SUBMISSION MCPHILLAMYS EIS V1

PROJECT APPLICATION AREA.

3 October 2019

The proposed McPhillamys Mine is a project in the wrong place. Orebodies occur where they do but it is not imperative that they be mined.

The EIS of 6,370 pages seems to cover most aspects of the proposed development but with only a USB and no index it greatly impedes a proper vetting of the project. The Appendices have to be interrogated *because the main body of the EIS appears to be slanted to the benefit of the development.*

The EIS on p737 infers that McPhillamys gold deposit sits within a highly mined and degraded area. This is not true. The three hard rock mines in the vicinity of Kings Plains in the late 1800's early 1900's were very small by today's standards and their combined total output would have been covered by one day of mining by the proposed McPhillamys mine. The associated alluvial mining and eluvial mining around the McPhillamys outcrop which is shown by a large black area on the map on page 167 of the EIS was done by small syndicates and lone prospectors making sustenance money, and they have left no trace. There was never a prolific industry.

P737 states that "the proposed land use of mining represents a significantly higher value land use for the site compared with the existing agricultural land use". This must not be taken as a justification for allowing the project. The profitable mining phase will last 10 years, the land used for agricultural purposes will last forever. On the same page it says that of the households, which number 88 within two kilometres, the ones living at Kings Plains will be impacted by noise (over acceptable limits) for the first "couple of years". This is very cavalier and is not acceptable. There does not seem to be any benefit bestowed on the residents living within two kilometres and their plight cannot be "ameliorated", which in the EIS seems to be the solution for any perceived problems.

Similarly on p737 it states that "The only beneficial land use that could be affected by the project is agriculture." "***The only"*** could have been worded better and gives an indication of the proponent's attitude to the land that they bought and to the surrounding landholders and residents. The environment certainly won't be "enhanced for the benefit of future generations".

The proposed pipeline it is claimed could have a future benefit for the water security of the Central West. This is another statement that is not right. If the water was not highly polluted it would not have been made available and it would have remained in the Sydney Water supply system. Potable water would not be sent to the other side of the Dividing Range. The desalinated part of the water remains in the Cox's River catchment, the saline residue (brine) from the desalination plant and coal mine dewatering water will be piped to McPhillamys if the project goes ahead.

On p738 the implication is that because the land had been held under exploration licences "'over a great period of time" it gave the company an unspoken right to mine. The granting of an Exploration Licence *does not* give the right to mine and companies are aware of this.

If the orebody were located somewhere where it would be less of an imposition it would be a good project. However in the Kings Plains-Vittoria area it has major problems:-

- It is being thrust on an established, quiet, rural and farming community. Some farms have been owned and worked through the generations.
- The project is on the headwaters of a river which will be adversely impacted.
- There is no source of environmentally acceptable water for the processing.

SURFACE WATER.

Surface water and groundwater are incontrovertibly interconnected. It is one system, but because it is the most visible and the easiest to measure, surface water is given priority. Surface water is the easiest to use and many rural pursuits totally depend on it.

The proposed mine and processing facilities will impact greatly on the upper reaches of the Belubula River. The major impact will be all the way from the proposed mine to the Carcoar Dam and the effects will be present downstream due to less water available to be released from the dam. In several places the EIS and appendices state that the water flow level change is expected *to be imperceptible in the natural variation in catchment conditions*. **This statement does not negate the fact that the water will not be there** and it will have a large impact in times of drought, especially above the dam.

The EIS gives the best case scenario and it states that the river flow contribution to the dam will be reduced by 4% to 9%, i.e. 636 ML/yr to 1402 ML/yr. Using the lowest figure of 4% it is 655 ML/yr equates to 1.8 ML per day or 21 litres per second every second of every hour of every day. To put it in perspective that is like having 35 garden taps flowing every second of every day. In dry conditions it could result in no flow in the river. The percentage decrease in flow gets substantially larger towards the project area and is probably the total flow above the confluence of tributary A with the river. Appendix O on Aquatic Ecology supports the prediction that the project would consume all of the river water above the confluence of Tributary A except in times of high rainfall.

In various places the reports claim that the upper reaches of the river are ephemeral, which is wrong. In app. J page 29 it states that on previous river gauging by government agencies the upper reaches of the river only experienced no surface flow 1% of the time which make the upper reaches perennial.

