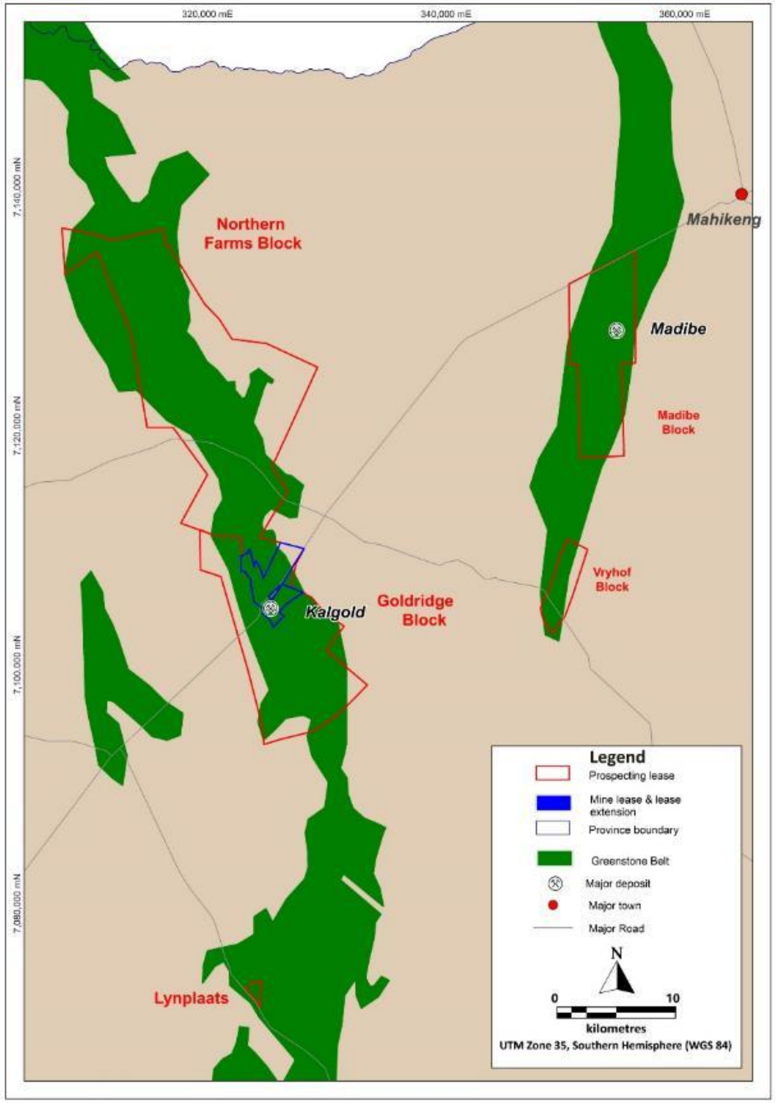
SAMREC Table 1 Report – Kalgold Operation, North West Province, Republic of South Africa

Section 1: Project Outline			
1.1	Property Description	(i)	*Brief description of the scope of project (i.e. whether in preliminary sampling, advanced exploration, Scoping, Pre-Feasibility, or Feasibility phase, Life of Mine plan for an ongoing mining operation, or closure).* Kalgold is a conventional open pit mining operation that produces approximately 35Koz per annum. Ore is processed through a standard CIL plant at a rate of around 1.2 Mtpa. Advanced brownfield exploration is being undertaken to target high grade gold satellite deposits and extensions to the known resources to provide operational flexibility and/or support a re-optimisation and expansion of the current operation.
		(ii)	*Describe (noting any conditions that may affect possible prospecting/mining activities) the topography, elevation, drainage, fauna and flora, the means and ease of access to the property, the proximity of the property to a population centre, and the transport infrastructure, the climate, known associated climatic risks and the length of the operating season and to the extent these are relevant to the mineral project. The sufficiency of surface rights for mining operations including the availability and sources of power, water, mining personnel. Potential tailings storage areas, potential waste disposal areas, heap leach pad areas, and potential processing plant sites.* The Kalgold operation is located on the southern edge of the Kalahari Desert. Physiography is dominated by low rolling plains with dry riverbeds and drainage gullies that become seasonally inundated. Where preserved native vegetation is dominated by open acacia scrub and grassland, although the bulk of the region has been extensively cleared for farming activities. Climate is semi-arid and mining activities undertaken year round with only minimal disruption by episodic rain events (100-500mm annually). The altitude of the Kalgold area is approximately 1250m and temperatures range from as low as 3 degrees in the Winter through to around 38 degrees in the Summer (with occasional daily extremes of up to 45 degrees). The Kalgold mine is located on the Mahikeng – Vryburg Highway (N18) approximately 55km southwest of Mahikeng. Surface rights to the lease area are owned by Harmony Gold Mining Company. Access is excellent with mine infrastructure including haul roads, power, water, tailings and waste disposal facilities established.
		(iii)	*Specify the details of the personal inspection on the property by each CP or, if applicable, the reason why a personal inspection has not been completed.* Mr Ronald Reid is a full time employee of Harmony and has been involved in the exploration program underway at Kalgold since the program commenced in June 2017. He has been involved in providing oversight for the work program, as well as time onsite reviewing geology, sample collection and data consolidation, QAQC, drill targeting and model development.
1.2	Location	(i)	*Description of location and map (country, province, and closest town/city, coordinate systems and ranges, etc.).* The Kalgold operation is located in the Northwest Province of the Republic of South Africa, approximately 55 km southwest of the provincial capital Mahikeng (formerly Mafikeng). Refer Figure 1 below.



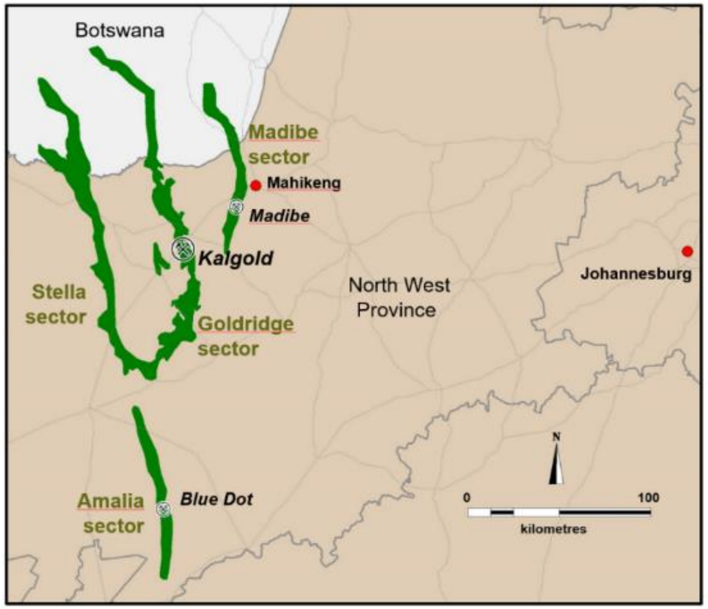


Figure 1: Location of the Kalgold operation

		(ii)	*Country profile: present information pertaining to the project host country that is pertinent to the project, including relevant applicable legislation, environmental and social context etc. Assess, at a high level, relevant technical, environmental, social, economic, political and other key risks.* Harmony has over 67 years' experience operating mines in the Republic of South Africa (RSA), and is currently the country's second largest gold producer. Key high level risks pertinent to the project include: Regulatory and legislative uncertainty, Labour relations and Licence to operate – community expectations. Harmony engages on key regulatory issues through the Minerals Council. These currently include: i. A revised mining charter for the RSA which questioned principle of 'once empowered always empowered'. The declaratory order was passed in favour of this principle, however, it is expected that DMR will be taking this decision on review. ii. The labour relations environment in the RSA can be volatile. Harmony negotiates changes to wages and other conditions of employment through a recognised collective bargaining structure under the auspices of the Minerals Council. iii. In terms of maintaining social licence to operate, compliance with all relevant labour and environmental legislation and adapting to political and regulatory changes is critical. Higher community expectations is giving rise to higher greater pressure to increase socio-economic investment, hence developing and maintaining healthy relationships with host communities and other stakeholders is also critical for mitigating this risk. Harmony strives to influence develop, and support sustainability of host communities, and ensure efficient use of resources (water and energy) in full compliance with permit conditions to minimise the environmental footprint of the operations.
		(iii)	*Provide a general topocadastral map*. Refer Figure 2 below.

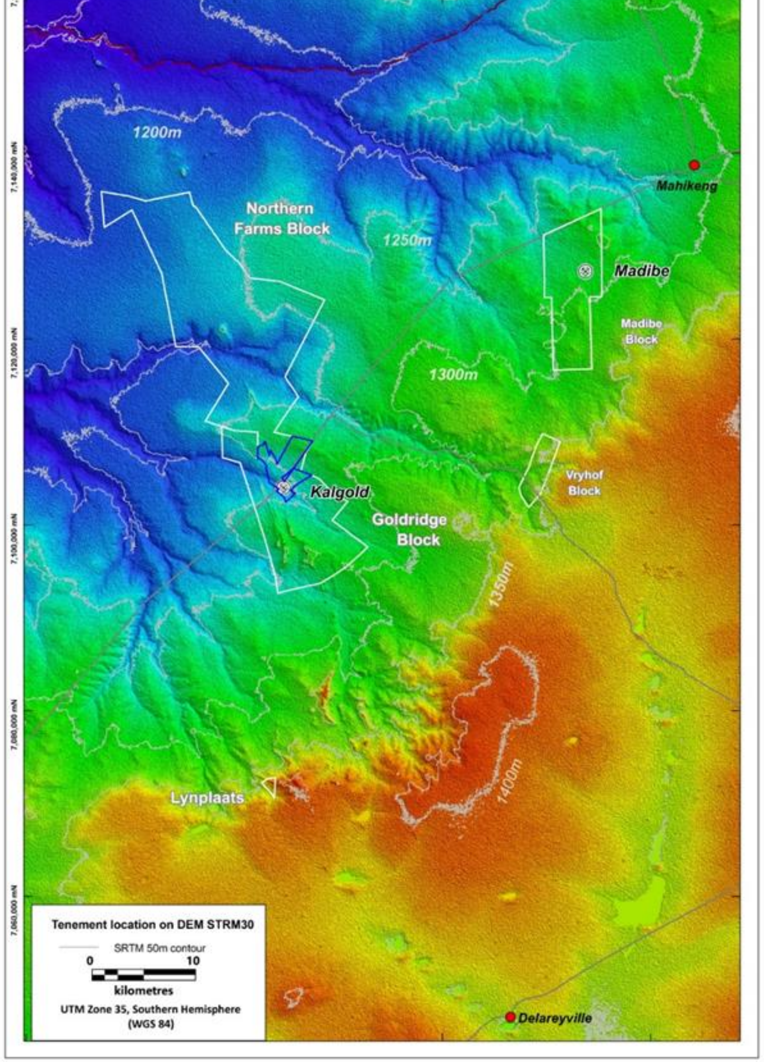


Figure 2: Topographical map of the Kalgold project and surroundings.

1.3	Adjacent Properties	(i)	*Discuss details of relevant adjacent properties. If adjacent or nearby properties have an important bearing on the report, then their location and common mineralised structures should be included on the maps. Reference all information used from other sources.* There are no adjacent properties that have a bearing on this report
1.4	History	(i)	*State historical background to the project and adjacent areas concerned, including known results of previous exploration and mining activities (type, amount, quantity and development work), previous ownership and changes thereto.* Shamrock Mining and Prospecting Company was formed in 1982 as a wholly owned exploration and development subsidiary of Shell Limited. Shell's mineral division commenced exploration in the Kraaipan greenstone belt in 1987. Outcropping mineralisation was discovered on the farm Goldridge in 1991, now known as the "D Zone" mineralisation. During 1992 the satellite deposits were discovered along the same lode of ore: A Zone, Watertank and Windmill, all within the mineral lease area. West Rand Consolidated Exploration Limited (a subsidiary of West Rand Consolidated Mines Limited – WRCM) acquired the deposit in 1994, and mining started in December 1995.Construction activities to develop a new mine started on the Goldridge site on January 17 1996 with construction of the crushing plant, phase 1 of the metallurgical extraction plant consisting of the heap leach and gold recovery section. By 30 July 1996 when the first gold was poured all mine infrastructures had been completed. Ore was treated by heap leaching until the installation of the first 2 mills in 1997. In May 1997 construction work on the second phase of the processing facility which included carbon-in-leach (CIL) plant and associated tailing disposal facility commenced and commissioning started in January 1998. The company changed its name to Kalahari Goldridge Mining Company Limited (Kalgold) in May 1996 and was listed on the Johannesburg Stock Exchange on 14 October 1996. Harmony acquired the mine in 1999. In 2003 a third mill was added to increase treatment capacity. The D zone pit was mined out in 2009, and subsequently converted for use as an in pit tailings storage facility in 2015.
		(ii)	*Present details of previous successes or failures with reasons why the project may now be considered potentially economic.* Kalgold is a producing mine with a reserve 21.1Mt @ 1.01 g/t for 683KOz. Full details are outlined in the 2018 resource / reserve statement at www.harmony.co.za.
1.5	Legal Aspects and Permitting		**Confirm the legal tenure to the satisfaction of the CP, including the following information:**
		(i)	*Discuss the nature of the issuer's rights (e.g. prospecting and/or mining) and the right to use the surface of the properties to which these rights relate. Disclose the date of expiry and other relevant details.* The Kalgold Mining Right encompasses 988.23 hectares and was successfully converted, executed and registered as a new order mining right at the Mineral and Petroleum Titles Registration office on 9 November, 2010 under Mining Right Protocol 574/2008 (DMR reference number NW30/5/1/2/2/77MR). The mining right is valid for a period of 30 years (from 28 August 2008 to 27 August 2038).
		(ii)	*Present the principal terms and conditions of all existing agreements, and details of those still to be obtained, (such as, but not limited to, concessions, partnerships, joint ventures, access rights, leases, historical and cultural sites, wilderness or national park and environmental settings, royalties, consents, permission, permits or authorisations).* Kalgold owns the Freehold and has no agreements with third parties to mine the area.

		(ii)	*Present the security of the tenure held at the time of reporting or that is reasonably expected to be granted in the future along with any known impediments to obtaining the right to operate in the area. State details of applications that have been made.* Kalgold Mining Right is valid for a period of 30 years (until 27 August 2038). Kalgold has the exclusive right to apply for a renewal of its Mining Right for further 30 years. An application has been made in terms of section 102 of the Minerals and Petroleum Resources Development Act of 2002 to include the farm Spanover into the mining right. This inclusion needs to be executed and will be valid for the duration of the mining right. The area of the Kalgold Mining right inclusive of the Spanover extension application is 1733.5 hectares.
		(iv)	*Provide a statement of any legal proceedings, for example, land claims, that may have an influence on the rights to prospect or mine for minerals, or an appropriate negative statement.* There are no land claims and Kalgold is the owner of the Freehold.
		(v)	*Provide a statement relating to governmental/statutory requirements and permits as may be required, have been applied for, approved or can be reasonably be expected to be obtained.* The conversion of the mining right has been executed and registered and is valid until 27 August 2038. The inclusion of the farm Spanover is expected to be executed in the near future.
1.6	Royalties	(i)	*Describe the royalties that are payable in respect of each property.* Kalgold Mine pays only government royalties, which are governed by a complex formulae that is dependent on the revenue and profitability of the mine. Royalties are included in the current Kalgold Life of Mine (LOM) financial plan. Kalgold current LOM estimates total government royalties at R397.3M to be paid over a LOM period of 21 years.
1.7	Liabilities	(i)	*Describe any liabilities, including rehabilitation guarantees, that are pertinent to the project. Provide a description of the rehabilitation liability, including, but not limited to, legislative requirements, assumptions and limitations.* Kalgold Mine has submitted the Social and Labour Plan (SLP) as required by the Department of Minerals and Energy. The total estimated cost amounts to R22.0M over the next five years. Kalgold environmental liability has been estimated at R93.5M and has already been provided for (R54M held in trust and remainder in the bank guarantees).
Section 2: Geological Setting, Deposit, Mineralisation			
2.1	Geological Setting, Deposit, Mineralisation	(i)	*Describe the regional geology.* The Kalahari Goldridge deposit (Kalgold) is hosted in the Archaean Kraaipan greenstone belt located in the central portion of the Kaapvaal Craton. The Kraaipan greenstone belt comprises a linear belt of weakly metamorphosed mafic volcanic rocks with interbedded metasedimentary rocks and banded iron formation (BIF). The belt extends roughly north over 250 km from the Vaal river (near Christina) into southern Botswana (southwest of Kanye). The greenstone belt is intruded by various granitoid suites which range from tonalitic and trondhjemitic gneisses through to granodiorite – monzonite suites. There is a general paucity of outcrop owing

			to the variably developed weathering profile and Tertiary – Recent cover including transported Kalahari sands. Because of the younger cover rocks and lack of information, the mineralisation potential of the belt is poorly understood.
		(ii)	*Describe the project geology, including deposit type, geological setting and style of mineralisation*. Kalgold comprises four discrete orebodies (D Zone, A Zone, Watertank, and Windmill) which are all hosted in BIF. In the mine area the sequence is broken down into three groupings: 1. Footwall mafics including metabasaltic rocks and chlorite schist; 2. A package of interbedded shale and BIF and; 3. Hanging wall metasediments comprising a succession of metamorphosed chert, conglomerate and greywacke. Outcrop on the Mining lease is sparse with most of the area covered by a layer of ferruginous ('Kalahari") sand ranging from 2-12m thick. Most of the geological model has been derived from drill hole geology and exposures in the open pits. Orebody thickness ranges up to 45m, and the main line of lode containing the D Zone, A Zone and Watertank open pit deposits extends over 4.5 km of strike. Mineralisation is essentially strata bound to the BIF package, resulting from intense silica, carbonate, sulphide, potassium alteration and metasomatic replacement of the BIF lenses. Mineralisation is manifested primarily as quartz veined and sulphidised BIF with sulphides dominated by pyrrhotite and pyrite. Gold predominantly occurs as small grains of native gold in association with pyrrhotite and trace chalcopyrite and sphalerite.
		(iii)	*Discuss the geological model or concepts being applied in the investigation and on the basis of which the exploration program is planned. Describe the inferences made from this model*. Kalgold mineralisation and alteration is typical of Archean lode gold deposits that have undergone silica-carbonate-sulphur-potassium alteration. BIF replacement models apply (similar to the Hill 50 deposit in Australia) with specific concepts underpinning the current round of drilling including: • Historic drilling undertaken by Shell and subsequent explorers is shallow (generally less 60m vertical depth) and does not take into account surface depletion and enrichment effects in the BIF. Furthermore, application of modern regolith concepts has not been used to put anomalism in context. • Drill density below the oxide zone is sparse, with deeper drilling limited to the deposit areas. Drilling at D Zone was undertaken on 50m line spacing. Below the oxide zone drill spacing at Watertank and A Zone pushes out to 160m line spacing. Elsewhere on the Mining Lease, drilling below oxide at depths greater than 60m vertical depth is sparse. ○ The inference of the two points above being that the areas of host stratigraphy that separates the current open pits are poorly drill tested and may represent areas that have undergone stronger surface depletion. • Planned drilling aims to test the system as a whole: to test the potential to link up mineralisation in the main BIF host sequence over 4.5km of strike, encompassing the known deposits at Watertank, A Zone and D Zone and their extensions; to depths up to ~400m below surface. Targeted drill line spacing will reduce to between 100 and 160m along the strike. • Historic drilling at Spanover Border and Windmill has obtained a number of shallow high grade gold intercepts below transported cover, which have not been followed up. These areas also have the potential to contribute high grade satellite gold deposits which could displace lower grade mill feed.
		(iv)	*Discuss data density, distribution and reliability and whether the quality and quantity of information are sufficient to support statements, made or inferred, concerning the Exploration Target or Mineralisation*. The Kalgold drill hole database (excluding blast hole / grade control sampling) contains some 3,111 drill holes representing 158,575m of drilling.

	The data informing the estimate is still sparse and widely spaced but still dense enough to allow us to infer a geological model with sufficient confidence to support the statements made. This means that any resource will only be classified Inferred where sufficient data exists but cannot be classified at any higher level at this stage. Significant infill drilling will need to be done and this could ultimately down grade some parts of the resource, this is the nature of Inferred resources.
(v)	*Discuss the significant minerals present in the deposit, their frequency, size and other characteristics. Include minor and gangue minerals where these will have an effect on the processing steps. Indicate the variability of each important mineral within the deposit*. The deposits at Kalgold are free milling, and processed through a conventional CIL plant. Mineralisation is dominated by pyrrhotite rich sulphide assemblages with lesser pyrite. Petrological investigations show gold occurs as native gold grains in association with pyrrhotite and base metal sulphides including trace amounts of chalcopyrite and sphalerite. Gold has also been recorded as blebs in pyrite. Gold grains and blebs range in size up to 100 microns. Cyanide consumption for Kalgold ore is high, generally ranging from 0.6kg/t to 1.8kg/t, reflecting (at least in part) elevated copper and zinc levels. Dominant gangue minerals include quartz, chlorite, carbonate (including siderite, ankerite-dolomite series) and stilpnomelaine which have no effect on the processing steps, although carbonate is added during the thickening stage to maintain alkalinity for cyanidation and leaching steps. Other mineral phases in the deposit are epidote, plagioclase and actinolite.
(vi)	*Describe the significant mineralised zones encountered on the property, including a summary of the surrounding rock types, relevant geological controls, and the length, width, depth, and continuity of the mineralisation, together with a description of the type, character, and distribution of the mineralisation*. All of the known economically viable zones of mineralisation at Kalgold occur in BIF and the geological controls on gold mineralisation are grouped into 3 main factors: contrast in competency, host rock geochemistry and structure. • Selective extension vein arrays are developed in iron rich, competent, cherty BIF units compared to adjacent altered interlayered schists / phyllites. They highlight the importance of brittle-ductile deformation at Kalgold, with mineralised fluids focussed from high strain ductile zones into brittle vein arrays. • Sulphidation haloes associated with extension vein arrays highlight the influence of the chemically reactive BIF host. Magnetite bands preferentially undergo metasomatic replacement to pyrrhotite (with lesser pyrite and base metal sulphide) and evidently the high iron ratio is a key factor in the localisation of gold deposition. • The distribution of gold mineralisation is also influenced by structures developed within favourable stratigraphy at Kalgold and two main orientations are recognised with an influence on the continuity of higher grades within the deposit: i) Ladder veins forming an extension vein array orthogonal to the main axis of compression; plunging 80 degrees east ii) Interpreted as a separate late vein/BIF intersection event supported by empirical observations; plunging 8 degrees to 340 degrees D Zone: The D Zone mineralisation is hosted in BIF and is stratabound, dipping approximately 65 degrees to the east. The mineralisation within the BIF varies from about 15 to 45m in width, along a strike length of approximately 1.5 km. Hanging wall metasediments and the metamorphosed footwall volcanics are relatively unaltered. The mineralised BIF occurs within a broader package comprising lenses of BIF with intercalated metasediments, shale, phyllite, and chlorite-sericite schist. A Zone: The A Zone is located 750m north of the D Zone on an extension of the same BIF/ metasediment package. In the A zone area two distinct mineralised zones are recognised: 1. The "East Limb" has an overall strike of 850m and envelopes a number of discrete higher-grade zones which are steeply dipping and have strike lengths of 20 to 500m. Ore body thickness ranges from 15 to 70m. 2. The "West Limb" which is located in the footwall of the East Limb. It has an overall strike of 750m and width between 20-25m

			The two zones East Limb and West Limb, are separated by a zone of sericite-chlorite schist with intercalated shale and phyllite that pinches out to the north. Watertank: The Watertank is a long narrow deposit hosted by cherty BIF interpreted as part of the continuation of the same BIF / metasediment package that hosts D Zone and A Zone. The Water Tank Pit is located 100m along strike from the A Zone open pit. The BIF hosted mineralisation at Watertank is 950m long and has an average widths ranging between 2 and 12m. Windmill: The Windmill deposit is the smallest of the Kalgold deposits but generally contains higher grades. It is positioned lower in the stratigraphy compared to the other three deposits, hosted in magnetite rich BIF. Mineralisation occurs discontinuously over 800m of strike, ranging in width between 2 and 17m thick. The Windmill zone is structurally complex and transected by a number of Proterozoic dykes.
		(vii)	*Confirm that reliable geological models and / or maps and cross-sections that support the interpretations exist*. Example cross sections through the Watertank and A Zone open pits are included below illustrating, geological logging and models underpinning the block model estimate. The models and data are available for a range of software including Leapfrog, Micromine, Datamine and Vulcan, and an extensive hardcopy plan library of maps and plans is located onsite.

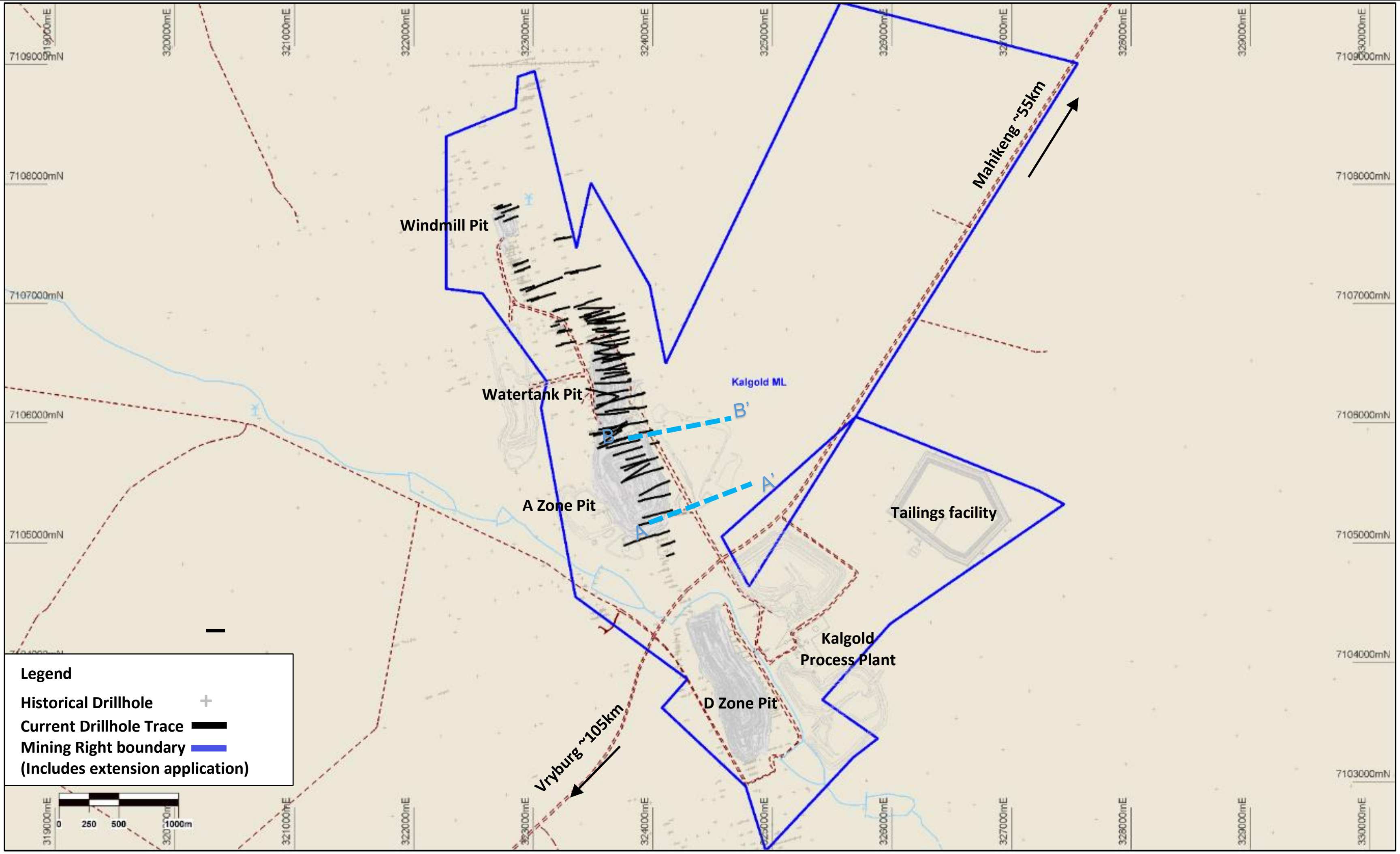


Figure 3: Plan view of Kalgold Mine area with cross section locations for below cross sections

