirmed at the public meeting on Monday 19 August, 2019 by Paul Thompson from The Department of Energy and Mining that **there has never been another mine in South Australia with 114 triggers invoking exempt land.**

If a mine was placed in the middle of Adelaide Oval there would not be as many triggers.

21-9 Terramin has been able to obtain agreements through exploration, and are confident in their ability to obtain agreements with the vast majority of landholder whose properties have the potential to require the negotiation and registration of a waiver of exemption.

At least one of the exploration agreements has had to go to court. All of the wineries and some other landholders have indicated that they will not agree.

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The Hon. D.C. VAN HOLST PELLEKAAN: There are a lot of very good operators, a lot of very good explorers out there, wanting to work with people properly. There are companies that have said to me, 'If people say no, we just don't go there because it's not worth the hassle. We don't want to tarnish our reputation. We don't want to force our way in with legal means and go exploring or have a mine, whether it is native title rights or whatever it is. If they say no, and we can't convince them, we don't go there because we don't want our brand tarnished that way.' That is tremendously good practice. The other example I shared is tremendously bad practice. As Minister for Energy and Mining, one of my responsibilities is to work with industry to try to clean up that bottom tail so that the industry has less problems, so that landholders have less problems. It is incredibly important that we understand that this is overwhelmingly a responsible industry in mining. This is overwhelmingly a responsible set of operators, whether it is in exploration or in mining. But the ones at the bottom of the pile do a lot of damage to everybody else, and I can understand why landholders would have so many frustrations.

By the **Mining Minister's own description Terramin are "at the bottom of the pile", "the bottom tail", an example of "tremendously bad practice".**

## 22.1.1 SOUTH AUSTRALIA'S MULTIPLE LAND USE FRAMEWORK

22-6 Mineral exports accounted for 29% of total State exports for 2015 and production was valued at \$5.4 billion. Together, mining and agriculture comprise 74% of South Australia's exports.

Mineral exports have access to 100% of the state and generate 29% of total state exports. Agriculture is limited to about 4.5% of the state as arable land and generates 45% of total state exports.

[https://www.saplanningportal.sa.gov.au/planning\\_reforms/new\\_planning\\_tools/environment\\_and\\_food\\_production\\_areas](https://www.saplanningportal.sa.gov.au/planning_reforms/new_planning_tools/environment_and_food_production_areas)

Within South Australia's multiple use framework, Woodside is part of The Environment and Food Production Areas which have been introduced to:

Protect our valuable food producing and rural areas as well as conserving our prized natural landscapes, and tourism and environmental resources

Support our sustainable growth and encourage the building of new homes in our existing urban footprint where supporting infrastructure already exists

Provide more certainty to food and wine producers as well as developers on the direction of future development in metropolitan Adelaide.

### 22.7.3.3 GROUNDWATER

22-25 It appears from the detailed technical review that, based on deployment of the planned interventions, the potential impact on ground water should be restricted to an area contained within the boundary of the BIH Project site. The key effect is likely to be a localised cone of depression surrounding extraction sites.

Which is a problem given the close proximity to neighbouring bores.

22-26 Whilst there are no obvious indications that the groundwater salinity is at risk from the program there is a need to carefully monitor this critical control point on an ongoing basis due to its ability to impact on productive capacity for surrounding irrigators.

It is interesting that this issue has hardly been addressed in the MLA. There is groundwater salinity all around the mine area. I have not seen any modelling in this application to show where that saline water is and is not. My own property is 1000 metres away and I have only salty water about 100 metres down. Just down the road from Bird in Hand one paddock will have good water and the next will be too salty. I have not seen this phenomenon mapped in this application - yet it is a critical issue. With all of the boreholes and probes being drilled and the digging and blasting in and around the site it is a matter of time till one of them goes through both a good and salty aquifer allowing them to mix and ruining the aquifer forever.

From the Keep Woodside Mine Free Facebook page:

"We live on Bird in Hand road. . . .our bore water is so that the salinity makes it unable to use . . ."

#### 22.7.3.4.3 POTENTIAL IMPACT ON AQUIFERS

22-27 Blasting can result in movement in localised fractures in the rock and have an impact on the local aquifer. This can cause new or expanded fractures and cracks to increase aquifer capacity and can cause localised collapsed fractures which may decrease aquifer capacity. The structure of the subsurface in which the bore is situated may have an impact on the effects of the blast on the

aquifer. In addition to the capacity of the aquifer, the structure can also affect other factors such as water quality.

