NI43-101 Technical Report

for the

OceanaGold, Waihi Mine

28th March 2019

Report Authors:
Trevor Maton, B.Sc. (Hons), M.Sc., M.Sc. (Min. Econ.), MAusIMM (CP)

David Carr, B.Sc., MAusIMM (CP)

David Townsend, MAusIMM (CP)

Peter Church, B.Sc., MAusIMM (CP)

TECHNICAL REPORT CERTIFICATION

The effective date of this Technical Report and sign off is 28th March 2019.

Trevor Maton Date: 28th March 2019

Peter Church Date 28th March 2019

David Townsend Date 28th March 2019

David Carr Date 28th March 2019

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CERTIFICATE OF QUALIFIED PERSON

As a qualified person and co-author of the report titled "NI 43-101 Technical Report for the OceanaGold Waihi Operation, New Zealand" (Technical Report) dated 28th March 2019, to which this certificate applies, I, Trevor William Maton do hereby certify that:

1. I, Trevor William Maton, am the Study Manager for OceanaGold Corporation. My business address is Moresby Avenue, Waihi, New Zealand.

2. I graduated with a BSc. (Hons) Mining Engineering in 1981 from Imperial College of Science and Technology and an MSc. Economics in 2002 from Curtin University School of Business. I hold first class mine manager certificates of competency in Queensland and New Zealand.

3. I am a member and Chartered Professional (Mining) in good standing with the AusIMM.

4. I have worked as a mining engineer and study manager in the mining industry for a total of 35 years since my graduation.

5. I have read the definition of "qualified person" set out in the National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and confirm that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am based at the Waihi Operation.

7. I am responsible for Sections 1.1 – 1.6, 1.14 – 1.15, 1.17- 1.23, 2-6, 15-16 and 18 – 24, 25.5-25.7 of the "NI 43-101 Technical Report for the Waihi Gold Mine" dated March 28, 2019.

8. I am not independent of OceanaGold Corporation applying all the tests in item 1.5 of NI 43-101 because I am an employee of OceanaGold (New Zealand) Limited.

9. I have had involvement with the Waihi Gold Operation since 2003.

10. I have read NI 43-101 and the items of the Technical Report under my responsibility have been prepared in compliance with NI 43-101.

11. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Trevor William MATON

Date of Signature: 28th March 2019

CERTIFICATE OF QUALIFIED PERSON

As a qualified person and co-author of the report titled “NI 43-101 Technical Report for the Waihi Gold Operation, New Zealand” (Technical Report) dated 28th March 2019, to which this certificate applies, I, Peter Church do hereby certify that:

1. I, Peter Church, am the Principal Resource Development Geologist for OceanaGold Corporation. My business address is Moresby Avenue, Waihi, New Zealand.

2. I graduated with a BSc. Geology.

3. I am a member and Chartered Professional in good standing with the AusIMM.

4. I have worked as a geologist for a total of 26 years since my graduation.

5. I have read the definition of “qualified person” set out in the National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* (“NI 43-101”) and confirm that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a “qualified person” for the purposes of NI 43-101.

6. I am based at the Waihi Operation.

7 I am responsible for Items 1.7 – 1.11, 1.13, 1.21, 6 – 12, 14, 23, 25.1 – 25.3 and 26 of the “NI 43-101 Technical Report for the Waihi Gold Mine” dated March 28, 2019.

8. I am not independent of OceanaGold Corporation applying all the tests in item 1.5 of NI 43-101 because I am an employee of OceanaGold (New Zealand) Limited.

9. I have had involvement with the Waihi Gold Operation since 2011.

10. I have read NI 43-101 and the items of the Technical Report under my responsibility have been prepared in compliance with NI 43-101.

11. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Peter CHURCH

Date of Signature: 28th March 2019

CERTIFICATE OF QUALIFIED PERSON

As a qualified person and co-author of the report titled "NI 43-101 Technical Report for the Waihi Gold Operation, New Zealand" (Technical Report) dated 28th March 2019, to which this certificate applies, I, Dino Bertoldi do hereby certify that:

1. I, David Carr, am the Chief Metallurgist for OceanaGold Corporation. My business address is 99 Melbourne Street, South Brisbane, Australia.

2. I graduated with a Bachelor of Engineering in Metallurgical Engineering from the University of South Australia.

3. I am a member and Chartered Professional in good standing with the AusIMM.

4. I have worked as Metallurgist and for a total of 26 years since my graduation.

5. I have read the definition of "qualified person" set out in the National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and confirm that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101.

6. Last visited the Waihi mine in September 2018.

7 I am responsible for Items 13, 17 and 21.2 of the "NI 43-101 Technical Report for the Waihi Gold Mine" dated March 28, 2019.

8. I am not independent of OceanaGold Corporation applying all the tests in item 1.5 of NI 43-101 because I am an employee of OceanaGold (New Zealand) Limited.

9. I have had involvement with the Waihi Gold Operation since 2015.

10. I have read NI 43-101 and the items of the Technical Report under my responsibility have been prepared in compliance with NI 43-101.

11. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

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David CARR

Date of Signature: 28th March 2019

CERTIFICATE OF QUALIFIED PERSON

As a qualified person and co-author of the report titled "NI 43-101 Technical Report for the Waihi Gold Operation, New Zealand" (Technical Report) dated 28th March 2019, to which this certificate applies, I, David James Townsend do hereby certify that:

1. I, David James Townsend, am the Underground Technical Services Superintendent for OceanaGold Corporation Waihi Operations. My business address is Moresby Avenue, Waihi, New Zealand.

2. I graduated with an Associate Degree in Spatial Science from the University of Southern Queensland in 2007, and a Graduate Diploma in Mining from the University of Ballarat in 2012.

3. I am a member and Chartered Professional (Mining) in good standing with the AusIMM.

4. I have worked in the mining industry for a total 19 years, 7 of which are post my graduation.

5. I have read the definition of "qualified person" set out in the National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and confirm that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am based at the Waihi Operation.

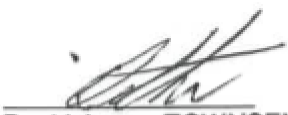
7. I am responsible for Sections I am responsible for Sections 1.1 – 1.6, 1.14 – 1.15, 1.17- 1.23, 15-16 and 18 - 24, 25.5-25.7 of the "NI 43-101 Technical Report for the Waihi Gold Mine" dated March 28, 2019. of the "NI 43-101 Technical Report for the Waihi Gold Mine" dated March 28, 2019.

8. I am not independent of OceanaGold Corporation applying all the tests in item 1.5 of NI 43-101 because I am an employee of OceanaGold (New Zealand) Limited.

9. I have had involvement with the Waihi Gold Operation since 2006.

10. I have read NI 43-101 and the items of the Technical Report under my responsibility have been prepared in compliance with NI 43-101.

11. As of the date of this certificate, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.



David James TOWNSEND

Date of Signature: 28th March 2019

1 SUMMARY

1.1 Overview

The Waihi Project area is situated within the world class gold mining town of Waihi located on the North Island of New Zealand. The Mineral Resources within Waihi are currently estimated to be 0.84 Million ounces of Measured and Indicated gold resource at an average grade of 4.88 grams per tonne and a further 1.08 million ounces gold in the Inferred category; the average ore grade of the Inferred material is 5.72 g/t Au. The Mineral Reserves are currently estimated to be 0.18 million ounces gold, supporting a mine life of 4 years.

The previous NI 43 101 technical report for the Waihi operation was filed in November 2015. This technical report prepared in accordance with Canadian National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") for the Waihi operation ("Technical Report") summarises work completed during the past twelve months covering optimisation of existing operations and exploration at the Wharekirauponga (WKP) deposit situated approximately 10 km north of Waihi. This report supports Mineral Resources and Mineral Reserves as at December 31, 2018.

1.2 Introduction

Waihi

Mining has played an important role in the history of the Waihi town since gold was first discovered in 1879. Since then the Martha deposit within the heart of the Waihi town has produced close to 6.9 Moz of Au. Historical underground mining of the Martha veins took place from 1882 to 1952 and an open pit mine extracted ore from the upper portions of the vein system from 1988 to April 2015. When mineralisation was discovered in the Favona deposit located approximately 2 km east of the Martha deposit a modern-day underground mine was developed, and extraction of ore commenced in 2004. This underground mine is still currently in operation having extracted ore from numerous vein systems in-between the Favona and Martha ore bodies including the Trio and Correnso ore bodies (producing approximately 1.1Moz Au to date). Ore is processed on site adjacent to the existing Favona underground portal. Recovery of gold at Waihi is achieved through a conventional SAG Mill-Ball Mill grinding circuit followed by Carbon in Pulp (CIP) leach circuit with a conventional elution and electro-winning circuit.

The OceanaGold, Waihi operation holds the necessary permits, consents, certificates, licences and agreements required to conduct its current operations, and to continue mining the Correnso ore body and develop the Martha underground mine in the future.

WKP

WKP is an exploration project situated approximately 10 km north of the Waihi town. A mineral resource estimation has been calculated for this area based on 31307m of diamond drilling. The project is currently at an exploration phase with no permits or consent established for mining.

1.3 Reliance on Other Experts

The authors, Qualified and Non-Independent Persons as defined by NI 43-101, were engaged by OceanaGold to study technical documentation relevant to the Technical Report, to contribute to or review the Technical Report on the Waihi operation, and to recommend a work programme if warranted.

The authors relied on several reports and opinions for information that is not within the authors' fields of expertise and these are detailed in Section 27.

The authors believe the information used to prepare the report and formulate its conclusions and recommendations is valid and appropriate considering the status of the operation and the purpose for which the Report is prepared. The authors, by virtue of their technical review of the project's exploration potential, affirm that the work programme and recommendations presented in the Report are in accordance with NI 43-101 and the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") technical standards.

1.4 Property Description, Location and Ownership

The Waihi and WKP projects are located on the North Island of New Zealand. All naturally occurring gold and silver minerals in New Zealand are owned by the Crown. Rights to prospect, explore or mine for these minerals are granted by permits issued under the Crown Minerals Act 1991 (CMA). Mineral exploration permits provide a permit holder the exclusive rights to explore for the specified minerals in an area. Minerals mining permits grant the holder to exclusive rights to mine for the specified minerals. The right to exchange an exploration permit with a mining permit may occur provided certain criteria specified in the Crown Minerals Act 1991 (CMA) are met (available at:

http://www.legislation.govt.nz/act/public/1991/0070/latest/whole.html#DLM246338).

1.4.1 Waihi

The Waihi mine is located within the township of Waihi situated within the Hauraki District. The Waihi project is managed by OceanaGold (New Zealand) Limited, a 100% owned subsidiary of the OceanaGold Corporation. All gold mining activities in Waihi including the current underground mining operation, the ore processing plant, tailings facility and the inactive Martha open pit are within the existing Favona Mining Permit 41 808 (MP 41808). The Martha open pit and the tailings storage facility were previously under the Mining Licence 32 2388 (ML 32 2388) prior to its expiry in July 2017 at which time the land area was merged into MP 41808.

MP 41808 extends across an area of 1485.38 hectares characterised by urban and rural land use. Land ownership is variable including parcels owned by OceanaGold, private landowners and government organisations. Permission is required by the landowner for access to the land.

OceanaGold holds a suite of resource consents from the Hauraki District Council (HDC) and Waikato Regional Council (WRC) relating to mining and associated discharge activities for the Mining Licence and Extended Project areas. Resource Consent for the Correnso Underground Project was permitted on the 7th October 2013 and mining is nearing completion. Resource Consent for underground mining of the remnant mineralisation around the Martha vein system was recently granted on the 12th December 2018.

1.4.2 Wharekirauponga (WKP)

The WKP Project is located approximately 10 km to the north of Waihi, held under mineral exploration permit 40598 (EP 40 598). The project is located on land owned by the Crown and administered by the Department of Conservation (DOC) as a conservation/forest park. Exploration activity requires an access arrangement with DOC in addition to resource consents from district and regional councils. Under the Crown Minerals Act 1991 exploration is restricted to low impact and higher impact activities including, but not limited to drilling, bulk sampling and trenching. All required mineral tenures, access agreements and consents have been obtained for the current work programmes. Known environmental liabilities are managed through stipulated conditions in the DOC access agreement and Regional and District Council Consents.

1.5 Accessibility, Climate, Local resources, Infrastructure and Physiography

Waihi town is situated 132 km from Auckland International Airport, an approximately 2-hour drive on a dual carriageway which is in good condition. The Waihi town is a large resource centre with a supermarket, two petrol stations and a sizeable retail hub. The township has a population of 4,527 (2017 census). The nearest domestic airport is 66 km to the south in Tauranga city.

The WKP project is remotely situated within the Coromandel ranges. It can be accessed by an easy to moderate hiking track (approximately 1.5-hour hike) from a road end which is an approximately 20-minute drive from the coastal town of Whangamata (or a 45-minute drive along a tar sealed road from Waihi). There is no infrastructure at the WKP project.

The climate within the Coromandel Peninsula is temperate. Mean monthly temperatures range from 8.9 °C in July to 18.9 °C in January. The Coromandel ranges reach over 600 m above sea level in places and run along the length of the Coromandel Peninsula. These ranges receive on average 2000mm of rainfall per annum, with approximately 31% of rainfall expected within the winter months between June and August and 22% of rain in the summer months between December and February.

Road, rail and air networks cover the country with road transport being the dominant method of passenger and freight transport. Bulk freight is mainly transported by coastal shipping and rail.

New Zealand's system of utilities is extensive. Large hydroelectric dams generate approximately 59 per cent of electricity with the remaining 61% produced by thermal (16%) (coal, diesel and gas), geothermal (17%) and wind (5%).

1.6 Project History

1.6.1 Waihi

Waihi is a historic mining centre. The original Martha mine began as an underground operation in 1879 and by 1952, about 12 million tonnes of ore had been mined to yield 1,217 tonnes of gold-silver bullion. The historic mine extracted four main parallel lodes (the Martha, Welcome, Empire and Royal) together with numerous branch and cross lodes.

Exploration drilling between 1979 and 1984 by Waihi Mining and Development Ltd. and AMAX Exploration Ltd. identified large open pit reserves within the confines of the historic mining area. Following the granting of permits, the Martha Mine open pit operation commenced operation in 1988 as an unincorporated joint venture between subsidiaries of Normandy Mining Limited Group and Otter Gold Mines Ltd. The Otter Gold holding was acquired by Normandy in 2002 and the Newmont Mining Corporation acquired full ownership of the Waihi Mine in 2002 through the acquisition of the Normandy Mining Group. OceanaGold obtained the Waihi property as an operating open pit mine, underground mine and process plant in October 2015.

The Martha Mine open pit started its operations in 1988 under the Mining Licence 32 2388. The pit produced 22Mt at 3.1 g/t Au (2.2 Moz.) between 1988 and April 2015 when a pit wall failure suspended open pit mining. There is no open pit mining currently active in Waihi. Mining Licence 32 2388 expired in July 2017 and was amalgamated into the existing Favona Mining Permit 41808.

The Favona Mining permit 40418 (MP 41 808) was granted in March 2004 for a duration of 25 years to mine the Favona ore body situated approximately 2 km east of the Martha ore body. Underground mining resumed in Waihi some 52 years after the closure of the Martha underground mine when the Favona decline was developed in 2004 and the subsequent mining of the Favona, Moonlight, Trio, Daybreak and Correnso ore bodies with the Correnso ore body nearing completion. An Extension of Land to MP 41 808 was granted in 2006 and 2017. Resource Consent for underground mining of the remnant mineralisation around the Martha vein system was granted on the 12^{th} December 2018, increasing the future underground mine life in Waihi.

1.6.2 WKP

Early prospecting and mining at WKP were attempted between1893-1897, but only 19 oz. of bullion was recovered from a 14-ton test parcel and mining was soon abandoned. Modern prospecting and exploration ignited again in 1978-1993 by Amoco, BP and others which included 5,500 m of drilling in 23 drill holes. Newmont acquired a controlling interest in the property in 2005 and started a reconnaissance geological mapping, sampling, CSAMT geophysics and drilling campaigns targeting high grade underground minable veins. In 2010, hole WKP-24 intersected the main T-Stream vein containing 156 m at 1.6 g/t Au. Wide spaced follow up drilling confirmed the presence of three prospective vein zones each striking more than 1 km in length, namely the Western Vein, the T-Stream Vein, and the East Graben (EG) Vein. Newmont completed 7000 m of diamond drilling in 15 holes intersecting locally high-grade Au mineralisation in each hole. Newmont ceased exploration in 2013 and the prospect remained idle until 2016 when OceanaGold acquired Newmont's New Zealand assets. Exploration then continued with additional geological mapping, sampling and geophysics leading up to further diamond drilling (WKP40 to WKP 68). Drilling intersected significant Au mineralisation including but not limited to 7.6 m (true width) averaging 10.84 g/t Au in the first hole (WKP40). All drilling since has intercepted significant Au mineralisation and a Mineral Resource estimate has been calculated.

1.7 Geology Setting and Mineralization

Both the Waihi and WKP projects are located within the Coromandel Peninsula which hosts over fifty gold and silver deposits that make up the Hauraki Goldfield. The peninsula is built up of Miocene to Quaternary volcanic rocks (the Coromandel Volcanic Zone) overlying a Mesozoic basement. It is bound to the west by the Hauraki Rift, a large graben filled with Quaternary and Tertiary sediments, and to the south by volcanics deposited by the presently active Taupo Volcanic Zone (TVZ).

The Coromandel Volcanic Zone (CVZ) is of Miocene to Pliocene in age and formed during three main phases of volcanism (Christie et al. 2007). The first phase constitutes the widespread andesites and dacites of the Coromandel group (18 – 3 Ma). The second phase encompasses the predominantly rhyolitic units of the Whitianga Group (9.1-6 Ma) and the third phase is dominated by Strombolian volcanoes and dykes of the Mercury Bay Basalts (6.0-4.2 Ma) (Skinner 1986). Epithermal veins and hydrothermal alteration are observed within the Coromandel and Whitianga Groups.

The Au-Ag deposits of the Waihi District and WKP are classical low-sulphidation adularia-sericite epithermal quartz vein systems associated with north to northeast trending faults. Larger veins have characteristically developed in dilational sites in the steepened upper profile of extensional faults with narrower splay veins developed in the hanging wall of major vein structures. Moderate to steeply dipping veins are characterised by 200 to 2000 m of strike, 170 to 700 m vertical range and typically 1 to 5 m vein widths (but up to 30 m locally). The main ore minerals are electrum and silver sulphides developed within quartz veins. Other minerals present within the veins include ubiquitous pyrite and more localised adularia, calcite, illite, smectite, sphalerite, galena, chalcopyrite, and rhodochrosite. Base metal sulphide content generally increases with depth.

The geological control on mineralisation is well understood and is sufficient to support the estimation of Mineral Resources and Mineral Reserves. The current experience and geological knowledge of the area is also considered sufficiently acceptable to reliably inform mine planning.

1.8 Deposit Types

The deposits discovered in/near Waihi to date are typical of epithermal vein gold – silver deposits. In the opinion of the Qualified Persons (QPs), features that the Waihi deposits display that are typical of epithermal gold deposits include:

- Gold-silver mineralisation is hosted within multiphase quartz veins.
- Host lithologies for veins are hydrothermally altered volcanic units including andesite (Waihi) and rhyolite (WKP),
- The upper portion of veining along the Favona deposit in Waihi contains an intact siliceous sinter sheet.

1.9 Exploration

Work completed since 1986 has comprised surface reconnaissance exploration, geological and structural mapping, geochemical sampling, airborne, ground and down-hole geophysical surveys, surface and underground drilling, engineering studies and mine development.

Diamond drilling within the last two years has largely focused on the Gladstone, Martha and WKP deposits. OceanaGold continues to drill in the Waihi area, with 27 km of drilling planned for resource infill and 20 km for reserve conversion for the Martha Underground project and 14 km planned for the WKP project in 2019.

The exploration programs completed to date are appropriate to the style of the deposit and prospects.

1.10 Drilling

Approximately 497,050 m of diamond core has been drilled on the Waihi Project since 1980. The WKP project has had 31,907 m of diamond drilling in 67 holes since 1980

Additionally, 86,074 m have been drilled in 4,445 reverse circulation grade control holes during the open pit operation.

Approximately 497,050 m of diamond core and 99,938m of RC drilling (predominantly pit ore control) has been drilled on the Waihi Project since 1980. Most exploration drilling was diamond core drilling done by triple tube wireline methods. The WKP project has had 31 907 m of diamond drilling in 67 holes since 1980.

Surface holes are collared using large-diameter PQ core, both as a means of improving core recovery and to provide greater opportunity to case off and reduce diameter when drilling through broken ground and historic stopes. All drill core was routinely oriented below the base of the post-mineral stratigraphy by plasticine imprint or using the Ezimark or Reflex core orientation tool.

All drilling data in Waihi is recorded in terms of Mt Eden Old Cadastral grid (MEO). This is the grid utilised for all underground and exploration activity within 3 km of the Waihi Mine beyond which New Zealand Map Grid is utilised (including WKP). Drillhole collars in Waihi are surveyed using a total station by a registered professional land surveyor. Drill collars at WKP are currently located using a handheld GPS with an accuracy of +/- 5 m for x and y coordinates. Drill pads have been surveyed using a total station, however individual collars within each drill pad still require survey pickups. Plans to more accurately survey the individual hole collars using a total station are in place for the near future, therefore there will be some minor collar adjustments at a future date. At the start of the hole the drillers line up the mast in the correct azimuth using an Azimuth Aligner. Down hole surveys are recorded at 30 m intervals by using a Reflex digital downhole survey camera tool.

All diamond drill core is logged including lithologies, alteration, veining, structure, geotechnical and recovery fields. Core is then photographed, and sample intervals chosen.

1.11 Sample Method and Analysis

The Mineral Resource estimates of individual projects in Waihi and WKP use a combination of sampling techniques including:

- Martha Underground (MUG): DD core, Reverse Circulation (RC) chips from exploration drilling, RC chips from open pit grade control drilling, and grade control channel samples,
- Gladstone Project: DD core, RC chips from exploration drilling,
- Correnso Project: DD core and underground grade control channel samples.
- WKP Project: DD core.

Once logged and photographed, any diamond core to be sampled is cut lengthways in half and one half is bagged for analysis and the other retained for storage in a core shed. Since mid-2006, sample preparation of drill core has been carried out at the SGS Waihi laboratory. Some of the WKP core was prepared at the Westport SGS laboratory on the South Island (only holes WKP40-WKP45). Current standardised sample preparation consists of crushing to 80% passing 3.35 mm, rotary splitting to 800 g, then ring pulverising to 90% passing 75 µm. Of the pulverised material approximately 300 g is sent for analysis. Pulps are assayed by SGS for gold by 30 g Fire Assay with AAS finish. Additional analyses for As, Ag, Sb, Cu, Pb, Sb and Zn are also often assayed using a 0.3 g Aqua Regia digest followed by an ICP-MS instrument finish.

Underground channel samples are marked up and chipped off with a hammer by an ore control geology team. Sample intervals are based on geology. Chip samples are sent to SGS for analysis of Au and Ag only.

Drill core QAQC samples include one standard, one blank and one crush duplicate every 17 samples. Underground channel QAQC samples include one standard, one blank, one crush and one field duplicate every channel (on average every 6 samples).

The Waihi protocol requires the QAQC Certified Reference Material (CRM) standards to be reported to within 2 Standard Deviations of the Certified Value. The criterion for preparation duplicates is that they have a relative difference (R-R1/mean RR1) of no greater than 10%. Blanks should not exceed more than 4 times the lower detection method of the assay method. Failure in any of these thresholds triggers an investigation and re-assay.

In addition to routine quality control procedures, umpire assays were carried out at Ultratrace Laboratories in Perth.

The sampling methods are acceptable, meet industry-standard practice, and are acceptable for Mineral Resource and Mineral Reserve estimation and mine planning purposes. The quality of the analytical data is reliable and sample preparation, analysis, and security are performed in accordance with exploration best practices and industry standards.

1.12 Data Verification

The data verification programs undertaken on the data collected from the Project adequately support the geological interpretations, the analytical and database quality, and therefore support the use of the data in Mineral Resource estimation.

1.13 Metallurgical Test Work

Metallurgical test work has been conducted in several programs since 1980. Composites of various ore types were developed using drill core samples. Metallurgical testing programs continue to be conducted as required to evaluate possible changes in feed types from new mining areas, proposed changes in processing to improve recoveries and to investigate factors causing lower than desired recoveries.

Metallurgical test work and associated analytical procedures were appropriate to the mineralization type, appropriate to establish the optimal processing routes, and were performed using samples that are typical of the mineralization styles found within Waihi and WKP. Samples selected for testing were representative of the various types and styles of mineralization. Samples were selected from a range of depths within the deposit. Sufficient samples were taken so that tests were performed on sufficient sample mass. Test work results have been confirmed by production data.

1.14 Mineral Resource Estimate

1.14.1 Reporting Date

Mineral Resources for the Martha Underground, Correnso, Wharekirauponga, Gladstone and Martha Open pit Waihi open pit and underground are reported as at December 31, 2018.

1.14.2 Qualified Persons

The mineral resources quoted here were prepared by, or under the supervision of Peter Church, Principal Resource Geologist for OceanaGold, with assistance from the OceanaGold geology team.

1.14.3 Mineral Resources

The modelling process employed in the grade estimation for all the Waihi projects is performed using numerous Vulcan and Leapfrog processes summarised in the steps outlined below:

1. Input data Validation
2. Update lithological domains, geologic model construction
3. Data selection, Drill hole data selection from an AcQuire drill database
4. Exclusion of unwanted drill holes by data type
5. Flag data files by lithology
6. Composite drill holes to fixed length composites within defined geological boundaries, typically 1 m using length weighting
7. Exploratory data analysis by domain, generation of domain and data type summary statistics
8. Variography
9. Assign top cuts by domain and data type to input data files
10. Block Model construction based upon lithological wireframes
11. Run estimation for all domains for Au, Ag, As, Resource Classification
12. Assign density, mining depletions, back fill grade, stripping of negative values from non-estimated blocks, assignment of grade to dilution domains
13. Classify model

The model is estimated using Vulcan software. Estimations were performed in individual lithological domains using length weighted down hole composites.

Vulcan software version 11.0 has been used to construct the Correnso Extended, Martha Underground, WKP and Gladstone models. MineSight® software version 9.10-01 was used to construct the Martha Phase 4 model.

Sub-blocking with either ordinary kriging (OK) or inverse distance weighting to the second power (ID2) or third power (ID3) methods are used for all underground models. With the data density which exists in Correnso and the surrounds ordinary kriging, and tetra-unfolding - using ID2 or ID3 estimates both achieve comparable results. The method of unfolding was adopted for the estimation of vein models as a way of dealing with the sinuous character of the veins.

The underground block models are rotated in bearing to align with the dominant strike of the veins and they are run using Vulcan software. Sub-blocking is used to define narrow veins and to maintain volume integrity with the geology solids. The grade estimation for all models is strictly controlled by the geology, with both sample selection and estimation of blocks limited to domains defined by the geology interpretation solids. Gold is estimated using one of the following methods; either - a single pass with a combined channel and drilling dataset; or a two-pass estimation using a combined dataset with short search range first, then followed by a second pass using drillhole data only with longer search ranges to estimate blocks not estimated in the first pass.

Mineral Resources were classified to Australasian Joint Ore Reserve Committee (JORC) Code categories[1], for all projects the Resource Classification is based on the average distance of the block to the closest three holes within specified ranges, with the ranges having been determined through drill spacing analysis of mineralisation continuity and site experience with similar veins.

[1] The definitions of Ore Reserves and Mineral Resources as set forth in the JORC Code have been reconciled to the definitions set forth in the CIM Definition Standards. If the Mineral Reserves and Mineral Resources were estimated in accordance with the definitions in the JORC Code, there would be no substantive difference in such Mineral Reserves and Mineral Resources.

The process included steps to remove isolated small clumps of blocks or isolated individual blocks of different classifications that cannot be realistically mined separately. The Martha underground project has been extensively mined historically, this project has abundant historic voids that interact with the remnant mineralisation. To adequately capture resource risk for this project the depleted insitu resource is evaluated through a stope optimisation process to define the potential future mineability of the resource. The stope shapes generated are based on an incremental cut-off and a stated gold price assumption. The stope shapes are then used to define the portion of the resource that has an appropriate average drillhole spacing for reporting purposes.

Table 1-1 :Classification Criteria

Project	Drill Spacing for Measured Resource	Drill Spacing for Indicated Resource	Drill Spacing for Inferred Resource
Martha Open Pit ELB	20 metres	50 metres	100 metres
Gladstone Open Pit	15 metres	30 metres	52.5 metres
Martha Underground	20 metres	40 metres	60 metres
WKP	15metres	40 metres	80 metres
Correnso	10 metres	30 metres	60 metres

Mineral Resource classifications are based solely on gold using a combination of data density, spatial arrangement of the data, quality of estimation, and geological interpretation. Mineral Resource classification reflects the confidence levels in the supporting data.

Mineral Resources are inclusive of Mineral Reserves and are presented in Table 1-2 to Table 1-4.

Table 1-2 :Open Cut Resource Estimate

Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Measured	0.16	3.1	30.4	0.02	0.15
Indicated	2.07	2.4	12.4	0.16	0.83
Measured & Indicated	**2.23**	**2.4**	**13.7**	**0.17**	**0.98**
Inferred	0.30	1.3	2.0	0.01	0.02

Table 1-3 :Underground Resource Estimate

Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Measured	0.34	5.6	11.3	0.06	0.12
Indicated	2.79	6.8	18.7	0.61	1.68
Measured & Indicated	**3.13**	**6.6**	**17.9**	**0.67**	**1.80**
Inferred	5.57	6.0	17.0	1.07	3.04

Table 1-4 :Combined Resource Estimate

Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Measured	0.50	4.8	17.2	0.08	0.28
Indicated	4.86	4.9	16.0	0.76	2.51
Measured & Indicated	**5.36**	**4.9**	**16.1**	**0.84**	**2.78**
Inferred	5.87	5.7	16.2	1.08	3.06

Notes to Accompany Mineral Resource Table:

1. Mineral Resources are inclusive of Mineral Reserves;
2. Mineral Resources are reported on a 100% basis;
3. Mineral Resources are reported to a gold price of NZD2,142/oz;
4. Martha underground Mineral Resource is reported below the consented Martha Phase 4 open pit design. This Resource is constrained within a conceptual underground design based upon the incremental cut-off grade.
5. WKP Mineral Resource is reported at a nominal cut-off of 3 grams per tonne Au.

6. No dilution is included in the reported figures and no allowances have been made to allow for mining recoveries. Tonnages include no allowances for losses resulting from mining methods. Tonnages are rounded to the nearest 1,000 tonnes;
7. Ounces are estimates of metal contained in the Mineral Resource and do not include allowances for processing losses. Ounces are rounded to the nearest thousand ounces;
8. Rounding as required by reporting guidelines may result in apparent summation differences between tonnes, grade and contained metal content;
9. Tonnage and grade measurements are in metric units. Gold ounces are reported as troy ounces.

Mineral Resources are reported on a 100% basis. The resource estimate is sub-divided for reporting purposes into an open-cut resource that includes material within the limits of the Martha pit and an underground resource within the Correnso Extended Permit Area. The resources are depleted for mining as at December 31, 2018.

1.15 Mineral Reserve Estimate

1.15.1 Reporting Standard

The Mineral Reserve estimates are reported in accordance with NI 43-101 and JORC 2012. The definitions of Ore Reserves and Mineral Resources as set forth in the JORC Code have been reconciled to the definitions set forth in the CIM Definition Standards. If the Mineral Reserves and Mineral Resources were estimated in accordance with the definitions in the JORC Code, there would be no substantive difference in such Mineral Reserves and Mineral Resources.

This section summarizes the main considerations in relation to the estimation of Mineral Reserves and provides references to the sections of the study where more detailed discussions of particular aspects are covered. The basis for the estimation of Mineral Reserves is a metal price of NZD 1,806 per ounce (USD 1,300 per ounce) for gold.

1.15.2 Reporting Date

Mineral Reserves for the Waihi open pit and underground are reported as at December 31, 2018.

1.15.3 Mineral Reserves

Mineral Reserves are reported within a detailed crest and toe Mineral Reserve pit design for the Martha pit and within underground stope and development designs for the Correnso mine. Only Measured and Indicated Resources that fall within the Mineral Reserve pit or underground designs have been directly converted to Proven and Probable Reserves respectively. Mineral Reserves are estimated using a gold price of NZD1,806 per ounce.

A localised failure of the north wall occurred in April 2015 which undercut the main access ramp. Operations were suspended in April 2015 and the mining contract terminated in June 2015. Studies have been completed to regain access to the bottom of the pit and permits have been granted to undertake this work. It is planned to undertake a wall strip in the north east to regain access to the ramp below the failure to allow full recovery of the remaining Mineral Reserve. Geotechnical studies have been completed that demonstrate that the planned north east wall strip to regain access has an adequate Factor of Safety.

The Mineral Reserve estimates are compliant with CIM Definition Standards for Mineral Resources and Mineral Reserves as incorporated by reference in NI 43–101. Mineral Reserves are shown in Table 1-5.

Table 1-5: Mineral Reserves, Trevor Maton, MAusIMM (CP), David Townsend, MAusIMM(CP)

Reserve Area	Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Open Pit	Proven	0.16	3.05	30.5	0.02	0.15
	Probable	0.66	2.91	29.1	0.06	0.61
Underground	Proven	0.34	5.63	11.3	0.06	0.12

	Probable	0.26	4.88	9.8	0.04	0.08
Total Proven		0.50	4.81	17.2	0.08	0.28
Total Probable		0.91	3.44	23.7	0.10	0.69
Total		**1.41**	**3.93**	**21.4**	**0.18**	**0.97**

Notes to Accompany Mineral Reserve Table:

- Mineral Reserves are reported on a 100% basis;
- Mineral Reserves are reported to a gold price of NZD 1,806/oz;
- Tonnages include allowances for losses resulting from mining methods. Tonnages are rounded to the nearest 1,000 tonnes;
- Ounces are estimates of metal contained in the Mineral Reserves and do not include allowances for processing losses. Ounces are rounded to the nearest thousand ounces;
- Rounding of tonnes as required by reporting guidelines may result in apparent summation differences between tonnes, grade and contained metal content;
- Tonnage and grade measurements are in metric units. Gold ounces are reported as troy ounces;

The change in Mineral Reserves reported at December 31, 2018 compared with those previously reported at December 31, 2017 is reported in Table 1-3. Changes between the December 31, 2017 Reserve and the December 31, 2018 Reserve estimate primarily reflect the depletion of ore from the Correnso underground mine.

The Mineral Resources for the mine, which have been estimated using surface and underground core drill data and underground chip data, have been performed to industry best practices, and conform to the requirements of CIM (2014).

Factors which may affect the geological models, the preliminary stope designs and therefore the Mineral Reserve estimates include commodity price assumptions, metallurgical recovery assumptions, and the assumptions in relation to stope size and mining method.

Table 1-6: Dec 2018 Reserve Estimates vs. Dec 2017 Reserve Estimates

Reserve Area	Tonnes (Mt)	Au (g/t)	Ag(g/t)	Contained Au (Moz)	Contained Ag (Moz)
December 31, 2017 Reserve					
Open Pit	0.81	2.9	29.4	0.08	0.77
Underground	0.97	5.6	11.2	0.18	0.35
Total (Dec 31, 2017)	1.74	4.4	19.7	0.24	1.10
Changes to Reserve, December 2017 vs. December 2018					
Open Pit	0	0.0	0.0	0.00	0.00
Underground	-0.37	6.1	12.1	-0.07	-0.14
Total	-0.21	9.6	19.4	-0.06	-0.13
December 31, 2018 Reserve					
Open Pit	0.81	2.9	29.4	0.08	0.77

Underground	0.60	5.3	10.6	0.10	0.20
Total (Dec 31, 2018)	1.41	3.9	21.4	0.18	0.97

1.16 Mining Methods

1.16.1 Open Pit

A localised failure of the north wall occurred in April 2015 which undercut the main access ramp. Operations were suspended in April 2015 and the open pit mining contract terminated in June 2015. A 1 million tonne failure of this wall occurred in April 2016 and studies to Feasibility Study level have now been completed to regain access to the Mineral Reserve. Permits and consents to commence the remedial works to access the Mineral Reserve were received in December 2018. The following refers to operations between 1988 and 2015 and will be relevant to the extraction of the open pit Mineral Reserve.

The open pit mining process at Martha was determined largely by the consents granted to the Company. Ore and waste were mined by conventional drill, blast, load and haul methods from the open pit. Waste and ore were categorised into hard and soft material and waste further categorised into potentially acid forming or non-acid forming rock. Ore sampling was conducted in-pit by RC drilling. Ore blocks were defined on the basis of this sampling and took into account the capacities of the equipment to selectively mine these blocks. Soft material was ripped by D9 dozer whereas hard material was blasted. Strict controls on blast vibration determined the blast hole spacing and the maximum allowable charge weight per delay. Ore was generally blasted in 5 metre vertical intervals (two flitches).

The presence of historic workings in the open pit required probe drilling to identify voids or weak pillars which created both a safety hazard and an operating constraint. Underground voids were either bunded off or marked with hazard tape.

All ore and waste were loaded by 190 tonne backhoe excavators into 85 tonne rear dump trucks and trucked via a 1 in 10 ramp and generally direct tipped to a jaw crusher or Stamler breaker station. Small quantities of ore and waste were stockpiled close to the jaw crusher.

Ore was conveyed 1.5 km to the process plant and placed in a 40,000 t stockpile. A surge (Polishing Pond) stockpile (up to 1.2Mt) is available close to the water treatment plant for excess ore. Crushed waste was conveyed a further 1.5 km and used to construct the tailings embankment.

1.16.2 Underground Mining

There are multiple orebodies within the current underground mine including Correnso, Daybreak, Empire, Trio, and Louis. All mining areas share the same stoping method and have very similar modifying factors and assumptions and design criteria applied. For simplicity all these areas are hereafter collectively referred to as “Correnso”.

Mining options available for Correnso are limited because of the permit conditions, blasting and backfill constraints. Avoca mining was selected as the preferred mining method. Correnso has been designed with a 15m level spacing, floor to floor, primarily to limit blast vibration but this also assists hanging wall and footwall stability.

Access to the Correnso underground is via a decline from previously mined areas which also serves as a fresh air intake. The Correnso exhaust ventilation circuit is connected to the existing Trio exhaust ventilation circuit as well as a dedicated return air drive broken through into the Martha pit. Return air capacity is around 300 m^3/s. Fresh air is drawn through the Favona portal and two raises in the Favona mine. The portal is located close to the processing plant.

Conventional cross cut accesses are designed for Avoca stoping levels. Ore and waste passes assist with efficient materials handling.

The Permit and mining method require all stopes and selected development to be backfilled. Sufficient backfill material exists on site to backfill the stopes.

1.17 Recovery Methods

Recovery of gold at Waihi is achieved from the use of leaching and adsorption following a conventional SAG Mill-Ball Mill grinding circuit. The plant has been successfully running for 30 years with a well-established workforce and management team in place. The Processing Plant has the capacity to treat up to 1.25 million tonnes of Martha ore or 800,000 tonnes of Correnso ore per annum.

Ore from the surface and underground mine is stockpiled at the ore pad before being fed to a jaw crusher located directly above the SAG mill. Ore is then fed to the SAG mill along with lime, water and steel balls. Once the ore has reached the final product size it is thickened to higher density slurry in a thickener before the leaching process begins.

The pre-leach thickener increases slurry density to approximately 37% to 40% solids prior to the CIP circuit, which comprises of five leach and seven adsorption tanks. The leaching tanks provide a total residence leach/adsorption time of 24 hours for Martha ore and 48 hours for Correnso ore.

The “loaded” carbon is fed into an elution column where the carbon is washed at high temperature and pressure to remove the gold and silver from the carbon and into the water. The cathodes are periodically harvested and rinsed to yield a gold and silver bearing sludge which is dried, mixed with fluxes and put into a furnace at 1200^{O}C. Once the sludge is molten it is poured as bars of doré bullion ready for shipment to the Mint.

The process plant is suitable for both Waihi and WKP ores. Flotation and ultrafine grind are being evaluated as a method to improve process recoveries.

1.18 Project Infrastructure

The Waihi operation has been in full production since 1988 and all mine site infrastructure has been completed to support the open pit and underground operations including; tailings storage facility, workshops, water treatment plant, waste dumps, power supply and ore processing facilities. Construction of the Correnso underground mine access and infrastructure has been completed.

1.19 Market Studies and Contracts

Contracts are in place covering underground mining, transportation and refining of bullion, and the purchase and delivery of fuel, electricity supply, explosives and other commodities. These agreements conform to industry norms.

OceanaGold maintains a number of operating permits for the importation of reagents into New Zealand. New Zealand has an established framework that is well regulated and monitored by a range of regulatory bodies. Risk associated with renewal of importation permits, is upon that basis regarded as manageable.

1.20 Environment and Permitting

The Waihi operation holds the permits, water rights, certificates, licences and agreements required to conduct its current operations and to extract the Mineral Reserve.

Environmental data has been collected over the last 28 years of Waihi operations and baseline data was collected prior to the start of operations and reported in the original mining licence application. Data is routinely collected for noise levels, blast vibration, air quality, and surface and ground water discharge quality from various sources, ground settlement and ground water levels. This data is reported to various regulatory bodies as required by the various consents and permits. External independent experts are engaged by OceanaGold to assist in the preparation and review of these reports. The reports are then reviewed and approved by various regulators who utilise independent expert reviewers to assist them.

Waihi has established various stakeholder engagement structures for the representation of stakeholders and project affected people including Iwi, Resident Groups, community-based organizations and local government.

The operation has well established complaints and grievance systems / procedures for the on-going management of all project grievances.

The permits are prescriptive in terms of stakeholder engagement with the Community. Consultation is an on-going component of the existing operation. From a community perspective impacts to be managed, associated with the Correnso project, include:

- effects on property values
- negative effects on the local community, and
- reputational risk related to mining activity in close proximity to homes.

1.21 Capital and Operating Costs

Capital and operating costs are well known from the 30 years of operations and have been appropriately applied to develop cut-off grades and inputs into economic analysis.

1.22 Economic Analysis

There is no material expansion of the current production at Waihi based on the reported Mineral Reserves.

1.23 Adjacent Properties

There are no adjacent properties that have an impact on the Waihi operation. The Waihi Mining Licence and Permits contains all Mineral Resources and Mineral Reserves on which this Technical Report is based.

1.24 Other Relevant Data and Information

The Waihi operation is in a high rainfall area, and heavy rain events are not unexpected. Procedures and costing are in place to deal with such events for the open pit operation and will not impact on the viability of extracting the Mineral Reserve.

New Zealand has an established framework that is well regulated and monitored by a range of regulatory bodies. OceanaGold has dedicated programs and personnel involved in monitoring consent compliance and works closely with authorities to promptly address additional requests for information. Risks associated with review and renewal of operating consents is, upon that basis, regarded as manageable within the ordinary course of business.

There is no material, unresolved matters dependent upon a third party on which extraction of the open pit and underground Mineral Reserve is contingent

The risk management process is not static, and risks may change with time. The current study represents an understanding by the operations personnel and project team of significant risks associated with the Waihi operation, while recognising that the level of risk may change over time and that new risks may emerge. The risk register is considered a 'live' document and forms part of the risk management plan which will be subject to regular review.

1.25 Recommendations

Future resource drilling required to define the Inferred Resource within the MUG Project is estimated to require an additional 23 km of diamond drilling to be completed over 2019 and 2020. Reserve Drilling of the MUG Project is estimated to require an additional 96 km of diamond drilling to be completed though the period from 2019 through to 2021. This drilling is largely planned to be undertaken from underground diamond drilling platforms.

Pending continuing successful drill results, further work for the Martha Underground Resource should involve a Prefeasibility study and / or Feasibility Study. It is expected that sufficient Indicated Resource will be available late in 2019 on which to base the study. Aspects of the study are expected to involve confirming the access options developed in the Scoping Study the proposed mining method in remnant areas and the ventilation circuits. Other studies will consider the backfill types and methods of placement, equipment selection, automation and mine control systems, power supply and dewatering methods. Mining production schedules should be developed which consider balancing mining around remnant areas and virgin areas. The consent conditions will require several management plans to be developed and this work should be undertaken in the near future.

Ongoing drilling is planned for the WKP project. 14.5 km of drilling is planned for 2019 and it is expected that further annual work programs of a similar quantum will be required in 2020 and 2021 to continue advancing this project.

2 INTRODUCTION

The Waihi operation is a gold mine in the North Island of New Zealand with Mineral Reserves currently estimated to be 0.18 million ounces gold supporting a mine life of 4 years with additional resources projected to provide a further ten years. The mine is located on the north island of New Zealand (Figure 2-1).

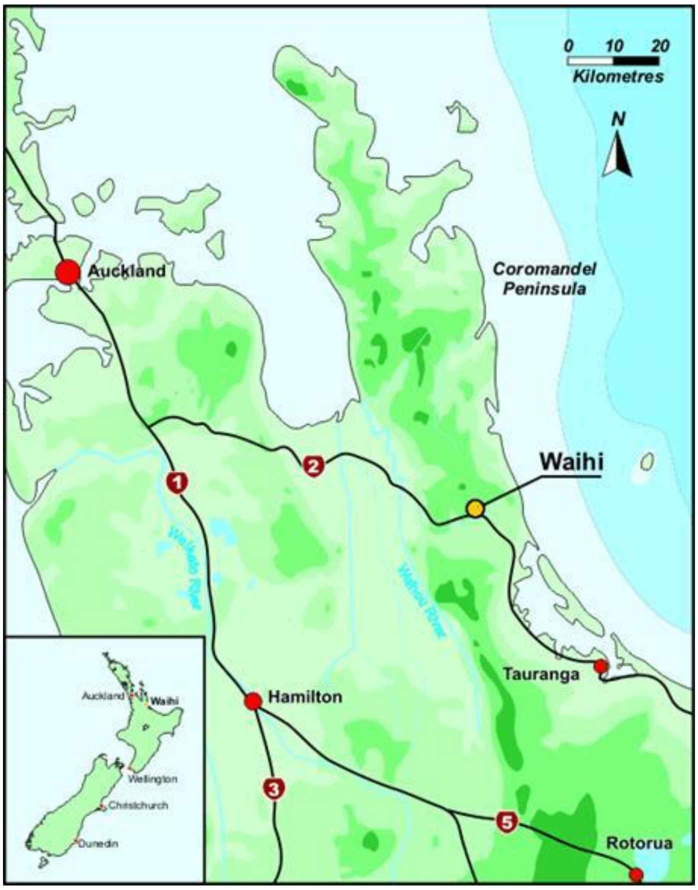


Figure 2.1: Project Location Map

Open pit mining and processing commenced at the site in 1988 and underground mining commenced in 2004 with the extraction of ore commencing in late 2006. OceanaGold holds the necessary permits, consents, certificates, licences and agreements required to conduct its current operations, and to construct and operate the Martha Open Pit and Correnso underground mine.

The open pit mining process at Martha is determined by the permit granted to the Company. Ore and waste are mined by conventional drill, blast, load and haul methods from the open pit. Waste is categorised into potentially acid forming or non-acid forming rock. Ore sampling is conducted in-pit by RC drilling. Strict controls on blast vibration determine the blast hole spacing and the maximum allowable charge weight per delay.

Correnso underground has been designed with a 15 m level spacing, floor to floor and stoping employs the Avoca mining method. All access development is in place. The portal is located close to the processing plant.

Recovery of gold at Waihi is achieved through a conventional SAG Mill-Ball Mill grinding circuit followed by Carbon in Pulp (CIP) leach circuit with a conventional elution and electro-winning circuit.

2.1 Terms of Reference

OceanaGold has prepared this technical report for the Waihi operation according to NI 43-101 and Form 43-101F1 to provide an update on the Waihi operations. The Waihi Gold Mine is owned by OceanaGold (Waihi) Limited, a wholly owned subsidiary of OceanaGold Corporation ("OceanaGold"). OceanaGold is listed on the Toronto and Australian stock exchanges under the code "OGC" and is the issuer of this Technical Report.

The report is for use by the general investing community. It provides an update on the status of the Waihi operation and will be lodged with SEDAR in accordance with TSX requirements. References in this report to "OceanaGold" include OceanaGold Corporation, OceanaGold (Waihi) Limited, Waihi Gold Company Limited and their subsidiaries and associates, as the context requires.

