

## APPENDIX W2

### ECONOMIC IMPACT ASSESSMENT PEER REVIEW

# BIRD IN HAND GOLD PROJECT

## MINING LEASE PROPOSAL MC 4473



ABN | 66 122 765 708

Unit 7 / 202-208 Glen Osmond Road | Fullarton SA 5063



South Australian Centre for Economic Studies

# Peer Review of ERC Economic Impact Analysis

Report commissioned by:  
**Terramin Australia Limited**

Report prepared by:  
**The South Australian Centre for Economic Studies**  
University of Adelaide

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**Authors:** Jim Hancock, Deputy Director

**Published by:** South Australian Centre for Economic Studies  
University of Adelaide  
SA 5005  
AUSTRALIA  
Telephone: (61+8) 8313 5555  
Facsimile: (61+8) 8313 4916  
Internet: <http://www.adelaide.edu.au/saces>  
Email: [saces@adelaide.edu.au](mailto:saces@adelaide.edu.au)

## Summary

SACES had been tasked to review Economic Research Consultants' (ERC) evaluation of the contribution of the proposed Bird in Hand Gold Mine (the Project) to the region in which it will operate.

The report prepared by ERC considers three types of economic impacts associated with Terramin's proposed Bird in Hand Gold Mine (the Project). The first is the impacts arising from the Project's purchases of inputs from local businesses and workers. The second scenario is the potential negative impacts on businesses located near to the mine site. The third is the displacement of agricultural production from land that is used by the mine.

These are key inputs into ERC's economic modelling. The scenario for the Project was derived from Terramin's business plan and represents an intended/planned outcome. The Terramin business plan also involves operating the mine so as to avoid negative impacts, but it is possible that some will arise. For this reason ERC has modelled the negative impacts scenario. ERC has built up this scenario from assumptions about the value at risk for other economic activities and assumptions about the probability of damage to those other activities.

ERC estimates the flow-on impact of these scenarios for South Australia, the Adelaide Hills region, and the Fleurieu and Kangaroo Island region. It has updated existing IO tables for this purpose.

ERC has estimated impacts on several macroeconomic variables. The two most important of these, which form the basis for the ERC discussion of impacts, are impacts on gross state product (i.e. value added) and employment. These estimates are the basis for ERC's discussion of impacts.

ERC has not conducted a benefit cost analysis of the mine. Its economic impact analysis is concerned purely with estimating changes in economic activity levels associated with the Project and the identified negative impact scenario.

### Review Findings:

1. ERC uses an input output (IO) modelling approach to estimate impacts on economic activity. IO models are commonly used in the estimation of sub-national economic impacts from output and final demand shocks.
2. The Project Scenario appears to be reasonable.
3. Given that the impact of the Project on adding value to other commodities or bringing other projects forward is highly uncertain, the decision to omit them from analysis seems reasonable, and adds a degree of conservatism to the impact assessments.
4. ERC has allowed for displaced agricultural activity relating to the mine's use of land for a buffer and found the impact to be small.
5. ERC's estimates of "offsetting" impacts, which effectively is an analysis of spillover impacts on neighbouring businesses, is plausible although unavoidably speculative.
6. Factor markets are likely to exhibit elastic supply for South Australia, the Adelaide Hills and the Fleurieu and KI. This supports the validity of the IO modelling technique for each of these three regions.
7. The IO tables employed by ERC are fit for purpose.
8. ERC has presented both "production" and "production and consumption" impacts which is conventional for IO analysis.
9. While the project has net positive impacts on incomes and employment in each of the regions considered, some of the incremental income and employment may accrue to firms and workers moving in to the regions.

### Key finding:

The conclusion of this Review is that ERC's economic impact assessment has been carried out competently. The assumptions that support the modelling have been based mainly on Terramin's business plan and thus reflect an "operating as intended" scenario. The modelling also includes some potential unintended negative consequences of the mine, as have been raised by neighbouring businesses, on a probability-weighted basis, and this part of the analysis unavoidably is speculative in nature.



## 1. Introduction

Terramin Australia Ltd has commissioned SACES to review Economic Research Consultants' (ERC) November 2017 evaluation of the contribution of the proposed Bird in Hand Gold Mine (the Project) to the South Australian and regional economies.

A Determination under the Mining Act 1971 (SA Government 2017) requires Terramin to address certain issues in its application for regulatory approvals for the Project. ERC's report provides information in connection with Section 4.2, Economic, of the Determination. Terramin has commissioned SACES to provide an independent review of ERC's work.

In preparing this Review we have considered:

- the suitability of the modelling approach employed by ERC;
- the plausibility of scenarios that are the input to the ERC modelling;
- ERC's selection of IO tables for the purpose of modelling;
- ERC's interpretation of the results of the modelling exercise; and
- the information requirements outlined in Section 4.2 Economic of the Determination.

## 2. Fitness of modelling methodology

ERC's economic impact analysis involves:

- identifying a scenario for a final demand shock on the basis of information provided by Terramin; and
- estimating the flow-on effects with regional input output (IO) tables.