Couldn't agree more. Because this is a fully allocated aquifer the risks and effects are too great.

#### 23.1.2.1 ADELAIDE HILLS COUNCIL DEVELOPMENT PLAN (2017)

23-7 The Adelaide Hills Council Development Plan also includes six specific objectives relating to Council wide mineral extraction activity including:

1. Development of mining activities in a way that contributes to the sustainable growth of the industry.

A five year mine is hardly sustainable to the industry

2. Protection of mineral deposits against intrusion by inappropriate forms of development.

It could be argued that the horse has bolted on this issue as the mine area is surrounded by horticulture, tourism and residences.

3. Areas with scenic or conservation significance protected from undue damage arising from mining operations.

The view from the wineries will be affected by the mine.

4. Mining operations undertaken with minimal adverse impacts on the environment and on the health and amenity of adjacent land uses.

Constant noise, explosions, dust, lighting and earthworks 24/7 will definitely affect the health and amenity of neighbours.

5. Minimisation of the impacts from mining activities upon the existing groundwater level and the quality of groundwater resources.

This proposal has a major impact on groundwater and is a direct threat to the quality of the groundwater.

#### 23.2 ASSESSMENT METHOD

23-9 When entering a region to explore for minerals, Terramin undertakes to firstly understand the community in which it will be working and identifies the community stakeholders that will be impacted by or have an interest in the project.

It then ignores them and does what it wants.

#### 23.4.1 SOCIAL VALUES

23-23 Neighbouring businesses (winery/cellar door/events centre venue) have indicated that the proposed project is incompatible with the values of the area, will destroy the existing commercial activity (through amenity impacts and removing access to water), and undermine the international reputation of the businesses, their services and products.

And yet Terramin continues to ignore them. If Terramin were to follow the Mining Ministers description of good practice they would have walked away from this site as previous companies had.

## 24.9.1 REVENUES AND EXPENDITURES OF BIHGP

24-34 Gross Revenue total \$300.1 million

Royalties total \$10.5 million

Is the risk to the State and surrounding businesses worth \$10.5 million? NO

TABLE 24-9 | FABAL RISK CONCLUSIONS (TAKEN FROM APPENDIX U1)

24-40 The Hunter Valley represents a community where mining (predominantly coal) and agriculture (including wine making) coexist.

And yet “the valley has suffered a degree of environmental damage that many believe to be at, or beyond, tolerable limits. (HEALTHY RIVERS COMMISSION, 2002, p. 1)

“This is particularly the case with water resources; 15 of 25 sub-catchments in the Hunter Region are classified as highly stressed, including a number of sub-catchments in the Upper Hunter region (HEALTHY RIVERS COMMISSION, 2002).

McManus, Phil. (2008). Mines, Wines and Thoroughbreds: Towards Regional Sustainability in the Upper Hunter, Australia. Regional Studies. 42. 1275-1290. 10.1080/00343400701827394.

“Hunter Valley Wine and Tourism Association spokesman on mining, Ian Napier, said people in the valley were sick of being told mining and wine could co-exist. “They can't,” he said.”

The Sydney Morning Herald - September 15, 2013

### APPENDIX G1 STRATEGIC VISUAL AMENITY PLAN

Lighting of the entry road, car park, operations area and water treatment plant are expected to be permanent fixtures. Temporary lighting for ventilation shafts and the integrated mullock landform is expected to be required when activity is occurring.

#### Potential Permanent Light Sources

1. Entry and Roadway
2. Operations Area
3. Car park
4. ROM Silo
5. Fuel Store
6. Water Treatment Plant

That's it – the full extent of the lighting plan for a mine that will be run 24/7 – all night, every night. From 1 to 5 is approx. 475m = about 3 times the length of a football oval. The area encompassing 4,6,2 & 5 is about 25,00 m<sup>2</sup> = about 1.5 times the area of a football oval.

This mine will spill light all the time and be visible from the whole valley and there will be a light glow visible from the town of Woodside.

As the Integrated Mullock Landform will have activity for the life of the mine it too will be lit up.

This severely affects the amenity of the area yet has received only a couple of lines in a huge report.

## APPENDIX H1 GROUNDWATER ASSESSMENT

It should be noted that the company that produced this report – Australian Groundwater Technologies is in liquidation.

