Oceana Gold (New Zealand) Limited

Economic Assessment Report

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20 April 2011

Maree Baker
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Dear Maree

Macraes Phase III: Economic Assessment

Further to my recent meeting with Mike Dodd, please find attached our report setting out our assessment of the traffic-related economic effects of Macraes Phase 3.

Yours faithfully
Traffic Design Group Ltd

Andy Carr
Senior Associate

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Oceana Gold (New Zealand) Limited

Economic Assessment Report Quality Assurance Statement

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Table of Contents

Executive Summary

OceanaGold proposes an extension to the consented life of the Macraes Gold Project. This is known as Macraes Phase III and will take the consented mine life through to 2020. As part of the project, a section of Macraes Road will be realigned from near Hocking Road to near the old Golden Bar haul road traffic lights. Golden Bar Road will also be extended towards the north by around 1.5km in order to ensure it rejoins the realigned Macraes Road.

Generally the roads in the area are lightly trafficked, with volumes on Macraes Road varying from 250 to 400 vehicles per day (two-way), with a volume of 360 vehicles per day (two-way) in the vicinity of Golden Bar Road. Golden Bar Road is recorded by Waitaki District Council as having a daily traffic volume of 11 vehicles (two-way). Over a five year period (2006 to 2010) and also including the partial record for 2011, six accidents recorded in the general vicinity of the proposed realignment, of which one resulted in serious injuries and two resulted in slight injuries (with three resulting in no injury).

The volume of traffic presently carried by Macraes Road is equivalent to one vehicle every two minutes in the peak hours. This represents Level of Service A, being the best level of service achievable. The accident records indicate an average rate of 0.5 injury accidents per annum, and it is not considered that there is any significant road safety issue on Macraes Road.

Using the procedures set out in the NZTA Economic Evaluation Manual, the effects on road users have been assessed. As the proposed road realignment increases the length of both Macraes Road and Golden Bar Road, there is a disbenefit imposed upon road users both in vehicle operating costs and journey time costs. These are in the order of $132,800 and $32,400 respectively, measured over a 30-year assessment period. Taking into account the capital costs, this leads to a benefit-cost ratio of -0.1 for both schemes (that is, there is an economic disbenefit in undertaking the scheme rather than retaining the current alignments).

A series of sensitivity tests has been carried out and it is considered that the benefit-cost ratio is robust. However, it is considered extremely unlikely that this will be perceived by drivers. In particular, the journey time on Macraes Road is almost identical under both the existing and proposed alignments and while the journey will be longer on Golden Bar Road, few vehicles are affected and because of reduced speeds, vehicle operating costs will reduce.. Further, the realignments can be expected to lead to a slightly improved accident rate.

Overall then, while there is a slight economic disbenefit to undertaking the road realignment scheme, any effects upon drivers using the road will be negligible and imperceptible.

1. Introduction

OceanaGold proposes an extension to the consented life of the Macraes Gold Project. This is known as Macraes Phase III and will take the consented mine life through to 2020.

In brief, the project will include a new tailings storage facility (called Top Tipperary Tailings Storage Facility), reclamation of tailings from within the current SP11 tailings storage facility, the construction of new rock stacks and extensions to existing waste rock stacks, expansion of pits, and a new fresh water storage dam in the Deepdell Creek catchment. Of particular relevance to this report is that Macraes Road will be realigned from near Hocking Road, following a legal (but unformed) road alignment north before turning west to run along the divide between the Deepdell and Tipperary catchments and rejoining the current alignment northwest of Innes Mills Pit, near the old Golden Bar haul road traffic lights. Golden Bar Road will also be extended towards the north by around 1.5km in order to ensure it rejoins the realigned Macraes Road.

This report describes and identifies the effects of the proposed development focussing on the proposed road realignments and also includes an evaluation of any other potential traffic-related effects which may arise.

2. Existing Transport Environment

2.1 Site Location

Macraes lies approximately 50km to the north of Dunedin. There is a network of local roads within the immediate area, including Macraes Road, Macraes Back Road, Golden Bar Road and Golden Point Road. The small settlement of Macraes Flat lies some 2.2km to the west of the Macraes Gold Project.

Figure 1 shows the location of the Macraes Gold Project and also the district roads in the immediate vicinity.

2.2 Roading Network

2.2.1 Description

Macraes Road runs with a generally east-west alignment from Dunback in the east to State Highway 87 in the west. All of the road is sealed. In the vicinity of the Macraes Gold Project site, Macraes Road provides one traffic lane in each direction of 3.5m width plus a sealed shoulder of approximately 1m.

Photograph 1: Macraes Road to east of Gold Project

West of the site, Macraes Road passes through the Macraes Flat settlement. In this location the road is slightly narrower, at 6.2m (that is, two 3.1m traffic lanes) with a gravelled shoulder of approximately 0.5m on either side, before the land falls away to form two relatively deep drainage channels. This part of the road is marked with signs warning of the likely presence of turning trucks.

