APPENDIX E

Traffic Assessment
(Traffic Design Group)

OceanaGold New Zealand Ltd

Project Martha

Transportation Assessment

May 2018

TDG Ref: 14618 project martha ita final v2.docx

OceanaGold New Zealand Ltd

Project Martha

Transportation Assessment

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Date: 15 May 2018

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1. Introduction

The Waihi gold mine currently accommodates several ongoing mining operations and it is understood that these operations are expected to be completed by late 2019. OceanaGold New Zealand Limited (OceanaGold) has identified an opportunity to extend the life of the mine though additional underground and open pit works. These proposed extensions will utilise the existing workforce and infrastructure and will progressively begin as the current operations come to an end.

TDG has been asked by OceanaGold to describe and assess the traffic and transportation effects associated with the proposed operations.

This report outlines the existing transport environment in the vicinity of the site, describes the expected changes in traffic generation under Project Martha, and assesses the likely effects of the proposed activity on the surrounding transport environment.

In summary, it is concluded that the proposed development is expected to result in less than minor traffic and transportation effects on the surrounding existing road network.

2. Transportation Environment

2.1 Site Location and Description

The existing mine is located over a large area (the site) within and to the east of Waihi township. There is a mixture of open pit and underground mining works, plus areas for the storage and/or disposal of rock and tailings (processed ore). At the surface level the mine broadly comprises two distinct sites. The Martha pit is located within Waihi town, and the remaining bulk of the site is located in a predominantly rural area immediately east of the town. The two parts of the site are linked by a conveyor for transporting ore, but are otherwise physically separated, including by State Highway 25. The general layout of the site in relation to the town and key road links are shown on Figure 1 and Figure 2.

Figure 1: Location of Main Site Components (Surface) – Waihi Area

The site has two main access points: a gate at the eastern end of Baxter Road, which in turn provides access onto SH2; and a gate onto SH25 within Waihi, which provides access from the Martha pit.

There are several other minor access gates, however these are used very infrequently:

- Moore Street - used in cases where an oversize or heavy load cannot access the process plant area via Baxter Road. It is also used as an alternative to the Baxter Road access on occasions when the Ohinemuri River floods, preventing access via Baxter Road.
- Clarke Street – used very infrequently for over-weight or over-dimension vehicles.

- An access gate off Grey Street, 200 m south of King Street.
- Two access gates off Golden Valley Road.

Figure 2: Site Location – Waihi Town

All staff and day-to-day access is via the two main gates. Over-weight and over-dimension vehicles also use the main gates wherever possible, with other accesses being used only when access via the main gates is impractical.

The company administrative office is located in a building on the corner of Moresby Avenue and Martha Street in Waihi, adjacent to the Martha pit.

2.2 Road Network

2.2.1 Baxter Road

Baxter Road is a rural road, classified as a local road in the Hauraki District Plan. It is a no exit road approximately 1.2 km long, and is primarily used to access the underground

mines, the processing and tailings disposal area, and for staff and deliveries. Baxter Road has a nominal seal width of 7.0 m. The road is marked with a centre line and edgelines. Baxter Road is in flat terrain and has a curvilinear alignment.

Baxter Road incorporates a one-lane bridge located 960 m from its intersection with SH2. Photographs 1 and 2 show the typical form of Baxter Road approximately midway between SH2 and the mine access.

Photograph 1: Baxter Road looking west

Photograph 2: Baxter Road looking east

2.2.2 SH2

SH2 in the vicinity of Baxter Road has an open road speed limit. This section of SH2 has a typical sealed width of 12.7 m and is marked with a centreline and edgelines to provide the following approximate cross section:

- 2.6m wide southbound shoulder.
- 3.7m wide southbound traffic lane.
- 3.6m wide northbound traffic lane.
- 2.8m wide northbound shoulder.

Data published by the New Zealand Transport Agency (NZTA) indicates an annual average daily traffic (AADT) volume of 10,952 vehicles at the nearest count site, which is located approximately 100 m south of Baxter Road. Hourly traffic volumes for this location are shown on Figure 3. This data was recorded during the week ending 31 March 2017.

NZTA has publicised a safe roads programme for SH2 from Waihi to Omokoroa and it is understood that safety improvements incorporating widening, wide centreline, sections of side barriers and various intersection improvements are expected to be completed over the next ten years.

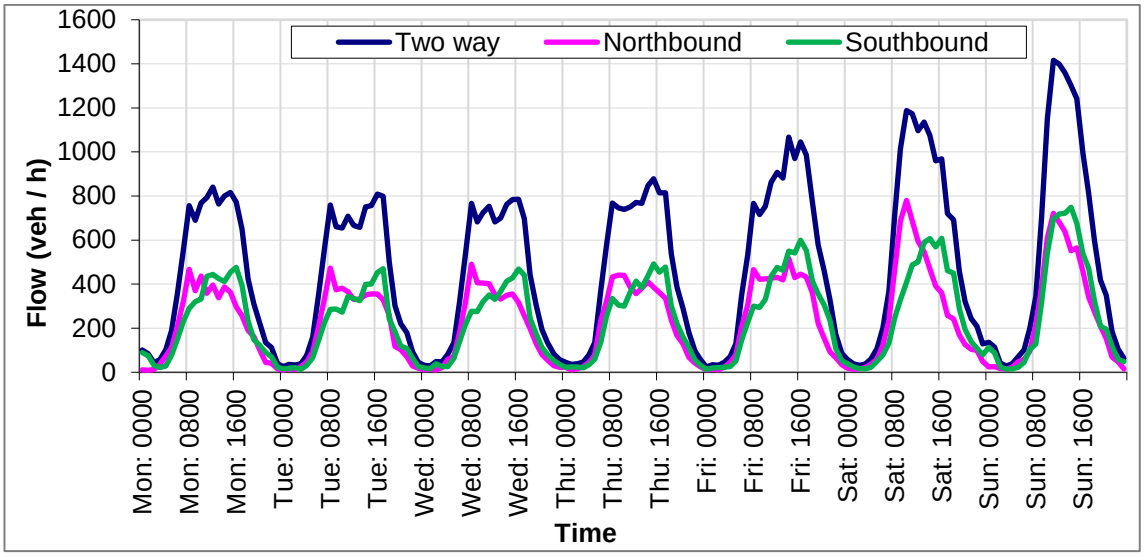


Figure 3: Hourly Traffic Flows on SH2 (w/e 31 March 2017)

Figure 3 indicates that the busiest times on this part of the highway are Sunday afternoons and Saturday late morning, with two-way flows of 1,400 vehicles per hour (veh/h) and 1,200 veh/h respectively.

Typical day time two-way flows during the rest of the week are in the 700 to 1,000 veh/h range.

2.2.3 Baxter Road / State Highway 2 Intersection

Baxter Road intersects SH2 approximately 1.2 km south of Waihi and forms a stop-controlled T-intersection. On the opposite side of SH2 approximately 50 m to the south is located Crean Road, also a side road intersecting SH2 at T-intersection.

Photographs 3 and 4 show the form of the intersection.

Photograph 3: SH2 looking west from opposite Baxter Road

Photograph 4: SH2 looking west showing left slip lane into Baxter Road

Sight distances are assessed to exceed 250 m in each direction, meeting safe intersection sight distance requirements for a 100 km/h speed environment.

The intersection has a widened shoulder of 2.9 m opposite Baxter Road on the highway to facilitate northbound highway traffic in passing a vehicle that has slowed or stopped to turn right into Baxter Road. A 3.0 m left-turn deceleration lane is provided on the highway for southbound traffic turning into Baxter Road.

2.2.4 SH25

SH25 in the vicinity of the open pit site access is a two-lane urban arterial route with a 50 km/h posted speed limit.

An NZTA count site located approximately 1.5 km north of the access (just outside the urban limit) recorded an AADT of 2,606 vehicles. Hourly flow data for the same site recorded in August 2017 is shown on Figure 4.

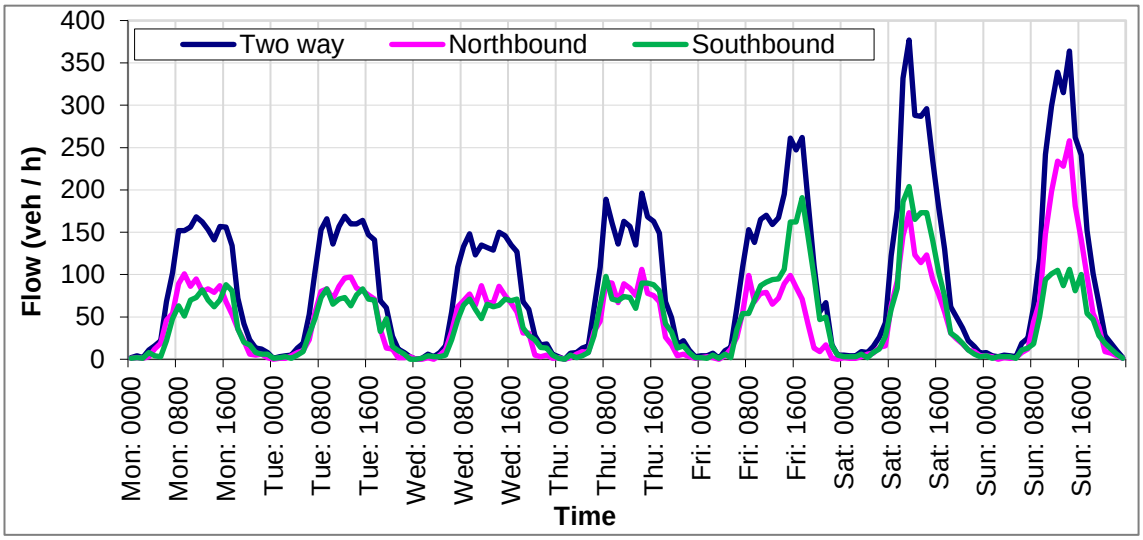


Figure 4: Hourly Traffic Flows on SH25

The data indicates that the busiest times on this part of the highway are Sunday afternoons and Saturday lunchtimes, with two-way flows of 360 to 380 veh/h.

Typical day time two-way flows during the rest of the week are in the 150 to 250 veh/h range. It is acknowledged that traffic flows will vary seasonally.

2.2.5 SH25 Access

Figure 5 shows the layout of the Martha pit mine access on SH25.

Figure 5: Barry Road and SH25 Intersection

The site access is located on the outside of a horizontal curve. A right-turn lane is provided for westbound traffic turning right into the site. The available sight distance to the north-east from the access is approximately 160 m. To the south the available sight distance is in excess of 250 m. The mine security gate is located approximately 43 m back from the SH25 carriageway.

2.2.6 Cambridge Road / Bulltown Road

Cambridge Road and the southern section of Bulltown Road, as far as William Street, are classified as Collector Roads in the District Plan (between Savage Road and William Street) linking the southern and northern areas of Waihi around the northern side of the Martha pit, as shown on Figure 6. The western end (Cambridge Road) is similar in nature to Savage Road, with an approximately 11 m carriageway with kerb and channel and is marked with a centre line.