### 3.1.1 Aquifer yield and salinity

p53 The vertical profiles of airlift yield, groundwater salinity, pH and penetration rate compiled from field measurements recorded during drilling are presented for each investigation well on Figure 13. Groundwater EC gradually increased with depth, but could be masked by the salinity of the high yielding Tarcowie Siltstone (1,586 to 1,765  $\mu\text{S}/\text{cm}$ ). (872 to 970 mg/L) Once the upper section of the wells was cased off, slightly higher EC's were observed in the Marble (1,910 to 2,040  $\mu\text{S}/\text{cm}$ ) (1050 to 1122 mg/L) (IB-1 and -2) and the Tapley Hill Formation (1,770  $\mu\text{S}/\text{cm}$ ) (IB-5).

<https://www.naturalresources.sa.gov.au/samurraydarlingbasin/publications/measuring-salinity>

Parts per million (ppm) are considered the same as milligrams per litre (mg/L).  
Simply times (x) EC ( $\mu\text{S}/\text{cm}$ ) by .55 to get an approximate ppm equivalent.

<http://agriculture.vic.gov.au/agriculture/farm-management/soil-and-water/salinity/measuring-the-salinity-of-water>

800–2,500  $\mu\text{S}/\text{cm}$  High salinity water – cannot be used on soils with restricted drainage. Even with adequate drainage, special management for salinity control may be required. The salt tolerance of the plants to be irrigated must be considered.

P50 Figure 10 | Groundwater census – wells surveyed.

Shows all the wells that were surveyed.

P87 Figure 28 | Regional groundwater salinity

Shows the same area with the same wells:

5 wells 185-500 mg/L

21 wells 500-1,000 mg/L

19 wells 1,000-1,500 mg/L

4 wells 1,500-2,500 mg/L

1 well 2,500-3,690 mg/L

Yet Figure 13 on page 53 only shows 1 well at 1,200  $\mu\text{S}/\text{cm}$  = 660 mg/L – nothing under this salinity. The salinity values don't match and different measurement units have been used to create confusion.

According to Figure 13 there is only one well that is supplying water under 1,500  $\mu\text{S}/\text{cm}$  or 800 mg/L which indicates that all but one well in the district is classed as high salinity. This is clearly and demonstrably incorrect.

What Figure 28 does show however is that adjacent wells can vary in salinity from 185 to 1,500 mg/L and even 185 to 2,500 mg/L. (Dark green 185-500mg/L to Yellow 1,000-1,500 mg/L and Orange 1,500-2,500 mg/L)

If these aquifers are in any way connected during mining they will be rendered useless to the surrounding businesses. Figure 28 shows that there is this variation within the actual mining area. There is no margin for error. Yet they cannot get the figures for the same wells to match.

It should also be noted that there has been very little mapping of the highly saline waters in the district. This is partly because those bores would normally be closed as soon as it was found that the

water was unsuitable. This leads to an incomplete idea of the extent of these highly saline waters which is crucial to know to avoid connections between them and the good quality water of the fully allocated good aquifer.

### 7.3.5 Groundwater salinity

P 149 The risk of saline groundwater intrusion from the higher saline FRA of the EMLR was assessed by the model.

As above – the model does not have much information on the extent of the highly saline water in the area, without information the model cant work. And with the information it is still only a model and not reality. In the confined space of this mine there is no room for error.

## 10. Modelling limitations

P 747 As discussed above, the transient CRDT calibration results display a relatively poor model-to measurement fit for some wells. As also discussed, this is likely attributable to local-scale anisotropy. This may be introduced into the model during future upgrades to improve local-scale drawdown representation, but is not expected to significantly influence larger-scale mining impact simulation results.

- Data availability to support a transient regional calibration process is relatively limited. That is, the available two-year timeseries is relatively short (however this is now approaching three years and therefore transient recalibration using the expanded dataset is a consideration for future model upgrades), and historical abstraction information is limited due to lack of metering.
- Some model parameters are presently based on a relatively coarse parameterization scheme, for example:
  - o Storage parameters within each layer are homogeneous. Introduction of spatially distributed specific storage would likely enable improved transient calibration performance (particularly regional variation in seasonal fluctuation magnitude). However, the merit of doing so is restricted by the currently limited transient data availability discussed above.
  - o The current mode of spatial variability for parameters that are spatially distributed (e.g., hydraulic conductivity) is piecewise constant zones. This effectively limits the degree of fit between observed and simulated hydraulic heads that is attainable through calibration (as compared with a continuous parameterization mechanism such pilot points, for example). However, as discussed above, the introduction of spatially variable storage parameters would only be useful if accompanied by reliable, holistic groundwater extraction data.
- Whilst key model parameters were targeted and highly conservative simulations were undertaken, the sensitivity/uncertainty analysis could be extended further, incorporating a greater range of tested parameters, in order to more accurately constrain model prediction likelihoods.