Photograph 2: Macraes Road near to Macraes Flat

Photograph 3: Warning Sign on Macraes Road near to Macraes Flat

Further west, Macraes Road passes through a predominantly rural area and at its western extremity, meets State Highway 87 at a priority intersection ('give-way' controlled). There is no localised widening at the intersection but sight distances for traffic emerging from Macraes Road are very good. State Highway 87 in turn provides links to the towns of Middlemarch, Ranfurly and Mosgiel, and the wider state highway network beyond.

Approximately 3.7km east of Macraes Flat, Macraes Road meets Golden Bar Road at a priority intersection ('stop' controlled).

Photograph 4: Macraes Road / Golden Bar Road intersection

Golden Bar Road is unsealed indicating very light traffic flows but unusually for such a situation, a right-turn lane is provided for vehicles turning from Macraes Road together with a deceleration lane for left-turning vehicles. The right-turn lane is 3.0m wide, with the adjacent traffic lanes being 3.3m in width.

The intersection is located at a slight crest on Macraes Road, affording good visibility for emerging drivers. Sight distance to the left for emerging drivers is 280m with sight distance to the right being 270m.

Photograph 5: Right-turn lane at Macraes Road / Golden Bar Road intersection

Golden Bar Road is sealed over 27m on the immediate approach to the intersection but otherwise is unsealed over the remainder of its length. The width of the metalled surface is in excess of 10m. Macraes Road in the vicinity of the intersection has traffic lanes of 3.2m and a sealed shoulder of less than 0.5m. Evidence of edge breakage and tar bleed was noted during site visits.

Photograph 6: Tar bleed and edge breakage on Macraes Road east of Macraes Road / Golden Bar Road intersection

Approximately 2km northeast of Golden Bar Road, Cranky Jims Creek Road and an un-named (but legal) road join Macraes Road at poorly formed priority intersections. Cranky Jims Creek Road is unsealed and provides a single traffic lane. The legal road meets Macraes Road 0.3km to the east of Cranky Jims Creek Road and provides a single traffic lane. The un-named road runs with a north-west / south-east direction and joins Cranky Jims Creek Road some 0.27km north of the Macraes Road / Cranky Jims Creek Road intersection. However the legal corridor continues further to the north-west, although the road is not formed.

Some 0.9km east of Cranky Jims Creek Road, Macraes Road meets Shag Valley Back Road at a priority intersection. There are no 'give-way' markings and the intersection itself is poorly formed, with the minor approach being unsealed. Some 30m from the edge of Macraes Road there is a cattle-stop where Shag Valley Back Road is restricted to a single traffic lane.

Photograph 7: Macraes Road / Shag Valley Back Road intersection and cattle-stop

Macraes Road in the vicinity of this intersection is 7.0m wide (that is, two traffic lanes of 3.5m each) and has sealed shoulders of 0.5m to 1.0m.

Further east, Macraes Road passes through a predominantly rural landscape and meets State Highway 85 at a priority intersection ('give-way') approximately 9km east of Shag Valley Back Road. There is no localised widening or turning lanes at the intersection. Further south, State Highway 85 joins State Highway 1 at Palmerston, providing a route between Picton to the north and Invercargill to the south.

2.2.2 Roading Deficiencies

Given that the proposal is for a road realignment, an evaluation was made during site visits of locations where the existing alignment of Macraes Road appears to fall below current standards and which may give rise to an increased road safety risk.

There is a horizontal and vertical curve approximately 0.2km east of the Macraes Road / Cranky Jims Creek Road intersections which restricts forward visibilities for approaching drivers.

Photograph 8: Macraes Road east of Cranky Jim's Creek Road

On the immediate approaches to Tipperary Creek, some 1.8km east of the Macraes Road / Golden Bar Road intersection, Macraes Road descends with a relatively steep gradient which also serves to restrict visibility of the road surface for approaching drivers.

Photograph 9: Macraes Road approaching Tipperary Creek

Some 150m west of the Macraes Road / Golden Bar Road intersection is a horizontal curve that limits driver forward visibilities.

Photograph 9: Macraes Road immediately west of Golden Bar Road

There is a crest curve 1.05km west of Golden Bar Road which limits the forward visibility for approaching drivers. This section of Macraes Road is marked with 'no overtaking' centrelines.

Photograph 10: Macraes Road 1.05km west of Golden Bar Road

2.3 Cyclists and Pedestrians

No specific infrastructure is provided for pedestrians or cyclists on any of the roads within the study area.

3. Current Transportation Patterns

3.1 Daily Traffic Volumes

Data has been sourced from Waitaki District Council for traffic flows on the District Roads in the immediate area. This showed that volumes on Macraes Road varied from 250 to 400 vehicles per day (two-way), with a volume of 360 vehicles per day (two-way) in the vicinity of Golden Bar Road.