This report has been prepared to satisfy OceanaGold obligations as a reporting issuer in Canada.
This Report uses metric measurements and Canadian English. The currency used is New Zealand Dollars (NZD) unless otherwise noted.

2.2 Principal Sources of Information

This Technical Report was prepared by OceanaGold. Information for the Report was based on published material as well as the data, professional opinions and unpublished material obtained from work completed by OceanaGold, and materials provided by, and discussions with, third-party contractors / consultants retained by OceanaGold. Reports and documents listed in Appendix A were also used to support preparation of the report. Additional information was sought from OceanaGold personnel where required to support preparation of this report.

Table 2-1: Specialist Consultants who provided information for the study

Consulting Company	Consulting Package
PSM Consultants Pty Ltd. ("PSM")	Geotechnical Engineering – Open Pit
SRK Consulting Pty Ltd ("SRK")	Geotechnical Engineering – Underground Mining Engineering – WKP Project
GWS Ltd.	Hydrogeology and Groundwater
Engineering Geology Ltd.	Waste Disposal and Tailings Storage
Entech Pty Ltd.	Mining Engineering- Martha Underground Mine
GHD Pty Ltd. (GHD)	Materials Handling - WKP Project

2.3 Qualified Persons and Inspections of the Property

The Qualified Persons (QPs) for the Report are OceanaGold employees engaged for the preparation of this Technical Report, as listed in Table 2-2. All the QP's except David Carr are based permanently on site in Waihi. David Carr is based in the Brisbane OceanaGold office and has inspected the property several times throughout 2018.

Table 2-2: Qualified Persons (QPs) who are responsible for preparing this Technical Report

Qualified Person (QP's)	Employer	Position	Technical Report Item(s) Contributed to or Reviewed
Trevor Maton (not Independent) BSc., M.Sc. MAusIMM (CP Mining), ARSM,	OceanaGold	Study Manager	Sections 1.1 – 1.6, 1.14 – 1.15, 1.17- 1.23, 2-6, 15-16 and 18 – 24, 25.5-25.7
David Townsend (not Independent) MAusIMM (CP Mining)	OceanaGold	Technical Services Superintendent	Sections 1.1 – 1.6, 1.14 – 1.15, 1.17- 1.23, 15-16 and 18 - 24, 25.5-25.7.
Peter Church (not Independent) BSc., MAusIMM (CP Geology)	OceanaGold	Principal Resource Development Geologist	Sections 1.7 – 1.11, 1.13, 1.21, 6 – 12, 14, 23, 25.1 – 25.3 and 26
David Carr (not Independent) BSc., MAusIMM (CP Metallurgy)	OceanaGold	Chief Metallurgist	Sections 13, 17 and 21.2

2.4 Effective Dates

The effective date of this Technical Report is 31 December 2018.

2.5 Information Sources and References

OceanaGold has sourced information from appropriate reference documents as cited in the text and as summarized in Section 27 of this Report. Additional information was provided by OceanaGold site personnel. The QPs have relied upon OceanaGold experts in the fields of mineral tenure, surface rights, permitting, social responsibility and environment.

3 RELIANCE ON OTHER EXPERTS

3.1 External Consultants

The authors, Qualified, Independent and Non-Independent Persons as defined by NI 43-101, were contracted by the Issuer to study technical documentation relevant to the Report, to contribute to or review the Technical Report on the Waihi operation, and to recommend a work programme if warranted. The authors relied on reports detailed in Section 27, and opinions as follows for information that is not within the authors' fields of expertise:

- PSM Consultants Pty Ltd ("PSM") was retained by OceanaGold to provide professional services with respect to the Martha pit operation. The scope of services was to determine the geotechnical engineering parameters for the open pit operations and mining inputs. The PSM reports have been referenced for inputs to this report;
- SRK Consultants Pty Ltd ("SRK") was retained by OceanaGold to provide professional services with respect to the WKP Project Underground operation. The scope of services was to determine the geotechnical engineering parameters for the underground operations, backfill requirements (underground) and mining inputs. The SRK reports have been referenced for inputs to this report;
- GWS was retained by OceanaGold to provide professional services with respect to the Waihi operation. The scope of services was to determine the hydrology (surface water) and hydrogeology (groundwater) parameters of the Waihi operation and provide management plans for water. The GWS reports were used to as inputs to this report;
- Entech Consultants Pty Ltd ("Entech") was retained by OceanaGold to provide professional services with respect to the Martha Underground operation. The scope of services was to determine the geotechnical engineering parameters for the underground operations, backfill requirements (underground) and mining inputs. The Entech reports have been referenced for inputs to this report.

The authors believe the information used to prepare the report and formulate its conclusions and recommendations is valid and appropriate considering the operational nature of the Project and the purpose for which the report is prepared. The authors, by virtue of their technical review of the Project's exploration potential, affirm that the work programme and recommendations presented in the Report are in accordance with NI 43-101 and CIM technical standards.

3.2 Trevor Maton

Mr Maton has relied, and believes he has a reasonable basis to rely, on information provided by the following third parties for the following areas of the report.

Table 3-1: Specialist Consultants who provided Information for the study

Section Ref	Subject Matter	Information Source	Date
Sections 15 and 16	Resource block model used in mine design and planning	Peter Church MAusIMM (CP Geology)	2015, 2016, April 2018
Sections 15 and 16	Geotechnical design criteria – Open Pit	PSM (Australia)	2010, 2011, 2012, 2013, 2014, 2018
Sections 13, 17	Metallurgical recoveries and throughput rates	David Carr MAusIMM(CP Metallurgy), OceanaGold Chief Metallurgist.	2018

3.3 David Townsend

Mr Townsend has relied, and believes he has a reasonable basis to rely, on information provided by the following third parties for the following areas of the report.

Table 3-2: Specialist Consultants who provided Information for the study

Section Ref	Subject Matter	Information Source	Date
Sections 15 and 16	Resource block model used in mine design and planning	Peter Church MAusIMM (CP Geology)	2015, 2016, April 2018
Sections 15 and 16	Geotechnical design criteria – Underground	SRK (Australia) Entech (Australia)	2014, 2018
Sections 13, 17	Metallurgical recoveries and throughput rates	David Carr MAusIMM(CP Metallurgy), OceanaGold Chief Metallurgist.	2018

3.4 Peter Church

None

3.5 David Carr

None

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The Waihi and WKP projects are located within the Waikato region within the North Island of New Zealand. Both projects fall within the Hauraki District (Figure 4.1).

Waihi is a small town situated approximately 142 km southeast of Auckland city. The Correnso and Martha underground projects are within the Waihi town. The WKP project is more remotely located approximately 10 km north of Waihi.

4.2 Mineral Tenure

All naturally occurring gold and silver minerals in New Zealand are owned by the Crown. Rights to prospect, explore or mine for these minerals are granted by permits issued under the Crown Minerals Act 1991 (CMA). Mineral exploration permits provide a permit holder the exclusive rights to explore for the specified minerals in an area. Minerals mining permits grant the holder to exclusive rights to mine for the specified minerals. The right to exchange an exploration permit with a mining permit may occur provided certain criteria specified in the Crown Minerals Act 1991 (CMA) are met (available at http://www.legislation.govt.nz/act/public/1991/0070/latest/whole.html#DLM246338). The Martha underground and Correnso underground projects fall within Favona Mining Permit 41 808 (MP 41 808). The WKP project falls within Exploration Permit 405 98 (EP 40 598). Each of these permits are discussed in more detail below.

4.2.1 Favona Mining Permit MP 41 808

Favona MP 41 808 was granted to on the 22nd March 2004 for the duration of 25 years. Work began on this permit with the development of the Favona decline in 2004 and the extraction of ore in late 2006. Two extensions of land to MP 41 808 were obtained in 2006 and 2017 firstly to include the Trio and potential extensions to Martha ore bodies and secondly to incorporate the land area previously covered by Mining Licence 32 2388 (ML 32 2388) prior to its expiry in July 2017.

MP 41808 currently extends across an area of 1485.38 hectares utilized by urban, rural and mining land use. All gold mining activities by OceanaGold in Waihi including the current underground mining operation, the ore processing plant, tailings facility and the inactive Martha open pit lie within the existing MP 41808. The permit is 100% owned by OceanaGold (New Zealand) Limited. The permit will expire on 21st of March 2029.

4.2.2 Exploration Permit EP 40598

The Hauraki Exploration Permit EP 40 598 was granted on the 22nd May 2003 for the duration of 5 years. Since then it has undergone numerous changes in land area and ownership. More recently a second four-year appraisal was granted in May 2017.

The permit currently covers an area of 3762.94 hectares which is held (100%) by OceanaGold (New Zealand) Limited. The current term of the exploration permit expires in May 2021 and confers rights to exchange the EP within that time for a mining permit upon meeting certain criteria specified in the Crown Minerals Act 1991 (CMA).

4.2.3 Other Exploration Permits

Table 4-1 details the full set of permit interests held by OceanaGold (New Zealand) Limited on the north island of New Zealand as at February 28th, 2019 including rights to explore for minerals in the vicinity of the Waihi mine and within the wider Hauraki and Thames-Coromandel area. An application for a four-year appraisal extension of duration on EP51630 has been lodged with NZPAM.

Table 4-1: Tenement Status 31 December 2018

Permit	Location	Permit Type	Granted	Term (years)	Expires	Area (ha)
41808	Favona	Mining	22/03/2004	25	21/03/2029	1485.38
51041	White Bluffs	Exploration	15/10/2008	14	14/10/2022	450.973
51630	Ohui	Exploration	22/06/2019	10	21/06/2019	1490.261
51771	Waihi North	Exploration	28/04/2010	10	27/04/2020	3089.32
52804	Twin Hills	Exploration	17/12/2010	10	16/12/2020	3223.786
40598	Hauraki	Exploration	22/05/2003	18	21/05/2021	3762.94
40813	Glamorgan	Exploration	7/09/2006	14	6/09/2020	2777.005
60372	Waimata	Exploration	6/12/2017	5	5/12/2022	330.675
60149	Dome Field North	Exploration	1/05/2017	5	30/04/2022	7287.262
60148	Dome Field South	Exploration	1/05/2017	5	30/04/2022	10044.73
40767	Waihi West	Exploration	21/12/2005	14	20/12/2019	280.4

4.3 Property Ownership and Access Arrangements

4.3.1 The Martha Underground and Correnso Projects

The potential Martha Underground and operating Correnso mines in Waihi are managed by OceanaGold (New Zealand) Limited, a 100% owned subsidiary of the OceanaGold Corporation.

All gold mining activities in Waihi including the current underground mining operation, the ore processing plant, tailings facility and the inactive Martha open pit are within the existing Favona Mining Permit 41 808 (MP 41808).

The Martha Underground and Correnso underground projects underlie land owned by various proprietors including the Crown (administered by Land Information New Zealand (LINZ)), Department of Conservation (DOC), the Hauraki District Council (HDC) and various private landowners.

Land within the mining permit that hosts the conveyor belt corridor, the water treatment plant (and an associated pipeline for the discharge of the treated water into the Ohinemuri River), the process plant, and the tailings storage facilities, is all owned by OceanaGold except for one parcel where the conveyor belt corridor runs through land adjoining the Union Hill area, which is in the name of the Commissioner of Crown Lands, and portions of public roads, road reserve and river reserve. The majority of the land covering the Martha open pit is owned by the Crown (administered by Land Information New Zealand (LINZ). OceanaGold has entered into an access arrangement with LINZ providing an on-going formal licence to enter and operate on the various publicly owned land parcels for Crown Minerals Act 1991 (CMA) purposes. In accordance with the requirements of the CMA, where mining activities involve surface disturbance on land not owned by OceanaGold an access arrangement with the landowner will be required.

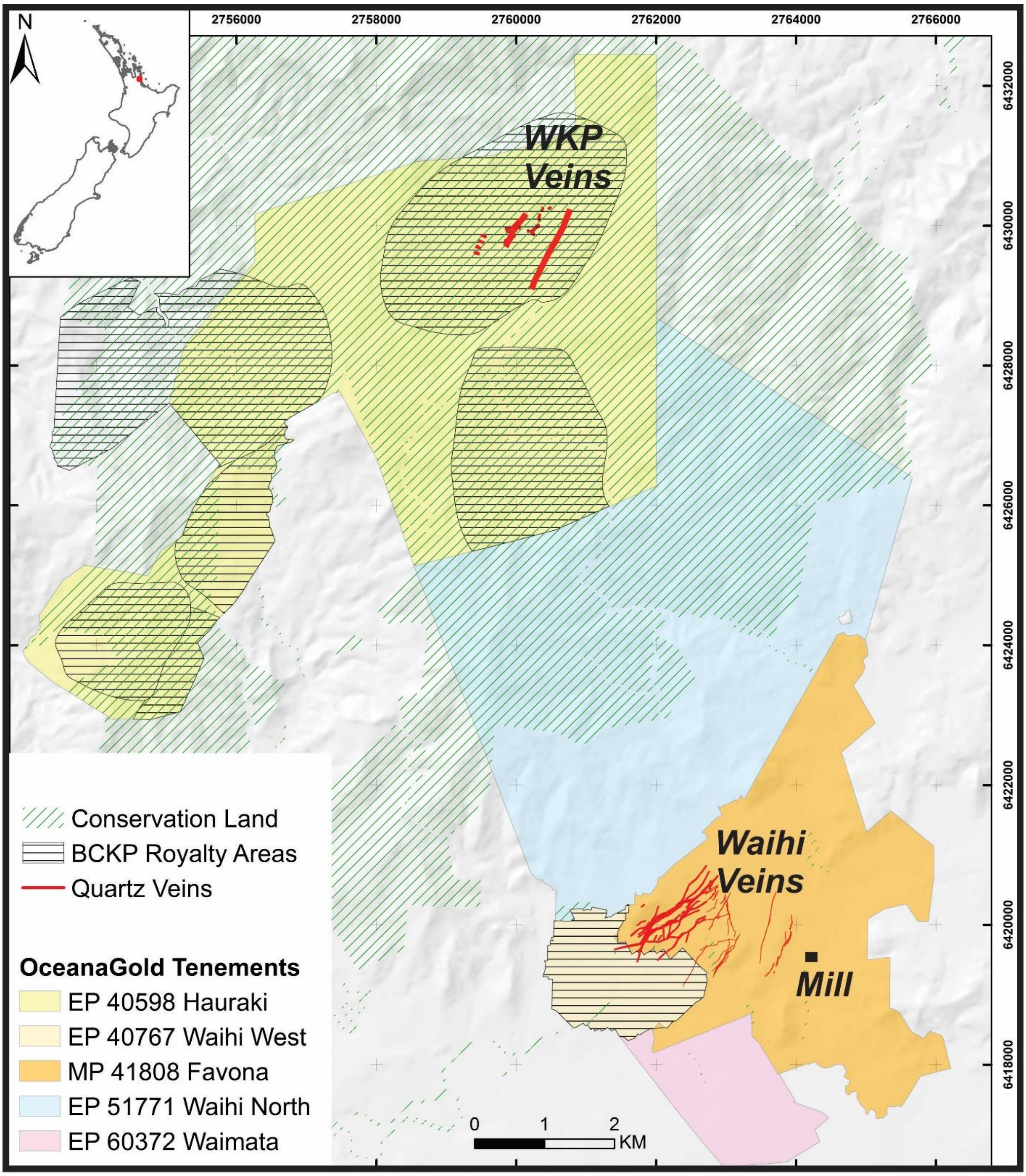


Figure 4.1: Location of OceanaGold Tenements near the Waihi and WKP projects.

The potential Martha Underground Project and Correnso underground require some mining beneath privately owned land. Pursuant to section 57 of the CMA, landowner consent to entry into the land. However, resource consents set out a process (including arbitration) for gaining access to land above stopes and development drives. Specific conditions of the principal Land Use resource consent for the Correnso Project include the following:

- At least three months prior to the placement of the first explosives for any blasts immediately beneath any part of the legal title to a residential property overlying stopes for any mining provided for under this consent, the consent holder shall offer to purchase that property from the registered proprietor at market value this offer shall be set by reference to the two independent valuations required by condition 52); or if the registered proprietor prefers, to provide an ex gratia payment equal to 5% of the property's market value to the registered proprietor.

- Prior to the placement of the first explosives for any development blasts immediately beneath any part of the legal title to a residential property for any mining provided for under this consent, the consent holder shall offer to provide an ex gratia payment equal to 5% of the property's market value to the registered proprietor of that title.
- If the Company's offer is not accepted, but the registered proprietor wishes to negotiate, the consent holder shall offer to commit to a binding arbitration process in relation to the property purchase or ex gratia payment referred to above, provided that the basis for determining the ex gratia payment is not amenable to further negotiation.

4.3.2 The WKP Project

The WKP project north of Waihi is managed by OceanaGold (New Zealand) Limited, a 100% owned subsidiary of the OceanaGold Corporation.

The project is located on land owned by the Crown and administered by the Department of Conservation (DOC) as a conservation/forest park. Exploration activity requires an access arrangement with DOC in addition to resource consents from local and regional councils. Under the Crown Minerals Act 1991 exploration is restricted to low impact and higher impact activities including, but not limited to drilling, bulk sampling and trenching.

Known environmental liabilities are managed through stipulated conditions in the DOC access arrangement and Regional and District Council Consents.

DOC access arrangement conditions include:

- Submission of an "Annual Work Programme" to obtain an 'Authority to Enter and Operate" for a twelve-month period.
- Ecological surveys are to be undertaken over areas requiring vegetation clearance such as drill sites, campsites, pump sites and helicopter landing sites.
- A DOC approved Kauri Dieback Management Plan must be in place and followed.
- Historical and cultural sites must be protected against damage.
- All cleared sites are to be rehabilitated to the satisfaction of the DOC manager.

All the required conditions of the access arrangement have been met for the current work programme at WKP.

4.4 Consent and Permitting

The regulatory agencies primarily responsible for consents, permits and licences associated with the Martha Underground, Correnso and WKP Projects are:

- New Zealand Petroleum and Minerals, which is the Crown agency responsible for administering rights to explore for and extract Crown-owned minerals, including gold and silver, under any Mining Licence under the Mining Act 1971 and Mining and Exploration Permits under the Crown Minerals Act 1991 (CMA).
- The Waikato Regional Council – (formerly Environment Waikato (EW)), which is the local government agency appointed under the Resource Management Act 1991 (RMA) to take responsibility for air and water quality issues for activities, including vegetation removal and earthworks activities that can give rise to erosion of soils, that affect any of these values in respect of both the Mining Licence and resource consents under the Resource Management Act (RMA) 1991.
- The Hauraki District Council (HDC), which is the local government agency appointed under the RMA to be responsible for the management of land-use and community issues in respect of both

the Mining Licence and resource consents. It is also responsible for Building Permits under the Building Act 1991, e.g. for vent and escape shafts.

- Heritage New Zealand Pouhere Taonga, which is the government agency appointed under the Heritage New Zealand Pouhere Taonga Act 2014 to grant an Authority to modify or destroy any archaeological site. Any impacts on old mine workings or old surface structures, where these pre-date 1900 or are otherwise specifically protected by law, will require such an Authority.

The Correnso Underground Project was permitted on the 7th October 2013 and mining is nearing completion. No further permits are required for the Correnso Project.

Resource consent was recently granted on the 12th December 2018 for the Martha underground and the Phase 4 open pit. All the Land use, water discharge and intake and air discharge permits are currently in place for these Waihi projects.

At the WKP project, a Regional Council water permit is required to abstract surface water for drilling purposes. Water take is metered, and maximum abstraction rates are stipulated within the granted permits. Restrictions apply if stream levels fall below specified thresholds during periods of reduced rainfall. District Council land use permits are required prior to any vegetation clearance. All the required mineral tenures, conditions of the access arrangement and consents have been obtained for the current work programmes at WKP.

4.5 Easements and Road Access

Public road access is provided to the OceanaGold underground amenities, and processing plant site, through Baxter’s Road and to the open pit mine by Seddon Street. A number of paper roads exist within the mining area. No additional agreements are required except in the event that OceanaGold imports significant quantities of waste rock from the local quarry, in which event the Company is required to fund certain road upgrades.

5 ACCESSIBILITY, CLIMATE, PHYSIOGRAPHY, LOCAL RESOURCES AND INFRASTRUCTURE

5.1 Accessibility

The Waihi site is located within the township of Waihi in the North Island of New Zealand and close to the major cities of Auckland (150 km north), Tauranga (60 km south) and Hamilton (100 km west). Waihi enjoys a temperate climate with high rainfall (2m per annum). Road access from Auckland and Tauranga is via State Highway 2. No rail access is available to the site.

The WKP project is located on land owned by the Crown and administered by the Department of Conservation (DOC) as a conservation/forest park. Access is by helicopter or foot.

5.2 Climate and Physiography

The town is at the foot of the Coromandel Peninsula. To the west are the hills of the Kaimai Ranges.

The climate is temperate. Mean temperatures range from 8 °C (46 °F) in the South Island to 16 °C (61 °F) in the North Island. January and February are the warmest months, July the coldest. New Zealand does not have a large temperature range, but the weather can change rapidly and unexpectedly. Winds in New Zealand are predominantly from the West and South West, in winter, when the climate is dominated by regular depressions. In summer, winds are more variable with a northerly predominance associated with the regular large anti cyclones which cover all the country.

New Zealand is seismically active. In the Waihi region:

- Earthquakes are common, though usually not severe, averaging 3,000 per year mostly less than 3 on the Richter scale.
- Volcanic activity is most common on the central North Island Volcanic Plateau approximately 200 to 300 km from Waihi.
- Tsunamis would not have any direct impact on Waihi.
- Droughts are not regular and occur less frequently over much of the North Island between January and April.
- Flooding is the most regular natural hazard.

5.3 Local Resources and Infrastructure

5.3.1 Workforce

Almost all of the employees reside in the nearby towns of Waihi, Waihi Beach, Katikati, Thames and Paeroa. Waihi is a relatively small community of approximately 4,500 people. Statistics New Zealand Census information shows that population numbers have remained relatively stable since 2001, with a small increase (approximately 27) from the 2006 Census. The population pyramid from the 2013 Census shows a noticeable dip in the numbers of young people in the range from 20-30.

The largest sectors for employment in Waihi are the retail trade (16.5%), health care and social assistance (14%), education and training (10%) and manufacturing (10%). Mining is relatively high at 3.2% of the usual resident population compared to the Waikato Region at 0.5% and New Zealand at 0.2%. Waihi is characterised by a comparatively high level of unemployment. In 2013 the unemployment rate for Waihi was 13.2% (up from 2006 at 8.3%), compared to 8.5% for the Waikato Region and 7.1% nationally. In addition, average wages in Waihi are lower than regional averages and are skewed towards lower income levels.

5.3.2 Community – Health, Education and Services

Community health, education and services are well established in Waihi with four primary schools, one secondary school, medical centres and various community health centres present. Most establishments are government funded.

5.4 Local Service Industry

A local service industry has established itself over the last 20 years to support gold mining in Waihi comprising engineering, cleaning, maintenance, drilling, rental and consumable suppliers, security, labour hire and other services. More technically advanced services are available from the regional centres in terms of heavy engineering, large equipment hire and other specialized services. Most suppliers are privately run and not affiliated with OceanaGold.

5.5 Comments on Accessibility, Climate, Local Resources, Infrastructure, and Physiography

In the opinion of the QPs:

- The existing and planned infrastructure, availability of staff, the existing power, water, and communications facilities, the methods whereby goods could be transported to any proposed mine, and any planned modifications or supporting studies are well-established and can support the declaration of Mineral Resources;
- Within OceanaGold land holdings, there is sufficient area to allow construction of any required project infrastructure;
- The QPs consider it a reasonable expectation that surface rights usages will continue to be granted for the projects with appropriate negotiation.

6 HISTORY

6.1 Waihi

Waihi is a historic mining centre. The original Martha mine began as an underground operation in 1879 and by 1952, about 12 million tonnes of ore had been mined to yield 1,056 tonnes of gold-silver bullion. The historic mine extracted four main parallel lodes (the Martha, Welcome, Empire and Royal) together with numerous branch and cross lodes. All lodes dip steeply and are fillings of extensional faults and fractures. Early stoping employed the cut and fill method but this was phased out and largely replaced after 1914 by the shrink stoping method. Stopes were generally not backfilled after 1914 but left open. The workings reached a total depth of 600 m from surface on sixteen levels. Man, and supply access was by 7 known shafts numerous other shafts were developed for ventilation and exploration purposes. In 1894, the Waihi Gold Mining Company adopted the cyanide process for gold extraction, which was first trialled at a nearby mine in Karangahake.

Exploration drilling between 1979 and 1984 by Waihi Mining and Development Ltd. and AMAX Exploration Ltd. identified large open pit reserves within the confines of the historic mining area. Following the granting of permits, the Martha Mine open pit operation commenced operation in 1988 as an unincorporated joint venture between subsidiaries of Normandy Mining Limited Group and Otter Gold Mines Ltd. The Otter Gold holding was acquired by Normandy in 2002 and the Newmont Mining Corporation acquired full ownership of the Waihi Mine in 2002 through the acquisition of the Normandy Mining Group.

The Martha Mine open pit produced 22 Mt at 3.1 g/t Au (2.2 Moz.) between 1988 and April 2015 when a localised failure of the north wall undercut the main access ramp suspending open pit mining operations. There is no open pit mining currently active in Waihi. Mining Licence 32 2388 expired in July 2017 and was amalgamated into the existing The Favona Mining permit 40418 (MP 41 808).

MP 41 808 was granted in March 2004 for a duration of 25 years to mine the Favona ore body. Underground mining resumed again in Waihi in 2004 with the development of the Favona mine located approximately 2 km east of the Martha pit. Mining of the Favona ore body led to further extensions of underground development towards the nearby Moonlight, Trio, and Correnso deposits. Mining of the Correnso ore body is nearing completion. Table 6.1 summarises the annual production from Waihi since 1988. Figure 6.1 shows a map of Waihi illustrating the areas mined through time.

OceanaGold obtained full ownership of the Waihi property as an operating open pit mine, underground mine and processing plant in October 2015. Resource Consent for underground mining of the remnant mineralisation around the Martha vein system and the Martha Phase 4 pit was granted on the 12th December 2018, increasing the current underground and pit mine life in Waihi.

6.2 WKP

Early prospecting and mining at WKP were attempted between1893-1897, but only 19 oz of Au bullion was recovered from a 14-ton test parcel and mining was soon abandoned. Modern prospecting and exploration ignited again in 1978-1993 by Amoco, BP and others which included 5,500m of drilling in 23 drill holes. Newmont acquired a controlling interest in the property in 2005 and started a reconnaissance geological mapping, sampling, CSAMT geophysics and drilling campaigns targeting high grade underground minable veins. In 2010, hole WKP-24 intersected the main T-Stream vein containing 156 m at 1.6 g/t Au. Wide spaced follow up drilling confirmed the presence of three prospective vein zones each striking more than 1 km in length, namely the Western Vein, the T-Stream Vein, and the East Graben (EG) Vein. Newmont completed 7000 m of diamond drilling in 15 holes intersecting locally high-grade Au mineralisation in each hole. Newmont ceased exploration in 2013 and the prospect remained idle until 2016 when OceanaGold acquired Newmont’s New Zealand assets. Exploration then continued with additional geological mapping, sampling and geophysics leading up to further diamond drilling (WKP40 to WKP 68). Drilling intersected significant Au mineralisation including but not limited to 7.6 m (true width) averaging 10.84 g/t Au in the first hole (WKP40). All drilling since has intercepted significant Au mineralisation and a resource estimate has been calculated for the area.

Table 6-1: Historic Production post 1988

	Martha Open Pit				Favona Underground (incl Moonlight)				Trio Underground				Correnso Underground (incl Empire)			
Year End	Tonnes	Au(gpt)	Mined Au(KOz)	Recovered Au(KOz)	Tonnes	Au(gpt)	Mined Au(KOz)	Recovered Au(KOz)	Tonnes	Au(gpt)	Mined Au(KOz)	Recovered Au(KOz)	Tonnes	Au(gpt)	Mined Au(KOz)	Recovered Au(KOz)
30/06/1988	68,179	2.4	5.3	3.6												
30/06/1989	775,240	2.8	69.8	63.1												
30/06/1990	879,294	3.1	87.6	78.9												
30/06/1991	858,173	3.4	93.8	84.2												
30/06/1992	834,472	3.1	83.2	74.5												
30/06/1993	817,003	3.2	84.1	75.7												
30/06/1994	800,203	3.3	84.9	77.8												
30/06/1995	880,580	2.5	70.8	66.4												
30/06/1996	892,859	2.9	83.3	79.2												
30/06/1997	915,135	3.0	88.3	82.7												
30/06/1998	917,346	3.1	91.4	85.6												
30/06/1999	907,790	3.6	105.1	95.5												
30/06/2000	1,030,062	3.3	109.3	102.0												
30/06/2001	1,202,938	2.7	104.4	95.1												
30/06/2002	1,343,925	3.3	142.6	129.9												
31/12/2002	638,210	3.5	71.6	64.4												
31/12/2003	1,231,521	3.1	120.8	109.7												
31/12/2004	1,274,790	3.4	141.0	127.6												
31/12/2005	1,158,385	4.8	180.2	167.7												
31/12/2006	794,231	4.0	102.9	97.0	135,304	7.9	34.2	30.0								
31/12/2007	273,414	1.7	15.2	13.3	225,276	11.1	80.1	72.2								
31/12/2008	536,360	1.9	32.6	29.7	330,619	11.1	118.0	101.5								
31/12/2009	951,481	2.0	62.4	57.7	333,103	8.2	87.8	79.4								
31/12/2010	564,031	2.4	44.1	39.7	367,577	6.2	73.8	66.1								
31/12/2011	691,763	2.5	54.5	48.9	304,609	6.0	58.4	51.6								
31/12/2012	15,972	4.8	2.5	2.2	51,580	5.6	9.3	8.6	340,391	5.4	59.1	54.6				
31/12/2013	165,569	2.8	14.8	12.8	52,200	4.3	7.2	6.5	463,854	6.4	95.7	88.0				
31/12/2014	684,473	3.1	68.0	61.7	6,820	7.4	1.7	1.6	301,694	7.7	75.1	69.1	7,912	2.8	0.7	0.6
31/12/2015	234,935	3.3	25.2	24.3									474,036	8.8	133.7	119.5
31/12/2016													489,300	8.1	126.1	116.0
31/12/2017													472,450	8.6	130.4	119.1
31/12/2018													433,593	6.77	94.4	83.495
Totals	**22,338,334**	**3.1**	**2,240**	**2,051**	**1,807,088**	**8.1**	**470.48**	**417.4**	**1,105,939**	**6.5**	**229.9**	**211.7**	**1,877,291**	**8.0**	**485.3**	**438.8**

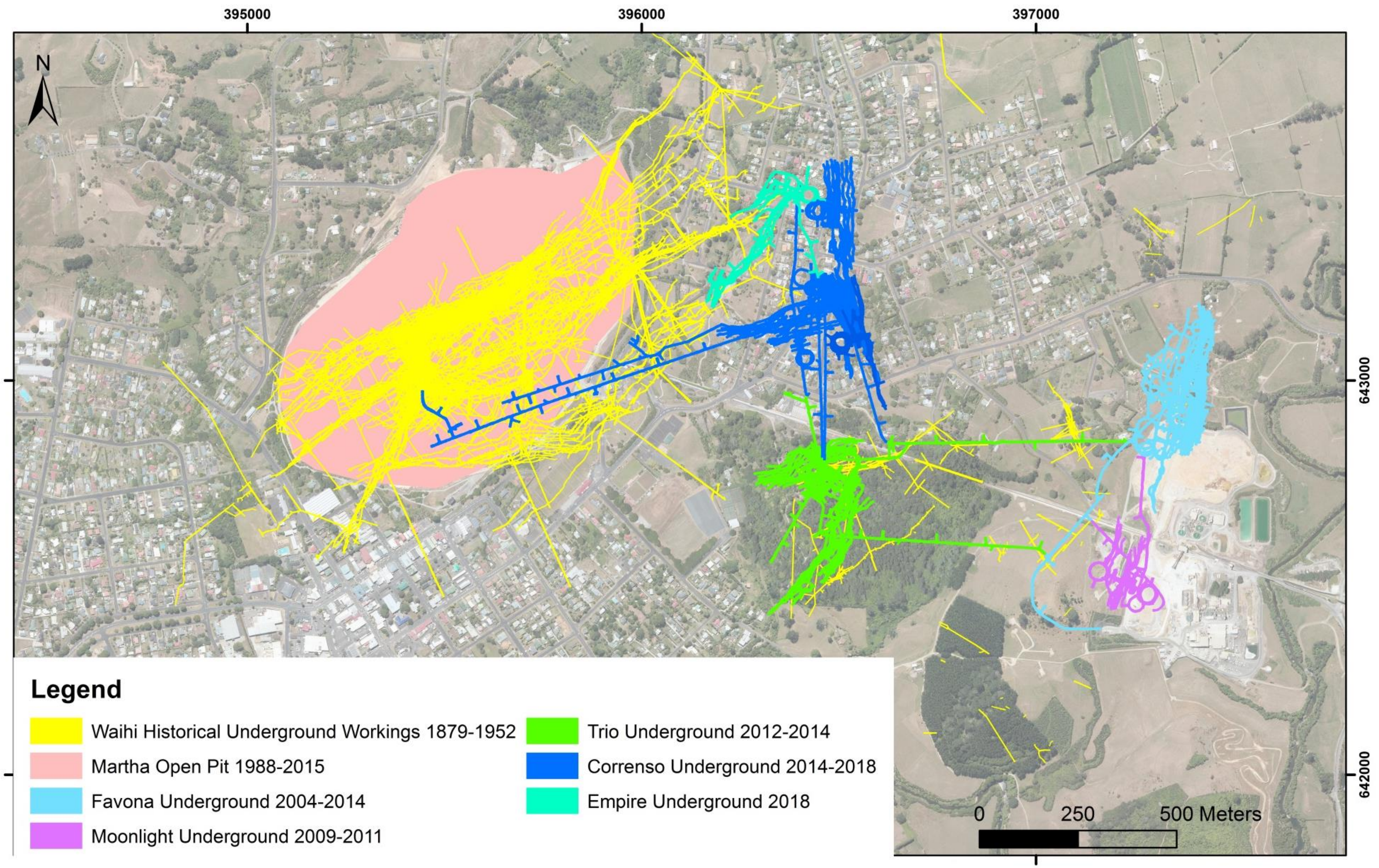


Figure 6.1 Map showing the mined areas in Waihi

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

Both the Waihi and WKP projects are located within the Coromandel Peninsula which hosts over fifty gold and silver deposits that make up the Hauraki Goldfield. The peninsula is built up of Miocene to Quaternary volcanic rocks (the Coromandel Volcanic Zone) overlying a Mesozoic basement. It is bound to the west by the Hauraki Rift, a large graben filled with Quaternary and Tertiary sediments, and to the south by volcanics deposited by the presently active Taupo Volcanic Zone (TVZ).

A schematic geological map of the Coromandel Peninsula is shown in Figure 7.1. Jurassic greywacke basement and intruded granitic stocks and dykes of the Mania Hill Group are exposed in the northern part of Coromandel, becoming progressively down-faulted to the south beneath younger volcanics. Coromandel geology is dominated by the Coromandel Volcanic Zone (CVZ), Miocene to Pliocene aged volcanics formed during three main phases of volcanism (Christie et al. 2007). The first phase constitutes the widespread andesites and dacites of the Coromandel group (18–3Ma). The second phase encompasses the predominantly rhyolitic units of the Whitianga Group (9.1-6Ma) and the third phase is dominated by Strombolian volcanoes and dykes of the Mercury Bay Basalts (6.0-4.2 Ma) (Skinner 1986). Epithermal veins and hydrothermal alteration are observed within the Coromandel and Whitianga Groups (Figure 7.1).

Coromandel Group can be subdivided into the Kuaotunu Subgroup andesites, dacites and plutons, forming in the northern region of the goldfield (ca. 18 to 11 Ma), the Waiwawa Subgroup andesites, dacites and rhyodacites in the south and east parts of the goldfield (ca. 10 to 5.6 Ma), and also the smaller Omahine (8.1 to 6.6 Ma) and Kaimai (5.6 to 3.8 Ma) andesite and dacite Subgroups in the southern parts of the goldfield (Edbrooke, 2001).

Mineralised sequences are overlain in places by post mineral andesitic to dacitic flows of the Kaimai Subgroup, rhyolitic ignimbrites of the Ohinemuri Subgroup and more recent, Pleistocene age sediments and ash units. Although these post mineral units do not blanket the mineralised units, they can be extensive and reach up to 1.5 km in thickness.

The CVZ hosts low- to medium-sulphidation epithermal Au-Ag and Cu porphyry deposits along its length (Christie et al. 2007). Porphyry Cu-Mo-Au deposits are associated with diorite-granodiorite composition intrusions and volcanic rocks dated between 18.1Ma and 16.4Ma. Epithermal deposits in the CVZ appear younger in age between 14 Ma and 5 Ma.

The Au-Ag deposits of the Waihi District and WKP are classical low-sulphidation adularia-sericite epithermal quartz vein systems associated with north to northeast trending faults. The main ore minerals are electrum and silver sulphides developed within quartz veins. Other minerals present within the veins include ubiquitous pyrite and more localised adularia, calcite, illite, smectite, sphalerite, galena, chalcopyrite, and rhodochrosite. Base metal sulphide content is low but generally increases with depth.

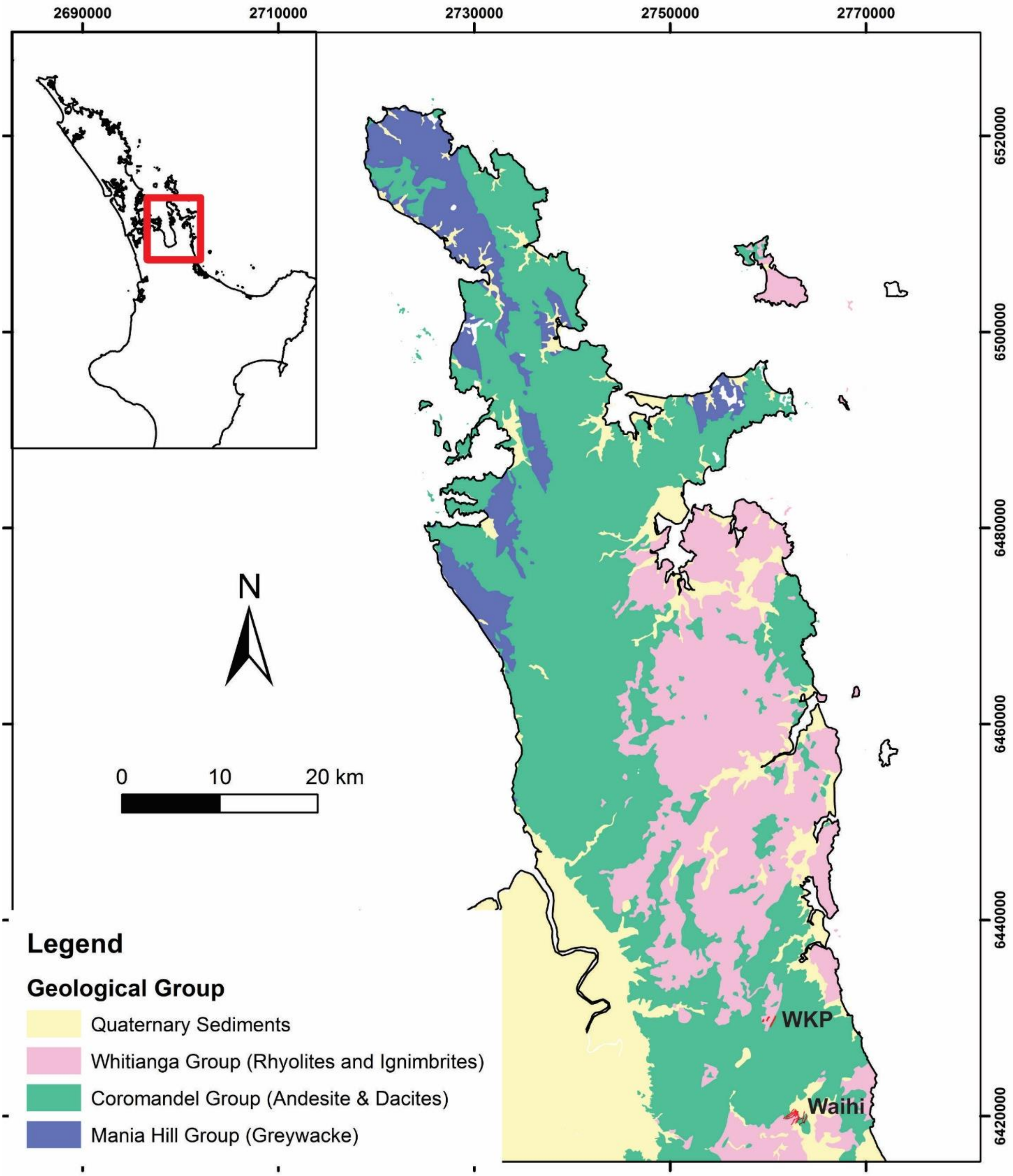


Figure 7.1: Regional Geological Map of the Coromandel Peninsula

7.2 Waihi Geology

The Waihi vein system is hosted within andesitic flows and pyroclastic units of the late Miocene (7.3 - 6.7 Ma) Waipupu Formation. The Waipupu Formation in Waihi can be subdivided into an upper quartz-phenocryst poor unit and a lower quartz-phenocryst rich unit which dip shallowly towards the SE. Some of the veining and gold mineralisation in Waihi appears to be better developed within the lower quartz-rich andesite flows, with the exception of the Favona deposit which is solely hosted within the upper andesite unit. Much of the mineralised andesites in Waihi are overlain by post-mineral rocks including dacite flows of the Uretara Formation (5.2 Ma), Pleistocene ignimbrites and recent ash deposits. Where veining is exposed close to the surface, the quartz-adularia altered andesites form resistant paleo-topo 'highs' that project through the post-mineral cover sequences.

A generalized map of the surface geology of Waihi and the location of veining at depth is illustrated in Figure 7.2. All known Au and Ag mineralisation in Waihi is confined to veining. The major mineralized veins are typically coincident with dip-slip, normal faults believed to have formed in an extensional setting related to early, back-arc rifting of the Taupo Volcanic Zone dated at ca 6.1 Ma.

Some of the main mineralised veins within the Waihi area include the Martha Vein System (which includes the Martha, Empire, Welcome, Royal, Edward, Rex and Albert veins amongst many others) in the NW and the Correnso, Daybreak, Union, Trio, Amaranth, Favona, Moonlight and Gladstone veins progressively SE (Figure 7.2).

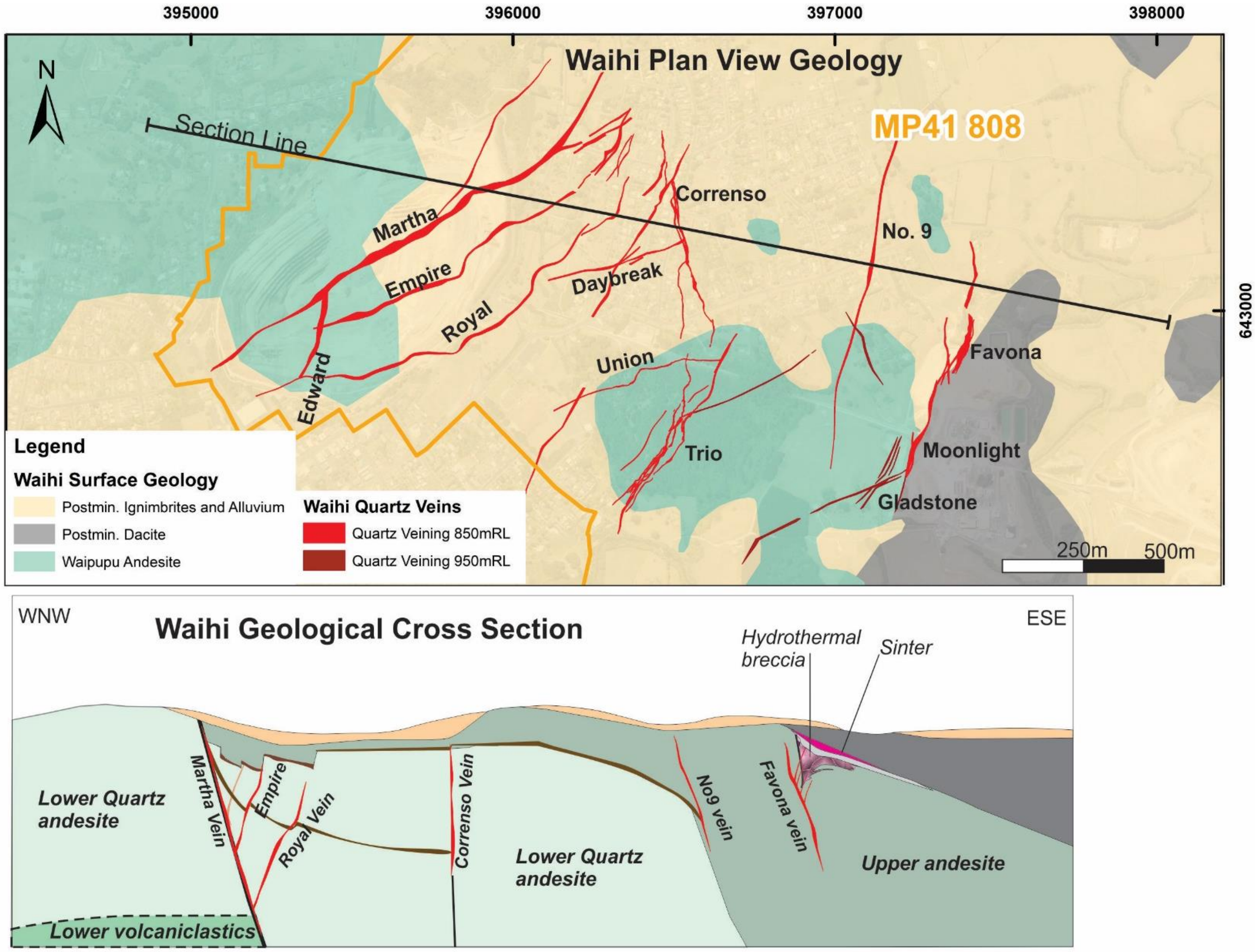


Figure 7.2: Geology Map and section across the Waihi area

7.2.1 Martha Vein System

The Martha Vein System is the largest and most documented of the vein networks in Waihi. The veins are numerous and form a large network that extends for more than 1600 m along strike and 600 m below the surface. The vein network although complex in detail, simply comprises the dominant southeast-dipping Martha vein and several northwest-dipping hangingwall splays including the Empire, Welcome, Royal and Rex veins. The Martha vein is the largest vein structure reaching up to 30m in thickness in places but averages 6 m to 15 m wide. Increased vein widths are closely associated with the steepening of vein dips from an average of 65-70 degrees to approximately 85 degrees to the SE. Steeper portions of the vein tend to contain higher concentrations of Au and Ag. The vein itself comprises mainly intact brecciated quartz vein material evidence for vein emplacement during the late stages of dip-slip faulting. The quartz is characterised by multiphase brecciation and banding (colloform and crustiform) and quartz textures are highly variable from a fine, microcrystalline and chalcedonic character to more coarsely crystalline particularly at depth. Apart from the main Martha vein, the hanging wall splay veins are also significant mineralised structures reaching 18 m in width (e.g. the Empire Vein). The hangingwall splays closest to Martha link up with the Martha vein at depth often forming a higher-grade lode at the intersection. Hangingwall splays further away from Martha either thin out at depth or are not drilled deep enough to make out their relationship with Martha at depth (e.g. the Rex and Ulster Veins). Additional, smaller-scale splay veins are present linking the larger vein structures and form a valuable contribution to the mineralisation particularly in the Martha Open Pit. These splays typically comprise smaller veins between 5 cm and 50 cm in width infilling extensional structures with no fault displacement, dipping moderately towards the NW. Two steeply dipping, NNE-trending and well mineralised vein structures known as the Edward and Albert veins also form an important part of the overall Martha vein network.