To quote Monty Python and the Holy Grail: “It’s only a model!”

It has limitations. It has inaccuracies. In a mine out in the Pilbarra this is more than adequate. In a mine surrounded by residences and businesses involving 114 triggers for exempt land, with an inherently unpredictable fractured aquifer, good quality and saline water in close proximity there is no margin for error. Yet mines always find things that were not in the model, things that were not predicted. In the Pilbarra there are few neighbours to effect. There is time and space to find a solution and implement it without affecting the neighbours. The Bird in Hand location does not have these luxuries. If an unpredicted problem occurs it may be irreversible. It is not worth the risk.

## APPENDIX E Important Information

P 990 This Report is provided for use solely by Golder's Client and persons acting on the Client's behalf, such as its professional advisers. Golder is responsible only to its Client for this Report. Golder has no responsibility to any other person who relies or makes decisions based upon this Report or who makes any other use of this Report. Golder accepts no responsibility for any loss or damage suffered by any person other than its Client as a result of any reliance upon any part of this Report, decisions made based upon this Report or any other use of it. This Report has been prepared in the context of the circumstances and purposes referred to in, or derived from, the Contract and Golder accepts no responsibility for use of the Report, in whole or in part, in any other context or circumstance or for any other purpose. The scope of Golder's Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it. At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report. Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

That's a lot of disclaimers!

## APPENDIX H1 GROUNDWATER ASSESSMENT

P 87 Figure 28 | Regional groundwater salinity

This Figure shows that in the area of the mine workings the groundwater salinity varies from 185 to 1,500 mg/L in separate wells in very close proximity. There is no modelling that explains why there is this much variation in salinity in such a small area. The grouting that is proposed to be used has the potential to and is indeed designed to block off the inflow of water as the mine progresses. This will create one of the biggest threats to the aquifer as when the fresher water inflows are blocked:

- 1 - this may directly affect existing high quality bores by removing the fresh inflows.
- 2 - It may affect the whole aquifer by blocking the fresh inflows thereby increasing the overall salinity of the aquifer.

## APPENDIX J1 WATER TREATMENT PROPOSAL

P 17 It is also proposed to utilise this Storage Dam as the primary nitrogen removal stage, through the use of Floating Wetlands installed on the surface of the Storage Dam. The Floating Wetland supports planted natural vegetation, the roots of which create anaerobic conditions.

As stated previously most of the plants suitable for this process are dormant in winter and/or frost sensitive in a high frost environment. Rendering this process ineffective in winter.

### Table 3-3: Estimate of Regeneration Wastes

Waste Produced per Day 12.5 m<sup>3</sup>/day

That's 4,562 cubic metres per year – that's a lot of waste.

### 3 ADDENDUM TO SECTION 2.2.5 – MAR INJECTION REQUIREMENTS

#### Table-2.8: Proposed MAR Targets for Ionic Constituents

TDS mg/L 994 (1)

(1) The TDS target was selected as the lowest TDS measured for the two Receptor Bores (994 mg/L in Receptor Bore #1).

Bore 6628-23182 which I believe is one of the closest private bores to the mine has a TDS of 529 mg/L.

If the MAR recharges with water at 994 mg/L this bore will be approx. double its current salinity.

### APPENDIX L1 REPORT ON GEOPHYSICAL SURVEY AND ADDITIONAL SITE HISTORY RESEARCH

Appendix D Information obtained from Maximus Resources

<http://www.maximusresources.com/projects.html>

Also in 2005, Maximus commenced additional exploration drilling on the historic Bird in Hand gold prospect, located in the Adelaide Hills area of South Australia. This work resulted in the identification of, and subsequent feasibility study on the mineral resource totalling 237,000 ounces.. In 2009, further exploration activity was suspended on the Bird in Hand project pending the outcome of a dewatering study and pumping test. In 2013, following an extensive review of the project and approvals timeframe, the Bird in Hand project was divested.

Maximus obviously decided after the dewatering study and pumping test that it was not worth their while to continue, yet Terramin decided it was.

