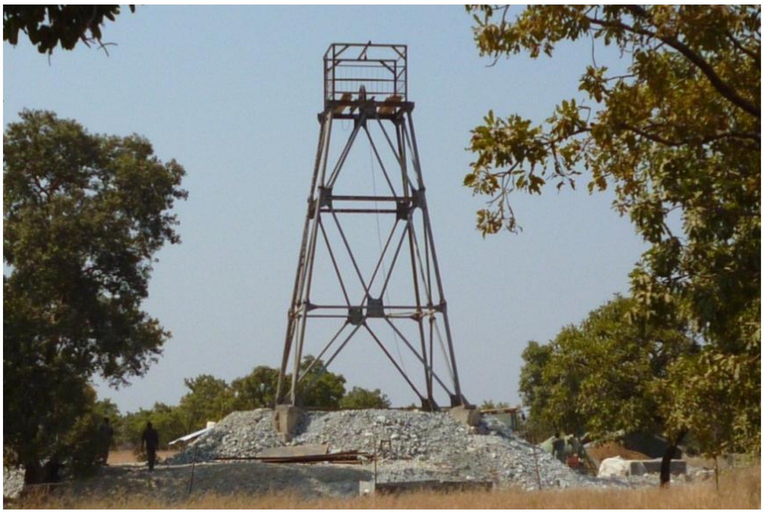
Independent Geologist's Report Bolgatanga Gold Project, Ghana Subranum Gold Project, Ghana Kilo-Moto Gold Project, Democratic Republic of Congo

Report Prepared for

Ridge Resources Ltd



Report Prepared by

srk consulting

SRK Consulting (Australasia) Pty Ltd

CAD001

September 2012

Independent Geologist's Report

Bolgatanga and Subranum Gold Projects, Ghana, West Africa & Kilo-Moto Gold Project, Democratic Republic of Congo, Central Africa

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Letter to Directors

The Directors

Ridge Resources Limited

52 Ord Street

West Perth WA 6005

Dear Directors

SRK Consulting (Australasia) Pty Ltd (SRK) has been commissioned by Ridge Resources Limited (Ridge) to provide an Independent Technical Assessment Report on the Cardinal Resources Ltd (Cardinal) Bolgatanga and Subranum Gold Exploration Projects in Ghana, and the Kilo-Moto Gold Project, located in the Democratic Republic of Congo.

This Independent Technical Assessment Report is intended for inclusion in the Notice of Meeting to be issued by Ridge, and also a Prospectus to be issued by Ridge where Ridge will offer to acquire 100% of the shares in Cardinal for a total consideration of 30,750,000 shares and 15,375,000 $0.20c options expiring 30 June 2014.

In conjunction with the acquisition of shares in Cardinal Resources Limited, Ridge will undertake a pro rata non-renounceable rights issue of up to 25,070,250 shares on the basis of 3 New Shares for every 2 Ordinary Shares held by Ridge shareholders at an issue price of twenty cents ($0.20) per New Share with a 3 for 2 free option, exercisable at $0.20 on or before 30 June 2014 to raise up to $5,014,050. Ridge has a current cash balance of approximately $2,000,000.

The exploration properties that are subject of this Report in which Cardinal has an interest, are considered to be 'Exploration Projects' which are inherently speculative in nature. Nonetheless, SRK considers that the projects have been acquired on the basis of sound technical merit. The properties are also considered to be sufficiently prospective, subject to varying degrees of exploration risk, to warrant further exploration and assessment of their economic potential, consistent with the proposed programs.