At the eastern end of Cambridge Road the carriageway continues as Bulltown Road to the north. The main alignment of Bulltown Road is narrower than Cambridge Road, with a seal width reducing to approximately 6 m. Bulltown Road is more rural in nature, with no kerb or channel, and grass berms on both sides. A short cul-de-sac is located on the south side and outside of the curve where Cambridge Road intersects with Bulltown Road. While this existing cul-de-sac is currently signed as Bulltown Road it is owned by OceanaGold and is no longer a public road.

Figure 6: Cambridge Road / Bulltown Road in the Vicinity of Martha Pit

3. Road Safety

A search has been undertaken of the NZTA's Crash Analysis System to identify any recorded crashes at key locations related to the project. The search covered the five-year period 2012 to 2016, and included any crashes recorded in 2017 to date.

A search has been undertaken of any crashes recorded near the site accesses or proposed road realignment, being:

- Baxter Road;
- SH2 / Baxter Road intersection (within 250 m of intersection);
- Barry Road (site access stub);
- SH25 for 250 m either side the site access; and
- Cambridge Road/Bulltown Road

The search identified a total of nine crashes, all of which were non-injury crashes.

3.1.1 Baxter Road

One non-injury crash occurred on Baxter Road approximately 1 km north of SH2 when the driver of a light vehicle fell asleep at the wheel and the vehicle collided with a fence.

3.1.2 Baxter Road / SH2 Intersection

One non-injury crash occurred on SH2 approximately 200 m south of the Baxter Road intersection when a southbound driver failed to notice the vehicle ahead slowing (the driver had accidently changed to an incorrect gear so the car slowed without the brake lights showing), and collided with it.

3.1.3 SH25 (including Martha Access Intersection)

Six non-injury crashes were recorded within this part of the search area, all on SH25.

One crash occurred near the intersection with Clarke Street when a northbound driver attempted a U-turn from the parking lane and struck a passing vehicle. Clarke Street is approximately 250m southwest of Barry Road.

One crash occurred at the intersection with Roycroft Street when a driver failed to notice the vehicle ahead slowing to turn right into Roycroft Street. Roycroft Street is approximately 190m northeast of Barry Road.

Four loss-of-control crashes occurred on the horizontal curves either side of the site access. Three involved single vehicles only, while in one crash the object struck was an oncoming vehicle. Alcohol was listed as a factor in one of these crashes, and inappropriate speed in wet conditions was listed as a factor in the other three.

3.1.4 Cambridge/Bulltown Roads

The search covered these two roads between Savage Road and William Street. One non-injury crash was recorded. It occurred at the intersection of Cambridge Road and Savage Road when a driver failed to slow at the end of Cambridge Road due to faulty brakes and collided with a fence. It is noted that the proposed realignments do not affect this intersection.

3.1.5 Summary

A trend is apparent with southbound drivers losing control in wet conditions on SH25 in the vicinity of the Martha pit access. However, none of the crashes involved vehicles turning into or out of the site and it is not expected that traffic movements associated with the proposed activity would exacerbate the trend.

No crashes have been reported that relate to traffic turning on to or off the state highways at either of the main site access locations.

No trend has been identified on the section of Cambridge Road/Bulltown Road to be realigned (see Section 8).

4. Current and Recent Site Activity

The mining and transportation of ore and rock does not take place on the public road network, but is contained within the site on internal roads and the use of the conveyor previously described. Traffic on the public road network consists only of mine staff, contractors, suppliers and visitors. Additionally, there is the infrequent movement of oversize equipment to and from the mine, however all such vehicle movements on public roads are by road-legal vehicles, and this will remain the case under Project Martha.

4.1 Staff Numbers

OceanaGold has provided data on the employee numbers for mining operations in Waihi for the past 15 years. This data has been analysed to establish a baseline for the proposal.

In the peak operating years OceanaGold and its predecessors have typically employed approximately 400 permanent staff at any one time. These comprised approximately 100 directly employed staff and also a number of contract staff effectively on a permanent basis, who typically numbered up to approximately 300 at any one time. These include administrative workers at the office on Moresby Avenue as well as mine workers, and are collectively indicated as full-time equivalent (FTE) staff on Figure 7.

In addition, casual contractors were employed, typically approximately 50 at any one time. These casual workers include various specialists such as geologists; farm workers for some of the OceanaGold land which is currently not mined; landscapers and general maintenance crews for the various properties owned by OceanaGold, some of which are not directly linked to the mining activity; and security guards.

The following data for all workers associated with the mine has been estimated by OceanaGold based on historical data from 2001 to 2016. The number of workers varied between approximately 260 and 470 throughout this period. This data is displayed graphically in Figure 7.

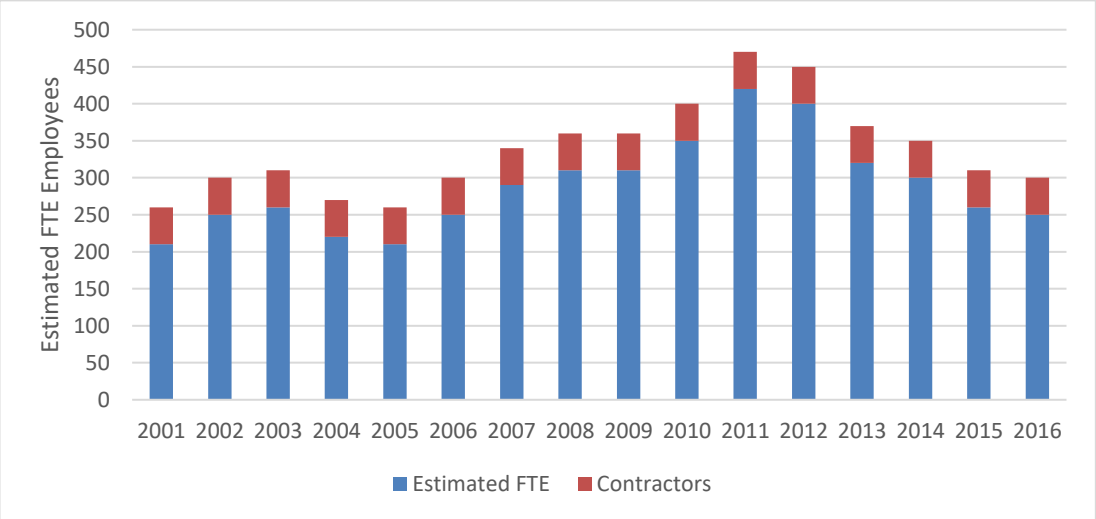


Figure 7: Typical Number of Mine Workers 2001 to 2016

The data in Figure 7 shows that the number of workers associated with the Waihi mine over the last 15 years, peaked in 2011 – 2012 with up to approximately 470 people in total. Outside of this peak the total number of workers was typically 260 to 400. It is noted that activity in the Martha pit is currently limited to occasional maintenance work as a land slip in 2015 effectively ended the working of the pit. The 2015 staff numbers are skewed by this change part way through the year (i.e. the number would be higher for the first part of the year and lower for the latter part), and the 2016 data represents the activity at the company office, casual contractors, and the workings accessed via Baxter Road.

The majority of underground mine activity is a 24-hour operation and is undertaken by shift workers. Typically, there are two shifts per day, which start at around 7 am and 7 pm, although some shifts have start and finish times offset by 15 to 30 minutes.

Open pit work is typically a daytime-only operation. The consented hours of work are 7 am to 7 pm however it is understood that typically the day shift may end as early as 5 pm.

4.2 Traffic Volumes

With very few exceptions, all site current traffic passes through security gates at either the SH25 or Baxter Road accesses. OceanaGold has provided historical gate log data which identifies the number of vehicles entering each gate.

4.2.1 Gate Log Data – Baxter Road

The number of inbound vehicles at the Baxter Road gate is shown in Figure 8. The data has been provided in vehicles per month and has been averaged over the working month (based on a six-day working week) to establish the average daily volume.

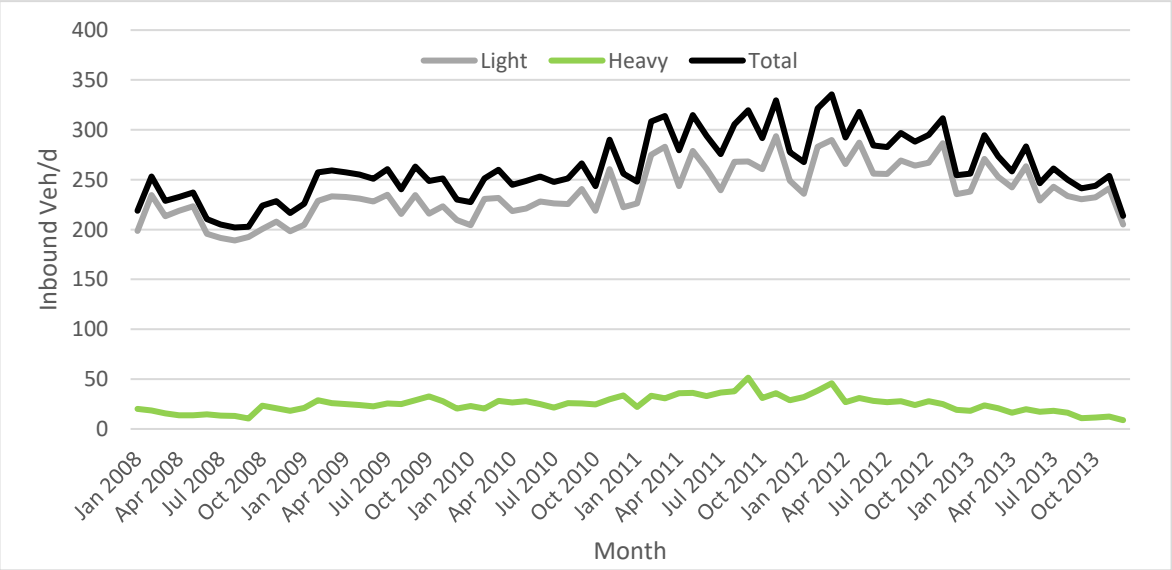


Figure 8: Average Daily Inbound Traffic at Baxter Road Gate

The data shows that site traffic via Baxter Road comprises mostly light vehicles. These typically make up around 90% of vehicle movements. The busiest period during the period for which data has been provided is late 2011 to early 2012. This corresponds to the peak levels of employees identified in Figure 7. At that time the total number of inbound

vehicles at this gate averaged approximately 340 per day. Outside of this peak, the daily volume was typically around 250 to 300 veh/d.

Noting that current employment levels are approximately 80% of that in 2013, it is assessed that the current total daily inbound flow at this gate is expected to be approximately 200 to 240 veh/d.

Data from late 2013 has also been provided by OceanaGold which shows the typical hourly arrival and departure flows for the Baxter Road gate. This is the 85th percentile flow for each hour throughout December 2013, which is assessed as being a fair representation of hourly flows throughout a day during that month.