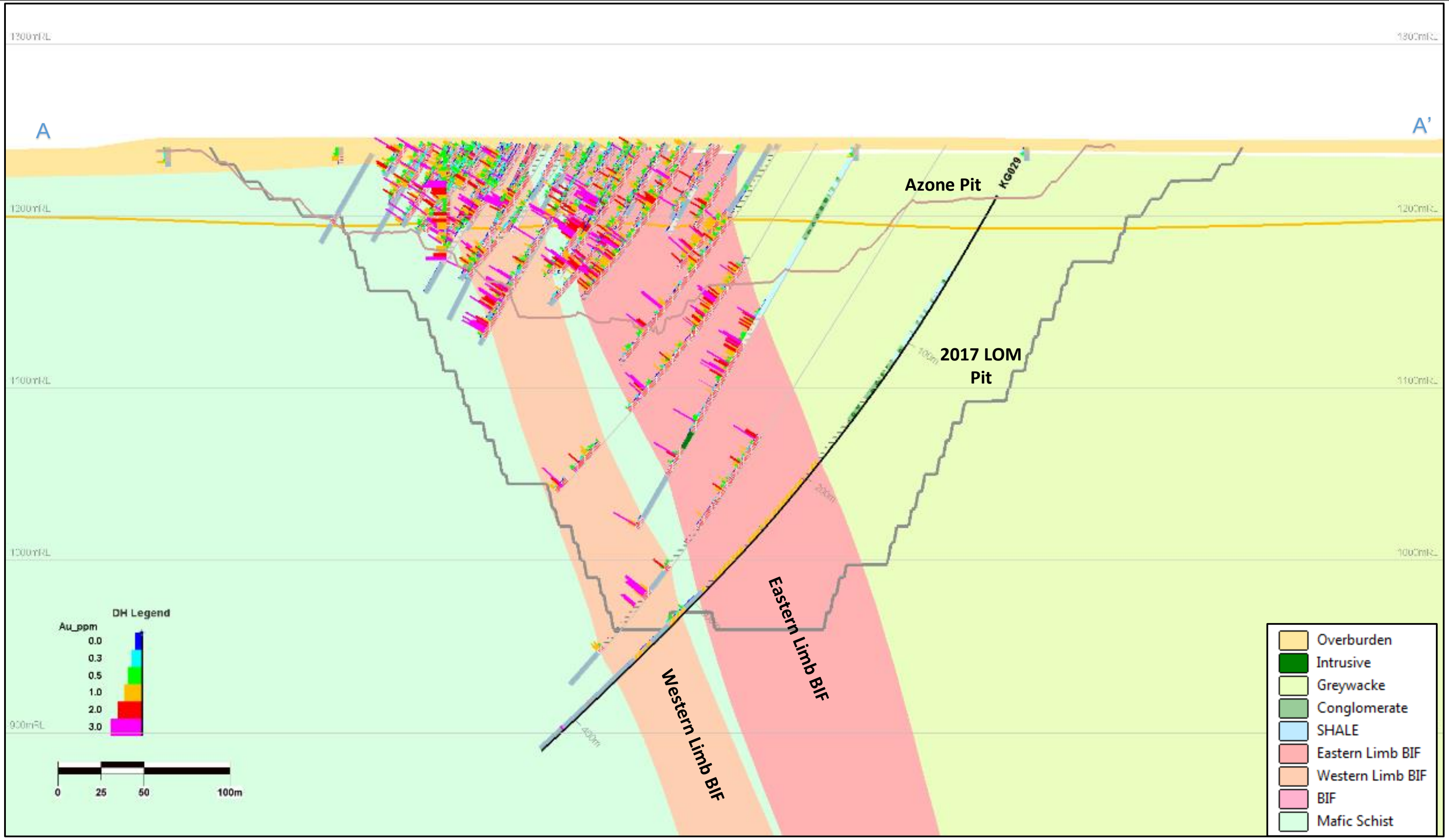


Figure 4: Example section through Azone Pit

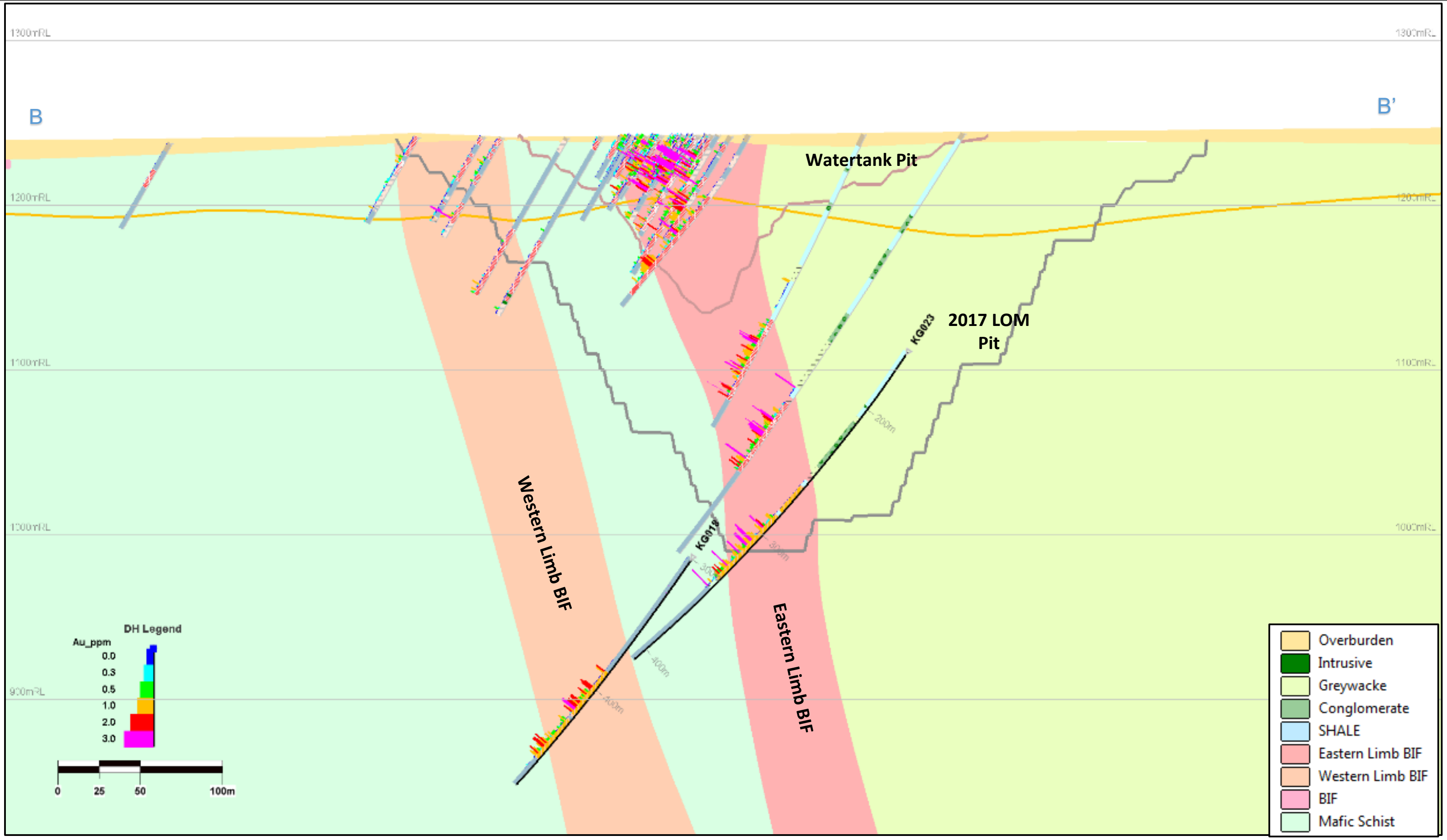


Figure 5: Example section through Watertank Pit

			Section 3: Exploration and Drilling, Sampling Techniques and Data
3.1	Exploration	(i)	*Describe the data acquisition or exploration techniques and the nature, level of detail, and confidence in the geological data used (i.e. geological observations, remote sensing results, stratigraphy, lithology, structure, alteration, mineralisation, hydrology, geophysical, geochemical, petrography, mineralogy, geochronology, bulk density, potential deleterious or contaminating substances, geotechnical and rock characteristics, moisture content, bulk samples etc.). Confirm that data sets include all relevant metadata, such as unique sample number, sample mass, collection date, spatial location etc.*

			The primary data acquisition technique is a combination of Reverse Circulation Drilling (RC) and Diamond Drilling (DD). Geological logging of the RC and Diamond drill holes is completed to a high level of detail and is based upon the geological framework derived from historical drilling and open pit mining exposures since the commencement of mining at Dzone in 1996. Continuous mining activities since 1996, initially at Dzone pit, followed by Watertank, Windmill and currently Azone pit, has resulted in a relatively high level of confidence in the nature of mineralisation and its association with the cherty BIF horizons. The mine lease area is covered by a high resolution aeromagnetic and radiometric survey completed Xcalibur Airborne Geophysics in September 2012. The survey comprised 7680 line-km over a 47km x 8km area of the greenstone belt at a line spacing of 50m and nominal flying height above ground of 30m. The aeromagnetic data provides detail of the magnetite bearing horizons, structural offsets to stratigraphy and intrusive bodies at a local scale, however does not differentiate mineralised from non-mineralised BIF units. The general stratigraphy of the host sequence is defined by drilling and pit exposures in the current pit walls and typically follows the general sequence outlined below: • Hanging wall (meta)sediments (Greywacke, shale, conglomerates) • Eastern Limb Cherty BIF intercalated with variable thickness shale lenses • Internal mafic schist • Western Limb cherty BIF intercalated with variable thickness shale lenses and mafic schist • Footwall Mafic schist The main deposits of Dzone, Azone and Watertank appear to lie within a similar stratigraphic position, however other mineralised BIFs units such as Windmill, Spanover Border, Spanover North and Farmhouse appear to lie either stratigraphically above or below the main deposits. A detailed stratigraphic framework with recognisable marker units has not been defined with confidence along the line of lode. The aeromagnetic dataset provides the main data on which the more prominent cross cutting structural features, intrusives and offsets can be defined, however the structures and offsets associated with low angle thrusting and shearing are not so apparent and cannot be defined at the local or mine scale with a high level of confidence. Alteration and mineralisation of the Kalgold deposits has been described by a number of previous workers and the paragenesis and associated mineral assemblages are described in detail i.e Hammond 2002.
		(ii)	*Identify and comment on the primary data elements (observation and measurements) used for the project and describe the management and verification of these data or the database. This should describe the following relevant processes: acquisition (capture or transfer), validation, integration, control storage, retrieval and backup processes. It is assumed that data are stored digitally but hand-printed tables with well-organized data and information may also constitute a database*. **Acquisition:** Drill hole logging is completed on site using toughbook computers and the Maxwell's LogChief logging program. All core is geologically and geotechnically logged by Harmony Exploration geologists and field technicians and entered into the LogChief logging system prior to synchronising to the main SQL database. Collar surveys are completed by the Kalgold mine survey department and imported into the collar table of the database using import process in DataShed. Downhole surveys are completed by the drilling contractor using the reflex gyro tool and the results are imported into the database using the import process in DataShed.

Assay files are received from the laboratory in digital format and imported into the database using standard import templates for the relevant results file by the Database Administrator or senior geologist. The digital assay files and associated pdf reports are stored on the Kalgold network server.

Validation

LogChief contains a number of validation checks through which the entered data must comply and further validation is completed once the logging is loaded to the main database. All core is digitally photographed onsite prior to cutting and sampling, with the core photos stored on the onsite server.
In addition to the database validation inherent in the LogChief logging software and the Datashed database management system, additional validation checks were run using Micromine's Drill hole database validation runs. In addition, the drill traces were visually checked on screen and any anomalous bends in the traces checked and corrected where required.

Integration:

The drilling data stored on the SQL Server database is managed through Maxwell's DataShed program and can be viewed and exported to the Micromine mining software for integration with other relevant datasets.

Control Storage and Retrieval:

Read and write access to the SQL database is controlled by the database administrator and Harmony IT department. Retrieval of data is managed through Maxwell's DataShed program and automated data export process managed by the database administrator.

Backup:

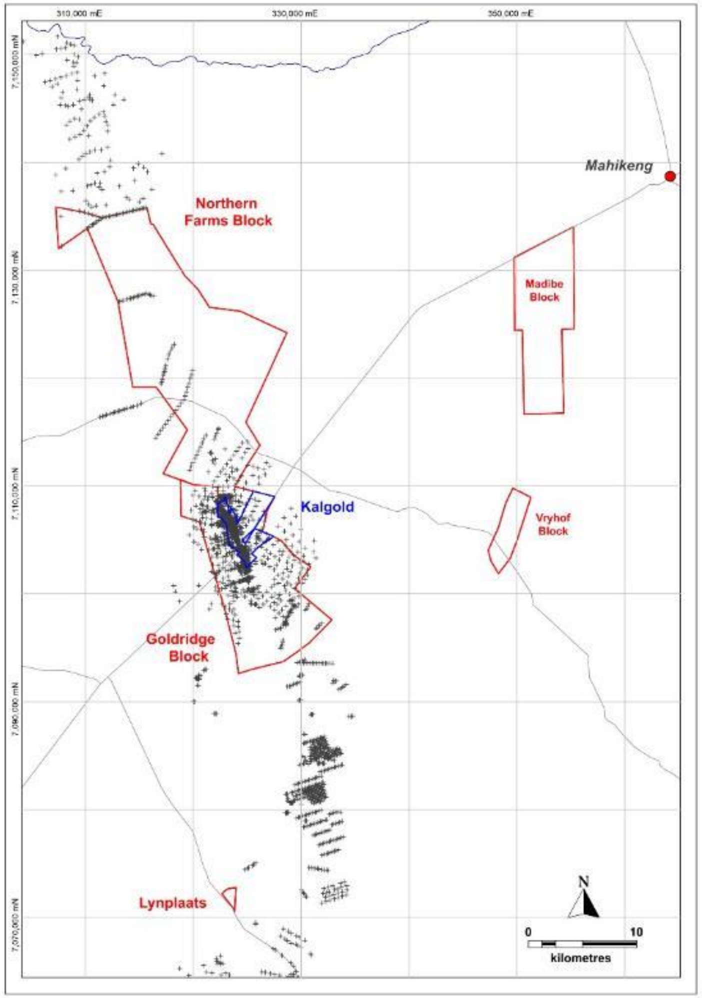
The backup process is managed by the Harmony IT department and comprises a full backup of the SQL server database (HGMTSP303) run every day at 5:30am, with 21 days stored on disk, along with a full backup to tape every month, which is stored at a 3rd party data storage location.

(ii) *Acknowledge and appraise data from other parties and reference all data and information used from other sources*.

Exploration commenced in the Kalgold area in 1987 by Shell Minerals and the historical data comprises a number of drilling programs through to the present time. This had been transferred to a Sabel database in 2013, however not all of the metadata associated with the historical drilling was transferred to the digital database and a breakdown of the various drill programs by year and type is not able to be readily produced. The historical drill hole database covering the Kalgold area and surrounds, including Aircore, Reverse Circulation and Diamond Drillholes, contains a total of 3056 drillholes for a total of 142,710m (Figure 6).

<table>
<tr><td>Company</td><td>From</td><td>To</td><td>Holes</td><td>Metres</td><td>Comments</td></tr>
<tr><td>Shell Minerals</td><td>1987</td><td>1994</td><td rowspan="4">3,056</td><td rowspan="4">142,710m</td><td>D Zone discovered 1991</td></tr>
<tr><td>West Rand Consolidated Exploration</td><td>1994</td><td>1996</td><td></td></tr>
<tr><td>Kalahari Goldridge Mining Company</td><td>May 1996</td><td>July 1999</td><td>Mining commenced 1996 and heap leach pad
Commissioning of CIL plant commenced Jan1998</td></tr>
<tr><td>Harmony Gold Mining Company</td><td>July 1999</td><td>June 2017</td><td>Reconnaissance RC drill fences undertaken</td></tr>
<tr><td>Harmony gold Mining Company</td><td>June 2017</td><td>Present</td><td>94</td><td>~29,900*</td><td>*Drill program in progress</td></tr>
</table>

Table 1: Summary table of historical drilling completed by previous owners

	 Figure 6: Plan of Kalgold Mining Right and surrounding Exploration Rights with collar locations of all historical drilling in Geological data base.
(iv)	*Clearly distinguish between data / information from the property under discussion and that derived from surrounding properties* All drilling results reported in Table 1 (above) are derived from drill holes located within the Kalgold mine lease.
(v)	*Describe the survey methods, techniques and expected accuracies of data. Specify the grid system used*.

	Planned collar coordinates are surveyed using a hand held gps, then once completed the collar position are surveyed by the Kalgold Mine Survey department using a Trimble R8 RTK GPS. The coordinate system used is the Cape Datum and the Clarke 1880 Ellipsoid. The original coordinates are stored in the collar table of the database along with the transformed coordinates to WGS84 Zone 35S. Accuracy of collar surveys are +- 0.1m Due to the magnetic nature of the BIF units, downhole surveys are taken using a Reflex Gyro survey tool. Downhole surveys are typically completed at the end of the RC precollar and/or at the end of the Diamond drill tail. A survey reading is taken every 10m from the end of hole depth to the collar position. Interim downhole surveys are completed at times during drilling in cases where the hole deviation is required to be monitored against the planned hole path. In cases where sections of the hole are surveyed separately, a 20 to 30m overlap between the surveys is completed to ensure there is agreement between the two surveys. Downhole surveys are loaded into the SQL database and the results are assessed to identify any anomalous readings and assign a priority to the final results.
(vi)	*Discuss whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the estimation procedure(s) and classifications applied*. Data spacing increases with depth below the mine from approximately 20m out to 60+m at depth. The distribution of pierce points is considered sufficient to obtain a high degree of confidence in geological continuity and for use in building a robust geological model which underpins the resource model. The current drilling programme adds more confidence to the grade continuity which is close spaced enough to ensure the estimates are of sufficient quality to meet the classification as applied to the resource models.
(vii)	*Present representative models and / or maps and cross sections or other two or three dimensional illustrations of results, showing location of samples, accurate drill-hole collar positions, down-hole surveys, exploration pits, underground workings, relevant geological data, etc* A plan and cross sections of the drilling are presented in Figure 7 below

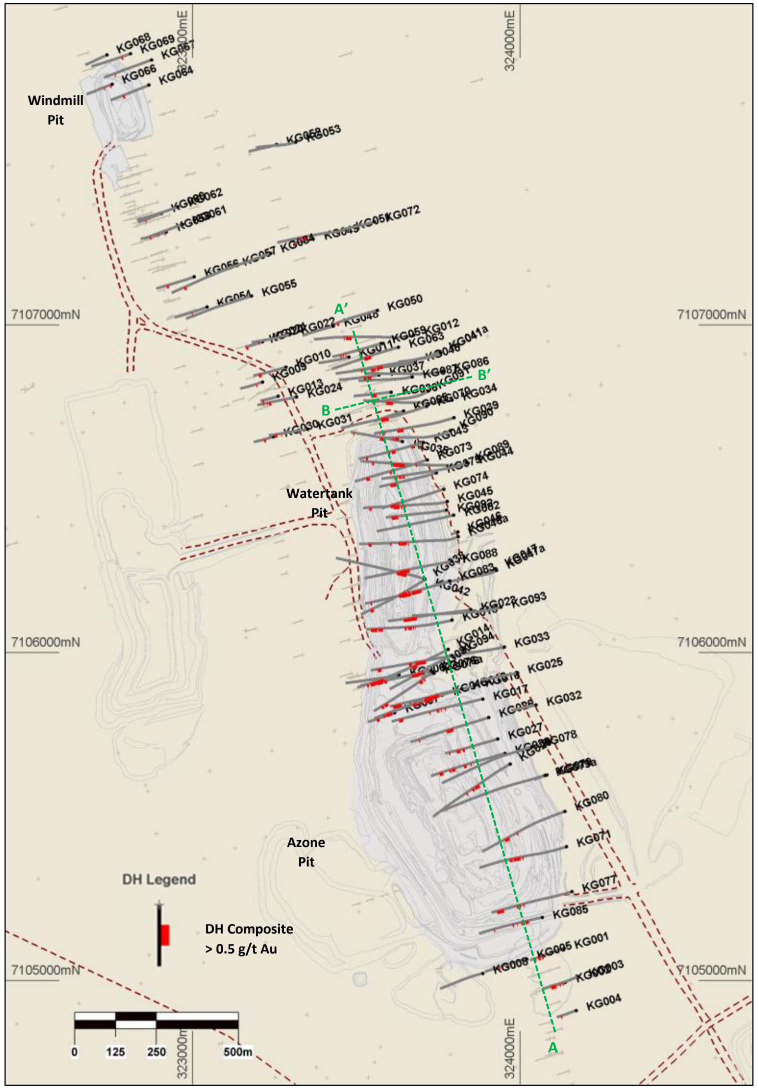


Figure 7: Plan illustrating location of current drillholes (black hole traces), mine infrastructure, and position of sections below.

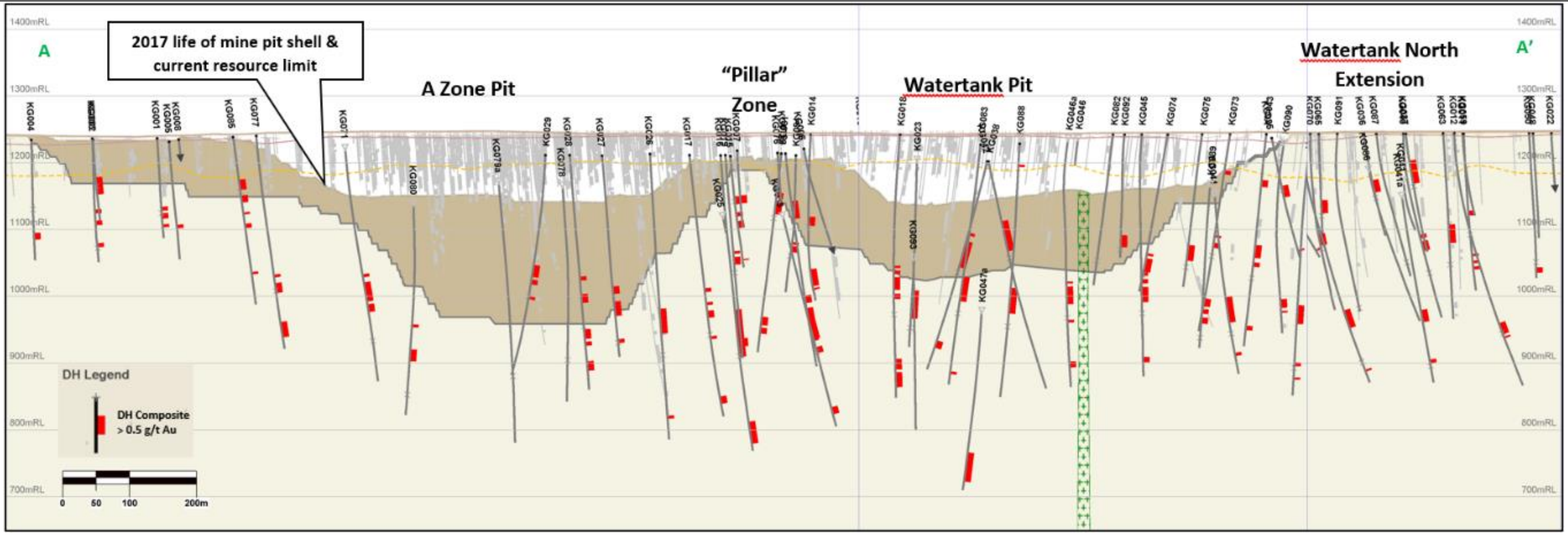


Figure 8: Longitudinal section AA' from A-Zone, the "Pillar", Watertank and the Watertank north extension showing new eastern limb BIF intercepts in relation to the current life of mine pit shell and resource limit. New drill traces shown in black. Historic hole traces grey.

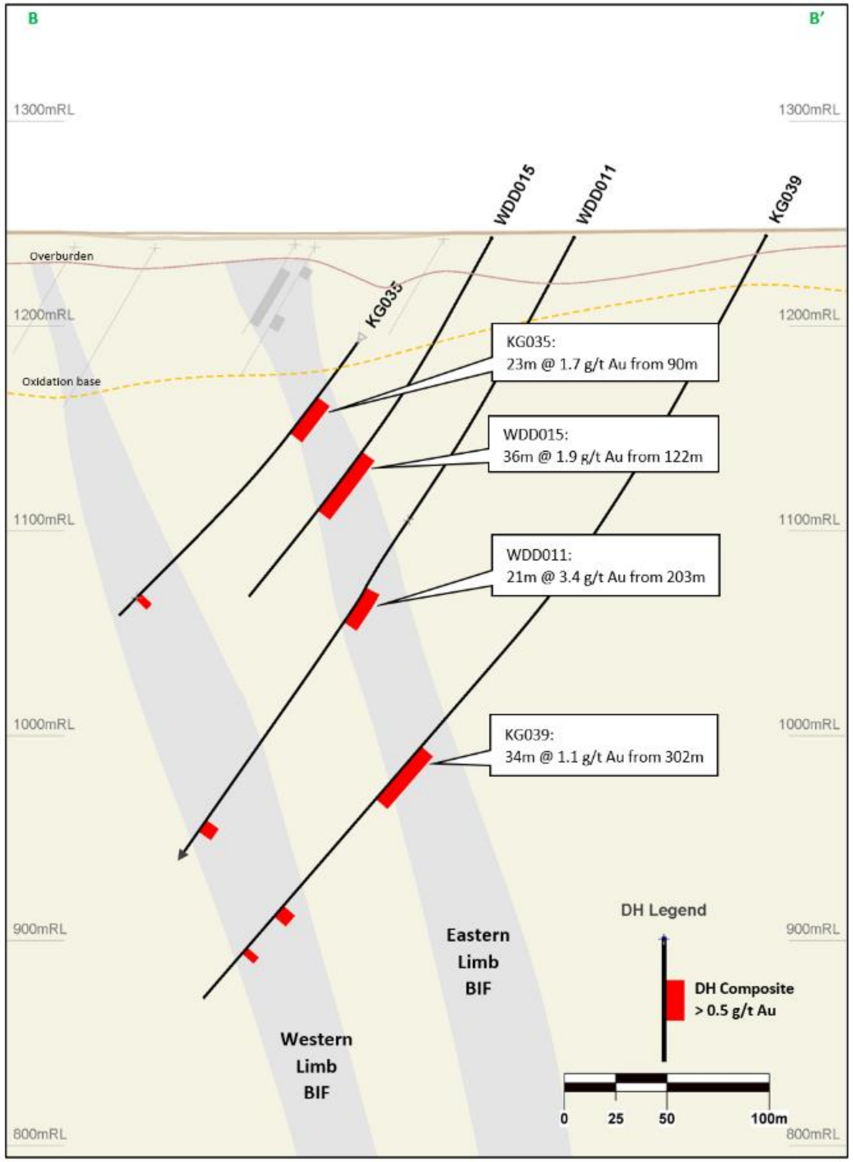


Figure 9: Cross section BB' highlighting eastern limb BIF mineralisation that extends north of the current Watertank Pit and resource limit.

		(Viii)	*Report the relationships between mineralisation widths and intercept lengths. The geometry of the mineralisation with respect to the drill hole angle is particularly important. If it is not known and only the down-hole lengths are reported, confirm it with a clear statement to this effect (e.g. 'down-hole length, true width not known').* All drilling attempts to intersect the grade carrying BIF units at as high an angle as possible to ensure a representative intersection. Drill hole intersections are reported down hole, true width has not been calculated for this report.
3.2	Drilling Techniques	(i)	*Present the type of drilling undertaken (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Banka, sonic, etc) and details (e.g. core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).* A combination of Reverse Circulation (RC) only and RC precollars with Diamond Drill tails (DD) were completed during the current program. The depth of the RC drill holes and precollars varied depending on the target depth, the depth and amount of groundwater and the penetration rate. If penetration rates of the RC drilling decreased materially or if groundwater inflows prevented the collection of a dry sample, then the drill hole would be continued with a diamond tail. In some cases in the hangingwall units where mineralisation was not intersected, the RC precollars were continued through zones of significant groundwater and associated wet samples to achieve the planned precollar depth prior to commencing the diamond tail. **RC Drilling** 2017 RC drilling was completed by Van Zyl Boorwerke drilling contractors a using a HDM400 rig with Atlas Copco compressor and booster. RC holes were drilled with a 5.5 inch face-sampling bit with 1m samples collected through a cyclone and splitter assembly to split a 1.5kg - 3kg sample for analysis. The remaining bulk sample was collected and stored in large plastic bag either at the drill site or laydown facility. 2018 RC Drilling was completed by Major Drilling drilling contractors using a Hanjin DB36 multipurpose rig. RC drillholes were drilled using either 4.5 to 5.5 inch face sampling bit with 1m samples collected through a cyclone and then riffle split to produce a 1.5kg to 3kg sample for analysis. The remaining bulk sample was collected and stored in large plastic bag either at the drill site or laydown facility. **DD Drilling** Diamond drill tails were completed using either NQ2 (50.6mm) or NQ3 (45.0mm) triple tube core for specific geotechnical drill holes. 2017 Diamond Drilling was completed by Van Zyl Boorwerke drilling contractors using 2 x HR6 and 1 x Everdighm diamond rigs. All core was orientated using ACT III digital core orientation tool. Drilling contractors were changed over during December 2017 and Major Drilling commenced operation using Hanjin DB36 multipurpose drill rigs to continue the program. Van Zyl Boorwerke completed RC drilling for drill holes KG001 to KG037 and Diamond drilling up to KG029. Major drilling completed all RC drilling from KG038 onwards and all diamond drilling from KG033 onwards. Major Drilling has utilised HQ, NQ2 and NQ3 core sizes in the drilling completed to date.
		(ii)	*Describe whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, Technical Studies, mining studies and metallurgical studies*. **RC:** All chip samples are geologically logged on a 1m sample interval and digitally input into the Logchief logging system. Geological logging of RC drilling comprises the following attributes: • Lithology • Weathering • Veining

- Mineralogy
- Colour
- Magnetic susceptibility

DD: All drill core is geologically and geotechnically logged by company geologists and digitally input into the LogChief logging system. Geological logging of the drill core comprises logging of the following attributes:

- Lithology
- Alteration
- Veining
- Mineralogy
- Weathering
- Structural Zones
- Orientated Structure.
- Specific gravity
- Colour
- Magnetic susceptibility

Basic Geotechnical logging of the core comprises logging of the following attributes

- Core recovery
- Rock Quality Description (RQD)

Detailed geotechnical logging was completed on specific drillholes identified by Kalgold's geotechnical consultant, MLB Consulting, and detailed geotechnical logging was completed by MLB Consulting geotechnical engineers. This also included collection of samples for point load testing and UCS testing.

The detail of logging was sufficient for mineral resource estimation and technical studies.

(iii) *Describe whether logging is qualitative or quantitative in nature; indicate if core photography (or costean, channel, etc.) was undertaken*.

All core is geologically and geotechnically logged by company geologists and digitally input into the LogChief logging system. Logged data must pass several validation checks within LogChief and then are again validated upon import into the companies SQL database.