Exploration and evaluation programs summarised in this report amount to a total expenditure of approximately $4,956,000 which Cardinal plans to spend in the first two years. Ridge will, after the completion of the proposed entitlement issue, have approximately $2,235,000 remaining. At least half the liquid assets held, or funds proposed to be raised by Cardinal, are understood to be committed to acquisition, exploration, development and administration of the mineral properties, satisfying the requirements of ASX Listing Rules 1.3.2(b) and 1.3.3(b). SRK also understands that Cardinal has enough working capital to carry out its stated objectives, satisfying the requirements of ASX Listing Rules 1.3.3(a). Cardinal has prepared staged exploration and evaluation programs, specific to the potential of the reported project, which are consistent with the budget allocations. SRK considers that the relevant areas have sufficient technical merit to justify the proposed programs and associated exploration expenditure, satisfying the requirements of ASX Listing Rules 1.3.3(a). The proposed exploration budget also exceeds the anticipated minimum annual statutory expenditure commitment on the various project tenements.

Reporting standard

The purpose of this Report is to provide an Independent Technical Assessment for inclusion in a Prospectus to be issued by Ridge.

This Report does not provide a valuation of the mineral assets and has been prepared to the standard of, and is considered by SRK to be, a Technical Assessment Report under the guidelines of the VALMIN Code. The VALMIN Code is the code adopted by the Australasian Institute of Mining and Metallurgy (AusIMM) and the Australian Institute of Geoscientists (AIG), and the standard is binding upon all AusIMM and AIG members. The VALMIN Code incorporates the JORC Code for the Reporting of Exploration Results, Mineral Resources and Ore Reserves.

This Report is not a Valuation Report and does not express an opinion as to the value of mineral assets or make any comment on the fairness and reasonableness of any transactions.

Aspects reviewed in this Report may include product prices, socio-political issues and environmental considerations; however, SRK does not express an opinion regarding the specific value of the assets and tenements involved.

The information in this report that relates to Exploration Results is based on information compiled by Mr Peter Gleeson (and the Subranum and DRC sections by Dr Matthew Cobb), as provided by Cardinal. Mr Gleeson is a member of the AIG, and Dr Cobb is a member of the AusIMM. Both are full-time employees of SRK Consulting. Both Mr Gleeson and Dr Cobb have sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity to which they are undertaking to qualify as a Competent Person as defined in the 2004 edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code, 2004 edition). Mr Gleeson and Dr Cobb consent to the inclusion in the report of the matters based on this information in the form and context in which they appear.

SRK independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK. SRK has no prior association with Ridge and Cardinal in regard to the mineral assets that are the subject of this Report. SRK has no beneficial interest in the outcome of the Technical Assessment being capable of affecting its independence. SRK’s fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

Information basis of this Report

SRK has derived the technical information which forms the basis of its assessment on information provided by Cardinal, as well as the site visit and work previously undertaken by SRK. SRK has supplemented this information where necessary with information from major literary sources. The past exploration history of these tenements has been derived from previous explorers’ reports, information provided by Cardinal and the government exploration database systems. SRK has not conducted its own independent searches.

Mr Peter Gleeson from SRK accompanied Cardinal’s representatives on a site visit of the Bolgatanga Project area in early December 2011. No site visit of the Subranum Project or the DRC properties has been made.

Note on Tenement Status and Material Contracts

SRK has not independently verified the ownership and current standing of the tenements that are the subject of this Report, and is not qualified to make legal representations in this regard. Instead, it has relied on information provided by Cardinal. SRK has prepared this Report on the understanding that Cardinal's tenements are in good standing and that there is no cause to doubt the eventual granting of any tenement applications. The reader is referred to the Solicitors' Report on Tenements for further information on tenement and material contract matters.

SRK and authors

SRK is an international mining industry consulting company that has been providing services and high-level technical and financial advice to the mining industry since 1975. SRK has fully staffed independent offices in all major mining centres of the world. This report was compiled by Mr Peter Gleeson and Dr Matthew Cobb, with peer review by Dr Matthew Greentree; all full-time employees of SRK.