After closure the decrease in flow is estimated at 0.5 ML per annum which will be due to the groundwater reporting to the open cut void in perpetuity. That is still a large deficit, of 500,000 litres every year from the upper river, assuming the quantity has not been understated.

In several places the EIS describes the upper reaches of the headwaters as a series of "stagnant ponds" which is not the case. It suggests that the report writers are not familiar with the "chain of ponds" concept or are deliberately trying to make the river sound like a drain instead of a normal entity. In app. J it states that some of the springs and seeps have run dry during the baseline monitoring period. This would be totally expected during the period of drought which spans their observation period. Perhaps a longer time span is required or they should have consulted the local farmers who depend on this water source and know its history.

On page 24 Appendix J it is stated that "streamflow data is not available for the project area at present" and "Monitoring flow in the local creeks prior to mining, especially low flows, is an important component for measuring potential impacts for the project**".** Regis seems to be trying to advance the project without vital data and is asking to be taken on trust.

The ***Strahler System*** of stream classification and its implications are not treated well in some parts of the EIS. In the Main Report on page 228 it states that the stream assessment in the project area could not be properly classified under the usual method of classification under the Strahler System because the streams often had no incised channel. This reasoning is faulty. Not having an incised channel in a valley is a good thing as it means that there is little erosion. The consultants on p.37 Appendix J had no problem assigning the streams and I have verified their classification using the readily available HydroLine spatial data maps published by the NSW Department of Industry. The Strahler system is used by the State Government to impose certain limitations on riparian development which under normal circumstances would preclude the proposed project to be allowed. The Tailings Dam is situated on top of a 4th order stream, i.e. the Belubula River. In the table given on page B2 of Appendix J the consultants seem to try to hide this fact by stating the classification above the dam is 3 and below it, it is 5, and for some reason does not give the classification for the tailings dam site itself, which is 4. Any drainage of, or over, a Stream Order 3 is a significant drainage. The limitations set by the Strahler system should be adhered to. The classification of 5 should also make the location of the main waste rock dump unsuitable.

Comparing the surface areas of the upper tributaries of the Belubula River unfavourably with the surface area of tributaries A & B, which is done in various places in the EIS and appendices, is not a valid point in favour of allowing the river above their confluence to be destroyed by the proposed development. The surface area of a catchment is only one factor of its flow. The impact of the Belubula River and the springs above the confluence of tributaries A & B are ignored. The company may own a substantial portion of the Belubula River catchment but the land is a permanent legacy, the mine will only last 10 years and would destroy parts of it forever.

To assess the water quality App. J p30 suggests that baseline data may be inadequate. There also seems to be an error in their statistical treatment of data on p29 app. J as for their default value for something below the limit of detection they are using the BLD figure and not a nominal smaller one as is common practice.

Once the open cut is finished it will contribute highly saline and acid water to the river downstream of the mine through leakage to groundwater which in turn will report to the river. Initially the open cut void will be a sink for ground water and some of the seepage from the tailings dam where it will concentrate by evaporation for at least 500 years (p. 95). That is an unacceptable legacy for future generations.

The composition of the tailings dam liquid fraction is not given enough attention. The simulated electrical conductivity on p.95 app. J suffers from the same weakness as all of the geochemical tailings studies have done. The geochemical tests on the tailings were done with de-ionised water which is a standard laboratory method but is difficult to extrapolate to reality. The highly polluted water used in the ore treatment, which is to be sourced from the collieries and the power house reject water, is high in salts (chemistry not defined in the EIS) which will add to the burden of salt (and perhaps hydrocarbons) in the tailings and will also dissolve materials differently to the de-ionised water. All of the process chemicals will be in the tailings dam. **The imported water**, rejected by the Sydney Water authority, could contain between 2,847 tonnes per annum to 33,215 tonnes per annum of unspecified metal salts (not all NaCl), or if the average given by the proponents is used, 16,608 tonnes per annum or 166,080 tonnes over the life of the mine. **The process chemicals** comprise per annum, lime 5,000 t (benign), sodium cyanide 5,700 t, sodium metabisulphite 800 t, sodium hydroxide 140 t (benign), hydrochloric acid 444 t, flocculant 280 t, copper sulphate 550 t making 15,870 t or 158,700 tonnes over the life of the mine. **The above added to the chemical composition of the treated ore itself, at least 70 million tonnes, is an everlasting legacy that will slowly bleed into the environment for ever.**