Core is digitally photographed and stored in the company's core farm onsite.

All RC samples are wet-sieved and stored in labelled chip trays.

(iv) *Present the total length and percentage of the relevant intersections logged*.

All core is logged regardless of its mineralisation status.

(v) *Discuss the results of any downhole surveys of the drill-holes*.

Due to the magnetic nature of the BIF units, downhole surveys are taken using a Reflex Gyro survey tool. Downhole surveys are typically completed at the end of the RC precollar and/or at the end of the Diamond drill tail. A survey reading is taken every 10m from the end of hole depth to the collar position. Interim downhole surveys are completed at times during drilling in cases where the hole deviation is required to be monitored against the planned hole path. In cases where sections of the hole are surveyed separately, a 20 to 30m overlap between the surveys is completed to ensure there is agreement between the two surveys. Downhole surveys are loaded into the SQL database and assigned a priority for inclusion in the exported downhole survey results.

3.3	Sampling Method, Collection, Capture and Storage	(i)	*Describe the nature and quality of sampling (e.g. cut channels, random chips, or specific specialised industry-standard measurement tools appropriate to the minerals under investigation, such as downhole gamma sondes, or handheld XRF instruments, etc.).These examples should not be taken as limiting the broad meaning of sampling*. **RC:** Samples were collected as drilling chips from the RC rig using a cyclone collection unit and directed through a splitter assembly to create a 1.5kg - 3kg sample for assay. Samples were taken as individual metre samples. Due to delays in supply of sampling equipment by the drilling contractor, samples were collected using three different splitter assemblies over the course of the drilling program as outlined below • Riffle splitter: KG001 to KG012 and KG041 to KG057 • Static cone splitter: KG013 to KG018 • Rotating cone splitter: KG019 – KG037 and KG058 to KG094 To achieve a dry sample the drilling operators lifted water from the face of the hole at each rod change. The sample condition, either dry, wet or moist was recorded with the sample details during logging. In cases where a dry sample was not able to be maintained, the RC precollar was ended and diamond drilling commenced. RC sample recovery was monitored by weighing the bulk and split samples for each 1m interval. Recovery of the samples typically greater than 80%, except for some sample loss in the overburden and in the weathered zone. **DD:** The drill core is geologically and geotechnically logged and marked with metre intervals. Sample numbers and their associated drill hole intervals are recorded by the responsible geologist and given to the core yard technician for cutting and sampling. The entire length of the drill hole is not sampled with sampling typically commencing 10m above the hangingwall contact of the mineralised BIF and continuing through to 10m below the footwall contact of the BIF. Core within the interval designated for sampling is continuously sampled along metre intervals and not split on lithological or alteration based boundaries. The core is split using a core saw with half core samples taken in the HQ and NQ sections. When core orientation has been successful, the core is cut along the orientation line at the bottom of hole to reduce the possibility of sample bias. For intervals of very broken core, samples are collected by taking approximately half the core over the relevant sample interval. The remaining core is stored onsite. The core samples sent for assay are bagged in labelled calico sample bags which are then placed within larger poly weave bags for transport to the laboratory. Samples are collected by an SGS vehicle from the Kalgold coreshed and transported to the SGS laboratory in Randfontein. A sample despatch sheet documenting the sample numbers and required assay work is sent along with the batch to the laboratory.
		(ii)	*Describe the sampling processes, including sub-sampling stages to maximise representivity of samples. This should include whether sample sizes are appropriate to the grain size of the material being sampled. Indicate whether sample compositing has been applied*. **RC:** Samples were collected as drilling chips from the RC rig using a cyclone collection unit and directed through a splitter assembly to create a 1.5kg - 3kg sample for assay. Due to delays in supply of sampling equipment by the drilling contractor, samples were collected using three different splitter assemblies over the course of the drilling program as outlined below: • Riffle splitter: KG001 to KG012 and KG041 to KG057 • Static cone splitter: KG013 to KG018 • Rotating cone splitter: KG019 – KG037 and KG058 to KG094 To monitor representivity of the split samples a field duplicate was taken at every 50th sample. Results from the field duplicate samples illustrate there is no apparent bias. The split weight range of 1.5kg to 3kg is approximately 4% - 7% of the metre interval sampled, which is considered appropriate for the style of mineralisation and size of the RC sample over each 1m interval. **DD**: HQ and NQ drill core: ½ core is collected at 1m intervals down hole. The samples are cut using a core saw. Very broken core is sampled by taking approximately half of the core over the interval of interest. The sampling method is appropriate for the mineralization styles. .

		No compositing of sample occurs prior to assay.
	(iii)	*Appropriately describe each data set (e.g. geology, grade, density, quality, diamond breakage, geometallurgical characteristics etc.), sample type, sample size selection, and collection methods*. The drilling and survey processes, the geological and geotechnical logging and the sampling and assaying data is appropriate for the deposit and mineralisation style being modelled.
	(iv)	*Report the geometry of the mineralisation with respect to the drill-hole angle. State whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type. State if the intersection angle is not known and only the downhole lengths are reported*. Drilling is considered to have been approximately perpendicular to strike of mineralisation and as close to perpendicular as possible to the dip of mineralisation. True width has not been calculated for this report.
	(v)	*Describe retention policy and storage of physical samples (e.g. core, sample reject, etc.).* All RC chip trays and Diamond drilling half core samples are kept on site in the company's core storage facility. 1m Bulk samples from the RC drilling are stored on site or at mine laydown facilities for a minimum of 3months and then discarded. Coarse rejects from the assay laboratory sample are kept for 3 months and then discarded unless otherwise requested. This allows time for resamples or QA/QC checks. All pulp samples are returned and stored on site at the company's core storage facility.
	(vi)	*Describe the method of recording and assessing core and chip sample recoveries and results assessed, measures taken to maximise sample recovery and ensure representative nature of the samples and whether a relationship exists between sample recovery and grade, and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material*. RC: During RC Drilling, weights are recorded for the bulk and split samples over the 1m interval along with the condition of the sample whether it is dry, moist or wet. Bulk sample weights are monitored to indicate potential intervals of poor recovery, although variation in sample weights is also associated with changes in weathering and lithology/mineralisation. When groundwater was encountered during RC drilling, the operator attempted to lift the water column above the bottom of the hole at each rod change and/or metre interval to ensure dry sample was collected at the bottom of the hole. Face-sample bits and dust suppression were used to minimise sample loss. Comparison of sample recovery and gold grade does not show there is a sample bias and preferential loss/gain in the RC samples. DD: Recovery of drill core is assessed for each 'run' with the length of core recovered physically measured using a tape measure by the geologist or field assistant and compared to the length 'drilled' and recorded by the driller for the corresponding 'run'. The driller records the run information on the shift run sheet and the details on each core block which is placed in the core tray at the end of each run. The measured recovery data is captured by the geologist or field assistant in LogChief and synchronised to the main database. Core recovery can be calculated as a percentage recovery. Typically recoveries > 95% were achieved, with minimal core loss recorded in some strongly fractured zones associated with faulting. Experienced drillers are employed by the drilling contractor to oversee and manage the drill rig to ensure maximum recovery is achieved. Core recovery and grade has been reviewed and there is no correlation between sample recovery and grade which would lead to a bias in the sample results.
	(vii)	*If a drill-core sample is taken, state whether it was split or sawn and whether quarter, half or full core was submitted for analysis. If a non- core sample, state whether the sample was riffled, tube sampled, rotary spilt etc, and whether it was sampled wet or dry*. **RC:** Samples were collected as drilling chips from the RC rig using a cyclone collection unit and directed through a splitter assembly to create a 1.5kg - 3kg sample for assay. Samples were collected Dry and if a dry sample couldn't be maintained the RC hole would be ended and a diamond drill tail commence. Due to delays in supply of sampling equipment by the drilling contractor, samples were collected using three different splitter assemblies over the course of the drilling program as outlined below: • Riffle splitter: KG001 to KG012 and KG041 to KG053

			• Static cone splitter: KG013 to KG018 • Rotating cone splitter: KG019 – KG037 **DD**: HQ and NQ drill core: Half core is collected at 1m intervals down hole. The samples are cut using a core saw and half core samples are collected and submitted for analysis with the remaining half stored at the Kalgold core storage facility. Very broken core is sampled by taking approximately half of the core over the interval of interest.
3.4	Sample Preparation and Analysis	(i)	*Identify the laboratory/laboratories and state their accreditation status and Registration Number or provide a statement that the laboratories are not accredited*. Assaying of both RC and DD samples is completed at SGS Randfontein laboratory. This laboratory is accredited by the South African National Accreditation System (SANAS) and conforms to the requirements of ISO/IEC 17025 for specific tests. The facility accreditation number is T0265.The method used for gold assay of both RC and DD samples is FAA303 (Au by lead fusion followed by AAS finish) is an accredited method and conforms to ISO/IEC 17025.The multielement assay results completed by ICP-OES + ICP-MS methods are not accredited under the SANAS accreditation.
		(ii)	*Identify the analytical method. Discuss the nature, quality and appropriateness of the assaying and laboratory processes and procedures used and whether the technique is considered partial or total*. Both RC and DD samples were analysed for the following suite of elements and methods at the SGS Randfontein laboratory.

Protocol Name: Kalgold_Drilling	
FAA303	Au by fire assay (single), AAS finish - 30g aliquot Detection Limit: 0.01 g/t
ICM40B	Semi quantitative ICP-OES + ICP-MS scan, multi acid digestion (17 elements)

Elements	Lower reporting limit	Upper reporting limit
Ag	0.02ppm	10ppm
As	1ppm	1%
Ba	5ppm	1%
Bi	0.04ppm	1%
Ca	0.01%	15%
Cu	0.5ppm	1%
Fe	0.01%	15%
K	0.01%	15%
Mg	0.01%	15%
Na	0.01%	15%
Ni	0.5ppm	1%
Pb	0.5ppm	1%

S	0.01%	5%
Sb	0.05ppm	1%
Sc	0.1ppm	1%
Te	0.05ppm	0.05%
Zn	1ppm	1%

The multi acid digestion for the ICP-OES + ICP-MS scan is considered to be a total digest.

The methods used for both the gold and multi-element results are considered to be appropriate for the style of mineralisation.

(iii) *Describe the process and method used for sample preparation, sub-sampling and size reduction, and likelihood of inadequate or non- representative samples (i.e. Improper size reduction, contamination, screen sizes. granularity, mass balance, etc.).*

The sample preparation and analysis flow sheet for both the RC and DD samples is outlined in the flow chart below. Screen sizing tests after the crushing and pulverising stage are completed every 20th sample to ensure particle size tolerances are achieved prior to further splitting of the sample. Charts of screen sizing tests from samples submitted to date illustrate the sizing tolerances are being met by the laboratory with only minor exceptions (Screen sizing tests after the crushing (90% passing 2mm) and pulverising (95% passing 75um) stages).

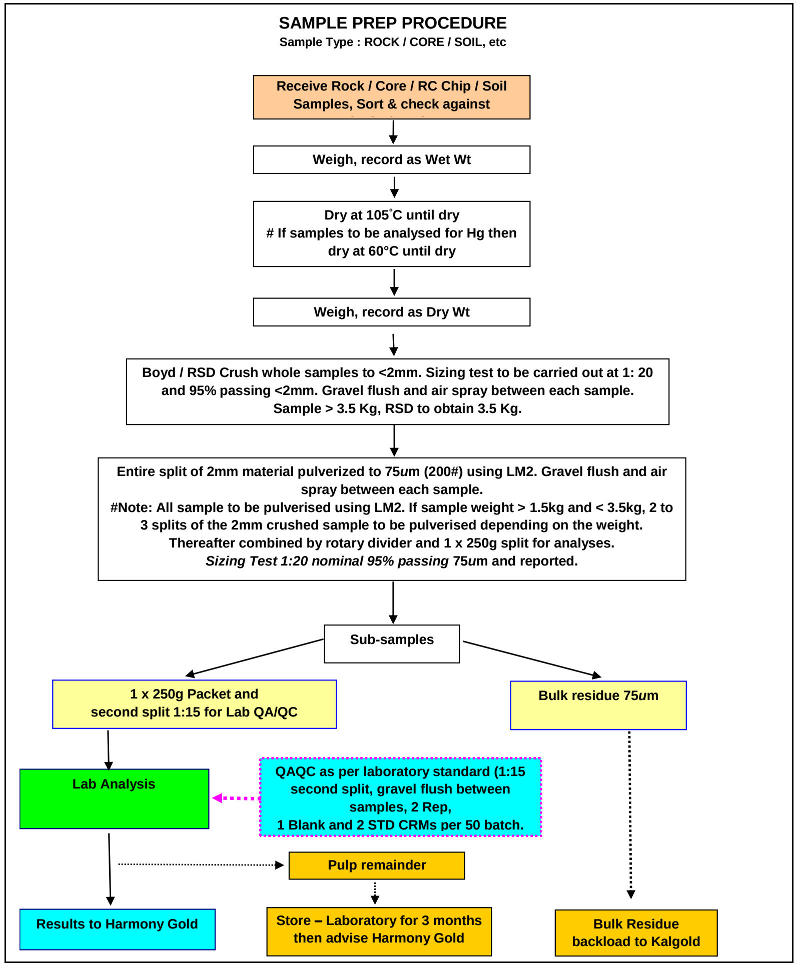


Figure 10: Sample flow sheet for Kalgold RC and DD samples at SGS Randfontein.

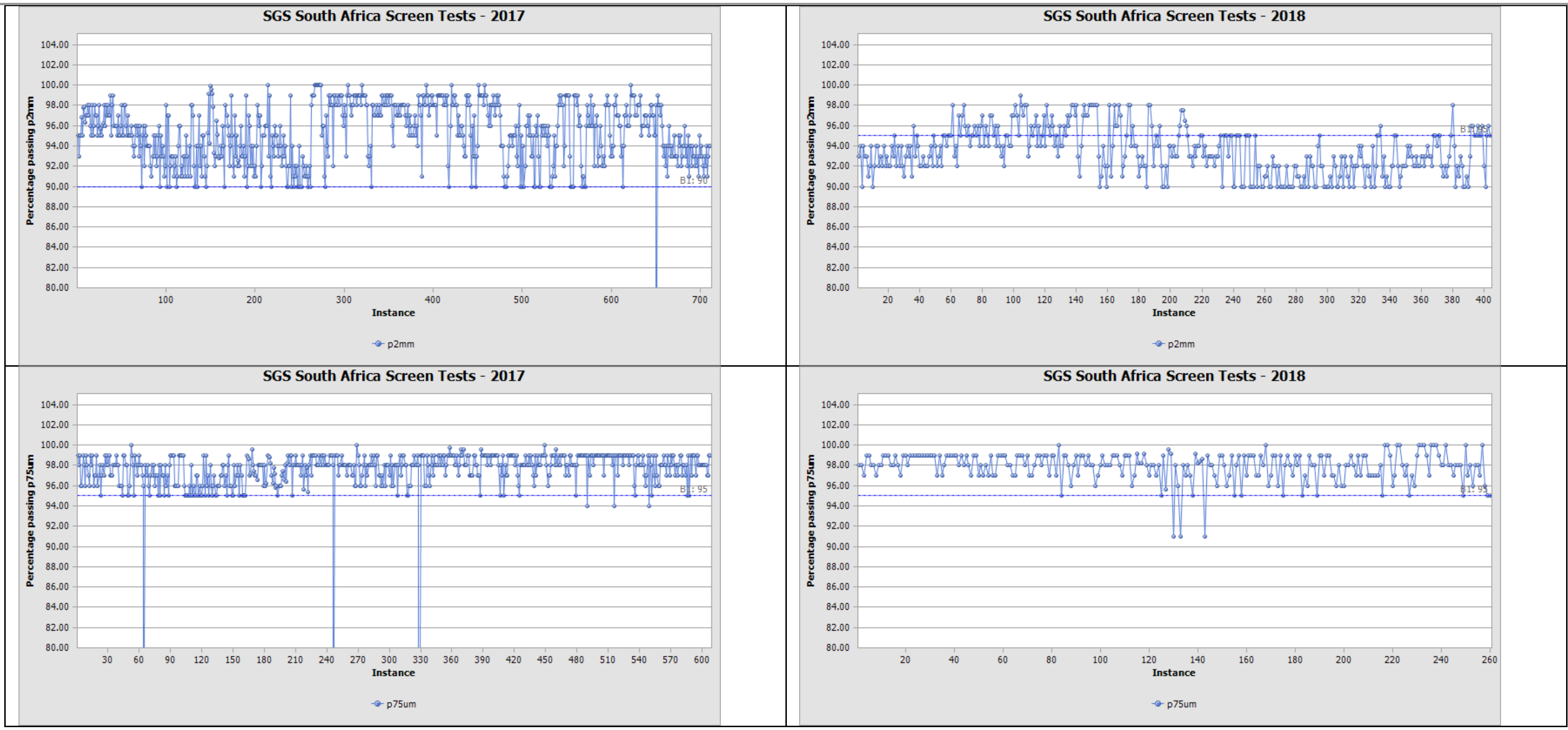


Figure 11: Screen sizing tests after the crushing (90% passing 2mm) and pulverising (95% passing 75um) stages

3.5	Sampling Governance	(i)	*Discuss the governance of the sampling campaign and process, to ensure quality and representivity of samples and data, such as sample recovery, high-grading, selective losses or contamination, core/hole diameter, internal and external QA/QC, and any other factors that may have resulted in or identified sample bias*. Assaying of both RC and DD samples is completed at SGS Randfontein laboratory. This laboratory is accredited by the South African National Accreditation System (SANAS) and conforms to the requirements of ISO/IEC 17025 for specific tests. Assays are regularly reviewed to ensure they conform to expected results and do not show any form of bias. External checks on the laboratory are undertaken.
		(ii)	*Describe the measures taken to ensure sample security and the chain of custody*. Samples are bagged, sealed, and numbered and collected by SGS laboratory vehicle from the company core storage facility. A hard copy sample submission form is sent with the samples and a digital copy along with a list of samples included in the submission is emailed to the laboratory. Upon receipt at the laboratory, the submission is sorted and checked against the sample submission form and the senior geologist is notified of any missing and/or additional samples.

(iii) *Describe the validation procedures used to ensure the integrity of the data. e.g. transcription, input or other errors, between its initial collection and its future use for modelling (e.g. geology, grade, density, etc.).*

All drilling data is logged digitally using the Maxwell's LogChief logging system. This system contains a number of validation steps and triggers which validates the logged entries against a series of library tables containing standard codes for the geological attributes being recorded.

RC sample interval data is generated in LogChief using the Sample Cut Sheet addon and then synchronised to the main database. DD sample interval data is generated in excel once the initial markup and logging of drillcore has been completed by the geologist. The sample tables in Datashed contain validation rules and triggers to prevent duplication of Sample IDs and overlapping intervals.

Assay results from the laboratory are received in digital format and loaded into the man database using a standard import process in DataShed. This process holds any results without matching Sample ID's in an 'incoming' assay table. Once the assay results are merged, the QAQC in batch is reviewed using Maxwells QAQCR program and the laboratory is notified of any results outside expected ranges.

Regular review of drillhole data in context with surrounding drillholes and the geological model is completed by both site based geologists and the competent person visually in either Micromine or Leapfrog software.

Significant intersections are reviewed by the senior geologist on site and the competent person.

(iv) *Describe the audit process and frequency (including dates of these audits) and disclose any material risks identified*.
The data and sampling techniques are audited internally by the company's competent persons.
Peer review (formal and informal) of the reports and technical documents generated are also undertaken utilising the company's subject matter experts.

3.6 Quality Control / Quality Assurance

(i) *Demonstrate that adequate field sampling process verification techniques (QAQC) have been applied, e.g. the level of duplicates, blanks, reference material standards, process audits, analysis, etc. If indirect methods of measurement were used (e.g. geophysical methods), these should be described, with attention given to the confidence of interpretation*.
The following QA/QC measures are employed by Harmony Gold as part of ongoing monitoring of RC and DD samples submitted for assay:
At each interval of 20 samples a pulp Certified Reference Material (CRM) or Gravel Blank was included as a sample. For RC drilling a duplicate field sample is taken from the splitter assembly every 50th sample and a gold assay pill is included into the sequence with the CRM standards and Blanks.

Internal Laboratory QAQC checks are reported with the assay results and these are imported to the main database, The internal Laboratory QAQC includes CRM standards, Blanks, Splits at the crushing stage and repeats after the pulverising stage along with Scree sizing tests and reprting of the lead button weights.

Total samples submitted for the drilling program to May 2018 and QAQC ratios of both Harmony Gold and internal laboratory samples are outlined in the table below:

Laboratories	ALS_JOBURG	SGS_SA
No. of Batches	1	398
No. of DH Samples	0	14827
No. of QC Samples	99	2270
No. of Standard Samples	29	4162

Standards

A range of CRM's derived from similar mineralisation styles were sourced from African Minerals Standards (AMIS) and inserted into the sample sequence by the logging geologist. The CRM standard assigned to a particular sample depended on the expected grade of the surrounding samples and where possible the grade of the standard was matched to the expected grade. The 75g pulp packet are removed from the sealed foil packet and placed in the corresponding calico sample bag. A photograph of the CRM standard name and associated calico bag sample id is recorded and used to reduce uncertainty regarding samples mix-ups. A summary of the number of CRM standards submitted to September 2018 and their ratio to the total number of RC and DD samples is outlined in the table below:

Standard Type	DH Sample Count	Standard Type Count	Standard Sample Count	Ratio of QC Standard to DH Samples
COMPANY_BLANK	14827	1	524	1:28
LAB_STD	14827	39	2214	1:7
LAB_BLANK	14827	2	782	1:19
CRM	14827	3	528	1:28
PILL	14827	4	143	1:104

Review of the QAQC performance of the CRM standards illustrates some outliers falling outside 3 standard deviations from the expected result, however the majority of results fall within 2 standard deviations of the certified values (**Error! Reference source not found.**Figure 12 to Figure 14). In cases where the CRM result was outside the expected range, the lab was immediately notified to investigate the anomalous result and where required, re-assay the adjacent 5 samples either side of the anomalous result, or alternatively re-assay the entire batch if the initial repeats identified further problems. Review of CRM results outside the expected range found the majority of cases to be related to sample mix-ups at some stage during the sample prep or fire assay process.

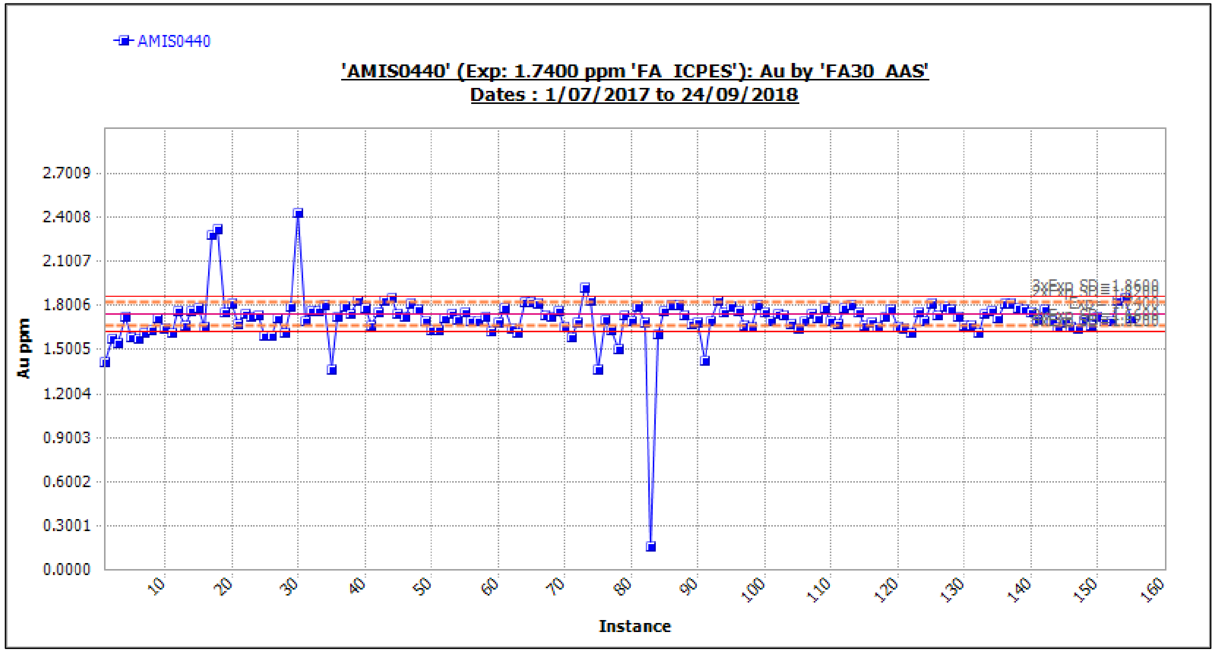


Figure 12: Control chart of CRM AMIS0440

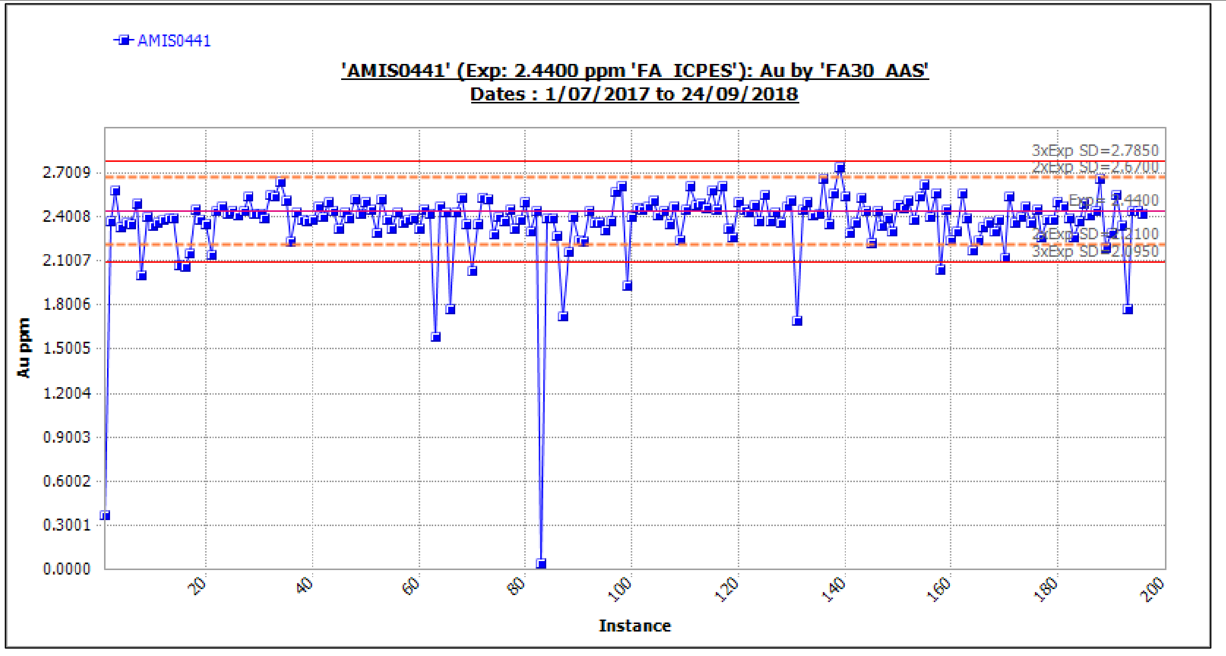


Figure 13: Control chart of CRM AMIS0441

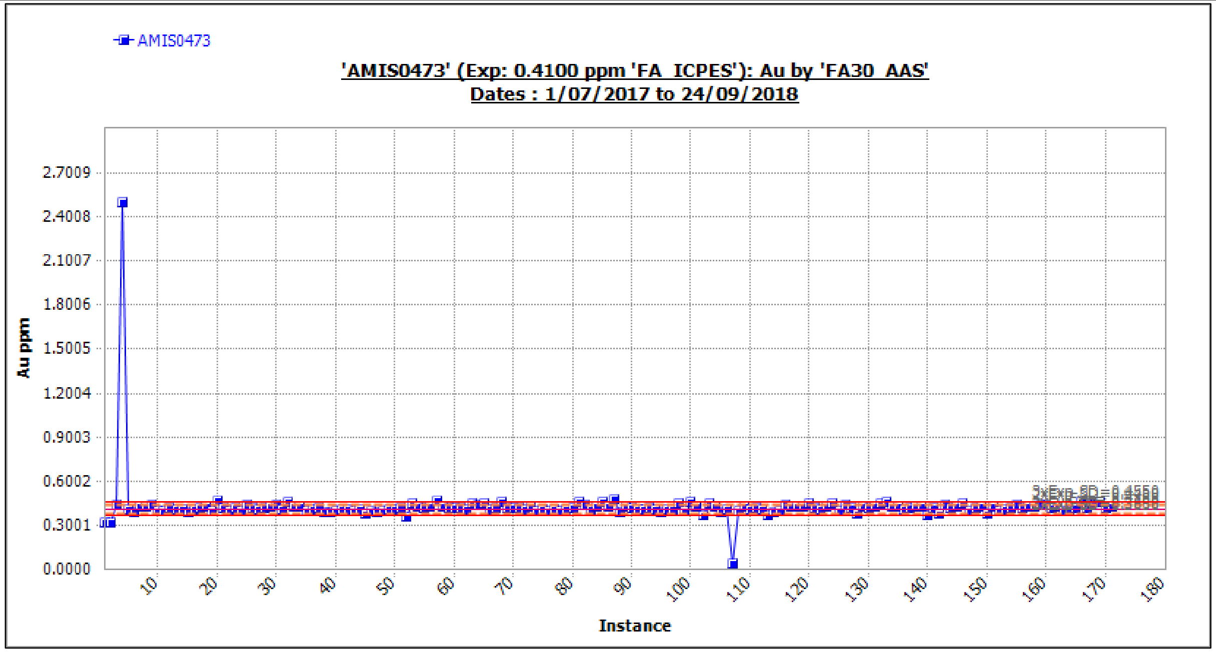


Figure 14: Control chart of CRM AMIS0473

Blanks

Blank material initially comprising barren quartz gravel and then subsequently RC chips from barren intervals were inserted into the sample sequence for both RC and DD samples at a ratio of approximately every 30th sample. A Control chart illustrating performance of the blanks to September 2018 illustrate a small number of anomalous results. Investigation of these outliers found they were the result of mix-ups during the sample preparation or fire assay process and resulted in partial or complete re-assay of the corresponding batch.