Peter Gleeson, Principal Consultant (Geology), BSc Hons (Mining Geology), MSc (Applied Geostatistics / Mining Geology), MAIG, MGSA

Peter has over 25 years of experience in both consultancy and production roles. This experience includes 10 years as open pit and underground mine geologist and five years as an exploration geologist. He has worked on resource estimation projects, project evaluations and 3D modelling studies for a variety of different geological environments and commodities, ranging from uranium, precious and base metals to iron ore. He is also experienced in performing mine feasibility, mine planning and expansion studies, as well as audits. His work experience encompasses mines and projects in Australia, Southern Africa, West Africa, North America, South America, Europe and Indonesia and he has had extensive exposure to diverse world-class ore deposits and mineral systems in Africa, Southeast Asia, North and South America and Australia. He is an expert user of several mining/ geological modelling software packages such as Vulcan, GOCAD, Geomodeller, FracSIS, Leapfrog and Datamine.

Peter is an experienced geostatistician – resource geologist and has performed numerous resource estimates and due diligence studies in iron ore, gold, copper, other base metals and uranium. Peter has been involved in several gold projects in Ghana, both from a resource evaluation and exploration perspective.

Matthew Cobb, Senior Consultant (Geology), PhD (Geology), MAusIMM, MIAMG

Matthew Cobb is a geologist with more than 10 years' post graduate experience that includes all facets of geology from target generation to mining. He has extensive experience in the exploration and 3D modelling of various commodities including gold, base metals and bulk commodities. In recent years, Matthew's focus has been on the development of best-practice techniques and QA/QC for both exploration and grade control systems, and the creation of grade control models for heavily structurally controlled ore systems. As a consequence, Matthew has strong technical skills in database auditing, model validation and QA/QC review. Matthew's experience has encompassed work in Eastern Europe, Sub-Saharan Africa, New Zealand and Australia.

Matthew Greentree, Principal Consultant (Geology), PhD (Geology), MAIG, MGSA

Matthew Greentree has over 13 years of experience in mineral exploration geology, and has international experience working on numerous deposit styles, including lode gold, IOCG, sediment-hosted Cu–Co and base metal deposits, magmatic nickel, and banded iron formation (BIF) -hosted iron ores. His industry experience includes his role as a gold exploration geologist for Sons of Gwalia, and various grass-roots and advanced nickel exploration projects in China and Central Australia, whilst in the employ of Anglo American Exploration. Matthew's consultancy expertise is in the management and interpretation of geological and exploration data within geological and GIS computer packages.

Matthew undertook peer review of this Report.

Warranties and indemnities

Ridge and Cardinal have represented in writing to SRK that full disclosure has been made of all material information and that, to the best of its knowledge and understanding, such information is complete, accurate and true.

As recommended by the VALMIN Code, Ridge and Cardinal have provided SRK with an indemnity under which SRK is to be compensated for any liability or expenditure resulting from any additional work required:

- which results from SRK's reliance on information provided by Ridge and Cardinal or to Ridge and Cardinal not providing material information; or
- which relates to any consequential extension workload through queries, questions or public hearings arising from this Report.

Consents

SRK consents to this Report being included, in full, in the Notice of Meeting to be issued by Ridge and also in the Prospectus to be issued by Ridge, in the form and context in which the Technical Assessment is provided, and not for any other purpose.

SRK provides this consent on the basis that the Technical Assessments expressed in the Summary and in the individual sections of this Report are considered with, and not independently of, the information set out in the complete Report and the Cover Letter.

Yours faithfully

Mr Peter Gleeson, *BSc Hons (Mining Geology), MSc (Applied Geostatistics / Mining Geology), MAIG, MGSA*

Principal Consultant (Geology)

Executive Summary

Cardinal Resources Ltd Limited (Cardinal), through its wholly owned subsidiary, Cardinal Resources Ghana Ltd offers the exposure to gold exploration projects in prospective and relatively unexplored granite-greenstone belts in Ghana and the Democratic Republic of Congo (DRC). The projects have gold mineralisation occurring in a variety of styles, in each of the project areas gold mineralisation has been identified in historic gold resources, artisanal workings and exploited in producing mines.