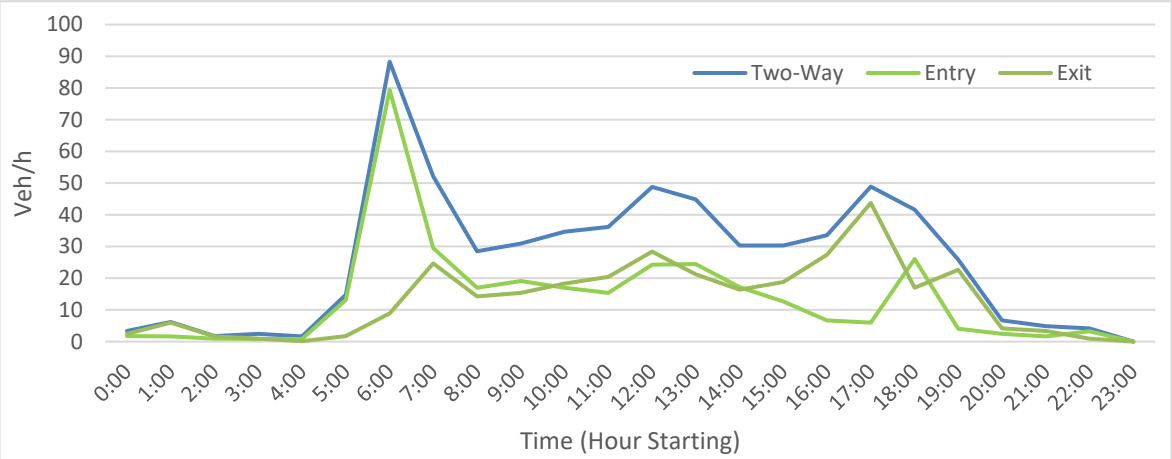


Figure 9: Hourly Traffic Flows at the Baxter Road Gate, December 2013

4.2.2 Count Data – Baxter Road

A turning count survey was undertaken at the intersection of Baxter Road with SH2 on Thursday September 14 2017. The survey covered the morning shift change identified by OceanaGold and the peak flow periods on the highway, with three periods surveyed between 6:00am and 6:00pm.

As Baxter Road serves only the mine gate and two dwellings, the survey is considered to be a good representation for the traffic generation of the current mining activity. The hourly flows recorded are shown on Figure 10.

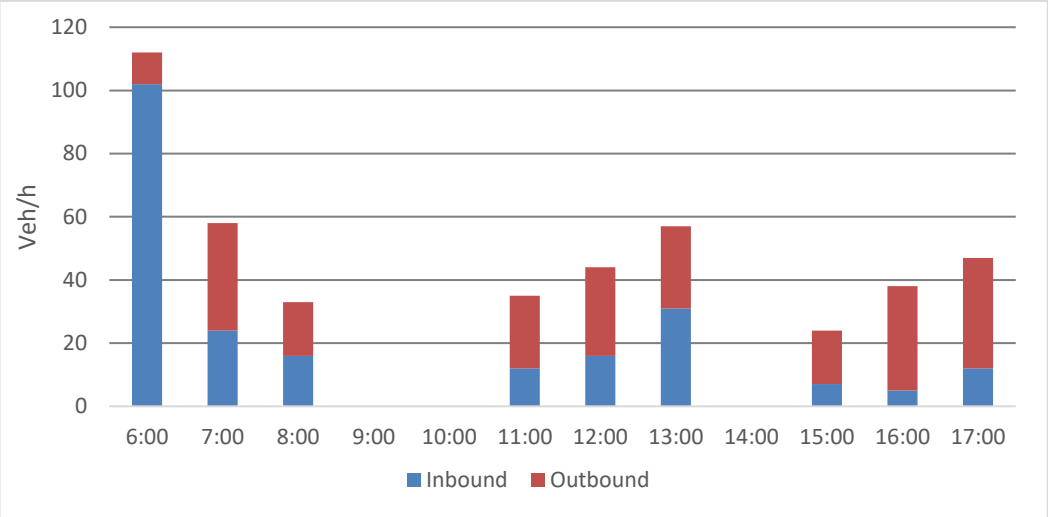


Figure 10: Surveyed Turn Movements at the Baxter Rd/SH2 Intersection

The survey indicates that the busiest hour was between 6:00am and 7:00am, with a total of 112 movements. For the rest of the survey period there were between 24 and 58 vehicle movements per hour. The survey data is noted as following a very similar pattern as is shown in Figure 9. However, the two-way flows are approximately 25% higher than the equivalent flows in 2013 as indicated in Figure 9. This appears to indicate that current staff levels are higher than in 2013, and (with reference to Figure 7) also higher than 2016 staff levels.

4.2.3 Gate Log Data – Barry Road

For the Barry Road gate, the available data covers a two-year period from January 2008 to December 2009. In this instance the number of staff entering was recorded rather than number of vehicles.

In order to estimate the vehicle demands reference has been made to the Baxter Road gate data which indicates that there was an average of 0.74 light vehicles and 0.07 heavy vehicles per person entering (this indicates that the average occupancy was greater than one person per vehicle). On the basis that a similar ratio of vehicles to people is expected at both gates, vehicle numbers at the SH25 gate have been estimated based on the known number of people entering. This is summarised in Figure 11. It is noted that the data was incomplete for some months; this can be seen in Figure 11 where there is no data point for some months.

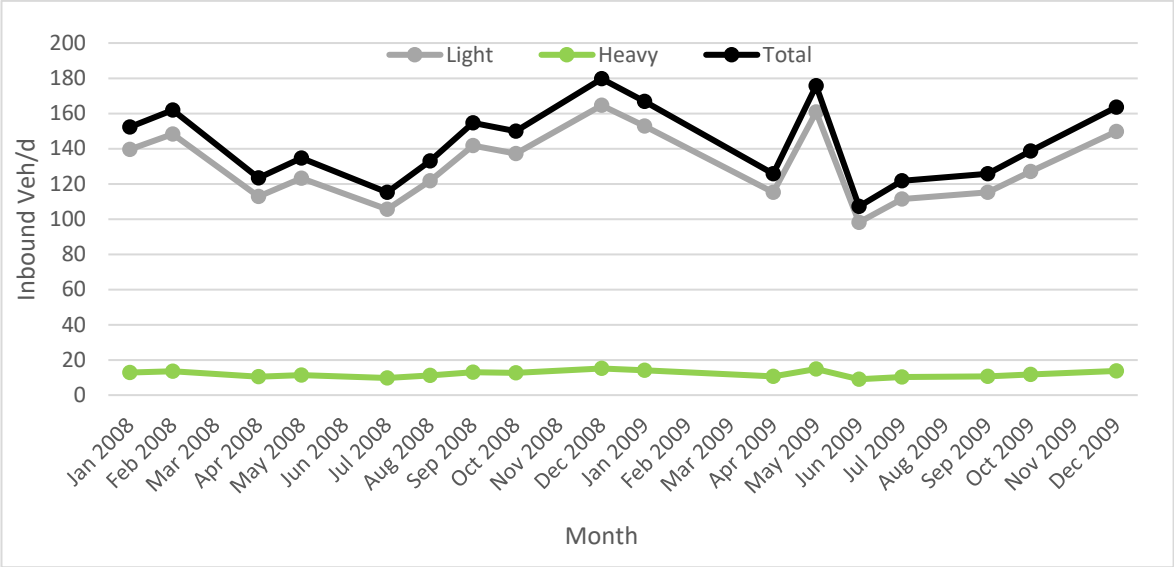


Figure 11: Average Daily Inbound Traffic at Barry Road Gate

It is estimated that at the Barry Road gate the typical daily inbound flow during 2008 – 2009 was approximately 150 veh/d, with busy months being up to 180 veh/d.

Data from late 2013 has also been provided by OceanaGold which shows the typical hourly arrival and departure flows for the SH25 gate.

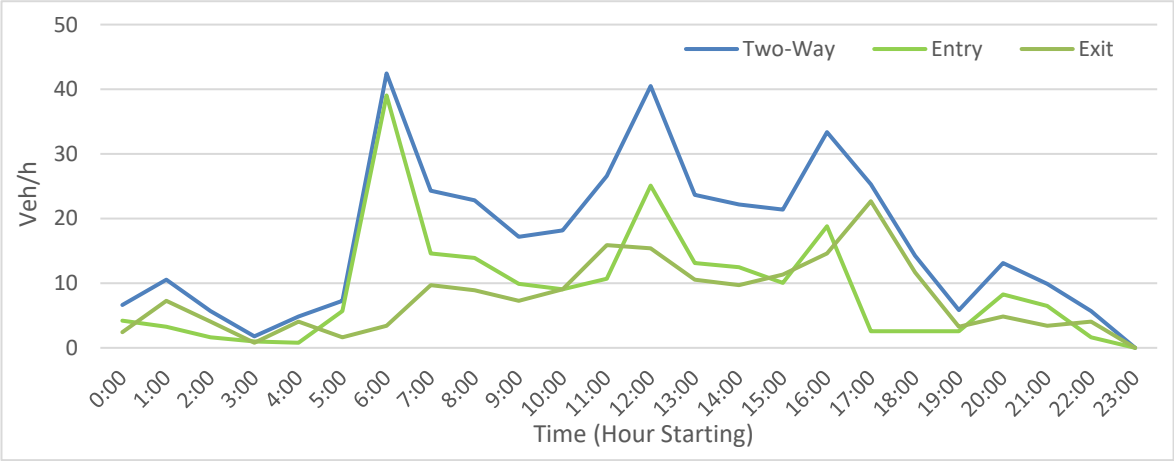


Figure 12: Hourly Traffic Flows at the Barry Road Gate, December 2013

From 2015, as the pit is not active, traffic movements at the SH25 (Barry Road) gate have significantly reduced and currently involve a small demand from vehicles associated with the 'care and maintenance' of the existing infrastructure. Based on the historic data, it is estimated that when the pit was last operating (2015) the daily inbound traffic flow at this gate was approximately 150 veh/d .

From the gate log data it is apparent that in general approximately one third of the overall mine site traffic used the SH25 gate when the Martha pit was active.

4.2.4 Traffic Distribution

The gate log data indicates that the Baxter Road gate was significantly busier than the SH25 gate in terms of traffic. Based on the data available, the SH25 gate accommodated approximately 32% of daily site traffic, while the Baxter Road gate accommodated 68%.

The turning movement survey at the Baxter Road / SH2 intersection recorded the following turn movements during the morning and evening peak hours.

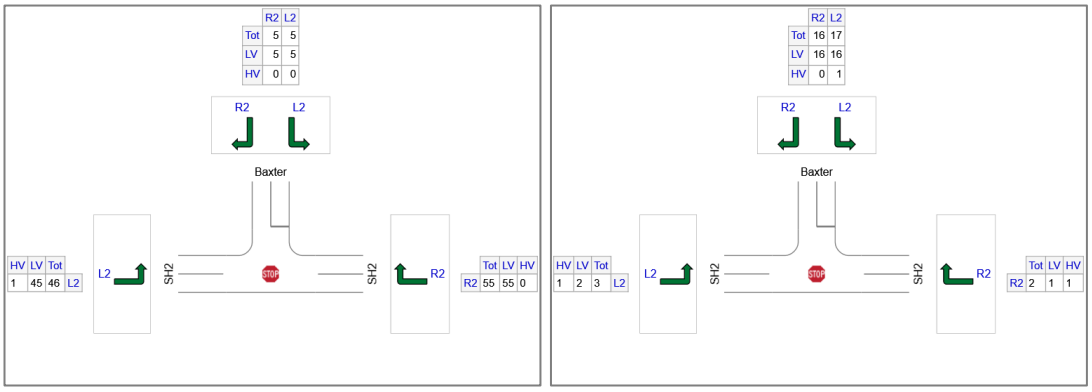


Figure 13: Morning (Left) and Evening (Right) Surveyed Turn Movements at SH2/Baxter Road

The survey indicated that during the morning peak approximately 54% of inbound traffic approached from the north and turned right into Baxter Road, while 46% approached from the south. With regard to the inbound right-turn movement at this intersection, 55 vehicles were counted during the busiest hour in the morning period. This peak in activity-related traffic occurred prior to the peak on the state highway, and the number of opposing vehicles at this time is typically 125 veh/h. Observations of the intersection during the morning peak indicate that the current layout operates efficiently and safely. At other times of the day the number of right-turning vehicles decrease significantly, with typically 5 to 20 veh/h observed.