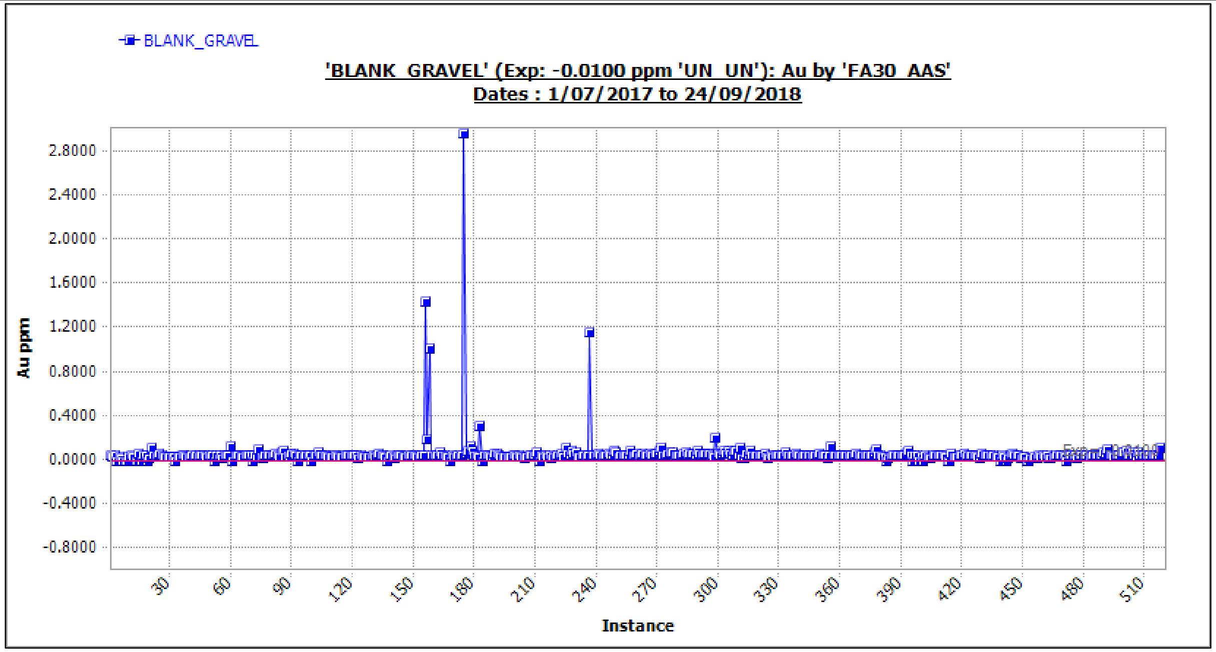


Figure 15: Control chart of blank results

Gold Assay Pills

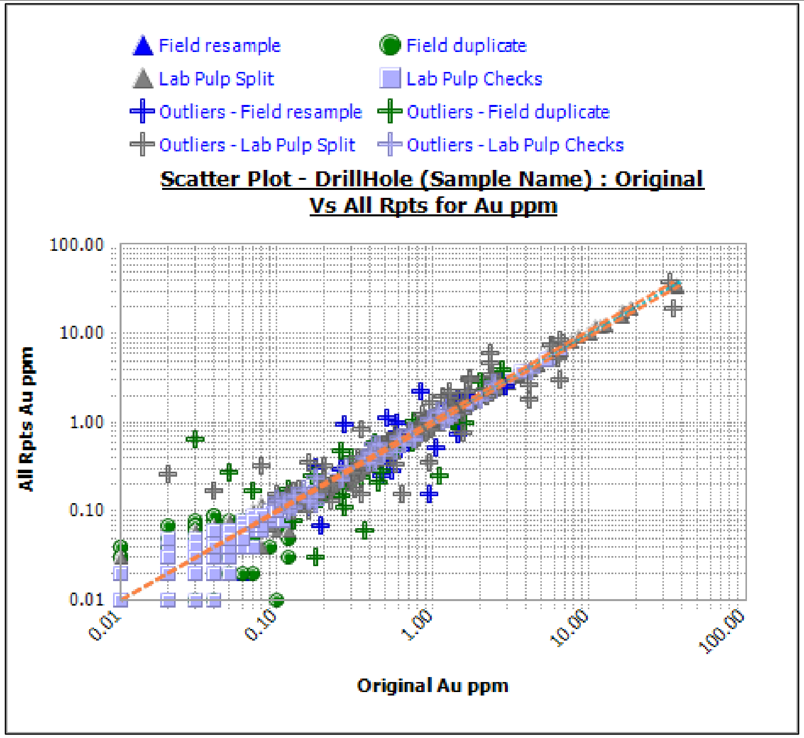
A range of Gold Assay Pills were sourced from Geostats Pty Ltd in Perth. Gold assay pill comprises 1g pill of known gold grade added to a blank sample. Expected grade is calculated from the weight of blank material and grade of pill. The advantages of the gold assay pills over pulp type CRM standards is they are difficult to distinguish from the normal RC chip samples in the batch and test the sample size reduction and splitting processes along with the potential sample mix-ups and analytical errors. As the expected value of each inserted pill sample is different the relative difference plotted against expected grade is used to plot and review results. The target for the Pill QAQC samples is to be within ± 5% of the expected result.

Initial results showed higher variation from the expected results due to samples being split after the crushing stage. Improvement in results once pulverizing of entire sample commenced. The low grade pill in the range of 0.1 to 0.4 g/t Au performed relatively poorly with an average of ± 15% relative diff from expected value.

Duplicates / Repeats

No bias is apparent in lab duplicates, pulp splits or lab repeats. Outliers predominantly associated with repeats of samples in batches that experienced sample swaps/mixups, however some outliers were due to the presence of coarse gold in the original samples.

A total of 94 pulp samples were re-assayed for Au at ALS laboratories in Johannesburg using the same 30g fire assay with AAS finish. Results showed there was no material bias between the SGS and ALS results.

			 Figure 16: Scatter plots of duplicate and repeat data for all samples to September 2018. SRK completed a review of the QAQC results for drillholes KG001 to KG058 as part of the audit completed on the June 2018 resource update. In summary SRK found: • Harmony has a comprehensive QAQC program and data quality monitoring system in place, and there is no systematic bias. Most of the CRMs have a mean value within 2% of the Certified Value. SRK was satisfied with the CRMs on average, and do not consider there to be evidence of accuracy or precision problems. However results from the program have shown that some sample swaps do occur, and SRK has recommended that Harmony investigate, along with the analytical laboratory the source of the errors and implement improved controls to ensure these do not occur in the planned drilling program. The QAQC program audited by SRK has been continued for the additional drilling completed between May and September. Communication with the laboratory to address issues identified has been maintained and the frequency of QAQC controls in the sample sequence has been increased to ~1:10 to reduce the occurrence of sample mix-ups.
3.7	Bulk Density	(i)	*Describe the method of bulk density determination with reference to the frequency of measurements, the size, nature and representativeness of the samples*.

Collection of drill core samples for bulk density testing has been completed at 30m intervals downhole. Samples are air dried, then a piece of core approximately 10cm in length is selected and weighed in air followed by weighing submerged in water. The bulk density is determined as per the below equation:

$$\text{Bulk Density} = \frac{\text{Mdry}}{\text{Msat} - \text{Msat in water}}$$

The lithology and mineralisation of the sample are recorded in logchief along with the dry and submerged sample weights and then synchronised to the geological database. Results are visually checked and samples with values outside of expected ranges for the recorded lithology and mineralisation are repeated. Project to date a total of 754 bulk density samples have been collected with results summarised in the below chart.

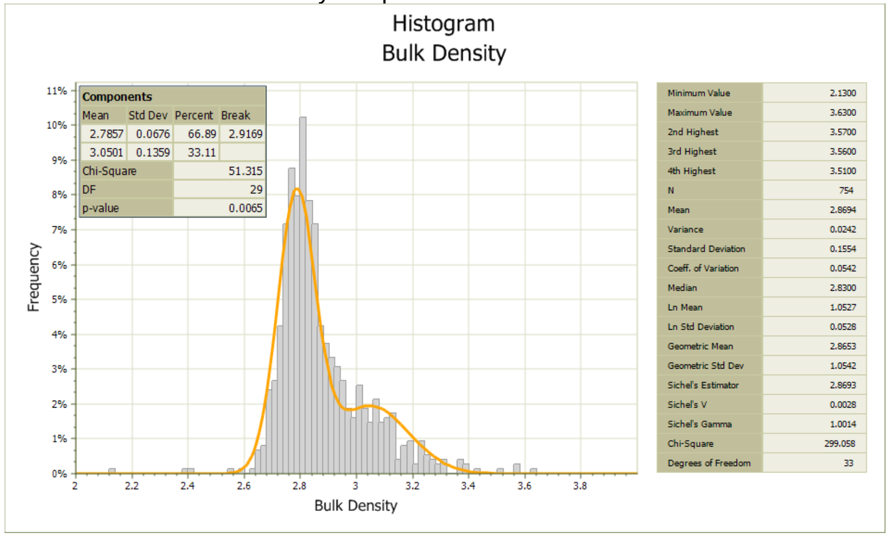


Figure 17: Results of bulk density testing.

(ii)	*If target tonnage ranges are reported, state the preliminary estimates or basis of assumptions made for bulk density*. No target tonnages ranges have been reported in this study.
(iii)	*Discuss the representivity of bulk density samples of the material for which a grade range is reported*. Bulk density measurements are taken at regular 30m intervals downhole and are considered representative of the material for all grade ranges.
(iv)	*Discuss the adequacy of the methods of bulk density determination for bulk material with special reference to accounting for void spaces (vugs, porosity etc.), moisture and differences between rock and alteration zones within the deposit*.

			Further work is required to determine the variation in bulk density between the different rock types and alteration assemblages, however the average values assigned are in line with expected bulk density values for these rock types. To date drill core samples collected during this program have all been from fresh material below the base of oxidation and the impact of void spaces due to porosity and vugs within the samples is not material due to its hard, competent nature.
3.8	Bulk Sampling and / or Trial Mining	(i)	*Indicate the location of individual samples (including map)*. Bulk sampling has not been completed as part of the current program. Open pit mining operations have been occurring continuously at Kalgold since 1996. Mining at D Zone pit has been completed and current area of operations is within Azone pit and the pillar between Azone and Watertank pits (refer figure 1 above).
		(ii)	*Describe the size of samples, spacing/density of samples recovered and whether sample sizes and distribution are appropriate to the grain size of the material being sampled*. Not applicable - Bulk sampling has not been completed as part of the current program.
		(iii)	*Describe the method of mining and treatment*. Kalgold utilises open pit mining methods and a carbon-in-leach CIL plant to extract the gold
		(iv)	*Indicate the degree to which the samples are representative of the various types and styles of mineralisation and the mineral deposit as a whole*. Bulk sampling has not been completed as part of the current program.
Section 4: Estimation and Reporting of Exploration Results and Mineral Resources			
4.1	Geological Model and Interpretation	(i)	*Describe the geological model, construction technique and assumptions that forms the basis for the Exploration Results or Mineral Resource Estimate. Discuss the sufficiency of data density to assure continuity of mineralisation and geology and provide an adequate basis for the estimation and classification procedures applied*. The geology rock model has been built using implicit modelling in Leapfrog Geo 4.2, the result is shown in Figure 18 below. The geology has been constructed using drilling information, mapping information, geophysical survey and interpretation information and air photography and satellite photography studies. The estimation domains are controlled by the underlying geology model. Rock codes have been assigned to the different geology types as classified from drilling and mapping. Drill density, together with significant outcrop exposed in the open pit provides a robust understanding of the geological continuity. Where necessary the wireframes have been edited using polylines, points and structural information to ensure the model looks correct and there are no significant RBF induced errors in the model.

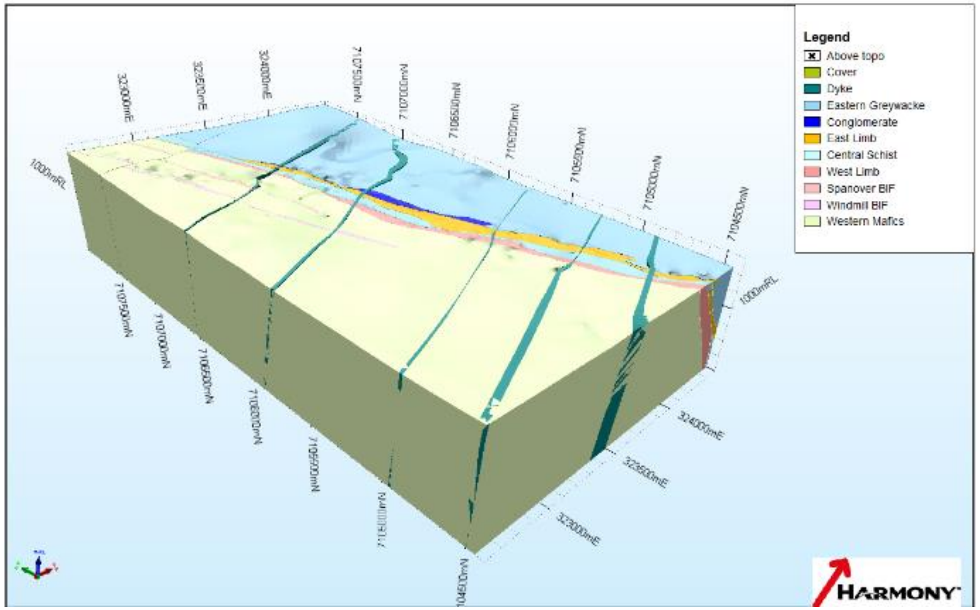


Figure 18: Oblique view of the Kalgold geology model showing rock type subdivisions

Estimation domains are based on geology domains (domains pictured below, right), no grade shells are used in this model. Only lodes 10 and 30 have been run in the estimate, the central schist has not been estimated due to the sparsity of data in the central schist which is generally not sampled. The central schist was only run in the grade control model which uses the close spaced blast hole drilling, however spotty and incomplete coverage of the central schist will mean the GC model may not fairly map the grade distribution. The coverage of the overall resource block model is such that future drilling in the Spanover and Windmill BIF units can be incorporated into the one block model.

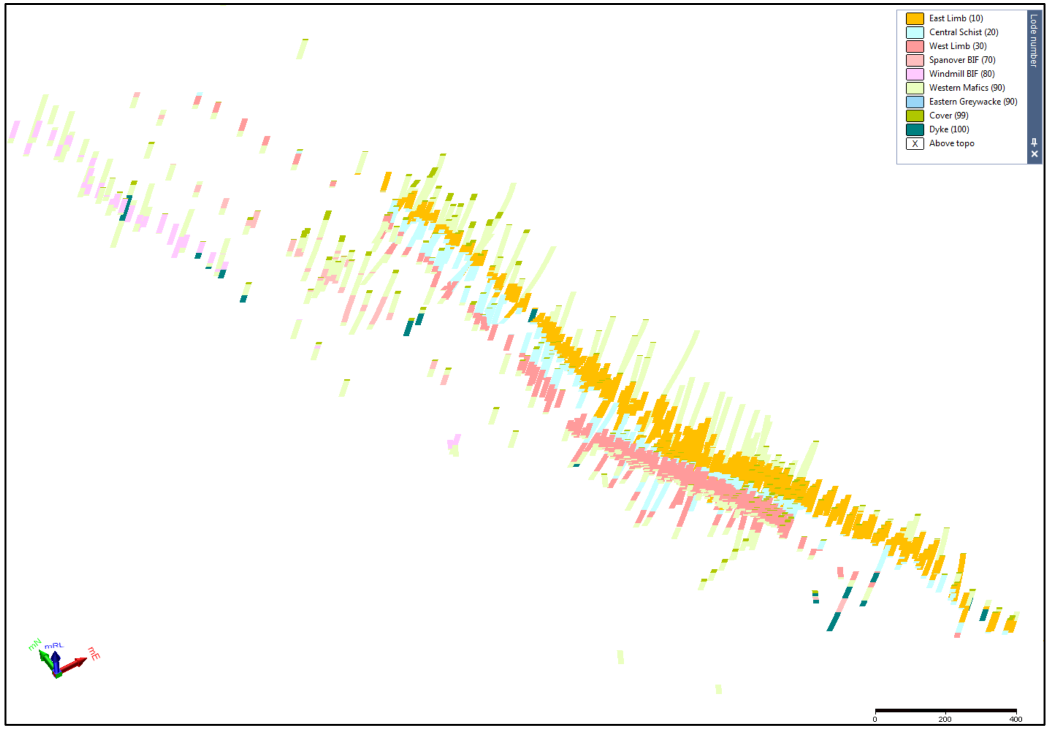


Figure 19: Model domains (lodes) used in the estimate are Geology based however the eastern greywacke, conglomerate and the western mafics are merged in to one waste domain

The domains (Lodeno) are:

- East Limb (EL) = 10
- Central Schist (CS) = 20
- West Limb (WL) = 30
- Spanover BIF (SB) = 70
- Windmill BIF (WB) = 80
- Waste host (WST) = 90
- Kalahari Sands cover (COV) = 99
- Dolerite intrusive (INT) = 100

The dolerite intrusives stope out the mineralisation and so these blocks have been excluded from the mineralisation estimate, as has the overlying Kalahari sands cover which are not mineralised.

The strike of the BIF units varies across the deposit, as such the estimation domains have been split into three structural domains – North, Central and South, based on the general strike and orientation of the stratigraphy, this was used to inform the search direction. The structural domains are shown in the picture below.

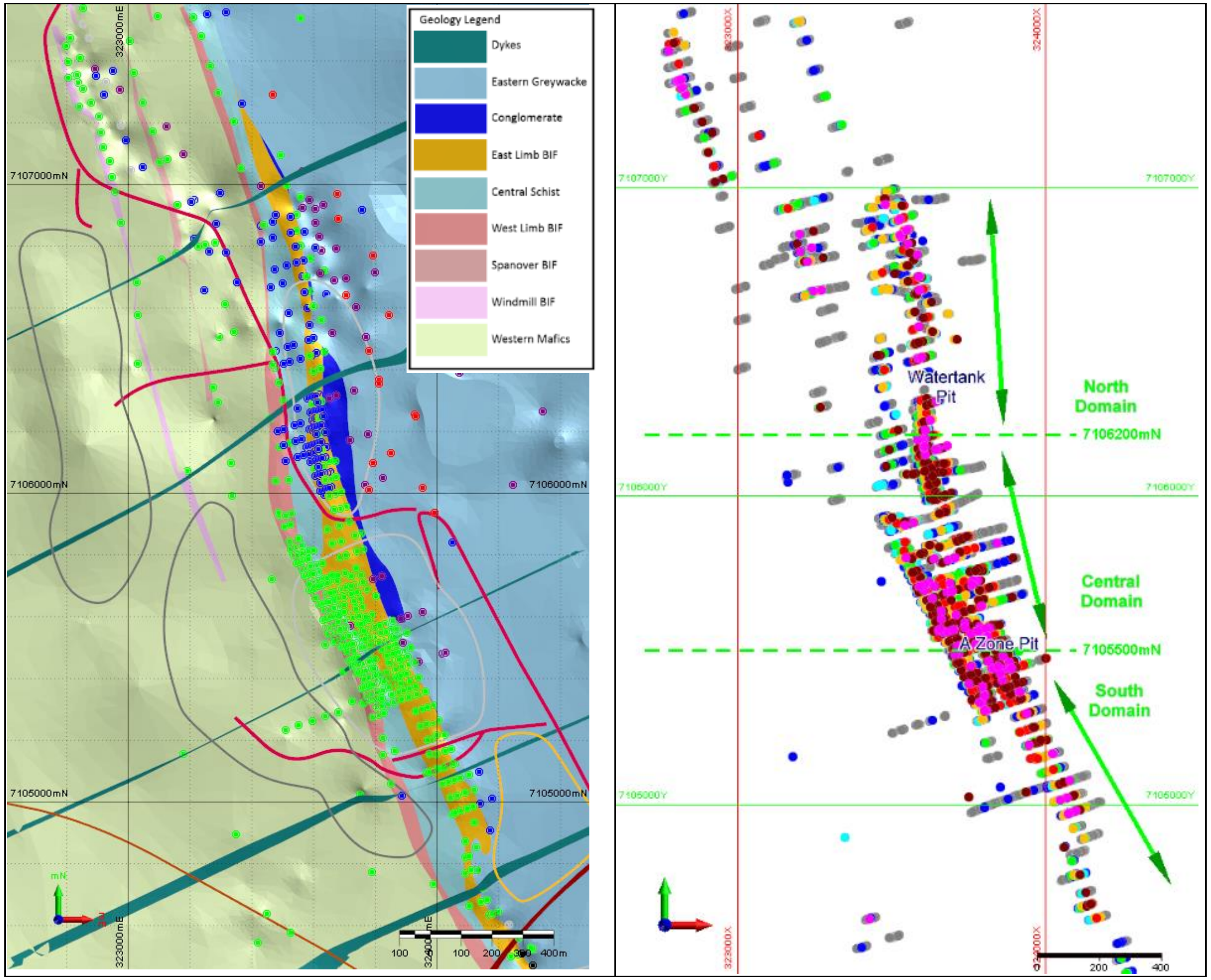


Figure 20: Distribution of the structural domains, with Geology and infrastructure on the left and composite file on the right. Green arrows indicate the general strike of the search directions in each domain.

		(ii)	*Describe the nature, detail and reliability of geological information with which lithological, structural, mineralogical, alteration or other geological, geotechnical and geometallurgical characteristics were recorded.* Detailed logging, data collection and storage / recording procedures that underpin the updated Mineral Resource estimate are outlined in detail above in Sections 3.2(ii), 3.2(iii), 3.3 and 3.5. • The new logging data is highly reliable and can be validated against material in RC chip trays, or half diamond core in storage in the Kalgold core yard. The latest round of drilling which commenced in 2017 has been subject to extensive modern QAQC procedures and monitoring which has included lab visits and audits by the geologists in charge. • Historic diamond core is also available in the core yard and validation checks indicate historic data is also reliable. Historic RC drill holes are less reliable than the diamond drill data. Historical Assay data is largely lacking QAQC information, however the data that have been available has been subject to some assessment of duplicates and QAQC in the past. None of this information was supplied with the database so all assay data supplied has been taken as is.
		(iii)	*Describe any obvious geological, mining, metallurgical, environmental, social, infrastructural, legal and economic factors that could have a significant effect on the prospects of any possible exploration target or deposit.* Obvious areas for additional work to improve the revised model include: 1. Oxidation For the majority of the shallow drilling in the deposit, historic oxidation codes within the database were not specific regarding the amount of oxidation present. This has prevented separation of the oxidation profile into complete/partial/fresh categories. Partial oxidation was rarely logged and few holes have any partial or fracture controlled oxidation recorded in the database. Whilst there are scattered partially oxidised entries in the database they are not consistent, nor coherent enough to enable a viable surface to be generated. Accordingly, only two oxidation domains were completed based on all available information – Oxidised and Not Oxidised (Fresh). All partially oxidised material that could be reliably identified was included into the oxidised profile. 2. Metallurgy & Geotechnical Anecdotal evidence provided by mining staff was that the west limb BIF's do not recover as well as the East Limb BIFs (Lourens Joubert, pers.com. 2018), however no evidence for this has been provided. To this end recovery assumptions have been applied across the board and metallurgical testwork have been scheduled as part of Technical Studies going forward. There have been no Geotechnical assumptions applied to this model.
4.2	Estimation and Modelling Techniques	(i)	*Describe in detail the estimation techniques and assumptions used to determine the grade and tonnage ranges.* The estimation domains are based on the geology and structural domains. All domain construction was completed within Leapfrog Geo v4.2.3 using implicit modelling. All wireframes generated using implicit modelling were assessed and modified using points and polylines inside Leapfrog to generate a reliable model. Wireframes were then exported to Micromine where they were simplified by merging coincident triangles to reduce file size and make the files more manageable. The estimation domains have been split into East Limb, Central schist, West Limb and Waste (comprising both the Western Mafic unit, conglomerate unit and the Eastern Greywacke). Whilst no separate waste estimate is to be conducted based on the boundary analysis the waste rock composites will be used in the estimation of the BIF units. The overprinting dykes are not mineralised and stope out the mineralisation however they are included here as a domain in the model to ensure these blocks are excluded from the estimate.

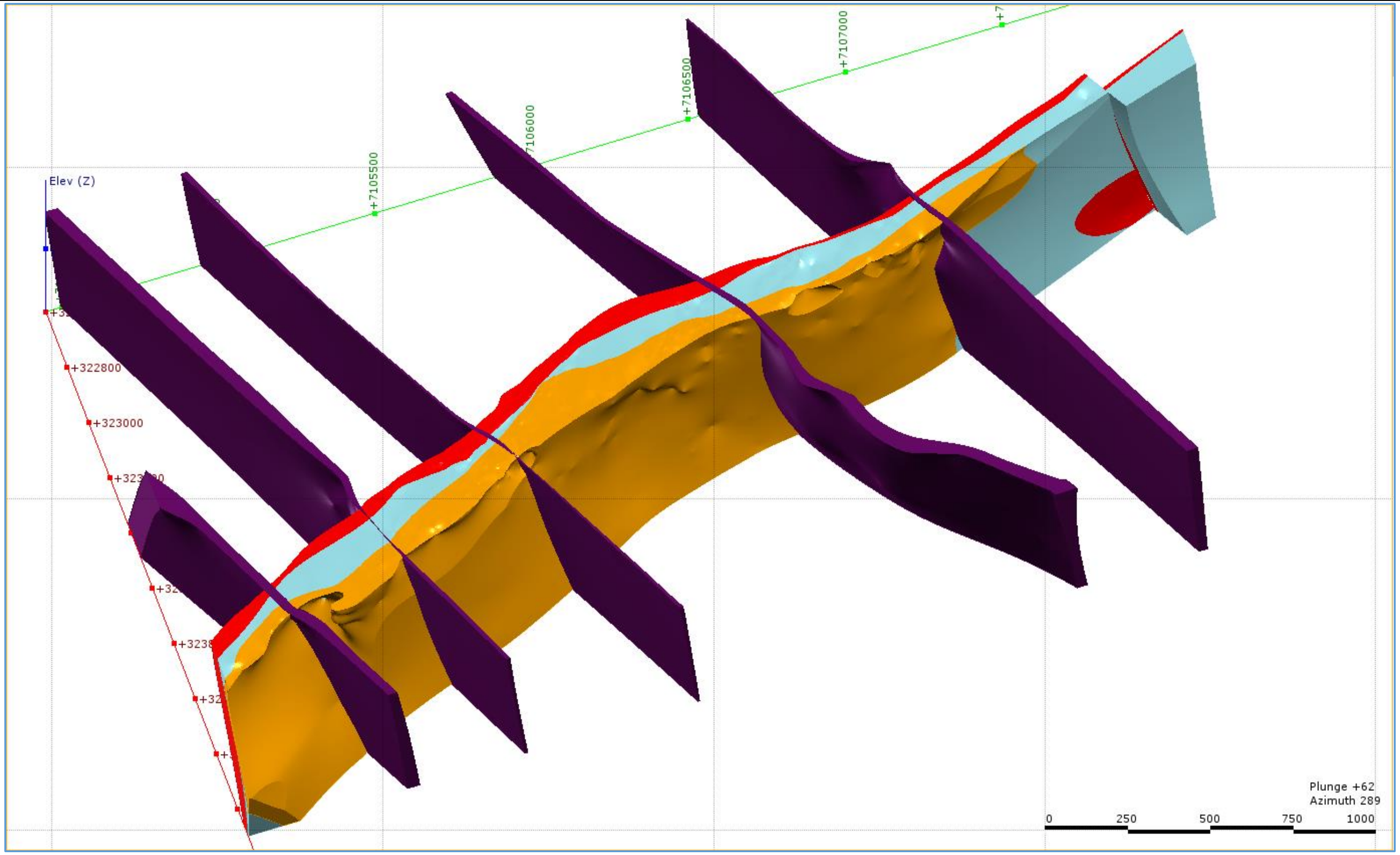


Figure 21: Geology domains used in the estimate, East limb, Central Schists and the West Limb. The dyke material is not estimated but stopes out the mineralisation.

As outlined above, the oxidation domains are split into oxidised and fresh only. The resulting wireframes were used in the flagging of the oxidation profile at Kalgold. Whilst there is a general depletion of gold towards the surface there is no specific change in grade at the oxide contact so the oxidation field was not used in the estimation domains. It is solely a metallurgical domain.