The three tenements in the Bolgatanga Project area include Bongo, Ndongo and Kungongo, collectively covering an area of over 674 km^2 (granted). The historic Nangodi gold mine is located nearby and produced some 18,620 oz Au from 23,600 tonnes, approximately 0.77 oz per tonne (Ghana Department of Mines records, 1938). The Nangodi Belt is considered to be the southern extension of the Youga Greenstone Belt in Burkina Faso, where it is host to the producing Youga gold mine (1.56 Moz Au; MEG database). Other greenstone belts in the project area which can be linked to those in Burkina Faso include the Bole Belt.

The Bolgatanga Project area is located in NE Ghana some 150 km north of the regional centre of Tamale, and is near Bolgatanga Township. The project consists of three tenements which are relatively un-explored, despite recent interest by Western mining companies in the region. Recent exploration and mining activity in the area includes the Shaanxi Mining Ghana Ltd underground mine. This mine has targeted gold mineralisation along the sheared margin of the Nangodi Belt. No formal resource is available; however this is a significant operation including two head frames which have been erected along the strike of the ore body. The Shaanxi Mining operation is to the south of Cardinal's Ndongo tenements. Numerous contemporary and historical small-scale artisanal small-scale workings are found along this trend, as well as the other project areas, with many of the artisanal working having visible gold within the ore being targeted. This exploration project is targeting structurally-controlled gold mineralisation hosted in Paleoproterozoic in greenstones. Identified gold deposits range in size from small-scale, high-grade shear-hosted veins that occur along lithological contacts, to larger tonnage lower-grade deposits associated with stock works in felsic to intermediate intrusions. There is potential for the discovery of both large-scale open pit and high-grade underground deposits.

The second project in Ghana is a single tenement in the Subranum Project in SW Ghana, which covers an area of 68.7 $km^{2,}$ in the Sefwi-Bibiani greenstone belt. The Subranum Project is proximal to the currently producing Bibiani and Chirano mines. Bibiani has produced over 3.8 Moz Au since its discovery in 1902 from a mixture of open pit and underground mining methods. Current owner Noble Mineral Resources Ltd recently completed their first gold pour, in March 2012, from a re-furbished 2.7 Mtpa mill (Noble Mineral Resources, 2012). The Chirano gold mine (Kinross Mining Corporation), proximal to the Bibiani mine, produced in excess of 260,000 oz (equivalent) Au in 2011 (Kinross Gold Corp, 2011). Despite the existence of these large discoveries and the protracted history of gold production in the area, the remainder of the Sefwi-Bibiani greenstone belt remains comparatively under-developed. Similar to the Bolgatanga Project, exploration of the Subranum Project will be targeting structurally controlled greenstone belt deposits, comprising fault and shear hosted veins contained within intermediate volcaniclastic rocks and felsic intrusives. Geologically, the greenstone belts and areas adjacent to the intrusive margins are considered as more prospective, especially were the margin is faulted (e.g. Bole-Bolgatanga Fault Zone). Recent work by SRK has shown the Nangodi Belt to be structurally complex with at least two phases of folding. This added level of structural complexity is considered to be favourable in providing potential structural traps for gold deposition. Additionally, a number of intra-belt intrusions are likely to form favourable low-strain dilatational zones adjacent to them. It is possible that some of the major structures in the area (Bole-Bolgatanga Fault) is likely to be a major deep-tapping thrust faults similar

to those seen in southern Ghana and known to contain some of the most significant gold deposits in Ghana. Such deep-tapping structures provide important regional fluid pathways to focus mineralising fluids into trap positions in the greenstone belts.