All other roads carry considerably less than 250 vehicles per day (and in the majority of cases formal traffic count data is not available). Golden Bar Road is recorded as having a daily traffic volume of 11 vehicles (two-way).

3.2 Cyclists and Pedestrians

No pedestrians or cyclists were observed during site visits. This is perhaps unsurprising, given the lack of potential destinations for these road users.

3.3 Road Safety

The NZTA Crash Analysis System (CAS) has been used to identify all reported crashes on Macraes Road (between Fraser Road 1.7km west of Macraes Flat, and a point approximately 7km east of Macraes Flat) and also along the northernmost 2km of Golden Bar Road, over a five year period (2006 to 2010) and also including the partial record for 2011..

Six accidents were recorded within this area, of which one resulted in serious injuries and two resulted in slight injuries. As would be expected for a rural road, the majority of accidents (five) involved a single vehicle where the driver lost control. The remaining accident arose when one vehicle struck another while taking action to avoid a stray animal. All accidents occurred on Macraes Road with none occurring on Golden Bar Road.

The serious accident occurred mid-way between Golden Point Road and Macraes Flat, when a driver lost control and hit a ditch. The accident report notes that alcohol was a suspected factor in the crash. One of the slight injury accidents occurred at the Macraes Road / Valley Street intersection (within the settlement of Macraes), when a driver lost control while negotiating the intersection, with the other slight injury accident occurring when one vehicle slowed to avoid a stray animal and was struck by another vehicle.

The locations of the reported accidents are shown on Figure 2.

It is understood that there have also been some unreported accidents in the area. In order to take this into account, a sensitivity analysis has been undertaken when assessing the scheme economics.

4. Current Levels of Service

The quality of service provided by a road network can be assessed using quantitative measures to characterise operational conditions within a traffic stream. The level of service (LOS) is a measure that describes the operational conditions generally in terms of measures such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience.

In general, six levels of service are defined with letters from A to F used to designate each level. LOS A represents the best operating conditions while LOS F represents the worst conditions. Each level of service represents a range of operating conditions and the driver's perception of those conditions. Safety does not form part of the measures used to assign a level of service.

The traffic conditions associated with the various levels of service for urban and suburban arterial roads with interrupted flow conditions are described in the Austroads Guide to Traffic Management Part 3: "Traffic Studies and Analysis", which references the US Highway Capacity Manual 2000 (HCM2000). The LOS definitions are as follows:

- **LOS A:** Primarily free flow operations at average travel speeds, usually about 90% of the free flow speed (FFS) for the given street class. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at signalised intersections is minimal.
- **LOS B:** Reasonably unimpeded operations at average travel speeds, usually about 70% of the FFS for the street class. The ability to manoeuvre within the traffic stream is only slightly restricted, and control delays at signalised intersections are not significant.
- **LOS C:** Stable operations; however, ability to manoeuvre and change lanes in mid-block locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50% of the FFS for the street class.
- **LOS D:** A range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors. Average travel speeds are about 40% of FFS.
- **LOS E:** Characterised by significant delays and average travel speeds of 33% of the FFS or less. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.
- **LOS F:** Characterised by urban street flow at extremely low speeds, typically 25% to 33% of the FFS. Intersection congestion is likely at critical signalised locations, with high delays, high volumes, and extensive queuing.

The volume of traffic presently carried by Macraes Road is equivalent to one vehicle every two minutes in the peak hours. This represents Level of Service A, being the best level of service achievable.

The accident records indicate an average rate of 0.5 injury accidents per annum. Using the accident prediction equations in the NZTA Economic Evaluation Manual, it can be expected that Macraes Road would have an accident rate of around 0.2 injury accidents per annum. While the observed rate is slightly higher than the equations would predict, the very low traffic volumes and low accident numbers mean that the equations are very sensitive. Consequently it is not considered that there is any significant road safety issue on Macraes Road.

5. Proposed Road Realignment

The proposed realignment of Macraes Road is shown on Figure 3.

Towards its eastern extremity, in the vicinity of the existing Macraes Road / Cranky Jims Creek Road intersection, it is proposed to realign Macraes Road northwards to pass along the eastern side of the Top Tipperary Tailings storage facility. The road will then turn westwards and run with an approximately east-west alignment in the direction of Macraes Flat settlement.

Over the majority of the realignment, the proposed road will lie within or in close proximity to, an existing legal but unformed road.

Based upon the latest plans provided, the existing section of Macraes Road to be realigned is 5.12km in length, with the realigned road being 5.8km long. Golden Bar Road will be increased in length from 0.24km to 1.65km in order to meet the realigned Macraes Road.

There is the potential for the Gold Project to generate interest from sight-seers and those passing on the road network. Accordingly, consideration has been given to the construction of an area for vehicles to pull off Macraes Road to see the mine elements, in a location identified as having sufficient landscape/viewpoint value by a landscape architect.