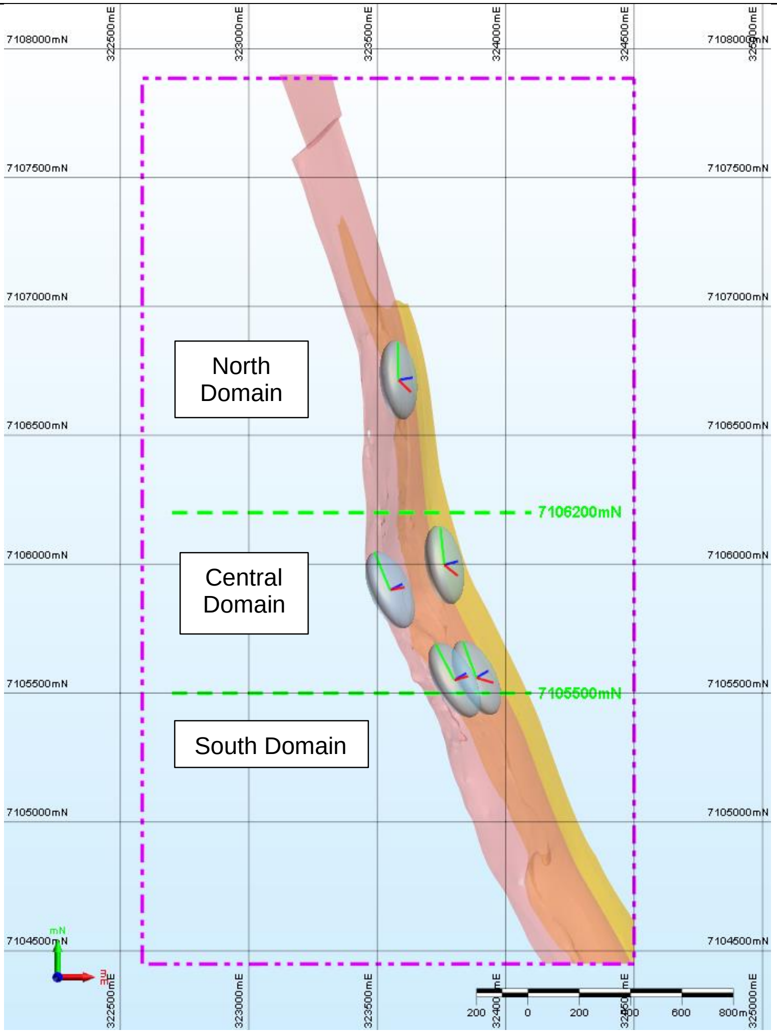


Figure 22: Variogram ellipses used for each of the Structural domains, West Limb North domain used the same ellipse as the East limb due to a lack of supporting data

The orebody has been divided into 3 structural zones to accommodate the change in strike, the domains are split such that the south domain (<7105500mN) comprises the bulk of A Zone; the central domain (>=7105500mN and <7106200mN) largely comprises the Bridge zone; and the northern domain (>=7106200mN) comprises Water tank and Water tank North (Figure 22). The boundaries between these structural domains are considered soft so that data from adjacent domains will inform the estimated domain. These domains directly influence the variogram axes and the search parameters. Where there were not enough sample to properly define the variograms the search and variogram parameters were taken directly from the neighbouring domains.

(ii) *Discuss the nature and appropriateness of the estimation techniques (s) applied and key assumptions, including treatment of extreme grade values (cutting or capping), compositing (including by length and/or density), domaining, sample spacing, estimation unit size (block size), selective mining units, interpolation parameters maximum distance of extrapolation from data points.*

The estimate was run using ordinary kriging (OK), the statistical analysis indicates that whilst the estimate would benefit from a more local method such as MIK the lack of data prevents this. The analysis does indicate that the deposit is amenable to OK and as this is the method that has been used in the past it was felt the same process should continue to be used until significantly more data has been obtained. The distribution of the grade indicates more advanced forms of estimation such as UC or LUC would not be recommended at this deposit which leaves Ordinary Kriging as the only robust option.

Exploratory Data Analysis

Whilst exploratory data analysis was conducted on all domains only the 3 domains of interest are discussed here. Of the 3 domains, 20 was not estimated due to a lack of consistent sampling resulting from a policy of not sampling this schist unit. A comparison of the data before and after compositing to 2m is shown below. Compositing to 2m adequately reduces the sample variance whilst maintaining an adequate amount of sample for estimation. The data in all domains is negatively skewed and shows significant variance.

Table 2: Summary of raw and composited statistics for domains 10.20 and 30.

	Number of samples	Minimum	Maximum	Mean	Standard deviation	Variance	COV
Domain 10							
Raw Data	17,208	0.005	135.5	0.74	1.88	3.55	2.53
Composited data	8,472	0.005	34.60	0.70	1.20	1.44	1.70
Domain 20							
Raw Data	2,740	0.005	11.2	0.15	0.48	0.22	3.16
Composited data	1,491	0.005	11.2	0.15	0.43	0.19	2.95
Domain 30							
Raw Data	9,446	0.005	136.2	0.67	1.89	3.58	2.83
Composited data	4,877	0.005	68.3	0.66	1.42	2.03	2.16

Global Analysis

A global analysis of the data shows that the natural cut-off for the data sits around 0.2g/t and this is possibly a good basis to develop a grade shell. Unfortunately the lack of consistent sampling downhole (selective geology based sampling has been completed) it is difficult to build a coherent grade shell for use as a domain.

For this reason at this stage all estimation domains will be geologically based with no grade input. This may lead to overstating tonnages in areas where there is a lack of assay information. As drilling data increases into the future this may change.

Data Compositing

With two different supports between the two drill sets (1-2m in drilling, 2.5m in grade control), compositing to a regular support is difficult without significant smoothing issues. A 2.5m composite was used in the past but splits far too many exploration drillhole samples but compositing to the nearest common length of 5m will significantly increase smoothing within the dataset. To this end it was decided that the Exploration drilling would be composited to a length relevant for the dataset whilst the grade control data would be used as is – that is raw 2.5m composites.
Various composite lengths were assessed in order to select a representative composite length and comprised 1, 2, 2.5 and 5m lengths. Statistics by domain show that there is in general a significant fall in variability between Raw, 1m and 2m but after 2m the variability is very stable. The results of the study indicate that a 2m composite is appropriate for this dataset, maintaining the variance within the dataset whilst reducing the C.O.V of data to something more amenable for an OK estimate.

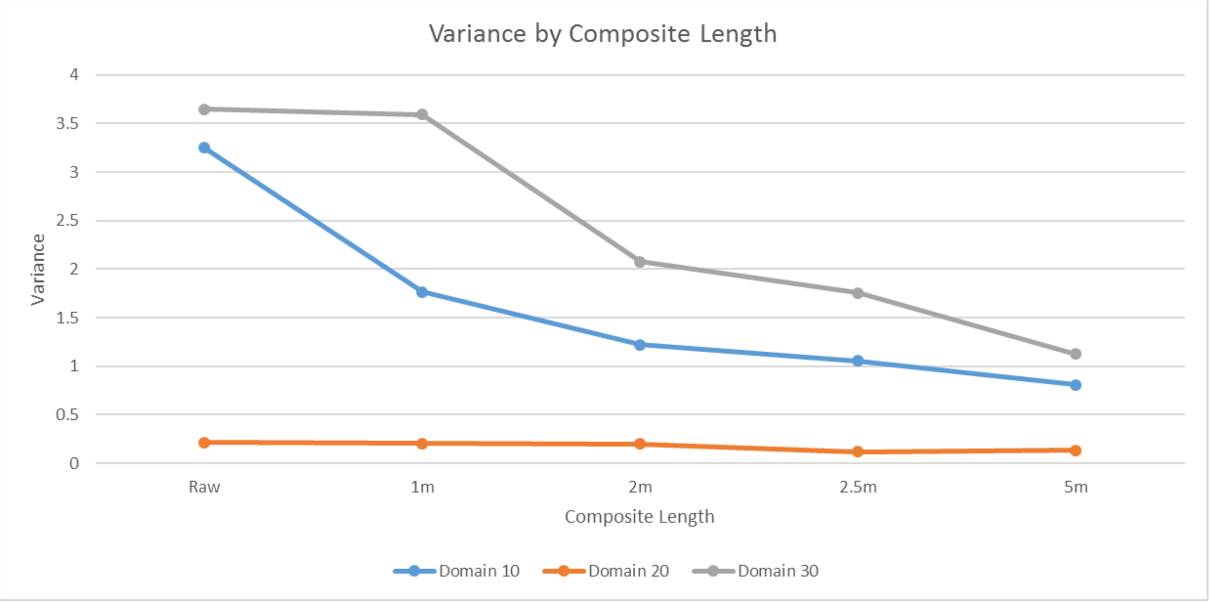


Figure 23: Variance by Composite length showing the stabilisation of the variance at approximately 2m, indicating a stable composite length.

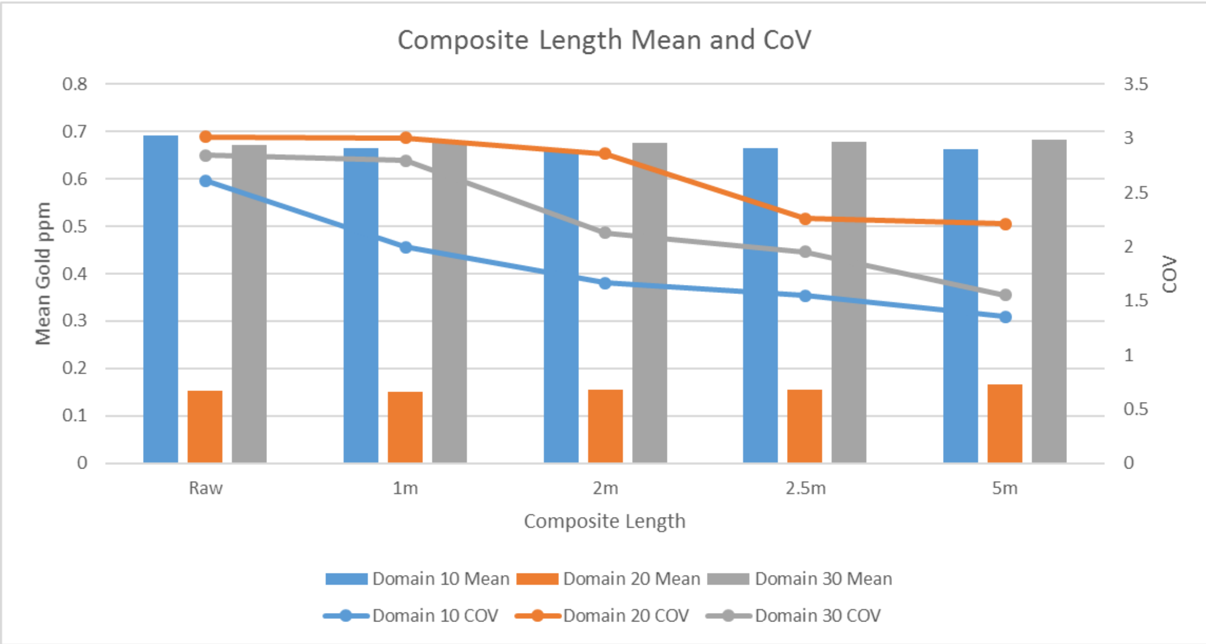


Figure 24: Mean and Coefficient of Variation showing the very stable means across each composite length and the reduction to below 2 for the COV at 2m.

Contact Analysis

A domain boundary contact analysis was completed using Micromine (normal distance to wireframe) in order to understand the nature of the boundaries between the different units. The hangingwall to the east limb BIF and the footwall to the west limb BIF were both found to be soft over 10-20m, however the internal central schist appears to have hard boundaries between it and the BIFs on either side with significant grade drops moving from the BIF unit into the schist.

Table 3: Grid showing the nature of the boundaries between different units, NA indicates these units are not in contact.

	EG	**EL**	**CS**	**WL**	**WM**	**SB**	**WB**
EG		SOFT	NA	NA	NA	NA	NA
EL	SOFT		HARD	NA	NA	NA	NA
CS	NA	HARD		HARD	NA	NA	NA

WL	NA	NA	HARD		SOFT	NA	NA
WM	NA	NA	NA	SOFT		HARD	HARD
SB	NA	NA	NA	NA	HARD		HARD
WB	NA	NA	NA	NA	HARD	HARD	

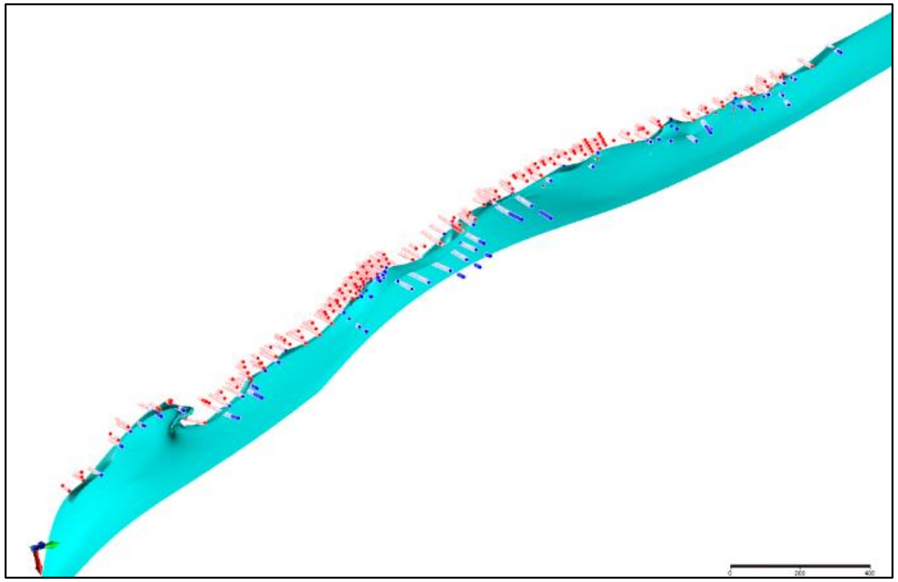


Figure 25: Composites used in the East Limb BIF (red) - Eastern Graywacke/Conglomerate waste (blue) contact profile.

Contact East Limb Hanging wall

The sample data was flagged with distance from the BIF – Greywacke/Conglomerate contact in order to assess the grade profile across the boundaries. The grade profile shows that there is a soft contact between the units – grade shows a progressive decline from within the BIF and into the hangingwall greywacke over a distance of approximately 20m.

Basic Statistics

Summary of basic statistics derived from the Kalgold deposit using composited domained assays prior to and post the application of declustering and a top-cut are shown in the table below. The basic domain statistical analysis shows the domains are strongly skewed but generally contain only low to medium grades.

Table 4: Summary of basic, declustered and top cut statistics for domains 10, 20 and 30.

	Number of samples	Minimum	Maximum	Mean	Standard deviation	Variance	COV
Domain 10							
Naïve composite Data	9,192	0.001	34.6	0.641	1.163	1.352	1.815
Declustered data	9,192	0.001	34.6	0.629	1.247	1.555	1.984
Top Cut data	9,192	0.001	7	0.604	0.961	0.923	1.591
Domain 20							
Naïve composite Data	3,750	0.002	11.2	0.059	0.279	0.078	4.695
Declustered data	3,750	0.002	11.2	0.079	0.309	0.095	3.897
Top Cut data	3,750	0.002	2	0.071	0.19	0.036	2.673
Domain 30							
Naïve composite Data	5,100	0.003	68.31	0.629	1.399	1.957	2.224
Declustered data	5,100	0.003	68.31	0.606	1.318	1.736	2.174
Top Cut data	5,100	0.001	6	0.584	0.903	0.815	1.545

Upper Cut Determination

Top cuts determined using statistical analysis, specifically analysing where the histogram breaks down and assessing that point against the data distribution in 3D, the metal content of the cut samples and the 99th percentile. Top cuts were determined from exploration data only and where possible top cuts remove less than ~10% of contained metal within the domain. Only the three domains to be estimated were assessed at this time, the final top cuts are:

(East Limb) Zone 10 = 7 g/t

(Central Schist) Zone 20 = 2 g/t

(West Limb) Zone 20 = 6 g/t

The post top cut domain statistical analysis shows the domains are less strongly skewed and while they do only contain low to medium grades the CoV (Variation Coefficient) variable indicates the domains are amenable to Ordinary Kriging. Ideally the CoV should be below 1.2 but for the model's purpose an OK estimate will suffice.

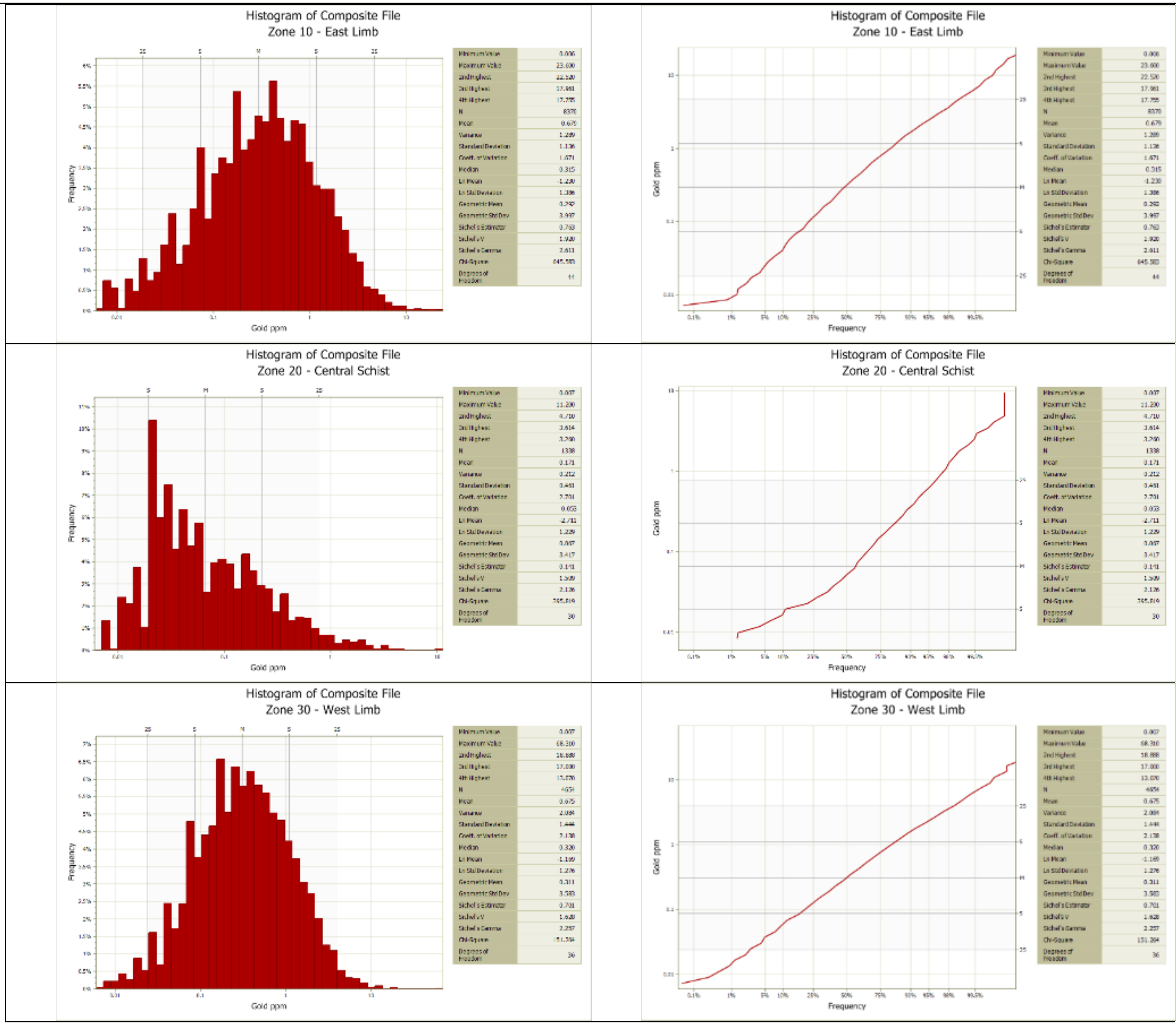


Figure 26: Statistics of domains 10, 20 and 30 showing the histograms and Probability Plots for the estimated domains.

Domained Statistics

The domains are split into north, south and central solely to account for the bend in the orebody. The search parameters for each domain are specific however the actual composite domains do not change. Some of the domains have too few samples to enable proper variography and in these cases the domain will use the search and variogram parameters for the adjacent domain – for example Central Schist North and West Limb North both use the East Limb North search and variogram parameters as they do not have the sample support to build their own variograms.

East Limb BIF South

The South East Limb domain contains a significant amount of composites derived from the exploration drillhole database. The top cut normal statistics shows a strong negative skew in the data.

Figure 27: Basic statistics and distribution of the East Limb South composites.

East Limb Central

The Central East Limb domain comprises the core of the Azone deposit, into the bridge zone and so has the largest number of exploration samples with which to inform it. As is general for the Kalgold deposit this domain is also negatively skewed.

Figure 28: The Central East Limb domain comprises the bulk of the current exploration data,

East Limb North

The east limb North domain defines the Water tank deposit and comprises a long thinner higher grade portion of the deposit.

Figure 29: East Limb North comprises the Water tank Pit in the north

West Limb South

West limb South is the southern half of the A-Zone pit towards D-Zone. It is generally a thinner lower grade portion of the deposit but has not been subject to much infill drilling, most drilling is shallow and does not adequately test the deposit.

Figure 30: The West Limb South is the southern portion of the Azone pit and is largely under drilled.

West Limb Central

The west limb central domain comprises the most well drilled portion of the West Limb, whilst the shallow portions of the limb have been well drilled they deeper portions have until recently seen very little drilling.

Figure 31: West Limb Central is the most well drilled portion of the west limb - however most of this drilling is very shallow.

West Limb North

West Limb North is in the footwall of the Water Tank deposit and is the North extension of the West Limb that has been drilled in the A-Zone pit. Historic drilling has only targeted the shallow levels and failed to test the mineralisation below the shallow gold depletion zone that is found across the Kalgold area.

Figure 32: West limb north has not been drilled below the shallow depletion zone until recently and so has very little drilling.

Central Schist South

Central schist south has not been adequately sampled and comprises only minor sampling along the edges next to the BIFs. For this reason the Central Schist has not been estimated.

Figure 33: The central schist south domain comprises only a small number of samples and is not adequately sampled.

Central Schist Central

Central schist central domain has also not been adequately sampled, only minor sampling along the edges next to the BIFs occurs where slivers of mineralised BIF occurs. For this reason the Central Schist has not been estimated.

Figure 34: Whilst the most well sampled portion of the Central schist, the central domain still lacks comprehensive sampling.

Central Schist North

Central schist north has also not been adequately sampled and has not been estimated.

Figure 35: The Central Schist North has received little sampling and has not been included in the estimate.

Stationarity

To test for domain stationarity a series of grade swath plots of mean grade and standard deviation were generated. These charts show that there is very little drift in the deposit domains with steps in the graphs correlated to changes in deposit strike which will be handled through search parameters, staged estimation and structural domaining.

Grade control model

In order to generate a planning model that uses the most robust estimate available and the best data available a separate Grade Control model based on the blast hole data was created. The blast hole data consists of 10m Blast holes sampled at 2.5m sample lengths designed to align with the benches. This 2.5m sample length is not compatible with the 1m and 2m sample lengths used in the exploration drilling and so should not be merged during estimation. Whilst the resource mode relies solely on the exploration drilling sampled at 2m composite lengths the grade control model is built using the 2.5m grade control composites and simulated into a model with 2.5x2.5x2.5m nodes.

CONSIM model

The grade control model was created using OBO grade control software created by Golders, an international consulting firm. OBO uses an implementation of GsLib's Sequential Gaussian Simulation (SGS) program to generate up to 50 simulations of the data. An ore block optimiser process is then used to classify the model into ore and waste based on the assumed costs, prices and levels of risk acceptable to the operation around missing/hitting target production levels.

The Kalgold GC model was constructed using OBO but was not subject to the OBO process itself, instead an algorithm in Micromine was used to classify the model into ore types based on the e-type gold average, mining costs, process costs, prices and recoveries provided by sit. This model was reblocked to the SMU size of 10x10x2.5m in order to compare against the resource model and to allow the data to be merged with the resource model to create a planning reserve model that utilises both datasets.

Table 5: Table of Parameters used in the GC estimate for OBO Conditional Simulation runs (rotations are GSLib format)

	East	North	RL
Minimum	323,451	7,105,111	1,121.25
Maximum	324,036	7,105,866	1,241.25
Node	2.5	2.5	2.5
Runs	50	**Search Range**	40m
Samples	**Min**	**Max**	**Max Sim**
	12	48	24
Search	**Sang1**	**Sang2**	**Sang3**
	163	-5	-60
Max-Semi Ratio	0.68	**Max-Minor Ratio**	0.29
Variogram	**2 Structures**	**C0**	3.56
A1	5m	**A2**	38m
C1	3.42	**C2**	0.90

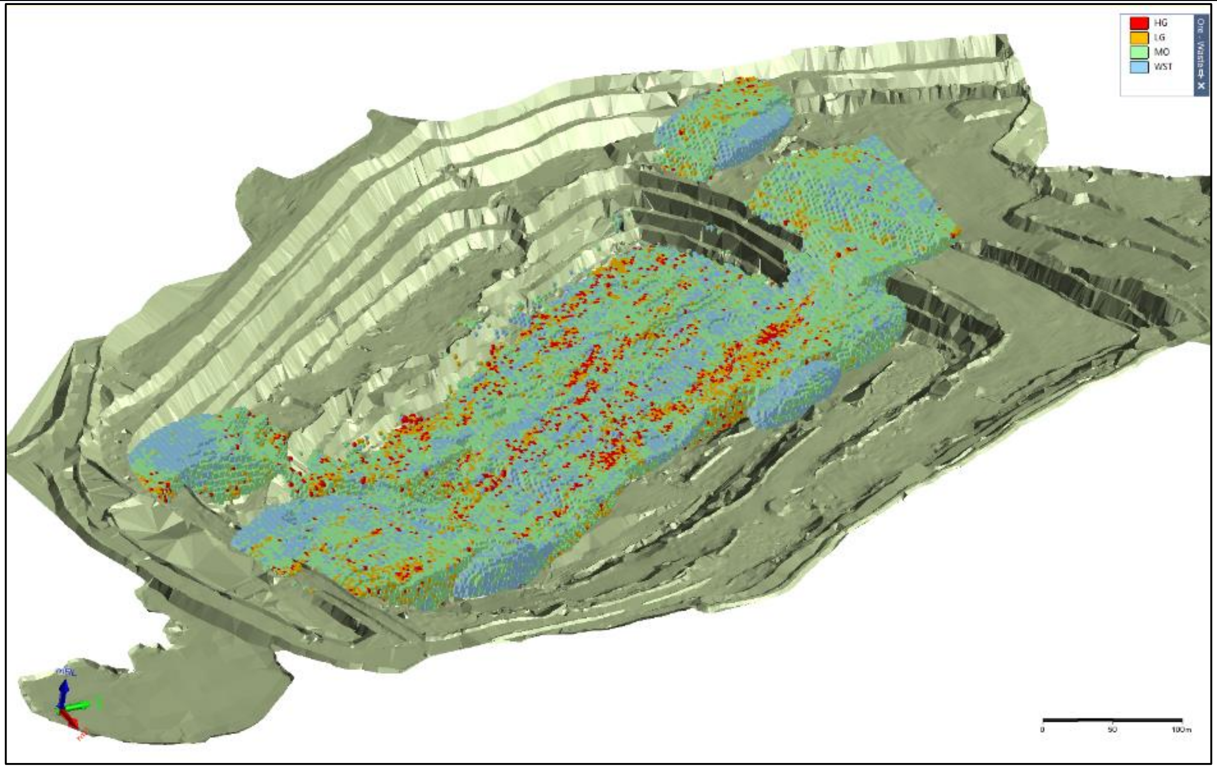


Figure 36: CONSIM grade control model coloured by ore type based on parameters supplied by the Mine.

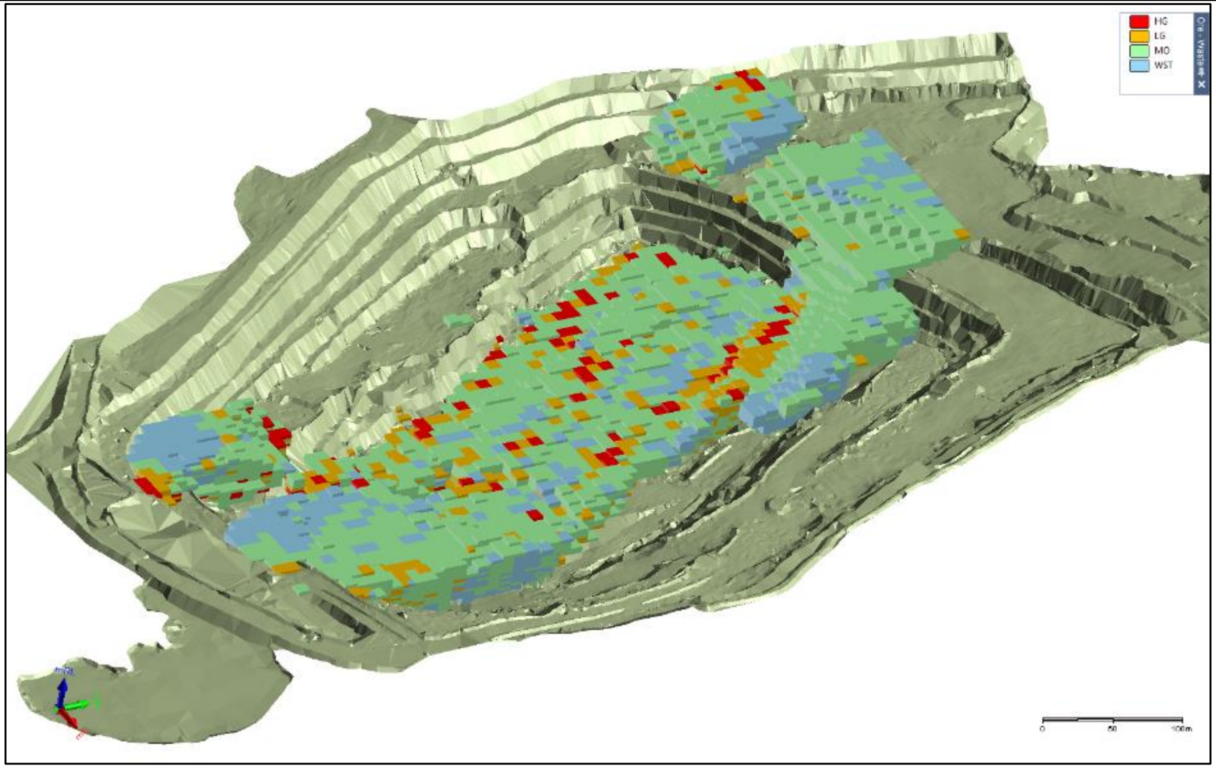


Figure 37: Same GC model reblocked to the 10x10x2.5m SMU size

Block Model and Estimate Parameters

1. Kriging Network Analysis

A basic exploratory data assessment was run on the East limb to assess the impact of different block sizes, sample counts and search ranges, a sample count similar to that used during the 2017 Site update was used and gave a representative result.