There are three other similarly oriented greenstone belts in Ghana comparable to the Nangodi and Sefwi belts; the Kibi, Ashanti and Bui belts. All have known gold mineralisation that includes world-class deposits such as in the Ashanti mine (40 Moz) in the Ashanti Belt and the Chirano mine (2.4 Moz) in the Sefwi Belt. Similar Archean greenstone belts in other locations around the world have been host to significant gold deposits (Superior Province of the Canadian Shield, Yilgarn, Western Australia, greenstone belts of Zimbabwe). Though the greenstone belts are the main exploration priority, the adjacent sedimentary deposits of Paleoproterozoic age should not be ignored (Obuasi deposit – 40 Moz).

To date, only broad-scale regional geophysics has been flown over the tenement areas. More detailed airborne surveys (as proposed by both SRK and Cardinal) have often been found to be key to the geological and structural understanding of similar greenstone belts and have contributed enormously to exploration success.

The exploration potential of the Nangodi and Bole belts is recognised by other explorers who hold tenements adjacent to Cardinal's permits (Kinross Gold Corporation).

In addition to the gold potential, there is also significant base metal mineral potential within the Proterozoic aged rocks. Other companies exploring for base metals in the region and into Burkina Faso include Ampella Mining. Base metal exploration is the least understood and developed in Ghana, given the strong focus on gold exploration over the past 25 years.

In the Subranum Project, regional geophysics (aeromagnetics), soil sampling, RAB drilling and limited RC drilling have been conducted and have defined an area of gold mineralisation that remains open to the south and at depth.

Politically Ghana has low sovereign risk and has enjoyed over 20 years of continuous democratic rule. It is one of the most developed and affluent countries in Africa, with a well-developed Mining Code, infrastructure and a population with the technical skills to support modern mining projects.

Mining investments in Africa are rising fast, and the relative political stability in Ghana has made the country one of the most attractive new mining investment areas in Africa. After South Africa, Ghana is Africa's second-largest gold producer. Large industry players like Newmont Mining Corporation and AngloGold Ashanti have been joined by smaller players including Randgold Resources, Keegan Resources, Red Back Mining, Golden Star Resources and African Gold Group, as well as individual and local artisanal miners.

Many industry observers see potential for the discovery of more deposits in Ghana as much of the country remains relatively under-explored. Successful discoveries quickly become acquisition targets by larger companies.

The DRC project has two licences under consideration for investment. These are in the Kilo-Moto Project area, located within the Neo-Archaean Kilo-Moto greenstone belt in far north-eastern DRC. The same greenstone belt is host to both the 20 Moz Kibali Gold Project owned by Randgold Resources and AngloGold Ashanti, and the Giro Gold Project, currently under review for purchase by Erongo Energy (ASX: ERN), and containing numerous instances of historic workings for gold. It should be noted that the DRC project has the potential for moderate levels of sovereign risk compared to the Ghanaian projects.

In summary, SRK considers that the portfolio of exploration assets offered by Ridge has high potential for economic gold mineralisation. The acquisition of additional ground in the greenstone belts through joint ventures or small-scale mining application should also be sought. The Cardinal tenements contain early stage exploration targets, and as such, are speculative in nature and have a higher risk. This is mitigated by the known occurrence of large economic gold mineralisation in the area from producing mines. Ridge and Cardinal are approaching the regions with well-established exploration concepts, based on their geological understanding of the regions, and with specific deposit models in mind. In many cases, there has been only limited previous exploration in the areas where they are focusing, representing good opportunities for the Company.

SRK considers the projects to be worthy of the exploration budgets proposed by Ridge, and the management of the Company has and will acquire the projects based on sound geological concepts and exploration methods. To date, no resources (as defined by the JORC or NI 43-101 codes) have been identified on any of Cardinal's leases.