The andesitic host rocks within proximity to veining have often undergone pervasive hydrothermal alteration, sometimes with complete replacement of the primary mineralogy. Characteristic alteration assemblages of the host rocks are dominated by argillic alteration (quartz+adularia+pyrite+illite) closest to veining and propylitic alteration (weak quartz+weak pyrite+ carbonate+ chlorite+ interlayered illite-smectite and chlorite-smectite clays) extending over tens of metres laterally from major veins. The degree of alteration within the Waihi district is variable and often dependant on the host rock lithology and the nearby veining. On rare occasions, some host rocks at or near the contact of large veins appears only weakly altered, for example the “hard bars” identified during the early historical mining of the Martha vein. Volcaniclastic units tend to have increased clay alteration compared to the flow units.

Gold occurs mostly as small inclusions of electrum (averaging 38% silver) occurring as both free grains in the quartz and as inclusions in sulphides such as pyrite, galena, sphalerite and less commonly chalcopyrite. Free gold is rarely observed. Acanthite associated with pyrite and galena is the main silver mineral.

Martha ore has silver to gold ratios of greater than 10:1, The Favona and Trio ores had silver to gold ratios of approximately 4:1, and Correnso ore had a silver to gold ratio of less than 2:1.

The base metal sulphide content is low but is observed to increase in concentration with depth within all the Waihi veins. Sphalerite and galena are the most abundant base metal sulphides while chalcopyrite is less common and pyrrhotite is rare. Correnso ore has higher base metal content than other Waihi veins.

Oxidation extends down the vein margins to over 250m below surface, however the andesite host rocks can appear only weakly weathered at or near the surface.

Much of the Martha vein system has been mined from underground historically between 1883 and 1952. However, significant mineralised veined material remains intact adjacent to the historical workings that was not recoverable historically.

7.2.2 Gladstone

The Gladstone ore body is part of the greater Waihi epithermal vein system located approximately 2 km to the east of the Martha open pit. It is situated along the southern strike extent of the Favona and Moonlight ore bodies. Veining at Gladstone occurs within the upper 250 m below the surface, hosted within the upper andesite unit (devoid of quartz phenocrysts). The mineralisation is characterized by shallow-level, hydrothermal breccias and associated banded quartz veins interpreted to represent the top of the epithermal system. The uppermost mineralised quartz veins flare up into hydrothermal explosion breccias.

The Gladstone veins are predominantly steeply-dipping veins developed within the hanging-wall of the Favona Fault that dips moderately towards the SE. Gladstone veining trends ENE to NNE between 010° and 070° and dips steeply towards the SE.

7.2.3 Correnso

The Correnso epithermal vein system is part of the greater Waihi epithermal vein system. It is a steep, easterly dipping vein that trends N to NNW and lies between the Martha deposit to the west and the Union--Trio deposits to the south (Figure 7.2). The dominant host lithology's of Correnso are quartz phyric andesite flows, similar to the Martha vein system. The Correnso system comprises a main lode with smaller splays veins on both the hanging wall and footwall sides. The veining is characterized by a more intermediate-sulphidation style of mineralisation compared to the other veins in Waihi, with abundant green-coloured, mixed chlorite-smectite clays (corrensite) and higher concentrations of base metal within the multiphase veining. The highest-grade gold mineralisation lies between 900mRL and 775mRL. The lowest levels in the deposit contain the highest concentration of galena (up to +3% Pb) and sphalerite (up to +1% Zn).

The main mineralized lode of Correnso is complicated towards the north by late-stage, barren NE-trending calcite-quartz veining. Much of the Correnso ore body has already been mined from underground with only the basal and distal portions of the ore body remaining in reserve.

7.3 WKP

Low sulphidation epithermal quartz veins at WKP are hosted in Whitianga Group rhyolites, typically rhyolite flow domes to sub-volcanic intrusions within polymict lapilli tuffs. Deep drilling to the west indicates the rhyolites are underlain by Coromandel Group andesites. The mineralized sequences are partially overlain by strongly magnetic, fresh andesite flows, rhyolitic tuffs and recent ash deposits observed in drilling and regional mapping (Figure 7.3-7.4).

Gold mineralization occurs in association with quartz veining developed along two types of structurally-controlled vein arrays. The principal veins, namely the EG-, T-Stream and Western Veins occupy laterally continuous, NE trending (025-47°), moderately dipping (60-65°) fault structures reaching up to 10 m in width. More subsidiary, extensional veins (1-100 cm wide) are developed between or adjacent to the principle fault hosted veins. These veins often form significant arrays that are moderate to steeply dipping with a more northerly to NNE strike and appear to lack lateral and vertical continuity compared to the principle veins.

The rhyolites have undergone pervasive hydrothermal alteration, often with complete replacement of primary mineralogy by quartz and adularia with minor illite and/or smectite clay alteration. Figure 7.3 shows the distribution of the main veins at the WKP deposit.

The Eastern Graben (EG) vein is the largest and most continuous mineralised structure drilled at WKP to date. The vein strikes approximately NE (020°) for over ~1000 m although the extent of veining to the north and south remains open due to limited drill data. Veining dips steeply to the west and is still considered to be open up-dip. To date the highest up dip intersection on the EG vein was WKP64 where abundant clay gouge was encountered in the place of veining which still carried significant Au values. The EG vein has been well drilled to more than 400 m below the surface (WKP41, WKP39, WKP37 and WKP35). Veining and grade are seen to decrease at depth (at approximately -180 m RL) (Figure 7.4 long section). Veining observed in drill core is characterised by multi-phase white quartz/chalcedony with textures including colloform banding, brecciation, vein sediments and quartz replacing platey calcite.

Within the footwall of the EG vein are a series of veins referred to as the East Graben footwall veins. These veins show unique characteristics to other WKP veins in that they appear more as sulphide-rich (pyrite-marcasite) vein breccias with anomalous As, Hg and Sb. The brecciated nature of these veins indicate they may be more fault controlled than extensional.

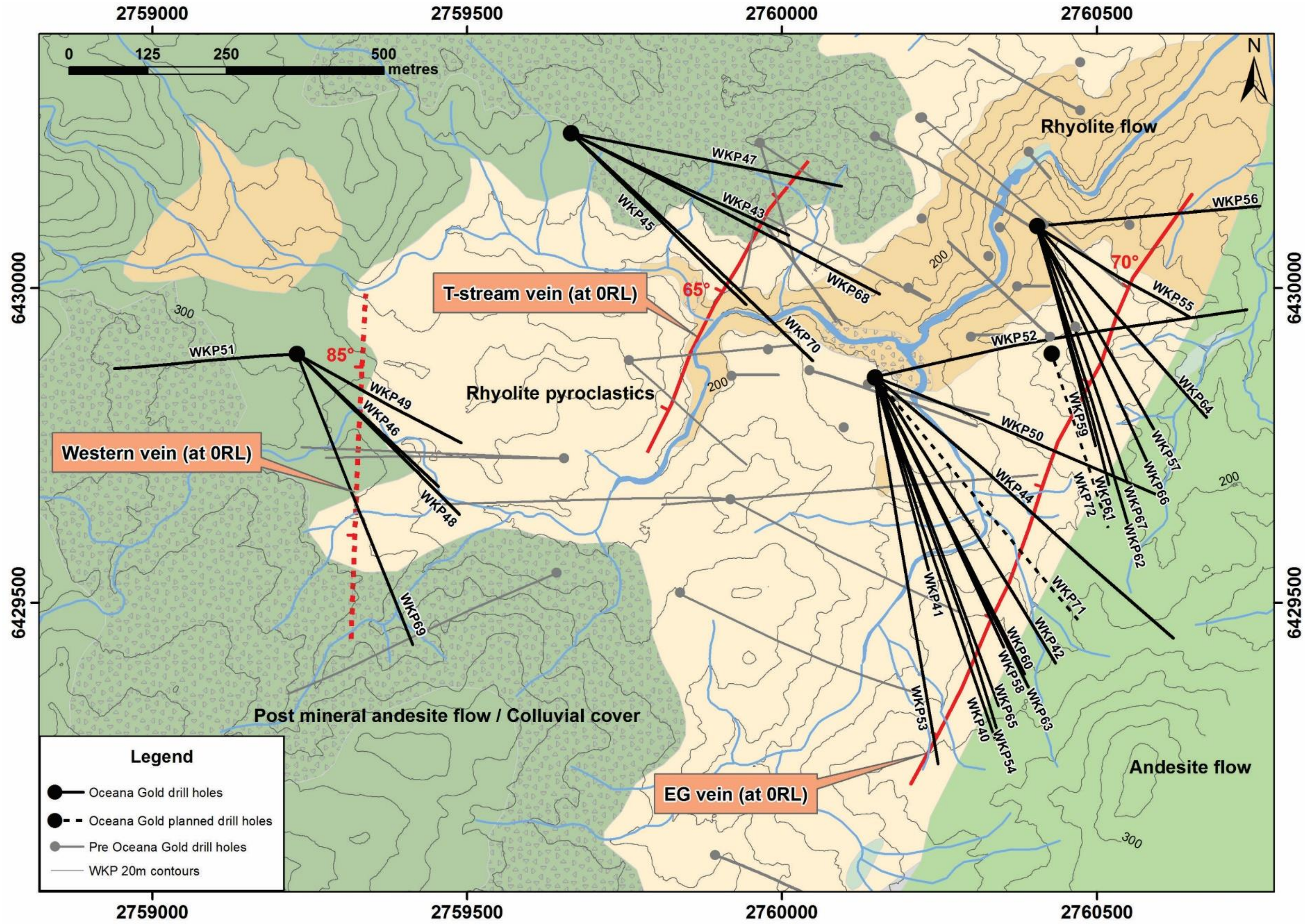


Figure 7.3: Geological Map of the WKP Prospect

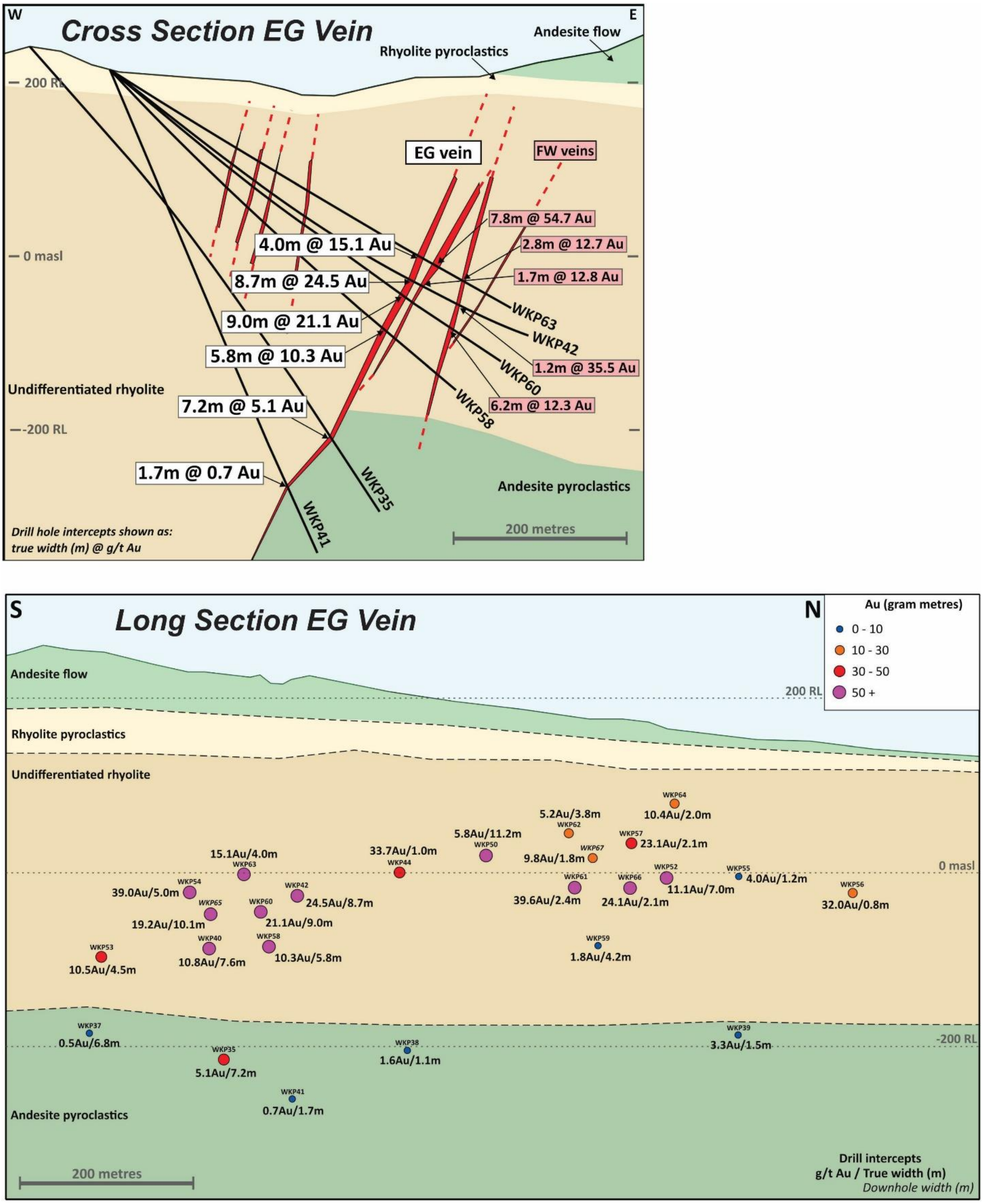


Figure 7.4: Simplified Cross and Long Sections along the EG Vein at WKP.

There are a series of sheeted hanging wall veins along the EG structure containing significant Au grade in places. These veins appear to have a more northerly strike with sub-vertical dips. These veins outcrop at surface and were the focus of minor historical workings (pre-1950s) and early diamond drilling in the 1980s.

The T-Stream vein is a breccia zone within rhyolite flows containing mineralised quartz veins located approximately 500 m to the west of the main EG vein. This structure strikes approximately NE (020°) and dips moderately (65°) towards the west (Figure 7.3). The brecciated vein zone is exposed at the surface and appears oxidized and often broken at depth. Low-grade Au occurs over the entire width of the structure with narrow internal pockets of high Au grade veins. Drilling to date shows Au grade decreases below 0mRL.

The Western vein zone is located approximately 1 km to the west of the EG vein and is the least understood of the WKP veins. Drill data contains minimal orientation data due to poor ground conditions however veining is believed to be N to NNE trending and steeply dipping towards the west. The vein zones contain numerous individual veins not all of which carry anomalous Au. The dominant vein textures are quartz replacing platey calcite and minor chalcedonic quartz.

7.4 Comments on Geological Setting and Mineralization

In the opinion of the QPs knowledge the geological control on mineralisation is well understood and is sufficient to support the estimation of Mineral Resources and Mineral Reserves. The current experience and geological knowledge of the area is also considered sufficiently acceptable to reliably inform mine planning.

8 DEPOSIT TYPES

All the gold deposits outlined by OceanaGold to date in this report are considered to be typical of epithermal vein gold–silver deposits.

8.1 Comments on Deposit Types

In the opinion of the QPs, features observed in Waihi and WKP deposits display the following features that are typical of epithermal gold deposits elsewhere in the world:

- Gold-silver mineralisation is confined to localized bands within multiphase quartz veins.
- Host lithologies for veins are andesite and/or rhyolite in composition.
- There is an association of sphalerite, galena and chalcopyrite with gold-silver mineralisation throughout the deposit. Towards the base of the deposits base metal content increases with galena (up to +3% Pb) and sphalerite (up to +1% Zn).
- Host rock volcanics have undergone pervasive hydrothermal alteration, often with complete replacement of primary mineralogy. Characteristic alteration assemblages include quartz, albite, adularia, carbonate, pyrite, illite, chlorite, interlayered illite-smectite and chlorite-smectite clays extending over tens of metres laterally from major veins.
- The upper portion of veining along the Favona and Gladstone deposits in Waihi contains an intact siliceous sinter sheet and hydrothermal eruption breccias.
- Mineralization is structurally controlled.

9 EXPLORATION

Approximately 598 017m have been drilled in 3687 core and exploration RC drill holes in Waihi since 1980. OceanaGold continues to drill in the area, with 27 km of drilling planned for resource infill and 20 km planned for Resource conversion for the Martha Underground project and 14 km planned for the WKP project in 2019.

No exploration results are being presented in this report, rather this report is focused on advanced projects that have well defined geological models and associated resources estimates completed.

9.1 Grids and Surveys

All historic mine data in Waihi was recorded in terms of Mt Eden Old Cadastral grid (MEO). This is the grid utilised for all underground and exploration activity within 3 km of the Waihi Mine beyond which New Zealand Map Grid is utilised. The MEO grid is offset from New Zealand Transverse Mercator (NZTM Grid) by 5215389.166 (shift m N) and 1456198.997 (shift m E).

The Martha Open Pit operation has historically used a local mine grid, referred to as 'Martha Mine Grid', derived from Mt Eden Old Cadastral grid but oriented perpendicular to the main veins. The grid origin is based at No.7 Shaft (1700 m E, 1600 m N) and rotated 23.98° west of Mt Eden Old Cadastral North. All open pit channel and drilling data has been converted to Mt Eden Old Cadastral for the resource estimation of the Martha Underground resource.

Relative level (RL) is calculated as Sea Level + 1000 m.

All WKP data is reported using New Zealand Map Grid (NZMG), however plans are in place to move towards using the NZTM Grid for this area.

More detailed documentation on drilling is presented in Section 10 of this Report.

9.2 Bulk Density

Bulk density determinations are discussed in Section 11 of this Report.

9.3 Comments on Exploration

In the opinion of the QPs:

- The exploration programs completed to date are appropriate to the style of the deposits and prospects within the Waihi and WKP projects;
- The exploration work supports the interpretations of the orogenesis of the deposits;
- The projects retain exploration potential, and additional work is planned.

10 DRILLING

Approximately 497,050 m of diamond core has been drilled on the Waihi Project since 1980. The WKP project has had 31,907 m of diamond drilling in 67 holes since 1980.

Most surface diamond drill holes were drilled by triple tube wireline methods with some holes precollared through post-mineral rocks by tricone or stratapac. Surface holes are collared using large-diameter PQ core, both as a means of improving core recovery and to provide greater opportunity to case off and reduce diameter when drilling through broken ground and historic stopes. Drill hole diameter is usually reduced to HQ at the base of the post-mineral stratigraphy. Underground drillholes are collared using HQ diameter core and reduced to NQ and BQ respectively, if bad ground is encountered. All drill core was routinely oriented below the base of the post-mineral stratigraphy, either by plasticine imprint or using the Ezimark or Reflex core orientation tool.

Additionally, 86,074 m have been drilled in 4,445 reverse circulation grade control holes during the open pit Southern Stability Cut (SSC) and Eastern Layback (ELB) projects between May 2007 and May 2015, using a 114 mm hole diameter and rig-mounted cyclone sampler. Details of the various drilling programs are summarized in Table 10-1 by year. Locations of drill hole collars are included in Figure 10.1.

10.1 Drill Methods

All surface drill holes were drilled by triple tube wireline diamond methods. Surface holes are collared using large-diameter PQ core, both as a means of improving core recovery and to provide greater opportunity to case off and reduce diameter when drilling through broken ground and historic stopes. Hole diameter is usually reduced to HQ at the base of the post mineral stratigraphy. All drill core was routinely oriented below the base of the post mineral stratigraphy, either by plasticine imprint or using the Ezimark or Reflex core orientation tool.

Drillhole location is recorded relative to the local mine grid Mt Eden Old Cadastral. Initial set-out and final survey of drill hole location for all recent drill holes (2004 onwards) have been carried out by mine surveyors using real time differential GPS. Downhole surveys were performed at 20m intervals up to 60m and then 30 m intervals to end of hole using a digital single shot camera. The accuracy of the downhole camera is checked monthly against a fixed camera stand. Magnetic field and gravity readings are taken for each camera shot and surveys are rejected if the readings are outside the normal ranges. Magnetic readings from downhole surveys are loaded to the database and converted to local grid north (Mt Eden Old Cadastral) based on the current magnetic declination.

Core recovery is recorded for all drilled intervals and is typically greater than 95%. No grade versus recovery relationship is evident.

Table 10-1: **Summary of Drilling by Year**

Year	Waihi Near Mine				Grade Control		Other Districts	Drill hole series
	Surface exploration DD m's	Surface exploration RC m's	Underground DD m's	Total Drill m's	UG DD m's	Pit RC m's	Total Drill m's	
1980-1985	16,747			16,747				WHD, WE, WHD, WR, UW
1986	2631			2,631				WE, UW
1987	325			325				WE, WHD
1988	1095			1,095				FRC
1989	991			991				WE, WHD, WR
1990	2,273			2,273				UW
1991	3,567			3,567				WE, WHD, WR
1992	1,134			1,134				WE, WHD, WR
1993	975			975				WHD
1994	1,215			1,215				WHD
1995	90			90				WHD, WC
1996	3,768			3,768				WHD, WG, UW, WE
1997	3,052			3,052				WHD, UW, WG
1998	1,371			1,371				WHD, UW, WG
1999	3,064			3,064				UW, WHD
2000	1,442			1,442				UW, WHD
2001	12,084			12,084				UW, WHD
2002	18,893			18,893				UW, WHD
2003	12,427			12,427				UW, WHD
2004	20,434			20,434				UW
2005	23,389	330		23,719			4,118	UW, WHD, MRC
2006	15,464	1,149	*2,851*	19,464	1051		2,851	WHD, UW, MRC, FU, FD
2007	9,818	1,536	*6,129*	17,483	4353	16770	1,011	WHD, UW, MRC, MWRC, FU, FD
2008	7,572	1,972	6,892	16,436	5197	17192	2,250	WHD, UW, MRC, MWRC, MNDDH, FU, FD
2009	9,755	2,998	703	13,456	3963	13044	3,222	UW, FU, FD
2010	12,935		218	13,153	2828	7018	2,877	UW, FU, FD,
2011	15,516	4,709	3,464	23,689	13195	2479	3,243	UW, UG, MED, FU, FD, CGD
2012	8,186	1,170	4,947	14,303	15789	4186	5,016	UW, MED, CGD; TRIOUGDD
2013	0		5,290	5,290	9606	6750	1,400	TRIOUGDD and CORUGDD
2014	1,770		20,607	22,377	3200	14803		CORUGDD, DAYUGDD, GEMUGDD, UW
2015	2,681		20,035	22,716	14391	3831.8		CORUGDD, DAYUGDD, GEMUGDD, UW, WAIHIEXP
2016	14,227		21,693	35,920	6580			CORUGDD, DAYUGDD, GEMUGDD, UW, WAIHIEXP
2017	19,437		19,143	38,580	7994.7		3,750	CORUGDD, DAYUGDD, GEMUGDD, UW, WAIHIEXP, W
2018	13,782		32,161	45,943	2659		12,002	CORUGDD, GEMUGDD, TRIOUGDD, UW, WAIHIEXP,
TOTALS	262,110	13,864	144,133	420,107	90,807	86,074	41,740	

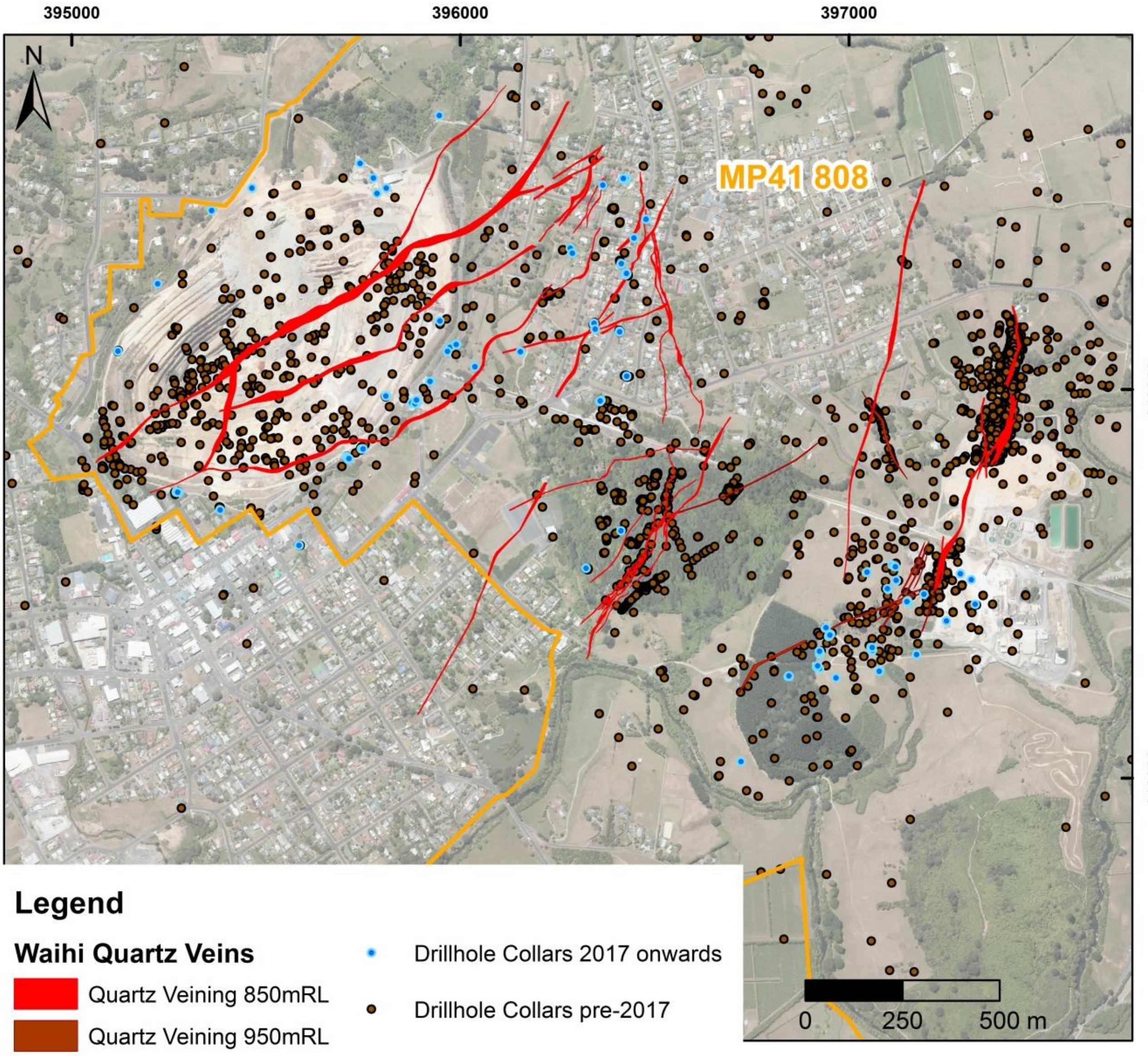


Figure 10.1: **Drill Hole Collar Locations, Waihi**

10.2 Geological Logging

Since July 2015, when OceanaGold took ownership of Waihi Gold all drill core has been logged into excel spreadsheets using validated templates.

Log intervals are based on geological boundaries or assigned a nominal length of one or two metres. The geological log incorporates geotechnical parameters, lithology, weathering, alteration and veining. A dropdown menu for each field allows the geologist to enter data by selecting from the available codes. Once logging is completed, the log is validated and then uploaded into an AcQuire database. A complete digital photographic record is maintained for all drill core.

RC grade control drilling in the open pit was sampled over 1.5 m intervals.

10.2.1 Lithology Codes

Lithology fields include three primary fields, composition, rock type and grain size. Secondary logging fields for lithological information (optional) include fields to record local or formal geological unit names, textural features, intensity of texture, and composition of clasts.

With the increased drilling around historic workings, logging codes have been modified to sufficiently characterise material associated with the workings for example stope fill, open stope, collapsed stope and open ground such as drives.

10.2.2 Weathering Fields

Weathering is logged on a scale of 1 to 5 where 5 represents fresh rock and 1 represents intensely weathered material.

10.2.3 Alteration fields

The primary fields for alteration use a 1-5 scale to record the intensity of hydrothermal alteration of the host rock. This includes fields for intensity of silicification, clay alteration, chlorite alteration, carbonate and hematite. A secondary field “Alteration Style” allows the style of alteration to be described, based on visual identification of the alteration mineralogy. The definitions for Alteration Style are based on temperature-pH charts from Corbett and Leach, 1998.

10.2.4 Structural fields

Structural fields are used to record information about veins, secondary breccias (such as faults) and hydrothermal breccias. Fields used to record veining includes Vein Percentage, Vein Mineralogy, Vein Texture, Vein Style and Sulphide Content. Fields for secondary breccias includes Breccia Percentage, Breccia type, Matrix composition and Clast composition.

Structural data is recorded in a separate excel spreadsheet with inbuilt formulas to convert measurements taken from the core to estimate the dip and dip direction of measured structures. The calculations take into account a ‘top of core’ reference line and the drilling direction and angle of the drillhole.

The orientation log is validated during logging and uploaded into the AcQuire database once logging is complete.

10.2.5 Geotechnical Logging

Geologists record standard geotechnical parameters, including RQD, fractures per metre and hardness for all drill core. The geotechnical group then log selected ore and waste intervals in greater detail using geotechnical logging criteria.

10.3 Recovery

Diamond drilling recovery is estimated by measuring the recovered core length against the drilled length. Recovery data has been captured for all sample intervals for all diamond drill holes and there is no observed relationship between core recovery and grade. Core from the Martha project is monitored for recovery daily to rationalize actual core loss against the intersection of historic mining voids with re-drilling actioned if necessary.

Core recovery within veined material (>40% vein in sample interval) varies between projects and is summarized as follows:

- 92.5% within the Martha Underground project,
- > 95% for the extended Correnso project,
- 89-90% for the Gladstone project,
- 96.2% for the WKP project.

RC drill sample recoveries were assessed by weight for representivity by the sampling technician and dispatching geologist. Samples were discarded where the recovered sample weight did not correlate well with the drilled interval.

Core recovery around historic workings have been increasingly difficult, so different methodologies have been trialled and adopted with relevance to the ground conditions that are encountered. Areas of core loss are broken out where possible so not to smear grade over disproportionate areas.

10.4 Collar Surveys

All historic mine data in Waihi was recorded in terms of Mt Eden Old Cadastral grid (MEO). This is the grid utilised for all underground and exploration activity within 3 km of the Waihi Mine beyond which New Zealand Map Grid (NZMG) is utilised. The MEO grid is offset from New Zealand Transverse Mercator (NZTM Grid) by 5215389.166 (shift m N) and 1456198.997 (shift m E).

The Martha Open Pit operation has historically used a local mine grid, referred to as 'Martha Mine Grid', derived from Mt Eden Old Cadastral grid but oriented perpendicular to the main veins. The grid origin is based at No.7 Shaft (1700 m E, 1600 m N) and rotated 23.98° west of Mt Eden Old Cadastral North. All open pit channel and drilling data has been converted to Mt Eden Old Cadastral for the resource estimation of the Martha Underground resource. Relative level (RL) is calculated as Sea Level + 1000 m.

Drill collars are surveyed using a total station by a registered professional land surveyor. At the start of the hole the drillers line up the mast in the correct azimuth using an Azimuth Aligner.

Drill collars at WKP are currently located using a handheld GPS with an accuracy of +/- 5 m for x and y coordinates. Drill pads have been surveyed using a total station, however individual collars within each drill pad still require survey pickups. Plans to more accurately survey the individual hole collars using a total station are in place for the near future, therefore there will be some minor collar adjustments at a future date.

10.5 Downhole Surveys

Downhole surveys are performed at 20 m intervals up to 60 m and then 30 m intervals to the end of hole using a digital single shot camera. Magnetic readings from downhole surveys are loaded to the drilling database, which calculates true north and local grid north (Mt Eden Old Cadastral) based on the current magnetic declination.

Azimuth readings (relative to magnetic north) from the downhole camera are loaded into the database and converted to MEO azimuth based on the current magnetic declination. Magnetic declination has been validated for all holes used in the models.

Where surveys are unable to be taken or inaccurate they are replaced with an estimate. In the vicinity of old workings, surveys are estimated on either side of the workings to reduce the inaccuracy of the automatic curvature applied by Vulcan software irrespective of where the actual deviation occurred. All downhole surveys are validated by a geologist in the AcQuire database.

A gyro survey has been used to validate the downhole survey data for one recent drillhole in the Waihi East area. The recorded hole dip is very similar for the two methods, whereas azimuth readings differ by up to 2.5 degrees; on average the gyro azimuth readings are 1 degree less than the downhole camera readings.

10.6 Geotechnical Drilling

Geotechnical drilling has been carried out for Gladstone pit, Martha underground and WKP for the purposes of collecting samples for triaxial, uniaxial strength testing and other laboratory test work. All resource drilling has geotechnical components logged in detail which are analysed by a site Geotechnical Engineer.

There were 2 geotechnical cover holes drilled from the 920 level to investigate ground conditions while mining the current drill drives for the Martha project. These were used to test the ground conditions for the drill drives and any interactions with expected or unexpected historic workings. An additional cover hole enabled an investigation into the conditions expected for the safe breakthrough into the Open Pit from the 920 level, and another one, a Raise bore cover hole between the 920 and 800 levels.

10.7 Current Drill Spacing's

The Correnso ore body uses a 30 m drill spacing to support classification of Indicated Mineral Resources, instead of 40 m previously used for the Favona and Trio deposits. The Gladstone deposit has been drilled targeting a nominal drill hole spacing of 30 m on the major mineralised veins. A tighter spacing of 22.5 m has been implemented in the more complicated zones exhibiting strong brecciation and/or stockwork veining.

The Martha UG project uses an average spacing to three drill holes of 60 m for inferred and 40 m for indicated. The extensive mining history of Martha (+135 years) has developed significant experience in assessing the continuity of mineralisation and mining the Martha vein system and the adjacent deposits. The vein style mineralisation has a strong visual control, is well understood and has demonstrated continuity over significant ranges. An estimation run utilizing a maximum of three drill holes with a single sample per drill hole was undertaken storing the average distance to the three drill holes used to estimate the block. This formed the basis for the resource classification.

For the Martha Phase 4 pit, the sample composite length was based on the nominal sample interval of 1.5 m for DD and RC drill data and 1 m for grade control channel data. Compositing was by fixed-length, honouring the domain boundaries.

The WKP project area contains 67 diamond drill holes (plus 5 re-drills along portions of holes) at the time of writing this report. The bulk of recent drilling has been targeted toward the East Graben Vein Zone. The East Graben Vein zone has been intersected in drilling over a strike length of approximately 1 km, this structure is larger than those typically encountered in the Waihi project area and on this basis the average drill hole spacing required for classification as an inferred resource has been increased by 15% to 80 metres average distance to the three closest drill holes. All other mineralisation has been classified using a distance threshold of 70 metres to the three closest drill holes for classification as inferred.

Table 10-2: **Current drill spacing per project**

Project	Average distance to 3 closest holes	Average distance to 3 closest holes
	Indicated Resource	Inferred Resource
Martha Open Pit	0-50 metres	50-100 metres
Correnso	0-30 metres	30-60 metres
MUG	0-36 metres	36-60 metres
WKP	0-50 metres	50-82.5 metres

10.8 Current Drill Orientation

Drill holes are designed to intersect known mineralised features in a nominally perpendicular orientation as much as practicable given the length of drillholes (often plus 250 m) and availability of drilling platforms.

10.9 Comments on Drilling

In the opinion of the QPs, the quantity and quality of the lithological, geotechnical, collar and downhole survey data collected in the exploration and infill drill programs are sufficient to support Mineral Resource estimation as follows:

- Geological logging of drill core (surface and underground) and RC chips meets industry standards for gold exploration within an epithermal vein gold setting;
- Collar and downhole surveys have been performed using industry-standard
- Recovery data from core drilling is acceptable;

- Geotechnical logging of drill core meets industry standards for underground and pit operations;
- Drill orientations are generally appropriate for the mineralization style;
- No material factors were identified with the data collection from the drill programs that could affect Mineral Resource estimation (refer to Section 12).
- From June 2016 onwards, a robust system was introduced for validating all drilling and logging data that is imported into the AcQuire database.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sampling Methods and Preparation

11.1.1 Drill Core and RC Drilling

Once the core is logged, photographed and sample intervals allocated, it is cut in half length ways. If a vein is present, the cut line is preferentially aligned to intercept the downhole apex of the structure. Within each sample interval, one half of the core is bagged for sampling and the other is kept in storage. Whole core has been sampled on an occasion where there was significant core loss coupled with visible electrum and for all BQ core due to reduced sample volumes. Labelled calico bags containing the cut core samples are transported to the local Waihi SGS Laboratory for crushing and sample preparation. Refer to the sample preparation flow sheet illustrated in Figure 11.1.

Sample preparation has been carried out at the SGS Waihi laboratory since 2006. Prior to then the sample preparation facility was located at the Martha mine site and operated by trained site employees. Some of the WKP core (holes WKP40-45) was sent to the Westport SGS laboratory for crushing and sample preparation.

RC drill chips were collected predominantly as part of the grade control process during the Martha Open Pit operation but also on a minor scale for exploration purposes (approximately 4309 m used in MUG estimate). At the rig site, samples were collected in a bag attached to the cyclone at 1.5 m intervals from which a 3-5 kg sample was split using a cone splitter. Bags were then transported to the secure sample preparation facility. Sample preparation of RC chips is the same as drill core.

11.1.2 Underground Ore Control Sampling and Backs Mapping

The Correnso Resource estimate includes data collected by underground face sampling (channels). While an underground development heading advances, the ore control geologists regularly channel sample the face. The geologists aim to sample at least once every 10 m of ore development. The sample intervals are determined by the ore control geologist based on changes in lithology, vein texture and/or alteration observed in the face. Where possible, a discrete vein has a sample start point along the left-hand contact and a sample end point along the right-hand contact of the structure.

Minimum sample interval widths of 0.3m and maximum widths of 2.0 m are allocated along each channel. The sample material is chipped off the rock face using a hammer and collected in a pre-labelled calico bag.

Four QAQC samples are assigned per face including a blank sample, a crush duplicate, a field duplicate and a standard. Each face sampled is sketched on a tablet and uploaded into Vulcan software. These sketches are used for geological modelling purposes.

A key element of interpreting the ore body and vein geometries comes from backs mapping of development headings. Each development heading is mapped on a daily basis as the heading progresses at a 1:250 scale. Major ore contacts and the relevant hanging-wall or footwall contacts are marked up in paint and picked up by survey on an approximately three cut rotation. Paper maps are then digitised into a Vulcan mapping layer utilising the survey drive and ore pickups. Backs maps are used on a regular basis for geological modelling, stope design and geotechnical evaluation.

An underground photogrammetry trial is currently underway in the Correnso underground mine. A series of overlapping high resolution photographs are taken of the underground development and processed with Agisoft photoscan software to produce an accurate high-quality 3D photographic mesh. This process may supplement and/or replace existing ore control mapping processes in the future Martha Underground mine.

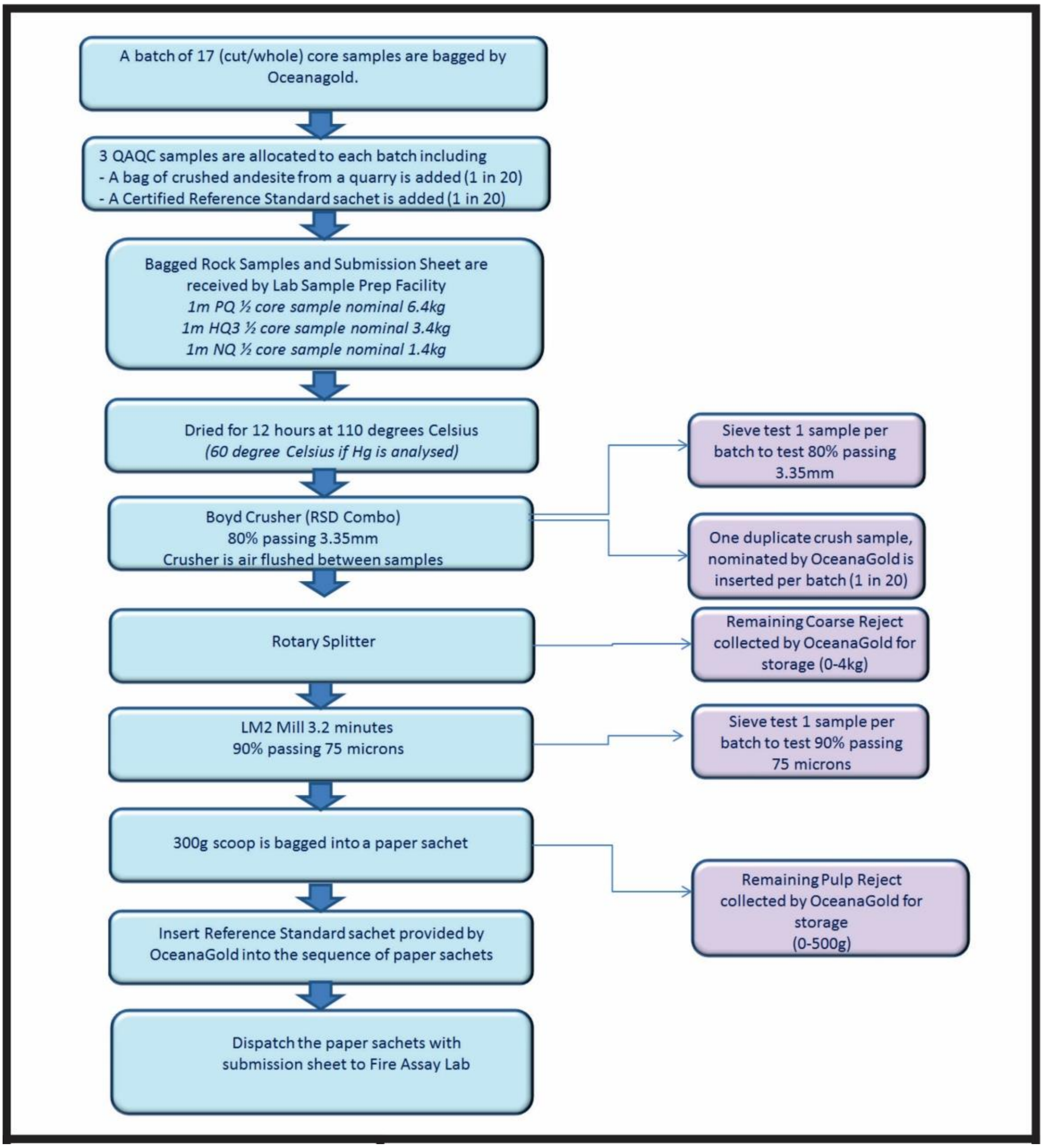


Figure 11.1: Sample Preparation Flow Sheet SGS, Waihi

11.2 Quality Assurance and Quality Control

11.2.1 Exploration Drilling Samples

Analyses of drill sample pulps from WKP were undertaken at the ALS laboratory in Brisbane, the ALS laboratory in Townsville and SGS laboratory in Waihi. The quality of exploration assay results has been monitored by:

- Sieving of the jaw crush and pulp products at the laboratory.
- Monitoring of assay precision through routine generation of duplicate samples from a second split of the jaw crush and calculation of the fundamental error.
- Monitoring of accuracy of the results through insertion of Certified Reference Materials (CRM) and blanks into sample batches.

Blank, duplicate and CRM results are reviewed prior to uploading results in the AcQuire database and again on a weekly basis. The Waihi protocol requires CRMs to be reported to within 2 standard deviations of the certified value. The criterion for preparation duplicates is that they have a relative difference (R-R1/mean RR1) of no greater than 10%. Blanks should not exceed more than 4 times the lower detection method of the assay method. Failure in any of these thresholds triggers an investigation and re-assay.

In addition to routine quality control procedures, umpire assay has been carried out on 248 samples (Correnso Project) at Ultratrace Laboratories in Perth. Results for gold were consistent with original SGS assay results and showed no effective bias, apart from 3 umpire samples that returned significantly higher gold values than the original assays. Those three samples were repeat assayed by SGS, the re-assay producing results consistent with the Ultratrace umpire assays; the second set of SGS assays have therefore replaced the initial assays in the database.

11.2.2 Underground Face Samples

Every face must include a blank, CRM standard, crush and field duplicate. Blank samples (samples that have been certified as containing zero Au values) are entered into the sample sequence preferably after what is thought to be the highest-grade sample in the face. A field and crush duplicate of the sample preceding the blank, is to be entered in after the sample sequence is completed. The final sample in the sequence is the CRM standard.

11.2.3 RC Grade Control Data

Assay quality control procedures for grade control RC data are set out in the site Martha Pit Grade Control Procedures updated in 2015. These procedures were designed to detect any poor sampling and sample preparation practices and ensure that results are within acceptable ranges of accuracy and precision. The QAQC protocols implemented for RC grade control sampling in the Martha pit are summarised in Table 11-1.

Table 11-1: Grade Control QAQC samples for RC sampling

Check	Description	Frequency
Blanks	Coarse Post-mineral Andesite (Tirohia Quarry); Submitted Blind to the lab	1 per Drillhole
Standards	Currently using Rocklabs standards - submitted as pulp to lab	1 per Drillhole
Field Duplicates	Additional RC sample taken from reject material from drill rig split	1 every fifth Drillhole
Crush Duplicates	Split of crush residue repeat assayed by 50 g Aqua Regia Assay	1 every 50 samples
Fire Assay	Repeat Assay of Pulp by 30 g Fire Assay	30 per Month

11.3 Laboratory Analyses

The standard suite of elements analysed at SGS for all exploration drill and RC samples are gold and silver, although a significant proportion of core is also analysed for copper, arsenic, lead, zinc and antimony. Gold is assayed using a 30 g charge for Fire Assay with AAS finish. Between May 2007 and September 2014 pulps were assayed by SGS for Gold and Silver by 30 g Aqua Regia Digest. From September 2014 Fire Assay analyses were conducted on gold only. Over range Au results of >100 g/t are re-assayed using an increase in dilution for the acid digest prior to instrument finish. Silver is analysed using a 0.3 g charge and AAS or ICP-MS instrument finish. For all other elements, the samples undergo a 0.3 g Aqua Regia digest followed by an ICP-MS instrument finish.

Generally, elements including mercury, arsenic, selenium and antimony increase at shallow levels within epithermal deposits. The presence of sinter and high-level quartz vein textures in the Gladstone project area indicate that the resource is at the top of an epithermal system. As a result, multi element data with an extended suite of elements (Au, Bi, Hg, Sb, Se, Sn, Te, Th, Ti, U, W, Ag, Al, As, B, Ba, Be, Ca, Cd, Ce, Co, Cr, Cu, Fe, Ga, K, La, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sc, Sc, Sr, Ti, V, Zn) has been undertaken at ALS Laboratories in Brisbane. Sample preparation was conducted at SGS Waihi following standardised procedures with a variation to sample drying temperature. A reduced temperature of 60 °C has been used to limit Hg volatilisation.

A selection of WKP and Waihi holes have undergone additional 42 element ICP-MS geochemical analyses at the ALS laboratory in Brisbane.

Comparison of the Ultratrace data with routine multi-element data produced by SGS Laboratory in Waihi showed good correlation between the parent (SGS) and umpire (Ultratrace) data sets for silver, lead, zinc and arsenic, which gives confidence in the accuracy of SGS data for these elements. For samples with over-range silver and lead, these elements are found to be extracted more efficiently by using a more dilute Aqua Regia digest (1-gram sample weight rather than the standard 10 grams per 50 ml). Antimony is not efficiently extracted by the current Aqua Digest method at SGS and consideration should be given to using the Peroxide Fusion extraction if more accurate antimony results are required.

11.4 Database

All QAQC data is managed in an AcQuire database via the CheckAssay and CheckChemistry compound definitions. Blanks and CRM standards are reviewed on a weekly basis using AcQuire QAQC objects. Any sample preparation or assay issues are discussed directly with SGS.

11.5 Sample Security

Access to site is controlled; Drill core is stored with secure facilities on site. Site employees transport samples to the analytical lab. The laboratory compound is secured.

11.6 Density Determinations

An updated assessment of density determinations was completed in May 2018. Density measurements are routinely collected during logging of diamond drill core. A field in the AcQuire database is setup to automatically calculate the specific gravity (SG) from these density measurements using the formula:

$$\text{Specific Gravity (SG)} = \frac{\text{Weight in Air}}{\text{(Weight in Air- Weight in Water)}}$$

11.6.1 Martha Underground

Specific gravities determined for rock units used in the Martha Underground project are summarized in Table 11-2.