The ERC report says that "The use of economic impact assessments based on State and Regional Input Output Tables has been a prominent process for translating directly created expenditure (a final demand stimulus) into jobs and incomes, and for establishing the extent of the flow-on impacts" [p. 7]. ERC notes that IO models are a subset of the class of computable general equilibrium (CGE) models. The distinctive feature of IO models in the broader CGE family is that they impose infinite elasticities of supply. Accordingly, the quality of the impact estimates produced by IO will depend on how good an approximation to reality the "infinite elasticities" assumption is.

The assumption of infinite elasticity of supply will rarely hold absolutely, but ERC argues that it is a reasonable approximation to the reality in the current context. We agree with this view. That view is discussed further below.

**Review Finding: ERC uses an input output (IO) modelling approach to estimate impacts on economic activity. IO models are commonly used in the estimation of sub-national economic impacts from output and final demand shocks.**

## 3. Plausibility of assumptions

### 3.1 Impact scenarios

ERC are reliant on Terramin to provide a description of the Project Scenario, including the allocation of activity between Woodside and Strathalbyn. Neither we nor ERC are able to provide better judgments than Terramin about most parts of the scenario (e.g. the relative importance of capital and operating expenditures). However, drawing on our knowledge of the South Australian economy more broadly, the indicative wage levels and tax rates that ERC has employed seem to be broadly reasonable.

**Review Finding: The Project Scenario appears to be reasonable.**

ERC notes that there is a potential for the Project to stimulate other economic development—for instance value adding to mined commodities or bringing forward other projects. However, there is no attempt to model these impacts.

**Review Finding: Given that the impact of the Project on adding value to other commodities or bringing other projects forward is highly uncertain, the decision to omit them from analysis seems reasonable, and adds a degree of conservatism to the impact assessments.**

ERC (2017) reports that the mine will use a 37ha site to establish the mining operation. In the absence of the Project the most likely alternative use for this site is agricultural, and consequently there is potentially some displacement of agricultural production. ERC estimates that the impact of the Project's land use is small. An upper end estimate of the impacts arising from displaced agricultural production is "of the order of \$0.9 million of GSP/GRP annually, and some 6 jobs" [p. 3].

Terramin advises that it has a ground water allocation of 15 ML and the potential displacement of agricultural activity associated with this would appear to be small.

**Review Finding: ERC has allowed for displaced agricultural activity relating to the mine's use of land for a buffer and found the impact to be small.**

ERC has considered the potential for spillover impacts on a number of neighbouring land uses. It has (i) estimated the "value at risk" at neighbouring businesses and (ii) put forward a scheme of probabilities to apply to these values at risk. ERC's analysis is conceptually valid and is a sensible way to address the question at hand. However, the method is dependent on the quality of data inputs and securing robust data is a challenge.

ERC has identified the "at risk" activities to be at Bird in Hand and Petaluma plus a small amount of other agriculture. Some \$8 million of value added/GRP and over 100 jobs are thus "at risk". These values may be quite sensitive to the scope of the "at risk" category. They are plausible but unavoidably speculative.

The scheme of probabilities adopted by ERC is necessarily dependent on speculative assumptions. ERC assumes a high probability of little or no impact and small probabilities of large impacts. This appears reasonable if the regulatory scheme and its breach provisions provide a real incentive for Terramin to go to lengths to avoid major adverse impacts. The corresponding "probability weighted value" of possible impacts, at \$1.6 million of value added and 18 jobs, suggest that the impact scenario involves a loss of about one-fifth of the identified "value at risk".

**Review Finding: ERC's estimates of "offsetting" impacts, which effectively is an analysis of spillover impacts on neighbouring businesses, is plausible although unavoidably speculative.**

### 3.2 Inputs have highly elastic supply

This assumption needs to be considered at the South Australian and regional levels. Supply elasticities will generally be higher:

- the smaller the regional economy is relative to the economy of surrounding regions; and
- the longer the time allowed for adjustment.

The supply of labour is elastic at the State level and highly elastic at the regional level in the medium term.<sup>1</sup> Australian regional and State labour markets are closely connected in the medium term. The South Australian labour market is small relative to the national labour market (about 7 per cent of total employment). There appears to be sufficient labour mobility within Australia to accommodate emerging labour demands over the medium term. Evidence for this is that interstate and interregional variations in employment growth do not flow into ever-widening unemployment rate differentials, as mobility provides a correction.

In the medium term, any displacement of existing economic activities within South Australia as a consequence of new labour demand from Terramin and its supporting suppliers is likely to be only a small fraction of that new labour demand. The same is true with even greater force for impacts within the regional labour markets considered by ERC (Adelaide Hills, Fleurieu and KI) as these markets are even smaller relative to the State and national labour markets and also small relative to the labour market formed by the greater Adelaide area.