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (Australasia) Pty Ltd (SRK) by Ridge Resources Ltd and Cardinal Resources Ltd (Ridge and Cardinal respectively), as well as the site visit and work previously undertaken by SRK. The opinions in this Report are provided in response to a specific request from Ridge to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this Report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

List of Abbreviations

Abbreviation	Meaning
AUD	Australian dollar/ s
amsl	above mean sea level
AusIMM	The Australasian Institute of Mining and Metallurgy
AIG	Australian Institute of Geoscientists
ASX	Australian Securities Exchange
EM	electromagnetic
GIS	Geographic Information System – refers to a type of computerised set of data that can be processed to reveal target and other information
g/t	grams per tonne
JORC	Joint Ore Reserves Committee of The Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and the Minerals Council of Australia
IPO	initial public offering
Ma	millions of years ago
Moz	millions of ounces
Mt	million tonnes
NI 43-101	Canadian National Instrument 43-101 Code for Reporting Resources and Reserves as defined by the Toronto Stock Exchange
Pb	metal lead
ppb	parts per billion
ppm	parts per million
RC	reverse circulation
SPT	source-pathway-trap
SRK	SRK Consulting (Australasia) Pty Ltd
Au	gold metal
VALMIN	Code for the Technical Assessment and Valuation of Mineral and Petroleum Assets and Securities for Independent Expert Reports - 2005
VTEM	versatile time-domain electromagnetics; an airborne geophysical survey method

Glossary of Terms

Term	Meaning
Anticline	Folded rock structure, convex up
Anomalous	Departure from the expected norm; in mineral exploration, this term is generally applied to either geochemical or geophysical values higher or lower than the norm
Antiforms	Folded rock, convex up, without any reference as to the relative age of strata
Archaean	Geologic eon before the Paleo-Proterozoic era of the Proterozoic eon, before 2,500 Ma ago
Arsenopyrite	An iron-arsenic-sulphide (Fe As S), the most common mineral of arsenic; it is often associated with gold ores particularly those derived from volcanic or hot spring (epithermal) environments
Assay	A quantitative determination of an element
Bedrock	Rocks beneath regolith cover
Belt	Zone or band of a particular group of rocks exposed on the surface
Basin	Depression in the Earth's surface that collects sediment
Breccia	Volcanic or sedimentary rock containing broken angular fragments
Clastic	Term used to describe sedimentary rocks that consist of fragments of rock or other material that have been transported from their place of origin
Conglomerate	Very coarse sandstone containing small to large boulders
Disseminations	Scattered, isolated, fine grained particles (of gold, silver, copper etc.) in the rock
Electromagnetic survey	Geophysical survey technique designed to detect some types of sulphide mineralisation
Felsic	Rocks composed principally of silica and alumina; equates with "acid" rocks in the geologic sense
Fold belt	A zone, which may be tens of kilometres wide and hundreds of kilometres long, in which the rock formations are folded and sheared as a result of mountain-building processes
Geochemistry	Branch of geology that focuses on the chemical composition of Earth's materials
Granitoids	A broad group of medium to coarse grained quartz-feldspar rich igneous rocks of the granite suite
Granodiorite	Coarse-grained igneous rock of mafic provenance
Greenstone belt	Supracrustal belts of volcanic and sedimentary rocks, generally of Archaean age
Intrusion and intrusive complex	Bodies of magma which have been emplaced and crystallised in the Earth's crust
Laterite	Hard ferruginous duricrust that generally forms the upper part of an in situ weathering profile
Lithological	Compositional and textural characteristics of a rock
Mafic	Rocks that have high iron and magnesium contents and are usually dark coloured; equates with "basic" in the geologic sense
Magma	Used in a geological context, refers to molten rock
Outcrop	Exposure of the bedrock
Precipitation	Process of separating mineral constituents from a solution; e.g., by evaporation (such as halite or anhydrite) or by cooling of magma (to form an igneous rock)
Prospective	Ore that cannot be included as Proved or Probable, nor definitely known or stated in terms of tonnage
Proterozoic	Division of geological time which spans the period 2,500 to approximately 570 million years ago
Pyrite	Sulphide mineral containing iron and sulphur with the formula FeS_2