6. Provision for Tourist Traffic

It is anticipated that none of the traffic on Macraes Road directly associated with the Gold Project would stop at a viewing facility, rather the facility would be used only by tourists and sight-seers. OceanaGold estimates that at least 80% of the traffic on Macraes Road is project-related, and if a nominal allowance is made for 25% of the remaining traffic to stop at the viewing area, the demand would be 18 vehicles per day, suggesting that at most there would be two or three vehicles parked at the same time. Given this level of activity, it is considered that the viewing area would be most appropriately provided for by means of a layby on Macraes Road.

There are currently no particular policy or design guidelines for the location and design of laybys for the purpose of providing viewing facilities. Whilst some guidance is provided in the State Highway Control Manual for rest areas, this is related to full rest areas that are likely to include additional facilities for motorists, such as toilets and picnic areas. Consequently the approach commonly taken in developing viewing areas is to ensure that typical traffic engineering design standards can be met particularly with regard to the available sight distance and manoeuvring space. This includes ensuring that vegetation does not obscure sight distances and providing suitable signage for the layby.

On this basis, the following broad parameters have been adopted for the layby layout:

- safe intersection sight distance measured in accordance with the AUSTROADS "Guide to Road Design Part 4A, Unsignalised and Signalised Intersection" document, appropriate for the 85th percentile operating speed;
- sufficient manoeuvre space for a "design car" to undertake manoeuvring at the lay-by clear of the live traffic lanes; and
- provision of appropriate advanced warning tourist signs, and additional signage at the layby itself.

Whilst detailed speed surveys have not been undertaken in the area, it is expected that an 85th percentile operating speed of up to 100km/h would prevail, thereby requiring safe intersection sight distances of some 250m to be provided. To accommodate three cars, the layby should be 25m in length, which would also be sufficient to accommodate a tour coach.

The width of the lay-by is recommended to be a minimum of 5m in order to ensure that cars can park and doors can be opened well away from the road carriageway. This is in accord with the width suggested in the "AUSTROADS Rural Road Design" guideline which suggests that laybys should be a minimum of 4.5m wide from the road edgeline.

Some localised widening on both sides of the road is also recommended to enable safe deceleration into and acceleration from the layby area. The detailed design may well be further guided by the particular engineering constraints (such as drainage), width of available road reserve and distance to existing fences.

A potential viewing area has been identified approximately 1.1km south of the Macraes Road / Shag Valley Back Road intersection. Macraes Road has both a horizontal and vertical curve in this location, but on-site measurements suggest that sight distances in excess of the required minima can be achieved.

7. Economic Analysis

In order to assess the economic effects of the road realignment, the procedures set out in the NZTA Economic Evaluation Manual have been used. Each aspect of the analysis is set out below.

7.1 Traffic Conditions

Present traffic volumes on the section of Macraes Road to be realigned are in the order of 360 vehicles per day, with traffic flows of 11 vehicles per day on Golden Bar Road. Although the traffic volumes on the latter are very low, the increase in distance these vehicles are required to travel is more significant than for vehicles using Macraes Road. The proposed changes to Golden Bar Road have therefore not been disregarded within this analysis, but have been specifically identified in light of the very low numbers of vehicles involved.

The majority (estimated to be at least 80%) of the traffic volumes in this area are associated with the operation of the Gold Project. Once the consent expires, traffic volumes will reduce and therefore a sensitivity test has been undertaken allowing for a traffic volume of 72 vehicles per day on Macraes Road (Sensitivity Test 1)

It is not envisaged that traffic flows on these sections of road will change in the immediate future and so a nominal traffic growth of 0.5% per annum has been allowed for. However Sensitivity Test 2 allows for growth at 1% per annum.

In order to calculate the prevailing speeds on the existing and realigned road, the procedure set out in the Economic Evaluation Manual has been followed. Under this, the length of the road is divided into separate sections, with each section being defined in a manner which ensures that the characteristics of the road remain constant within that section. The speeds on each section are then determined through reference to the standard designs speeds of the Manual or in the case of a curved section, by reference to the appropriate AUSTROADS Guide. Through reference to the lengths of each section and the calculated speeds, the average speed can then be determined.

Following this process yields an average speed of 86km/h for the existing road alignment and 95km/h for the proposed road realignment of Macraes Road. Speeds of 90km/h and 55km/h respectively are calculated for Golden Bar Road. These values have been used in the analysis.

The accident records show that over the past five years, no accidents have been reported on the sections of Macraes Road and Golden Bar Road that are to be realigned. Given that the realignments will adhere to current design practices, it is not expected that any increase in accidents over and above the present numbers will arise. As noted above however, it is understood that there have been a number of unreported accidents. Under New Zealand legislation, if these accidents resulted in an injury then they are required to be reported to the police and hence would appear within the CAS database. Thus, since no accidents are in the database, it can be assumed that all resulted in damage only. Such accidents generally have a low economic value when compared to injury accidents. Two sensitivity tests have therefore been carried out, Sensitivity Test 3 allows for 1 non-injury accident every year, and Sensitivity Test 4 allows for 2 non-injury accident every year open.