### APPENDIX P1 BLASTING IMPACT ASSESSMENT

Page iii Air Overpressure – 115dB(L) for 95% blasts per year, with a 120dB(L) maximum unless agreement is reached with the occupier that a higher limit may apply.

How does this fit with the stated limit of 52 dB(A) during the day?

Figure: 7.2b Extent of blast induced overpressure from the decline development

This is an interesting figure as it shows that there are at least 4 sensitive receptors at 110 dB(L) or above. What I find particularly interesting is the rate of decline over distance. It shows that the noise level starts at 135 dB(L) and drops down to 110 dB(L) at the distance of these 4 sensitive receptors – a drop of 25 dB(L) (18.5%) over this distance.

The other models however would have us believe that the noise from 13 trucks at 100dB(L) each (plus other noise sources) will drop by 48% to 52dB(L) or less over this distance. Whereas this figure shows that it is much more likely to drop by only 18% to 81.5 dB(L).

One or both of the models must be wrong!

## APPENDIX T1 EXEMPT LAND MAPS

The first map shows the overlapping exempt areas are so dense that the map looks like a complicated spirograph diagram.

## APPENDIX T3 EXEMPT LAND TABLE

Table E1: Summary of triggers invoking Exempt Land within the Mineral Claim

This Table shows that there are **114 triggers invoking exempt land** within this Mineral Claim. **19 of these are residences** within 400 metres of the Claim.

It was confirmed at the public meeting on Monday 19 August, 2019 by Paul Thompson from The Department of Energy and Mining that **there has never been another mine in South Australia with this many triggers invoking exempt land.**

**If a mine was placed in the middle of Adelaide Oval there would not be as many triggers.**

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The Hon. D.C. VAN HOLST PELLEKAAN: There are a lot of very good operators, a lot of very good explorers out there, wanting to work with people properly. There are companies that have said to me, 'If people say no, we just don't go there because it's not worth the hassle. We don't want to tarnish our reputation. We don't want to force our way in with legal means and go exploring or have a mine, whether it is native title rights or whatever it is. If they say no, and we can't convince them, we don't go there because we don't want our brand tarnished that way.' That is tremendously good practice. The other example I shared is tremendously bad practice. As Minister for Energy and Mining, one of my responsibilities is to work with industry to try to clean up that bottom tail so that the industry has less problems, so that landholders have less problems. It is incredibly important that we understand that this is overwhelmingly a responsible industry in mining. This is overwhelmingly a responsible set of operators, whether it is in exploration or in mining. But the ones at the bottom of the pile do a lot of damage to everybody else, and I can understand why landholders would have so many frustrations.

The Minister for Mining has said above that Terramin are bad operators. People have said no. Terramin have tarnished their reputation. They have forced their way in by legal means already. Terramin have not been responsible. They are doing a lot of damage to the mining industry. Landholders do have so many frustrations.

## APPENDIX U1 AGRICULTURAL IMPACT ASSESSMENT

### P 14 7.2. GROUNDWATER

The key groundwater issues relate to the mining operation and potential interaction with a Fractured Rock Aquifer adjacent to the targeted mineralised area. The process of depressurising the adjacent aquifer and minimising potential seepage into mining drive will influence the local aquifer fracture conditions. The AGT (2017) work has extensively modelled these interactions and outlines the technical variables. There are several key interventions that TAL intends to deploy to mitigate risks and impact on the groundwater conditions:

1. Careful mine design to avoid high water yielding zones;
2. Deploying a technique of probing and grouting (as outlined in Bird-In-Hand Gold Project – Grouting for Groundwater Control - Multigrout 2017); and
3. Depressurising, treatment and Managed Aquifer Recharge (MAR) program.

#### 7.2.2. Salinity

Another absolutely critical factor on par with utility is the quality of water for the surrounding agricultural irrigators. In particular, changes in salinity can have a detrimental impact on

productivity. Although the local groundwater salinity varies both temporally and spatially, generally the regional groundwater is in the order of 1,000 ppm. Generally, grapevines upper long-term sustainable limit is in the order of 1,200 ppm. This response is dependent on soil type and structure, variety / rootstock combination and magnitude of leaching seasonal rainfall. Movement over time towards that upper limit figure impacts on accumulative soil salinity and ultimately has the potential to reduce productive capacity (Lanyon 2011). The AGT (2017) modelling deals with the risks of potential encroachment from Eastern Mount Lofty Ranges sub catchment in detail and suggest that the MAR program should maintain the barrier interface effectively. Whilst there are no obvious indications that the groundwater salinity is at risk from the program there is a need to carefully monitor this critical control point on an ongoing basis due to its ability to impact on productive capacity for surrounding irrigators.