Term	Meaning
Quartz	Mineral species composed of crystalline silica
Quartzite	Clastic sedimentary rock comprised almost entirely of quartz grains
Regolith	Surficial materials deposited on the Earth's surface by a variety of processes and weathered in situ rock
Sandstone	Sedimentary rock composed of sand grains (mainly quartz and feldspar)
Schist	Type of rock displaying a platy habit due to shear-metamorphism
Sedimentary	Rocks formed by deposition of particles carried by air, water or ice
Shear	Movement between two bodies of rocks characterised by a lack of fracturing
Sinistral	Left-hand strike-slip offset or movement on a fault
Stratigraphy	A sequence of rock units in time and their correlation in a spatial context
Strike	Intersection of the long dimension of a geological unit at a particular horizontal surface, usually the Earth's surface; the term is also used to describe the general trend of a geological unit
Structural	Of, or pertaining to, rock deformation or to features that result from it
Sulphides	Minerals consisting of a chemical combination of sulphur with a metal
Supracrustal	Rocks formed on a basement; greenstone belts formed in elongate basins over older granite basements
Stockwork	Thin complex array of veinlets
Tenements	Granted Reconnaissance Permits, Prospecting Licences and applications for these licences and leases
Thrust	Low angle fault structure resulting from compressional forces

1 Introduction and Overview

1.1 Location and tenement details

The following four Ghana tenement licences are discussed in this report:

1 Bongo

2 Kungongo

3 Ndongo

4 Subranum

The first three licences combine to form the Bolgatanga Project. The final license constitutes the Subranum Project. The relative location of the projects is shown in Figure 1-1 and Figure 1-2.

DRC project opportunities are discussed separately.

Figure 1-1: Location of Bolgatanga and Subranum Projects

Figure 1-2 shows the location of the three Bolgatanga tenements in relation to the regional geology.