In app. K p210 the water salinity of the **proposed imported water** via the pipeline is categorised by the Total Dissolved Solids (TDS) saying that "water salinity is typically categorised by the TDS of the water". This statement is misleading as it can only be done once the composition of the salts is known in case some of the components are deleterious. Regis has not divulged the analysis of the ions that make up the salts despite having been asked by several people to do so. Until it is known the imported water TDS should not be related to suitability for stock, which makes it sound benign. The Springvale water treatment plant turns one third of the water into acceptable potable water. The remaining two thirds of the water contains the full load of the salts and metals and the McPhillamys proposal is to pump this reject brine to Kings Plains for use as processing water. The remaining water to be pumped is highly polluted coal mine water that is being prevented from being discharged into the Cox's River (Sydney Drinking Water Catchment).

The river will also be impacted by acid drainage from the overburden rock piles. **42% of the mine overburden is described as potentially acid forming.** Once mined the prefix "potential" should be dropped. It is intended that the acid forming rock is to be encapsulated, however the amount of available non-acid forming rock and clay, especially in the latter years of mining, does not appear to be enough to cover the acid forming rock to prevent it coming in contact with rain water or in contact with a possibly elevated water table below the overburden rock piles. Initially the advice was that only 25% was potentially acid forming but that has now almost doubled. In case Regis Resources considers using crushed limestone with

the acid forming rock as a neutralising agent, it doesn't work outside of the laboratory as the limestone surfaces become passivated with time.

The ground reconnaissance or ground truthing of the whole area was carried out over three days in May 2017 in order to establish a "baseline record of the stream characteristics". This is in a period of drought and does not give a fair representation of the streams. A major weakness in the baseline record is that the streams under the proposed tailings dam and over the proposed open cut were not included. This pre-empts the outcome of the proposal and does not depict the areas to be destroyed to the readers of the EIS. This harm minimisation is a theme that runs through many of the reports. Many of the site photos show a partly degraded swampy meadow landscape, common to this part of the Central West, which were very productive and can be brought back by restorative farming. A swampy meadow designation seems to be the descriptor on only one photo but the designation does not depend on size.

On p56 App. J it say that only tributary A and B exhibit flow. They have not looked, or looked properly at the Belubula River in the project area as that part of the river near Dungeon Road (I used to live on Dungeon Road) flows nearly all of the time and when there is no obvious surface flow there is sub-surface flow feeding a chain of ponds. The current condition of the streams within the mine and processing footprint should have no bearing on the advisability of mining as it is productive farmland and it will not be able to be restored as such.

There is a strong possibility that muddy water will contaminate the river if it rains during the stripping and construction of the tailings dam wall and the production and rock storage sites. The area is large and it will be difficult to contain the contaminated water on-site or to provide adequate stilling pond volume.

GROUNDWATER.

1. The water intake of the open cut is estimated from borehole information. The open cut excavation will intersect fault zones, fracture zones and joints in the rock that are often missed in test water bores. The open cut is in a structurally complex area where substantial regional faults (Copperhannia and Godolphin Faults) intersect and the McPhillamys deposit sits in one of the splays from the faults. Some of the tributaries and the river itself reflect the underlying structures so it is very possible that water transmitting structures are intersected by the mine. The water in the Belubula River above tributary A will report to the open cut via rock structures and the river may only flow in times of high rainfall. The draining of the water table by the open cut will interfere with the river upstream and downstream, with the springs and the water bores of nearby properties.
2. A diagram of *predicted extent of groundwater level drawdown due to mining* presented at the McPhillamys community open day on 14 May 2019 and in appendix K show the **cone of drawdown,** in the three scenarios given, all fortunately stopping just short of the river but still impacting on the river alluvials. The river alluvials and the river are connected and the pit will drain the river. The cone of depression around

the open cut as depicted in the EIS seems too steep. The calculations treat the rocks as having the same uniform internal composition in all directions and do not allow for any structural irregularities that will increase the flow in to the pit. The pit, close to completion will be 370 metres below the river next to it. In an area within a geological fault system connecting structures between the pit and the river cannot be discounted. The water level in the open cut is predicted to remain below the level of the current water table for at least 400 years which means that it will be depleting the ground water for this time. The groundwater from the overall mining area will over time flow to the lowest point which is the open cut void.