Outbound traffic during this period was evenly split between left- and right-turn traffic, with 5 veh/h making each movement.

During the evening peak period approximately 38% of inbound traffic approached from the north and turned right into Baxter Road, while 62% approached from the south. Of the outbound traffic during this period, approximately 52% turned left onto SH2 while 48% turned right.

5. Proposed Activity

5.1 Description

Project Martha will extend the life of the existing mine activities at Waihi and will make use of the existing infrastructure and workforce as the current activities reach their conclusion. The project comprises three key components:

- The Martha Phase 4 pit (MP4);
- The Martha underground, including the Rex orebody; and
- Existing Rock and tailings storage facilities.

The locations of these components are shown on Figure 14.

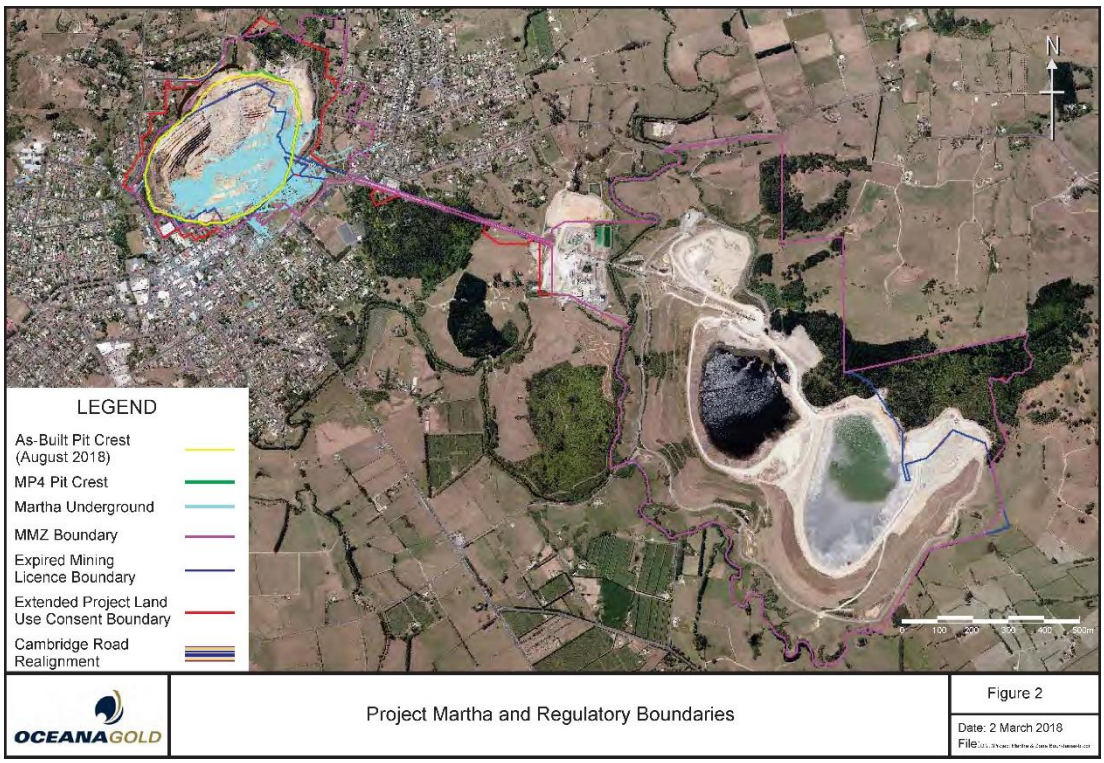


Figure 14: Locations of Project Martha Components

The MP4 component of the project involves laying back the northern side of the pit wall which will move the edge of the pit northwards. The proposed changes to the pit rim require a realignment of the current curve(s) linking Cambridge Road and Bulltown Road. It is proposed to realign these roads over a length of approximately 270 m to accommodate the proposed pit wall.

It is understood that the components will not all run concurrently, although some overlap will occur. Work will start with the Martha underground and Rex components. The Martha underground work is expected to last the duration of the project, while work on the Rex orebody is expected to cease after year 3. Mining within the Martha pit will follow in the third year. Activity associated with rock and tailings storage will occur throughout the

project. The project is expected to run for approximately 11 years in total. The following table indicates when each component is expected to be active within that timeframe[1].

Component	Project Year										
	1	2	3	4	5	6	7	8	9	10	11
Rex	•	•	•								
Martha underground	•	•	•	•	•	•	•	•	•	•	•
MP4			•	•	•	•	•	•	•	•	
Rock & Tailings	•	•	•	•	•	•	•	•	•	•	•

Table 1: Project Component Timeline

Ore recovered from the mining activity will be transported within the site by truck and conveyor to the existing process plant. All vehicle movements associated with the movement of ore will occur on internal roads within the mine and will not use the public road network.

Overburden from mining, and tailings from the mill, will be transported by truck, conveyor or pipeline to various locations for storage or disposal within the site boundary. Again, all vehicle movements associated with this activity will occur within the site, and not on public roads.

It is understood that there is the possibility of aggregate being imported from outside of the site as part of this project to be used in cemented aggregate fill (CAF). One possible source of aggregate is the Waitawheta Quarry,) located to the south-west of the site and SH2. The transport route would be by way of McLean Road, Waitawheta Road, Frankton Road, Crean Road, SH2 and Baxter Road and the The importation of material along this route has previously been consented as part of the Correnso project.

Staff, contractor and delivery traffic will continue to use the two main access points to the site on SH25 Barry Road and Baxter Road. It is understood that staff and contractors associated with the MP4 component will access the site at Barry Road, and all staff and contractors associated with the other project components will use the Baxter Road access. The majority of these vehicle movements are expected to be light vehicles.

The company office on Moresby Avenue will continue to house administrative staff associated with the mine.

Following completion of Project Martha it is understood that a 'closure plan', which has been consented under an earlier stage of the mine development, will be implemented and will see the Martha pit transformed into a lake with reserves around it. It is understood that the shape of the MP4 pit rim requires a minor change to the closure plan in the vicinity of the Cambridge Road and Bulltown Road realignment and both vehicle and pedestrian connectivity will be maintained.

[1] Source: "Martha Revised Project Description" OceanaGold, 12th December 2017

5.2 Proposed Worker Levels

It is understood that the staff and contractors who currently work at the mine will incrementally transition to the various components of Project Martha as the existing operations wind down. There is therefore expected to be little change initially in terms of the number of staff and contractors visiting the site each day.

OceanaGold has provided data for the expected number of staff and permanent contractors for the proposed operations[2] over the 11-year project. Up to 50 casual contractors are also expected, as is typical of current and historical operations.

This data is displayed graphically in Figure 14, alongside the data from 2001 to 2016 for comparison.

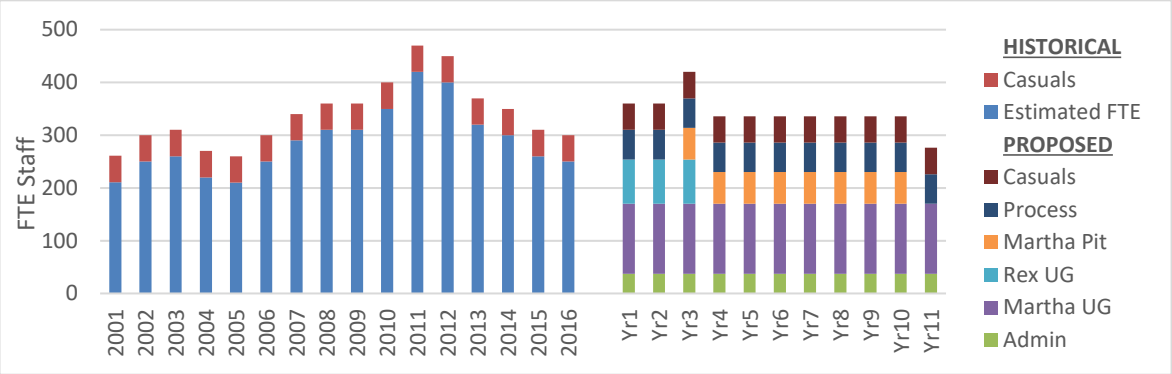


Figure 15: Historic and Expected Worker Numbers

Figure 14 shows that the overall workforce is expected to vary between 280 to 360 people for the majority of the time, possibly peaking at 420 workers if the Rex and Martha underground works overlap in the third year. Broadly speaking, the number of workers is expected to remain approximately the same as current and recent historical levels. The possible maximum of 420 workers in year three of the project is around 10% lower than the number of workers estimated from the busiest of recent years (470 in 2011).

It is understood that the existing shift patterns will generally continue through to the new project components. This is expected to result in minimal changes to the number and timing of arrivals to and departures from the site at the Baxter Road gate. The Martha pit workforce (accounting for approximately 60 to 70 workers) is smaller than for the previous pit operation pre-2015. Therefore, the operation is expected to increase the activity levels at the Barry Road gate in comparison to 2017 traffic but less activity than for historical levels.

In summary, as noted in Figure 15, the total number of workers is expected to be slightly higher than 2016 levels for three years until mining of the Martha open pit commences; to increase to a level similar to the busiest of recent years; and then decrease over time as operations begin to wind down. It is anticipated that the associated traffic movements will follow a similar pattern, as detailed in Section 6.

[2] Source: "Martha Revised Project Description" OceanaGold, 12th December 2017 – Table: Direct Labour and Manpower Summary

6. Traffic Effects

6.1 Trip Generation

The following Table 2 summarises the expected vehicle numbers associated with the forecast number of workers through the life of the project. The traffic forecasts are based on the same trip demands, light and heavy vehicle ratios and distribution of traffic (i.e. between gates) as derived from the historic data in Section 4 above.

Year	Total Employed	Office	Barry Road Gate		Baxter Road Gate	
		Light	Heavy	Light	Heavy	Light
Year 1	360	55	0	0	38	404
Year 2	360	55	0	0	38	404
Year 3	420	55	8	89	38	404
Year 4	336	55	8	89	26	280
Year 5	336	55	8	89	26	280
Year 6	336	55	8	89	26	280
Year 7	336	55	8	89	26	280
Year 8	336	55	8	89	26	280
Year 9	336	55	8	89	26	280
Year 10	336	55	8	89	26	280
Year 11	276	55	0	0	26	280

Table 2: Assessed Traffic Generation (Vehicle Movements -two way- per Day)

Table 2 indicates that in the busiest expected years (years 1 to 3) up to approximately 404 veh/d (light vehicle) and 38 veh/d (heavy) are expected at the Baxter Road gate and through to the Baxter Road / SH2 intersection.