Table 11-2 Specific Gravities used in the Martha Underground Estimation

Domain	Sample Count	Mean SG	Standard Deviation
Qtz Andesite	1361	2.52	0.15
Vein	634	2.53	0.09
Base Metal content logged (some overlap in Vein above)	426	2.56	0.08
Global Average	2156	2.5	0.16

The specific gravity of the Quartz Andesite and vein structures in the Martha Underground are influenced by several different factors. The SG of the quartz andesite unit is reduced when it is exposed to the surface weathering profile mainly seen in UW surface drill holes. At depth the density of andesite appears to decrease where it has undergone intense hydrothermal alteration however the unit has a clear upper limit of less than 2.8 grams per cubic cm. The density of 'vein' material in the Martha Underground model is mostly influenced by weathering associated with historical workings and less by surface weathering. Other influencing factors are base metal content, clay content and calcite content within veining.

In assigning SG within the resource estimate 'Stope fill' is assigned a SG of 1.8. Collapse zones associated with the Milking Cow subsidence and the Pit failure have been assigned a SG of 1.9. Fill is captured in the model via the 'mined' variable summarised in Table 11-3.

Back filled stope blocks are assigned grade based on an average from available data collected through drilling and open pit grade control processes. Stopes in the Martha Vein are assigned a grade of 5 g/t. All other stope fill is assigned a grade of 3.6 g/t. Within the current model there is a modelled void volume of approximately 2.5 million cubic metres, this being open voids from historic underground mining (stopes, shafts, passes and level development).

Table 11-3 Mined Variable Values used around Historical Workings

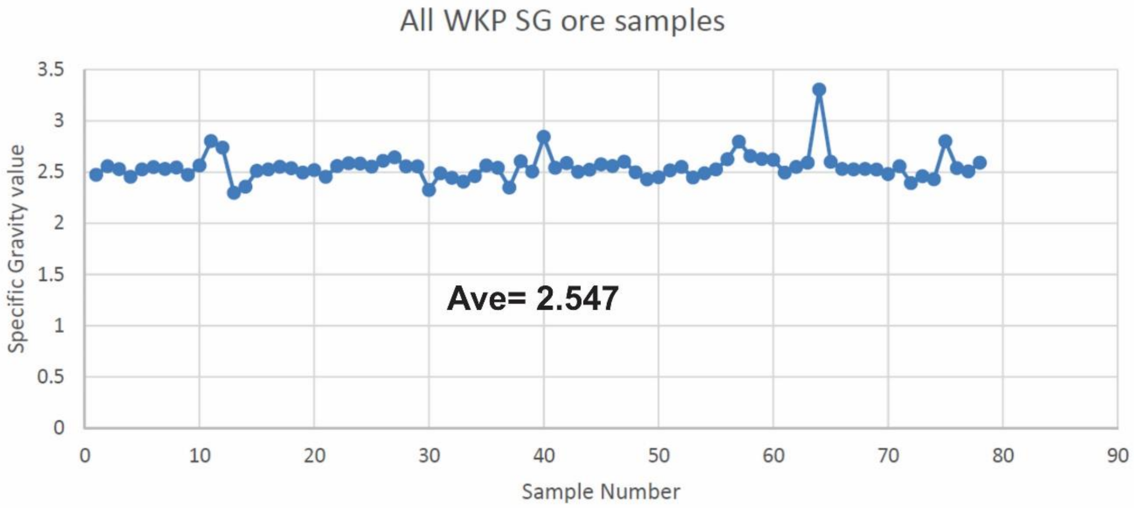
Mined Variable value	Material Type	Modifying factors
0	In-situ	As estimated
1	Back filled stopes	Density and grade modified
2	subsidence	Density and grade modified
5	Open stop	Density set to zero, grade removed
6	Open Development	Density set to zero, grade removed

11.6.2 WKP

WKP Density (SG) assignment is based on an updated WKP SG data Memo completed In January 2019. Density samples are routinely collected during logging of DD core. Specific gravities determined for rock units used in the WKP project are summarized in Table 11-4.

Table 11-4 Specific Gravities used in the WKP Estimation

Domain	Sample Count	Mean SG
Waste Rock	156	2.45
Vein	79	2.54
Global Average	235	2.5



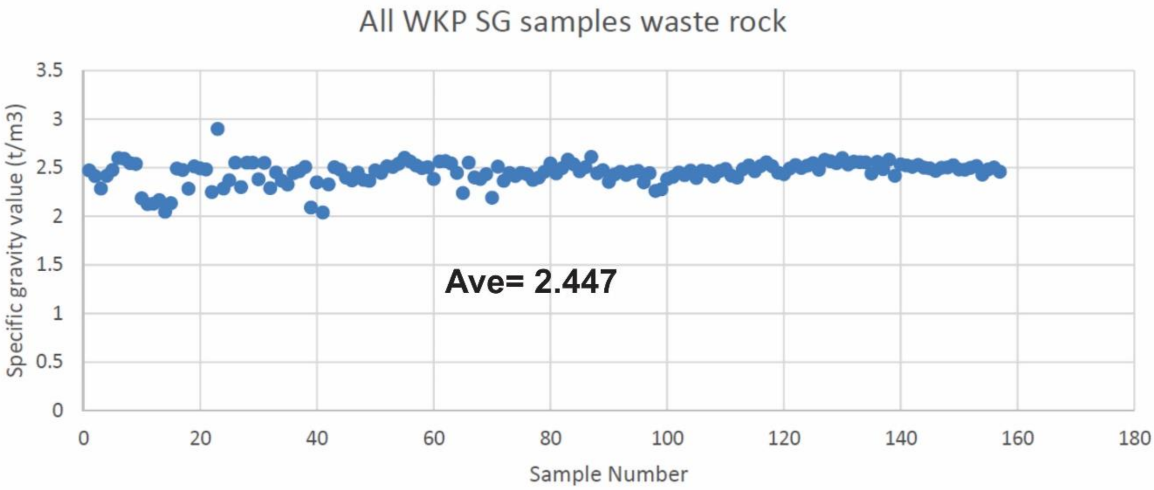


Figure 11.2 Charts showing the SG values calculated for ore and waste rock samples at WKP

11.6.3 Correnso

Dry bulk densities have been estimated for the Correnso resource using a water displacement method modified from NZS 4402: 1986, which is considered appropriate for competent half-core (Lipton, 2001). Dry bulk densities were determined for 247 samples of Correnso drill core, including representative vein and wall rock material from mineralized intercepts over a downhole depth range of 182 m to 519 m, corresponding to approximately 1000 m RL to 750 m RL. Geological classes were identified on the basis of logged physical characteristics and each main geological class is represented by SG measurements from at least 30 drillcore samples. An overall mean value of 2.52 g/cm^3 was obtained for all 247 density values. There is a slight increase in density with depth which corresponds to increasing base metal sulphide content. There is no relationship between the density and the Au grade.

11.6.4 Gladstone

Density is assigned to material by geologic unit and oxidation level within the Gladstone estimate

Densities are included in the block model for the various geological units and the oxide layer. The densities in t / m3 assigned to the model are shown in Table 11-5.

Table 11-5 Specific Gravities used in the Gladstone Estimation

Zone	Area	Oxide Density	Primary Density
1	Black Hill Dacite	2.2	2.2
2	Rhyolite Tuff	2.1	2.3
3	Andesite	2.0	2.2
4	Volcaniclastics	2.0	2.0
5	Hydrothermal Breccias	2.2	2.2
9	Quartz Veins	2.3	2.5
MINED 1	Mined Development	0	0
MINED 2	AVOCA Stopes	1.8	1.8

11.6.5 Martha Pit

A global density value is assigned to the blocks based on the project. The Martha open pit model is the only model that currently has variable densities assigned to lithological units where surface lithologies and weathering influence the model. Table 11-6 lists the density values assigned to the current models.

Table 11-6: Specific Gravities used in the current models

Project	Model Density
Martha	
Dig	1.60
Rip	2.00
Blast	2.30
Very Hard	2.47
Stope Fill	1.80
Correnso	2.50

11.7 Comments on Sample Preparation, Analyses, and Security

In the opinion of the QPs, sample collection, preparation, analysis and security for all OceanaGold drill programs are in line with industry-standard methods for gold deposits and provide data that are sufficiently bias and error free to support Mineral Resource estimation.

12 DATA VERIFICATION

Drill hole data is entered via an AcQuire database interface which includes validation protocols. Personnel are well trained and routinely check source versus input data during the entry process. All laboratory result files are uploaded directly into an AcQuire database. Below level detection limit assay results are stored in the database as (negative) half the detection limit. No other modification of the assay results is undertaken. Monthly QAQC reporting and review is undertaken on all laboratory assay results. CRMs performance is regularly scrutinised and the database QAQC function thresholds are reviewed bi-annually. CRMs are currently assigned to batches on a rotational roster in a “pigeon pair” system.

In addition to routine quality control procedures, umpire assay has been carried out on 248 samples (Correnso Project) at Ultratrace Laboratories in Perth. Results for gold were consistent with original SGS assay results and showed no effective bias, apart from 3 umpire samples that returned significantly higher gold values than the original assays. Those three samples were repeat assayed by SGS, the re-assay producing results consistent with the Ultratrace umpire assays; the second set of SGS assays have therefore replaced the initial assays in the database. For samples with over-range silver and lead, these elements are found to be extracted more efficiently by using a more dilute Aqua Regia digest (1-gram sample weight rather than the standard 10 grams per 50 ml). Antimony is not efficiently extracted by the current Aqua Digest method at SGS and consideration should be given to using the Peroxide Fusion extraction if more accurate antimony results are required.

Underground face samples contain one blank, one crush duplicate and one CRM standard per channel. Results are required to pass QAQC validation prior to being imported to a Microsoft Access database.

Open pit RC samples contained one blank, one crush duplicate and one CRM standard every 20 samples. Results were required to pass QAQC validation prior to being imported to an AcQuire database.

SGS routinely release its internal QAQC data to OceanaGold for review. The performance of SGS internal CRM standards appears satisfactory.

A limited number of twinned holes were completed during the initial investigations for Correnso. These indicated that there is some short-range variability in gold mineralisation. No twinned holes have been drilled for the Martha Underground project. There are strong visual indicators for high grade mineralisation observed both in drill core and in underground development.

All intercepts are reviewed during the construction of the geological wire frames prior to grade estimation, this review involves visual comparison of core photography, assay and logging data and spatial relationships to adjacent data. Significant intercepts are reported internally on a weekly basis for peer review purposes.

Check assay programs have been undertaken for projects previously as a part of the project advancing past milestones such as feasibility level studies.

A number of internal reviews have taken place to verify data collected for Mineral Resource purposes. A list of some of these reviews are provided below:

12.1 Geology & Wireframing

Rhys, DA. 2009 Observations and exploration recommendations at Newmont exploration properties Hauraki Goldfield. Unpublished Memo to Newmont Waihi Gold.

Rhys, DA. 2010 Wharekirauponga (WKP) prospect: review of exploration results with recommendations. Unpublished Memo to Newmont Waihi Gold.

Rhys, DA. 2011 Observations of selected drill core from the Wharekirauponga (WKP) prospect (with WKP-30 information added). Unpublished Memo to Newmont Waihi Gold.

Rhys, DA 2011. Review of the Structural Setting of the Correnso Vein System, Waihi, New Zealand. Unpublished report to Newmont Waihi Gold.

12.2 Density

White, T. 2012 Correnso Dry Bulk Density Study. Unpublished Internal Report, Newmont Waihi Gold.

Mcarthur, F. 2019 WKP SG Data Memo. Unpublished Internal Report. OceanaGold.

Vigour-Brown, W. 2019 Martha Underground SG Memo, Unpublished Internal Report. OceanaGold.

12.3 Assay QAQC and Multielement Geochemistry

Inglis R. 2013. Heterogeneity Study. Unpublished Internal Report, Newmont Waihi Gold.

12.4 Static and Kinetic Test work

Kirk, A. 2012. Geochemistry of Ore, Tailings and Waste Rock Assessment by URS New Zealand for the Correnso Underground Mine (Newmont Waihi Gold).

12.5 Mineralogy

Mauk J. 2009. Petrographic Examination of Samples from the Reptile North and Number Nine Veins, Waihi. Unpublished Report to Newmont Waihi Gold.

Ross, KV. and Rhys, DA. 2011. Petrographic Study of Representative Samples from the Correnso Vein System, Waihi District, New Zealand. Unpublished Report to Newmont Waihi Gold.

Menzies A. 2013 QEMSCAN Analysis of Samples from the Waihi District, New Zealand: Correnso. Unpublished report. Universidad Catolica del Norte, Antofagasta, Chile.

Coote, A. 2011 Petrological Studies of Diamond Core from WKP029 and WKP030, of the WKP South Project, Coromandel, New Zealand. Unpublished Report to Newmont Waihi Gold

Coote, A. 2012 Petrological Studies of Diamond Core from WKP024 and WKP031, of the WKP Epithermal Deposit, Coromandel, New Zealand. Unpublished Report to Newmont Waihi Gold.

Simpson, M. 2012 SWIR report for drill holes WKP-24, WKP-27 and WKP-30, Wharekirauponga, Southern Hauraki Goldfield. Unpublished Report to Newmont Waihi Gold.

12.6 Hydrology

GWS Limited 2012. Proposed Underground Mining Extensions – Waihi. Assessment of Groundwater Inflows and Throughflows. Prepared for Newmont Waihi Gold.

12.7 Comments on Data Verification

The QPs have reviewed the appropriate reports and are of the opinion that the data verification programs undertaken on the data collected from the Project adequately support the geological interpretations, the analytical and database quality, and therefore support the use of the data in Mineral Resource estimation.

Database audits confirm the data are acceptable for use in estimation with no significant database errors identified. No bias corrections were considered warranted on drill and analytical data.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

A 10 year+ LOM expansion project is underway at Waihi comprising Mineral Resources from three sources, Martha underground, Gladstone open pit and WKP. The Martha underground component has potential to deliver the greatest value through a flotation and ultrafine grind capital plant upgrade.

The testwork programmes completed in 2018 where;

- Gladstone pit: metallurgical composites, variability, MLA comminution and WTP testing
- Martha UG: Metallurgical composites
- Flotation and ultra-fine grind: Process Engineering Pre-Feasibility Study

The works planned for 2019 are:

- Flotation & UFG: Variability, locked cycle, signature plot testwork and Feasibility Study.
- Martha UG: metallurgical variability, MLA comminution and WTP testing

13.1 Correnso

Correnso ores have been processed over the last four years. A grind size P_{80} of 53 microns has been selected for the throughput rates, as plant operating experience has shown that an equivalent laboratory gold recovery at a P_{80} of 38 microns is achieved. This relationship is due to the laboratory grind test work being in open circuit, whereas in the plant the grinding circuit is in closed circuit. This results in the higher density sulphides being preferentially ground finer and hence liberating more gold particles that are disseminated within the sulphides. It is determined that a grind size P_{80} of 53 microns is the optimum that maximizes value for the Correnso resource.

Recovery is estimated from test work. Recovery at 88 tph throughput is estimated at:

*Recovery % = [Au Head grade – (0.09*Au Head grade + 0.25+0.02)] / Au Head grade * 100%.*

Both gold and arsenic have been identified as the statistically significant predictors for estimating residue grade for the Correnso Extensions resource.

13.2 Martha Underground Project

Prior to 2018, metallurgical test work was previously completed on 30 composite samples of intercepts from Edward (18) and Martha (9) and Welcome (1) and Empire East (2). Twenty-three samples were submitted to the Newmont Inverness testing facility. Six samples representing the Edward vein were submitted to Amtech Laboratory in Perth. Samples were mostly submitted both as quarter core and as jaw crush reject material (95% <7 mm), if both were available.

Leach tests showed a range of recoveries from 89% to 98% for the Edward mineral resources and 87% to 99% for Martha mineral resources, as shown in Figure 13.1 where calculated head grade is plotted against recovery or extraction.

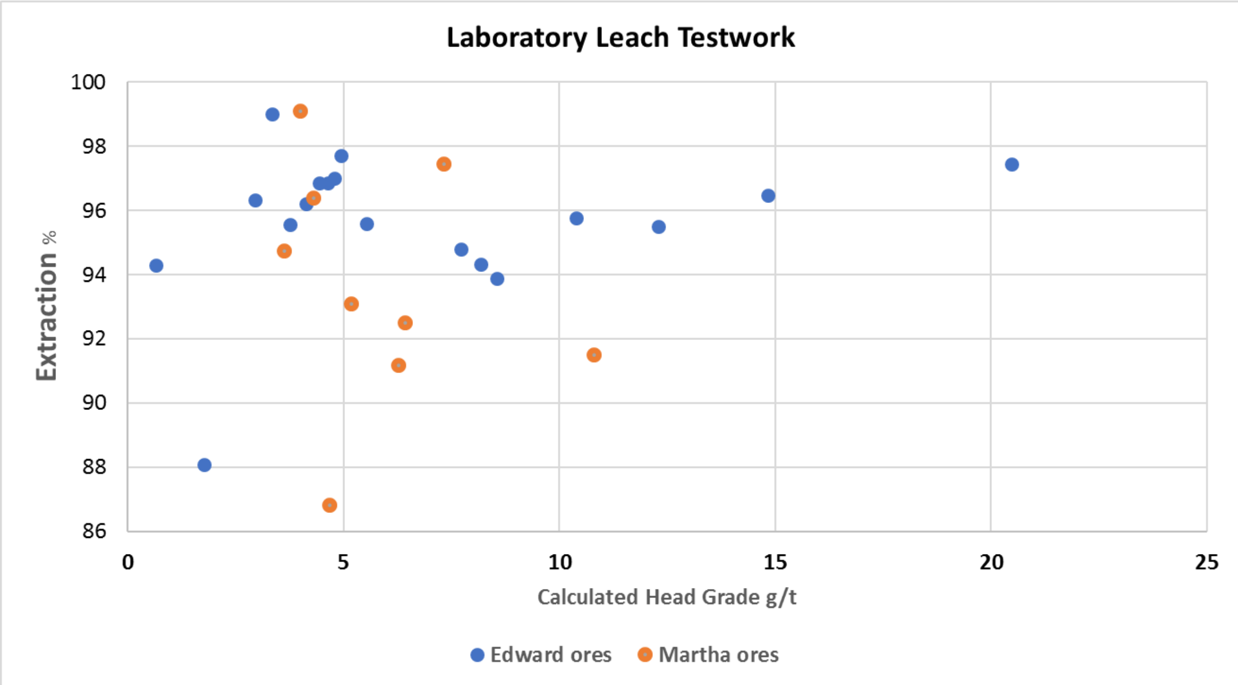


Figure 13.1: Laboratory Leach Testwork Chart

It was found that the recoveries of the Martha resources achieved a minimum of 90% leach extraction at a P_{80} of 53 µm across the 30 samples. This high base recovery indicates there may be less refractory gold in Martha mineral resources than Correnso.

Metallurgical testwork was completed on two composites in 2018 generated from resource definition drilling representing low and high-grade intercepts from the prepared bingo charts. Testwork was undertaken by AMML in Australia and included comminution, leach, flotation, and ultrafine grinding to establish recovery parameters.

Table 13-1: Martha UG Composite Grades

Composite	Au 1 g/t	Au 2 g/t	Au Average g/t	Ag g/t	S %
Composite 1 - High Grade	13.1	12.7	12.9	78	1.8
Compoiste 2 -Low Grade	3.56	3.91	3.74	65.2	1.48

Cyanide leach tests were performed on each composite at grind sizes ranging from a P80 of 90 to 8.5 microns. Results of the leach tests are presented below in Table 13-2 and indicate gold leach extractions at similar levels to that achieved historically with the Martha open pit resource.

Table 13-2: Leach performance on Martha UG composites

Composite	Grind P_{80}	% Dissolution		Residue Assay		Calculated Head	
	um	Au	Ag	g/t Au	g/t Ag	g/t Au	g/t Ag
Composite 1 High Grade	90	87.6	66.9	1.41	18.5	11.4	55.7
	75	87.8	66.3	1.40	17.1	11.4	50.7
	53	90.6	68.0	1.11	18.7	11.8	58.4
	38	92.9	64.1	0.83	22.7	11.7	63.3
	8.5	97.3	87.9	0.30	8.1	11.2	67.0
Composite 2 Low Grade	90	81.4	67.0	0.70	21.9	3.8	68.2
	75	82.8	71.4	0.69	18.5	4.0	64.6
	53	85.9	71.4	0.56	21.7	4.0	75.8
	38	88.3	81.6	0.46	11.9	3.9	64.4
	8.5	94	92.5	0.25	5.3	4.2	70.7

Diagnostic leach tests were conducted on the residues of the 75 um grind test to examine the deportment of unleached gold and silver. The results are presented in Table 13-3 and indicate the majority of unleached gold present is locked in sulphides at this grind size. This is similar to diagnostic leach results from the current treatment of Correnso ore through the current process plant.

Table 13-3: Martha UG Diagnostic Leach Results

Residue	% Free Milling		% Carbonate Locked		% Sulphide Locked		%Silicate Locked	
	Au	Ag	Au	Ag	Au	Ag	Au	Ag
Composite 1 - 75um	4.0	35.1	12.5	36.2	42.4	10.7	41.1	18.1
Composite 2 - 75um	8.3	26.9	11.4	41.2	58.1	8.7	22.2	23.1

Project work and metallurgical testing have shown Martha underground mineral resources to be amenable for processing via the existing Waihi treatment plant flow-sheet and achieve practicable throughput rates, reagent and consumable consumption and process recovery.

A metallurgical recovery of 90% been used for the Mineral Resource calculation.

13.3 Martha Pit

Martha pit Mineral Reserve metallurgical recovery of gold is estimated at 90.5% and silver recovery is estimated at 60% based on the process plant performance and reconciliations over the last 30 years of operation extracting similar veins.

13.4 Gladstone

Laboratory scale test work has been conducted on the drill hole samples obtained for the Gladstone Mineral Resource. The key focus of the metallurgical work has been to derive gold recovery, throughput rates, reagent consumption and to confirm the suitability of current Plant configuration. This test work has shown the Gladstone mineral resource to be amenable for processing via the existing Waihi treatment plant flow-sheet. Recovery is shown to vary with the weathering extent of the Gladstone resource.

The weathered domain achieves higher recoveries than the primary un-weathered domain. Separate recovery relationships have been determined for the weathered and un-weathered domains. A small separate metallurgical domain characterised by the hydrothermal breccia host rock was also identified.

A grind size of P_{80} of 90 microns has been selected, as plant operating experience has shown that this is equivalent to a laboratory gold recovery at a P_{80} of 75 microns. The gold and arsenic relationship identified in Correnso resource is not observed in the Gladstone Resource. The statistically significant drivers of recovery within the Gladstone resource are weathering and gold head grade.

The recovery estimate from the test work is calculated at a P_{80} of 75 microns

- Weathered: Recovery % = 100 * (0.902 – (0.049 / Head Grade Au))
- Un-weathered: Recovery % = 100 * (0.85 – (0.452 / Head Grade Au))
- Hydrothermal Breccia: Recovery % = 74%

This relationship predicts an average recovery for the Gladstone Resource of 77.8% based on the average Mineral Resource grade of 1.99 g/t Au.

13.5 WKP

A series of 10 composite samples were generated from drill core obtained from the WKP EG vein across the long section and at varying depths in several test programs. Eight of these composites represent material in the main EG vein with the other two testing the footwall and hanging wall structures adjacent. The source of each composite is outlined in Table 13-4. The composite samples were subjected to a standard suite of tests to characterise the recovery of gold from the samples via conventional mineral processing flowsheets similar to that employed at the Martha process plant.

Table 13-4: WKP Composite Locations

Composite #	Hole ID	Sample No	Zone
1	WKP40	WKP40 - 0595-0605	EG Vein
2	WKP42	WKP42 - 0500-0515	EG Vein
3	WKP50	WKP50 - 0403 – 0406 WKP50 - 0413 - 0415	EG Vein
4	WKP52,55	WKP52 - 0550, WKP55 - 0363,0364, 0307	EG FW Vein
5	WKP50	WKP50 - 0087, 0093, 0094	EG HW Vein
6	WKP35	WKP35 - 0450 - 0457	EG Vein
7	WKP44	WKP44 - 0410 - 0422	EG Vein
8	WKP53	WKP53 – 0677 - 0689	EG Vein
9	WKP56	WKP56 - 0348 - 0356	EG Vein
10	WKP57	WKP57 - 0341 – 0344, 0346 – 0349	EG Vein

Composite 6 lies below the main high-grade mineralisation but was included in the test program due to the slightly higher gram-meter result and to test performance of the deeper higher sulphur mineralisation. From a geo-metallurgical perspective, it is not regarded as representative of the main vein mineralisation and is not included in calculating aggregated results but shows the potential to process material at the extremities of the system. Composites 4 & 6 lie in adjacent structures and are not part of the main EG Vein.

Testing on the composites was completed by ALS Metallurgy in Perth, Australia and included:

- Head assay and screen fire assay
- Gravity gold recovery at 106 um grind size
- Cyanide leach of both gravity concentrate and gravity tails
- Sulphide flotation and leaching of flotation products

Head grade analysis is outlined in Table 13-5 below and indicate a gold head grade ranging from 4.2 g/t to 26 g/t for the main EG vein samples. Total sulphur head grades range up to 1.82% Sulphur and arsenic grades range up to 580ppm, similar ranges to the current Correnso North deposit being processed at Waihi.

Table 13-5 WKP Composite Head Assay Results

Composite #	Au g/t FA	Ag g/t	As ppm	Hg ppm	SiO2 %	Stotal %
1	7.53	10	15	<0.1		
2	26	35	325	0.8		
3	9.47	8	100	<0.1	88.4	0.42
4	4.83	4	270	2.9	82.0	1.34
5	4.54	16	30	0.1	89.2	<0.02
6	4.20	11.4	580	0.4	80.8	1.82
7	4.60	5.4	350	0.1	84.6	0.52
8	7.00	4.5	80	<0.1	89.0	0.26
9	5.21	6.9	390	0.5	80.4	1.74
10	7.67	12.9	110	0.2	81.6	0.86

Gravity concentrates were produced using a laboratory gravity concentrate with the concentrate subject to intensive cyanide leach conditions and the gravity tail subject to standard leach conditions. The combined leach recoveries are indicative of that expected from a conventional gold processing flowsheet.

Table 13-6 shows that gravity gold recovery ranged from 8.1% to 41% averaging 18.4% for the EG vein samples at either 53 um or 106 um grind size. The relatively low gravity recovery results and screen fire assay results suggest the majority of the gold is present as fine particles.

The average gold recovery from leaching on the main EG Vein samples averages 90.7% and suggests the majority of the EG Vein material can be regarded as free milling. The lower recovery experienced in composites 4 and 6 may be attributable to the higher sulphur feed grade and likely partially refractory locked in sulphides.

Further grinding of the ore finer than 106 um may lead to a further increase in leach recovery as found with composites 1 & 2 where an increase in leach recovery of 6% was found at 53 um compared to 106 um. Optimisation of grind size to improve recovery further with a direct leach flowsheet will be part of the ongoing work program.

Diagnostic leach tests were completed on direct leach tailings samples for 6 of the composites from the EG vein. The results show there is little free milling gold remaining in the tails that would be recoverable with longer leach residence time. Up to 40% of the unleached gold appears to be silica locked and given the high silica head grade is unlikely to be recoverable via leaching or flotation without further grinding to liberate the locked gold.

Table 13-6: WKP Leach Results

Composite	Head Grade g/t	Au:Ag	P80 um	Gravity %	Total Recovery %
1	7.96	01:01.2	106	35.1	95.5
2	28.7	01:01.2	53	15.1	89.5
3	9.78	01:01.4	53	25	89.3
4	5.08	01:01.6	53	8.1	66.4
5	4.46	01:01.4	53	12.5	80.9
6	3.78	01:02.7	106	11.5	68.8
7	5.35	01:01.2	106	10.9	91.2
8	6.65	01:00.6	106	41	95.8
9	5.72	01:01.3	106	9.7	84.3
10	7.58	01:01.7	106	15.5	89.1

The test work completed to date supports the adoption of a direct leach flowsheet for gold recovery at a primary grind size of 106 microns or finer and an expected recovery of 90% or higher is a reasonable assumption given optimisation work has not yet been completed.

13.6 Comments on Section 13

In the opinion of the QP, the following conclusions are appropriate:

- Metallurgical test work and associated analytical procedures were performed by recognized testing facilities, and the tests performed were appropriate to the mineralization type;
- Samples selected for testing were representative of the various types and styles of mineralization within the Waihi and WKP areas. Samples were selected from a range of depths within the deposit. Sufficient samples were taken so that tests were performed on adequate sample mass;
- Average recoveries have been assumed based on test work completed. These recoveries are appropriate to be used in support of Mineral Resource and Mineral Reserve estimation, based on the drill hole spacing and sample selection.
- Metallurgical testwork conducted on the composites to date from the Martha Underground deposit supports an expected gold recovery assumption of 90% for treatment through the existing Waihi process plant flowsheet based on targeting a primary grind size of 53um used in the mine optimisation.
- Metallurgical testwork on the main EG vein samples tested from the WKP deposit supports an expected gold recovery assumption of 90% for treatment through the existing Waihi proves plant flowsheet based on a similar 53um grind size.
- Further variability testing will be undertaken as core becomes available to increase the confidence in the recovery estimates and to investigate potential alternative flowsheets that may further increase recovery.

14 MINERAL RESOURCE ESTIMATES

14.1 Key Assumptions/Basis of Estimate

Five areas have Mineral Resource estimates. Correnso Extended project is the only area currently in production. Close-out dates for the databases used in estimation are as indicated in Table 14-1.

Table 14-1: Model Close Out Dates

Project	Database	Effective Date
Correnso extended	ADMWAIHIEXP, ADMWAIHIGC	27-05-2015
Martha Underground	ADMWAIHIEXP, ADMWAIHIGC	31-10-2018
Martha Open Pit	ADMWAIHIEXP, ADMWAIHIGC	11-05-2015
WKP	ADMWAIHIEXP	31-12-2018
Gladstone Open pit	ADMWAIHIEXP	Feb 2018

Data used to support the estimates include surface and underground diamond drill core, RC chips and underground grade control channel sample chips.

14.2 Geological Models

Open pit and underground mining since 1988 have provided a large database of mapping and grade control sampling, which has confirmed the geological interpretation to date.

The geological interpretation process routinely utilises all available drill logging data, core photography, drill assay data, and oriented core measurements, all of which are systematically collected and validated. Often additional data may be available to contribute to the final geological model including surface mapping, underground face and backs mapping, grade control channel sampling, historical underground quartz vein mapping and channel sampling.

Geological modelling of the Martha Underground, Martha Phase 4 pit, Gladstone and WKP projects was performed in Leapfrog Geo 4.2.1 using the interval selection and vein systems tools. Drilling data in Leapfrog was linked directly to the ADMWAIHIEXP AcQuire database.

Geological modelling of the Correnso deposit used a combination of Vulcan and Leapfrog Geo. Hanging wall and footwall points of veins were created in Vulcan using a direct link to the AcQuire drilling database. These points were then exported from Vulcan and used in Leapfrog to create vein wireframes.

Geological models and geological concepts have been routinely reviewed by internal and external reviewers.

14.2.1 Martha Underground

A Martha Underground geological model update and reserve estimate was completed in December 2018. This model is an update on the scoping study model completed in June 2018.

This model was prepared to enable a prefeasibility level study to be undertaken on the Martha system.

The comprehensive Martha dataset includes diamond drilling, in-pit mapping, grade control channel and RC data, backs mapping from modern development, historic cross-cuts, historic mapping, digitized historic mining wireframes.

Comparative assessment of the June and December 2018 models indicates only modest changes between estimates. The number of veins forming the basis for the geological interpretation has increased slightly and the additional drilling has resulted in an increased resource confidence. Both indicated and inferred resources having grown substantially since the previous estimate. Increased drilling density has reduced the influence of the lower quality historic cross cut data, particularly in close proximity to the drill positions.

Updates to December 2018 model include:

- New drilling undertaken between May and November 2018, from the underground 920 and 800 drill platforms and surface platforms
- Some additional veins defined within the geologic model
- Additional scanned maps from the Auckland museum to refine geometry of historical voids
- Backs mapping and channel sampling from underground development

Outputs from the December model includes:

- 65 Vein triangulations (Table 14-2). The fundamental architecture remains consistent. Additional diamond drilling has allowed for the extrapolation of more minor structures clearly present in open pit GC data
- 10 Lithology triangulations
- 3 Oxide triangulations
- Historical workings were updated including development headings, open stope and filled stope triangulations.

The model was built with underground mining economics in mind, and delineation of consistently narrow or low-grade structures was not necessary.

Wireframes were created using Leapfrog Geo software. Geological logging fields of drilling data such vein textures, vein mineralogy, vein percentage, breccia type and historical voids were initially used to create representative wireframes of vein structures. These initial wireframes were then modified on a vein-by-vein basis and compared to Au and Ag grade, core photography and structural measurements to establish geological consistency between veins.

Veins defined by pit grade control data but without supporting drilling information to substantiate vein extrapolation beyond the pit boundary were not included in the wireframes.

Individual veins were validated at various stages throughout the modelling process. Upon completion of the modelling process, additional validation includes:

- A visual review in 3-axis sliced planes viewing Au grade, historical voids and logged geology.
- Drill-hole review following domain flagging and filtering for Au immediately outside of vein boundaries.
- Peer review within the Waihi geology team.
- Review against historic mining. Note that in instances where mined voids had no drilling data, relative position of stoping panels was determined using vein wireframes. This ensures a conservative approach was taken to depletion.

Table 14-2: Martha Vein Domain Triangulations used in the December 2018 estimation

1100_Martha.00t	**1302_Victoria.00t**	1408_Letter_Y.00t
1109_Martha_East.00t	**1304_Magazine.00t**	1409_Emp_HW1.00t
1110_Nth_Branch.00t	**1305_Welcome.00t**	1420_Nth_Section_Empire.00t
1111_Loop_No1.00t	1306_Welcome_Back.00t	1421_State_Branch.00t
1112_Martha_South_Section.00t	1307_Welcome_C.00t	1422_State_Reef.00t
1113_Loop_No2.00t	1308_Alexandra.00t	1423_Dominion.00t
1120_Mary.00t	1309_Welcome_D.00t	1424_Republic.00t
1130_No2.00t	1310_Welcome_E.00t	1425_Wowser.00t
1131_No2_West.00t	1311_Welcome_F.00t	1426_Harry.00t
1132_No2_South.00t	1320_Grace.00t	1427_Boxall.00t
1140_Flat_A.00t	1331_Vic_FW3.00t	**1500_Royal.00t**
1141_Flat_B.00t	1332_Vic_FW9.00t	1501_Royal_FW_A.00t
1143_Ella.00t	1333_Vic_FW7.00t	1510_Rex.00t
1144_Flat_C.00t	1334_Vic_FW10.00t	1511_Princess.00t
1201_Albert.00t	**1400_Empire.00t**	1512_Royal_Nth_Branch.00t
1220_Edward.00t	1401_Letter_H.00t	1513_Dreadnought.00t
1221_Edward_Link.00t	1402_Letter_J.00t	1514_Dreadnought_Sth.00t
1222_Edward_B.00t	1403_Letter_C.00t	1520_George.00t
1223_Edward_C.00t	1404_Gordon.00t	1530_Ulster.00t
1224_Edward_D.00t	1405_Letter_D.00t	1551_Louis.00t
1225_Edward_A.00t	1406_Letter_X.00t	1552_Emp_F1.00t
	1407_Letter_L.00t	1553_Roy_HW1.00t

14.2.1.1 Historical Workings Model

Given the mining history of the Martha project the accurate treatment of historic mine workings is recognised as being of high importance to the project.

A 3D model of historic workings was utilised in the construction of the geological model. This model was constructed as part of ongoing geotechnical studies and captures the extent of known stopes within the major lode structures. A 3D model of the historical stopes was initially constructed by draping digitised historical long sections of stoping blocks on to the footwall of the vein wireframe to form 3D polygons. These 3D polygons were then extruded, towards the vein hanging wall, the average width of the block as determined from historic data to form a solid wireframe. Using the historical long sections, the stope wireframes were then attributed with stoping type, to determine if filled or void. Unknown types were assumed to be voids, unless verified by current mining. A review of the historic development and stope models of the Martha and Grand Junction workings in 2009 found the original interpretation of most historic workings were modelled between 2 m and 15 m lower than surveyed intercepts with workings in the pit.

Recently, new data has provided an additional source from which the historical void model can be updated and remodelled. This new data includes the on-going Martha diamond drilling program, recent underground mine development (2017 to present) and additional historical mine plans made available through the Auckland War Memorial Museum. Underground surveyors provided the geology team survey pickups of all old workings intercepted during mining.

Significant updates were applied to the historical mine workings. All the workings were separated into individual wireframes and assessed for position, orientation and width against all the newly available data. Where required, the following adjustment techniques were applied using Vulcan software:

1. Translation – Workings were shifted to match drill hole intercepts and/or vein wireframes. Translations used a 'reference point to destination point vector'.
2. Rotation – Whole wireframes were rotated either in cross section or plan view to match vein wireframe orientations. Stopes that required partial or incremental rotation were sectioned into polygons then each polygon was rotated individually in cross section before the solid wireframe was recreated.
3. Reshaped – Stopes that required width change to match drill hole intercepts were also sectioned into polygons, moved and reshaped to match drill hole logging before the solid wireframe was recreated.
4. Reclassified – Stopes were reclassified if the recent data (drilling/ development) contradicted with the classification in the original stope model.

Stope shapes and levels were validated for closure, consistency, and crossing triangles to ensure they could be evaluated for volume, then re-merged into a complete set of development levels, filled stopes and open stopes. All remodelled historical workings were peer reviewed and validated against previous models. All updates are recorded in a 'stope adjustment register'. The updated model contains wireframes for development levels, open stopes, filled stopes, shafts, passes and the Milking Cow caved zone.

14.2.2 WKP

The WKP model is based on the three main mineralised vein zones including the EG vein, the T-Stream vein and Western vein (refer to Section 7.3).

The WKP veins were modelled using Leapfrog Geo software using both surface mapping and diamond drilling data.

14.2.3 Correnso

The Correnso deposit is in an advanced state of mining having been stoped out from the 795 RL to the 915 RL. Minor development and stoping is in progress at Correnso deeps and the upper portions of Correnso are currently being mined by handheld methods (air-leg). The Correnso deposit is scheduled to be mined out by 2020. Grade control models are being updated on a continual basis as ore drive development is completed.

Geological modelling of the Correnso deposit uses a combination of Vulcan and Leapfrog Geo. Geologists use backs mapping (picked-up by survey), face mapping and sampling to update the hanging wall and footwall points of veins in Vulcan.

The digital core photographic record is used extensively during the modelling process. Identifiable characteristics of particular veins can be recognised, such as mineralogical and textural characteristics, the nature of particular contacts, and the existence and relative timing of mineral phases within the vein zones. The mineralized veins have a distinctive appearance with common textures and mineralogy including green chlorite-smectite clays, base-metal sulphides and quartz often exhibiting complex internal multiphase banding and brecciation. Barren veins on the other hand are usually white in colour comprising quartz and calcite, for example the quartz-calcite veining (5995 lode) that interrupts mineralisation along the north end of the Correnso ore body. Often the mapped geometries of veining mined in the past is used as a guide for geological modelling as sinuous deflections in the strike of veining tends to be continuous over a considerable vertical extent.

The finalised hangingwall and footwall points are exported from Vulcan and used in Leapfrog Geo to create updated vein wireframes using the "Mesh from polygon" tool.

Geological models and geological concepts have been routinely reviewed by internal and external reviewers.

Solids for the Correnso Project are listed in Table 14-3.

Table 14-3: Correnso Vein Domain Triangulations

Wireframe	Description
c5900_20190225-model_dilution.00t	Correnso dilution domain
c5901_20190225.00t	Main vein south of quartz-calcite structure
c5903_20190225.00t	Eastern splay off 5904
c5904_20190225.00t	Main vein nouth of quartz-calcite structure
c5907_20190225.00t	Western splay off main vein north of Daybreak
c5908_20190225.00t	Eastern splay2 off main vein south of calcite fault
c5930_20190225.00t	Western splay off 5901
c5995_20190225.00t	Quartz-calcite structure

14.2.4 Gladstone

The Gladstone Project is based on open pit/s around the Gladstone hill and Winner hill area. The resource model describes the mineralisation within Gladstone and Winner hills and includes part of the Moonlight orebody, depleted for underground mining.

The Gladstone mineralisation is characterized by shallow-level, hydrothermal breccias and associated banded quartz veins interpreted to represent the top of the epithermal system. The uppermost mineralised quartz veins flare up into hydrothermal explosion breccias. The Gladstone veins are predominantly steeply-dipping veins developed within the hanging-wall of the Favona Fault that dips moderately towards the SE. The vein trend ENE to NE between 035° and 075° and dips steeply towards the SE.

14.3 Exploratory Data Analysis

14.3.1 Martha Underground

The Martha project has an extensive mining history, consequently there is abundant data collected over many years that requires assessment in construction of grade estimates for the deposit. The model update incorporates all available data including exploration diamond drilling, in-pit grade control channel data and in-pit grade control RC drill data to build of the geologic model and in the grade estimate.

There are three drilling datasets from within the open pit that have been utilized in the development of this model:

- Grade Control Channel data from the Open Pit collected between 1988 and 2008,
- Reverse Circulation Grade Control (RC) drilling data collected between 2008 and 2015 and
- Exploration drilling data collected over the life of the project.

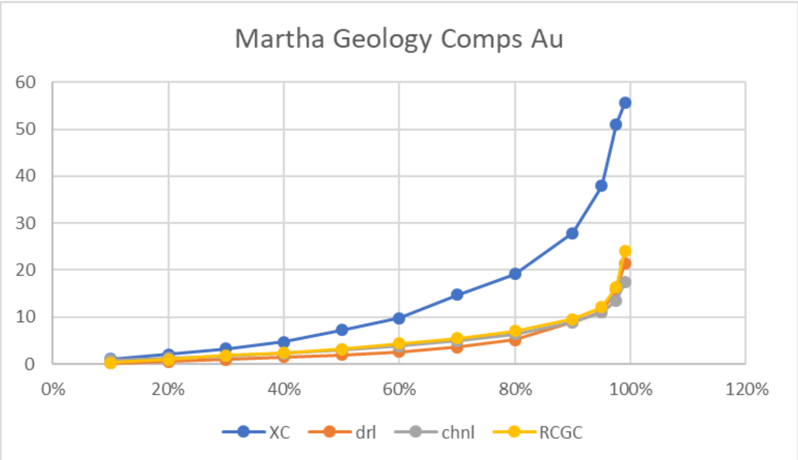
Table 14-4 Summary Statistics for Martha Underground Major Domains (2 metre composites)

Statistic	Domain 1100	Domain 1201	Domain 1220	Domain 1302	Domain 1304	Domain 1305	Domain 1400	Domain 1500
Samples	1949	86	416	254	146	803	615	134
Minimum	0.005	0.01	0.005	0.025	0.005	0.01	0.005	0.005
Maximum	227.347	20.45	131.324	35.2	29.695	88.663	130.584	44.9
Mean	3.57245	2.44703	5.44525	3.16138	2.6127	3.32837	4.5139	5.14885
Standard deviation	8.69493	4.25873	12.0238	4.13503	4.59438	5.51362	9.46017	7.31277
CV	2.43388	1.74036	2.20812	1.30798	1.75848	1.65655	2.09578	1.42027
Variance	75.6018	18.1368	144.571	17.0985	21.1083	30.4	89.4947	53.4766
Skewness	12.0578	2.40391	5.57407	3.97903	3.30795	6.76596	6.9471	2.29913
Log samples	1949	86	416	254	146	803	615	134
Log mean	-0.0918324	-0.9039	0.0701507	0.410488	-0.514125	0.18003	0.221961	0.249752
Log variance	3.4798	4.81505	4.25725	1.9717	4.25384	2.82409	3.56792	4.56478
Geometric mean	0.912258	0.404987	1.07267	1.50755	0.598024	1.19725	1.24852	1.28371
10%	0.06	0.025	0.053	0.14	0.025	0.095	0.073	0.045
20%	0.161	0.035	0.14	0.598	0.052	0.3	0.27	0.102
30%	0.363	0.065	0.358	0.92	0.236	0.632	0.607	0.484
40%	0.688	0.175	0.711	1.241	0.48	1.06	1.063	0.949
50%	1.182	0.317	1.27	1.85	0.86	1.493	1.61	2.435
60%	1.735	0.9	2.08	2.49	1.47	2.205	2.436	3.297
70%	2.7	1.51	3.906	3.843	2.19	3.443	3.495	5.34
80%	4.678	4.256	6.318	4.895	3.8	5.135	6.298	8.708
90%	9	7.9	15.951	7.359	6.505	8.175	11.386	14.82
95%	14.15	13.515	23.61	9.8	11.477	12	17.019	20.01
97.50%	21.75	13.7	33.141	11.491	16.533	16.983	25.767	21.883
99%	32.15	18.541	55.379	17.05	24.11	22.224	42	34.98

In the construction of this model it was recognised that there is significant historic cross cut data from the level development that could be utilised to aid in estimating grade particularly in the poorly drilled portions of the deposit. The legacy cross cut data is of unknown quality, grade historically was recorded as an economic value and a gold equivalent value was back calculated for this data set previously. The crosscut data was reviewed spatially and only data that spanned the full width of the vein was selected for utilisation in the grade estimation process. This data was further limited to only the second pass grade estimation pass.

The channel and RC data are spatially distinct from each other and cover those portions of the deposit that have already been mined or are immediately adjacent to the mined portion of the deposit whereas the Exploration drilling data covers the full extent of the area being modelled. Figure 14.1 below presents the comparative assessment of the grade by data type for the Martha Domain. It is apparent that the legacy cross cut data is representative of the high-grade subset of the domain. On this basis the cross-cut data is excluded from the grade estimate for indicated and inferred resource.

Figure 14.1 Martha Domain comparative assessment of grade distribution by data type



14.3.2 WKP

Reconciliation history for the Waihi project has demonstrated that some level of high-grade restriction is necessary to limit the influence of outliers on grade estimates for the epithermal veins that have been mined during the operations history. Statistical assessment of the input data is undertaken by domain, typical top-cut selection is based on the assessment of the population distribution characteristics and for inverse distance estimates cutting at the 98th percentile on the log probability distribution has been a long-standing methodology that has produced acceptable results. For the WKP project the approach of cutting to the 98th percentile is considered appropriate.