3. Even until the final open cut water level is reached the open cut will discharge polluted water which will mix with the lower part of the water table and is likely to appear downstream in the Belubula River.
4. The water table in the mine area will not recharge to its present level while the mine operates. This will be a water deficit for landholders downstream from the mine for more than 10 years. After the mine closure there will still be a substantial deficit for years while the water table recovers close to its pre-mining level. A lesser deficit will last for ever because of evaporation from the open cut pond which will remain as a sink.
5. Water from **the tailings dam** will leak into the water table very soon after it is commissioned. The seepage flow rate given in the EIS of 50m in 100 years implies that the highly contaminated seepage will take a long time to reach the river. That is totally misleading as the tailings dam (TSF) is sitting on top of the river, there is no buffer between the tailings dam and the river. **The seepage does not have to travel to reach the river, it is right there**.
6. The salt content of water used in **dust suppression** may be low to start off but evaporation will increase it. Watering down is a continuous operation and the new water applied, or the rainwater, will carry the salts to the water table. The water may also contain hydrocarbons from truck exhausts and oil. When it is particularly hot and windy, some of the mines that I have worked at in the Central West have had to install road water sprays.

TAILINGS

The tailings dam will sit on significant drainages that comprise the head of the Belubula River.

1 The tailings studies indicate that the tailings liquid fraction will be elevated in sulphate, selenium and fluorine. There is no mention of arsenic which is a component of the ore and surrounding rock.
2 The geochemical tests were done with de-ionised water (equivalent to distilled water) which is a standard laboratory method but is difficult to extrapolate to field conditions. The highly salty water used in the ore treatment, as well as the processing chemicals, will form a mix which will dissolve minerals differently to the de-ionised water.
3 The tailings will be (potentially) acid forming and in the main body of the EIS it claims that the acid will be overcome by the lime used to raise the pH of the processing.

However on page 41 App. K discussing the tailings geochemistry it states for the acid base characterisation curve that "the acid base results suggest that the readily available neutralising capacity of the samples is significantly lower than the measured acid neutralising capacity" and that "the results of the ABCC tests suggest either that the calcite in these samples is not contributing as expected to the acid neutralising capacity or that there are issues with the ABCC data". I suggest the results have no issues and that the decreased capacity is caused by the surface of the carbonates becoming passivated and cannot neutralise the tailings over time. Therefore the tailings are acid forming. I have noted that the main body of the EIS not agreeing with the results in the appendices happens in other places.

4 The process chemicals which become an intermixed part of the tailings comprise per annum, lime 5,000 t, sodium cyanide 5,700 t, sodium metabisulphite 800 t, sodium hydroxide 140 t, hydrochloric acid 444 t, flocculant 280 t, copper sulphate 550 t making 15,870 t or 158,700 tonnes of chemicals in the tailings dam over the life of the mine.

5 The proposed **imported water** from the Lithgow collieries and the power station is water rejected by the Sydney Water Authority and was stopped from being released into the Cox's River. It is not "surplus" water that can be used beneficially. The analysis of the water has not been revealed despite many requests to Regis. They either don't know or are unwilling to reveal it. I could not find any analysis but only a range of TDS (Total Dissolved Solids) which is a measure of the quantity only and not of the components. Using the TDS the water being transferred over the Great Dividing Range could contain between 2,847 tonnes per annum to 33,215 tonnes per annum of unspecified metal salts (not all NaCl), or if the average given by the proponents is used, 16,608 tonnes per annum or 166,080 tonnes over the life of the mine, but it could be a lot more. This also becomes an intimate part of the tailings mix. There may also be a hydrocarbon content as the water comes from collieries. **This water should not be allowed to be used by the proposed McPhillamys mine.**

6 Comparing the water from Lithgow with accepted TDS in stock water is not valid until the actual composition of the salts are known.