Guidance is set out in the Economic Evaluation Manual as to the effects of road realignments on road safety. Because of the lack of base data it is difficult to be accurate as to the actual safety-

related effects of the road alignments but the Manual shows that a 10% reduction in accidents involving a collision with an object can be expected under the proposal, with a 30% reduction in accidents involving a loss of control.

7.2 Lengths of Schemes and Road Conditions

Based upon the latest plans provided, the existing section of Macraes Road to be realigned is 5.123km in length with the proposed new route being 5.799km long. Some 1.65km of Golden Bar Road being realigned compared to the existing length of 0.24km.

No assessment of the roughness of the road surface has been undertaken. Consequently a road roughness IRI of 4.0 has been allowed for on the existing road and 2.5 on the proposed road. Sensitivity Test 5 adopts a value of 3.5 for the existing road.

7.3 Expenditure on Macraes Road / Golden Bar Road

Given the traffic volumes, it is not expected that there is significant expenditure on the section of Macraes Road that is to be realigned. An allowance of $10,000 per annum has been made. The realignments are slightly longer (6.6km compared to 4.9km) but given that the carriageway will be in an extremely good condition, it is not expected that the maintenance will increase in proportion to the lengths of road. A maintenance allowance of $11,000 per annum has been allowed for.

In terms of the capital costs of construction, a figure of $1.7M has been used based upon the Project Description prepared by OceanaGold in September 2010. This has been apportioned on the basis of 80% to Macraes Road and 20% to Golden Bar Road, on the basis of their relative lengths.

7.4 Other Factors

In accordance with standard NZTA practice, an 8% discount rate has been allowed for and the analysis undertaken over a 30-year timeframe. No adjustments have been made to travel time costs, vehicle operating costs, or comfort benefits.

7.5 Results

7.5.1 Macraes Road

The proposed road realignment increases the length of Macraes Road, meaning that drivers must travel further. However, because the gradients and curves will meet current standards, vehicle speeds will be higher on the realigned road. As a result of this, the journey time on the proposed road will be just 3 seconds greater than on the existing road.

At present, the annual travel time costs of using Macraes Road are calculated to be $178,900, equivalent to $1.36 per vehicle per journey. With the revised alignment, the annual travel time costs increase to $181,300, equivalent to $1.38 per vehicle per journey. Over a standard 30-year evaluation period, this equates to a total net disbenefit of $33,600.

As vehicle speeds rise, vehicle operating costs also rise. To some extent this is offset by more gentle gradients on the proposed alignment than on the current alignment, but the calculations

show that on the existing alignment the vehicle operating costs are $287,500 ($2,19 per vehicle per journey) which would rise to $296,300 ($2.25 per vehicle per journey) under the proposed alignment. Over a standard 30-year evaluation period, this equates to a total net disbenefit of $99,200.

Taking into account the capital costs, this leads to a benefit-cost ratio of -0.1 (that is, there is an economic disbenefit in undertaking the scheme rather than retaining the current alignments).

Several sensitivity tests have also been undertaken as described above:

- Sensitvity test 1, traffic volumes reduced to 72 vehicles per day: Travel time disbenefits of $500 per annum, vehicle operating cost disbenefits of $1,800 per annum, benefit-cost ratio of 0.0 (ie neutral)
- Sensitivity test 2, growth in traffic volumes of 1% per annum. Travel time disbenefits of $2,400 per annum, vehicle operating cost disbenefits of $8,800, benefit-cost ratio of -0.1
- Sensitvity test 3, allowance for one non-injury accident per annum occurring on the existing road. Travel time disbenefits of $2,400 per annum, vehicle operating cost disbenefits of $8,800, accident ***benefits*** of $300 per annum, benefit-cost ratio of -0.1
- Sensitvity test 4, allowance for two non-injury accident per annum occurring on the existing road. Travel time disbenefits of $2,400 per annum, vehicle operating cost disbenefits of $8,800, accident ***benefits*** of $600 per annum, benefit-cost ratio of -0.1
- Sensitvity test 5, allowance for roughness IRI of 3.5 on existing road. Travel time disbenefits of $2,400 per annum, vehicle operating cost disbenefits of $20,800 per annum, benefit-cost ratio of -0.2

It can be seen that the bulk of the sensitivity tests do not materially affect the overall benefit-cost ratio of the proposed scheme, with a value of -0.1 consistently found. However, the roughness of the road surface has a substantial impact on the vehicle operating costs with a relatively small change leading to a more than doubling of the vehicle operating costs.