Table 14-5 Summary Statistics of Major Domains for WKP

	T Stream	Eastern Graben	FW1	South EG splay	FW2
Statistic	Domain 400	Domain 410	Domain 420	Domain 425	Domain 430
Samples	117	118	28	41	44
Minimum	0.001	0.243	0.005	0.37	0.39
Maximum	83.702	112.317	30.532	108.747	58.2
Mean	3.50826	15.8135	3.95189	20.5724	9.41341
Standard deviation	10.4356	18.9822	6.39769	29.8329	12.8759
CV	2.97459	1.20038	1.61889	1.45014	1.36782
Variance	108.902	360.323	40.9304	890.003	165.788
Skewness	5.35188	2.68227	3.10517	1.47711	2.37649
Log samples	117	118	28	41	44
Log mean	-1.75599	2.0943	-0.189647	1.63286	1.52504
Log variance	9.10693	1.71109	6.9785	3.34657	1.46062
Geometric mean	0.172737	8.11972	0.827251	5.1185	4.59531
10%	0.003	1.16	0.005	0.505	1.064
20%	0.005	3.073	0.312	1.02	1.607
30%	0.025	5.224	0.74	1.13	2.13
40%	0.03	6.555	1.288	1.96	2.674
50%	0.37	8.879	1.437	3.212	3.481
60%	0.54	11.902	1.7	5.25	4.81
70%	1.18	16.949	3.656	20.34	6.933
80%	2.34	26.96	5.99	47.538	16.551
90%	7.579	35.9	7.28	72.275	23.3
95%	16.5	47.855	15.511	75.649	37.557
97.50%	33.783	58.773	15.511	90.072	39.401
99%	56.462	101.199	30.532	108.747	58.2
Top Cut value	40	45	25	80	45

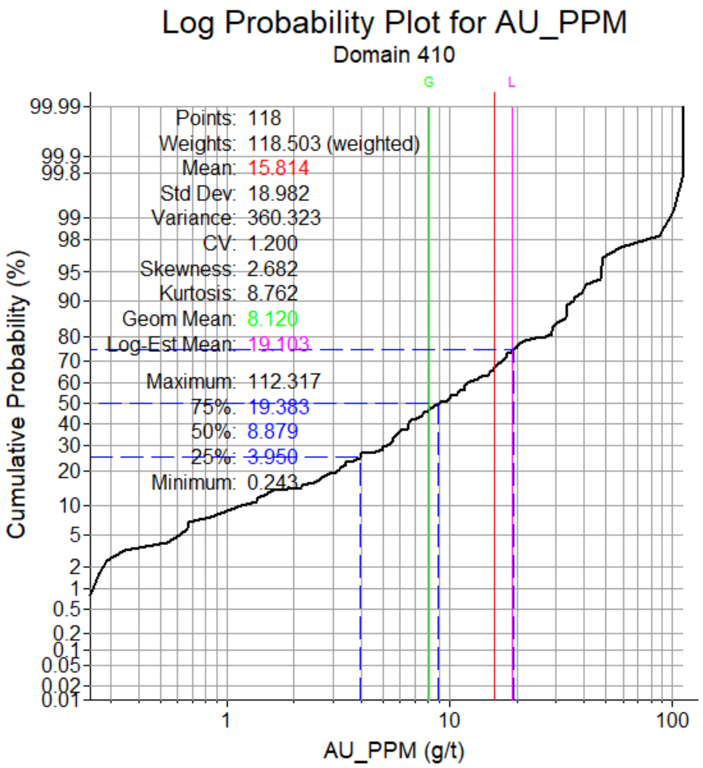


Figure 14.2 Log Probability Plot of the EG Vein, WKP

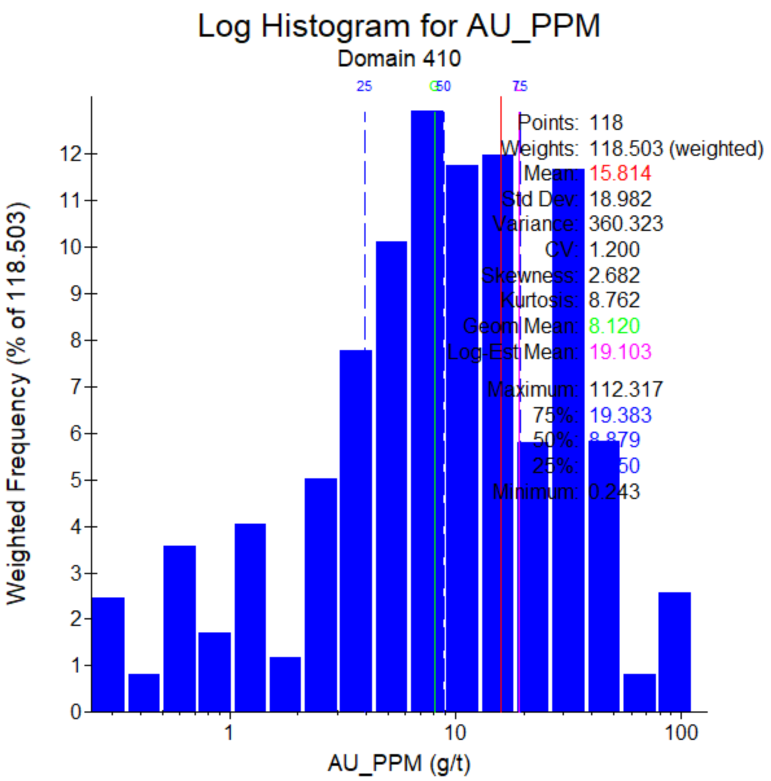


Figure 14.3 Log Histogram Plot of the EG Vein, WKP

14.3.3 Correnso

Available drilling data was extracted from the AcQuire drilling database for each area. The data was statistically analysed to determine domain selection for the resource estimation. The analysis was completed using the composited data. Table 14-6 summarises the statistics of the current resource models.

Table 14-6: Correnso Model Composite Statistics

General Stats AU_PPM <5901>, ..., AU_PPM <5930>_2

Variable name	AU_PPM <5901>	AU_PPM <5903>	AU_PPM <5904>	AU_PPM <5907>	AU_PPM <5908>	AU_PPM <5930>
Count	2714	103	1152	457	823	48
Mean	10.224	16.265	11.779	10.436	20.247	4.011
Standard deviation	18.721	54.393	19.490	15.465	28.561	5.684
CV	1.831	3.344	1.655	1.482	1.411	1.417
Max	407.704	542.500	247.159	131.000	262.003	22.935
Upper quartile	11.468	17.494	14.163	11.965	25.817	4.898
Median	5.334	5.120	6.118	5.010	11.162	1.402
Lower quartile	1.982	0.320	1.898	1.660	3.889	0.310
Min	0.005	0.007	0.005	0.006	0.010	0.005
Variance	350.487	2958.636	379.849	239.164	815.742	32.312
Skewness	9.017	9.073	5.571	3.508	3.869	2.002
Kurtosis	139.231	88.038	46.736	16.617	21.580	3.538
Range	407.699	542.493	247.154	130.994	261.993	22.930
Sum of weights	2714.000	103.000	1152.000	457.000	823.000	48.000
Geometric mean	4.382	2.337	4.067	4.044	7.882	1.199
Geometric variance	8.586	783.196	32.911	14.908	22.012	41.396
Harmonic mean	0.808	0.118	0.310	0.556	0.682	0.127
Logarithmic mean	1.478	0.849	1.403	1.397	2.065	0.181
Logarithmic variance	2.150	6.663	3.494	2.702	3.092	3.723
Sichel t statistic	12.841	65.407	23.333	15.615	36.980	7.714

14.4 Composites

Composite weighting by length was applied during estimation to avoid bias from very small, high grade composites. There has been no change to the compositing method used since May 2010.

The standard method used to define composites for all resource was to flag the raw data in the database local drilling database for the project against the geology solids. The Vulcan compositing program (run length) was run to generate a length composited database at the required sample length. Compositing was by fixed-length, honouring the domain boundaries. 1 m fixed length composites are routinely generated for the narrow veins across all deposits. There are 5 vein-based domains in the Martha underground project that have a vein width of greater than 10 m, these broader domains are composited to a 2 m fixed length interval. See table 14-8 below for the Martha Underground domains composite length summary.

14.5 Grade Capping/Outlier Restrictions

14.5.1 Martha Underground

Estimation for the underground model utilised ordinary kriging for this model, previous top cutting strategies employed on site had been developed in conjunction with the ID2 estimation and reconciliation performance relative to the ID2 estimates. Evolution of kriged estimates indicated that the kriging required less severe topcutting on the input data to deliver a comparable global estimate. The 99th percentile was therefore utilised as the high-grade restraining threshold.

Statistical assessment was undertaken independently on the different data types as it is recognized that the data is spatially zoned.

Topcut assessment was undertaken on each of the fixed length composited datasets generated in the compositing stage, topcuts were then assigned by domain to the individual datasets for the composite databases through the addition of an Au_cut field.

Table 14-7 Martha Underground Drilling Topcut and average vein width by Domain.

Dcode	Domain	Comp Length in estimate	Top Cut	Average Vein Width based on Drill intercept length		Dcode	Domain	Comp Length in estimate	Top Cut	Average Vein Width based on Drill intercept length
1100	**Martha**	**2m**	**30.0**	**9.7**		1309	Welcome D		50	5.3
1109	Martha East	2m	4.5	10.7		1310	Welcome E		35	6.7
1110	Nth Branch	1m	9.0	5.8		**1400**	**Empire**	**2m**	**36.30**	**4.8**
1111	Loop No1	1m	11.5	5.3		1401	Letter H	1m	5.50	5.1
1112	Martha South Section	1m	35.0	1.7		1402	Letter J	1m	37.50	4.7
1120	Mary	1m	10.6	5.0		1403	Letter C	1m	17.00	2.1
1130	No2	1m	13.5	3.2		1404	Gordon	1m	40.00	3.5
1131	No2 West	1m	27.0	3.7		1405	Letter D	1m	11.40	2.4
1132		1m	9.4	3.0		1406	Letter X	1m	17.30	3.2
1140	Flat A	1m	29.0	3.6		1420	Nth Section Empire	1m	24.00	2.9
1141	Flat B	1m	0.7	1.4		1421	State Branch	1m	23.00	2.6
1143	Ella	1m	60.0	2.9		1422	State Reef	1m	30.00	2.3
1201	Albert	2m	18.0	11.1		1423	Dominion	1m	25.00	2.8
1220	**Edward**	**2m**	**55.0**	**8.4**		1424	Republic	1m	50.00	2.1
1221	Edward Link	1m	15.0	2.4		1425	Wowser	1m	11.20	2.8
1222	Edward B	1m	28.0	2.5		1426	Harry	1m	55.00	4.1
1223	Edward C	1m	36.0	2.3		**1500**	**Royal**	**1m**	**44.00**	**4.7**
1224	Edward D	1m	60.0	2.6		1501	Royal FW A	1m	8.00	4.0
1225	Edward A	1m	21.0	4.2		1510	Rex	1m	50.00	2.4
1302	Victoria	2m	18.3	6.5		1511	Princess	1m	10.00	3.1
1304	Magazine	2m	24.0	15.1		1512	Royal Nth Branch	1m	0.00	6.2
1305	Welcome	2m	23.7	10.0		1513	Dreadnought	1m	4.50	3.4
1306	Welcome Back		25.0	2.9		1514	Dreadnought Sth	1m	50.00	2.9
1307	Welcome C		2.5	3.8		1520	George	1m	6.00	3.0
1308	Alexandra	1m	50.0	5.9		1530	Ulster	1m	7.00	3.0
						1551	Louis	1m	45.00	1.0

14.5.2 WKP

Reconciliation history for the Waihi project has demonstrated that some level of high-grade restriction is necessary to limit the influence of outliers on grade estimates for the epithermal veins that have been mined during the operations history. Statistical assessment of the input data is undertaken by domain, typical top-cut selection is based on the assessment of the population distribution characteristics and for inverse distance estimates cutting at the 98th percentile on the log probability distribution has been a long-standing methodology that has produced acceptable results. For the WKP project the approach of cutting to the 98th percentile is considered appropriate.

14.5.3 Correnso

Top cutting for Correnso models has routinely used cutting at the 98th percentile on the log probability distribution plot. Using the Vulcan cell decluster tool, inverse distance estimations have had declustered weights applied since mid-2018 to all resource and grade control models. Since January 2019 all major domains have been estimated with ordinary kriging and validated against the declustered inverse distance method.

Table 14-8 Correnso Drilling Topcut by Domain

	5901	5903	5904	5907	5908	5930
	Au	Au	Au	Au	Au	Au
Count	1685	58	860	457	823	48
Sum length	2521	86	1287	563	1105	66.198
Sum metal	19946	1763	14673	5622	23665	288
Length weighted grade	7.9	20.6	11.4	10.0	21.4	4.4
Naïve grade	7.9	21.1	11.3	10.4	20.2	4.0
Maximum assay	151	543	247	131	262	23
Median	4.3	5.6	6.7	5.0	11.2	1.6
StDev	12.3	71.5	16.2	15.5	28.6	5.7
CV	1.55	3.39	1.43	1.48	1.41	1.42
98th percentile	41	82	54	65	99	21
Cut value	**41**	**82**	**54**	**65**	**100**	**21**
Cut sum metal	18551	1116	13737	5427	22251	285
Cut length weighted mean	7.4	13.0	10.7	9.6	20.1	4.30

14.5.4 Gladstone

Summary statistics for the major Gladstone domains are presented in Table 14-9 below. As with all estimates at Waihi utilising an Inverse Distance based estimation scheme the top-cut is set to the 98th percentile of the cumulative distribution.

Table 14-9 Gladstone Composite Statistics by Domain

Statistic	Domain 6101	Domain 6102	Domain 6103	Domain 6105	Domain 6109	Domain 6201	Domain 6204
Samples	1138	736	418	815	296	2441	26093
Minimum	0.03	0.01	0.03	0.01	0.01	0.01	0.01
Maximum	66.2	26.363	25.7	35.137	23.2	25.88	57.637
Mean	2.74262	1.30953	1.55034	1.56183	1.45504	0.384851	0.305404
Standard deviation	5.43082	1.90949	2.59547	3.2728	2.21813	0.778577	0.931327
CV	1.98016	1.45814	1.67413	2.09549	1.52445	2.02306	3.04949
Variance	29.4938	3.64614	6.73648	10.7112	4.9201	0.606182	0.867369
Skewness	6.6461	5.63901	5.83976	6.03634	5.31362	16.7989	25.5654
Log samples	1138	736	418	815	296	2441	26093
Log mean	0.228179	-0.411509	-0.151617	-0.519538	-0.239423	-1.66702	-1.97541
Log variance	1.44473	1.72944	1.0898	2.07181	1.29713	1.46853	1.414
Geometric mean	1.25631	0.66265	0.859317	0.594795	0.787082	0.188809	0.138704
10%	0.31	0.14	0.204	0.071	0.199	0.035	0.025
20%	0.46	0.269	0.336	0.17	0.32	0.066	0.05
30%	0.645	0.43	0.522	0.312	0.448	0.1	0.08
40%	0.86	0.574	0.668	0.491	0.62	0.143	0.11
50%	1.18	0.76	0.83	0.664	0.82	0.2	0.142
60%	1.565	1.036	1.06	0.979	1.05	0.28	0.19
70%	2.38	1.36	1.41	1.342	1.44	0.38	0.252
80%	3.47	1.84	2.061	1.914	1.91	0.51	0.354
90%	5.86	2.8	2.98	3.111	3.127	0.826	0.584
95%	9.23	3.84	4.24	5.22	4.75	1.274	0.94
97.50%	14.2	6.235	7.05	8.873	6.594	1.73	1.492
99%	25.6	9.83	13.53	17.3	10.862	2.92	2.667

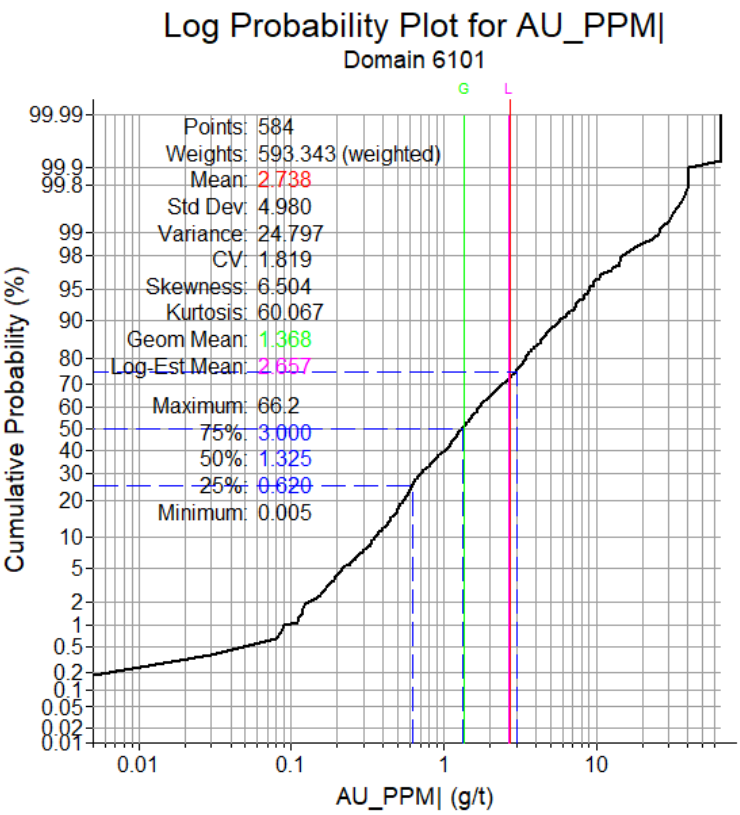


Figure 14.4 Log probability Plot for the 6101 domain, Gladstone

14.5.5 Martha Pit

Increased drilling density in the Eastern Layback resource between May 2014 and April 2015 allowed for increased geological domain resolution and a review of top cut strategy. This was undertaken using a disintegration approach, whereby log-scale probability plots are used to determine the grade at which sample support for a high-grade tail diminishes. Open pit production records, reconciliation data and grade control modelling were used for estimation validation, as well as comparisons to previous resource models and their retrospective performance.

Table 14-10: Model Grade Caps Applied

Triangulation	Domain Code	Uncapped Mean	Uncapped CV	Cap Grade	Total No of samples	No. of Capped Samples	Capped Mean	Capped CV
1100_Martha	1100	5.8	2.1	60	56269		5.6	1.4
1201_Albert	1201	2.2	2.1	35	1112		2.2	2
1220_Edward	1220	1.8	4.7	85	9464		1.7	4.1
1302_Victoria	1302	2.5	1.4	18	239		2.5	1.4
1305_Welcome	1305	3.6	1.7	45	30981		3.6	1.6
1308_Alexandra	1308	1.7	2.9	50	5202		1.7	2.6
1401_Empire East	1401	5.5	2.1	60	48		5.5	2.1
1402_Empire West	1402	2.2	2.4	50	9388		2.2	2.2
1501_Royal West	1501	3.8	1.3	25	49		3.8	1.3
1900_Central	1900	0.5	4.4	20	13691		0.5	3.6
1901_Edward HW	1901	1.7	2.9	33	11918		1.6	2.4
1902_Letter_North	1902	1.8	2.4	67	31607		1.8	2.3
1903_Magazine	1903	1.5	2.6	75	94881		1.5	2.6
1904_Martha_FW	1904	1.5	3	35	133269		1.4	2.4
1905_Martha_HW	1905	2.2	2.2	40	25518		2.1	2
1906_Royal_FW	1906	0.4	11.3	30	1597		0.3	6.2
1907_Royal_HW	1907	1.2	3	25	27272		1.2	2.5
1908_Welcome_FW	1908	0.3	3.6	12	1829		0.3	3.5
1909_Welcome_HW	1909	1.2	2.2	26	1005		1.2	2.2
5901_16102014_boolean.00t	5901	8.1	1.6	60	547	11	7.2	1.4
5902_16102014_boolean.00t	5902	16.2	1.6	70	88	1	12.6	0.9
5904_21102014_boolean.00t	5904	9.5	1.3	45	356	8	8.3	1.1
5905_16102014_boolean.00t	5905	10.3	1.2	50	129	3	9.2	1.1
5907_16102014_boolean_v2.00t	5907	7.1	2.2	50	113	8	4.4	1.7
5908_16102014_boolean.00t	5908	47.8	2	60	15	1	20.2	1
5901_20150519_boolean.00t	5901	11.6	1.7	50	1912	63	10.4	1.2
5903_20150519_boolean.00t	5903	17.5	3.8	60	136	5	11.4	1.3
5904_20150519_boolean.00t	5904	9.7	1.5	50	750	16	9.2	1.3
5905_20150519_boolean.00t	5905	8.6	1.2	40	251	4	8.3	1.1
5907_20150519_boolean.00t	5907	8	1.8	50	195	5	7.4	1.5
5908_20150519_boolean.00t	5908	19.7	1.7	90	300	12	17.4	1.3
5906_24112014_boolean.00t	5906	5.9	2	20	60	2	4.9	1.5
GM1320_ vein1320.00t	1320	6.3	1.1	15	38	4	5.5	0.9
1321_26112014_boolean.00t	1321	1.5	2.2	15	34	1	1.4	1.9
1323_25112014_boolean.00t	1323	1.1	2.3	-	13	-	-	-
1400_25112014_boolean.00t	1400	7.7	2.7	68	73	2	6.4	2.2
1410_18112014_boolean.00t	1410	5.8	1	-	9	-	-	-
1411_26112015_boolean.00t	1411	2.4	0.4	-	4	-	-	-

14.6 Variography

Down hole and directional variography are typically run using Snowden Supervisor v7 software. Variograms are run as a means to test spatial continuity within the selected geological domains. Due to the scarcity of data, variogram models often are not easily obtained so in this instance anisotropic ratios are based on geological observation rather than on fitting data to the variogram models. Dominant mineral continuity is set along the strike of the modelled veins. In 2008 work done by Golder Associates developed a single median indicator variogram to use for all vein domains with the searches changed to align with the individual vein geometry.

14.6.1 Martha Underground

Variograms were modelled using Vulcans data analysis tools. In Waihi the variography is only successful on un-domained data, as the domaining process removes the variance necessary to model a robust variogram. Orientations of the omni direction variogram are defined by the orientation of the vein.

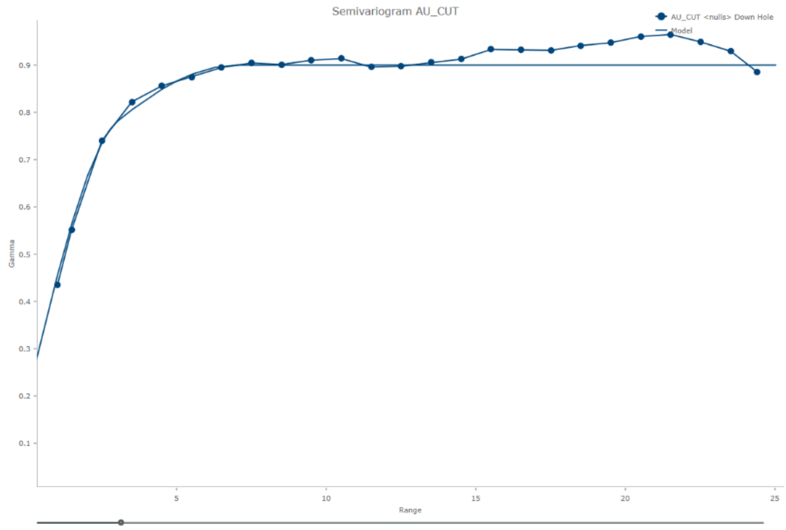


Figure 14.5 Semi-variogram for the Martha Underground

14.6.2 WKP

Given the variable drilling density across the WKP project area no robust variograms have been generated for this project at this time. The best model of the variability for this project is the vein interpretation. Given the challenges faced in modelling variograms there has been no attempt to generate a kriged estimate of grade for this deposit. This is not regarded as a risk to this project as the site has significant experience reconciling Inverse Distance grade estimates to Mill production and consequently has an established estimation methodology that can be demonstrated to be appropriate for the epithermal veins encountered at the site

14.6.3 Correnso

An omni-directional variogram has been modelled in Vulcan utilising all domains. A low nugget has been applied to reduce smoothing over short ranges, giving an estimate result similar to the inverse distance method previously employed.

Table 14-11: Variogram Parameters

Type	Sill	Azimuth	Plunge	Dip	Major	Semi	Minor
Nugget	0.150						
Spherical	0.480	0.000	0.000	0.000	2.700	2.700	2.700
Spherical	0.370	0.000	0.000	0.000	39.000	39.000	39.000

14.6.4 Gladstone

As with WKP the Gladstone project has been estimated utilising an inverse distance estimation method due to challenges faced in generating robust variograms for this deposit. This is again not regarded as a risk to this project as the site has significant experience reconciling Inverse Distance grade estimates to Mill production.

14.7 Estimation/Interpolation Methods

The modelling process employed in the grade estimation for all the Waihi projects is performed using numerous Vulcan and Leapfrog processes summarised in the steps outlined below:

14. Input data Validation
15. Update lithological domains, geologic model construction,
16. Data selection, Drill hole data selection from the site acQuire database
17. Exclusion of unwanted drill holes by data type
18. Flag data files by lithology,
19. Composite drill holes to fixed length composites within defined geological boundaries, typically 1m using length weighting,
20. Exploratory data analysis by domain, generation of domain and data type summary statistics
21. Variography
22. Assign top cuts by domain and data type to input data files
23. Block Model construction based upon lithological wireframes,
24. Run estimation for all domains for Au, Ag, As, Resource Classification,
25. Assign density, mining depletions, back fill grade, stripping of negative values from non-estimated blocks, assignment of grade to dilution domains
26. Classify model,

The model is estimated in Vulcan. Estimations were performed in individual lithological domains using length weighted down hole composites.

Vulcan software versions 11.0 has been used to construct the Correnso Extended, Martha Underground, WKP and Gladstone estimation models. MineSight® software version 9.10-01 is used to construct the Martha model.

Sub-blocking with either ordinary kriging (OK) or inverse distance weighting to the second power (ID2) or third power (ID3) methods are used for all underground models. With the data density which exists in Correnso and the surrounds ordinary kriging, and tetra-unfolding - using ID2 or ID3 estimates both achieve comparable results. The method of unfolding was adopted for the estimation of vein models as a way of dealing with the sinuous character of the veins.

The underground block models are rotated in bearing to align with the dominant strike of the veins and they are run using Vulcan software. Sub-blocking is used to define narrow veins and to maintain volume integrity with the geology solids. The grade estimation for all models is strictly controlled by the geology, with both sample selection and estimation of blocks limited to domains defined by the geology interpretation solids. Gold is estimated using one of the following methods; either - a single pass with a combined channel and drilling dataset; or a two-pass estimation using a combined dataset with short search range first, then followed by a second pass using drillhole data only with longer search ranges to estimate blocks not estimated in the first pass.

14.7.1 Martha underground

The Martha Underground block model dimensions, origin and cell size are provided in the table below.

Table 14-12: ***Block Model Dimensions, Martha Underground***

Variable	X	Y	Z
Origin	395150	642330	500
Extents (m)	1700	950	700
Block Size (Parent)	5	5	5
No. of Blocks (Parent)	340	190	140
Sub Block Size	1.25	1.25	1.25
Orientation	+65 degrees	X axis around Z	

For this model the vein domains were estimated using Ordinary kriging, tetra unfolding was employed for domains that had complex vein geometries to aid in resolution of the sample selection for the estimation.

Dilution domains where created based on a 5-metre halo around the veins and grades where estimated into these domains using a simple kriging technique.

An octant search was applied to all domains. The final estimation parameters used are presented in Table 14-14. The estimation file used was ph5_r0516ph5_UG_Kriged_full.bef.

Table 14-13: *Listing of fields in the Martha Underground Model*

Model Field	Type	Default Value	Description
code	Short (Integer * 2)	-99.0	vein code
sg	Float (Real * 4)	2.5	density value =2.5
rescat	Byte (Integer * 1)	4	4=MI; 3=inferred; 2=indicated; 1=measured
rescat_nsamps	Short (Integer * 2)	0	resource classification # of samples
rescat_avedist	Float (Real * 4)	-99	resource classification average distance
rescat_nholes	Short (Integer * 2)	-99.0	resource classification # of holes
rescat_id	Float (Real * 4)	4	
mined	Byte (Integer * 1)	0	historic workings and subsidence
hdns	Byte (Integer * 1)	3	hardness code for pit
pit	Byte (Integer * 1)	99	pit phase
oxide	Byte (Integer * 1)	2	oxide surface
est_id	Integer (Integer * 4)	-99.0	estimation id
au_id_nsamps	Short (Integer * 2)	-99.0	number of samples used in id2 estimate
au_id_nholes	Short (Integer * 2)	-99.0	No of drillholes used to calculate block grade id2
au_id_avedist	Float (Real * 4)	-99.0	average distance to samples
au_id_ndist	Float (Real * 4)	-99.0	distance to nearest sample
au_nn_c1	Float (Real * 4)	-99.0	nearest neighbour estimate cut
au_nn_ndist	Short (Integer * 2)	-99.0	distance to nearest sample nearest neighbour
au_pref	Float (Real * 4)	-99.0	preferred au
au_ok_nholes	Short (Integer * 2)	-99.0	No of drillholes used to calculate block grade id2
au_ok_nsamps	Short (Integer * 2)	-99.0	No of samples
au_ok_avedist	Float (Real * 4)	-99.0	average distance to samples
au_ok_ndist	Float (Real * 4)	-99.0	distance to nearest sample
au_ok_k_var	Integer (Integer * 4)	-99.0	kriging variance

ag	Float (Real * 4)	-99.0	
as	Float (Real * 4)	-99.0	
geol	Name (Translation Table)	none	

Table 14-14 Estimation Parameters used in estimate – Major Veins

	1100	1201	1220	1221	1302	1305	1308	1400
Major Axis X	240	240	240	240	240	240	240	240
Semi-major Z	180	180	180	180	180	180	180	180
Minor - X (1)	1	1	1	1	1	1	1	1
Bearing	81	43	50	53	80	80	95	82
Plunge	0	0	0	0	0	0	0	0
Dip	-75	-75	82	50	-83	-88	-70	80
Discretisation XYZ	3,2,3	3,2,3	3,2,3	3,2,3	3,2,3	3,2,3	3,2,3	3,2,3
min Samp	6	6	6	6	6	6	6	6
Max Samp	12	12	12	12	12	12	12	12
Samp per DH	3	3	3	3	3	3	3	3
Max samp/octant	4	4	4	4	4	4	4	4
High Grade Restraining	na	na	na	na	na	na	na	na
Method	OK	OK	OK	OK	OK	OK	OK	OK
Tetra Model	1100.tetra	1201.tetra	1220.tetra	1221.tetra	1302.tetra	1305.tetra	1308.tetra	1400.tetra

(1) Tetra unfolding ranges for the across strike range are expressed as a relative proportion of the vein thickness

14.7.2 WKP

Drilling data is composites to a 1 m composite length using the distributed technique, this methodology is consistent with the techniques applied for the Waihi deposits. Composite weighting by length is applied during estimation to avoid bias from small, high grade composites.

For the WKP deposit the grade was estimated into the sub celled blocks, future estimates will utilise parent cells of 5 m x 5 m x 5 m, with minimum sub-block dimensions of 1.25 m in each direction.

For future iterations of the WKP model will employ an estimate of full vein width composites as a sensitivity assessment on the basis of recommendations made by SRK in the review of this model.

The raw assays are composited to one metre fixed lengths and “distributed” (1MD) across the vein width to eliminate very small remnant composites. The distributed method divides the vein interval into several equal length samples as close to the desired sample composite length as possible given the intercept width, this is an option available in the Vulcan® software.

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The general approach to estimation for the WKP project is as detailed above. The specific details for the WKP resource estimate such as block model dimensions, origin and cell size are provided in the tables below.

Table 14-15: ***Block Model dimensions, WKP***

Variable	X	Y	Z
Origin	2759150	6429410	-345
Extents (m)	1400	1640	620
Block Size (Parent)	5	10	10
No. of Blocks (Parent)	280	164	62
Sub Block Size	0.5	0.5	0.5
Orientation	+100 degrees	X axis around Z	

Table 14-16: ***Listing of fields in model***

Model Field	Type	Default Value	Description
code	Integer (Integer * 4)	0	vein code
sg	Float (Real * 4)	2.5	density value = 2.5
au_id	Float (Real * 4)	-99.0	au ID2 estimated value cut
ag_id	Float (Real * 4)	-99.0	ag OK estimated value cut
au_id_u	Float (Real * 4)	-99.0	au ID2 estimated value uncut
res_cat	Byte (Integer * 1)	4	classification 2= Ind; 3 = Inf, 4=mineral inventory
au_samps_id	Integer (Integer * 4)	-99.0	number of samples used in estimate ID2
au_dist_id	Float (Real * 4)	-99.0	Wtd ave distance of samp for ID2
rescat_id	Float (Real * 4)	-99.0	
rescat_avedist	Float (Real * 4)	-99.0	
rescat_nsamp	Float (Real * 4)	-99.0	
rescat_nholes	Float (Real * 4)	-99.0	
au_id_nn	Float (Real * 4)	-99.0	nearest neighbour Au

14.7.3 Correnso

The Correnso Project Vulcan block model was oriented parallel to the strike of the 5901 Correnso Vein. The Daybreak and Grace/Empire Project Vulcan block models are oriented parallel to the strike of the dominant Daybreak and Empire East veins. The small sub-block size provides better definition of the veins, particularly across the width of the typically narrow veins.

Table 14-17: Block Model Parameters, Correnso

Origin

X Coordinate	396450.0
Y Coordinate	642750.0
Z Coordinate	620.0

Rotation

Bearing	80.0	(absolute bearing of X axis around Z axis)
Plunge	0.0	(relative rotation of X axis around Y axis)
Dip	0.0	(relative rotation of Y axis around X axis)

(Rotations follow left hand rule)

Display | Pick Origin | Interactive | Autofit

(Offsets are the minimum distance from the origin).

Schemes

	Scheme	Start X Offset	Start Y Offset	Start Z Offset	End X Offset	End Y Offset	End Z Offset	Block X Size	Block Y Size	Block Z Size	Blocking X Maximum	Blocking Y Maximum	Blocking Z Maximum
1	parent1	0.0	0.0	0.0	350.0	900.0	250.0	2.0	5.0	2.0			
2	sub1	0.0	0.0	0.0	350.0	900.0	250.0	1.0	1.0	1.0	2.0	5.0	2.0
*													

14.7.4 Gladstone

Gladstone grade estimation is undertaken using similar methodology as that used for Correnso with the exception being the use of regularised blocks. Gladstone deposit veins are interpreted using Leapfrog software. Vein and geology wireframes are then utilised to construct a block model within Vulcan. Drilling data is then length composited within the vein wireframes and lithological units and grade estimates are prepared utilising unfolding and ordinary kriging. Nearest neighbour and ID2 estimates are also prepared for validation and assessment. The grade estimation is strictly controlled by the geology, with both sample selection and estimation of blocks limited to domains defined by the geological interpretation solids. Gold is estimated using data.

14.8 Block Model Validation

14.8.1 Martha Underground

Numerous methods have been used to validate the r1218 *Martha Underground* resource model. The validation has included;

- Validation of the new data,
- a review of the interpretation, including classification shapes,
- a review of the methodology,
- a review of the EDA work, including variography and search neighbourhoods,
- global grade and tonnage comparisons with the previous model
- a visual sectional validation of the block model with interpretation and drilling, and
- a comparison of tonnes and grade of the LoM shapes and upcoming pit / stope designs will be provided upon completion of preliminary design work, and
- Swath plots are generated using the Vulcan drift analysis tools, blocks selected for comparative evaluation relative to the samples database are limited to blocks estimated in the first pass, blocks below the Phase 4 consent pit and exclude historic mined blocks. Axis values are relative to the model origin, 395150 x, 642330 y and 500 z. The variance in observed output for the drift analysis is a result of not estimating blocks within the depleted portion of the open pit and thereby restricting the block the model data.

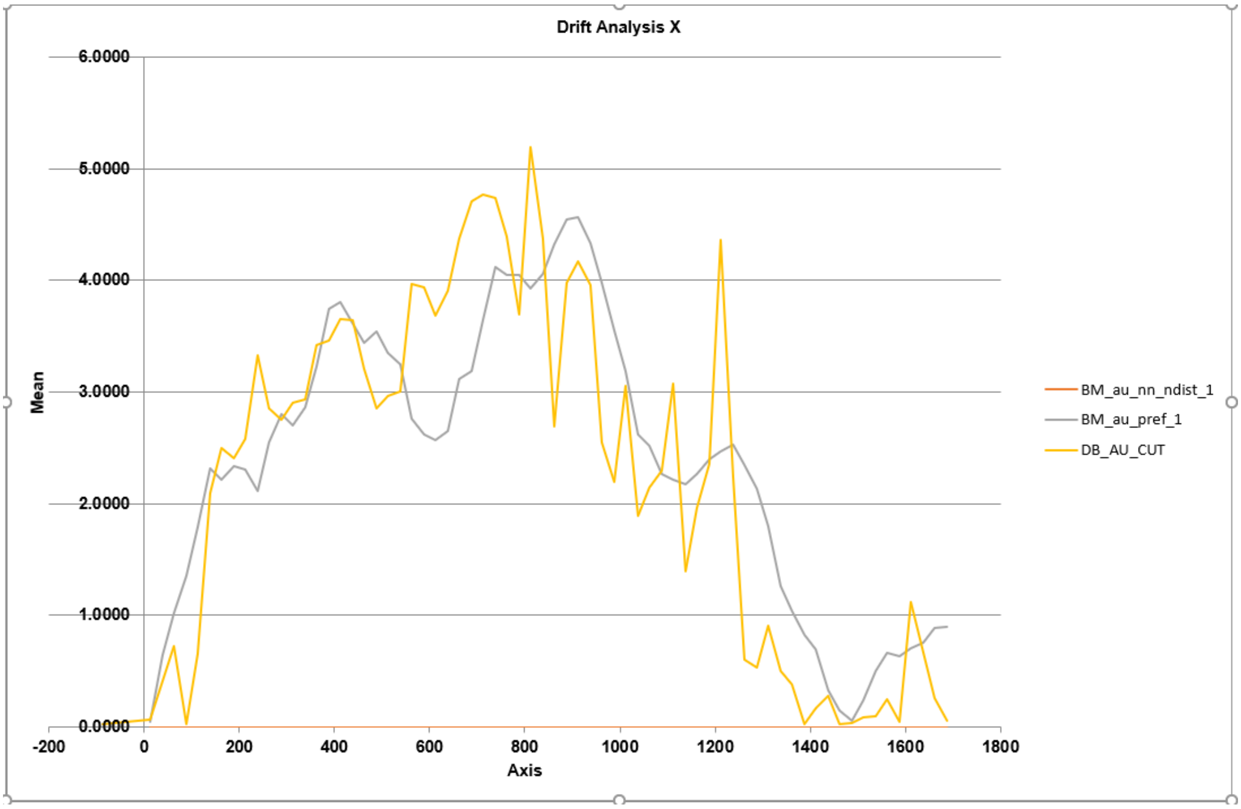


Figure 14.6 All domains X drift analysis, RC, Channel and Diamond drilling sample data

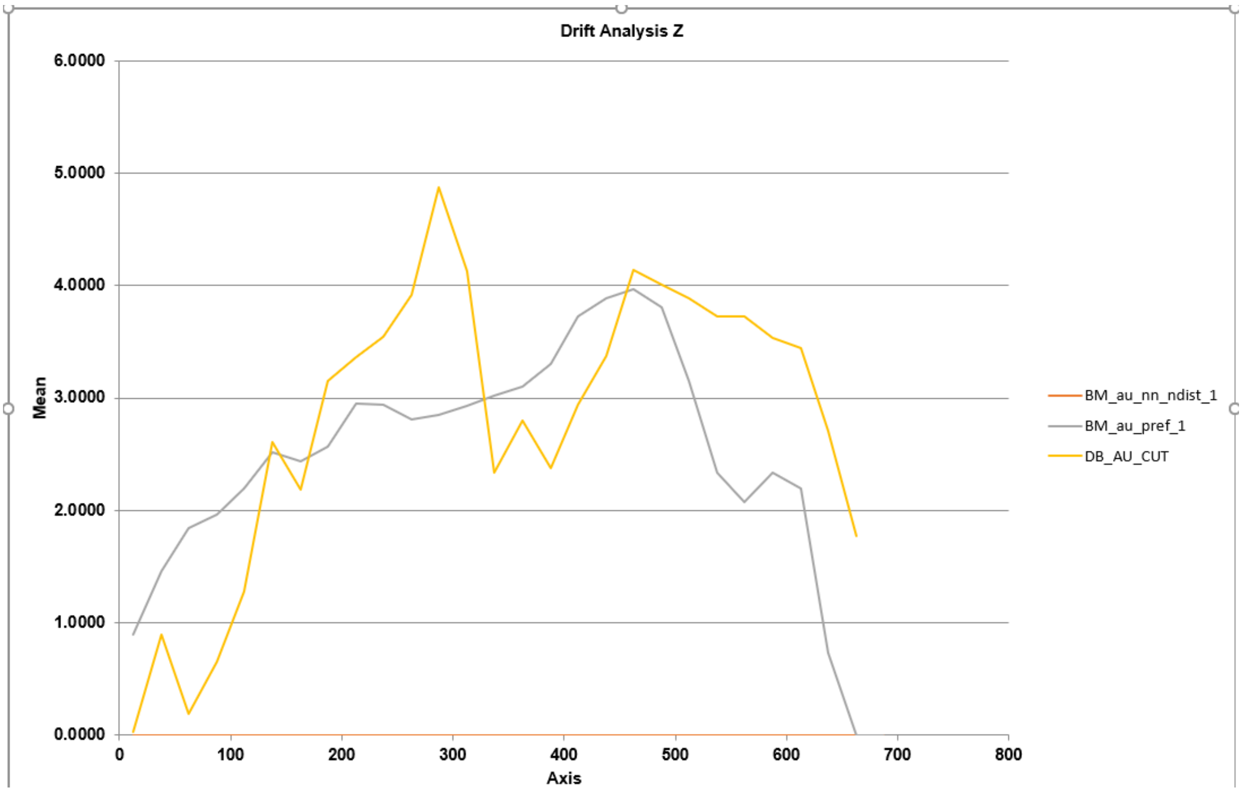


Figure 14.7 All domains Z drift analysis, RC, Channel and Diamond drilling sample data

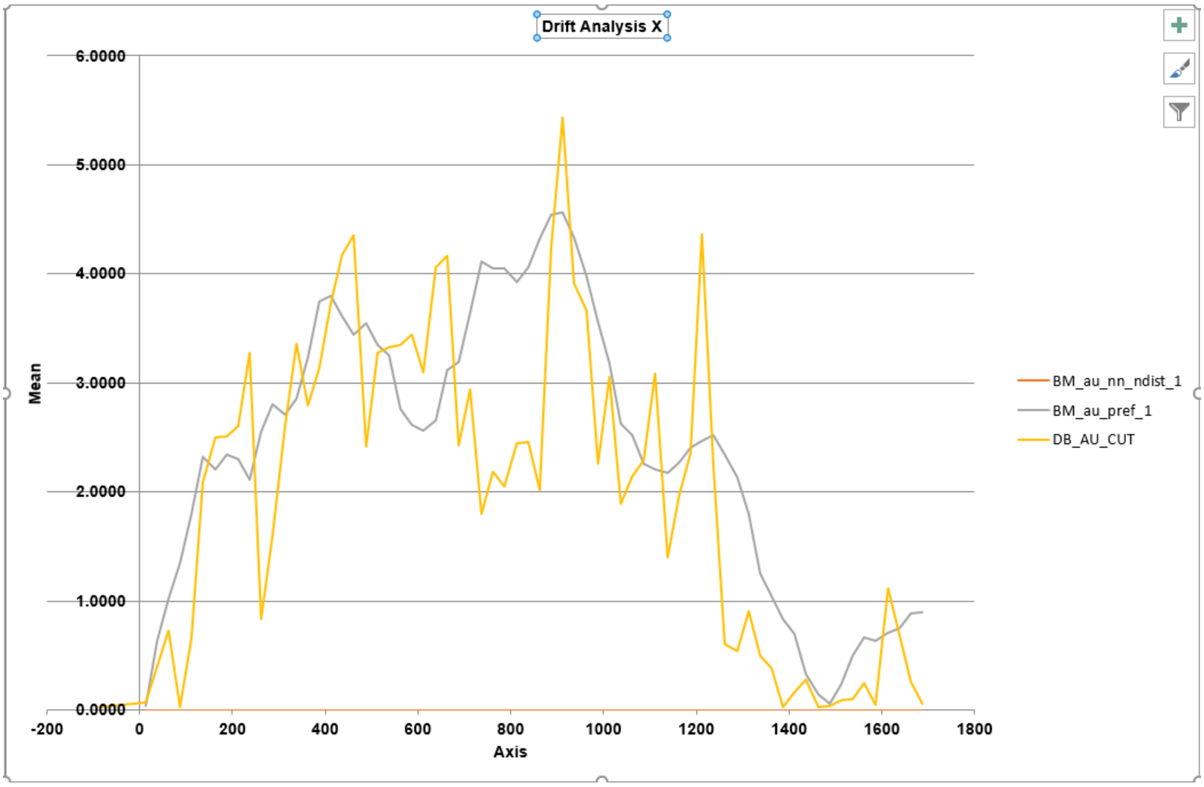


Figure 14.8 All Domains – X Drift analysis - Diamond drilling only

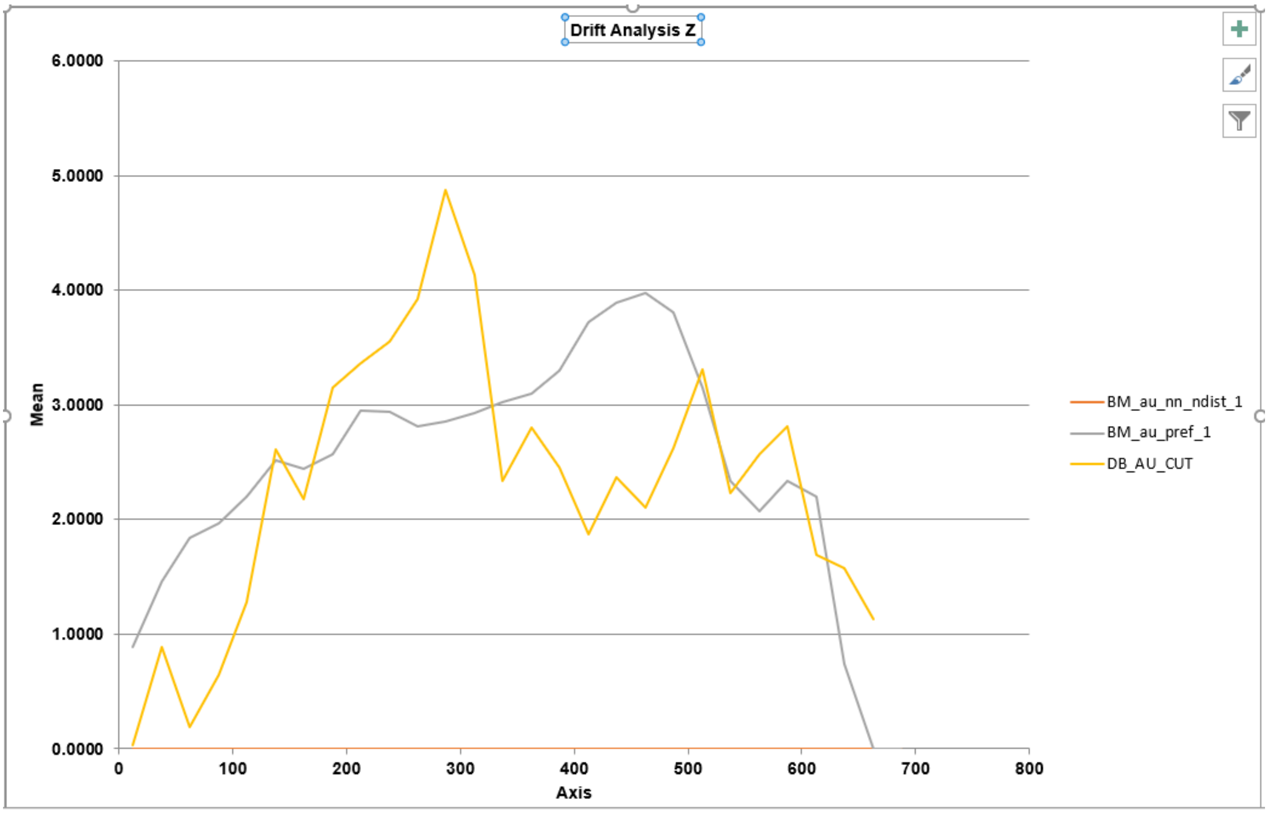


Figure 14.9 All Domains – Z Drift analysis - Diamond drilling only

Comparative assessment of the model relative to the June 2018 indicates only modest changes between estimates, the number of veins forming the basis for the geological interpretation has increased slightly and the additional drilling has resulted in an increase in higher confidence resource, both indicated and inferred resource having grown substantially since the previous estimate. The further increase in drilling data has further reduced the relative influence of the lower quality historic cross cuts, particularly local to the drill positions. One point of difference over the previous build was a move to a fine resolution sub-blocking scheme 1.25 m x, 1.25 m y, and 1.25 m z, this has been assessed and has negligible impact on the in-situ resource, but it is considered to have potential benefit in mine planning evaluations particularly for veins on orientations that are not well aligned to the block model rotation angle

The model has been compared to previous *r0618_MUG_FNL.bmf* model. The grade tonnage curves are generated using vein coded material only coded to Pit eq 4. The comparison illustrates an 8% increase in contained metal at a 3 g/t cutoff, this is a function of an increase in tonnage (12%) which is attributed to the increase in drilling and a slight decrease in grade (4%) due to a decrease in blocks estimated using the historic cross cut input data again due to the increase in drilling data available in the r1218 estimate.