Similarly, up to 89 veh/d (total) are expected at the Barry Rd gate between years 3 and 10, with a 50 / 50 inbound/ outbound split over the course of a day.

Vehicle movements associated with the office at Moresby Avenue are expected to be in the order of 55 veh/d. This estimate has been provided by OceanaGold, and it is understood that staffing levels at the Moresby Avenue office will remain approximately the same under Project Martha as occurs at present.

As previously identified (Section 5), the proposal is expected to result in a maximum trip generation approximately 10% below the daily volume of the historical peak period of activity at the mine. In general, taking into account the traffic volumes and safety records described in this report, this level of decrease would be expected to have very small positive effects on the road network, relative to historical maxima. Notwithstanding this, the intersection modelling as described in the following sections is based on absolute volume of traffic as opposed to the net decrease in volume to understand the actual performance of each junction.

It is also understood that from approximately year 6 of the project some of the traffic associated with underground services may start accessing the mine via the SH25 gatehouse

rather than the Baxter Rd gatehouse. The magnitude of the change has not been quantified by OceanaGold, other than to note that the expected change is expected to be small, with 10% given as being a much higher proportion than is expected. The effects of this are discussed in the following sections.

The importation of aggregate to the site has been previously assessed and consented as part of the previously proposed Correnso development. It is understood that the importation of aggregate for use in CAF as part of this application is expected to fit the same traffic generation characteristics as the Correnso project with respect to daily and hourly flows albeit the time period may be extended. Table 3 summarises the consented truck volumes associated with the Correnso project.

Year	Truck Movements per Day	Peak Truck Movements per Hour
Year 1	43	4-5
Year 2	71	7-8
Year 3	43	4-5
Year 4	4	1
Year 5	2	1
Year 6	2	1

Table 3: Consented CAF Truck Movements for Correnso Project

It is understood that the consented CAF plant has a maximum production capacity which determines the frequency of trucks delivering material. Any CAF production for Project Martha would be offset by a corresponding reduction in that produced for Correnso, if deliveries for the two projects were to overlap, such that the total number of trucks would be limited to those noted in Year 2 (Table 3).

However, the importation of aggregate for Project Martha could extend the period over which material is imported, with a peak over two to three years and lower volumes in the shoulder years.

6.2 Traffic Effects – Baxter Road Access

6.2.1 Intersection Performance

It is anticipated that Project Martha will commence in early 2020. Data from the NZTA Data Booklets published on the NZTA website indicates that traffic on this part of SH2 has grown at approximately 1.7% per annum over the last 10 years. This rate has been applied to the SH2 flows for the assessment of future intersection performance.

The surveyed turn movements at the Baxter Road / SH2 intersection have been modelled to quantify the existing intersection performance for current traffic levels and tabulated in Table 3. The through volumes of traffic are based on the flows described in Figure 3 and the busiest hour of turning movements has been used, being 6 am to 7 am.

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	162	13.6	0.139	0.4	LOS A	0.5	3.4	0.19	0.18	92.1
3	R2	58	0.0	0.139	8.5	LOS A	0.5	3.4	0.19	0.18	82.2
Approach		220	10.0	0.139	2.5	NA	0.5	3.4	0.19	0.18	89.2
North: Baxter											
4	L2	5	0.0	0.004	10.1	LOS B	0.0	0.1	0.25	0.85	72.8
6	R2	5	0.0	0.008	12.1	LOS B	0.0	0.2	0.48	0.84	70.2
Approach		11	0.0	0.008	11.1	LOS B	0.0	0.2	0.36	0.84	71.4
West: SH2											
7	L2	49	2.1	0.027	7.9	LOS A	0.0	0.0	0.00	0.66	73.7
8	T1	145	10.1	0.079	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		195	8.1	0.079	2.0	NA	0.0	0.0	0.00	0.17	91.7
All Vehicles		425	8.9	0.139	2.5	NA	0.5	3.4	0.11	0.19	89.8

Table 4: Operating Performance of Current Traffic Flows, Baxter Road / SH2 Intersection, AM Peak

The results indicate that the intersection currently operates well, with a high level of service (LOS) and low degree of saturation for all movements.

Table 5 summarises the expected operating performance of the intersection during the first year of Project Martha (expected to be 2020). This includes growth-adjusted SH2 volumes while the site generated traffic is not expected to change.

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	162	13.6	0.139	0.4	LOS A	0.5	3.4	0.19	0.18	92.1
3	R2	58	0.0	0.139	8.5	LOS A	0.5	3.4	0.19	0.18	82.2
Approach		220	10.0	0.139	2.5	NA	0.5	3.4	0.19	0.18	89.2
North: Baxter											
4	L2	5	0.0	0.004	10.1	LOS B	0.0	0.1	0.25	0.85	72.8
6	R2	5	0.0	0.008	12.1	LOS B	0.0	0.2	0.48	0.84	70.2
Approach		11	0.0	0.008	11.1	LOS B	0.0	0.2	0.36	0.84	71.4
West: SH2											
7	L2	49	2.1	0.027	7.9	LOS A	0.0	0.0	0.00	0.66	73.7
8	T1	145	10.1	0.079	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		195	8.1	0.079	2.0	NA	0.0	0.0	0.00	0.17	91.7
All Vehicles		425	8.9	0.139	2.5	NA	0.5	3.4	0.11	0.19	89.8

Table 5: Operating Performance, 2020, Baxter Road / SH2 Intersection, AM Peak

Table 5 shows that during the initial years minimal changes are expected during the morning peak of the activity as would be expected with no change to the site generated traffic.

Vehicle activity in year 11 (expected to be 2030) has been used to assess the long-term effects at this intersection noting that the site generated traffic component is expected to decrease.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	171	13.6	0.152	0.5	LOS A	0.5	4.1	0.21	0.18	92.1
3	R2	62	8.5	0.152	8.9	LOS A	0.5	4.1	0.21	0.18	78.3
Approach		233	12.2	0.152	2.7	NA	0.5	4.1	0.21	0.18	88.0
North: Baxter											
4	L2	4	0.0	0.003	10.1	LOS B	0.0	0.1	0.26	0.84	72.7
6	R2	4	0.0	0.007	12.4	LOS B	0.0	0.2	0.49	0.83	69.9
Approach		8	0.0	0.007	11.2	LOS B	0.0	0.2	0.37	0.84	71.3
West: SH2											
7	L2	54	7.8	0.031	8.0	LOS A	0.0	0.0	0.00	0.66	71.6
8	T1	153	10.3	0.084	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		206	9.7	0.084	2.1	NA	0.0	0.0	0.00	0.17	90.6
All Vehicles		447	10.8	0.152	2.6	NA	0.5	4.1	0.11	0.19	88.8

Table 6: Operating Performance, 2030, Baxter Road / SH2 Intersection, AM Peak

Table 6 indicates that the intersection is expected to continue to operate with a high level of performance and low degree of saturation in the morning peak (in terms of site activity) for the duration of the project.

The intersection survey indicated that the site generates a significantly lower rate of vehicle movements in the afternoons than the mornings, however the rate of through movements on the highway is significantly higher than during the morning period. Accordingly, the above scenarios have been repeated for the afternoon peak of 4pm to 5pm, which corresponds to the peak mine traffic activity.

The performance of the intersection with the surveyed turn movements and assessed through movements has been modelled, and the detailed tables are shown in Appendix A. The key points are summarised as follows:

- The intersection operates with a good level of service and low degrees of saturation for all movements based on the observed turning movements and current through movement data.
- With the small increase in site traffic by Year 3 of the project and growth on the highway, small increases in delay can be expected for vehicles exiting Baxter Road and turning right from the highway. Overall, however, a good level of service and low degree of saturation are expected.
- While the volumes of traffic associated with the mine are expected to have decreased after the end of the Rex underground works, the anticipated background growth on the highway is expected to lead to further increases in delay for turning vehicles. Effects on through-traffic on the highway are expected to be negligible.

It is further noted that if Project Martha were not to proceed, there would likely be negligible traffic using Baxter Road. This scenario has been used as a basis for comparison,

with each of the turn movements having a single light vehicle per hour, which is the minimum which can be modelled.

The difference between the two sets of data (with and without mine generated traffic) is that for vehicles exiting Baxter Road the average delay per vehicle increases by approximately 5 s per vehicle with the inclusion of mine traffic. Vehicles turning right into Baxter Road and through-traffic on the highway show no change in delay.

A further consideration particularly for an intersection in the high speed rural environment is the expected effects that increased traffic flows will have on road safety. The intersection has sightlines that meet the appropriate Austroads[3] standards, and the most difficult movement to make, being the right turn exit from Baxter Road to SH2, continues to operate well below its capacity with moderate levels of delay in all the modelled scenarios. The highest modelled degree of saturation for this movement is 27%, with peak delays of 39 s, occurring in year 2030.

As noted in Section 6.1, from approximately year six of the project the volume of traffic using the Baxter Road access may decrease by some small amount (less than 10%). If this occurs, it would slightly reduce any adverse effects at this intersection.

6.2.2 Road Safety

The number of right turns from SH2 into Baxter Road is not expected to change significantly due to the proposed activity excluding the importation of aggregate. As previously described, the intersection does not have a right-turn lane but has a wide shoulder which allows traffic to pass vehicles slowing or waiting to turn right. No issues have been identified in the recorded crash history, and observations of the intersection showed it to operate safely. On this basis it is assessed that the intersection is expected to continue to operate safely with the proposed small increases in mine traffic and the projected underlying highway growth in traffic through to 2030.

However, should the importation of aggregate result in an any more than minor increase in right turn movement into Baxter Road, particularly by trucks, then consideration is necessary to an intersection upgrade similar to that proposed by the consented Correnso project. OceanaGold currently has a separate consent for expansion of the Correnso operation, which includes a trigger for an intersection upgrade at SH2/Baxter Road if aggregate is brought to the site from Waitawheta Quarry. The required upgrade would likely include right-turn lanes at both Baxter Road and Crean Road. If aggregate is sourced from elsewhere then further assessment is required. The existing consent condition wording relating to this is:

"If the aggregate/backfill material required for the Correnso Underground Mine is not sourced from the Waitawheta Quarry on McLean Road, the Council shall be advised at least one month prior to the commencement of the aggregate/backfill haulage activity of the location of the source of the material and the expected haulage routes.

Intersection upgrades of State Highway 2 and Baxter Road and/or Crean Road shall be completed by and at the cost of the consent holder, prior to the first use of these intersections by trucks importing quarry rock to the site for the purpose of creating

[3] Austroads Guide to Road Design Part 4A

cemented aggregate fill (as approved under this land use consent). Prior to the commencement of the intersection upgrade, the consent holder shall submit to Council details of the design of the proposed upgrade, along with written confirmation from the NZTA (as the road controlling authority for State Highway 2) that the NZTA accepts the proposed design."

As noted in Sections 5 and 6, there is a possibility that CAF may be brought to site as part of Project Martha (independently of Correnso). The potential rate of truck movements would not exceed that already consented, and it is assessed that the mitigation required remains appropriate. It is therefore recommended to replicate a similar condition for this current application that requires an intersection upgrade on SH2 at Baxter Road (potentially to include the Crean Rd intersection) if CAF is to be imported for Project Martha.