7.5.2 . Golden Bar Road

As with Macraes Road, the proposed road realignment increases the length of Golden Bar Road meaning that drivers must travel further, but it also reduces the vehicle speeds. Although few vehicles are involved, the journey time will be more than 1.5 minutes greater than at present.

At present, the annual travel time costs of using Golden Bar Road are calculated to be $250, equivalent to $0.06 per vehicle per journey. With the revised alignment, the annual travel time costs increase to $2,750, equivalent to $0.68 per vehicle per journey. Over a standard 30-year evaluation period, this equates to a total net disbenefit of $32,700 (comparable to that of the realigned Macraes Road).

Vehicle speeds are expected to decrease which offsets the increase in journey length. The calculations show that the total vehicle operating costs are $25 ***less*** per annum on the proposed alignment than on the current alignment, equivalent to an increase of less than a cent per vehicle. Over a standard 30-year evaluation period, this equates to a total net ***benefit*** of $300.

Taking into account the capital costs, this leads to a benefit-cost ratio of -0.1 (that is, there is an economic disbenefit in undertaking the scheme rather than retaining the current alignments).

Due to the low volumes of traffic, the sensitivity tests of changing traffic volumes slightly have an imperceptible effect on the travel time and vehicle operating costs, and the associated benefit-cost ratios. Similarly, changing the roughness IRI has no effect.

8. Summary and Conclusion

This report considers the economic effects upon road users of the proposed realignment of Macraes Road and Golden Bar Road in the vicinity of the Macraes Gold Project. The realignment is proposed in order to extend the life of the consented mine to 2020.

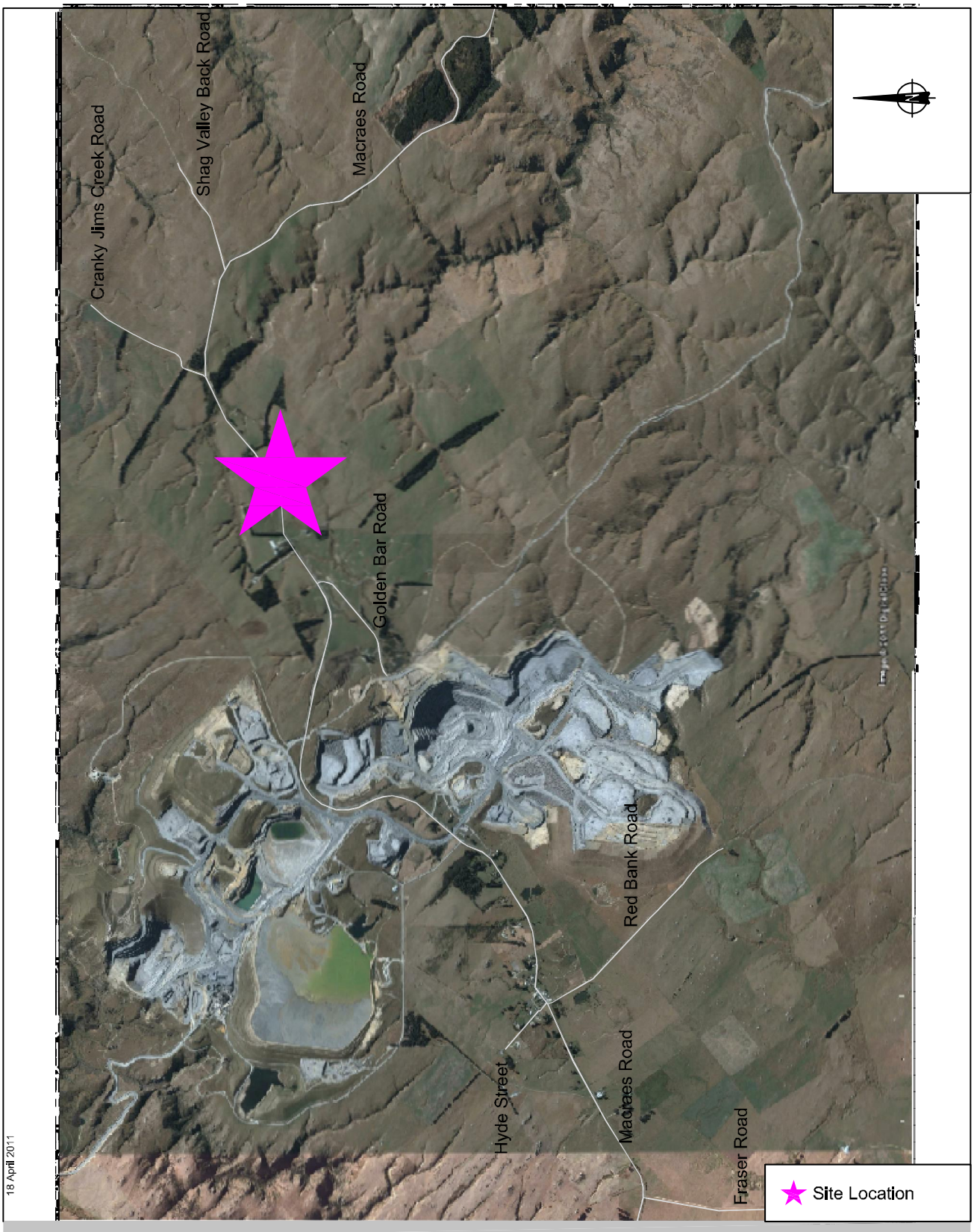
Using the procedures set out in the NZTA Economic Evaluation Manual, the effects on road users have been assessed. As the proposed road realignment increases the length of both Macraes Road and Golden Bar Road, there is a disbenefit imposed upon road users both in vehicle operating costs and journey time costs. These are in the order of $132,800 and $32,400 respectively, measured over a 30-year assessment period.