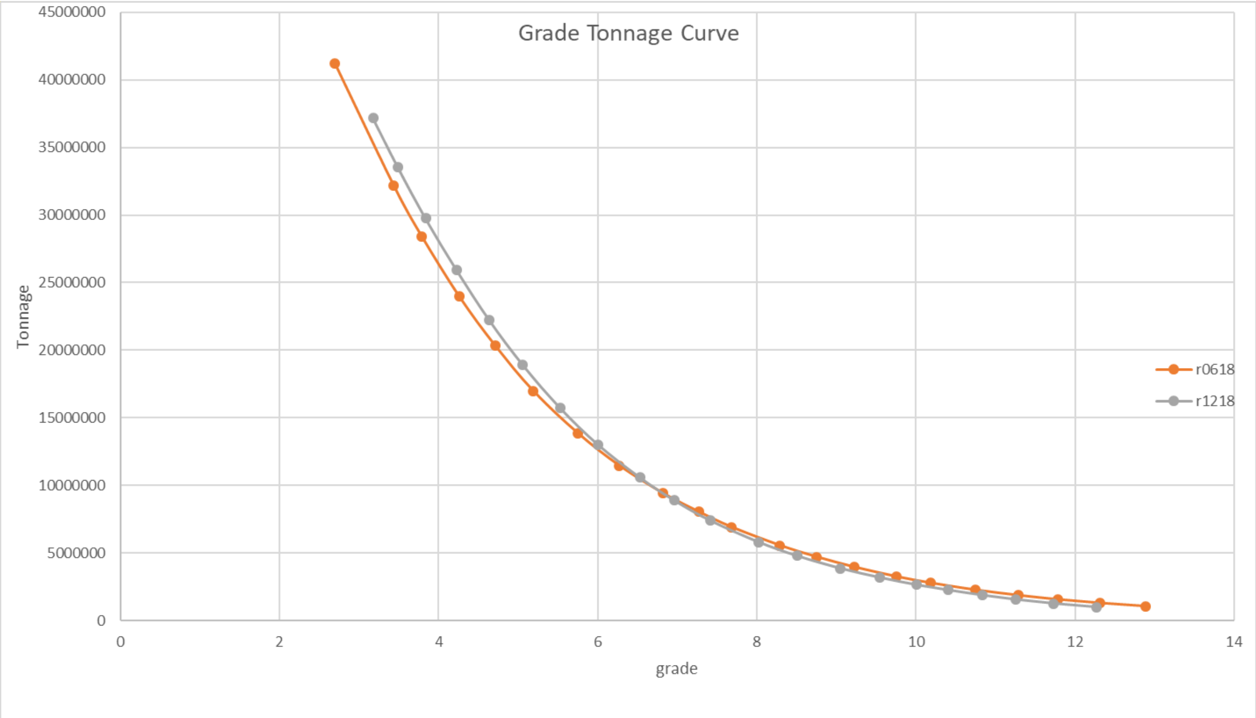


Figure 14.10: **Grade Tonnage Curve Comparing r0618 to r1218_MUG**

Table 14-18: Comparison between r0618_MUG and r1218_MUG data

	r1218			r0618		
Cutoff	Tonnes	au_pref	Ounces	Tonnes	au_pref	Ounces
0	37179105	3.18	3801168	41206144	2.7	3576982
0.5	33565555	3.49	3766260	32151361	3.44	3555894
1	29747728	3.84	3672621	28415716	3.79	3462493
1.5	25924129	4.23	3525621	23978619	4.26	3284164
2	22225164	4.64	3315538	20348289	4.71	3081342
2.5	18913880	5.06	3076962	16993170	5.19	2835521
3	15722020	5.53	2795275	13867430	5.75	2563627
3.5	12985853	6.01	2509204	11471648	6.27	2312514
4	10585197	6.53	2222303	9426255	6.82	2066877
4.5	8899738	6.96	1991487	8050592	7.27	1881713
5	7385895	7.42	1761968	6924252	7.68	1709720
5.5	5814512	8.02	1499266	5562784	8.29	1482647
6	4783511	8.51	1308782	4711497	8.75	1325434
6.5	3862705	9.05	1123909	3964764	9.22	1175275
7	3179438	9.55	976213	3247456	9.76	1019023
7.5	2644531	10.01	851086	2785811	10.18	911780
8	2257065	10.41	755415	2261984	10.75	781788
8.5	1878096	10.84	654542	1861916	11.29	675841
9	1569038	11.25	567514	1558977	11.78	590440
9.5	1269956	11.73	478936	1294669	12.31	512398
10	997871	12.27	393649	1052131	12.89	436025

An additional comparison between the models for indicated and inferred material coded to below the envisaged pit shape is presented below. This comparison shows the increase in Indicated and Inferred material available as a consequence of drilling completed in the second half of 2018.

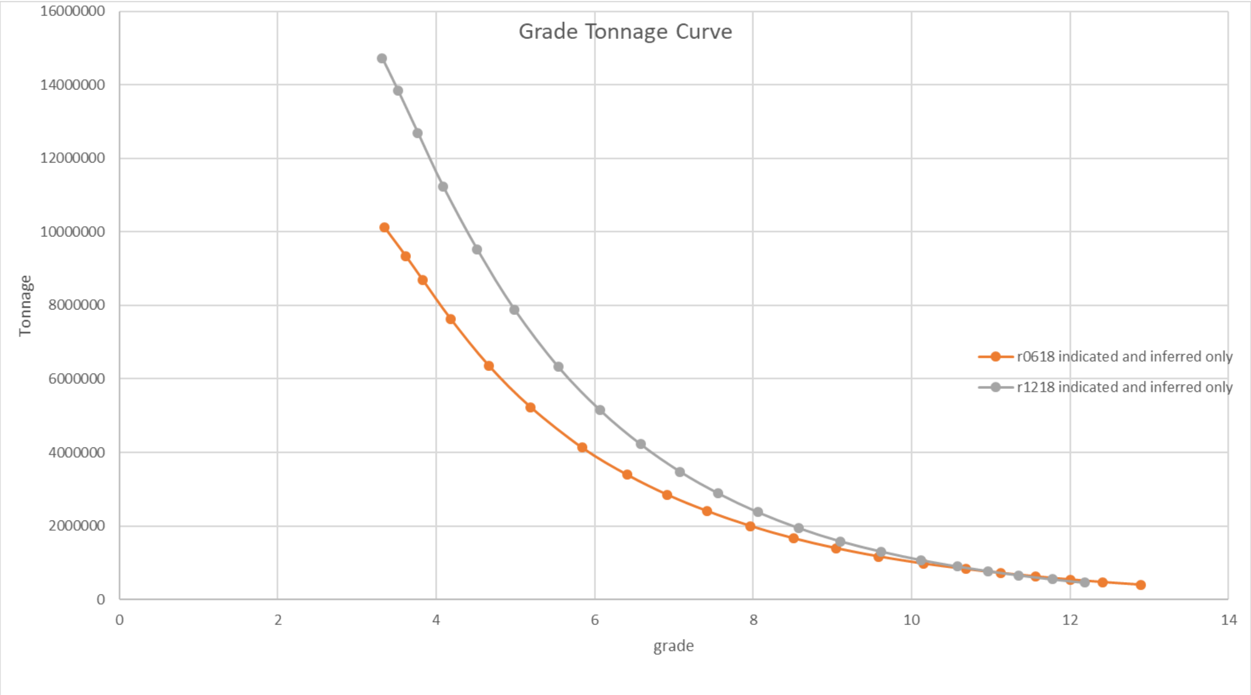


Figure 14.11: Grade Tonnage Curve Comparing Indicated and Inferred Resource, r0618 to r1218_MUG

14.8.2 **WKP**

Numerous methods have been used to validate the WKP0119_USC resource model. There are no previous publicly reported estimates for the WKP project with which to provide a comparative assessment. The validation has included;

- Validation of the new data,
- a review of the interpretation, including classification shapes,
- a review of the methodology,
- a review of the EDA work, including variography and search neighbourhoods,
- global grade and tonnage comparisons with the previous model
- a visual sectional validation of the block model with interpretation and drilling, and
- Swath plots are generated using the Vulcan drift analysis tools,

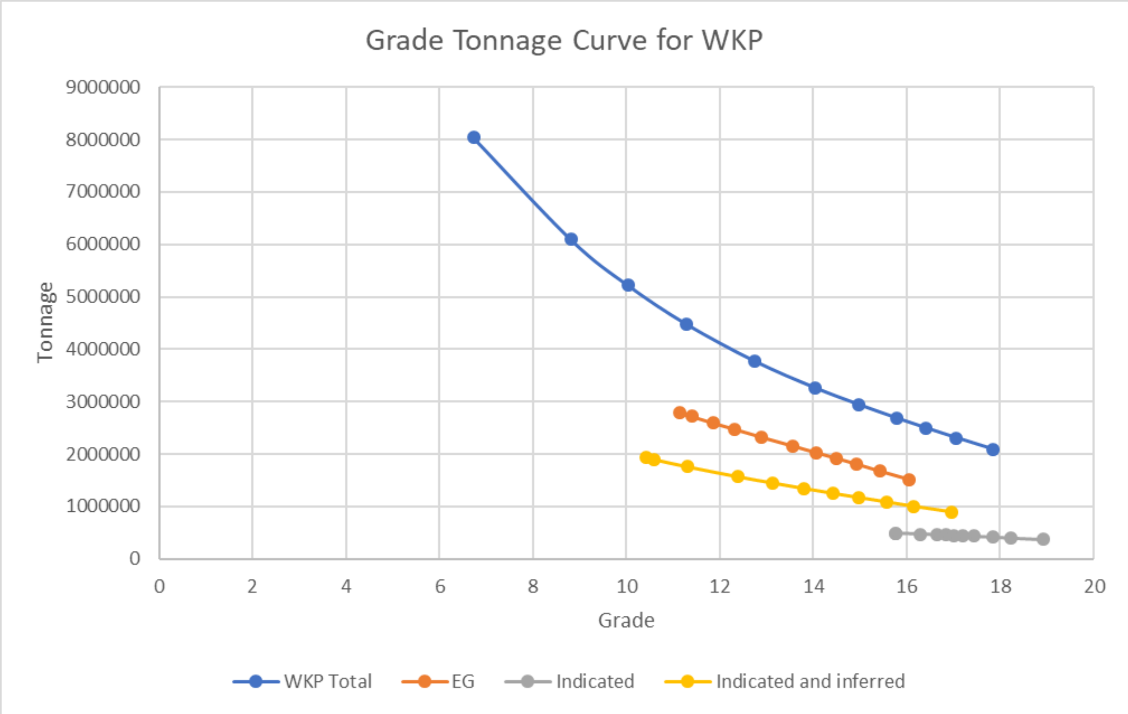


Figure 14.12 Grade Tonnage curves by resource category

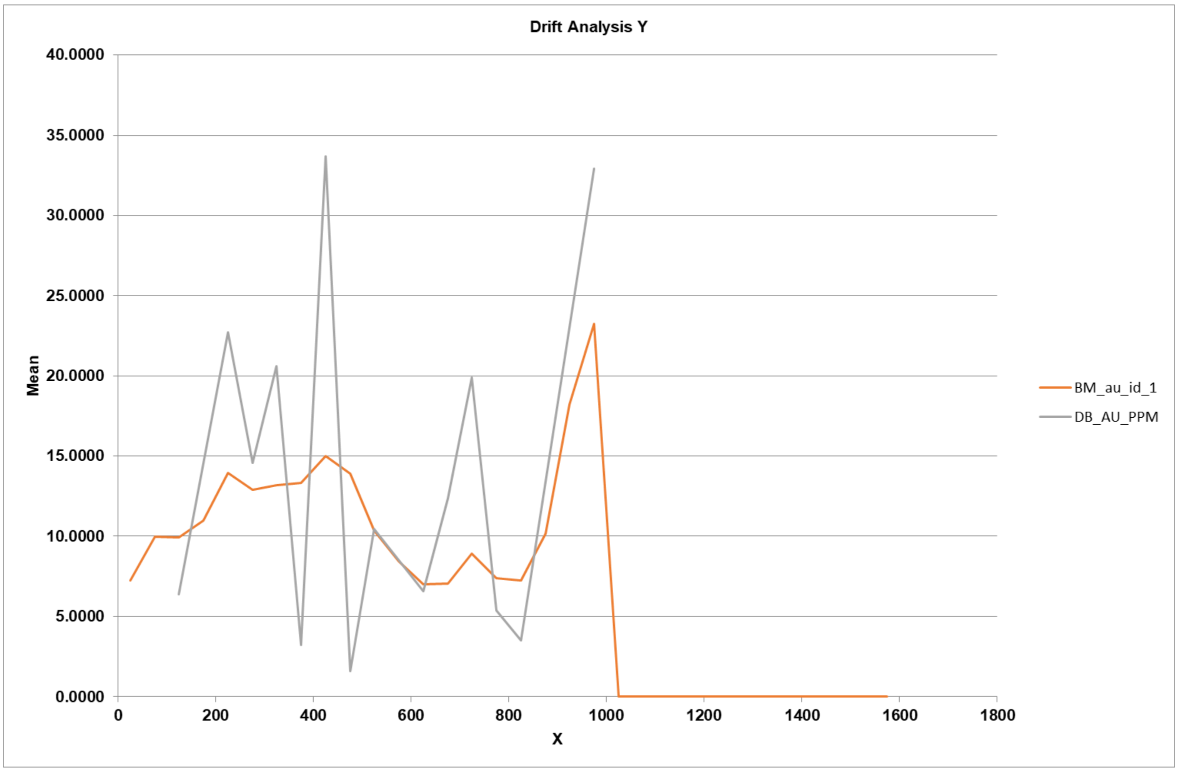


Figure 14.13 EG Vein – Y Drift analysis - Uncut Diamond drilling only

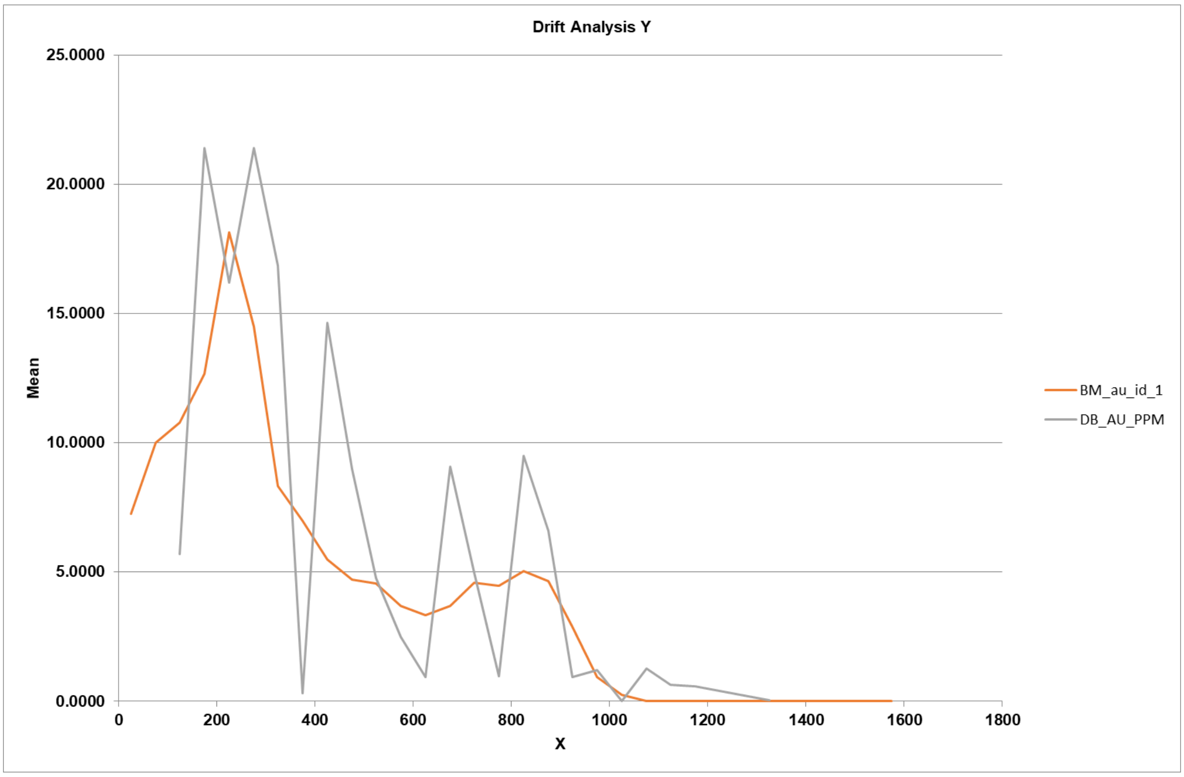


Figure 14.14 All WKP veins – Y Drift analysis - Uncut Diamond drilling only

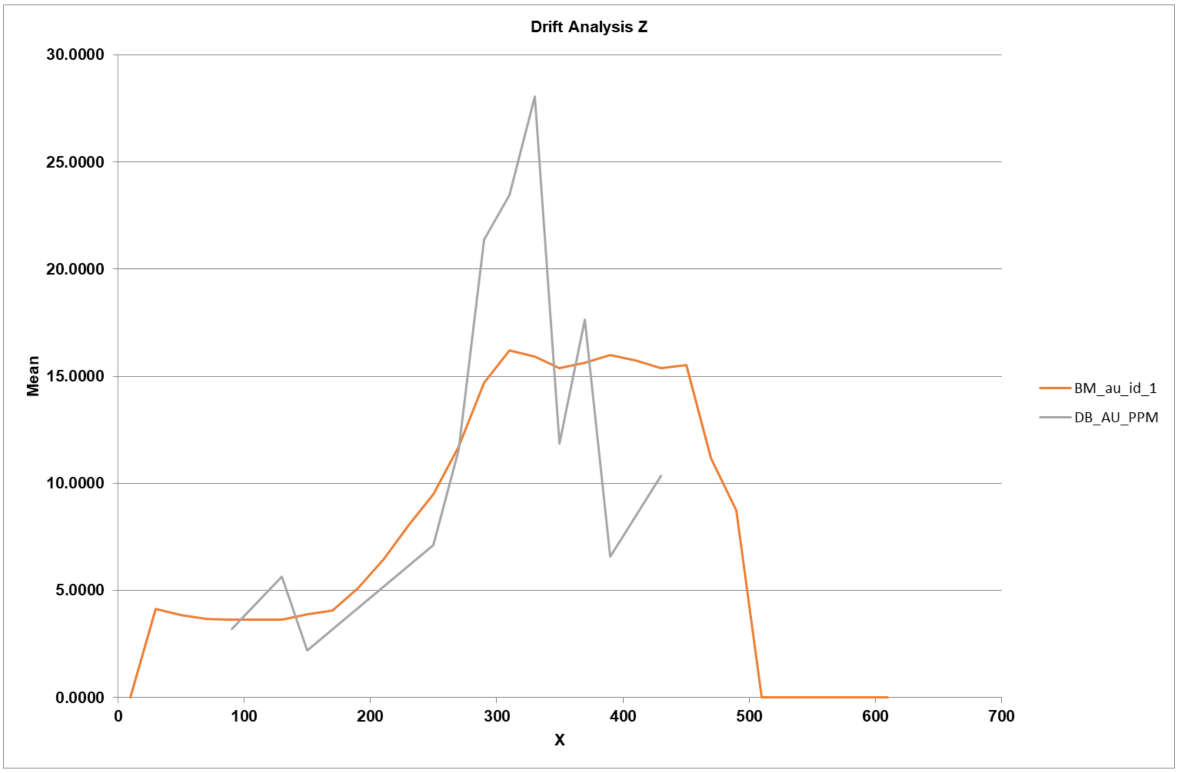


Figure 14.15 EG Vein – Z Drift analysis – Uncut Diamond drilling only

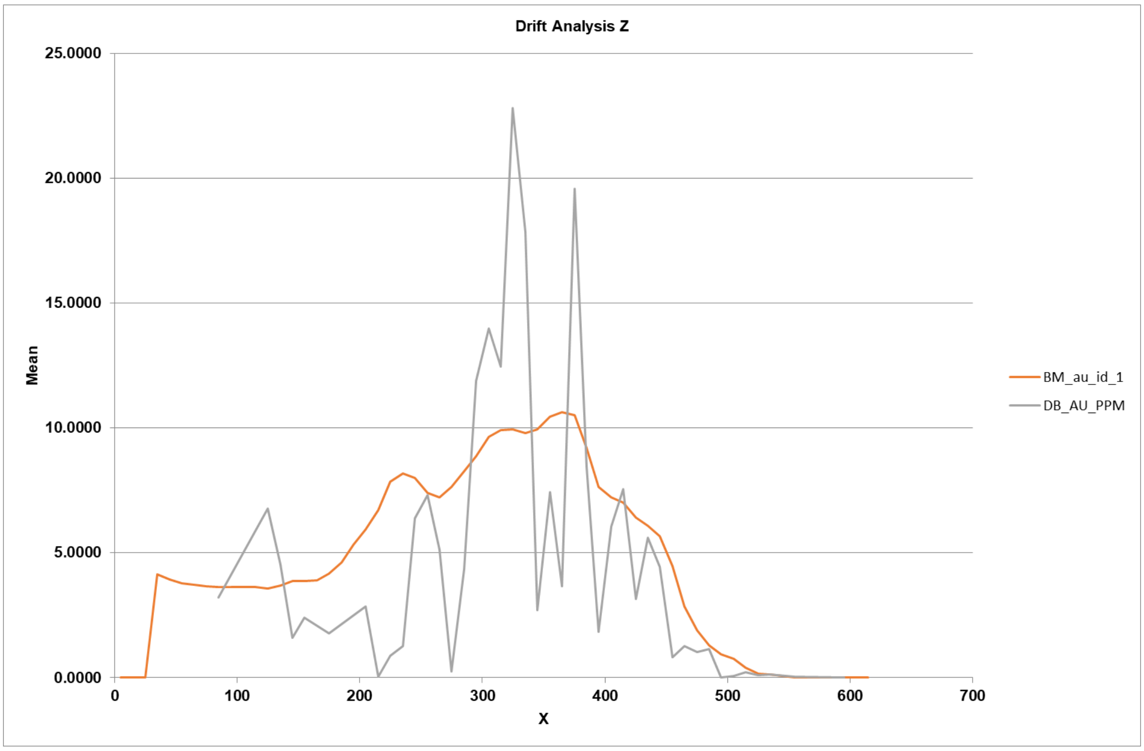


Figure 14.16 All WKP Veins – Z Drift analysis – Uncut Diamond drilling only

14.8.3 Correnso

Swath plots by elevation, northing and easting are constructed for each of the veins. Cut samples are compared to the Ordinary Kriged estimate in Figure 14-7.

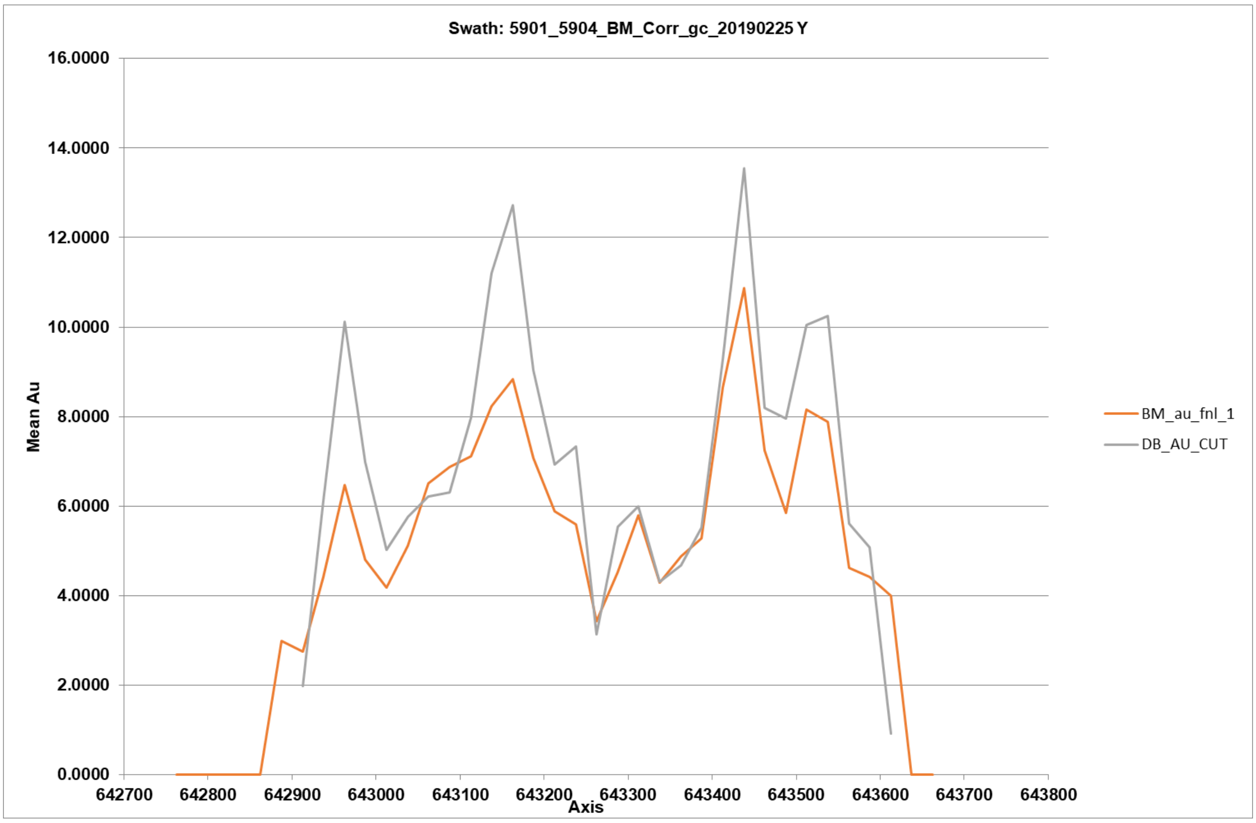
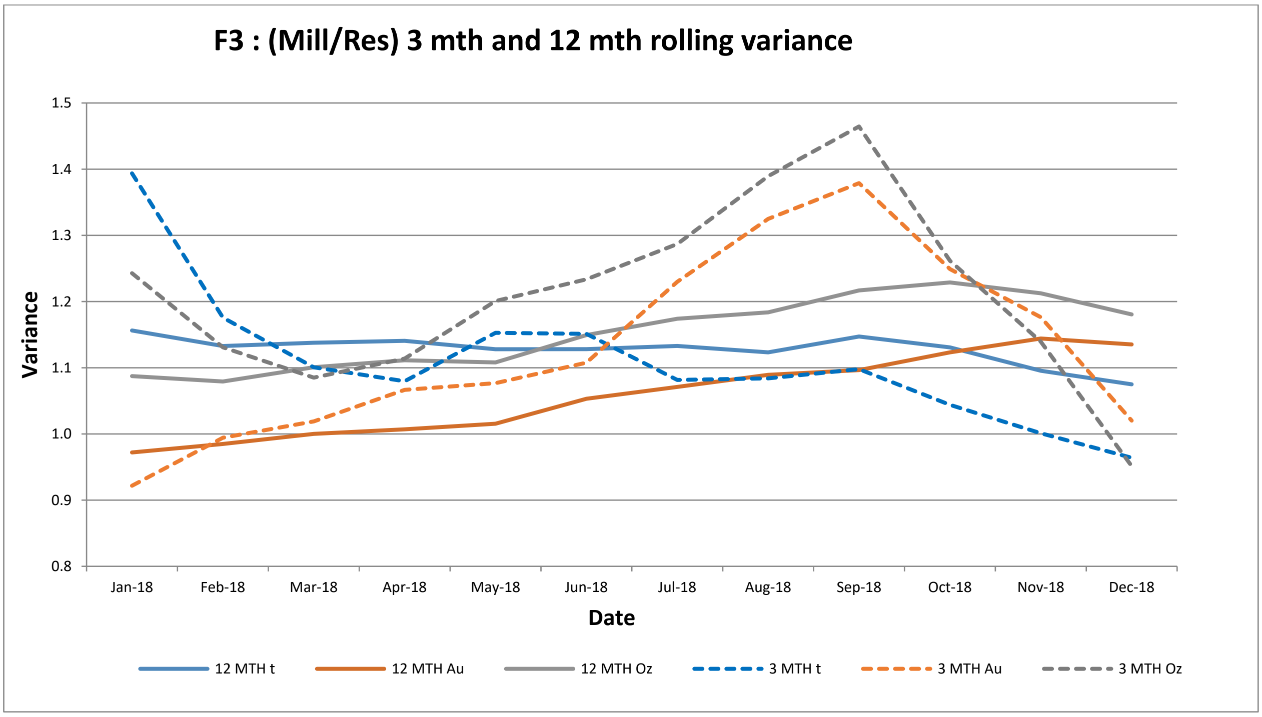


Figure 14.17: Example swath plot Northing Domain 5901 and 5904 Correnso Model

Model performance is formally reviewed on site a monthly basis. Investigation of variance between Ore control vs. Reserve model (F1), Received at mill vs. Claimed delivered to mill (F2) and Mill vs. Reserve model (F3) is undertaken at monthly, 3 month rolling and 12 month rolling resolutions. Mitigating actions are identified in order to minimise sources of variance where practicable.



F3 Factors	3 Month rolling			F3 Factors	12 month rolling		
	Tonnes	Au g/t	Au Oz		Tonnes	Au g/t	Au Oz
Variance	94%	98%	92%	Variance	106%	110%	117%

Figure 14.18: Mill vs. Reserve Model variance as at December 2018

14.9 Estimation Scheme

14.9.1 Martha Underground

The Martha Underground model has been estimated in Vulcan with ordinary kriging. Estimations were performed in individual lithological domains using length weighted down hole composites; 1 m in narrow (<10 m width) veins, 2 m composites in the broader veins. The grade is estimated into parent cells of 5 m x 5 m x 5 m, with minimum sub-block dimensions of 1.25 m in each direction. All estimates utilise tetra unfolding to address complex local geometries and appropriate sample selection strategies. Au is estimated using a 2-pass grade estimation scheme, Cross cut data is excluded in the first estimation scheme, un-estimated blocks are then reprocessed with cross cuts included in the input data set to enable estimation of those portions of the model where historic mining has taken place yet there is not adequate modern data to enable a grade estimate.

14.9.2 WKP

The WKP model has been estimated in Vulcan with Inverse Distance interpolation. Estimations were performed in individual lithological domains using 1m length weighted down hole composites. The grade is estimated into the sub celled blocks, future estimates will utilise parent cells of 5 m x 5 m x 5 m, with minimum sub-block dimensions of 1.25 m in each direction.

The raw assays are composited to one metre fixed lengths and "distributed" (1MD) across the vein width to eliminate very small remnant composites. The distributed method divides the vein interval into several equal length samples as close to the desired sample composite length as possible given the intercept width, this is an option available in the Vulcan® software.

Drilling data is composites to a 1 m composite length using the distributed technique, this methodology is consistent with the techniques applied for the Waihi deposits. Composite weighting by length is applied during estimation to avoid bias from small, high grade composites.

14.9.3 Correnso

The Correnso models have been estimated in Vulcan with ordinary kriging and inverse distance interpolation. Estimations were performed in individual lithological domains using 1 m to 2 m length weighted down hole composites depending on the drill hole intersection angles and shallow dip of some ore bodies (Empire).

Table 14-19: Grade Estimation Sample Selection Parameters

Estimation ID	Estimation description	Estimation type	Min No. Samples	Max No. Samples	Max No. Samples per Octant	Limit samples per Drill hole
5900ag	ag id2	INVERSE DISTANCE	3	8	0	2
5900as	as id2	INVERSE DISTANCE	3	8	0	2
5900au	au id2	INVERSE DISTANCE	3	8	3	2
5901ag	ag id1 c1.5	INVERSE DISTANCE	3	8	0	2
5901as	as id1 c1.5	INVERSE DISTANCE	3	8	0	2
5901k1	autetra ok p1 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5901k2	autetra ok p2 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5903ag	ag tetra id1 c1.5	INVERSE DISTANCE	3	8	0	2
5903as	ag tetra id1 c1.5	INVERSE DISTANCE	3	8	0	2
5903k1	autetra ok p1 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5903k2	autetra ok p2 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5904ag	ag id1 c1.5	INVERSE DISTANCE	3	8	0	2
5904as	as id1 c1.5	INVERSE DISTANCE	3	8	0	2
5904k1	autetra ok p1 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5904k2	autetra ok p2 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5907ag	ag tetra id2	INVERSE DISTANCE	3	8	0	2
5907as	as tetra id2	INVERSE DISTANCE	3	5	0	2
5907au	au tetra id1 p1 dxl weight	INVERSE DISTANCE	5	12	4	2
5908ag	ag tetra id2 c1	INVERSE DISTANCE	3	8	0	2
5908as	ag tetra id2 c1	INVERSE DISTANCE	3	8	0	2
5908k1	autetra ok p1 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5930ag	ag tetra id2 c1	INVERSE DISTANCE	3	8	3	2
5930as	ag tetra id2 c1	INVERSE DISTANCE	3	8	3	2
5930k1	autetra ok p1 lngth w8 c1.5	ORDINARY KRIGING	5	24	4	2
5995ag	ag id2 c1.5	INVERSE DISTANCE	3	8	0	2
5995as	as id2 c1.5	INVERSE DISTANCE	3	8	0	2
5995au	au id2 c1.5	INVERSE DISTANCE	5	8	3	2

Table 14-20 Search Ellipse Parameters, Correnso

Estimation ID	Bearing (Z)	Plunge (Y)	Dip (X)	Major Axis	Major Axis	Minor Axis
5900ag	357	0	-63	40	30	5
5900as	357	0	-63	40	30	5
5900au	357	0	-63	40	30	2
5901ag	352	0	-63	80	60	20
5901as	352	0	-63	80	60	20
5901k1	352	0	-74	30	20	0.25
5901k2	352	0	-74	80	60	0.5
5903ag	357	0	-60	60	40	20
5903as	357	0	-60	60	40	20
5903k1	357	0	-74	30	20	0.25
5903k2	357	0	-74	80	60	0.5
5904ag	357	0	-63	80	60	20
5904as	357	0	-63	80	60	20
5904k1	357	0	-74	30	20	0.25
5904k2	357	0	-74	80	60	0.5
5907ag	0	0	90	60	40	0.5
5907as	0	0	90	60	60	0.5
5907au	0	0	90	20	15	0.5
5908ag	358	0	-85	60	40	20
5908as	358	0	-85	60	40	20
5908k1	358	0	-74	30	20	0.25
5930ag	50	0	65	40	30	10
5930as	50	0	65	40	30	10
5930k1	50	0	-74	30	20	0.25
5995ag	23	0	80	60	40	20
5995as	23	0	80	60	40	20
5995au	23	0	80	60	40	20

14.10 Cut –off Parameters

Underground mining cut-offs were based on a gold price NZD1806, mining costs of NZD90 / ore tonne and processing costs of NZD68 / tonne (which includes all general and administrative charges).

Cut-off grades applied to the underground mine are shown in the Table 14-21 below.

Table 14-21: Correnso Underground Cut-offs Used

Area	Stoping	Ore Development
Correnso, Daybreak, Empire, Correnso Deeps, Trio Deeps, Christina.	2.9 g/t	3.1 g/t

14.10.1 Martha Underground Project

A cut-off grade of 2.15 g/t has been used for the Martha Underground Resource mine design.

Cut off grades are estimated at a USD 1500 gold price and based on projected (2018) processing costs of NZD 30/tonne, general and administration costs of NZD 20/tonne, current mining costs (including sustaining capital development) of NZD 80/resource tonne. Additional sustaining capital costs of NZD 6/resource tonne have been allowed for to cater for fixed and mobile plant.

14.10.2 Martha Open Pit

A cut-off of 0.5 g/t has been utilised for Martha Phase 4 pit. This is based on a gold price of NZD 2083/oz, silver price of NZD 26/oz, process gold recovery of 90%, milling costs of NZD 31.60/tonne and waste disposal credits of NZD 2.20/t.

14.10.3 Gladstone Open Pit

Cut-off grades are calculated based on rock type as the cost of processing divided by the equivalent price multiplied and process recovery. The cut-off grades were based on a gold price of USD 1500/oz. and silver price of USD 20 / oz.

For the optimisation, the equivalent gold price was estimated at NZD 68.05/g, the cost of processing at NZD 33.73/t and process recoveries developed from regression analysis of testwork. Cut- off grades for weathered and un-weathered Mineral Resources are as shown in Table 14-22.

Table 14-22: Gladstone Pit Cut-offs Used

Area	Cut-off grade
Weathered mineral resources	0.6 g/t
Un-weathered resources	1.1 g/t
Hydrothermal breccias	0.7 g/t

14.10.4 WKP

The WKP Resource is calculated above a cut-off grade of 3.0 g/t Au based on the assumptions provided below. Silver was not included in the cut-off grade calculation due to its small contribution to the value of the mineralization. Parameters used to calculate the cut-off grade were derived from the nearby Waihi operation with additional costs allowed for surface and underground haulage of the Resource to the Waihi process plant.

Metal recovery (%): 90

Operating cost (NZD/t): 170

Gold price (USD/oz): 1,500

14.11 Mining Factors or Assumptions

There are no Inferred Mineral Resources in the Open Pit or the Correnso underground. All Inferred Mineral Resources lie within the Martha Underground, Gladstone pit and the WKP areas.

14.11.1 Correnso

There are no Inferred Resources in the Correnso underground. All Mineral Resource has been converted to Mineral Reserve.

14.11.2 Martha Pit

There are no Inferred Resources in the Martha Open Pit. All Mineral Resource has been converted to Mineral Reserve.

14.11.3 Martha Underground

Mining method selection work for the Martha Underground Project was undertaken by SRK in 2011, 2016 and 2017 and confirmed by Entech in 2018. The Mineral Resource has applied the same recommended mining methods recommended by SRK and Entech for the purposes of reasonable prospect for eventual economic extraction.

A proportion of the Mineral Resource inventory will involve the extraction of remnant ore skins in the footwall or hangingwall of previously mined stopes, or the extraction of both remnant ore skins and historical backfill (which contains economic gold grades). This mining method utilising remote drilling and loading methods, combined with remote LHD equipment for ore extraction from remnant mining areas. This method involves additional waste development adjacent to the remnant stopes, which increases overall development quantities and mining costs. SRK and Entech conclude that once established, the method is expected to achieve acceptable ore recovery with few safety issues anticipated. The proposed mining method is illustrated in Figures 14.19 and 14.20.

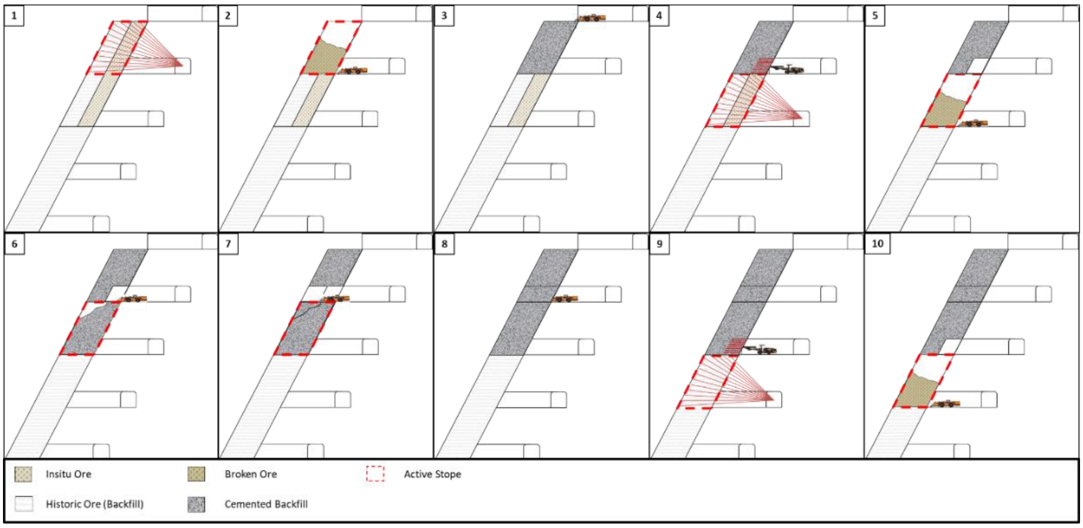


Figure 14.19: Side Ring Mining Method

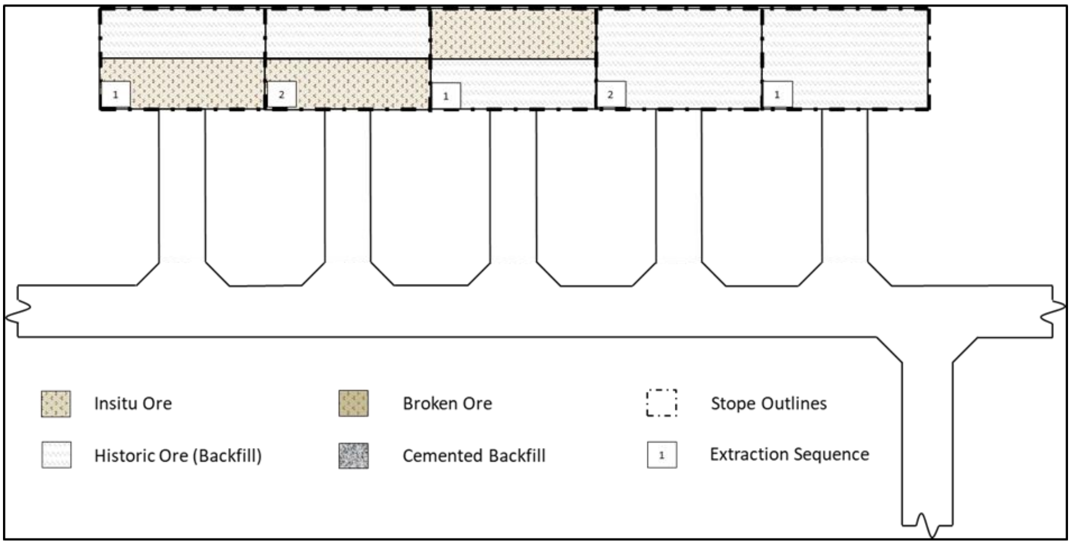


Figure 14.20: Side Ring Mining Method - Plan

OceanaGold has estimated the Mineral Resource using the Alford stope optimiser. All stope shapes were created automatically using MSO (Mineable Shape Optimiser). Nominal stope dimensions of 15 m high by 10m in length were selected for the design with a small number of sub-shapes of 7.5 m along strike where these could form part of a larger block.

Stope widths vary, depending on the thickness of the mineralisation. A minimum stope width of 0.5 m was used for both the side ring drilling method (for remnant mining) and for the Avoca mining method. 0.5 m of dilution was applied to both the footwall and hangingwall resulting in a minimum stope width of 1.5 m. A maximum stope width of 15 m was used with a minimum pillar width between stopes of 8m. A maximum percentage of historical stoping of 10% was allowed in each MSO shape.

The method of specifying the strike and dip angles for the initial stope-seed-shapes in MSO was to apply a stope control surface wireframe over the full extent of the orebody where stope shapes are to be generated.

Stope control surfaces were generated in Deswik and the medial surface generation tool was applied to the hangingwall and footwall vein surfaces of each lode resulting in separate medial surfaces for each lode. These surfaces were then combined into a single wireframe file and used inside MSO as a stope control surface. Figure 3.4 present the MSO shapes prior to exclusion based on geotechnical and economic assessment.

Stope shapes from the MSO run were manually inspected for proximity and any isolated stopes removed. The following stopes were manually excluded from the Mineral Resource estimate:

- Stopes closer than 50 m from the surface.
- Within a solid created as an exclusion solid around the historical "Milking Cow" zone by projecting the base of the cave zone outwards by 20 m and projecting it upwards at an angle of 65° from horizontal.
- All stopes intersecting the base of the Martha Reserve pit.

Figure 14.21 Figure 14-21 presents the MSO shapes after exclusion based on geotechnical and economic assessment.

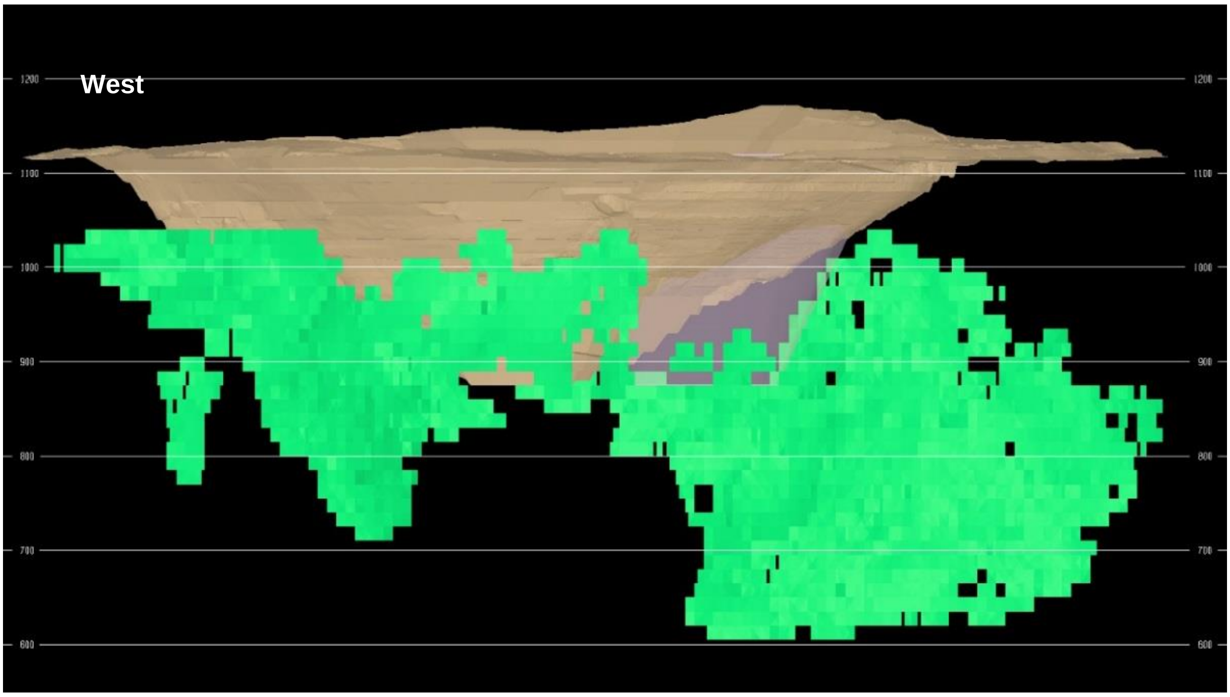


Figure 14.21: Martha Underground Mineral Resource Long Section

No mining recovery or dilution was applied to the Mineral Resource estimate. The Mineral Resource is reported within the MSO shapes above the 2.15 g/t cut-off grade.

14.11.4 Hydrogeology

GWS Limited Consulting (GWS) have modelled the groundwater system in Waihi since the late 1980's. A specific groundwater model was prepared for the Martha Underground Project and a technical report issued. GWS concluded that:

- The ore body to be mined comprises near-vertical quartz veining with relatively elevated permeability and storage within an Andesite rock mass of lower permeability and storage. Vein and fault intersections provide interconnections between Martha, Trio and Correnso mines. These intersections have been enhanced by mine developments.
- Because of the interconnections, dewatering of one vein also dewaters the interconnected veins to a similar elevation, but the Andesite rock mass surrounding and between the veins is dewatered to a lesser degree such that steep hydraulic gradients develop between the veins and the rock mass.
- While the current dewatering level of the Martha, Trio and Correnso vein systems is at approximately 705 m RL, historical dewatering has been undertaken to approximately 540 m RL and with the proposed Martha Underground Project to extend to 500 m RL only some 40 m of previously non-dewatered ground would be dewatered.

- An estimate of the expected averaged daily pumping rates to dewater range from 14,000 m3/day to 16,700 m3/day.
- Monitoring data collected over the period since dewatering began in the late 1980s has indicated no adverse effects on shallow groundwater or baseflow to surface waters. This is, largely, a consequence of the perched nature of the surface water bodies in the shallow groundwater system. The proposed deepening will have no additional effect to surface waters than that already experienced.

14.11.4.1 Geotechnical

Entech report that ground conditions within the Martha Underground Project will be impacted due to proximity to historic mining voids. Mechanisms for mitigating the associated risks will be considered as part of the project scoping study to be undertaken in the coming year.