As noted in Section 2.2.2, the NZTA is currently undertaking a programme of safety works on SH2, which may include an upgrade of the intersection of SH2 with Baxter Road. In this event it is likely that the necessary safety improvements will be in place prior to the giving effect to this consent. To clarify this possibility, it is recommended that the addition of the words "*Unless already completed*…" to the beginning of the second paragraph of the above recommended condition.

6.3 SH25 Access

A similar analysis has been carried out for the Barry Road access. Traffic volumes on SH25 are much lower than on SH2, but NZTA data indicates growth of approximately 3.4% per annum over the last ten years. This rate has been used for the analysis of future years.

Appendix A includes the detailed model output data, which is summarised as follows:

- During the morning peak (6am to 7am) based on the current (estimated minimal) site activity, as well as initial operating conditions and Year 10 conditions, the data indicates that the access can accommodate the expected reintroduction of site traffic with negligible effects on performance
- For the afternoon peak (4pm to 5pm) the analyses show that this access is expected to operate with a high level of service and minimal delays during the afternoon peak of site activity during all stages of the project.

The effects of these increases in traffic on the intersection's safety are expected to be negligible as the intersection has sight distances that meet Austroads standards and is operating well below its capacity with low delays to all movements.

No road safety issues have been identified at this access, and the modest increase in traffic is expected to be accommodated without significant safety effects.

As noted in Section 6.1, from approximately year six of the project the volume of traffic using the SH25 access may increase by some small amount (less than 10%). On the basis of the assessments described above, and the expected high level of operational performance, a change of this magnitude is assessed as having less than minor effects.

6.4 Grey Street Access

It is expected that a small number of vehicles will require use of this existing access throughout the project.

It is expected that there will be a small increase in traffic when mining commences in the pit. Six items of plant (large machinery) could be expected to use this entrance to enter the site initially, with approximately 8 plant movements during each of years 3 and 4. A further 8 to 11 movements per year are expected for years 4-8.

The applicant has advised that wherever possible, machines moved onto the site will stay for the duration of the open pit operation or their operating life. The pit duration is 6 years. Occasional other movements may occur from time to time as production rises and falls or a machine needs replacement, and there would be a period of towards the end of the project when the plant is removed from site.

These movements will be very infrequent, and any associated affects are assessed to be localised and less than minor.

6.5 Summary of Effects

Overall, it is concluded that the effects of the proposal, excepting the importation of aggregate, on the existing network including existing intersections, are less than minor. The largest changes result from the anticipated background growth or seasonal variation in traffic flows on the highway, which would be expected to occur regardless of the proposed activity going ahead.

With consideration to the potential for the importation of aggregate, a condition is recommended for inclusion in any consent to mitigate the effect of any aggregate deliveries which may require either further assessment or intersection upgrades.

7. Parking and Loading

At the company office in Waihi staff currently park in the metalled car park adjacent to the building, in two parking spaces marked alongside the loading access at the north side of the building, and on-street nearby. The number of staff based in the office is not expected to change, and therefore no parking-related effects are anticipated within the town.

Within the remainder of the mine site (i.e. adjacent to the Martha Pit and the workings accessed via Baxter Road), sealed and unsealed parking areas are provided at several locations and all vehicles associated with the mine are currently provided for on-site.

No changes to the existing parking facilities are proposed. The number of staff and contractors visiting the site is not expected to increase above historical levels as a result of the proposed activities.

A number of parking areas are located at surface level around the mine. All parking areas are located well within the site, and it is assessed that off-site parking will not occur.

Specific loading areas are not provided within the site, with any deliveries being taken to the required location within the mine. Delivered materials will be set down in appropriate locations as directed by mine staff, in line with operational safety guidelines. No off-site loading effects are anticipated.

8. Road Realignment

8.1 Proposed Network Change

8.1.1 Cambridge Rd / Bulltown Rd Realignment

The MP4 component of the project will involve a minor enlargement of the existing Martha pit, which is located within Waihi township. Specifically, the northern side of the pit wall is proposed to be cut back and this will move the edge of the pit and northwards.

The proposed laying back of the pit wall affects two local roads, namely Cambridge Road and Bulltown Road, between Savage Road and William Street. It is proposed to realign these roads over a length of approximately 270 m to accommodate the proposed pit wall. The design of the new alignment will be in accordance with Council standards and, as the traffic route will not be substantially altered, the net traffic effects of realignment are expected to be negligible. The road alignment of the Cambridge Road - Bulltown Road corner will require the purchase and relocation of one private dwelling. it is understood that negotiations are currently underway with the owner. The effects on other properties are expected to be minor.

The proposed maximum extents of the Martha pit are shown on Figure 16, and demonstrates that a small realignment will be required as the pit edge will overlap the current alignment.

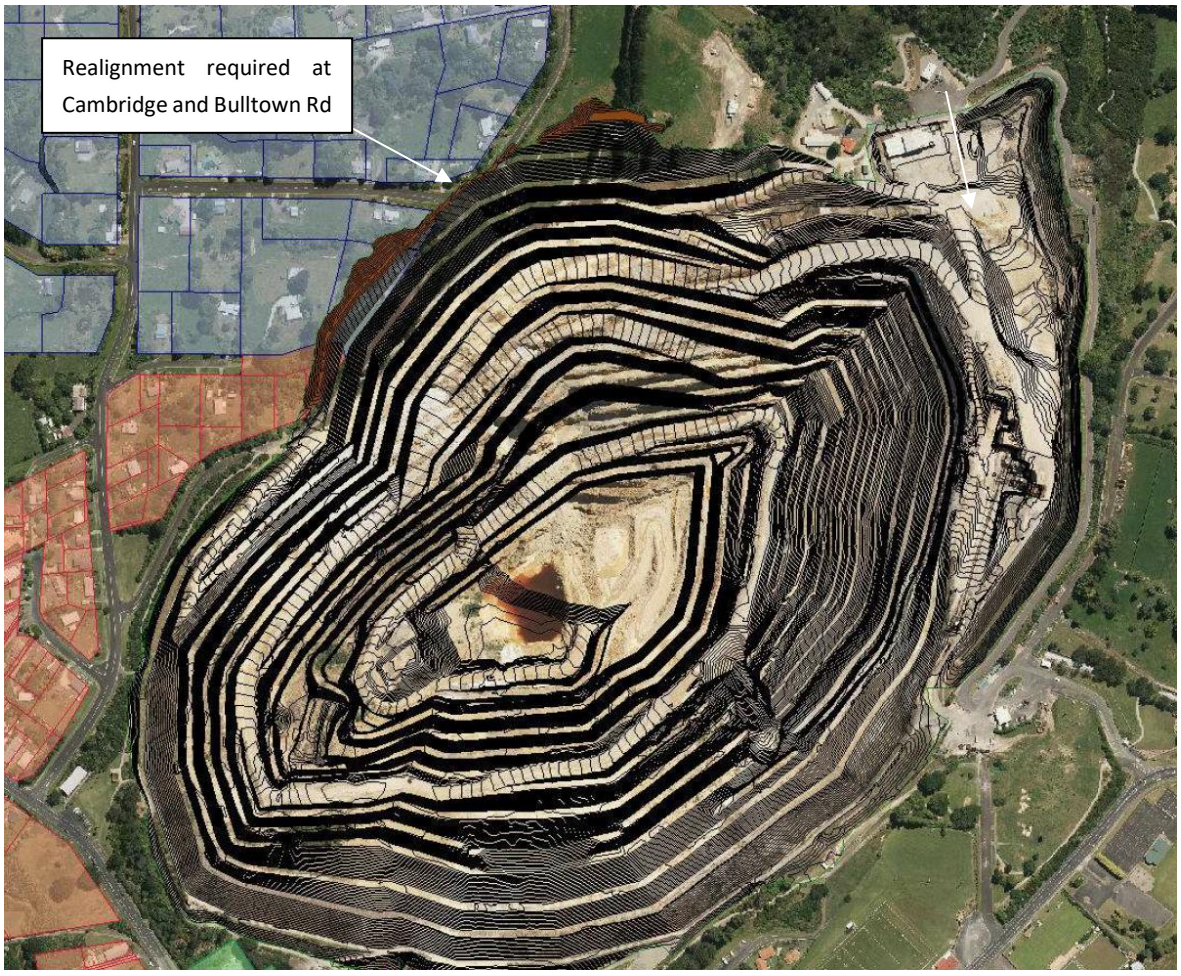


Figure 16: Full extent of Martha Phase 4 Pit in Relation to Surrounding Roads

A concept design for the new road alignment has been prepared, and is described below and shown on Figure 17 (a larger version is included at Appendix B). The alignment shown is reproduced at a larger scale in Appendix B. The cross-sections and intersection concepts have been prepared to the requirements of the Hauraki District Council Engineering Manual. The key design parameters adopted are:

- The concept realignment of Cambridge Road and Bulltown Road comprises a 20 m wide legal road corridor. The proposed road will have a nominal seal width of 9 m to match the existing Cambridge Road carriageway, and will include tapers to match the existing Cambridge Road carriageway of approximately 11 m at the western tie-in and the Bulltown Road carriageway of approximately 6 m at the northern tie-in.
- Geometric elements have been designed in accordance with the Austroads Guide to Road Design Part 3: Geometric Design.
- The existing reverse curve will be significantly improved, with the larger radius curve being reduced in length, and the smaller 65 m radius curve being increased to a radius of 140 m.
- Minimum horizontal radius curves are 140 m and are larger radius than existing curves.

- The realignment will improve the horizontal geometry and improve the relatively sudden change in carriageway width at the urban/rural boundary which is present in the current alignment. Overall, this is assessed as being a net benefit, however the effects are small enough that they are unlikely to be noticeable to road users.
- Existing minor undulations in the vertical alignment will be eliminated, with a constant grade of approximately 8% for the new alignment.
- A vertical crest curve k value of 6.8 and sag curve k value of 7.0 have been used.
- Superelevation has not been applied to any of the curves.
- Cut slopes have been shown at 1:3 and fill slopes at 1:4.
- The realignment has been designed to minimise earthworks overall, and specifically to avoid completely the need for any earthworks which would affect No.10 Cambridge Road and No.79 Bulltown Road, which are not owned by OceanaGold. The realignment is expected to result in a reduction in road length of approximately 12 m.
- Additionally, it is expected that the proposed realignment will incorporate a crossing point for pedestrians in the vicinity of No.10 Cambridge Road (at the western end of the realigned section) and short section of footpath on the southern side of the road which will connect to the pit perimeter path within the mine site. This will provide increased connectivity along Bulltown Road (noting that at present the footpath ends outside No.77 Bulltown Road.)

The detailed design for the new roading is to be completed in consultation with Hauraki District Council, to ensure that the new alignments and intersections remain compliant with the requirements of the Hauraki District Council Engineering Manual or other agreed standard and a condition of consent is recommended to this effect.