2. Block Size Analysis

A series of block sizes were tested against the data in each of the three structural domains (locations shown below). The current block size of 10x10x2.5 is too small for the current state of drill spacing and will result in an unrepresentative model. Block sizes assessed included (in X*Y*Z) 10x10x2.5, 10x20x5, 10x20x10, 10x20x20, 10x40x20, 20x40x10 and 10x40x40. All other variables were held constant.

Block Model

The parameters used in constructing the block model are shown in Table 6. The resulting model was the reblocked to 10x10x2.5m to create the reserve model.

Table 6: Summary of block model extents used for the Kalgold deposit

Variable	X	Y	Z
Minimum (Origin Centroid)	322605	7104420	785
Maximum	324535	7107880	1250
Extents	1930	3460	465
Parent block size	10	20	20
Sub block size	5	5	2.5
No. of blocks	194	174	25
Rotation (Bearing/Plunge/Dip)	90	0	0

The final reserve model was then converted to Kalgold Grid by rotating the WGS84 model block centroids to the Clarke LO25 based Kalgold grid and a new model constructed in Kalgold grid was filled using a nearest neighbour estimate to populate the new centroid data with the old. An ellipsoid search of 1.2x block size with a maximum of 1 sample and a discretisation of 1x1x1 was used to ensure no averaging. Table 7 shows the model extents used in the local Kalgold grid.

Table 7: Summary of block model extents used for the Kalgold deposit in Kalgold Grid

Variable	X	Y	Z
Minimum (Origin Centroid)	22561.5	-95250	776.25
Maximum	24461.5	-91800	1293.75
Extents	1910	3460	520
Parent block size	10	10	2.5
Sub block size	10	10	2.5
No. of blocks	191	346	208
Rotation (Bearing/Plunge/Dip)	90	0	0

Interpolation Parameters

The estimate was run using ordinary kriging (OK), the statistical analysis indicates that whilst the estimate would benefit from a more local method such as MIK the lack of data prevents this. The distribution of the grade indicates more advanced forms of estimation such as UC or LUC would not be recommended at this deposit which leaves Ordinary Kriging as the only robust option. The statistical analysis does indicate that the deposit is amenable to OK and as this is the method that has been used in the past it was felt the same process should continue to be used until significantly more data has been obtained.

Variograms were modelled using Corellograms, the ranges of the variograms help inform the data searches in combination with the level of sample support. The first pass was based on half the main variogram range at the recommendation of an independent reviewer. The second pass was double the first and the third was four times the first. The purpose of the third pass was to simply inform those parts of the model not filled by the earlier passes. Whilst the range of the first pass was based on sample support requirements it is very close to the maximum ranges indicated in the variography. The table below summarises the estimation parameters used in the estimation process.

After a series of check runs it was decided not to run the central schist unit (this is in accordance with past practices where the central schist was also not run), this was due to the central schist estimate causing a smearing of grade due to the practice of not generally sampling this unit.

Table 8: Summary of the basic interpolation parameters used for the Kalgold deposit

		Search Orientation (Micromine Geology)			Range			Samples			Informing Samples
Domain	**Search**	**Bearing**	**Dip**	**Pitch**	**Major**	**Semi-major**	**Minor**	**Min**	**Max**	**Max /Hole**	**Domains**
10 S	Pass1	330	66	23	80	66	30	12	28	6	10, 90
10 S	Pass2	330	66	23	160	130	60	12	28	6	10, 90
10 S	Pass3	330	66	23	320	260	125	12	28	6	10, 90
10 C	Pass1	345	70	25	80	66	30	12	28	6	10, 90
10 C	Pass2	345	70	25	160	130	60	12	28	6	10, 90
10 C	Pass3	345	70	25	320	260	125	12	28	6	10, 90
10 N	Pass1	350	70	25	80	66	30	12	28	6	10, 90
10 N	Pass2	350	70	25	160	130	60	12	28	6	10, 90
10 N	Pass3	350	70	25	320	260	125	12	28	6	10, 90
30 S	Pass1	330	65	6	80	66	30	12	28	6	30, 90
30 S	Pass2	330	65	6	160	130	60	12	28	6	30, 90
30 S	Pass3	330	65	6	320	260	125	12	28	6	30, 90
30 C	Pass1	335	65	7	80	66	30	12	28	6	30, 90
30 C	Pass2	335	65	7	160	130	60	12	28	6	30, 90

30 C	Pass3	335	65	7	320	260	125	12	28	6	30, 90
30 N	Pass1	350	70	25	80	66	30	12	28	6	30, 90
30 N	Pass2	350	70	25	160	130	60	12	28	6	30, 90
30 N	Pass3	350	70	25	320	260	125	12	28	6	30, 90

Block Model results

The resource estimate has generated an acceptable model and resulted in a significant upgrade to the size of the model. Step out drilling has generated significant extensions to the model to the north and has commenced filling in the model in the pillar zone between the two open pits. This combined result has resulted in a significant increase in the tonnages.

Table 9 below shows the grade tonnage table for the material that has been classified and indicates the higher confidence portions of the resource. A large component of this material is still not well drilled and the classifications are a stretch in some areas, these areas require more drilling to support the classifications that have been applied.

Table 9: Grade Tonne Table for the global unmined classified Kalgold Resource.

Cut-off	Mt	Au (g/t)	Au (oz.)
0.01	225.1	0.57	4,093,906
0.1	205.2	0.61	4,051,230
0.2	171.2	0.71	3,889,004
0.3	141.6	0.80	3,652,866
0.4	119.2	0.89	3,402,141
0.5	99.1	0.98	3,112,905
0.6	82.1	1.07	2,813,246
0.7	67.9	1.15	2,517,829
0.8	56.4	1.24	2,238,998
0.9	45.9	1.32	1,953,368
1	37.6	1.41	1,699,616
1.2	24.4	1.58	1,237,432

Figure 38 shows the GT curves for the classified resources.**Error! Reference source not found.** These GT curves show that the Kalgold deposits are not particularly cut-off sensitive as a shallow tonnage curve and a shallow grade curve indicates that the chances of finding significant amounts of high grade material are low, however large tonnages are available so simply moving more tonnes will open up more of the high grade material that exists.

Table 10: Global resource statement at a gold cut-off of 0.44g/t Au within the R650c33 pit shell

Resource Category	Mt	Au g/t	Au (Koz)
Measured	11.3	0.85	310
Indicated	36.4	0.96	1,125
Inferred	28.7	0.98	903
Total	76.5	0.95	2,339

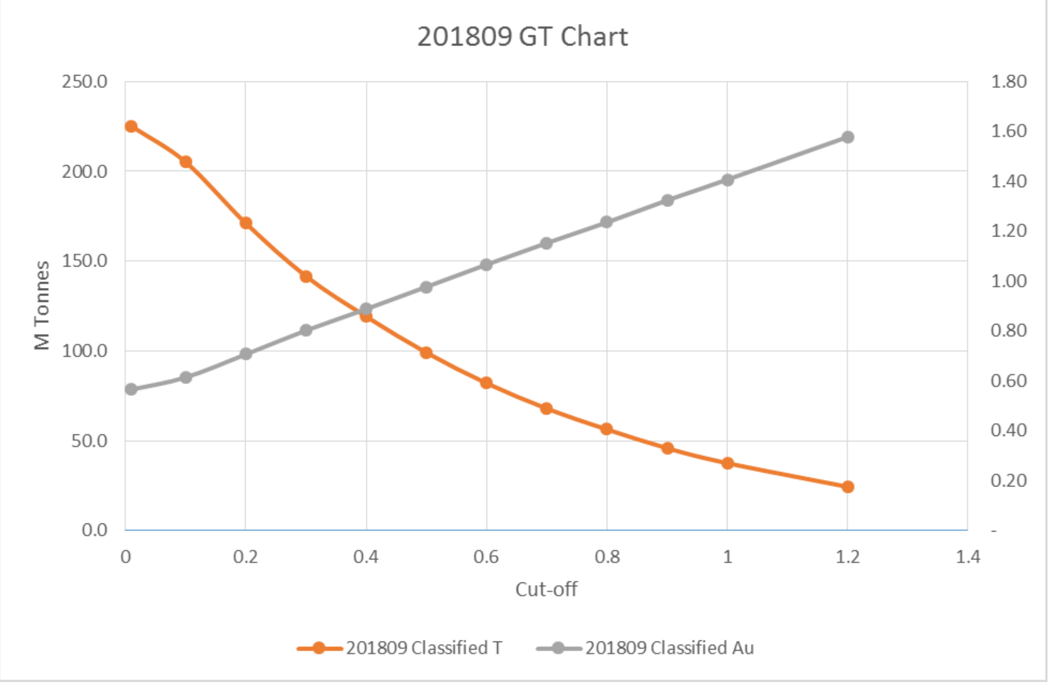


Figure 38: Kalgold Global Grade Tonnage chart for all classified resources.

4.2 Estimation and Modelling Techniques (continued)

(iii) *Describe assumptions and justification of correlations made between variables*.

Variography

The Variography generally has a high nugget and variograms are noisy due to the effects of the strong proportional effect seen in the orebody. To enable a relatively robust estimate a series of correlograms were modelled for each domain. The central schist domains and the West Limb BIF North domain all had too few samples to generate a robust variogram, in these cases the variogram from the adjacent domain has been used.
Variograms tend to indicate a nugget of between 35-50% which is generally high, the second structure tends to comprise a further 30-40% of the variance with the long range third structure comprising the remainder. The first structure commonly covers 70-80% of the total variance and 10-20% of the total range with distances of between 20-40m, this indicates that in order to obtain a high quality estimate drilling needs to be spaced at the 20-40m spacing.

The variograms were modelled in Isatis software as correlograms, rotations were determined using Geological Plane to ensure easy transfer between Isatis, leapfrog and Micromine. Geological Plane rotation is ZYZ rotation or Z (Azimuth); Y (Dip right hand down looking along the strike); Z (Pitch in plane rotated down from Azimuth direction). Search rotation angles have been based on the underlying geological strike and grade continuity based on a structural analysis.

Table 11: Summary of the Variogram parameters used for the Kalgold deposit, the Central Schist domains use the East limb parameters.

		Search Orientation (Geology Plane)			Nugget	1st Structure				2nd Structure			
Domain	**Type**	**Bearing**	**Dip**	**Pitch**	**C0**	**C1**	**Major**	**Semi-major**	**Minor**	**C2**	**Major**	**Semi-major**	**Minor**
Domain ELS	Corellogram	330	66	23	0.39	0.45	50	20	10	0.16	205	120	45
Domain ELC	Corellogram	345	70	25	0.42	0.27	45	35	10	0.31	115	95	45
Domain ELN	Corellogram	350	70	25	0.38	0.46	12	15	15	0.16	140	70	55
Domain WLS	Corellogram	330	65	6	0.52	0.33	30	20	15	0.15	370	280	50
Domain WLC	Corellogram	335	65	7	0.37	0.48	25	25	8	0.15	180	280	60
Domain WLN	Corellogram	350	70	25	0.38	0.46	12	15	15	0.16	140	70	55
Domain CSS	Corellogram	330	66	23	0.39	0.45	50	20	10	0.16	205	120	45
Domain CSC	Corellogram	345	70	25	0.42	0.27	45	35	10	0.31	115	95	45
Domain CSN	Corellogram	350	70	25	0.38	0.46	12	15	15	0.16	140	70	55

(iv) *Provide details of any relevant specialized computer program (software) used, with the version number, together with the estimation parameters used*.

The 2018 Kalgold model has been compiled using Leapfrog Geo 4.2 for geological modelling, Isatis 2018 for all geostatistical analysis and Micromine 2018 for the Resource Estimation and drillhole validation. The estimate has been completed using the Ordinary Kriging methodology which was assessed to be the best option for this deposit. Estimation parameters are outlined in detail above in section 4.2(ii).

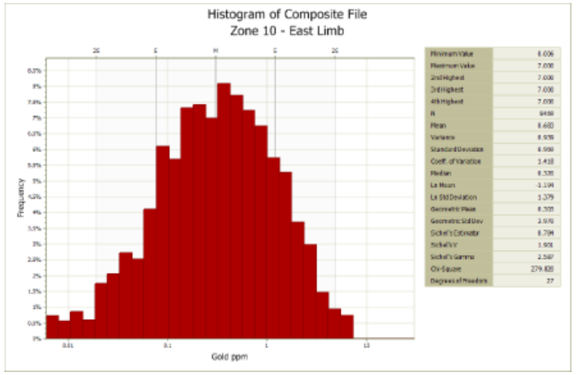
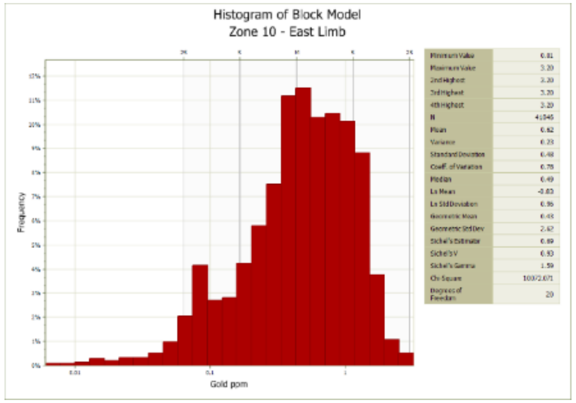
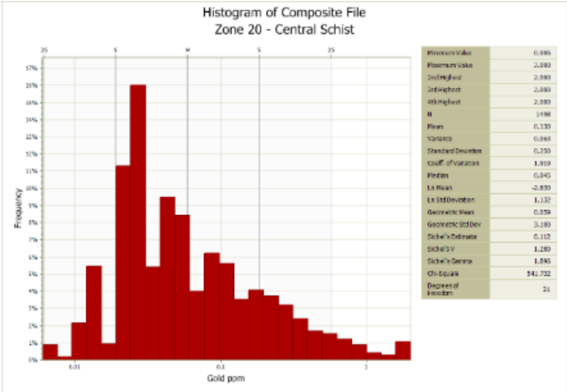
(v) *State the processes of checking and validation, the comparison of model information to sample data and use of reconciliation data, and whether the Mineral Resource estimate takes account of such information.*

Validation checks

The comparable statistics and graphs presented in the figures and table below show that there is a significant reduction in variance in the model as a result of the smoothing in the estimate. This is a side effect of the lack of drilling. Domain 20 has not been estimated so there are no Block stats for the comparison.

Table 12: Comparison of composite grade, declustered composite grade and block grade for Kalgold domains 10, 20 and 30.

Grade	Mean	Median	Variance	COV
Raw Au Z10	0.64	0.28	1.35	1.81
Declus Au Z10	0.63	0.21	1.56	1.98
Top Cut Au Z10	0.60	0.21	0.92	1.59
Block Au Z10	0.52	0.49	0.23	0.78
Raw Au Z20	0.06	0.005	0.08	4.70
Declus Au Z20	0.08	0.005	0.10	3.90
Top Cut Au Z20	0.07	0.005	0.04	2.67
Block Au Z20				
Raw Au Z30	0.63	0.28	1.96	2.22
Declus Au Z30	0.61	0.23	1.74	2.17
Top Cut Au Z30	0.58	0.23	0.82	1.54
Block Au Z30	0.30	0.22	0.08	0.95

						
					Histogram of blockmodel Zone 20 - Central Schist	

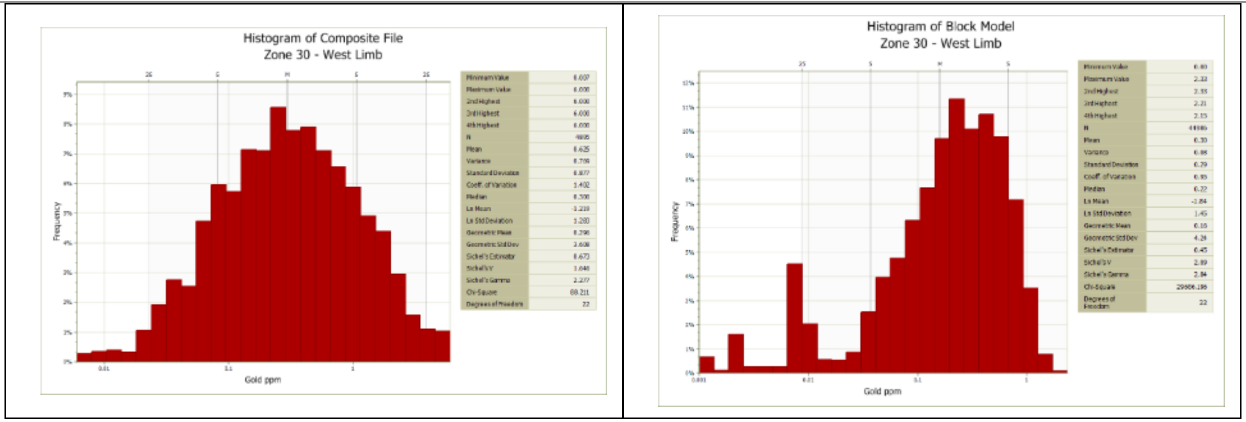


Figure 39: Comparison of composite and block grade distribution for domains 10, 20 and 30. Central Schist (domain 20) was not estimated in this run.

Some 56% of the estimated blocks have been filled by the more robust first passes 1 and 2 with half of the remainder being populated by the third pass. The fourth pass is simply a filler pass and does not contribute to the resources. This is indicative of the under drilled nature of the resource. It would be better to have the majority of the resource estimated in the first pass as this is more indicative of the high grade shoot lengths.

Table 13: Proportion of the model estimated by each pass.

	Number of blocks	**% estimated by each pass**
Total Blocks	98,503	
Pass 1	28,519	29%
Pass 2	26,371	27%
Pass 3	21,930	22%
Pass4	21,683	22%

Swath Plots

Swath plots were generated to compare the block grades to composite grades for easting, northing and elevation slices through the deposit. Block model grades generally follow the composites and display an adequate amount of smoothing.

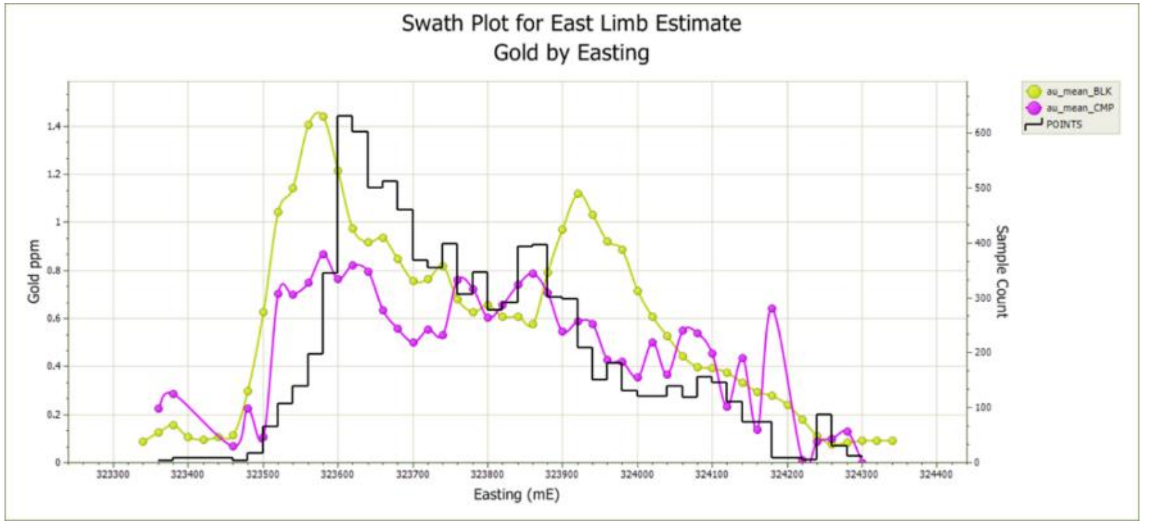


Figure 40: East Limb Validation swath plot by 20m easting increment.

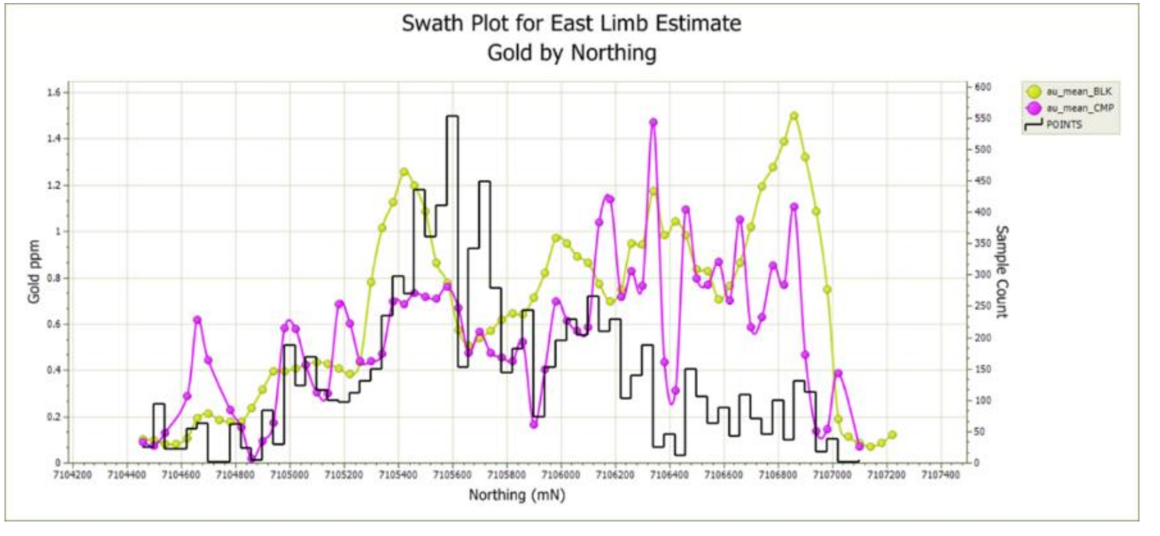


Figure 41: East Limb Validation swath plot by northing in 60m increments.

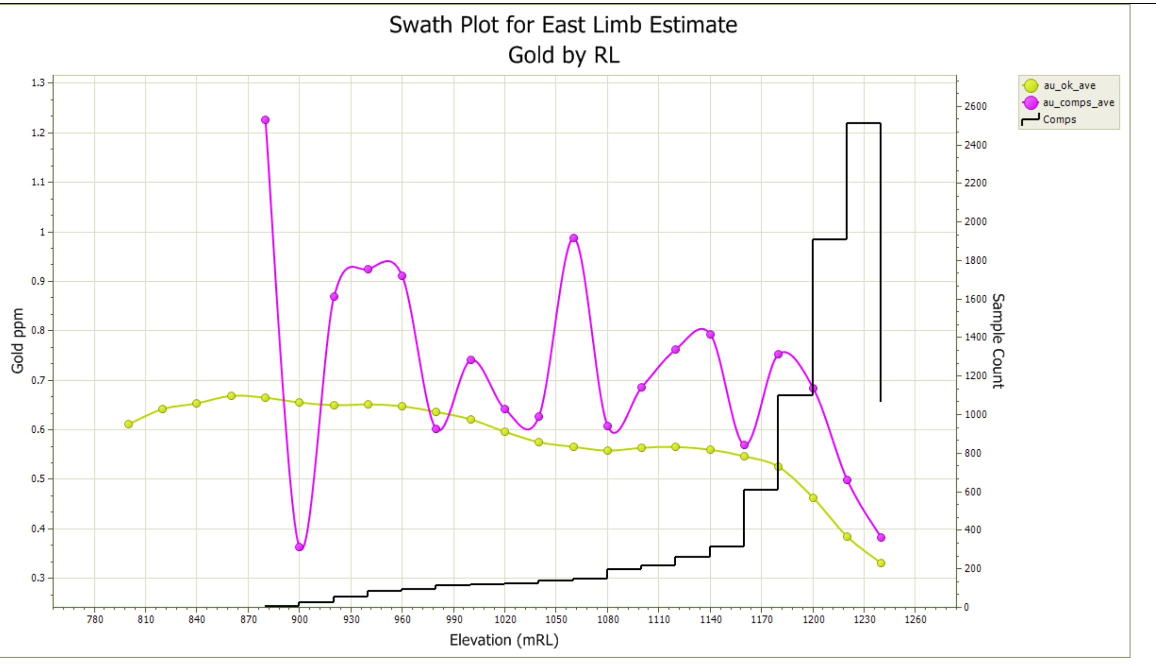


Figure 42: Validation swath plot by elevation in 60m increments.

Impact of Anomalous or Historical Data

The potential impact of anomalous data has attempted to have been controlled through the exclusion of some holes, holes that were obviously misplaced or had grade profiles that did not appear to be in the correct locations were excluded from the resource. The habit of sampling only obviously mineralised material has resulted in a large number of holes and gaps in the database. Whilst this has been handled in the compositing process by inserting a background grade of 0.005g/t Au it is possible that these low grade “non-sampled” zones will have a negative impact on the estimate, dragging the overall head grade down. It was felt this was preferable to maintaining the Null value and having the estimate fill blocks in low grade and waste areas with high grades spilled over from the small modelled intersections.
Given the majority of the drilling into the deposit is historical drilling it was not possible to exclude historical drilling from the dataset. The assay methods used have changed little since the mid-nineties and the QA data indicates the sampling methods are robust enough for inclusion into this model.

Geological Risk

There is an inherent risk in the resource due to the early stage of the resource drill out and the lack of drilling. This risk has been reflected in the resource classification process. However the Geological model is considered robust as the stratigraphy is well understood. There are some questions around the structural models and the mineralisation and alteration domains however these issues are not considered overly material at this stage.

Estimation Risk

Estimation risk was assessed using cross validation plots and a supporting ID2 estimate. The Inverse Distance estimate plotted against the Ordinary Kriged estimate below indicates the ordinary kriged estimate is robust. The GT curves from both estimates replicate each other indicating no significant estimation issues with the OK estimate showing some additional smoothing related to the variograms and high nugget.

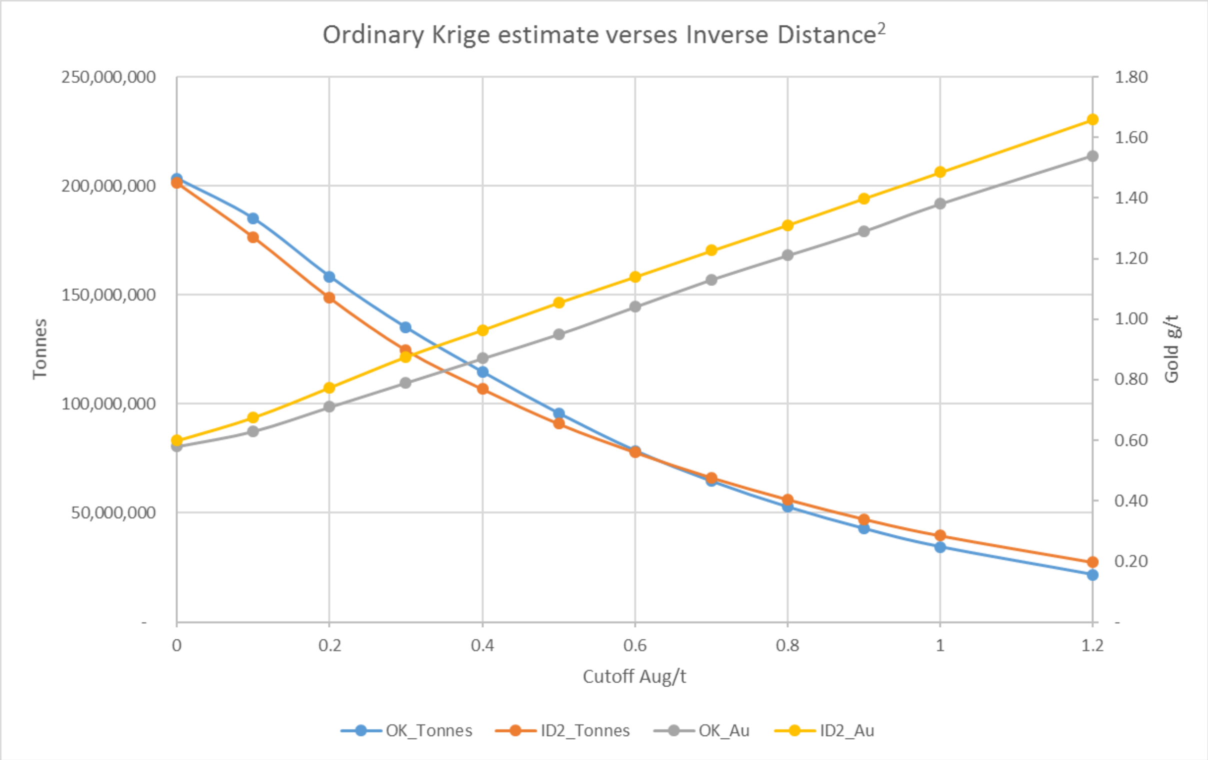


Figure 43: Resource OK estimate GT curves with an ID check estimate showing the OK estimate is robust. The ID estimate should show less smoothing at higher grades due to the lack of a nugget variable in the estimation algorithm.