Pells Sullivan Meynink (PSM) engineering consultants reported on the effect of the Martha Underground Project on the Martha Pit wall stability and concluded that the Martha underground will run in parallel with the Martha Pit and this will have several benefits:

- A proportion of the existing unfilled historical stopes will be stabilised by filling with rockfill and half of these lie in the upper levels immediately below the Martha Pit.
- A proportion of the total planned mining is re-mining of historical stopes, it will be mining from the top down, a very large proportion of these lie immediately below the Martha Pit; and cemented aggregate fill will be used extensively in this mining.
- These two factors will result in a significant improvement in overall rock mass conditions; firstly, by improving pit stability conditions both in the short and long term, secondly by reducing any impacts of the Martha underground mining and thirdly by reducing the longer-term creep of the rock mass around the historical underground.

AMC investigated the stability of the underground workings and reported that based on the current understanding of ground conditions, the planned ongoing investigation of conditions as suitable drilling positions become available, and the proposed cautious approach to development using close ground control techniques where required, AMC is confident that the proposed Martha underground mine can be developed and brought into production without any compromise to underground or surface stability.

AMC reported that the ground conditions influence the mining method, the means of access, and the design of stopes and access tunnels. A critical aspect of the Martha Underground Project is to undertake investigations to understand those conditions so that a safe and efficient mining method and well-informed approach to developing the mine is used.

14.11.5 Gladstone Pit

The Gladstone Resource is reported within a conceptual pit shell defined using a USD 1500 gold price, this resource is largely Indicated however approximately 10% of the contained metal within the Resource reporting pit shell is classified as inferred.

The method for estimating the Mineral Resource involved a 2018 pit optimisation study using the “Whittle” Lerch-Grossman algorithm to determine the economic limits. Operating costs were estimated based on contract rates for the Martha open pit conventional drill, blast, load and haul with standard mid-sized mining equipment. The selected mining method and design is appropriate for the Gladstone open pit.

14.11.5.1 Hydrogeology

Two aquifers are interpreted across the site, an upper aquifer within the surficial materials and young volcanics, and a lower aquifer within the andesite with the two aquifers partially separated by the lower permeability, weathered and hydrothermally altered cap at the top of the andesite sequence.

The model at Gladstone comprises:

- An upper perched groundwater system within the surficial materials of moderate to low hydraulic conductivity, with pore pressures below hydrostatic and a standing water level at ~1096 m RL with seasonal fluctuation;

- A lower groundwater system in the Andesite with a standing water level of approximately ~1075 m RL.

14.11.5.2 Geotechnical

Geotechnical studies during 2017 on preliminary design concepts including geotechnical drilling, rock / soil testing and detailed core logging showed that the slopes in the Winner Hill pit and the northern slopes in Gladstone Hill were generally satisfactory under fully saturated or partially drained conditions. However, the southern and eastern upper slopes were shown to be marginally stable under fully or partially saturated conditions particularly where there was a significant depth of the surficial deposits.

The geological model shows the north-western wall will comprise andesite, overlain by a thin band of hydrothermal breccia and a relatively thin sheet of rhyolitic tuff/ignimbrite thickening to the south. The south-eastern wall has a thicker band of rhyolitic tuff/ignimbrite and hydrothermal breccia overlying andesite; and the east wall has the greatest thicknesses of dacite and volcaniclastics.

Design pit slopes were modified based on a geotechnical study completed by PSM in early 2018 including three additional geotechnical holes and geotechnical modelling. Geotechnical domains were re-defined based on the recent analysis. The design criteria used to support calculation of Mineral Resources are reported in Table 14-23 below.

Table 14-23: Gladstone Pit Slopes

Pit Design Parameter	Bench Height m	Face Slope degrees	Berm Width m
Gladstone Pit			
• 1040 to 1100	15	60	5
• 1100 to 1140	10	40	5
• Breccias / Dacites	10	40	5
• Surface to 6m depth	35		
Haul Road Width	• 20m wide @1 in 10, surface to 1070, • 12m wide @ 1 in 9 to 1040		
Winner Pit			
• 1060 to 1085	15	60	5
• 1085 to 1100	15	55	5
• 1100 to 1130	10	55	5
• Surface to 8m depth	30		
Haul Road Width	18m wide 1 in 10		

No mining losses were applied. It is considered that the resource estimation technique applied to the broad mineral resource zones provides an adequate estimate of the Mineral Resource tonnes and grades.

14.11.6 WKP

No Mining Factors were applied to the Resource calculation.

14.12 Metallurgical Factors or Assumptions

Laboratory scale test work has been conducted on samples over the last 30 years. Metallurgical test work is described in Section 13. There are no Inferred Resources in the Correnso underground or Martha open pit and metallurgical recovery factors for these deposits are discussed in Section 13. Mineral Resource estimates of metal contained do not include allowances for processing losses.

14.12.1 Martha Underground Project

A metallurgical recovery of 90% been used for the Mineral Resource cut-off grade calculation.

14.12.2 Gladstone Open Pit

The metallurgical recovery estimate for the Mineral Resource calculation is calculated for the different ore types as described in Section 13.4. This relationship predicts an average recovery for the Gladstone Resource of 77.8% based on the average Mineral Resource grade of 1.99 g/t Au.

14.12.3 WKP

A metallurgical recovery of 90% been used for the Mineral Resource cut-off grade calculation.

14.13 Classification of Mineral Resources

For all projects the Resource Classification is based on the average distance of the block to the closest three holes within specified ranges, with the ranges having been determined through drill spacing analysis of mineralisation continuity and site experience with similar veins.

The process included steps to remove isolated small clumps of blocks or isolated individual blocks of different classifications that cannot be realistically mined separately. The Martha underground project has been extensively mined historically, this project has abundant historic voids that interact with the remnant mineralisation. In order to adequately capture resource risk for this project the depleted insitu resource is evaluated through a stope optimisation process to define the potential future mineability of the resource. The stope shapes generated are based on an incremental cut-off and a stated gold price assumption. The stope shapes are then used to define the portion of the resource that has an appropriate average drillhole spacing for reporting purposes.

The ranges are determined based on the observed continuity of the veining for a given project

Table 14-24: Classification Criteria

Project	Drill Spacing for Measured Resource	Drill Spacing for Indicated Resource	Drill Spacing for Inferred Resource
Martha Open Pit ELB	20 metres	50 metres	100 metres
Gladstone Open Pit	15 metres	30 metres	52.5 metres
Martha Underground	20 metres	40 metres	60 metres
WKP	15metres	40 metres	80 metres
Correnso	10 metres	30 metres	60 metres

The classification of Open pit Mineral Resources takes into account geologic, mining, processing and economic considerations, and have been confined within appropriate LG pit shells, and therefore are classified in accordance with the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves. The Martha underground resource is constrained within a conceptual underground design based upon the incremental cut-off grade, this additional step of applying a design evaluation is incorporated to account for the risk associated with proximity to historic voids. The WKP resource is reported at a nominal cut-off, no dilution is included in the reported underground resource figures and no allowances have been made to allow for mining recoveries

For underground the Measured material is classified on the basis of proximity to drilling and sill drive development, blocks are classified as measured if they are within an average distance of 10 metres of three separate sampled locations, either drill holes or lateral Ore drive development channel sample locations

Models used to estimate the Mineral Resources disclosed in this Report contain the following defined block variables:

- au: estimated gold grade (regardless of method used);
- res_cat: resource block classification (resource category), where 1 = Measured, 2 = Indicated, 3 = Inferred, and 4 = mineral inventory,
- code: domain name for block estimation;
- sg: density field for tonnage calculation.

The original models contain additional variables and calculations to assess the:

- Impact of the selected cap grade;
- Calculated drill spacing;
- Comparisons to other estimation techniques.

The resource estimate outlined in this document appropriately reflects the Competent Person’s view of the deposit.

14.14 Mineral Resource Statement

The OceanaGold Waihi resource estimates, as at 31 December 2018, are presented in Tables 14-25, 14-26, and 14-27 and are classified in accordance with CIM and JORC 2012. Mineral Resources are inclusive of Mineral Reserves and are reported at a commodity price of NZD 2,142/oz gold.

The resource estimate is sub-divided for reporting purposes: an open-cut resource that includes material within the limits of the Martha pit and a conceptual Gladstone Pit shell; and underground resources within the Correnso Extended Permit Area, the Martha Underground project area and for the WKP project. The resources are depleted for mining as at 31 December 2018.

Information relating to Geology, Sampling, Data Verification and Mineral Resources in this document was prepared by or under the supervision of Peter Church. Peter Church is a Chartered Professional Member of the Australasian Institute of Mining and Metallurgy and is the Qualified Person for those topics. Mr Church is a full-time employee of OceanaGold Limited and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Qualified Person.

Table 14-25: Open Cut Resource Estimate

Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Measured	0.16	3.1	30.4	0.02	0.15
Indicated	2.07	2.4	12.4	0.16	0.83
Measured & Indicated	**2.23**	**2.4**	**13.7**	**0.17**	**0.98**
Inferred	0.30	1.3	2.0	0.01	0.02

Table 14-26: Underground Resource Estimate

Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Measured	0.34	5.6	11.3	0.06	0.12
Indicated	2.79	6.8	18.7	0.61	1.68
Measured & Indicated	**3.13**	**6.6**	**17.9**	**0.67**	**1.80**
Inferred	5.57	6.0	17.0	1.07	3.04

Table 14-27: Combined Resource Estimate

Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Measured	0.50	4.8	17.2	0.08	0.28
Indicated	4.86	4.9	16.0	0.76	2.51
Measured & Indicated	**5.36**	**4.9**	**16.1**	**0.84**	**2.78**
Inferred	5.87	5.7	16.2	1.08	3.06

Notes to Accompany Mineral Resource Table:

10. Mineral Resources are inclusive of Mineral Reserves;
11. Mineral Resources are reported on a 100% basis;
12. Mineral Resources are reported to a gold price of NZD 2,142/oz;
13. Martha underground Mineral Resource is reported below the consented Martha Phase 4 open pit design. This Resource is constrained within a conceptual underground design based upon the incremental cut-off grade.
14. WKP Mineral Resource is reported at a nominal cut-off of 3 grams per tonne Au.
15. No dilution is included in the reported figures and no allowances have been made to allow for mining recoveries. Tonnages include no allowances for losses resulting from mining methods. Tonnages are rounded to the nearest 1,000 tonnes;
16. Ounces are estimates of metal contained in the Mineral Resource and do not include allowances for processing losses. Ounces are rounded to the nearest thousand ounces;
17. Rounding as required by reporting guidelines may result in apparent summation differences between tonnes, grade and contained metal content;
18. Tonnage and grade measurements are in metric units. Gold ounces are reported as troy ounces.

Table 14-28 shows the resources by mining areas.

Table 14-28: Resource Estimate by Area

Class	Tonnes (Mt)	Au(g/t)	Ag(g/t)	Au(Moz)	Ag(Moz)
Underground Correnso Extended					
Measured	0.34	5.66	11.3	0.06	0.12
Indicated	0.26	4.88	9.8	0.04	0.08
Measured & Indicated	**0.59**	**5.32**	**10.6**	**0.10**	**0.20**
Inferred	0	0.00	0.0	0.00	0.00
Martha Underground					
Measured	0.0	0.0	0.0	0.0	0.0
Indicated	2.13	4.83	19.0	0.33	1.30
Measured & Indicated	**2.13**	**4.83**	**19.0**	**0.33**	**1.30**
Inferred	4.52	4.59	17.0	0.67	2.47
WKP Underground					
Measured	0	0.00	0.0	0.00	0.00
Indicated	0.41	17.99	22.7	0.23	0.30
Measured & Indicated	**0.41**	**17.99**	**22.7**	**0.23**	**0.30**
Inferred	1.11	11.88	16.8	0.40	0.60
Open Pit Martha					
Measured	0.16	3.05	30.5	0.02	0.15
Indicated	0.66	2.91	29.1	0.06	0.61
Measured & Indicated	**0.81**	**2.94**	**29.4**	**0.08**	**0.77**

Inferred	0	0.00	0.0	0.00	0.00
Open Pit Gladstone					
Measured	0	0.00	0.0	0.000	0.00
Indicated	1.42	2.1	4.7	0.10	0.22
Measured & Indicated	**1.42**	**2.1**	**4.7**	**0.10**	**0.22**
Inferred	0.30	1.3	2.0	0.01	0.02

14.15 Factors That May Affect the Mineral Resource Estimates

Factors which may affect the geological models and the preliminary stope and pit designs used to constrain the Mineral Resources, and therefore the Mineral Resource estimates include:

- Commodity price assumptions;
- Metallurgical recovery assumptions;
- Geotechnical assumptions.

14.16 Comments on Section 14

The QPs are of the opinion that the Mineral Resources for the Project, which have been estimated using core and RC drill data and underground face chip data, have been performed to industry best practices, and conform to the requirements of CIM (2014).

15 MINERAL RESERVE ESTIMATES

15.1 Reporting Standard

The reserves were compiled with reference to the NI 43-101 and JORC. This section summarises the main considerations in relation to the preparation of Mineral Reserves and provides references to the sections of the study where more detailed discussions of particular aspects are covered. The basis for the estimation of Mineral Reserves is a metal price of NZD 1,806 per oz (USD 1,300 per ounce) for gold.

15.2 Reporting Date

Mineral Reserves for Waihi open pit and underground are reported as at December 31, 2018.

15.3 Qualified Person

Information relating to open pit Mineral Reserves, Mine Planning, Project Infrastructure, Capital and Operating Costs, and Economic Analysis in this document was prepared by or under the supervision of Trevor Maton. Trevor Maton is a Chartered Professional Member of the Australasian Institute of Mining and Metallurgy and is the Qualified Person for those topics. Mr Maton is a fulltime employee of OceanaGold Company Limited and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Qualified Person as defined by NI 43-101 and is employed at the Waihi operation.

Information relating to underground Mineral Reserves, Mine Planning, Project Infrastructure, Capital and Operating Costs, and Economic Analysis in this document was prepared by or under the supervision of David Townsend. David Townsend is a Chartered Professional Member of the Australasian Institute of Mining and Metallurgy and is the Qualified Person for those topics. Mr Townsend is a fulltime employee of OceanaGold Company Limited and has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Qualified Person as defined by NI 43-101 and is employed at the Waihi operation.

15.4 Mineral Reserves

The combined Mineral Reserves for Waihi Open Pit and Underground are summarised Table 15-1.

Table 15-1: Mineral Reserves, Trevor Maton, MAusIMM (CP), David Townsend, MAusIMM(CP)

Reserve Area	Class	Tonnes (Mt)	Au (g/t)	Ag (g/t)	Au (Moz)	Ag (Moz)
Open Pit	Proven	0.16	3.05	30.5	0.02	0.15
	Probable	0.66	2.91	29.1	0.06	0.61
Underground	Proven	0.34	5.63	11.3	0.06	0.12
	Probable	0.26	4.88	9.8	0.04	0.08
Total Proven		0.50	4.81	17.2	0.08	0.28
Total Probable		0.91	3.44	23.7	0.10	0.69
Total		**1.41**	**3.93**	**21.4**	**0.18**	**0.97**

Notes to Accompany Mineral Reserve Table:

- Mineral Reserves are reported on a 100% basis;
- Mineral Reserves are reported to a gold price of NZD 1,806/oz;
- Tonnages include allowances for losses resulting from mining methods. Tonnages are rounded to the nearest 1,000 tonnes;

- Ounces are estimates of metal contained in the Mineral Reserves and do not include allowances for processing losses. Ounces are rounded to the nearest thousand ounces;
- Rounding of tonnes as required by reporting guidelines may result in apparent summation differences between tonnes, grade and contained metal content;
- Tonnage and grade measurements are in metric units. Gold ounces are reported as troy ounces.

The change in Mineral Reserves reported at December 31, 2018 compared with those previously reported at December 31, 2017 is reported in Table 15-2.

Table 15-2: Mineral Reserves, Dec 2017 Reserve Estimates vs. Dec 2018 Reserve Estimates

Reserve Area	Tonnes (Mt)	Au (g/t)	Ag(g/t)	Contained Au (Moz)	Contained Ag (Moz)
December 31, 2017 Reserve					
Open Pit	0.81	2.9	29.4	0.08	0.77
Underground	0.97	5.6	11.2	0.18	0.35
Total (Dec 31, 2017)	1.74	4.4	19.7	0.24	1.10
Changes to Reserve, December 2017 vs. December 2018					
Open Pit	0	0.0	0.0	0.00	0.00
Underground	-0.37	6.1	12.1	-0.07	-0.14
Total	-0.21	9.6	19.4	-0.06	-0.13
December 31, 2018 Reserve					
Open Pit	0.81	2.9	29.4	0.08	0.77
Underground	0.60	5.3	10.6	0.10	0.20
Total (Dec 31, 2018)	1.41	3.9	21.4	0.18	0.97

Changes between the December 31, 2017 Reserve and the December 31, 2018 Reserve estimate primarily reflect the depletion of ore from the Correnso underground mine.

Inputs to the calculation of cut-off grades for the open pit and underground mine include mining costs, metallurgical recoveries, treatment and refining costs, general and administration costs, royalties, and commodity prices.

Open pit mining was undertaken by a contractor from 1997 to 2015 under a schedule of rates, and production rates and costs are therefore well understood.

Long hole bench stoping with rock backfill is the current mining method for extraction of underground Mineral Reserves. Stope dilution has been estimated based on expected geotechnical conditions, stope spans and industry experience for similar mining operations. Recovery of ore requires the use of remote loaders, and allowances have been made for loss of Mineral Reserves and for dilution from back fill.

Recovery of gold at OceanaGold Waihi is achieved through a CIP plant and a conventional SABC grinding circuit. The plant has an established skilled workforce and management team in place. Recent costs and processing recoveries support the reporting of the stated Mineral Reserves.

The technical and economic viability of the reported Mineral Reserves is supported by studies which meet the definition of a Feasibility Study. All permits and consents are in place for the extraction of the Mineral Reserve.

15.5 Open Pit

15.5.1 Open Pit Reserve

Open pit mining and ore processing at Waihi has been in continuous operation from 1988 until April 2015. The method for conversion of Mineral Resource to Mineral Reserve involved a 2010 pit optimisation study using the “Whittle” Lerch-Grossman algorithm to determine the economic limits of the Mineral Reserve. Mining of this layback was commenced in 2010.

A localised failure of the north wall occurred in April 2015 which undercut the main access ramp. Operations were suspended in April 2015 and the open pit mining contractor terminated in June 2015. A 1 million tonne failure of this wall occurred in April 2016 and studies have now been completed to regain access to the Mineral Reserve.

Permits and consents to commence the Phase 4 remedial works to access the Mineral Reserve were received in December 2018. The Phase 4 cut back will be mined in a single top down cutback sequence. The pit is shown in Figure 15.1. It should be noted that the cut-back requires the partial relocation / realignment of a public road for which permits are in place.

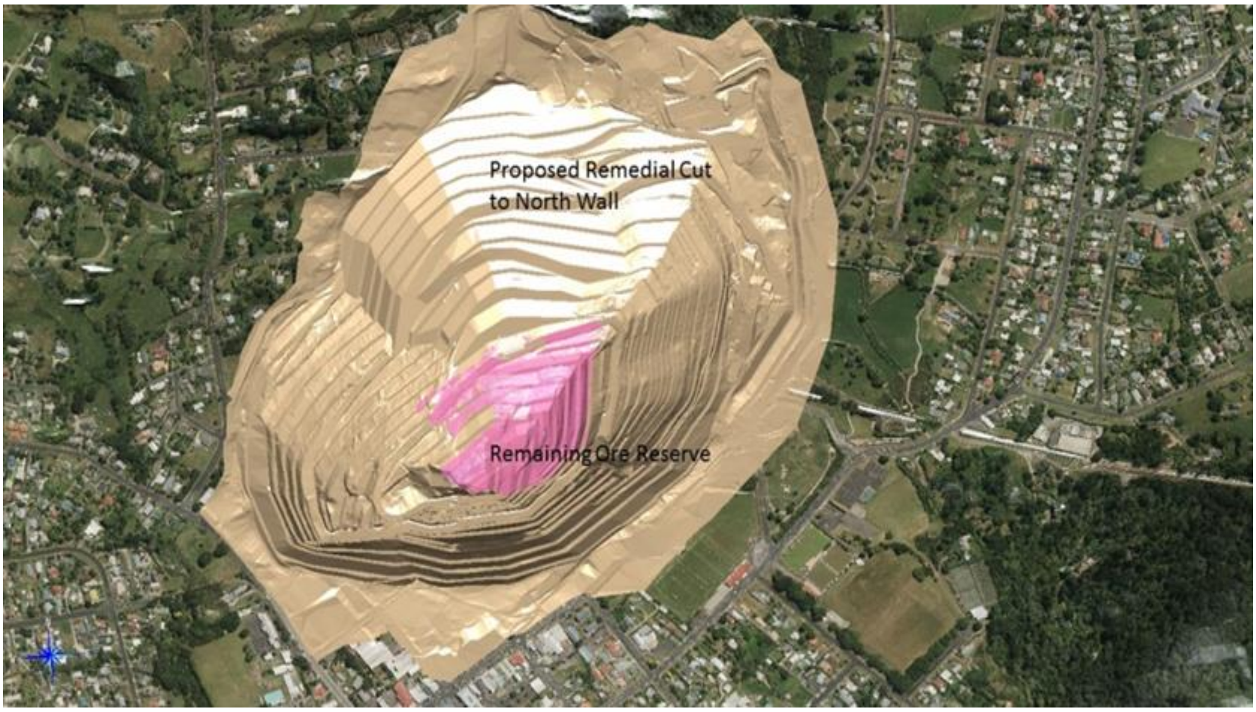


Figure 15.1: Open Pit Mineral Reserve Limits and Stability Cutback

To achieve the target depth and due to the narrow and constrained nature of the cutback, it will be necessary to provide temporary ramps. The upper part of the Phase 4 cutback will likely be developed using smaller open pit equipment due to the narrow haul roads. Below 1120 m RL conventional open pit mining equipment will be used.

Phase 4 pit comprises 0.81 Mt of ore and 8 Mt of non-acid and potentially acid producing waste and it is expected to take around four years to mine.

15.5.2 Cut-off Grade

Cut –off grade is based on Mineral Reserve metal price of NZD 1,806 per ounce. A silver price of NZD 26 per ounce for silver is applied as a by-product credit to the operating costs. Inputs to the calculation of cut-off grades for Waihi open pit include mining costs, metallurgical recoveries, treatment and refining costs, general and administrative costs, royalties. The cut-off grade used to determine Mineral Reserves for the Open Pit was 0.5 g/t Au.

15.5.3 Pit Slopes and Geotechnical

PSM has reviewed the Phase 4 design for geotechnical stability and have concluded that:

- Phase 4 is a remedial cutback of a failure undertaken in order to re-establish the mine, which is a normal part of conventional mining activities and there is nothing unique or special in the planned cutback.
- Monitoring has now been in place for up to two decades and does not show large scale pit wall instability movements. Consequently, in engineering terms there has been a mine scale validation of the ultimate material properties used for the design of the pit walls.
- The Phase 4 pit is much flatter overall than the north wall of the East Layback and this is necessitated by the operational need to incorporate additional haul roads and wide benches.
- The stability has been checked and overall there are high Factors of Safety for the Phase 4. The lower slope is potentially affected by underground stopes and disturbed rock mass.
- Phase 4 comprises a north wall cut back with all other walls remaining as currently built.

The design slopes for the Phase 4 north wall are shown in Table 15.3.

Table 15-3: Pit Slope Design Criteria to Support Mineral Reserve Calculations

Bench RL		Face Slope	Face Height	Inter-Ramp
	>1135	35	15	
1135	1120	45	15	
1120	1104	45	15	35
1104	1090	50	15	
1090	1070	60	20	
1070	1050	60	20	
1050	1030	60	20	
1030	1010	60	20	33
1010	990	60	20	
990	970	70	20	
970	950	70	20	
950	930	70	20	55
930	910	70	20	
910	875	70	20	

The open pit geotechnical conditions are impacted by the presence of extensive historic mine workings, particularly on the south and east walls of the pit. Caving initiated during historic mining has resulted in zones of poor-quality rock mass within and outside of the pit slope limits. There has been ongoing large-scale block movement over the last seventy years and this large-scale block movement will continue into the caved zones in the future beyond the life of the open pit.

15.5.4 Mining Dilution and Ore Loss

The ore zones are broad on each mining bench, and the overall dilution edge effects are minimal, with the result that there is little difference between the overall in situ and diluted tonnes and grade. The Mineral Resource block model has a block dimension which is larger than the optimum selective mining unit (SMU). When estimating open pit Mineral Reserves there is no requirement for additional mining dilution after the geological modelling stage.

No mining losses were applied. It is considered that the resource estimation technique applied to the broad ore zones provides an adequate estimate of the run of mine (ROM) tonnes and grades. Reconciliation data from mining the Martha open pit supports this approach.

There are no Inferred Mineral Resources included in the open pit economic evaluation. The studies have demonstrated that the open pit operation is technically and economically viable without the inclusion of inferred Mineral Resources.

15.6 Underground

15.6.1 Underground Reserve

Underground mining and ore processing at Waihi have been in continuous operation since 2004.

There are multiple orebodies within the current underground mine including Correnso, Daybreak, Empire, Trio, and Louis. All mining areas share the same stoping method and have very similar modifying factors and assumptions and design criteria applied. For simplicity all these areas are hereafter collectively referred to as “Correnso”.

The study work undertaken for Correnso meets Feasibility Study level standard. Mining studies have been conducted for mine design, mine planning, ventilation, cut-off grade, detailed cost estimation and economic evaluation. The site has had a 14-year operating experience with Mineral Reserve reconciliation and metallurgical recovery performance. Actual costs for underground mining, ore processing, general and administration and selling costs are well known.

A mine plan has been developed which is technically achievable and economically viable. All Modifying Factors have been considered.

Permits and consents have already been granted for Correnso and all planned mining methods are in accordance with the licence, permit and consent conditions, principally related to placement of backfill, blast vibration limits, method of working and hydrogeological controls.

15.6.2 Cut-off Grades

Cut –off grade is based on Mineral Reserve metal prices of NZD1,806 per ounce. A silver price of NZD26 per ounce for silver is applied as a by-product credit to the operating costs. Inputs to the calculation of cut-off grades for Correnso include mining costs, metallurgical recoveries, treatment and refining costs, general and administrative costs, royalties and metal prices. The following cut-off grades have been used to determine the Underground Mineral Reserve:

- Ore development and stoping beyond designed limits 3.2 g/t Au,
- Ore development beyond stope limits 3.1 g/t Au,
- Incremental stopes (ore development in place) 2.9 g/t Au,
- Incremental ore development 2.8 g/t Au.

The cut-off grades are determined from a mining cost of NZD 90/ore tonne and processing cost of NZD68/ore tonne (which includes all general and administrative charges).

15.6.3 Geotechnical Design Parameters

It has been proven that stable stope strike spans of up to 30 m can be mined. Caving and surface subsidence potential has been assessed for development and stoping with the risk being low if recommendations for ground support, allowable spans, and management techniques are followed.

The following geotechnical parameters have been used within the Correnso Underground mine design:

- Development ground support regimes with bolting and mesh required in all areas, fibrecreting as required in poorer ground areas and cable bolting of drive intersections and wider excavations
- Minimum 1:1 pillar width separating development openings
- 15 m to 18 m vertical level spacing provides a good basis for stable stoping and manageable blast vibration.

15.6.4 Mining Dilution and Ore Loss

The mining recovery factors applied for Correnso underground are summarized in the table below. Over-break is included in the capital and operating lateral waste development dimensions so that no additional over-break is assigned. No over-break is assumed for operating lateral ore development as the over-break tonnes are generally ore which are included in the stope tonnes. Assuming zero over-break in the ore drives removes the risk of either double counting or under calling ore tonnes and metal.

Stopes were designed with 0.4 m dilution on both the footwall and the hangingwall which when applied with the stope recovery factors reconciles with performance of stopes in both the Favona and Trio mines.

Tonnage recovery factors shown in the table below for stoping include in-situ ore plus dilution material. Metal recovery factors consider the difficulties associated with recovering all ore from a stope, particularly under remote control operations. Additionally, it allows for the potential loss of metal due to excess dilution burying ore and limiting recovering of all of the ore.

Table 15-4: Underground Mining Recovery Factors

Activity	Tonnage recovered	Metal recovered
Lateral Development — Capital Waste	100%	-
Lateral Development — Operating Waste	100%	-
Lateral Development — Operating Ore	100%	100%
Vertical Development — Capital Waste	100%	-
15m high Long hole Stope (includes 5% fill dilution at zero grade)	108%	95%

No Inferred Resource metal has been included in the Mineral Reserve. Each individual design item was interrogated to report against each Mineral Resource category, and the average grade of each design item reassessed only allowing contribution of metal from Measured and Indicated Mineral Resource categories. As such, any Inferred Resource material was effectively included as diluting material at zero grade.

15.7 Metallurgical Factors or Assumptions

Laboratory scale test work has been conducted on samples over the last 30 years. Metallurgical test work is described in Section 13. Mineral Resource estimates of metal contained do not include allowances for processing losses. Metallurgical recoveries are used to develop cut-off grades and for the economic evaluation in Section 0.

15.8 Comments on Section 15

The QPs are of the opinion that the Mineral Reserves for the Project conform to the requirements of CIM (2014).

16 MINING METHODS

16.1 Martha Open Pit

The method for conversion of Mineral Resource to Mineral Reserve involved a 2010 pit optimisation study using the “Whittle” Lerch-Grossman algorithm to determine the economic limits of the Mineral Reserve. Mining of the current layback was commenced in 2010.

A localised failure of the north wall occurred in April 2015 which undercut the main access ramp. Operations were suspended in April 2015 and the mining contract terminated in June 2015. Studies have been completed to regain access to the bottom of the pit. It is planned to undertake a wall strip in the north east to regain access to the ramp below the failure to allow full recovery of the remaining Mineral Reserve. Geotechnical studies have been completed to demonstrate that the planned north east wall strip to regain access has adequate Factors of Safety.

The open pit mining process at Martha is determined largely by the land use consents granted to the Company. The following refers to operations between 1988 and 2015 and will be relevant to the extraction of the Mineral Reserve.

Ore and waste were mined by conventional drill, blast, load and haul methods from the open pit. Waste and ore were categorised into hard and soft material and waste was further categorised into potentially acid forming or non-acid forming rock. Ore sampling was conducted in-pit by RC drilling. Ore blocks were blocked out based on this sampling and accounts for the capacities of the equipment to selectively mine these blocks.

Soft material was ripped by D9 dozer whereas hard material was blasted. Strict controls on blast vibration determined the blast hole spacing and the maximum allowable charge weight per delay. Ore was generally blasted in 5 m vertical intervals (two flitches), but blast vibration limitations required some blast holes to be drilled at 2.5 m vertical intervals. Electronic detonators were used in all holes to ensure detonation of charges occur as per the design sequence. The Company monitored each blast vibration for conformance.

All ore and waste were loaded via 190 t backhoe excavators into 85 t rear dump trucks and trucked via a 1 in 10 ramp and generally direct tipped to a Jaw Crusher or Stamler Breaker station. Small quantities of ore and waste were stockpiled close to the jaw crusher. The presence of historic workings in the open pit requires probe drilling to identify voids or weak pillars which create both a safety hazard and an operating constraint. Underground voids are either bunded off or marked with hazard tape. Excavators and trucks must operate around the void working in towards the void. This process can at times influence the bench extraction sequence. All ore and waste were crushed. Ore was conveyed 1.5 km to the process plant and placed in a 40,000 t stockpile. A surge (Polishing Pond) stockpile (up to 1.2 Mt) is available close to the water treatment plant for excess ore.

The minimum mining width was set at 3 metres wide, determined by the observed width of many of the small narrow veins that were being mined. Equipment was sized to suit these design parameters. The selective mining unit developed for the geological block model was a bench height of 2.5 m, and east west dimension of 3 m and north south dimension of 10 m reflecting the drill spacing and the main trend of the mineralised veins in an east westerly direction.

Reverse Circulation grade control drilling was used since 2006 and drilled to an approximate 10 m x 5 m pattern with 1.5 m down hole sample lengths. Drill holes were inclined to the north.

16.2 Correnso Underground Mining

There are multiple orebodies within the current underground mine including Correnso, Daybreak, Empire, Trio, and Louis. All mining areas share the same stoping method and have very similar modifying factors and assumptions and design criteria applied. For simplicity all these areas are hereafter collectively referred to as “Correnso”, and exceptions to the collective factors are discussed where appropriate

Correnso is accessed via the existing Favona Mine and Trio Mine, the portal is close to the Process Plant, refer Figure 16.1.

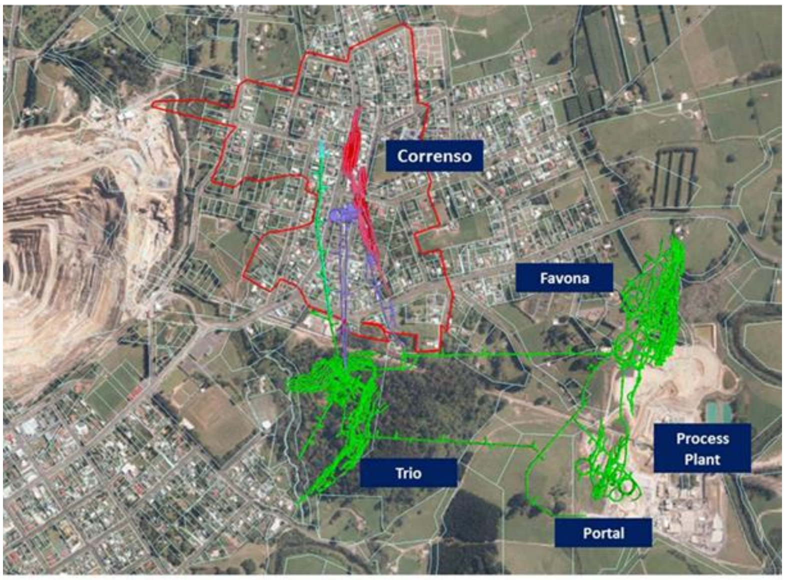


Figure 16.1: Location of Correnso Mineral Reserve

Mining options available for Correnso are limited because of the consent conditions which include blasting and backfill constraints. Modified Avoca long hole bench mining with waste rock backfill was selected as the preferred mining method for extraction of Correnso, refer Figure 16.2.

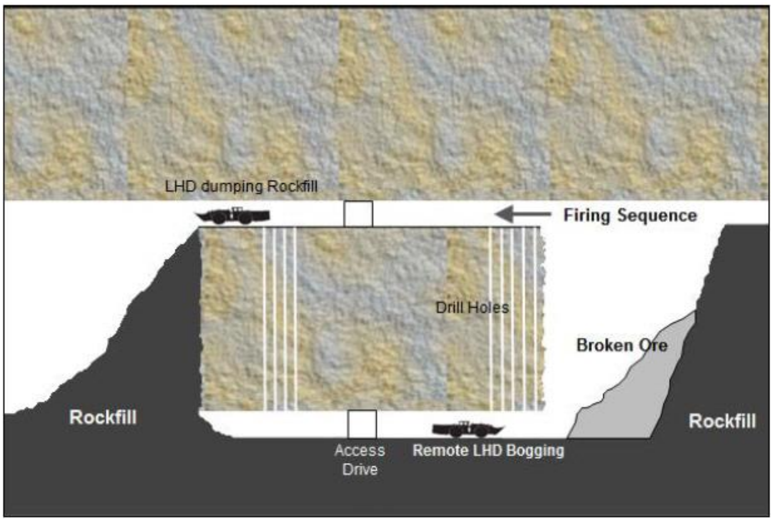


Figure 16.2: Modified AVOCA Mining Method

Small areas of the Louis orebody use an overhand cut and fill method due to the narrow, shallow dipping nature of the orebody.

Access to underground workings is via a decline from previously mined areas, which also serves as a fresh air intake. The primary ventilation is exhausted through a raise bored shaft to surface and a return air drive breakthrough into the Martha pit. An escapeway rise that has been raise bored to surface and equipped also serves as a fresh air intake. The portal is located close to the processing plant.

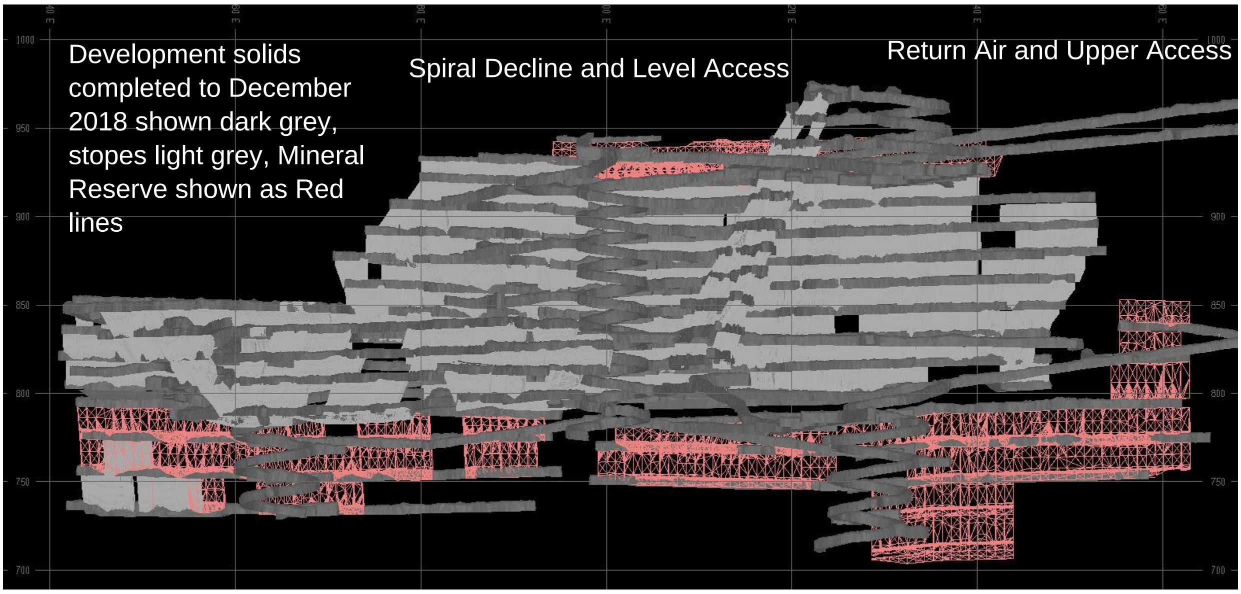


Figure 16.3: Long Section of Correnso Mineral Reserve

Figure 16.3 shows a long section view of the Correnso Mineral Reserve (in red). Note that the image below does not show the final design but is indicative of the overall design. Development and stoping shown in grey have been completed prior to January 2019.

In general mining areas are designed with either a 15 m or 18 m level spacing, floor to floor. This is primarily to limit blast vibration, but this also assists hanging wall and footwall stability. This is in line with previously mined areas and has proven to be successful and efficient. The mine layout for the current underground workings can be summarized as follows:

- Primary accesses via the existing development that was used for the Favona, and Trio mines.
- Exhaust ventilation from the development levels travels to a dedicated return air raise adjacent to the spiral decline.
- Ore and level development at level spacing discussed above
- All material movements on and off levels are via stockpiles developed on the level access.
- The permit and mining method require all stopes and selected development to be backfilled.
- Sufficient material exists at the surface to backfill the Mineral Reserve.

16.2.1 Hydrogeology

Correnso is fully dewatered and no further dewatering is required for the extraction of the Mineral Reserve. Current water levels are maintained by the pumping system installed within the underground mine.

16.2.2 Correnso Geotechnical Model

The geotechnical model for stoping assessments was based on empirical modelling using Q ratings for the rock mass quality and applying the Mathews method to determine stable spans. Geotechnical modelling is impacted by mine design where level spacing was set by blast vibration limits and modelling had to ensure stable pillars were left.

Geotechnical assessments indicate that rock mass conditions within the ore zones and immediately adjacent to the ore zones are generally of good to very good quality except for the northern portion of the Correnso Vein (which has now been fully extracted). In general, the ground conditions do not require any special remediation other than standard first pass ground support.

It has been proven that stable stope strike spans of up to 30m can be mined in all the orebodies except for Empire where 15 m is used due to poor host rock conditions in the Hangingwall. Caving and surface subsidence potential has been assessed for development and stoping with the risk being low if recommendations for ground support, allowable spans, and management techniques are followed. Numerical modelling was undertaken to assess the global effects of mining including global mine stability, risk due to chimney failure of individual stopes, and the effects on ground surface subsidence. The numerical modelling concluded that the likely effects on ground surface stability due to mining would be negligible.

16.2.3 Mine Scheduling

Correnso mine production criteria was calculated from benchmarked rates. Table 16-1 lists the productivity rates and activity durations used in the mine development and production schedule.

Table 16-1: Underground Mining Rates

Activity	Rate
Critical Access and Ventilation Development	20 m / week max
General Rate Level Waste Development	15 m / week
High Priority Ore Drive Development	15 m / week
General Rate Ore Drive Development	9 m / week
Stope Production –peak individual stope	850 t / day
Stope Production – total mine peak Reduced Correnso case	1,170 t / day
Stope Production – total mine peak Full Correnso case	1,350 t / day
Standard Backfilling Rate	850 t / day
Long hole drilling rate per rig	160 m / day

Mine development is now largely complete. Checks were made to ensure development and stopes were sequenced correctly with bottom up development, development completed on the level prior to stoping commencing and adequate separation between the stoping fronts on the various levels. Checks were also made to ensure stoping, drilling and backfilling activities on a single level could be carried out independently of each other.

16.2.4 Staffing

Currently staff at the underground mine comprises Mine Manager, Technical Services Superintendent, Maintenance Superintendents (2), Mine Foreman and Shift Foreman (6), Mining Engineers (6), Geologists (6), Geotechnical engineers (1), surveyors (3) and support staff. Operating personnel (mining and maintenance) is approximately 125.

16.2.5 Stockpiling and Waste Dump

Some stockpiling of material will be required to enable waste production to be scheduled in accordance with backfill requirements and maintain consistent ore feed through the process facility. The stockpile areas near the Favona portal will be used for the temporary storage of waste rock.

A shortage of backfill material exists for the Correnso mine and this will be sourced from the Waste Development Site.

Ore from the underground mine will be processed relatively quickly with the run of mine (ROM) material stockpiled in the ROM stockpile located near the conveyor in the processing area.

16.2.6 Equipment and Haulage

The Correnso mining equipment fleet size is in place and comprises:

- Lateral Development face drilling and bolt installation with 2 Boom Jumbo
- Loading using CAT 1700 or 2900 underground loaders
- Trucking using 50 tonne underground trucks.
- Solo 5V long hole drill rigs capable of drilling in the diameter range of 51 mm to 76 mm and up to 25 m hole length.
- Ancillary equipment (explosive charge vehicles, shotcrete equipment, integrated tool carries, grader).

16.2.7 Maintenance

Comprehensive maintenance tracking and reporting systems, in addition to preventive maintenance (PM) programs are established. Site maintenance facilities are considered adequate to support the current and forecast LOM fleet and exist in centralized facilities on surface and a service bay underground. PMs are routinely performed as per the manufacturer's recommendations.

16.2.8 Blast Vibration

Vibration modelling has been completed for Martha underground and Correnso by Heilig and Partners. This modelling has been based upon vibration relationships developed from the underground blasting. When mining the lower levels (more than 300 m below surface), blasting can use simplified stoping blasting procedures (i.e. single deck of column per blast hole). The upper sections of the mine (220 m to 300 m below surface) will be blasted with using several discrete columns of explosive within a single blast hole to control vibration levels. Mine scheduling is appropriately based on the consented blasting windows.

16.3 Ventilation

Network analysis is routinely conducted and has verified that designs and planning are adequate. The Correnso exhaust ventilation circuit is connected to the existing Trio exhaust ventilation circuit as well as a dedicated return air drive broken through into the Martha pit. Return air capacity is around 300 m^3/s. Fresh air is drawn through the Favona portal and two raises in the Favona mine. Secondary ventilation is by conventional axial flow fan and vent bag means.

16.4 Compressed Air and Service Water

Compressed air and water services for Correnso are from an extension of the Favona/Trio system. Two compressors are installed at a rated capacity of 1000 cfm @ 8.5 Bar each.

17 RECOVERY METHODS

The metallurgical process at Waihi is well-tested and proven technology, having been in operation for 30 continuous years.

17.1 Actual Plant Performance

Mill production tonnes processed and feed grade for the 2018 year are shown in Figure 17.1.

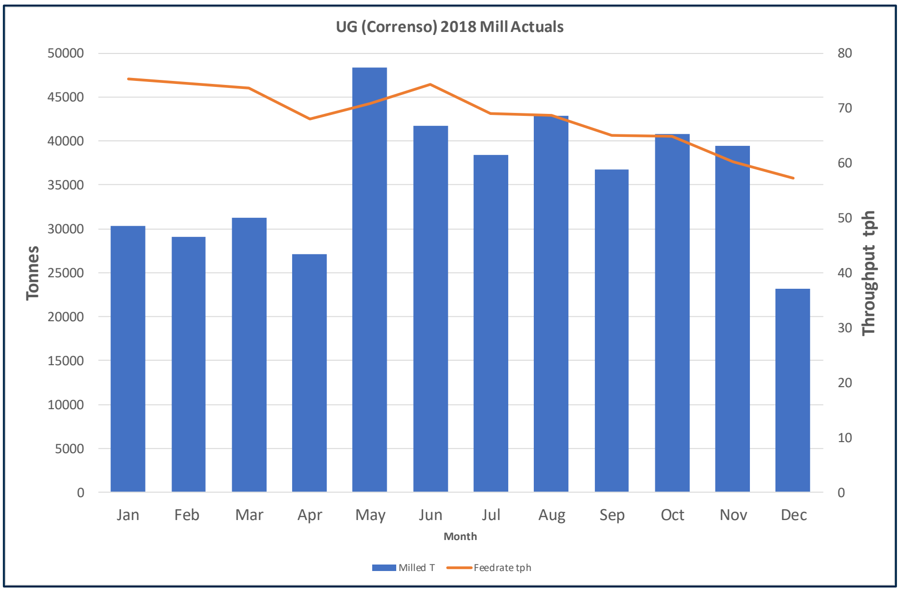


Figure 17.1: Underground mill feed tonnes and throughput actual 2014

17.2 Metallurgical Accounting

Metallurgical accounting at Waihi is primarily based on the tonnage of wet ore processed through the comminution circuit, as totalised on a conveyor weightometer and gold receipts from the Mint. Wet tonnes are converted to dry tonnes by using a moisture factor, the moisture factor is derived from samples taken from the conveyor. Gold production is based on gold receipts from the Mint and the changes to the gold stocks in circuit. Gold stock takes are taken monthly.

Samples are taken at strategic points in the processing stream to measure gold concentrations in those streams to determine plant efficiencies on a day to day basis. All information is entered into a data base which then performs the metallurgical accounting.

17.3 Ore Processing

Ore processing consists of five stages: comminution, leaching/adsorption, elution, electro-winning and smelting as shown in Figure 17.2.