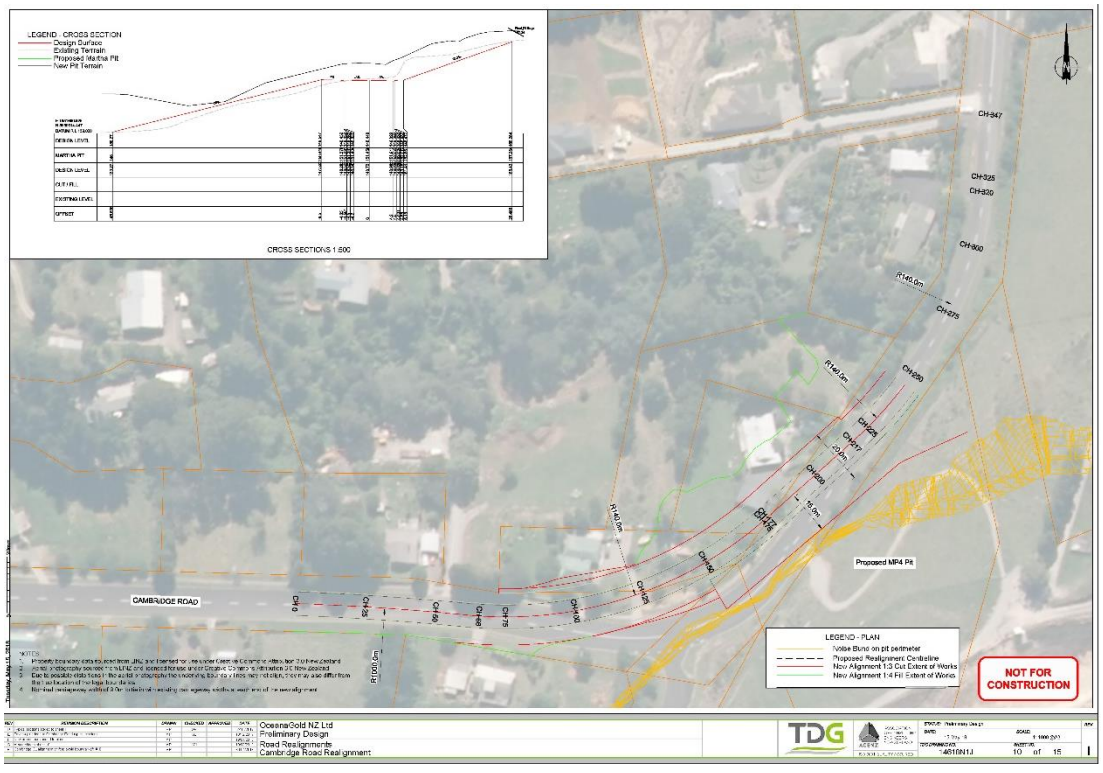


Figure 17: Proposed Cambridge Road / Bulltown Road Realignment

8.2 Construction Effects

It is likely that the construction of this new road section will cause a minor level of disruption at a local level, but will be subject to a Construction Traffic Management Plan (CTMP). There will inevitably be lane closures, temporary lowered speed limits, and possibly full closures of the road for short durations, subject to consultation with Council. It is expected that these will be managed through the CTMP. The CTMP will need to identify (among other things) diversion routes, how the works will be signposted to road users, and the level of consultation required with affected road users and nearby residents and businesses. The CTMP will require certification from the Council, as the road controlling authority, before works can be undertaken. This is in accordance with normal process for undertaking work on the public road network.

The construction effects of the road realignments will be temporary and short-term. The expected traffic effects associated with construction, when appropriately mitigated by way of a CTMP, are assessed to be no more the minor.

8.3 Summary

The design for the road realignment will retain the existing overall form and level of service of the road network in terms of connectivity and intersection priorities. The new alignment will marginally reduce the length of the road and will improve the existing horizontal and vertical alignment.

On the basis that the realignment will have improved geometry compared to the current alignment, no road safety issues have been identified along the proposed realignment route of these roads.

It is therefore anticipated that there will be a small positive effect on the network overall resulting from the realignment of Cambridge Road and Bulltown Road.

9. Conclusions

OceanaGold is proposing a package of mining activities which will extend the operation of the existing Waihi gold mine. It is intended that the components of the project will come online as existing operations wind down and will make use of the existing workforce and on-site infrastructure.

The total number of staff and contractors on site is expected to vary over the 11-year life of the project, however is generally expected to be commensurate with the current and recent staffing levels, and lower than the peak numbers working at the site in recent years (approximately 2011). Traffic generation on public roads is expected to mostly comprise of staff movements to and from the site, along with occasional delivery and maintenance access. Heavy vehicle movements associated with the mine activity, e.g. the movement of ore and rock, will be limited within the site boundaries. The key change resulting from the increase in staff numbers will be associated with the proposed reinstatement of working in the Martha Pit, which has been closed except for maintenance works since mid-2015. The possible use of imported fill material has been noted and, if this does occur a condition has been recommended that requires either an upgrade of the Baxter Road intersection with SH2 as appropriate or further assessment relevant to the source of material and proposed route for delivery.

Activities on the eastern part of the site accessed via Baxter Road will make use of existing staff and plant, who will transfer to the new operations from the existing works, which will result in minimal changes to staffing numbers and related traffic movements at this access, relative to current activity.

An increase in levels of activity at the Barry Road access compared to current levels, although at lower levels than during previous working of the pit, is expected as the Martha Pit element of the project commences in the third year. Overall, based on similar traffic patterns eventuating as in previous years, the effects on the road network are assessed as less than minor. Internally within the site, new roading will be constructed as needed throughout the project. However, no changes are proposed to the site's access arrangements onto the public road network.

Cambridge Road and Bulltown Road within Waihi, which currently run near the edge of the Martha pit, are proposed to be realigned to allow for the expansion of the pit to the north. The realignment is expected to maintain the current overall network connectivity while improving the road geometry and will ultimately have a small but positive effect on the safety and efficiency of the network.

A comprehensive Construction Temporary Traffic Management process exists for managing construction on the public road network, and this process will be utilised for all the road network components of the proposal.

Overall, it is assessed that the proposed Project Martha together with the recommendations herein will have less than minor effects on the surrounding road network.

TDG

Appendix A

Intersection Modelling

Baxter Road / SH2 Intersection

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	396	9.8	0.220	0.1	LOS A	0.1	0.4	0.01	0.00	99.6
3	R2	2	50.0	0.220	15.1	LOS C	0.1	0.4	0.01	0.00	67.2
Approach		398	10.1	0.220	0.2	NA	0.1	0.4	0.01	0.00	99.4
North: Baxter											
4	L2	18	5.9	0.024	12.7	LOS B	0.1	0.6	0.51	0.89	67.7
6	R2	17	0.0	0.063	21.5	LOS C	0.2	1.5	0.77	1.00	60.0
Approach		35	3.0	0.063	17.0	LOS C	0.2	1.5	0.63	0.94	63.8
West: SH2											
7	L2	3	33.3	0.002	8.7	LOS A	0.0	0.0	0.00	0.66	63.7
8	T1	498	10.1	0.272	0.0	LOS A	0.0	0.0	0.00	0.00	99.8
Approach		501	10.3	0.272	0.1	NA	0.0	0.0	0.00	0.00	99.5
All Vehicles		934	9.9	0.272	0.7	NA	0.2	1.5	0.03	0.04	97.4

Table 7: Operating Performance of Current Traffic Flows, Baxter Road / SH2 Intersection, PM Peak

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	417	9.8	0.233	0.1	LOS A	0.1	0.5	0.02	0.01	99.5
3	R2	4	0.0	0.233	11.6	LOS B	0.1	0.5	0.02	0.01	88.0
Approach		421	9.7	0.233	0.2	NA	0.1	0.5	0.02	0.01	99.3
North: Baxter											
4	L2	41	10.3	0.058	13.4	LOS B	0.2	1.6	0.54	0.94	65.8
6	R2	38	11.1	0.181	27.1	LOS D	0.6	4.7	0.83	1.01	52.9
Approach		79	10.7	0.181	20.0	LOS C	0.6	4.7	0.68	0.97	58.9
West: SH2											
7	L2	7	14.3	0.004	8.2	LOS A	0.0	0.0	0.00	0.66	69.4
8	T1	523	10.1	0.286	0.0	LOS A	0.0	0.0	0.00	0.00	99.8
Approach		531	10.1	0.286	0.1	NA	0.0	0.0	0.00	0.01	99.2
All Vehicles		1031	10.0	0.286	1.7	NA	0.6	4.7	0.06	0.08	94.3

Table 8: Operating Performance, 2020, Baxter Road / SH2 Intersection, PM Peak

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	493	9.8	0.275	0.1	LOS A	0.1	0.8	0.02	0.01	99.4
3	R2	4	0.0	0.275	13.2	LOS B	0.1	0.8	0.02	0.01	88.0
Approach		497	9.7	0.275	0.2	NA	0.1	0.8	0.02	0.01	99.3
North: Baxter											
4	L2	41	10.3	0.069	14.6	LOS B	0.2	1.9	0.58	0.97	64.6
6	R2	38	11.1	0.269	38.7	LOS E	0.9	6.9	0.90	1.02	45.3
Approach		79	10.7	0.269	26.2	LOS D	0.9	6.9	0.73	1.00	53.7
West: SH2											
7	L2	7	14.3	0.004	8.2	LOS A	0.0	0.0	0.00	0.66	69.4
8	T1	619	10.2	0.338	0.0	LOS A	0.0	0.0	0.00	0.00	99.8
Approach		626	10.3	0.338	0.1	NA	0.0	0.0	0.00	0.01	99.2
All Vehicles		1202	10.1	0.338	1.9	NA	0.9	6.9	0.06	0.07	94.0

Table 9: Operating Performance, 2030, Baxter Road / SH2 Intersection, PM Peak

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	493	9.8	0.270	0.0	LOS A	0.0	0.2	0.00	0.00	99.8
3	R2	1	0.0	0.270	13.2	LOS B	0.0	0.2	0.00	0.00	88.3
Approach		494	9.8	0.270	0.1	NA	0.0	0.2	0.00	0.00	99.8
North: Baxter											
4	L2	1	0.0	0.002	13.1	LOS B	0.0	0.0	0.55	0.80	69.5
6	R2	1	0.0	0.006	28.7	LOS D	0.0	0.1	0.85	0.93	53.8
Approach		2	0.0	0.006	20.9	LOS C	0.0	0.1	0.70	0.86	60.6
West: SH2											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.00	0.66	75.3
8	T1	619	10.2	0.338	0.0	LOS A	0.0	0.0	0.00	0.00	99.8
Approach		620	10.2	0.338	0.1	NA	0.0	0.0	0.00	0.00	99.7
All Vehicles		1116	10.0	0.338	0.1	NA	0.0	0.2	0.00	0.00	99.6

Table 10: Baseline Operating Performance, 2030, Baxter Road / SH2 Intersection, PM Peak