7 In the EIS it is not made clear that the process water and the process chemicals are a part of the seepage from the tailings dam.

8 **The 70 million tonnes of ground up mineral, the metal salts in the process water and the chemicals used in the processing will comprise a totally unacceptable legacy hanging over the source of the Belubula River seeping out for generations to come**.

DUST.

Appendix M *Mine development air quality and greenhouse gas assessment* is another appendix that would not be understood by an average person. If one relies on the EIS or the executive summary the impression is that everything has been covered and is OK.

Of the eleven sources of dust listed as being of concern on p 36 and table 7.3.2 p 45, App. M the source given the least prominence and added almost as an afterthought is the TSF (the tailings dam).

The other sources of emission are ones normally associated with any mine development and are ameliorated by standard methods and procedures. The fact that the trucking of ore and of waste will produced the most dust is of no significance as it is easily contained.

The dust from the tailings stored behind the dam wall is not normal country-side dust but consists of ground up ore (silica, metals and metalloids), salts from imported processing water and process chemicals.

The tailings dam has the potential to create the most dust.

Dust from the TSF originates from three sources.

- The tailings dam wall
- The stripped tailings pond receival area
- The surface of the deposited tailings.

1. The Tailings dam wall will generate dust for most of the operation until there are no more lifts to heighten the wall. Previously ameliorated surfaces will be disturbed by the new lifts and give rise to dust.
2. The pre-stripped tailings pond embankment area will have to be larger than the immediate tailings receival area as it has to be in advance of and conditioned prior to the receival of tailings. This will be a large bare earth area around the circumference of the dam which will generate dust. This has not been taken into account.
3. The dust from the tailings dam has been assigned very small quantities in the *Calculated annual TSP etc.* (Total Suspended Particles aka Dust) in tables 7.3 onwards. Having worked at several mines, dust from the tailings dams is ubiquitous, almost generic. I spoke to the technical person at the Regis Resources McPhillamys Community Information Day on May 14, 2019 and was told that the figure given by Regis Resources to be put into the prediction model was that at the maximum area that the dry tailings would occupy would be 25% of the surface area. *This is only an estimate or assumption but the modelling treats it as a fact*. It may not be valid and the dry area which will generate dust may be larger. Even using this estimate, near completion that would amount to 70 ha of dry area. The company is relying on the tailings surface staying damp by releasing the new tailings from the various spigots (one at a time) which are arranged along the edge nearest to the treatment plant. This may work at the start of operations but after that the area occupied by the tailings increases dramatically to a final 282 hectares which is too large to keep dry with new tailings. Also on hot dry windy days the tailings dry out fast.
   There is no allowance made for the dust generated between the time that the processing has been completed and before the dam surface has been covered with rock, subsoil and soil. Even during the rehabilitation and before grass cover is

established there will be a lot of dust generated, possibly for years, depending on rainfall, that dust has not been taken into consideration.
In my estimation the predicted dust has been grossly underestimated.

A common statement throughout the EIS is that the project area is 8 km from Blayney. By line of sight the tailings dam is 5 km. You can see Blayney from where the crest would be of the proposed tailings dam and the fine dust would follow.

CYANIDE.

Cyanide Detoxification.

The EIS states that free and weak acid dissociable cyanide levels will be reduced to less than 30 ppm and in the same section say that 30 ppm will be achieved. It is important to know if 30 ppm is an average value or the maximum value and over which time span. If it is the average then it follows that the level can exceed 30 ppm as there would be equivalent lower periods.

The Cowal Gold Project at West Wyalong, which is of a similar size to the proposed McPhillamys Project aims to have WAD cyanide levels not to exceed 20ppm average over six months and a 30ppm maximum limit at any one time. That level may be more appropriate to preserve wildlife.

The Cowal gold mine has a protocol in place that if any fauna is found dead in the mine area it will be examined by a vet to ascertain if it has been poisoned. A similar protocol should be put in place at McPhillamys if it goes ahead.

NOISE.

The noise studies presented in Appendix L are beyond a normal person's comprehension and require an independent assessment. The conciliatory remark that the effect of the noise are "negligible" because they are "temporary" wants nearby residents to be satisfied with interrupted or no sleep for *only* four years at the start of the project. After that a person has probably been carted off to rehabilitation.