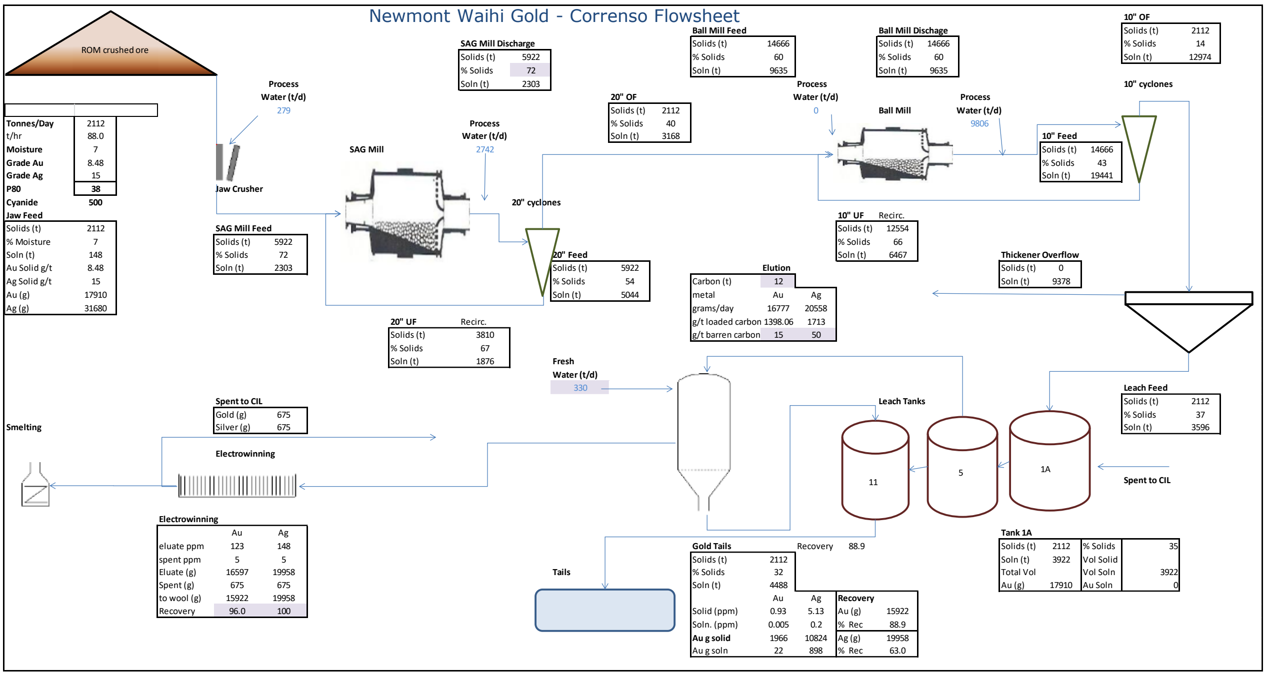


Figure 17.2: Process Flow Sheet

17.4 Comminution

Underground stockpile ore is reclaimed at 80 tonnes per hour by front end loader and fed onto a static grizzly with an aperture of 150 mm. The final conveyor from the ore handling circuit transports the ore into the grinding circuit.

Prior to entry into the feed chute of the semi autogenous (SAG) mill, the ore is further reduced in feed size via a jaw crusher to a P_{80} of 110 – 130 mm. The SAG mill ball size is 125 mm and the mill will operate typically with a 10% ball load. The SAG mill draws between 2.1 and 2.5 MW of power.

The SAG mill discharge is sized using a trommel attached to the SAG. The +12mm oversize material is conveyed to a 30 kW cone crusher and is recycled back to the SAG mill. The undersize slurry from the SAG trommel is pumped to two 0.5 m diameter inclined Weir Warman Cavex cyclones. The cyclone underflow reports to the SAG mill feed chute. The cyclone overflow gravitates to the ball mill discharge hopper, whereby the slurry is pumped to a cyclone distributor, which consists of fourteen 250 mm diameter Weir Warman Cavex cyclones. The cyclone underflow reports back to the ball mill for further grinding and the cyclone overflow reports to the pre-leach thickener.

Normally, the comminution process is set-up as a closed-circuit, but the plant has an ability to operate to an open circuit system if required.

17.5 Leaching and Adsorption

The pre-leach thickener increases slurry density from approximately 15% solids to approximately 37% to 40% solids prior to the leach/adsorption circuit, which comprises six leach and six carbon in pulp (CIP) adsorption tanks. The leaching tanks capacity are 700 m^3 and the adsorption tanks have 300 m^3, providing a total residence leach/adsorption time of 24 hours for Martha ore and 48 hours for Correnso ore. Wedge wire cylindrical inter-stage screens with mechanical wipers are installed in each adsorption tank. The inter-stage screens retain carbon in the tank but let the slurry pass through to the next stage. A bleed stream is pumped from an adsorption tank to the previous tank in the circuit, the carbon contained in the bleed stream is retained in the previous adsorption tank in the circuit, this provides counter current flow whereby the slurry flows from adsorption tank 1 to 6 while the carbon flows from adsorption tank 6 to 1. This allows for maximum carbon loading in adsorption tank 1 and maximum scavenging of gold solution in adsorption tank 6. From adsorption tank 6 the slurry passes over a carbon safety screen to collect any carbon that may have leaked from the adsorption circuit, the barren tailings slurry is then pumped to the tailings storage facility.

Cyanide is delivered and mixed on site, via a sparging system to a concentration of 21 % wt./vol. The cyanide is dosed into the first leach tank and the concentration is maintained at 280 ppm for Martha and 240 ppm for Correnso. Oxygen is added to the first leach tank by a shear reactor to enhance the leach kinetics and reduce cyanide consumption.

17.6 Elution, Electrowinning and Smelting

Loaded carbon from the adsorption circuit is fed into an elution column where the carbon is washed at high temperature and pressure to remove the gold and silver from the carbon and into a pregnant eluate. The pregnant eluant is then passed through electrowinning cells where gold and silver are electroplated onto stainless steel cathodes. Following elution, the barren carbon is reactivated and recycled to the adsorption tanks.

The cathodes are periodically harvested and rinsed to yield a gold and silver bearing sludge which is dried, mixed with fluxes and put into a furnace at 1200^{O}C. Once the sludge is molten it is poured as bars of doré (alloy of gold and silver) ready for shipment to the Mint.

17.7 Other

The Waihi processing plant has a SCADA control system. Equipment protection and P&ID control loops to optimise the control of the major streams/processing parameters within each process circuit are actively in use within the process plant.

The Processing Plant has the capacity to treat either 1.25 Mt of Martha ore or 0.9 Mt of Correnso ore per annum.

18 PROJECT INFRASTRUCTURE

18.1 Mine Layout

Martha pit and Correnso underground use the existing process facilities, tailings storage facilities, water treatment facilities and other site infrastructure established at the Martha Mine in 1988 and upgraded in the late 1990's.

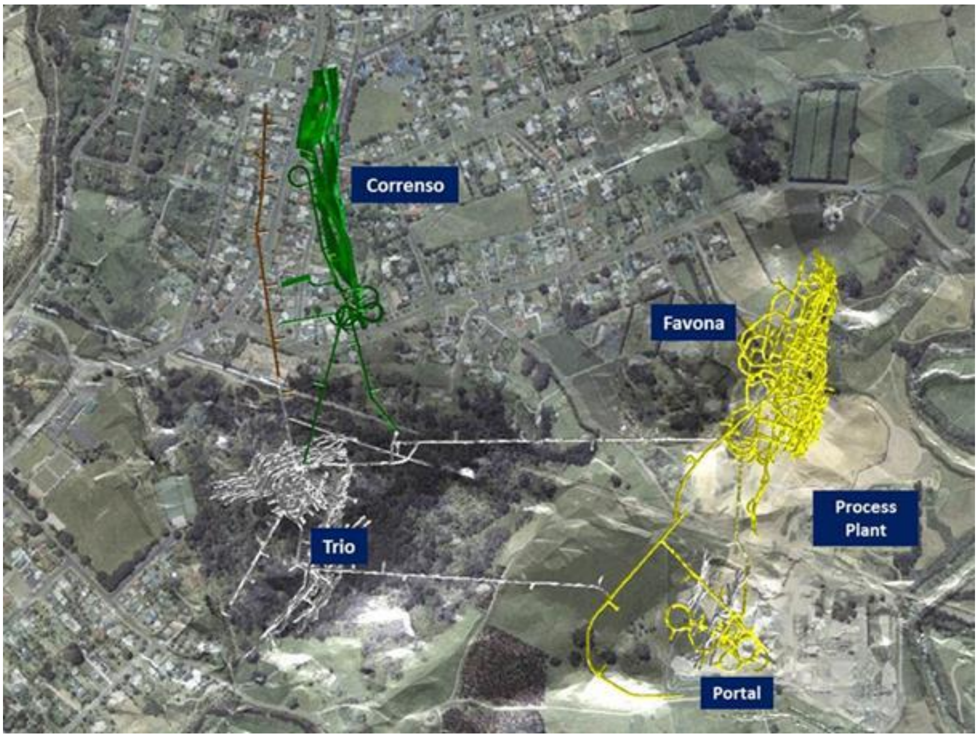


Figure 18.1: Location of mine infrastructure relative to Waihi Township

18.2 Waste Disposal Facilities

All waste produced from the underground mine is classified as potentially acid forming and is returned underground as stope backfill.

Waste from the open pit will be conveyed 2.5 km to the waste development load-out site where it will be either directly loaded into 100 t trucks and transported a further 1 km to the tailings embankment or stockpiled for future use. At the waste development site, the waste will be selectively placed in accordance with a quality control program to form an engineered dam for the tailing impoundment.

18.3 Tailings Storage Facilities

Waihi has two tailings storage facilities (TSFs) known as Storage 2 and 1A. Both are located south-east of the Martha Pit as shown in Figure 18.2. The TSFs are formed by downstream constructed embankments that abut elevated ground to the east of Storage 2 and north of Storage 1A.

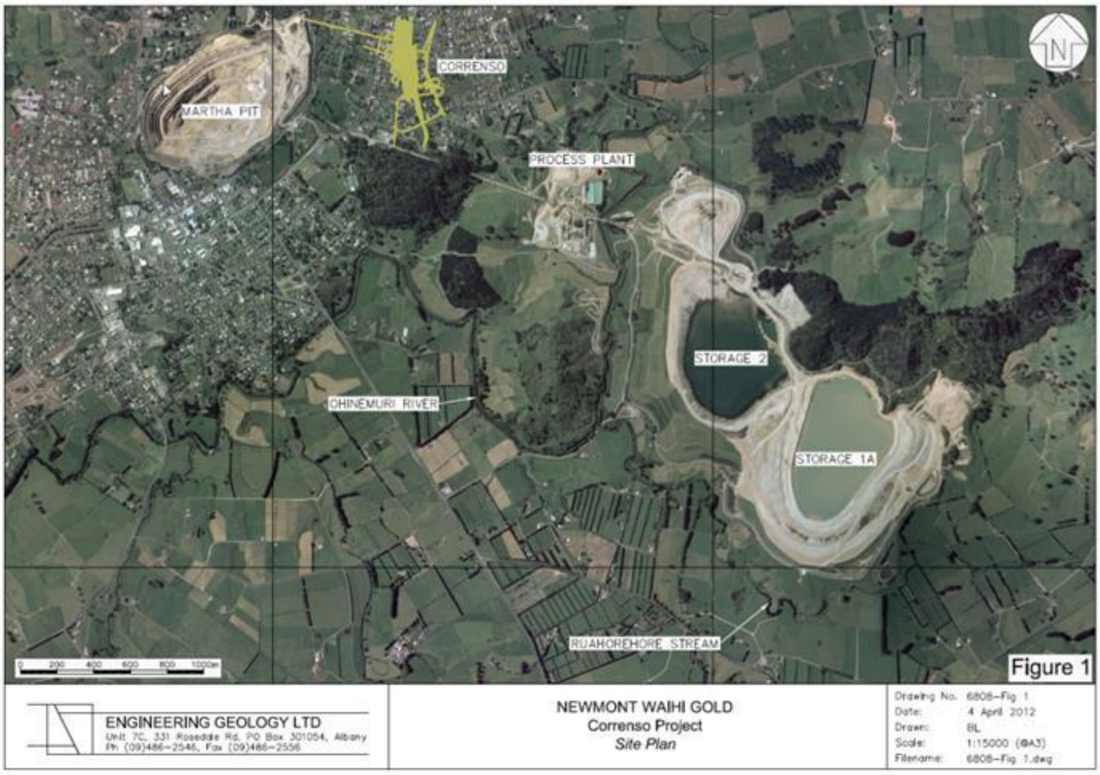


Figure 18.2: Location of tailings storage facilities

Storage 2 has a planned finished crest elevation of 161 m RL and the planned crest of Storage 1A is 177.25 m RL. The embankments have both been constructed from overburden material obtained from mining Martha pit. Storage 2 was constructed first and provided tailings storage from 1989 to May 2000. Storage 1A has since provided tailings storage. Storage 1A and 2 are permitted by the Mining Licence, Storage 1A has a Building Consent allowing it to be constructed to 177.25 m RL. Storage 2 has a Building Consent allowing it to be raised to 161 m RL.

Enough tailings capacity exists for the Martha open pit and Correnso underground Mineral Reserve. Additional permitted capacity of 3 million tonnes is available for Mineral Resources after allowing for water from an extreme rainfall event.

18.4 Stockpiles

The batching of open pit ore and waste through the crusher conveyor system will require material to be hauled to stockpiles. This will occur when an excavator is excavating materials not being conveyed at the time or when maintenance or modification works are being undertaken on the conveyor crusher system. The maximum stockpile capacity at the Martha Pit is 200,000 t. A 1.2 Mt stockpile facility for ore has been constructed adjacent to the process plant.

18.5 Power and Electrical

Power demands average and peak are shown below in Table 18-1. During peak holiday seasons, the mine is restricted in its power draw to 9 MW and some areas of the operations are shut down during these times. This is taken into account in the LoM planning process.

Table 18-1: Waihi Power Demands

Activity	Peak MW	Average MW
Ball and SAG Mill	2.5	1.8
Other Processing	1.0	0.9
Water treatment	0.1	0.1

Underground mine	4.5	4.3
Open Pit crushing and conveying	5.5	5.0
Total Power Draw	**13.6**	**12.1**

18.6 Communications

Technologies installed at Correnso include:

- person to person communications consists of hand held and vehicle mounted radios transmitting via leaky feeder cable reticulated through the mine.
- Proximity detection (equipment to equipment and equipment to person).
- Electronic tagging and tracking and proximity detection using proprietary cap lamps.

18.7 Comments on Infrastructure

In the opinion of the QP, the existing infrastructure is appropriate to support the Mineral Reserve.

19 MARKET STUDIES AND CONTRACTS

19.1 Market Studies

The mine has been operational continuously for the last 30 years and has current contracts in place for doré refining and other goods and services required to operate an underground mine and open pit mine.

19.2 Commodity Price Projections

Metal price assumptions are provided by OceanaGold Corporation. Prices used for the December 2018 Mineral Reserve estimates:

- Gold: NZD 1,806/oz
- Exchange Rate NZD: USD 0.72

The metal price assumptions provided by OceanaGold Corporation for the December 2018 Mineral Resource estimates:

- Gold NZD 2,083/oz
- Exchange Rate NZD: USD 0.72.

19.3 Contracts

OceanaGold has agreements at typical industry benchmark terms for metal payables and refining charges for doré produced from the Waihi operations. Gold and silver bearing doré is shipped to an Australian refinery for further processing under a toll refining agreement.

Contracts are in place covering underground mining, transportation and refining of bullion, and the purchase and delivery of fuel, electricity supply, explosives and other commodities. These agreements conform to industry norms.

19.4 Comments on Market Studies and Contracts

In the opinion of the QPs:

- OceanaGold is able to market the doré products produced from the Project.
- The terms contained within the sales contracts are typical and consistent with standard industry practice and are similar to contracts for the supply of doré elsewhere in the world.
- Metal prices are set by OceanaGold Corporation management and are appropriate to the commodity and mine life projections.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental

20.1.1 Baseline Studies

Environmental data has been collected over the last 29 years of Waihi operations and baseline data was collected prior to the start of operations and reported in the original mining licence application. Data is routinely collected for noise levels, blast vibration, air quality, and surface and ground water discharge quality from various sources, ground settlement and ground water levels. This data is reported to various regulatory bodies as required by the Company's various consents and permits. External independent experts are engaged by OceanaGold to assist in the preparation and review of these reports. The reports are then reviewed and approved by various regulators who utilise independent expert reviewers to assist them.

20.1.2 Environmental Design Criteria

Project environment design criteria is focused on limiting noise, blast vibration, ground differential settlement, air quality and water quality to as a minimum comply with the permit conditions. Key environmental permit limits are:

- Noise limits at the nearest privately-owned residence is 55 dB (L10) measured at the boundary during daytime hours and 40 dB (L10) during night time. Noise from the Martha Mine and underground mines is required to be measured cumulatively along with all operations within the processing plant, waste and tailings area, and the conveyor and associated activities.
- Blast vibration conditions require that there shall be no more than three underground blast events per day, from Monday to Saturday and between 0700 and 2000, and no blasting shall be undertaken at night (2000 to 0700 the following day), on Sundays or on public holidays. In addition, the peak particle velocity (vector sum) shall be no more than:
    - For development blasts;
        - 5 mm/s for 95% of the monitored events.
        - 2 mm/s on average.
    - For production blasts;
        - 5 mm/s for 95% of the monitored events.
        - 3 mm/s on average.
- Air quality: Dust arising from operations above the following levels requires investigation and mitigation:
    - Dust deposition: 4 grams per square metre per month above background.
    - Total particulate matter concentration: 45 micrograms per cubic metre.
- Lighting: any lighting installed in the project area shall not exceed 8 lux at the boundary of the site.
- Water quality - The discharges authorized by the permits shall not cause a significant adverse environmental effect on the receiving water, or on users of that resource, or in the case of surface water, on aquatic biota.
- Differential ground settlement when measured between two permanent survey markers is to be less than 1 in 1000 so as to ensure no damage to structures by a wide margin.
- Storage of hazardous materials is limited to approved currently quantities for diesel, ammonium nitrate, packaged explosives and detonators.

20.2 Social License

20.2.1 Stakeholder Engagement

The company has established various stakeholder engagement structures for the representation of stakeholders and project affected people including Iwi, Resident Groups, Community based organizations and local government.

The operation has established complaints and grievance systems / procedures for the on-going management of all project grievances.

The permits are prescriptive in terms of stakeholder engagement with the Community. Consultation is an on-going component of the existing operation. From a community perspective impacts to be managed, associated with the Correnso, Martha underground and Martha pit, include:

- effects on property values.
- negative effects on the local community, and
- reputational risk related to mining activity in close proximity to homes.

20.2.2 Property Programme

The Property Programme comprised a range of initiatives including property purchases and Top-Up. The overall objective of the property programme is to pre-empt any negative impact the announcement of Project Martha might have on the property market within the project area. This includes:

- The purchase of 1 property that was on the market at the time of the announcement of Project Martha.
- Top-Up available for all properties within and adjacent to the Project Area for the duration of the project.

As a result of discussions in the course of the consenting process for the Correnso Project, including mediation in the Environment Court, the above initiatives were incorporated into permit conditions. Included in these conditions were conditions 46 and 47 of the principal Land Use resource consent requiring ex gratia payments to house owners above development works and offers to purchase housing above stopes. These have now been incorporated in the project Martha Consent Conditions -84-91.

20.3 Community Consultation

OceanaGold (formally Waihi Gold) has undertaken community consultation since the start of operations and the role of the Community Liaison Person is established in the Mining License and subsequent permits.

Consultation has been undertaken with the following parties:

- Land owners and occupiers in the immediate vicinity and neighbouring the permit area
- The rest of Waihi
- Iwi groups - Ngati Hako, Ngati Tamatera, Ngati Maru, Ngati Koi, Ngati Tara Tokanui, Ngati Maru, Ngati Whanaunga and Ngati Pu
- Government departments including Ministry of Energy and Resources, Ministry for Economic Development, Department of Conservation.
- Waikato Regional Council and Hauraki District Council and Thames Coromandel District Council.

Consultation has taken the form of neighbourhood and community meetings, mail outs of information brochures and questionnaires, local medial articles, a dedicated web-site linking to results of technical monitoring, home visits and individual meetings.

20.4 Environmental Assessment

Environmental studies conducted as part of the Correnso and Martha Phase 4 project are extensive and were required to support the permit applications. The environmental effects-based reports are all independently reviewed by consultants employed by the Regional and District Council's (permit issuers).

Studies include, air quality, water quality and ecology, noise, blast vibration effects, traffic, potential for subsidence, ground settlement in response to dewatering, property values, dewatering and geochemistry of tailings, waste and groundwater.

20.5 Environmental Management System

All operations are conducted under the existing Environmental Management System (EMS). Potential environmental risks included in the current risk register include issues such as:

- Surface Water and Groundwater protection from TSF seepage;
- Controlled discharge of excess water into the Ohinemuri River;
- Hydrocarbon management;
- Waste management;
- Noise and blast vibration management.
- Biodiversity management (including fauna, weed, clearing management)
- Management of process/tailings water;
- Containment of hazardous chemicals; and
- Air quality impacts from dust and greenhouse gas emissions.

The above risks are tracked and managed through specific Management Programs. Environmental Management Plans (EMPs) and related documentation specific to management areas also contribute to day-to-day management of specific environmental aspects.

20.6 Socio-economic and Cultural Characteristics

20.6.1 Socio-economic Characteristics

The direct and indirect impacts of OceanaGold operations account for approximately 25% of the town's economy. Other significant employers are the retail and hospitality sectors, and there are also several small, specialised engineering and manufacturing businesses located in the town. Key aspects of the demographics include an ageing population, and a noticeable dip in the proportion of people in the 20-30 year-old bracket. The community also features a high proportion of people on invalid or sickness benefits, and scores relatively highly on socio-economic deprivation scales. This suggests a community that could be vulnerable to significant changes in the town's economy.

20.6.2 Cultural Characteristics

Ngati Tamatera, Ngati Maru, Ngati Hako, Ngati Koi, Ngati Tara Tokanui, Ngati Whanaunga, Ngati Pu and the Waihi Community Marae have been consulted in relation to mining activity in Waihi and exploration at WKP.

The Company recognizes through its Iwi Cultural Policy and Protocol, the special relationship that local Iwi have with Pukewa (Martha Hill), the Ohinemuri River and Motukeho (Black Hill) and that this relationship is important to their spiritual, cultural and social wellbeing. It recognizes that Pukewa, Motukeho, the Parakiwai Valley, the Ohinemuri River and other waterways are highly valued taonga (treasure) of Iwi groups with a particular interest in these areas.

Consultation has been undertaken with Indigenous groups as part of the Correnso consent application into the cultural issues associated with the project. A Correnso consent condition requires OceanaGold to ensure that a cultural awareness programme is provided to all of the consent holder's staff and full-time contractors working at the Waihi operations.

20.6.3 Local Service Industry

A local service industry has established itself over the last twenty years to support the Waihi Gold mine comprising engineering, cleaning, maintenance, rental, tire and consumable suppliers, security, labour hire and other services. More technically advanced services are available from the regional centres in terms of heavy engineering, large equipment hire and other specialized services. Most suppliers are privately run and not affiliated with OceanaGold. It would be expected that these services would continue to support the Correnso project and it would be unlikely the project would see an increase in these services.

20.6.4 Stakeholders and Communication

OceanaGold has a comprehensive procedure to ensure that appropriate communication and consultation regarding mining operations, project development and exploration is carried out with identified stakeholders and other interested parties in a timely and consistent manner

20.7 Project Closure and Reclamation

Rehabilitation proposals and concept plans were developed well before the commencement of construction for open pit mining in 1987, and those plans are revised annually. In preparing these plans, the advice and skill of a large range of experts, including soil scientists, hydrologists, engineers, aquatic biology and water quality specialists has been sought. Where possible, OceanaGold progressively rehabilitates areas of disturbed land.

Closure of the Correnso Mine will involve the removal of the underground infrastructure. Backfilling of the stopes will occur as a part of stoping and is required by the consents. The shafts will be filled with rock and capped with concrete and the portal will be plugged or otherwise blocked off (as already required by the Favona resource consents). Rehabilitation of other facilities such as the processing mill, water treatment plan and tailings storage facilities are already provided for under the Martha Mining Licence and resource consents.

Re-flooding of the Correnso workings will occur naturally from groundwater recharge once dewatering required for underground mining has ceased and will also occur as part of the consented pit lake formation which is provided for under the current Rehabilitation and Closure Plan. River and treated water may be used to supplement the natural groundwater inflows and accelerate re-flooding. The closure works for Martha underground and Martha Phase 4 pit will be included in the existing rehabilitation and closure plan required by the regional resource consents.

Hauraki District Council and Waikato Regional Council hold both cash and bank bonds over the Company for the quantum of the closure works. The purpose of the rehabilitation bond is to provide the Councils with unencumbered access to a source of funds to close and rehabilitate the current mine site in the unlikely event that OceanaGold fails to meet its closure obligations. The quantum of this bond is assessed annually, calculated on the basis of the cost to close the site at the end of each 12-month bond period.

21 CAPITAL AND OPERATING COSTS

21.1 Capital Costs

Only minor capital expenditure is required for the open pit and underground Mineral Reserve. The Phase 4 layback is largely covered under operating expenditure. Capital expenditure is related to relocation of a minor public road and re-establishment of the noise bund. Correnso capital works are largely complete. For the mining of the Mineral Reserve covered by this report only capitalised mine development and minor sustaining capital for escapeways, fans, pumps are required.

The capital costs including sustaining capital is outlined in Table 21-1. The range of accuracy for the capital cost estimate is +/- 15%.

Table 21-1: Capital Costs Initial and Sustaining

Summary Capital Expenditure Schedule		LOM Estimate
General	NZD M	1.2
Martha Open Pit	NZD M	1.1
Correnso Underground	NZD M	4.3
Processing	NZD M	3.5
General and Administration	NZD M	4.1
Total	**NZD M**	**14.2**

The capital cost estimate is based on a combination of equipment supplier quotations and supplier pricing and is approximately NZD 10 / t for the Mineral Reserve.

21.2 Operating Costs

Separate cost models were developed for mining and processing and these build up costs from first principles using physical inputs as drivers and unit rates sourced from site and supplier. The cost structure is based on fixed costs and variable / driver derived costs and was used to estimate operating costs.

- Operating costs for underground mining include lateral ore and waste development, stoping costs, backfilling costs, mine services and mine overheads.
- Operating costs associated with Process Plant includes include water treatment and tailings disposal, ore stockpiling, SAG and Ball mill crushing and grinding, operating and maintenance, reagent mixing, thickening, leach and adsorption, and gold room.
- General and Administration operating costs include general site management, health and safety, emergency response, human resources, supply chain, environment and community relations.

The cost estimate is +/- 15%. This level of accuracy is attributed to the site operating history over a range of conditions. Table 21-2 show the estimated operating costs and is approximately NZD 148 / t for the Mineral Reserve.

Table 21-2: Operating Costs

Summary Operating Expenditure Schedule		LOM Estimate
General and Administration Costs	NZD M	50.0
Processing	NZD M	57.5
Open Pit Mining	NZD M	47.6
Underground Mining Correnso	NZD M	53.8
Other & stockpile	NZD M	-
Total	**NZD M**	**208.8**

22 ECONOMIC ANALYSIS

There is no material expansion of the current production at Waihi based on the reported Mineral Reserves. The Correnso production schedule is being implemented through to completion and the current Martha Phase 4 pit mine plan is cashflow positive, however the commencement date for mining has not been fixed pending further study work.

23 ADJACENT PROPERTIES

There are no adjacent properties that are relevant to this Report.

24 OTHER RELEVANT DATA AND INFORMATION

The Waihi operation is in a high rainfall area, and heavy rain events are not unexpected. Procedures and costing are in place to deal with such events for the open pit operation and will not impact on the viability of extracting the Mineral Reserve.

The Waihi operation holds the permits, consents, certificates, licences and agreements required to conduct its current operations.

New Zealand has an established framework that is well regulated and monitored by a range of regulatory bodies. OceanaGold has dedicated programs and personnel involved in monitoring consent compliance and works closely with authorities to promptly address additional requests for information. Risks associated with review and renewal of operating consents is, upon that basis, regarded as manageable within the ordinary course of business.

The Company maintains a number of Principal Hazard Management Plans which identify the key risks and controls / mitigations for the site. The Company also maintains a risk register on the OceanaGold intranet.

There is no material, unresolved matters dependent upon a third party on which extraction of the underground Mineral Reserve is contingent.

25 INTERPRETATION AND CONCLUSIONS

Following review of the data available on the Waihi Project, the QPs have reached the following interpretations and conclusions.

25.1 Mineral Tenure, Surface Rights, Royalties, Environment, Social and Permits

- Mining tenure held by OceanaGold in the areas for which Mineral Resources and Mineral Reserves are estimated is valid;
- OceanaGold holds sufficient surface rights to support mining operations over the planned life-of-mine that was developed based on the Mineral Reserves;
- Permits held by OceanaGold for the Project are sufficient to ensure that mining activities are conducted within the regulatory framework required by New Zealand law;
- Sufficient tailings storage facilities have been planned for;
- OceanaGold has sufficiently addressed the environmental impact of the operation, and subsequent closure and remediation requirements that Mineral Resources and Mineral Reserves can be declared, and that the mine plan is appropriate and achievable. Closure provisions are appropriately considered. Monitoring programs are in place;
- The existing infrastructure, availability of staff, the existing power, water, and communications facilities, the methods whereby goods are transported to the mine, and any planned modifications or supporting studies are sufficiently well-established, or the requirements to establish such, are well understood by OceanaGold, and can support the declaration of Mineral Resources and Mineral Reserves and the current mine plan;
- The mine currently holds the appropriate social licenses to operate;
- OceanaGold has developed a communities' relations plan to identify and ensure an understanding of the needs of the surrounding communities and to determine appropriate programs for filling those needs. The company monitors socio-economic trends, community perceptions and mining impacts.

25.2 Geology and Mineralization

- The geological understanding of the setting, lithologies, and structural and alteration controls on mineralization is sufficient to support estimation of Mineral Resources and Mineral Reserves. The geological knowledge of the area is also considered sufficiently acceptable to reliably inform mine planning;
- The mineralization style and setting are well understood and can support declaration of Mineral Resources and Mineral Reserves. The deposit displays classic features that are typical of volcanic-hosted epithermal Au deposits. The QPs consider the model and interpreted deposit genesis to be appropriate to support exploration activities.

25.3 Exploration, Drilling, and Data Analysis

- Exploration activities since 1986 comprised surface reconnaissance exploration, geological and structural mapping, geochemical sampling, airborne, ground and down-hole geophysical surveys, surface and underground drilling, engineering studies and mine development;
- The exploration programs completed to date are appropriate to the style of the deposit and prospects. The research work supports the genetic interpretation of the Waihi vein deposits.
- The majority of surface drilling was by triple tube wireline diamond methods. Surface holes are collared using large-diameter PQ core, both as a means of improving core recovery and to provide greater opportunity to case off and reduce diameter when drilling through broken ground and historic stopes. Drill hole diameter is usually reduced to HQ at the base of the post mineral

stratigraphy. RC drilling is mostly confined to the immediate pit vicinity, or isolated first pass exploration drill holes.

- The quantity and quality of the lithological, geotechnical, collar and down hole survey data collected in the exploration, delineation, underground, and grade control drill programs are sufficient to support Mineral Resource and Mineral Reserve estimation;
- Sampling methods are acceptable, meet industry-standard practice, and are acceptable for Mineral Resource and Mineral Reserve estimation and mine planning purposes;
- The quality of the analytical data is reliable and sample preparation, analysis, and security are performed in accordance with industry standards;
- There have been limited data verification programs undertaken by third-party consultants.

25.4 Metallurgical Testwork

- Metallurgical test work and associated analytical procedures are appropriate to the mineralization type, appropriate to establish the optimal processing routes, and were performed using samples that are typical of the mineralization styles found within the Project;
- Samples selected for testing were representative of the various types and styles of mineralization. Samples were selected from a range of depths within the deposit. Sufficient samples were taken so that tests were performed on sufficient sample mass. As mining progresses deeper and/or new mining zones are identified, additional variability tests are undertaken as required;
- Test work results have been confirmed by production data;
- Mill process recovery factors are based on production data and are considered appropriate to support Mineral Resource and Mineral Reserve estimation, and mine planning.

25.5 Mineral Resource and Mineral Reserve Estimates

- Mineral Resources and Mineral Reserves for the Project, which have been estimated using core drill data, have been performed to industry best practices, and conform to the requirements of CIM (2014). The Mineral Reserves are acceptable to support mine planning;
- Reviews of the environmental, permitting, legal, title, taxation, socio-economic, and marketing factors and constraints for the Project support the declaration of Mineral Reserves using the set of assumptions outlined;
- Factors which may affect the estimates include: commodity price assumptions; metallurgical recovery assumptions; changes to the geotechnical and hydrogeological parameters used for stope and open pit mine design; dilution assumptions; changes to capital and operating cost estimates.

25.6 Life-of-Mine Plan

- Underground mine plans are appropriately developed to maximize mining efficiencies, based on the current knowledge of geotechnical, hydrological, mining and processing information on the Project.
- A localised failure of the north wall of the open pit occurred in April 2015 which undercut the main access ramp. Studies have been completed to regain access to the bottom of the pit. It is planned to undertake a wall strip in the north east to regain access to the ramp below the failure to allow full recovery of the remaining Mineral Reserve.
- Production forecasts are achievable with the current equipment and plant.
- The Mineral Reserve are currently estimated to be 0.18 million ounces gold.
- The current process facilities are appropriate to the mineralization styles in the underground and open pit operations and the existing process facilities will support the current life-of-mine plan.
- Infrastructure required to support mining activities is sufficient for the current life-of-mine.

25.7 Conclusions

In the opinion of the QPs, Mineral Resources and Mineral Reserves have been appropriately estimated for the Waihi Mine and WKP. Mining and milling operations are performing as expected. This indicates the data supporting the Mineral Resource and Mineral Reserve estimates were appropriately collected, evaluated and estimated.

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26 RECOMMENDATIONS

Future resource drilling required to define the inferred resource within the MUG Project is estimated to require an additional 23 km of diamond drilling to be completed over 2019 and 2020. Reserve Drilling of the MUG Project is estimated to require an additional 96 km of diamond drilling to be completed though the period from 2019 through to 2021. This drilling is largely planned to be undertaken from underground diamond drilling platforms.

Pending continuing successful drill results, further work for the Martha Underground Resource should involve a Prefeasibility study and / or Feasibility Study. It is expected that sufficient Indicated Resource will be available late in 2019 on which to base the study. Aspects of the study are expected to involve confirming the access options developed in the Scoping Study the proposed mining method in remnant areas and the ventilation circuits. Other studies will consider the backfill types and methods of placement, equipment selection, automation and mine control systems, power supply and dewatering methods. Mining production schedules should be developed which take into account balancing mining around remnant areas and virgin areas. The consent conditions require several management plans to be developed and it would be expected that this work would be undertaken in the near future.

Ongoing drilling is planned for the WKP project, resource drilling of 14.5 km is planned for 2019. It is expected that further annual work programs of a similar quantum will be required in 2020 and 2021 to continue advancing this project.

APPENDIX A - REFERENCES

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APPENDIX B - TECHNICAL GLOSSARY AND ABBREVIATIONS

	Technical Glossary and Abbreviations
AAS	atomic absorption spectroscopy
AEP	Annual Exceedance Probability
AEPEP	Annual Environmental Protection and Enhancement Programmes
Ag	silver
AMC	AMC Consultants Pty Ltd
Analabs	Analabs Proprietary Limited
ANCOLD	means the Australian National Committee on Large Dams Inc., which is an Australian based non-government, non-profit association of professional practitioners and corporations with a professional interest in dams. ANCOLD is a member of the International Commission on Large Dams (ICOLD) and publishes internationally recognised guidelines for the sustainable development and management of dams and water resources.
APMI	Australasian Philippines Mining Incorporated
Arimco MC	Arimco Mining Corporation
ASX	Australian Securities Exchange
ATV	Acoustic Televiewer
Au	gold
AU$	Australian dollar
AuEq.	gold equivalent
Barangay	is the smallest administrative division in the Philippines and is the native Filipino term for a village, district or ward.
bcm	bank cubic metre(s)
BFA	bench face angles
BIR	Bureau of International Revenue
block model	is a computer based representation of a deposit in which geological zones are defined and filled with blocks which are assigned estimated values of grade and other attributes. The purpose of the block model is to associate grades with the volume model.
bulk density	is the dry in-situ tonnage factor used to convert volumes to tonnage.
CAAP	Civil Aviation Authority of the Philippines
CAMC	Climax-Arimco Mining Corporation
CIL	carbon in leach
CIM	the Canadian Institute of Mining, Metallurgy and Petroleum
CIM Standards	are the CIM Definition Standards for Mineral Resources and Mineral Reserves adopted by the CIM Council on 27th December, 2010, for the reporting of Mineral Resource, Mineral Reserve and mining studies used in Canada. The Mineral Resource, Mineral Reserve, and Mining Study definitions are incorporated, by reference, into NI 43-101, and form the basis for the reporting of reserves and resources in this Technical Report. With triple listings on the TSX, ASX and NZX, OceanaGold also reports in accordance with the JORC Code and where necessary reconciles its reporting to ensure compliance with both the CIM Standards and the JORC Code.
CIP	carbon in pulp
Climax	Climax Mining Limited and, as the context requires, its related bodies corporate
CLRF	Contingent Liabilities and Rehabilitation Fund
cm	centimetre(s)
CSR	corporate social responsibility
Cu	copper
cut-off grade	is the lowest grade value that is included in a Mineral Resource statement, being the lowest grade, or quality, of mineralised material that has reasonable prospects for eventual economic extraction.
CWC	Credible Worst Case
Cyprus	Cyprus Phillippines Corporation
Delta	Delta Earthmoving, Inc
DENR	is the Department for the Environment and Natural Resources. The DENR is the Philippines government agency primarily responsible for implementing the government's environmental policy and for regulating the exploration, development, utilization and conservation of the Philippine's natural resources.
DH	drill hole
diamond drilling	is a rotary drilling technique using diamond set or impregnated bits, to cut a solid, continuous core sample of the rock.
DWP	Development and Utilization Work Program

E	East
ECC	means an Environmental Compliance Certificate, issued by the DENR, certifying compliance with the EISS.
EIS	Environmental Impact Study
EISS	means the Environmental Impact Statement System, established under the Mining Act for classifying projects in terms of their potential impact on the environment. A project that is classified as environmentally critical or located in an environmentally critical area requires an ECC from the DENR, certifying that the operator will not cause a significant negative environmental impact and has complied with all of the requirements of the EISS.
EMB	means the Philippine Environmental Management Bureau, established within the Department of Environment and Natural Resources, as the Philippines national authority responsible for pollution prevention and control, and environmental impact assessment.
EOM	end of month
EOY	end of year
EPCM	Engineering, Procurement and Construction Management
EPEP	means the Environmental Program and Enhancement Program for the Didipio operation submitted under the conditions of the ECC.
EPRMP	Environmental Performance Report and Management Plan
ERA	mean the Environmental Risk Assessment conducted under the conditions of the ECC.
ESE	East South East
ESIA	Environmental and Social Impact Assessment
ETF	means the Environmental Trust Fund established for the Didipio operation under the conditions of the ECC.
FAR	fresh air rise
Fe	iron
FMRDF	Final Mine Rehabilitation and Decommissioning Fund
FMRDP	means the Final Mine Rehabilitation/Decommissioning Plan which is still being reviewed by the Mine Rehabilitation Fund Committee
FTAA	Financial or Technical Assistance Agreement
FTD	Flow through drain
g	gram(s)
G&A	general and administration
GHD	GHD (Australia) Pty Ltd
g/t	grams per metric tonne
GTA	graphite tube atomization
H&S	Hellman and Schofield
ha	hectare(s)
HDPE	high density polyethylene
Hg	mercury
HLUR	Housing and Land Use Regulatory Board
HQ	is a reference to the ~ 96 mm diameter of drill rods used to recover diamond drill core
ICC	means Indigenous Cultural Communities under the Indigenous People's Rights Act, Republic Act No. 8371.
Implementing Rules and Regulations	means DENR Administrative Order No. 2010- 21, 28th June, 2010, issuing Revised Implementing Rules and Regulations of Republic Act No. 7942, Otherwise Known as the "Philippine Mining Act of 1995"
Indicated Mineral Resource	as defined under the CIM Standards is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.
Inferred Mineral Resource	as defined under the CIM Standards is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.
IP	means Indigenous Peoples under the Indigenous People's Rights Act, Republic Act No. 8371.
IRA	inter-ramp angles
JK	JK Tech Proprietary Limited
JORC Code	means the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves which became effective 20th December, 2012 and mandatory from 1st December, 2013. The JORC Code is the accepted reporting standard for the ASX and the NZX.

kg	kilogram(s)
km	kilometre(s)
km^2	square kilometre(s)
koz	thousand troy ounces
kt	thousand metric tonnes
kV	kilovolts
kWh	kilowatt hour(s)
kWh/t	kilowatt-hours per tonne
lb	pound(s)
LG	Lerch Grossman
LHOS	long hole open stoping
LoM	Life of Mine
µm	micron or micrometre
m	metre(s)
M	million(s)
m^3	cubic metre(s)
m^3/h	cubic metres per hour
m/s	metres per second
Ma	million years
MCE	Maximum Credible Earthquake
MDE	Maximum Design Earthquake
Measured Mineral Resource	as defined under the CIM Standards is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.
Metso	Metso Technology PTSI Pty Ltd
MGB	means the Mines and Geosciences Bureau, established under the DENR to administer the Mining Act.
Mineral Reserve	as defined under the CIM Standards is the economically mineable part of a Measured or Indicated Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. A Mineral Reserve includes diluting materials and allowances for losses that may occur when the material is mined. The term "Mineral Reserve", when used in this Technical Report, is consistent with "Ore Reserve" as defined by the JORC Code.
Mineral Resource	as defined under the CIM Standards is a concentration or occurrence of diamonds, natural solid inorganic material or natural solid fossilized organic material including base and precious metals, coal and industrial minerals in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.
mineralisation	means the concentration of minerals in a body of rock.
Mining Act	means Republic Act No. 7942, also known as the Philippine Mining Act 1995, which governs the granting of rights to explore and mine for minerals in the Philippines.
mm	millimetre(s)
MMT	Multipartite Monitoring Team
Moz	million troy ounces
MRF	Mine Rehabilitation Fund
MRFC	means Mine Rehabilitation Fund Committee established to administer the EPEP and FMRDP and comprising representatives of the DENR, local authorities, community representatives and a representative of OGPI
mRL	metres above sea level. Note: for technical reasons all mRL coordinates described in this Technical Report have had 2000m added, ie: 2000m represents sea level.
MSO	Mineable Stope Optimiser software developed by Alford Mining Systems.
Mt	million metric tonnes
MTF	Monitoring Trust Fund
Mtpa	million tonnes per annum
multiple indicator kriging	is a grade estimation technique
MW	megawatt(s)

MWT	Mine Waste and Tailing Fees
N	North
NAPP	negative acid producing potential
NATA	National Association of Testing Authorities, the body which accredits laboratories and inspection bodies within Australia
National Internal Revenue Code	means the Tax Code of the Philippines or Republic Act No. 9337, as amended.
NCIP	means the National Commission on Indigenous Peoples, which is responsible for identifying and delineating ancestral domains/lands in the Philippines with the consent of the ICC/IP concerned.
NE	Northeast
NI 43-101	National Instrument 43-101 – Standards of Disclosure for Mineral Projects of the Canadian Securities Administrators.
NNE	North North East
NPV	net present value
NQ	is a reference to the ~ 76 mm diameter drill rods used to recover diamond drill core.
NW	Northwest
NWRB	means the National Water Resources Board, which grants authorities for taking water from and discharging to rivers and waterways in the Philippines in accordance with the Water Code.
NMV	means Net Metal Value
NSR	net smelter return
NUVELCO	Nueva Vizcaya Electric Cooperative
NZX	means NZX Limited, the New Zealand Stock Exchange.
OBE	Operating Basis Earthquake
OceanaGold	means OceanaGold Corporation and/or any of its subsidiaries.
OCEANAGOLD or **OGC**	means OceanaGold Corporation
OGPEC	means OceanaGold (Philippines) Exploration Corporation (previously Arimco Mining Corporation, then Climax Arimco Mining Corporation)
OGPI	means OceanaGold (Philippines), Inc (previously Australasian Philippines Mining, Inc)
OHPL	Overhead Power Line
ordinary kriging	is a grade estimation technique.
OREAS	certified gold and copper reference standards produced by Australian-based company Ore Research and Exploration and used internationally in the assay of samples.
Orica	Orica Philippines Inc.
oz	troy ounce (31.103477 grams)
Pb	lead
PCE	Pollution Control Equipment
PDMF	Partial Declaration of Mining Feasibility
PIMA	Portable Infrared Mineral Analyser
PHP	Philippine Peso
polygonal method	is a grade estimation technique.
PPA	Philippines Port Authority
ppb	parts per billion
ppm	parts per million
PQ	is a diamond drill tube size equivalent to 85 mm inside diameter.
Preliminary Feasibility Study	as defined under the CIM Standards is a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred mining method, in the case of underground mining, or the pit configuration, in the case of an open pit, is established and an effective method of mineral processing is determined. It includes a financial analysis based on reasonable assumptions on mining, processing, metallurgical, economic, marketing, legal, environmental, social and governmental considerations and the evaluation of any other relevant factors which are sufficient for a Qualified Person, acting reasonably, to determine if all or part of the Mineral Resource may be classified as a Mineral Reserve. The CIM Standards require the completion of a Preliminary Feasibility Study as the minimum prerequisite for the conversion of Mineral Resources to Mineral Reserves.
Probable Mineral Reserve	as defined under the CIM Standards is the economically mineable part of an Indicated Mineral Resource and, in some circumstances, a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This study must include adequate information on mining, processing, metallurgical, economic and other relevant factors that demonstrate, at the time of reporting, that economic extraction can be justified. The term "Probable Mineral Reserve", when used in this Technical Report, is consistent with "Probable Ore Reserve" as defined by the JORC Code.

Proven Mineral Reserve	as defined under the CIM Standards is the economically mineable part of a Measured Mineral Resource demonstrated by at least a Preliminary Feasibility Study. This study must include adequate information on mining, processing, metallurgical, economic, and other relevant factors that demonstrate, at the time of reporting, that economic extraction is justified. The term "Proven Mineral Reserve", when used in this Technical Report, is consistent with "Proved Ore Reserve" as defined by the JORC Code.
PSE	Pollution Source Equipment
pXRF	portable X-ray fluorescence
Q1	Quarter beginning 1 January and ending 31 March
Q2	Quarter beginning 1 April and ending 30 June
Q3	Quarter beginning 1 July and ending 30 September
Q4	Quarter beginning 1 October and ending 31 December
QA/QC	quality assurance / quality control
Qualified Person or **QP**	as defined under the CIM Standards means an individual who is an engineer or geoscientist with at least five years of experience in mineral exploration, mine development or operation or mineral project assessment, or any combination of these; has experience relevant to the subject matter of the mineral project and the Technical Report; and is a member or licensee in good standing of a professional association.
QQ	Quantile-Quantile
PLI	Point Load Index
RAB	rotary air blast
RAR	return air rise
RC	reverse circulation
RCF	Rehabilitation Cash Fund
Revised Forestry Code	means Presidential Decree No. 705, enacted in 1975, which regulates the location, prospecting, exploration, utilization or exploitation of mineral resources in the Philippines, within forest concession areas. Licences, leases and timber permits, permitting mining operations within forest concession areas, are granted by the Director of the Bureau of Forestry.
RL	relative level. Note: for technical reasons all mRL coordinates described in this Technical Report have had 2000m added, ie: 2000m represents sea level.
RMI	Risk Management Intercontinental Pty Ltd
ROM	run of mine
RQD	the Rock Quality Designation index of rock quality
S	South
SABC	SAG mill / Ball mill / pebble crusher
SAG	semi-autogenous grinding
SCSR	self-contained self-rescuer
SDMP	means the Social Development and Management Program prescribed by the Mining Act and its implementing rules and regulations and approved by the MGB.
SE	Southeast
SG	specific gravity
SGS	SGS Philippines Inc.
Shell	Philippines Shell Petroleum Corporation
SMU	selective mining unit
SSM	small scale mining or miners
STDEV	standard deviation
SW	Southwest
SWMP	Surface Water Management Plan
t	metric tonne (1,000 kilograms)
TEM	technical economic model
t/m^3	tonnes per cubic metre
tpa	tonnes per annum
tpd	tonnes per day
tpm	tonnes per month
Trafigura	Trafigura Pte Ltd
TSF	tailings storage facility
TSP	the total suspended particulate
TSS	total suspended solids

TSX	Toronto Stock Exchange
UCS	Uniaxial Compressive Strength
US$	United States dollars
UTM	Universal Transverse Mercator
UTS	Uniaxial Tensile Strength
VCRC	Victoria Consolidated Resources Corporation
Water Code	means Presidential Decree No. 1067, enacted in 1976, which regulates the taking of water from and discharges to rivers and waterways in the Philippines.
WRD	waste rock dump
W	West
wt	weight
XRF	x-ray fluorescence
Zn	Zinc
3D	three-dimensional
@	at
%	percent
°	degrees
°C	degrees Celsius