Taking into account the capital costs, this leads to a benefit-cost ratio of -0.1 for both schemes (that is, there is an economic disbenefit in undertaking the scheme rather than retaining the current alignments).

A series of sensitivity tests has been carried out and it is considered that the benefit-cost ratio is robust. However, it is considered extremely unlikely that this will be perceived by drivers. In particular, the journey time on Macraes Road is almost identical under both the existing and proposed alignments and while the journey will be longer on Golden Bar Road, few vehicles are affected and because of reduced speeds, vehicle operating costs will reduce.. Further, the realignments can be expected to lead to a slightly improved accident rate.

Overall then, while there is a slight economic disbenefit to undertaking the road realignment scheme, any effects upon drivers using the road will be negligible and imperceptible.

Traffic Design Group Ltd
April 2011



Macraes Phase III

Site Location and Road Hierarchy

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1

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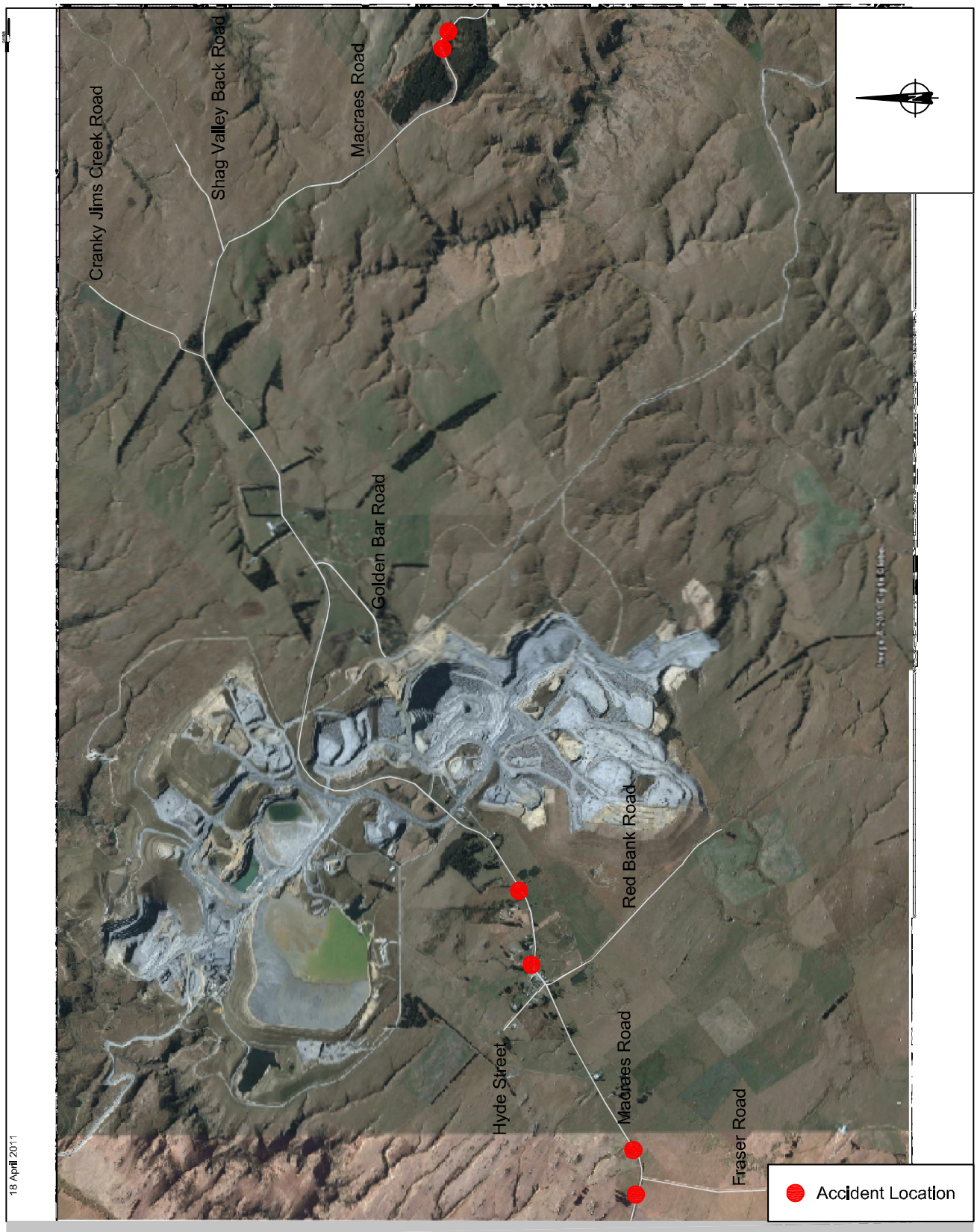