The supply of capital is in very highly elastic supply for South Australia and its regional economies. Capital is sourced on global capital markets, even when intermediated locally. There are possibly some constraints on the supply of capital to Australia, but South Australia and its regions are small relative to Australia. To the extent that other capital-using activities are displaced, it seems likely that only a small fraction of the displacement would be in South Australia or its regions.

Primary inputs such as land and ground water will be in inelastic supply. But they represent only a small part of the primary input mix of the Project. This is so because agriculture is by far the most extensive user of these

<sup>1</sup> The evidence suggests that labour supply is fairly inelastic at the national level although non-zero for at least some groups (Dandie and Mercante 2007). But the dynamics of supply are very different at the State and regional level due to interstate and interregional flows.

inputs and agriculture provides only a very small fraction of the Project's inputs—less than 1 per cent for South Australia (see ERC's Table A.1.1).

**Review Finding: Factor markets are likely to exhibit elastic supply for South Australia, the Adelaide Hills and the Fleurieu and KI. This supports the validity of the IO modelling technique for each of these three regions.**

#### 4. Application of Modelling Technique

To perform an IO assessment such as this, input-output tables are needed for the regions under consideration. ERC says that it has constructed a “20 sector 2017 state and regional input output tables based on the RISE model of SA ... and allowing for inflation and productivity change over time” [p. 7]. It has prepared IO tables for South Australia, Adelaide Hills, and “Fleurieu Peninsula and Kangaroo Island”.

The RISE model variant used by ERC was prepared for the SA Government and it has been promulgated by the SA Government for use in economic assessments for South Australia and regions. The latest publicly available model is available for the financial year 2011/12.

ERC had adjusted the 2011/12 model, rebasing its employment to output ratios to the year 2017. Second-order changes, such as changes in the input mix of industries, are not addressed by ERC but are of less importance.

**Review Finding: The IO tables employed by ERC are fit for purpose.**

#### 5. Interpretation of Results

IO modelling seeks to capture the broader economic impacts of a project by measuring the induced activity that arises from the projects' purchases of goods and services in the local economy. In addition to the direct impacts of a project, the modelling captures impacts arising from:

- induced production resulting from purchases from local suppliers (i.e. production effects);
- induced consumption resulting from payment of wages to locally resident labour (i.e. consumption effects).

The IO model allows for infinite rounds of (diminishing) impacts in each of these channels. We can think of the model as measuring the aggregate output impacts from an initial shock. Impacts can then be reported for a number of macroeconomic aggregates of interest, and ERC has considered the impacts on aggregate incomes and employment.

ERC presents both “production” and “production and consumption: impacts. These are the two most commonly cited impact concepts in IO studies.

**Review Finding: ERC has presented both “production” and “production and consumption” impacts which is conventional for IO analysis.**

We note that the gross operating surplus of the mine itself is omitted from the GSP impacts reported by ERC. This lends a conservative bias to the results. It is presentationally useful in that it keeps the focus on the impacts of the mine on firms other than Terramin and workers. It avoids a situation where the profits of Terramin swamp the analysis and obscure the other impacts.

It could be noted that some of the increase in incomes and employment in each of the regions (South Australia, Adelaide Hills and Fleurieu and KI) may be met via inward migration of firms and workers rather than from greater utilisation of existing firms and workers. The modelling indicates changes in the size of the regional economies but does not show who the beneficiaries will be.

**Review Finding: While the project has net positive impacts on incomes and employment in each of the regions considered, some of the incremental income and employment may accrue to firms and workers moving in to the regions.**

#### 6. Relation to Part 4.2 of the Determination

ERC's report addresses the following matters listed in part 4.2 of the Determination:

• revenue to be generated at the mine gate	Addressed Table 3
• the breakdown of capital and operating expenditures (spending in goods and services in local community, state and external to state)	Addressed Tables A.1.1, A.2.1 and A.3.1
• wages and other employee benefits	Addressed Table 3
• potential for value adding of a mined commodity	Addressed
• flow-on economic effects	Addressed in text of report, Tables 1, A.1.2-4, A.2.2-4, A.3.2-4
• economic benefits derived from local employment	Addressed Tables A.1.3-4, A.2.3-4, A.3.3-4
• potential to bring forward development of other mines in the area by utilising this mine's infrastructure	Addressed
• approximate royalty payments and other direct state government taxes profile	Addressed text, Table 3
• any other potential economic benefits and opportunities proposed during the development of the project, operation of the proposed mine and post mine completion.	None identified

## Bibliography

- Dandie and Mercante (2007), "Australian labour supply elasticities: comparison and critical review", *Treasury Working Paper*, 2007-04.
- Economic Research Consultants (2017), *Economic Impact of the Bird in Hand Gold Mine on South Australia and Regions. Final Report*. November 2017.
- FABAL Operations (2017), *Bird in Hand Gold Project. Agricultural Impact Assessment*.
- SA Government (2017), "Determination for a Mining Proposal for the Bird-in-Hand Gold Project", *The South Australian Government Gazette*, no. 21, pp. 1008-1019.
- Terramin Australia Limited (undated), *Bird-in-Hand Project, South Australia – Fast Facts*.