"Low" noise is as much a matter of perception as it is of decibels.

I have lived near three mining operations and you can always hear them, especially at night. You cannot get away from it. The only reason that the noise was acceptable to us was that the mine was where my wages were coming from and the rent was free.

The rural community of Kings Plains-Vittoria accrue no benefits. The community was there first and should be allowed to keep enjoying the country atmosphere without having the equivalent of an industrial complex inserted in its midst.

The effects of temperature inversions are not taken in to account sufficiently because they do not average more than two times per week. This ignores that they may occur more than twice a week over specific periods. It also ignores the anticipation of possible sleepless nights.

The conclusion that noise will be minimised "as much as possible" is not just a statement of intention but also an admission that noise is an ongoing factor.

The tipping of rock on the embankments (bunds) along the highway opposite the houses at Kings Plains will result in loud noise. The impact of rock on rock cannot be ameliorated. Changing the tone of the reversing beeper may be of some help but it has to be loud enough to be effective as a warning. When trucks tip the engine has to be revved increasing the noise output which will be noticeable at night.

The residents of Kings Plains will be looking at a bund wall instead of a country vista which they enjoy now.

Drilling Noise.

One item that I didn't see addressed is the blast hole drilling noise from the drill bit pulverising the rock. This cannot be ameliorated and the noise can be transmitted through the ground over long distances and appear as if it is coming from below where one hears it. For example the residents of a property at Forest Reefs, about 4 km from Cadia, could hear the drilling at night.

Blasting.

Using the noise created by lightning strikes to justify the effects of blasting on stock does not make sense. Thunder and lightning occur only occasionally and over a limited time period and is preceded by atmospheric conditions that the animals sense and are forewarned. Blasting will occur once or twice a day without warning (for the animals) and the noise is preceded by ground vibrations. As far as I can ascertain there was no specific study carried out on blasting effects on animals.

REHABILITATION.

The rehabilitated tailings dam and the open cut void will remain forever and this must be recognised as a part of the collateral damage for future generations caused by 10 years of mining.

Rehabilitation Bond.

The rehabilitation of a project of this size is a complex and expensive operation. It can cost tens of millions of dollars. Rehabilitation while the mine is actually operating is only a very

small part of the overall job. It is imperative that a bond is available commensurate with the size and the state of the development so that the government can fund the rehabilitation if the company goes into liquidation. If the McPhillamys operation changes hands the bond must be a part of the changeover.

Tailings Storage Facility (Tailings Dam).

It is intended to cover the tailings with a capillary break layer of non-acid forming waste rock 0.5 metres thick. For a dam of 282 ha this would take in the order of 1.4 million cubic metres. However much of the rock will be buried in to the tailings while it is being covered, even if the top surface is dry. An amount of at least 3 Mm^3 would be required. Taking into account the amount of acid forming overburden that has to be encapsulated (42%) there may not be enough rock available for the dam. The percentage of rock that goes to the acid forming rock stockpile may well exceed 42% as the exact boundary will be indistinct after blasting and the stockpile designation should err on the safe side.

The amount of subsoil required is 2 million cubic metres which may not be available.

The rehabilitated tailings surface could slump unevenly as the seepage progresses after closure allowing ponding of rainwater. This should be taken into account when designing the final surface profile. Keeping in mind that it is a large area of 282 ha.

The **seepage interception and recovery measures** will have to be kept in place and maintained by the company. It would include pumps (and electricity) and a dam where the contaminated water can be ameliorated if possible. Seepage could be up to 50 m^3 per day (50,000 litres) per day. **This may take "in the order of decades"** according to Appendix D p78 and "a long term seepage recovery system will have to be maintained".

Open Cut Void.

The open cut void will have to be fenced in perpetuity and a trust fund will have to be established with the Blayney Council for its inspection and maintenance.

A vehicular pathway will have to be maintained to the water level in case of accident, vandalism or misadventure.

The open cut pond will collect seepage from the ex-tailings dam and collect groundwater which will increase in salinity due to evaporation. This water will still attract birdlife which may not survive the water mixture or die off site. The water will be acidic because of the sulphides at the base and two sides of the pit. The seepage from the tailings dam in to the open cut will contribute toxic salts.

9 October 2019