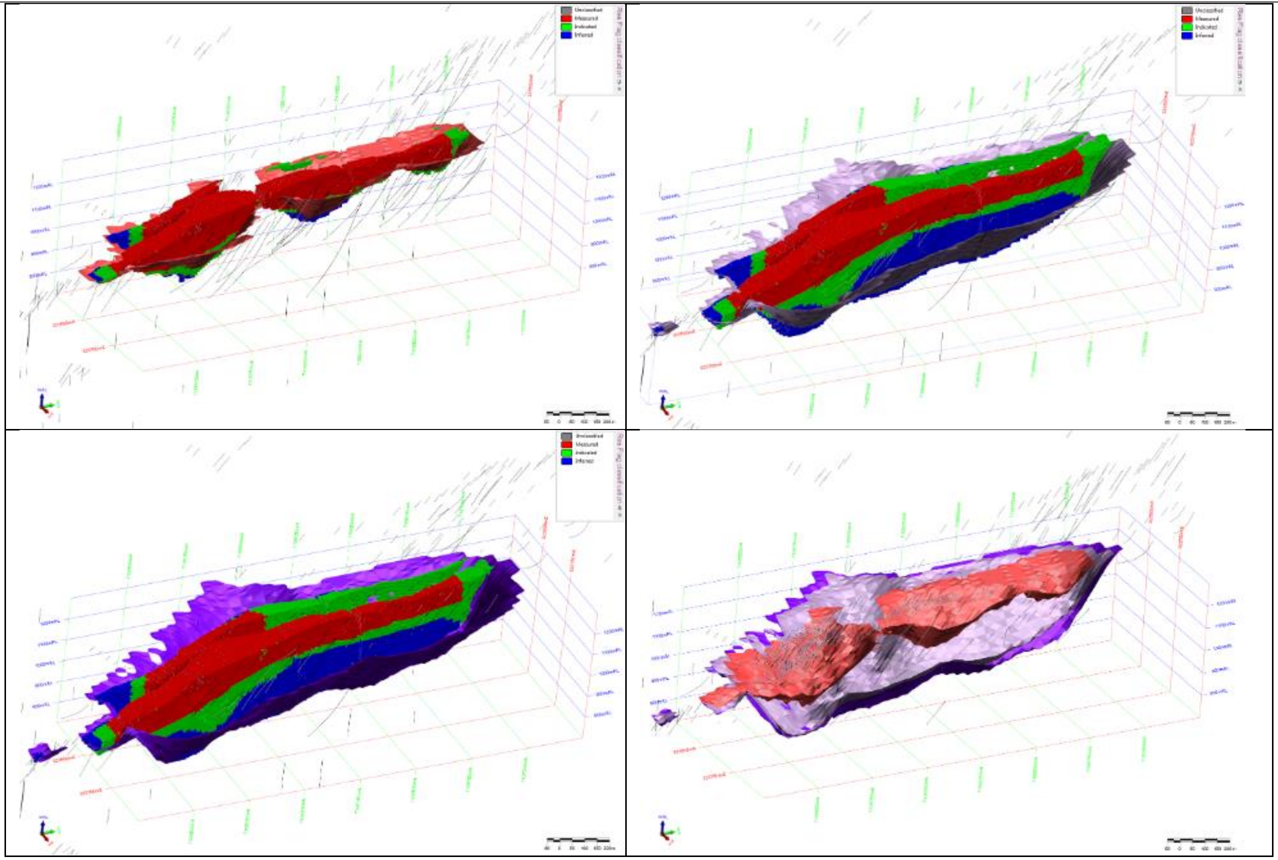
Cross Validation plots were generated for each of the domains to compare estimation and search parameters with composite data. The process compares the estimated grade at each composite sample location using the relevant search and estimation parameters with the actual composite grade. Results show an acceptable correlation between the composite grades and corresponding estimated values. There is no significant bias in the estimates and the mean and variance of the composite and estimated values similar.

(vi) *Describe the assumptions made regarding the estimation of any co-products, by-products or deleterious elements.*

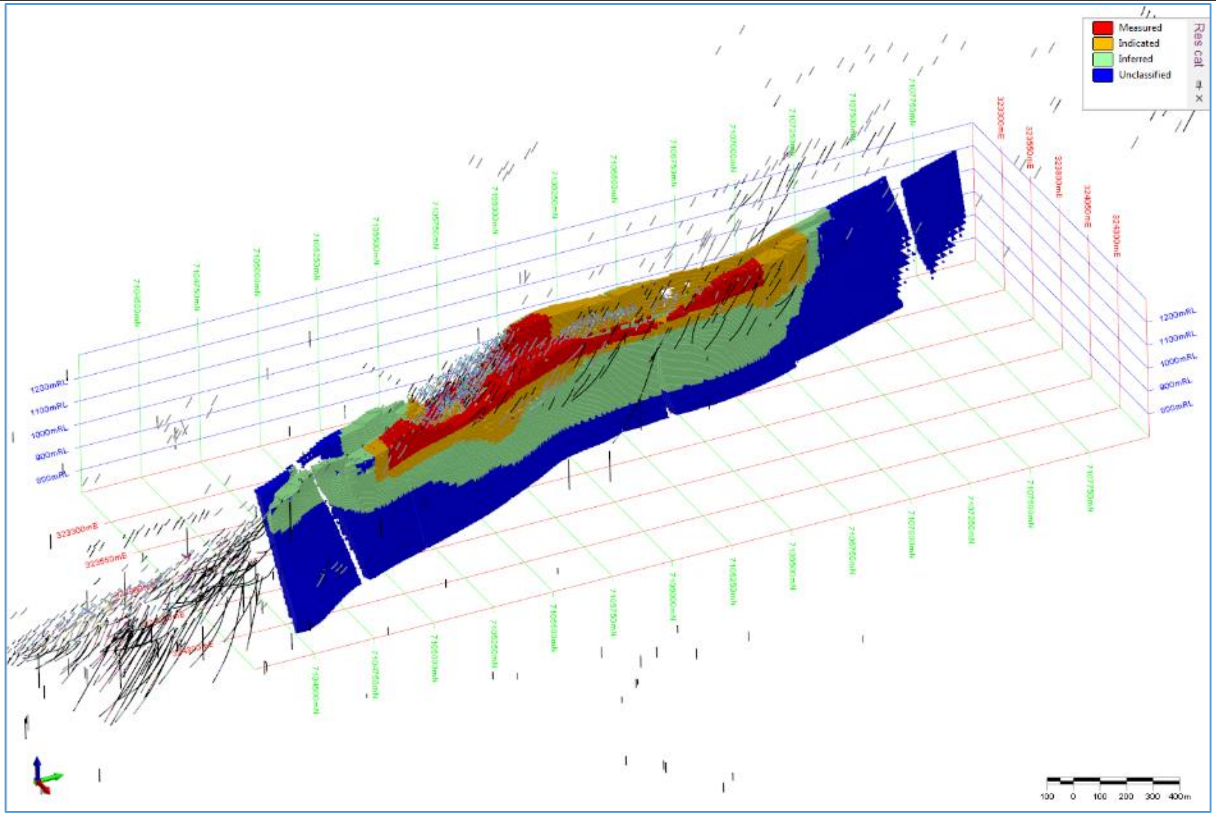
			There are no co-products, by-products or deleterious elements included, only gold has been modelled. The estimate may be expanded to include elements such as copper, bismuth and sulphur as part of the geomet model development.
4.3	Reasonable and realistic prospects for eventual economic extraction		*i) Disclose and discuss the geological parameters. These would include (but not be limited to) volume I tonnage, grade and value of quality estimates, cut-off grades, strip ratios, upper- and lower- screen sizes*. *ii) Disclose and discuss the engineering parameters. These would include mining method, dilution, processing, geotechnical, geohydraulic and metallurgical) parameters*. *iii) Disclose and discuss the infrastructure, including, but not limited to, power, water, site-access* *iv) Disclose and discuss the legal, governmental, permitting, statutory parameters*. *v) Disclose and discuss the environmental and social (or community) parameters*. *vi) Disclose and discuss the marketing parameters*. *vii) Disclose and discuss the economic assumptions and parameters. These factors will include, but not limited to, commodity prices and potential capital and operating costs* *viii) Discuss any material risks* *ix) Discuss the parameters used to support the concept of 'eventual'* The Kalgold deposit has been in production over the last 23 years and has established operating parameters and costs. Details on infrastructure, legal, permitting etc are discussed above in the project outline (Section 1), and full details are available in the company's annual reports and F20 filings with the NYSE. In order to demonstrate reasonable and realistic prospects for eventual extraction, the September 2018 resource declaration is constrained within an optimal pit shell generated at R650/g, at the break even cut-off grade cut-off grade of 0.44 g/t Au. The full technical & economic input parameters utilised for the Whittle pit optimisation run are tabulated below.

Kalgold Input Parameters: Initial Pit Optimization Runs		
S.No.	Parameter	Input_Resource Run
1	Geology Model	KG201806_RSV_OK_10x20x20rblk.dm
2	Grams to Ounces	31.10348
3	Reference mining faces	22nd June 2018 Survey
4	Latest waste dump survey	Dump surveys
5	Oxidised surface	Defined in the model in the model under öxide"field
6	Miining Block Dimensions	X=10 m Y=20 m Z=20 m
7	Geological Recovery	100%
8	Mining Recovery	100%
9	Mining Dilution	0%
10	Geotechnical Slope Design Parameters	33.5 Degrees and 52 Degrees (Weathered and Fresh Respectively)
11	Gold Price (ZAR/gm)	650
12	Exchange rate (USD:ZAR)	13.7
13	By products	None
14	Royalty (R/gm)	16.25
15	TCRC (R/gm)	16.25
16	Discount Rate	7.50%
17	Processing Cost (R/Mill tonne)	175.00
18	Process Recovery	85%
19	Price Escalation	None
20	Inflation	None
21	Capital cost	None
22	No Go Mining Areas	None
23	Average Mining Cost-R/t - Scenario 1	33
24	Average Mining Cost-R/t - Scenario 2	25
25	Diesel Cost (R/ltr)	13.63
26	Reference elevation	1220 m
27	Plant Throughput per annum	1 680 000
28	Services R/ton Miil	60.00
29	ROM R/ton mill (Re-handling)	NA

In the initial optimisation run two sets of costs were used, a lower cost of ZAR25/t and a higher cost of ZAR33/T. The resource is constrained to the more conservative mining cost ZAR 33/T.

			 Figure 44: The various optimisation shells considered as reporting constraints. Top left = Economic LOM shell, Top Right = SAR650/g MCST SAR33/t, Bottom Left = SAR650/g SAR25/t, bottom right = all shells (red = current LOM, pink = 33R/t and purple = 25R/t).
4.4	Classification Criteria	(i)	*Describe criteria and methods used as the basis for the classification of the Mineral Resources into various confidence categories*. The geological model is considered robust as it is based upon the well understood stratigraphic model with defined geological units that are readily mapped between drillholes and along strike. Whilst the geology has been subject to significant amounts of strain and folding the strain direction parallels the stratigraphy in the area of the deposit resulting in a simple stratigraphic model. There are several cross cutting dykes that stope out the mineralisation and are readily mapped using field observations and geophysics. There are several poorly mapped cross cutting faults that potentially impact the Water Tank North resource area that have not been included into the model. This adversely impacts the confidence in the model in this area and the classification is downgraded as a result.

			The grade model continuity is considered moderately good, variography and 3D analysis indicates the grade is relatively continuous and tightly constrained to the extents of the BIF units. Mapping the BIFs essentially maps the grade distribution. Within this broad envelope of the BIF there is a strong structural component to the grade distribution which results in shallow northerly plunging high grade lozenges that are contained in an overall broad tablet-type low grade halo constrained within the BIF. These grade lozenges are in the order of 40-80m in length and would require a high density of drilling to accurately map these within the model, this is well inside the current drill density and this lack of drill density negatively impacts on the robustness of the estimate. The grade model has been evaluated using estimation parameters such as Conditional Bias Slope, kriging efficiency, average sample distance, number of samples informing the estimate and relationship to the variogram. This data was then used to generate a series of wireframes for Measured, Indicated and Inferred, the wireframes were adjusted to account for the continuity seen in the geological model. The figure below shows a 3D view of the resource model coloured by resource classification, whilst this method results in a better more coherent result and maintains the reserve it is not fully indicative of the actual robustness of the estimate. All efforts should be made to ensure the classified areas of the model are appropriately drilled out to buttress the assumptions implicit in the broad classifications imposed on this model.

			 Figure 45: The Kalgold model coloured by resource classification, Resource has been depleted to remove mined material as of 19/09/2018 The resource category field (rescat) data shown in the figure should be used for reporting, however significant drilling will need to be done over the next year based on the automatic classification field (resflag) in order to bring the resource confidence level up to better match that indicated in the resource and reserve figures. The grades appear to be relatively consistent which allows this broad classification to be made but it is unlikely to be suitable for robust reserve planning. This deposit remains significantly under drilled.
4.5	Reporting		*i) Discuss the reported low and high grades and widths together with their spatial location to avoid misleading the reporting of Exploration Results*, *Mineral Resources or Mineral Reserves* *ii) Discuss whether the reported grades are regional averages or if they are selected individual samples taken from the property under discussion*. *iii) State assumptions regarding mining methods, infrastructure, metallurgy, environmental and social parameters. State and discuss where no mining-related assumptions have been made* *iv) State the specific quantities and grades I qualities that are reported in ranges and/or widths, and explain the basis of the reporting*.

v) Present the detail for example open pit, underground, residue stockpile, remnants, tailings, and existing pillars or other sources in the Mineral Resource statement
vi) Present a reconciliation with any previous Mineral Resource estimates. Where appropriate, report and comment on any historic trends (eg. global bias).
vii) Present the defined reference point for the tonnages and grades reported as Mineral Resources.
viii) If the CP is relying on a report, opinion, or statement of another expert who is not a CP, disclose the date, title, and author of the report, opinion, or statement, the qualifications of the expert and why it is reasonable for the CP to rely on the other expert, any significant risks, and any steps the CP took to verify the information provided.
ix) State the basis of equivalent metal formulae, if applied.

All Exploration Results are reported either as full length intersections or as higher grade intervals within a low grade envelope where significant high grade intervals have been recorded. All intervals are presented with Hole ID's and on sections and plans in order to avoid misleading reporting.

Reconciliation

The June 2018 model was compared against the original 2017 LOM model, the area compared was unmined (as of June 22, 2018) and above the 2018 Model SA RND 650,000 / Kg price NPV Scheduler shell. The table below shows the comparison between the two models within the tested volume. A significant increase in ounces is evident due to the extensional drilling and discovery of high grade material in the Water Tank North area.

Table 14: Comparison of the June 2018 model against the 2017 LOM model.

2018 run1 Rand 650k Mcost 25 volume	Tonnes	Gold ppm	Ounces
201704 Model	48,072,000	1.02	1,574,000
201806 Model	63,854,000	1.10	2,162,000

- @ 0.6g/t lower cut-off
- Measured, Indicated and Inferred

Error! Reference source not found. Table 14 shows that the new 2018 US$1275 shell has pushed the value in ground to the north outside the 2017 shell. Whilst additional drilling in the bridge zone has pushed metal between the pits at depth, shallow drilling has so far not increased the ounces in this area. Additional shallow drilling within the bridge zone should help define an increase in ounces held within the high grade pods found within this area.

The OK resource model was reconciled against both a grade control model built using OBO grade control software and past production.

The results of the reconciliation against production is shown in. The Milled estimate was supplied by the Kalgold Operation along with mine surfaces that represented to first (July 2015) and last (January 2018) months of the table. Unfortunately the start ASB wireframe was for the end of May rather than end of June resulting in the reconciled figures being one month short on production. To account for the missing tonnages an average monthly tonnage and average monthly ounce profile for the whole period was applied as the Junes production and added to the overall total. This brought the Milled figure up to match the tonnages determined from the models for that same period.

The GC simulated model uses a different method (conditional simulation) and a different dataset (the blast hole data) compared to the resource estimate method (Ordinary Kriged) and exploration dataset (no blast holes used). By comparing two separate models based on two separate estimation methods we have a way of assessing potential issues with the estimate methodology. The results indicate that there is very little difference between the models and that they both accurately model the results from the reconciliation.

The RSO model has been reported at the economic cut-off (rounded) of 0.7g/t, the GC models have been reported at the 0.8g/t cut-off to match the 18 month history taken from the Kalgold 2018 cut-off booklet.

Table 15: Table showing GC model and RSO model against Reconciled Mined (Milled) total of the period Jun2015 to Jan2018.

	Tonnes	Gold	Ounces
Milled Estimate (RM)	4,004,462	0.97	124,919
Resource (RSO) OK Estimate (0.7 cut)	3,920,756	1.08	135,996
GC Simulated (0.8 cut)	3,199,289	1.26	129,254
SMU Reblocked GC Simulated (0.8 cut)	3,607,866	1.07	124,542
RSV Plan model (GC+RSO merged) (0.8 cut)	3,633,074	1.00	120,553
RSO OK estimate Diluted (T+9%/AuOz+1%)	3,999,171	1.06	135,996
RSO to GC (reblocked)	109%	101%	109%
RSO to RM	98%	111%	109%
GC (reblocked) to RM	90%	111%	100%
RSO OK (diluted) to RM	100%	109%	109%

The Resource model closely matches the tonnage (109%) and grade (101%) of the GC model after reblocking the GC model to the same block size (support) as the resource model. Reblocking the fine resolution of the simulated model (2.5x2.5x2.5m) up to the same level as the reserve model (10x10x2.5m) smooths the grade profile through introducing a similar level of dilution as seen in the reserve model. The grade in the GC model is the e-type mean taken from all 50 simulations and shows a close match to the ordinary kriged grade of the resource model.

The Milled estimate shows 4Mt mined (including a one month average tonnage added to match the time period of the wireframed surfaces) over the period for 125KOz produced. All estimation methods are showing less tonnage compared to the Milled number. Table 15 shows that when 2% tonnage waste dilution is added to the model the Resource tonnages come to the same as that of the Milled Estimate. The dilution does not greatly affect the resource grade. This indicates there is possibly a dilution problem occurring through the mining process where some of the tonnage being sent to the mill is dilution.

The very close match between the GC model, the Resource model and the production data indicates the Resource model is robust and the model is valid for use. The results show that there is a significant dilution issue apparent in the mining process and that this may be having a negative impact on ounces.

There are no external reports or independent expert opinions relied upon for the exploration information provided and metal Equivalents are not applied as gold is the sole metal of interest.

Section 5: Technical Studies			
5.1	Introduction	(i)	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
5.2	Mining Design	(i))	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
5.3	Metallurgical and Testwork	(i)	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
5.4	Infrastructure	(i)	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
5.5	Environmental and Social	(i)	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
5.6	Market Studies and Economic Criteria	(i)	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
5.7	Risk Analysis	(i)	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
5.8	Economic Analysis	(i)	This section is not applicable for the reporting of Exploration Results and Mineral Resources.
Section 6: Estimation and Reporting of Mineral Reserves			
6.1	Estimation and Modelling techniques	(i)	*Describe the Mineral Resource estimate used as the basis for the conversion to Mineral Reserve*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.
		(ii)	*Report the Mineral Reserve statement with sufficient detail indicating if the mining is open pit or underground plus the source and type of mineralisation, domain orebody, surface dumps, stockpiles and all other sources*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.
		(iii)	*Provide a reconciliation reporting historical reliability of the performance parameters, assumptions and Modifying factors, including a comparison with previous Reserve quantity and qualities, if available. Where appropriate, report and comment on any historical trends (e.g. global bias)*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.

6.2	Classification Criteria	(i)	*Describe and justify criteria and methods used as the basis for the classification of Mineral Reserves into various confidence categories, based on the Mineral Resource category, and including consideration of the confidence in all modifying factors*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.
6.3	Reporting	(i)	*Discuss the proportion of Probable Mineral Reserves that have been derived from Measured Mineral Reserve (if any), including the reason(s) therefore.* This section is not applicable for the reporting of Exploration Results and Mineral Resources.
		(ii)	*Present details of for example open pit, underground, residue stockpile, remnants, tailings, and existing pillars or other sources in respect of the Mineral Reserve statement.* This section is not applicable for the reporting of Exploration Results and Mineral Resources.
		(iii)	*Present the details of the defined reference point for the Mineral Reserves. State whether the reference point is the point where the run of mine material is delivered to the processing plant. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported. State clearly whether the tonnages and grades reported for Mineral Reserves are in respect of material delivered to the plant or after recovery*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.
		(iv)	*Present a reconciliation with the previous Mineral Reserve estimates. Where appropriate, report and comment on any historic trends (e.g global bias)*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.
		(v)	*Only Measured and Indicated Mineral Resources can be considered for inclusion in the Mineral Reserve*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.
		(vi)	*State whether the Mineral Resources are inclusive or exclusive of the Mineral Reserve*. This section is not applicable for the reporting of Exploration Results and Mineral Resources.
			Section 7: Audits and Reviews
7.1	Audits and Reviews	(i)	*State type of review/audit (e.g. independent, external), area (e.g. Laboratory, drilling, data, environmental compliance etc.), date and name of the reviewer(s) together with their recognised professional qualifications.* Mr Mark Wanless, Pr.Sci.Nat, Principal Geologist of SRK Consulting (South Africa) (Pty) Ltd (**SRK**) was engaged by Harmony to undertake an independent audits of the Mineral Resources for Kalgold following completion of the first phase of drilling in August 2018, and again to review Harmony's latest September 2018 Mineral Resource estimate.

Harmony supplied a dataset of information for SRK's review, which included:

- The exploration drilling database including the collar, down hole survey, assay, lithological structure, weathering, core recovery, alteration, structural, and magnetic susceptibility logs;
- Grade control drilling database of desurveyed data;
- Exploration drilling 2m composite data used in the estimate;
- Wireframes of the major lithology, weathering surfaces, classification, original topography and June 2108 pit surface, and a reporting surface;
- Block models for the Mineral Resource estimate, and estimate based on the grade control data, and a composite block model combining the grade control and exploration block models;
- Quality Assurance and Quality Control (**QAQC**) results, including blanks, duplicates and Certified Reference Materials (**CRMs**).

SRK conducted a range of checks to validate the choices made by Harmony during the estimation and checks on the correlation between the estimation data and the estimation results.

(ii) *Disclose the conclusions of relevant audits or reviews. Note where significant deficiencies exist and remedial actions are required*.

SRK's reviews of the interim June 2018 Mineral Resource estimate and the September 2018 Mineral Resource estimate concluded that Harmony had followed a robust process which included testing and optimising of the parameters and methods used in the estimates. Main comments and recommendations of the audit reviews included:

- Harmony has a comprehensive QAQC program and data quality monitoring system in place, and there is no systematic bias. Most of the CRMs have a mean value within 2% of the Certified Value. SRK was satisfied with the CRMs on average, and do not consider there to be evidence of accuracy or precision problems. However results from the program have shown that some sample swaps do occur, and SRK has recommended that Harmony investigate, along with the analytical laboratory the source of the errors and implement improved controls to ensure these do not occur in the planned drilling program.
- SRK's review highlighted that normal scores transformed semi-variograms have a more robust structure with a lower nugget, and longer ranges than observed in the correllograms used by Harmony. On this basis SRK recommend that Harmony consider using a normal scores transform in the continuity modelling for less smoothing and improved local estimate.

While SRK were of the view that further optimisation of the estimate may be possible (along the lines of the recommendations cited above, these are likely to impact the local estimates, but not the global results. Additional exploration will improve the confidence in the estimates and is likely to convert more of the inferred Mineral Resources within the current optimised pit shell to Indicated and Measured Mineral Resources. The SRK audited Mineral Resource statement as at 19 September is tabulated below:

Resource Category	Mt	Au g/t	Au (Koz)
Measured	11.3	0.85	310
Indicated	36.4	0.96	1,125
Inferred	28.7	0.98	903

			Total | 76.5 | 0.95 | 2,339 The Mineral Resources are reported inclusive of any Mineral Reserves / that may be derived from them. However, the Mineral Resource is not a Mineral Reserve, and there is no guarantee that all or part of the Mineral Resource will be converted to a mineral Reserve. The Mineral Resources are reported above a 0.44 g/t cut off, and within a NPV Scheduler optimised pit shell. A mining cost of ZAR 33/t and a gold price of ZAR 650/g were used along with the current mining parameters of Kalgold to generate the pit shell.
Section 8: Other Relevant Information			
8.1		(i)	*Discuss all other relevant and material information not discussed elsewhere*. No additional information is relevant; all material information has been disclosed.
Section 9: Qualification of Competent Person(s) and other Key Technical Staff. Date and Signature Page			
9.1		(i)	*State the full name, registration number and name of the professional body or Recognised Professional Organisation (RPO) for all the CPs. State the relevant experience of the CP(s) and other key technical staff who prepared and are responsible for the Public Report*. Ronald Reid, a Competent Person who is registered with the Australian Institute of Geoscientists membership ID: 3507
		(ii)	*State the CP's relationship to the issuer of the report* Ronald Reid is a full time employee of Harmony Gold (PNG Services) Pty Ltd, a 100% owned subsidiary of Harmony Gold Mining Company Limited.
		(iii)	*Provide the Certificate of the CP (Appendix 2), including the date of sign-off and the effective date, in the Public Report*. **Report Description** **2016 Competent Persons statement:** **SAMREC Table 1 Report – Kalgold Operations, North West Province, Republic of South Africa**

Certificate of Competent Person:

As the Competent Person of the report entitled “SAMREC Table 1 Report – Kalgold Operations, North West Province, Republic of South Africa”, I hereby state:-

1. My name is Ronald Reid and am the Group Resource Geologist, Harmony Southeast Asia; located at Level 2, 189 Coronation Drive, Milton QLD 4064.

2. I am a member of The Australian Institute of Geoscientists (membership ID: 3507).

3. I have a Bachelor of Science degree (Geology; 1995) and a 1st Class Honours degree (Geology, 1995) from the James Cook University.

4. I have worked continuously since graduation in my field of study, in nickel, iron ore, copper, uranium, gold and copper-gold exploration and mining.

5. I am a ‘Competent Person’ as defined in the SAMREC Code.

6. I have visited the site on one occasion.

8. I am responsible for the entire report.

9. I am not aware of any material fact or material change with respect to the subject matter of the Report that is not reflected in the Report, the omission of which would make the Report misleading.

10. I declare that this Report appropriately reflects the Competent Person’s/author’s view.

11. I am ~~independent~~/not independent of Harmony Gold.

12. I have read the SAMREC Code (2016) and the Report has been prepared in accordance with the guidelines of the SAMREC Code.

13. I am an employee in respect of Harmony Gold.

14. At the effective date of the Report, to the best of my knowledge, information and belief, the Report contains all scientific and technical information that is required to be disclosed to make the Report not misleading.

Dated at Brisbane and 19/9/2018.