Macraes Phase III

Accident Locations

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2

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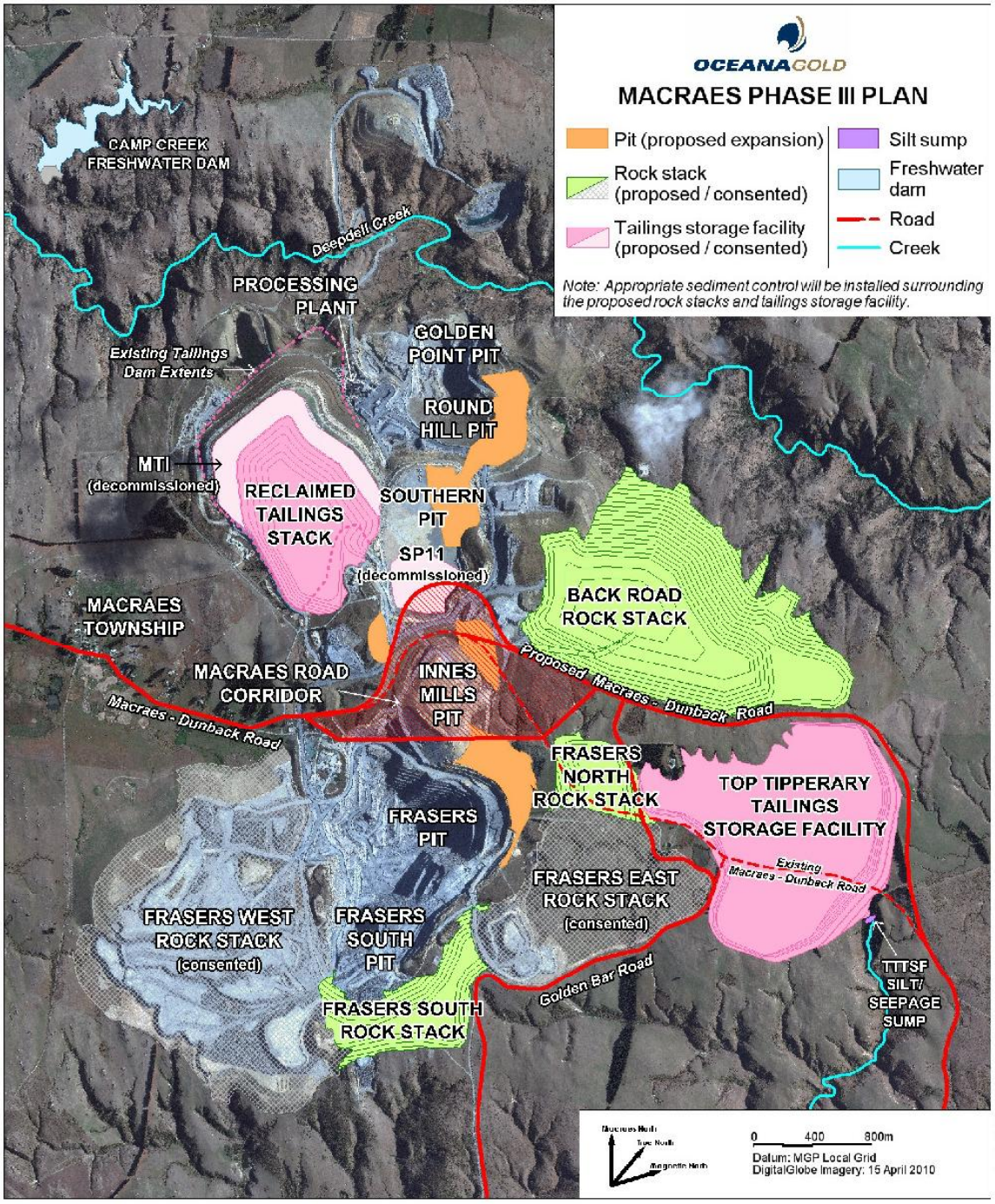

18 April 2011

Macraes Phase III

Road Alignment

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3

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