Areas of salinity in the aquifers have not been adequately mapped. The combination of grouting and MAR has not been used before on a fractured aquifer – not one example has been given. The mapping of a fractured aquifer is inherently difficult due to the nature of the rock and the unpredictability of the fracturing. Generally the regional groundwater may be in the order of 1,000 ppm but there are private bores close to the mine site that are much lower than this. If something were to happen to these good bores there is no way of returning them to the good quality they are now. The best they could expect to be would be 1,000 ppm (double or more what they are now). MAR systems are generally blunt instruments and are used in situations where a bit of leakage is of no or little consequence. The main example that Terramin have given of a similar type to the one proposed is Cloudbreak – it is a brackish aquifer in the middle of the Pilbarra with no other users of the aquifer, not a fully allocated fractured aquifer. If something goes wrong in this situation its not the end of the world. There is time and space with little impact on the surroundings. All mines encounter problems that were unknown and unforeseen.

Bird in Hand is a totally different proposition. For it to work this needs to be absolute precision. There are no margins for error. The mine is completely surrounded. The aquifer is fully allocated and being used daily over summer. There is a rock structure that makes predictions a guide at best. Even with the modelling the technique is probe around in the dark and try and feel if your fingers get wet. There has not been another example of using MAR & grouting in a fractured and fully allocated aquifer of this type anywhere in the world. If there had Terramin would have pointed it out to us. There has not even been an example of the use of MAR in a fully allocated aquifer in a situation like this. The risks are too great and it is too much of a blunt instrument.

## 8. POTENTIAL COMMERCIAL/MARKET RISK SOURCES FOR ADJOINING AGRIBUSINESSES

### P 16 8.1. VISUAL AMENITY

Not a single mention, let alone modelling, of the night time visual amenity of the project. Something that will affect the whole valley and the township of Woodside all night every night!

## APPENDIX W1 ECONOMIC IMPACT ASSESSMENT

P 16 Therefore, an expected worst case outcome on value impact from these assumptions is the loss of 18 FTE jobs and \$1.6 million of value added in affected operations

If the mine goes ahead the proposed \$30 million expansion of Bird In Hand Winery will not go ahead. That's just for starters.

The Hunter Valley represents a community where mining (predominantly coal) and agriculture (including wine making) coexist.

And yet “the valley has suffered a degree of environmental damage that many believe to be at, or beyond, tolerable limits. (HEALTHY RIVERS COMMISSION, 2002, p. 1)

“This is particularly the case with water resources; 15 of 25 sub-catchments in the Hunter Region are classified as highly stressed, including a number of sub-catchments in the Upper Hunter region (HEALTHYRIVERS COMMISSION, 2002).

McManus, Phil. (2008). Mines, Wines and Thoroughbreds: Towards Regional Sustainability in the Upper Hunter, Australia. *Regional Studies*. 42. 1275-1290. 10.1080/00343400701827394.

“Hunter Valley Wine and Tourism Association spokesman on mining, Ian Napier, said people in the valley were sick of being told mining and wine could co-exist. "They can't," he said.

The Sydney Morning Herald - September 15, 2013

In conclusion.

The fact that there are more close neighbours and more triggers for exempt land for this proposal than any other mining proposal in the history of South Australia shows that it, as the Mining Minister himself has said, “is tremendously bad practice.”

Other companies have looked at this proposal and walked away but Terramin, with gold fever, have pushed on. They have listened to and then ignored community and local sentiment. They have tried to tell us that all of their trucks, etc will only be as loud as a running fridge. That no light will leave the mine sight at night. These two farcical statements give an indication of the extent to which they will go to get this mine confirmed. This mine is surrounded by neighbours including homes, vineyards, wineries, cellar doors, restaurants, function centres and a concert venue all of which will be subject to 24 hour mining operations including explosions and lights and noise all night. The local roads which Terramin have stated are unsuitable will be subject to increased heavy vehicle traffic and tonnes of explosives being carried on them. It is surrounded by agriculture that relies on the only good water in the district. I believe I have shown that there are holes in the models – there always are because they are only models. But the situation this proposal is in has no margins for error. Who will manage this project because there is no-one with experience in a project of this sort with these tolerances. There are no similar projects. I have shown this with the examples Terramin have given.

The risks are too great!

Why risk so much for so little!