[Signed]

Ronald Reid

Table 2: Kalgold exploration and resource definition drill results to September 2018

Hole ID	Drill method	North (m)	East (m)	RL (m)	Depth (m)	Azi (ºtrue)	Dip	From (m)	To (m)	Interval (m)	Au (g/t)	Intercept	Comments
A-Zone – Watertank													
KG001	RC	7105098	324135	1237	186	253	-65	115	150	35	0.75	35m @ 0.75 g/t Au from 115m	
Including								137	148	11	1.17	11m @ 1.17 g/t Au from 137m	
And								158	165	7	1.00	7m @ 1 g/t Au from 158m	
KG002	RC	7104994	324139	1234	141	253	-65	63	94	31	0.62	31m @ 0.62 g/t Au from 63m	
KG003	RC	7105011	324179	1237	209	253	-70	115	125	10	0.72	10m @ 0.72 g/t Au from 115m	
And								137	147	10	0.71	10m @ 0.71 g/t Au from 137m	
And								176	183	7	1.73	7m @ 1.73 g/t Au from 176m	
KG004	RC	7104908	324173	1234	191	253	-75	146	165	19	0.59	19m @ 0.59 g/t Au from 146m	
KG005	RC	7105066	324021	1231	222	253	-60	152	159	7	2.06	7m @ 2.06 g/t Au from 152m	
KG006	RC	7105932	323631	1221	227	260	-50	147	152	5	0.68	5m @ 0.68 g/t Au from 147m	
KG007	RC	7105816	323617	1218	144	250	-60	83	99	16	1.40	16m @ 1.4 g/t Au from 83m	
KG008	RC	7105022	323887	1235	200	253	-55	134	139	5	0.43	5m @ 0.43 g/t Au from 134m	
KG011	RC	7106902	323477	1244	156	253	-60	78	83	5	0.51	5m @ 0.51 g/t Au from 78m	
KG012	RC/DD	7106969	323676	1244	493	253	-65	345	369	24	1.37	24m @ 1.37 g/t Au from 345m	RC to 200m
And								374	378	4	1.15	4m @ 1.15 g/t Au from 374m	
KG014	RC/DD	7106010	323780	1243	395	240	-57	164	187	23	1.24	23m @ 1.24 g/t Au from 164m	RC to 136m
And								299	362	63	1.32	63m @ 1.32 g/t Au from 299m	
Including								342	350	8	3.01	8m @ 3.01 g/t Au from 342m	
KG015	RC/DD	7105870	323763	1210	284	253	-55	77	94	17	1.45	17m @ 1.45 g/t Au from 77m	
And								109	118	9	0.55	9m @ 0.55 g/t Au from 109m	RC to 204m
And								127	145	*18*	0.68	18m @ 0.68 g/t Au from 127m	
And								242	255	13	0.72	13m @ 0.72 g/t Au from 242m	
Including								247	253	6	1.26	6m @ 1.26 g/t Au from 247m	
And								262	266	4	1.18	4m @ 1.18 g/t Au from 262m	
KG016	RC/DD	7105898	323861	1211	518	255	-67	257	342	85	1.50	85m @ 1.50 g/t Au from 257m	RC to 169m
Including								257	291	34	1.90	34m @ 1.90 g/t Au from 257m	
And								459	505	46	0.76	46m @ 0.76 g/t Au from 459m	
Including								475	486	11	1.37	11m @ 1.37 g/t Au from 475m	
KG017	RC/DD	7105859	323887	1211	489	256	-63	230	239	9	1.43	9m @ 1.43 g/t Au from 230m	RC to 200m
And								247	262	15	0.53	15m @ 0.53 g/t Au from 247m	
And								271	284	13	1.24	13m @ 1.24 g/t Au from 271m	
And								318	324	6	2.53	6m @ 2.53 g/t Au from 318m	
And								442	461	19	1.89	19m @ 1.89 g/t Au from 442m	
Including								443	451	8	3.06	8m @ 3.06 g/t Au from 443m	
Including								456	460	4	2.19	4m @ 2.19 g/t Au from 456m	
KG018	RC/DD	7106099	323793	1242	476	253	-63	227	271	44	1.31	44m @ 1.31 g/t Au from 227m	RC to 217m
Including								227	231	4	1.47	4m @ 1.47 g/t Au from 227m	
Including								236	242	6	0.56	6m @ 0.56 g/t Au from 236m	
Including								247	270	23	2.00	23m @ 2.00 g/t Au from 247m	
And								276	291	15	1.44	15m @ 1.44 g/t Au from 276m	
Including								277	287	10	1.96	10m @ 1.96 g/t Au from 277m	
And								399	420	21	1.77	21m @ 1.77 g/t Au from 399m	
And								425	455	30	1.06	30m @ 1.06 g/t Au from 425m	

			Including					438	455	17	1.45	17m @ 1.45 g/t Au from 438m	
KG019	RC/DD	7105889	323822	1211	414	254	-61	163	202	39	0.87	39m @ 0.87 g/t Au from 163m	RC to 165m
			Including					169	174	5	0.71	5m @ 0.71 g/t Au from 169m	
			Including					183	195	12	1.52	12m @ 1.52 g/t Au from 183m	
			And					356	381	25	1.32	25m @ 1.32 g/t Au from 356m	
			Including					360	377	17	1.61	17m @ 1.61 g/t Au from 360m	
KG023	RC/DD	7106131	323850	1242	410	256	-61	287	346	59	1.28	59m @ 1.28 g/t Au from 287m	RC to 180m
			Including					295	321	26	1.71	26m @ 1.71 g/t Au from 295m	
			Including					326	337	11	1.56	11m @ 1.56 g/t Au from 326m	
			Including					342	346	4	1.45	4m @ 1.45 g/t Au from 342m	
KG025	RC/DD	7105938	323993	1246	190	255	-60	NA, failed RC precollar					RC to 190m
KG026	RC/DD	7105802	323905	1213	497	252	-60	243	249	6	0.54	6m @ 0.54 g/t Au from 243m	RC to 210m
			And					259	304	45	1.38	45m @ 1.38 g/t Au from 259m	
			Including					259	265	6	1.43	6m @ 1.43 g/t Au from 259m	
			Including					278	300	22	2.01	22m @ 2.01 g/t Au from 278m	
			And					452	459	7	0.80	7m @ 0.80 g/t Au from 452m	
KG027	RC/DD	7105736	323933	1210	345	254	-60	223	236	13	0.78	13m @ 0.78 g/t Au from 223m	RC to 227m
			And					248	274	26	1.58	26m @ 1.58 g/t Au from 248m	
			Including					250	274	24	1.66	24m @ 1.66 g/t Au from 250m	
			And					301	305	4	0.50	4m @ 0.50 g/t Au from 301m	
			And					314	321	7	1.81	7m @ 1.81 g/t Au from 314m	
KG028	RC/DD	7105693	323955	1211	424	254	-59	128	132	4	2.18	4m @ 2.18 g/t Au from 128m	RC to 166m
			And					211	218	7	0.72	7m @ 0.72 g/t Au from 211m	
			And					230	260	30	0.59	30m @ 0.59 g/t Au from 230m	
			Including					248	258	10	1.02	10m @ 1.02 g/t Au from 248m	
			And					306	324	18	2.75	18m @ 2.75 g/t Au from 306m	
			Including					308	312	4	1.41	4m @ 1.41 g/t Au from 308m	
			Including					318	324	6	6.68	6m @ 6.68 g/t Au from 318m	
			And					329	337	8	1.50	8m @ 1.50 g/t Au from 329m	
			And					365	386	21	1.42	21m @ 1.42 g/t Au from 365m	
			Including					369	382	13	1.97	13m @ 1.97 g/t Au from 369m	
KG029	RC/DD	7105660	323971	1211	439	240	-60	201	240	39	1.48	39m @ 1.48 g/t Au from 201m	RC to 50m
			Including					208	218	10	4.23	10m @ 4.23 g/t Au from 208m	
			Including					230	240	10	0.74	10m @ 0.74 g/t Au from 230m	
			And					264	276	12	0.72	12m @ 0.72 g/t Au from 264m	
			Including					265	271	6	1.26	6m @ 1.26 g/t Au from 265m	
			And					306	320	14	0.41	14m @ 0.41 g/t Au from 306m	
KG032	RC	7105840	324049	1241	138	256	-65	NA, failed RC precollar					
KG033	RC/DD	7106017	323952	1242	604	256	-61	371	413	42	1.39	42m @ 1.39 g/t Au from 371m	RC to 222m
			Including					378	410	32	1.68	32m @ 1.68 g/t Au from 378m	
			And					420	424	4	2.18	4m @ 2.18 g/t Au from 420m	
			And					429	444	15	1.05	15m @ 1.05 g/t Au from 429m	
			Including					430	443	13	1.16	13m @ 1.16 g/t Au from 430m	
			And					558	577	19	0.82	19m @ 0.82 g/t Au from 558m	
KG034	RC/DD	7106771	323793	1244	463	252	-65	322	356	34	2.21	34m @ 2.21 g/t Au from 322m	RC to 198m
			Including					322	338	16	1.5	16m @ 1.50 g/t Au from 322m	
			Including					345	356	11	4.41	11m @ 4.41 g/t Au from 345m	
KG035	RC	7106644	323641	1237	241	283	-50	90	114	24	1.68	24m @ 1.68 g/t Au from 211m	
			Including					99	113	14	2.55	14m @ 2.55 g/t Au from 211m	

			And					225	229	4	1.25	4m @ 1.25 g/t Au from 225m	
KG036	RC/DD	7106795	323607	1243	192	264	-60	83	107	24	1.01	24m @ 1.01 g/t Au from 83m	RC to 192m
			Including					83	95	12	1.64	12m @ 1.64 g/t Au from 83m	
KG037	RC	7106847	323570	1243	216	258	-61	47	89	42	1.32	42m @ 1.32 g/t Au from 47m	
			Including					47	55	8	0.88	8m @ 0.88 g/t Au from 47m	
			Including					60	69	9	2.39	9m @ 2.39 g/t Au from 60m	
			Including					74	78	4	3.77	4m @ 3.77 g/t Au from 74m	
KG038	DD	7106223	323710	1202	385	237	-62	123	128	5	1.15	5m @ 1.15 g/t Au from 123m	
			And					138	185	47	1.77	47m @ 1.77 g/t Au from138m	
			And					322	340	18	0.77	18m @ 0.77 g/t Au from 322m	
			Including					327	340	13	0.94	13m @ 0.94 g/t Au from 327m	
KG039	DD	7106716	323798	1244	465	253	-62	302	337	35	1.12	35m @ 1.12 g/t Au from 302m	
			Including					302	307	5	2.78	5m @ 2.78 g/t Au from 302m	
			Including					321	326	5	1.56	5m @ 1.56 g/t Au from 321m	
			Including					331	335	4	1.77	4m @ 1.77 g/t Au from 331m	
			And					400	419	19	0.74	19m @ 0.74 g/t Au from 400m	
			Including					405	412	7	1.51	7m @ 1.51 g/t Au from 405m	
			Including					407	412	5	1.92	5m @ 1.92 g/t Au from 407m	
			And					432	436	4	1.02	4m @ 1.02 g/t Au from 432m	
KG040	RC/DD	7106888	323681	1244	372	250	-60	137	142	5	0.41	5m @ 0.41 g/t Au from 137m	RC to 99m
			And					190	225	35	1.76	35m @ 1.76 g/t Au from 190m	
			Including					191	199	8	0.54	8m @ 0.54 g/t Au from 191m	
			Including					205	225	20	2.81	20m @ 2.81 g/t Au from 205m	
KG041a	RC	7106915	323758	1245	466	241	-67	323	348	25	1.5	25m @ 1.50 g/t Au from 323m	
			Including					331	347	16	1.99	16m @ 1.99 g/t Au from 331m	
			And					421	428	7	1.11	7m @ 1.11 g/t Au from 421m	
			And					445	453	8	0.32	8m @ 0.32 g/t Au from 445m	
KG042	DD	7106225	323710	1202	442	287	-61	106	161	55	2.01	55m @ 2.01 g/t Au from 106m	
			Including					106	145	39	1.71	39m @ 1.71 g/t Au from 106m	
			Including					150	156	6	6.54	6m @ 6.54 g/t Au from 150m	
KG043	RC/DD	7106641	323705	1243	379	253	-65	76	89	13	0.65	13m @ 0.65 g/t Au from 76m	RC to 160m
			And					187	227	40	1.44	40m @ 1.44 g/t Au from 187m	
			Including					188	211	23	1.97	23m @ 1.97 g/t Au from 188m	
			Including					189	207	18	2.41	18m @ 2.41 g/t Au from 189m	
			Including					219	227	8	1.21	8m @ 1.21 g/t Au from 219m	
			And					337	347	10	0.73	10m @ 0.73 g/t Au from 337m	
			And					352	357	5	0.30	5m @ 0.30 g/t Au from 362m	
KG044	RC/DD	7106578	323842	1244	492	254	-65	315	371	56	1.51	56m @ 1.51 g/t Au from 315m	RC to 100m
			And					429	433	4	0.39	4m @ 0.39 g/t Au from 429m	
			And					439	449	10	0.51	10m @ 0.51 g/t Au from 439m	
KG045	RC/DD	7106461	323778	1243	448	257	-65	244	252	8	0.63	8m @ 0.63 g/t Au from 244m	RC to 133m
			And					257	267	10	1.57	10m @ 1.57 g/t Au from 257m	
			And					273	302	29	2.49	29m @ 2.49 g/t Au from 273m	
			And					408	420	12	3.46	12m @ 3.46 g/t Au from 408m	
			Including					408	414	6	6.53	6m @ 6.53 g/t Au from 408m	
KG046a	RC/DD	7106354	323812	1242	490	248	-63	268	317	49	1.5	49m @ 1.50 g/t Au from 268m	RC to 121m
			Including					270	274	4	1.12	4m @ 1.12 g/t Au from 270m	
			Including					280	316	36	1.87	36m @ 1.87 g/t Au from 280m	
			And					348	363	15	0.63	15m @ 0.63 g/t Au from 348m	

And								435	448	13	1.13	13m @ 1.13 g/t Au from 435m	
KG047a	RC/DD	7106250	323929	1242	603	242	-71	522	587	65	1.49	65m @ 1.49 g/t Au from 522m	RC to 100m
Including								534	539	5	1.82	5m @ 1.82 g/t Au from 534m	
Including								549	586	37	2.15	37m @ 2.15 g/t Au from 549m	
KG048	DD	7106996	323430	1244	185	255	-61	67	73	6	0.37	6m @ 0.37 g/t Au from 67m	
KG049	RC	7107262	323368	1246	106	256	-61	62	74	12	0.33	12m @ 0.33 g/t Au from 62m	
And								89	101	12	0.55	12m @ 0.55 g/t Au from 89m	
Including								95	101	6	0.87	6m @ 0.87 g/t Au from 95m	
KG050	DD	7107044	323564	1244	257	255	-61	236	249	13	0.51	13m @ 0.51 g/t Au from 236m	
KG051	RC/DD	7107291	323468	1246	297	253	-64	192	202	10	1.75	10m @ 1.75 g/t Au from 192m	RC to 81m
Including								193	199	6	2.51	6m @ 2.51 g/t Au from 193m	
And								212	222	10	0.53	10m @ 0.53 g/t Au from 212m	
Including								212	218	6	0.73	6m @ 0.73 g/t Au from 212m	
KG052	RC	7107550	323256	1250	141	253	-60	NSR					RC to 141m
KG053	RC	7107558	323315	1250	199	253	-65	NSR					RC to 199m
KG059	DD	7106944	323577	1244	282	253	-61	134	143	9	0.96	9m @ 0.96 g/t Au from 134m	
Including								136	142	6	1.17	6m @ 1.17 g/t Au from 136m	
And								213	218	5	0.54	5m @ 0.54 g/t Au from 213m	
And								226	231	5	0.76	5m @ 0.76 g/t Au from 226m	
And								237	243	6	1.23	6m @ 1.23 g/t Au from 237m	
KG063	DD	7106932	323629	1244	351	256	-60	163	198	35	0.97	35m @ 0.97 g/t Au from 163m	
Including								172	179	7	1.72	7m @ 1.72 g/t Au from 172m	
Including								192	198	6	0.89	6m @ 0.89 g/t Au from 192m	
KG065	DD	7106737	323644	1243	177	252	-61	116	145	29	1.6	29m @ 1.60 g/t Au from 116m	
Including								116	131	15	2.56	15m @ 2.56 g/t Au from 116m	
KG070	DD	7106752	323715	1244	381	249	-56	194	221	27	1.24	27m @ 1.24 g/t Au from 194m	
Including								194	200	6	1.34	6m @ 1.34 g/t Au from 194m	
Including								205	216	11	1.83	11m @ 1.83 g/t Au from 205m	
And								292	296	4	0.95	4m @ 0.95 gt Au from 292m	
KG071	RC/DD	7105108	324142	1239	506	253	-59	247	253	6	1.14	6m @ 1.14 g/t Au from 247m	RC to 201m
And								262	298	36	0.82	36m @ 0.82 g/t Au from 262m	
Including								265	271	6	0.7	6m @ 0.7 g/t Au from 265m	
Including								284	298	14	1.11	14m @01.11 g/t Au from 284m	
And								303	319	16	1.61	16m @ 1.61 g/t Au from 303m	
KG072	RC	7107315	323555	1246	150	254	-55	NA, RC precollar not sampled					RC to 150m
KG073	DD	7106588	323717	1243	375	251	-57	65	77	12	0.61	12m @ 0.61 g/t Au from 65m	
Including								65	72	7	0.95	7m @ 0.95 g/t Au from 65m	
And								183	189	6	1.36	6m @ 1.36 g/t Au from 183m	
Including								185	189	4	1.89	4m @ 1.89 g/t Au from 185m	
And								198	210	12	1.49	12m @ 1.49 g/t Au from 198m	
Including								202	208	6	2.5	6m @ 2.50 g/t Au from 202m	
And								304	330	26	0.73	26m @ 0.73 g/t Au from 304m	
Including								311	324	13	0.89	13m @ 0.89 g/t Au from 311m	
KG074	DD	7106499	323767	1242	308	252	-53	230	268	38	1.56	38m @ 1.56 g/t Au from 230m	
Including								240	267	27	2	27m @ 2.00 g/t Au from 240m	
KG075	DD	7106548	323745	1242	291	252	-56	207	239	32	0.78	32m @ 0.78 g/t Au from 207m	
Including								213	226	13	0.87	13m @ 0.87 g/t Au from 213m	
KG076a	DD	7105945	323728	1214	387	257	-62	41	47	6	0.43	6m @ 0.43 g/t Au from 41m	
And								75	115	40	0.93	40m @ 0.93 g/t Au from 75m	

Including								83	115	32	1.04	32m @ 1.04 g/t Au from 83m	
And								254	305	51	0.91	51m @ 0.91 g/t Au from 254m	
Including								254	267	13	1.27	13m @ 1.27 g/t Au from 254m	
And								277	305	28	0.99	28m @ 0.99 g/t Au from 277m	
Including								277	288	11	1.17	11m @ 1.17 g/t Au from 277m	
Including								296	305	9	1.34	9m @ 1.34 g/t Au from 296m	
And								316	341	25	0.76	25m @ 0.76 g/t Au from 316m	
Including								321	328	7	1.08	7m @ 1.08 g/t Au from 321m	
KG077	RC/DD	7105271	324159	1240	409	254	-58	249	265	16	0.73	16m @ 0.73 g/t Au from 254m	RC to 163m
Including								257	263	6	1.37	6m @ 1.37 g/t Au from 257m	
And								273	294	21	2.42	21m @ 2.42 g/t Au from 273m	
Including								274	294	20	2.53	20m @ 2.53 g/t Au from 274m	
And								353	388	35	1.78	35m @ 1.78 g/t Au from 353m	
Including								353	376	23	2.48	23m @ 2.48 g/t Au from 353m	
KG078	RC	7105713	32407	1241	161	253	-65	NA					RC to 161m
KG079	RC	7105627	624083	1240	78	254	-61	NA					RC to 78m
KG080	RC/DD	7105516	324137	1240	507	248	-65	323	330	7	0.67	7m @ 0.67 g/t from 323m	RC to 157m
And								371	395	24	1.16	24m @ 1.16 g/t Au from 371m	
Including								383	395	12	1.79	12m @ 1.79 g/t Au from 383m	
KG081	DD	7105941	323733	1214	369	234	-62	52	62	10	0.53	10m @ 0.53 g/t Au from 52m	
And								67	105	38	1.21	38m @ 1.21 g/t Au from 67m	
Including								68	73	5	2.13	5m @ 2.13 g/t Au from 68m	
Including								89	105	16	1.81	16m @ 1.81 g/t Au from 89m	
And								111	118	7	0.51	7m @ 0.51 g/t Au from 111m	
And								283	289	6	0.69	6m @ 0.69 g/t Au from 283m	
And								297	332	35	1.24	35m @ 1.24 g/t Au from 297m	
Including								297	314	17	1.7	17m @ 1.70 g/t Au from 297m	
Including								319	331	12	1.08	12m @ 1.08 g/t Au from 319m	
KG082	DD	7106419	323798	1243	330	257	-50	NSR					
KG083	DD	7106219	323786	1227	450	252	-64	234	281	47	2.51	47m @ 2.51 g/t Au from 234m	
And								386	390	4	0.63	4m @ 0.63 g/t Au from 386m	
And								422	428	6	0.65	6m @ 0.65 g/t Au from 422m	
KG085	RC/DD	7105192	324068	1238	322	259	-59	77	96	19	2.01	19m @ 2.01 g/t Au from 77m	RC to 195m
And								106	119	13	1.16	13m @ 1.16 g/t Au from 106m	
Including								115	119	4	2.52	4m @ 2.52 g/t Au from 115m	
And								137	166	29	0.51	29m @ 0.51 g/t Au from 137m	
Including								137	150	13	0.5	13m @ 0.5 g/t Au from 137m	
Including								158	166	8	0.83	8m @ 0.83 g/t Au from 158m	
Including								161	165	4	1.01	4m @ 1.01 g/t Au from 161m	
And								251	258	7	0.6	7m @ 0.6 g/t Au from 251m	
Including								252	257	5	0.68	5m @ 0.68g/t Au from 252m	
And								263	270	7	0.36	7m @ 0.36 g/t Au from 263m	
KG086	RC	7106859	323765	1244	187	257	-58	NA					RC to 187
KG087	RC	7106841	323670	1244	109	259	-60	NA					RC to 109m
KG088	DD	7106278	323792	1229	468	258	-65	35	39	4	2.51	4m @ 2.51 g/t Au from 35m	
And								253	302	49	2.74	49m @ 2.74 g/t from 253m	
KG089	RC/DD	7106580	323837	1244	418	245	-60	182	186	4	1.02	4m @ 1.02 g/t from 182m	RC to 97m
And								320	344	24	0.97	24m @ 0.97 g/t from 320m	
Including								320	329	9	0.92	9m @ 0.92 g/t from 320m	

Including								334	344	10	1.37	10m @ 1.37 g/t from 334m	
And								351	365	14	1.52	14m @ 1.52 g/t from 351m	
Including								354	361	7	2.54	7m @ 2.54 g/t from 354m	
KG090	RC/DD	7106677	323788	1244	315	244	-66	295	331	36	1.06	36m @ 1.06 g/t from 295m	RC to 151m
Including								297	315	18	1.62	18m @ 1.62 g/t from 297m	
Including								301	315	14	1.89	14m @ 1.89 g/t from 301m	
Including								321	325	4	1.12	4m @ 1.12 g/t from 321m	
KG091	RC	7106798	323719	1244	152	241	-65	NA					RC to 152m
KG092	RC	7106434	323776	2353	264	261	-51	202	206	4	0.85	4m @ 0.85 g/t Au from 202m	
And								211	240	29	1.76	29m @ 1.76 g/t Au from 240m	
KG093	RC	7106145	323942	1244	191	256	-61	NA					RC to 191m
KG094	RC	7105991	323792	1211	303	244	-60	164	193	29	0.58	29m @ 0.58 g/t from 164m	RC to 303m
Including								165	190	25	0.64	25m @ 0.64 g/t from 165m	
Including								178	184	6	1.04	6m @ 1.04 g/t from 178m	
And								213	219	6	0.36	6m @ 0.36 g/t from 213m	
WDD009#	DD	7106935	323628	1244	371	254	-63	175	206	30	0.90	31m @ 0.90 g/t Au from 175m	
Including								175	185	10	1.43	10m @ 1.43 g/t Au from 175m	
Including								190	196	6	1.60	6m @ 1.60 g/t Au from 190m	
And								288	302	14	1.36	14m @ 1.36 g/t Au from 288m	
Including								291	302	11	1.65	11m @ 1.65 g/t Au from 291m	
And								308	318	10	0.45	10m @ 0.45 g/t Au from 308m	
Including								312	316	4	0.65	4m @ 0.65 g/t Au from 312m	
And								323	327	4	0.82	4m @ 0.82 g/t Au from 323m	
WDD010#	DD	7106925	323565	1244	284	277	-49	31.95	37.95	6	0.99	6m @ 0.99 g/t Au from 31.95m	
And								214	232	18	0.57	18m @ 0.57 g/t Au from 214m	
And								215	220	5	0.93	5m @ 0.93 g/t Au from 215m	
And								227	232	5	0.67	5m @ 0.67 g/t Au from 227m	
WDD011#	DD	7106697	323706	1243	377	274	-61	181	191	10	0.47	10m @ 0.47 g/t Au from 181m	
Including								196	224	28	2.67	28m @ 2.67 g/t Au from 196m	
Including								203	224	21	3.41	21m @ 3.41 g/t Au from 203m	
And								301	310	9	0.28	9m @ 0.28 g/t Au from 301m	
And								345	352	7	1.36	7m @ 1.36 g/t Au from 345m	
WDD012#	DD	7106602	323738	1243	293	260	-57	96	102	6	0.97	6m @ 0.97 g/t Au from 96m	
And								201	233	32	0.98	32m @ 0.98 g/t Au from 201m	
Including								201	218	17	1.12	17m @ 1.12 g/t Au from 201m	
And								226	232	6	1.72	6m @ 1.72 g/t Au from 226m	
WDD015#	DD	7106689	323667	1243	212	257	-62	122	158	36	1.64	36m @ 1.64 g/t Au from 122m	
Including								122	133	11	1.78	11m @ 1.78 g/t Au from 122m	
Including								139	145	6	3.13	6m @ 3.13 g/t Au from 139m	
Including								154	158	4	3.98	4m @ 3.98 g/t Au from 154m	
WDD017#	DD	7106877	323606	1238	188	257	-60	101	138	37	2.2	37.0m @ 2.20 g/t Au from 101m	
Including								106	136	30	2.61	30.0m @ 2.61 g/t Au from 106m	
WDD019#	DD	7106646	323703	1243	230	253	-60	146	179	33	0.69	33m @ 0.69 g/t Au from 146m	
Including								146	160	14	0.84	14m @ 0.84 g/t Au from 146m	
Including								165	179	14	0.69	14m @ 0.69 g/t Au from 165m	
Windmill Prospect													
KG064	DD	7107731	322866	1253	249	251	-61	164	176	12	0.76	12m @ 0.76 g/t Au from 164m	
Including								171	176	5	1.08	5m @ 1.08 g/t Au from 171m	
KG066	DD	7107744	322746	1233	162	249	-62	7	19	12	1.01	12m @ 1.01 g/t Au from 7m	

And								24	30	6	0.43	6m @ 0.43 g/t Au from 24m	
And								55	61	6	1.02	6m @ 1.02 g/t Au from 55m	
And								67	71	4	2.55	4m @ 2.55 g/t Au from 67m	
KG067	DD	7107808	322874	1254	292	250	-62	230	244	14	0.73	14m @ 0.73 g/t Au from 230m	
KG068	DD	7107823	322738	1254	144	246	-62	NSR					
KG069	DD	7107827	322809	1254	262	250	-64	58	69	11	1.2	11m @ 1.20 g/t Au from 58m	
Including								58	64	6	2.02	6m @ 2.02 g/t Au from 58m	
Windmill South Prospect													
KG054	RC	7107054	323043	1244	187	253	-60	89	94	5	1.48	5m @ 1.48 g/t Au from 89m	
And								147	156	9	0.94	9m @ 0.94 g/t Au from 147m	
KG055	DD	7107088	323180	1245	385	254	-61	337	343	6	0.38	6m @ 0.38 g/t Au from 337m	
KG056	RC	7107146	323005	1245	199	252	-60	139	152	13	2.5	13m @ 2.50 g/t Au from 139m	
Including								144	151	7	4.15	7m @ 4.15 g/t Au from 144m	
KG057	DD	7107177	323122	1245	351	249	-60	278	291	13	4.5	13m @ 4.50 g/t Au from 278m	
Including								279	287	8	7.06	8m @ 7.06 g/t Au from 279m	
KG058	RC	7107284	322920	1247	170	248	-66	11	17	6	0.55	6m @ 0.55 g/t Au from 11m	
And								105	110	5	1.6	5m @ 1.60 g/t Au from 105m	
And								115	119	4	4.59	4m @ 4.59 g/t Au from 115m	
KG060	RC/DD	7107340	322905	1247	165	246	-66	114	120	6	8.9	6m @ 8.90 g/t Au from 114m	
Including								115	120	5	10.54	5m @ 10.54 g/t Au from 115m	
KG061	DD	7107306	322969	1247	252	250	-62	167	172	5	1.15	5m @ 1.15 g/t Au from 167m	
And								201	206	5	6.22	5m @ 6.22 g/t Au from 201m	
And								213	222	9	1.19	9m @ 1.19 g/t Au from 213m	
KG062	RC/DD	7107360	322954	1247	249	251	-66	NSR					RC to 121m
KG084	DD	7107219	323238	1246	253	249	-57	NSR					
KG095	RC	7107111	323035	1240	200	254	-64	NSR					RC to 200m
KG096	RC	7107242	322987	1240	199	251	-58	94	100	6	6.96	6m @ 6.96 g/t from 94m	RC to 199m
And								111	115	4	0.85	4m @ 0.85 g/t from 111m	
And								131	137	6	1.53	6m @ 1.53 g/t from 131m	
And								163	169	6	2.55	6m @ 2.55 g/t from 163m	
Spanover Border Prospect													
KG009	RC	7106826	323213	1243	132	253	-60	39	48	9	1.18	9m @ 1.18 g/t Au from 39m	
KG010	RC	7106871	323285	1244	192	253	-60	150	168	18	2.17	18m @ 2.17 g/t Au from 150m	
KG013	RC	7106782	323262	1243	117	252	-62	96	113	17	0.55	17m @ 0.55 g/t Au from 96m	
Including								101	105	4	1.21	4m @1.21 g/t Au from 101m	
KG020	RC	7106945	323203	1244	90	250	-61	60	66	6	0.51	6m @ 0.51 g/t Au from 60m	
And								73	88	15	0.78	15m @ 0.78 g/t Au from 73m	
Including								79	87	8	1.16	8m @ 1.16 g/t Au from 79m	
KG021	RC	7106949	323214	1244	99	249	-66	89	95	6	0.33	6m @ 0.33 g/t Au from 89m	
KG022	RC	7106972	323298	1244	250	253	-61	205	211	6	0.55	6m @ 0.55 g/t Au from 205m	
KG024	RC	7106784	323320	1239	264	256	-63	78	85	7	1.38	7m @ 1.38 g/t Au from 78m	
And								166	184	18	0.91	18m @ 0.91 g/t Au from 166m	
And								191	195	4	3.11	4m @ 3.11 g/t Au from 191m	
And								215	220	5	1.62	5m @ 1.62 g/t Au from 215m	
KG030	RC	7106659	323247	1242	150	253	-61	9	15	6	0.37	6m @ 0.37 g/t Au from 9m	
And								51	71	20	0.56	20m @ 0.56 g/t Au from 51m	
Including								51	62	11	0.79	11m @ 0.79 g/t Au from 51m	
KG031	RC	7106683	323350	1242	213	253	-60	146	151	5	3.37	5m @ 3.37 g/t Au from 146m	

And	166	195	29	1.07	29m @ 1.07 g/t Au from 166m	
Including	178	186	8	1.44	8m @ 1.44 g/t Au from 178m	

Notes:

1. DD: diamond drillhole; RC: reverse circulation drill hole; Au: *gold*;
2. Composited intervals were calculated downhole using minimum lower cut-off of 0.3 g/t Au Au with a maximum allowable interval of internal waste of 4m. Higher grade zones reported as inclusive intervals. High grades were assessed and no top cut was deemed necessary with no major outliers in the data. Only intervals >4m downhole included.
3. Collar coordinates in WGS84 Geodetic Datum, Azimuths true bearing
4. NA – Not assayed, precollar only.
5. NSR – No significant results
6. # New assays from existing but previously unassayed diamond drill core