SH25 Access

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	35	9.1	0.025	0.1	LOS A	0.1	0.4	0.06	0.12	95.8
3	R2	7	14.3	0.025	8.3	LOS A	0.1	0.4	0.06	0.12	78.4
Approach		42	10.0	0.025	1.5	NA	0.1	0.4	0.06	0.12	92.2
North: Baxter											
4	L2	1	0.0	0.001	9.7	LOS A	0.0	0.0	0.12	0.91	72.8
6	R2	2	0.0	0.002	9.7	LOS A	0.0	0.1	0.22	0.86	72.8
Approach		3	0.0	0.002	9.7	LOS A	0.0	0.1	0.18	0.87	72.8
West: SH2											
7	L2	20	10.5	0.012	8.1	LOS A	0.0	0.0	0.00	0.66	70.7
8	T1	40	10.5	0.022	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		60	10.5	0.022	2.7	NA	0.0	0.0	0.00	0.22	87.8
All Vehicles		105	10.0	0.025	2.4	NA	0.1	0.4	0.03	0.20	89.0

Table 11: Operating Performance, 2022, SH25 Access, AM Peak

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	43	7.3	0.029	0.1	LOS A	0.1	0.4	0.06	0.10	96.4
3	R2	7	14.3	0.029	8.3	LOS A	0.1	0.4	0.06	0.10	78.8
Approach		51	8.3	0.029	1.3	NA	0.1	0.4	0.06	0.10	93.4
North: Baxter											
4	L2	1	0.0	0.001	9.7	LOS A	0.0	0.0	0.13	0.89	72.8
6	R2	2	0.0	0.002	9.9	LOS A	0.0	0.1	0.24	0.85	72.7
Approach		3	0.0	0.002	9.8	LOS A	0.0	0.1	0.20	0.86	72.7
West: SH2											
7	L2	20	10.5	0.012	8.1	LOS A	0.0	0.0	0.00	0.66	70.7
8	T1	51	10.4	0.028	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		71	10.4	0.028	2.3	NA	0.0	0.0	0.00	0.19	89.5
All Vehicles		124	9.3	0.029	2.1	NA	0.1	0.4	0.03	0.17	90.5

Table 12: Operating Performance, 2029, SH25 Access, AM Peak

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	92	1.1	0.055	0.0	LOS A	0.1	0.5	0.04	0.07	97.3
3	R2	11	0.0	0.055	7.9	LOS A	0.1	0.5	0.04	0.07	86.3
Approach		102	1.0	0.055	0.9	NA	0.1	0.5	0.04	0.07	96.0
North: Baxter											
4	L2	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.17	0.87	72.8
6	R2	1	0.0	0.001	10.3	LOS B	0.0	0.0	0.31	0.81	72.3
Approach		2	0.0	0.001	10.0	LOS B	0.0	0.0	0.24	0.84	72.5
West: SH2											
7	L2	1	0.0	0.001	7.8	LOS A	0.0	0.0	0.00	0.66	75.3
8	T1	78	9.5	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		79	9.3	0.042	0.1	NA	0.0	0.0	0.00	0.01	99.5
All Vehicles		183	4.6	0.055	0.6	NA	0.1	0.5	0.03	0.05	97.1

Table 13: Operating Performance of Current Traffic Flows, SH25 Access, PM Peak

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	119	9.7	0.066	0.0	LOS A	0.0	0.1	0.00	0.01	99.7
3	R2	1	0.0	0.066	8.0	LOS A	0.0	0.1	0.00	0.01	88.2
Approach		120	9.6	0.066	0.1	NA	0.0	0.1	0.00	0.01	99.6
North: Baxter											
4	L2	7	14.3	0.006	10.7	LOS B	0.0	0.2	0.20	0.88	67.3
6	R2	20	10.5	0.026	11.4	LOS B	0.1	0.7	0.36	0.87	67.5
Approach		27	11.5	0.026	11.2	LOS B	0.1	0.7	0.32	0.87	67.4
West: SH2											
7	L2	2	0.0	0.001	7.8	LOS A	0.0	0.0	0.00	0.66	75.3
8	T1	93	10.2	0.051	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		95	10.0	0.051	0.2	NA	0.0	0.0	0.00	0.01	99.3
All Vehicles		242	10.0	0.066	1.4	NA	0.1	0.7	0.04	0.11	94.4

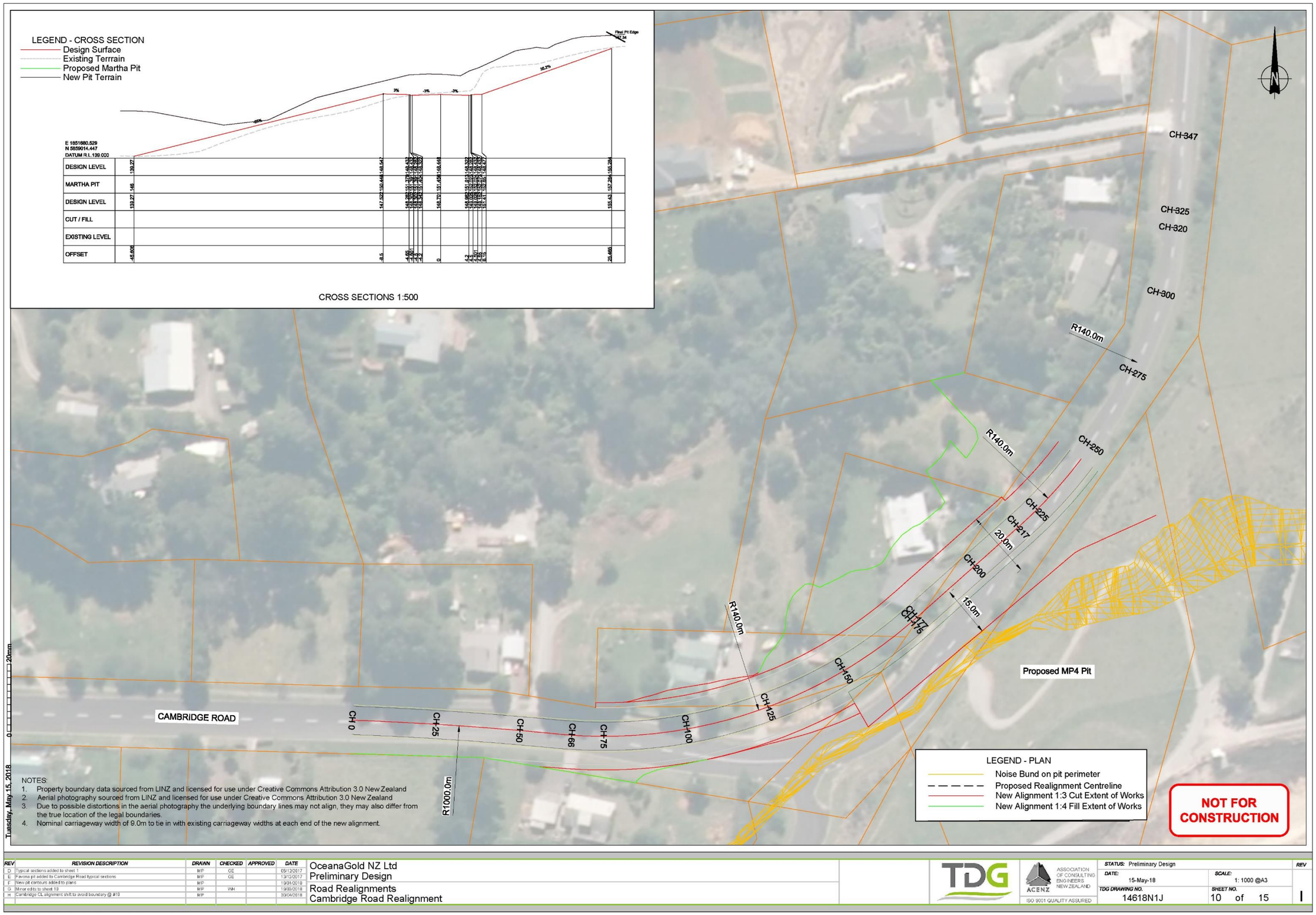
Table 14: Operating Performance of Expected Traffic Flows, SH25 Access, PM Peak

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: SH2											
2	T1	151	9.8	0.083	0.0	LOS A	0.0	0.1	0.00	0.00	99.8
3	R2	1	0.0	0.083	8.1	LOS A	0.0	0.1	0.00	0.00	88.3
Approach		152	9.7	0.083	0.1	NA	0.0	0.1	0.00	0.00	99.7
North: Baxter											
4	L2	7	14.3	0.006	10.8	LOS B	0.0	0.2	0.23	0.87	67.3
6	R2	20	10.5	0.028	11.9	LOS B	0.1	0.8	0.41	0.87	66.9
Approach		27	11.5	0.028	11.6	LOS B	0.1	0.8	0.36	0.87	67.0
West: SH2											
7	L2	2	0.0	0.001	7.8	LOS A	0.0	0.0	0.00	0.66	75.3
8	T1	117	9.9	0.064	0.0	LOS A	0.0	0.0	0.00	0.00	100.0
Approach		119	9.7	0.064	0.1	NA	0.0	0.0	0.00	0.01	99.4
All Vehicles		298	9.9	0.083	1.2	NA	0.1	0.8	0.04	0.09	95.3

Table 15: Operating Performance, 2034, SH25 Access, PM Peak

Appendix B

Road Realignment Plan


LEGEND - CROSS SECTION
Design Surface
Existing Terrrain
Proposed Martha Pit
New Pit Terrain
E 1851680.529
N 5859014.447
DATUM R.L.139.000
DESIGN LEVEL
MARTHA PIT
DESIGN LEVEL
CUT / FILL
EXISTING LEVEL
OFFSET
CROSS SECTIONS 1:500
CH 347
CH 325
CH 320
CH 300
CH 275
CH 250
CH 225
CH 217
CH 200
CH 175
CH 150
CH 125
CH 100
CH 75
CH 66
CH 50
CH 25
CH 0
R140.0m
R1000.0m
20.0m
15.0m
CAMBRIDGE ROAD
Proposed MP4 Pit
LEGEND - PLAN
Noise Bund on pit perimeter
Proposed Realignment Centreline
New Alignment 1:3 Cut Extent of Works
New Alignment 1:4 Fill Extent of Works
NOT FOR CONSTRUCTION
NOTES:
1. Property boundary data sourced from LINZ and licensed for use under Creative Commons Attribution 3.0 New Zealand
2. Aerial photography sourced from LINZ and licensed for use under Creative Commons Attribution 3.0 New Zealand
3. Due to possible distortions in the aerial photography the underlying boundary lines may not align, they may also differ from the true location of the legal boundaries.
4. Nominal carriageway width of 9.0m to tie in with existing carriageway widths at each end of the new alignment.
Tuesday, May 15, 2018
0 20mm
REV | REVISION DESCRIPTION | DRAWN | CHECKED | APPROVED | DATE
D | Typical sections added to sheet 1 | MP | GE | | 05/12/2017
E | Pavona pit added to Cambridge Road typical sections | MP | GE | | 13/12/2017
F | New pit contours added to plans | MP | | | 19/01/2018
G | Minor edits to sheet 10 | MP | WH | | 19/03/2018
H | Cambridge CL alignment shift to avoid boundary @ #10 | MP | | | 30/04/2018
OceanaGold NZ Ltd
Preliminary Design
Road Realignments
Cambridge Road Realignment
TDG
ACENZ
ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND
ISO 9001 QUALITY ASSURED
STATUS: Preliminary Design
DATE: 15-May-18
SCALE: 1: 1000 @A3
TDG DRAWING NO. 14618N1J
SHEET NO. 10 of 15
REV I