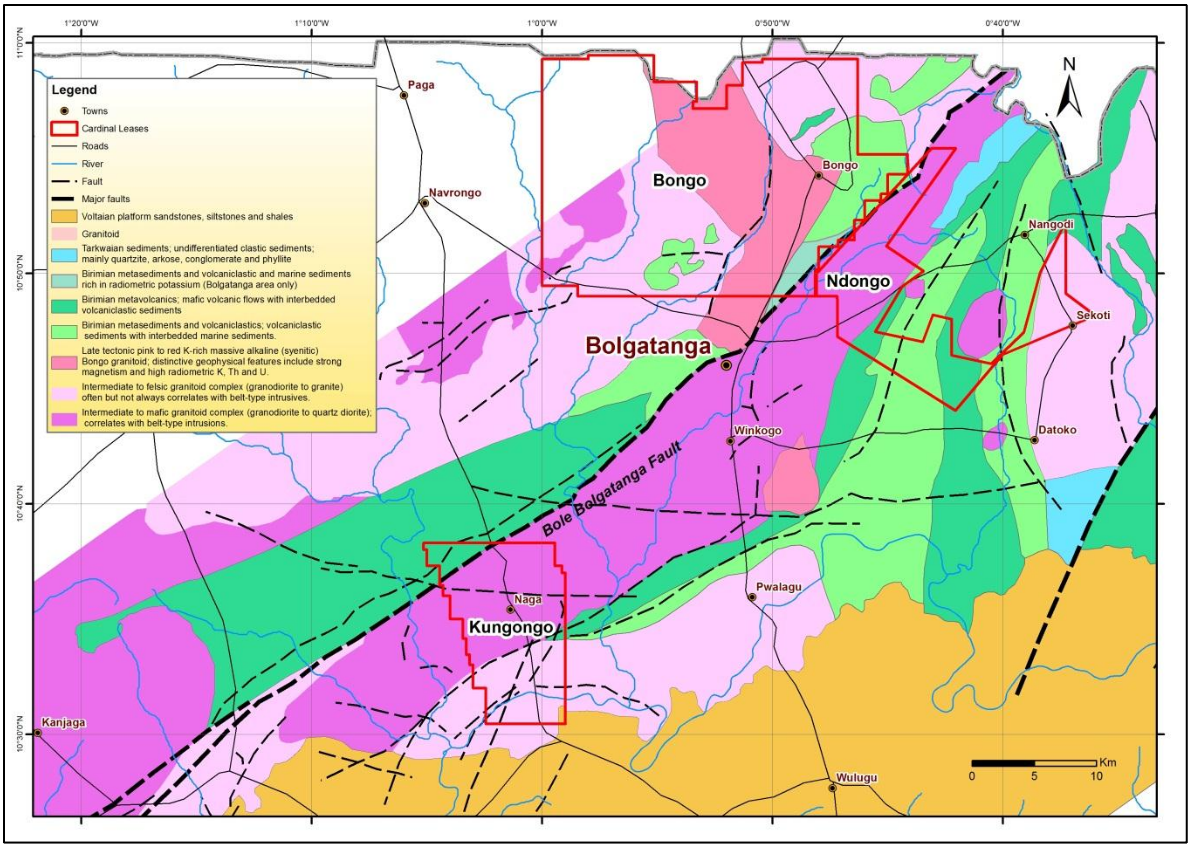


Figure 1-2: Geology map showing the location of the Bongo, Ndongo and Kungongo tenements

1.1.1 Bongo tenement

The Bongo tenement is located in NE Ghana some 4 km north of Bolgatanga and centered on the village of Bongo. The tenement is situated across three areas – Bongo District, Bolgatanga Municipality and the Kassena Nankani District. The tenement covers an area of some 447 km^2.

The granted reconnaissance licence is Bolgatanga, Bongo and Environs; field sheet 1001 A1 and A2.

The geographic co-ordinates of the tenements are given in Table 1-1 and the detailed location map in Figure 1-3.

Table 1-1: Location of the Bongo tenement corners in latitude and longitude

Pillar	Latitude	Longitude	Pillar	Latitude	Longitude
P1	10°59'30"	1°00'00"	P23	10°55'45"	0°42'15"
P2	10°59'30"	0°58'00"	P24	10°55'45"	0°43'45"
P3	10°59'45"	0°58'00"	P25	10°55'15"	0°43'45"
P4	10°59'45"	0°55'15"	P26	10°55'15"	0°44'15"
P5	10°58'30"	0°55'15""	P27	10°54'30"	0°44'15"
P6	10°58'30"	0°53'30"	P28	10°54'30"	0°45'00"
P7	10°57'45"	0°53'30"	P29	10°53'45"	0°45'00"
P8	10°57'45"	0°53'45"	P30	10°53'45"	0°45'30"
P9	10°57'15"	0°53'45"	P31	10°53'15"	0°45'30"
P10	10°57'15"	0°52'00"	P32	10°53'15"	0°46'00"

Pillar	Latitude	Longitude	Pillar	Latitude	Longitude
P11	10°58’15”	0°52’00”	P33	10°52’15”	0°46’00”
P12	10°58’15”	0°51’30”	P34	10°52’15”	0°46’45”
P13	10°59’15”	0°51’30”	P35	10°51’15”	0°46’45”
P14	10°59’15”	0°50’45”	P36	10°51’15”	0°47’15”
P15	10°59’30”	0°50’45”	P37	10°51’30”	0°47’15”
P16	10°59’30”	0°42’45”	P38	10°51’30”	0°48’00”
P17	10°58’30”	0°42’45	P39	10°50’30”	0°48’00”
P18	10°58’30”	0°42’15”	P40	10°50’30”	0°48’15”
P19	10°57’30”	0°42’15”	P41	10°49’30”	0°48’15”
P20	10°57’30”	0°41’45”	P42	10°49’30”	0°58’45”
P21	10°56’15”	0°41’45”	P43	10°49’15”	0°58’45”
P22	10°56’15”	0°42’15”	44	10°49’15”	1°00’00”

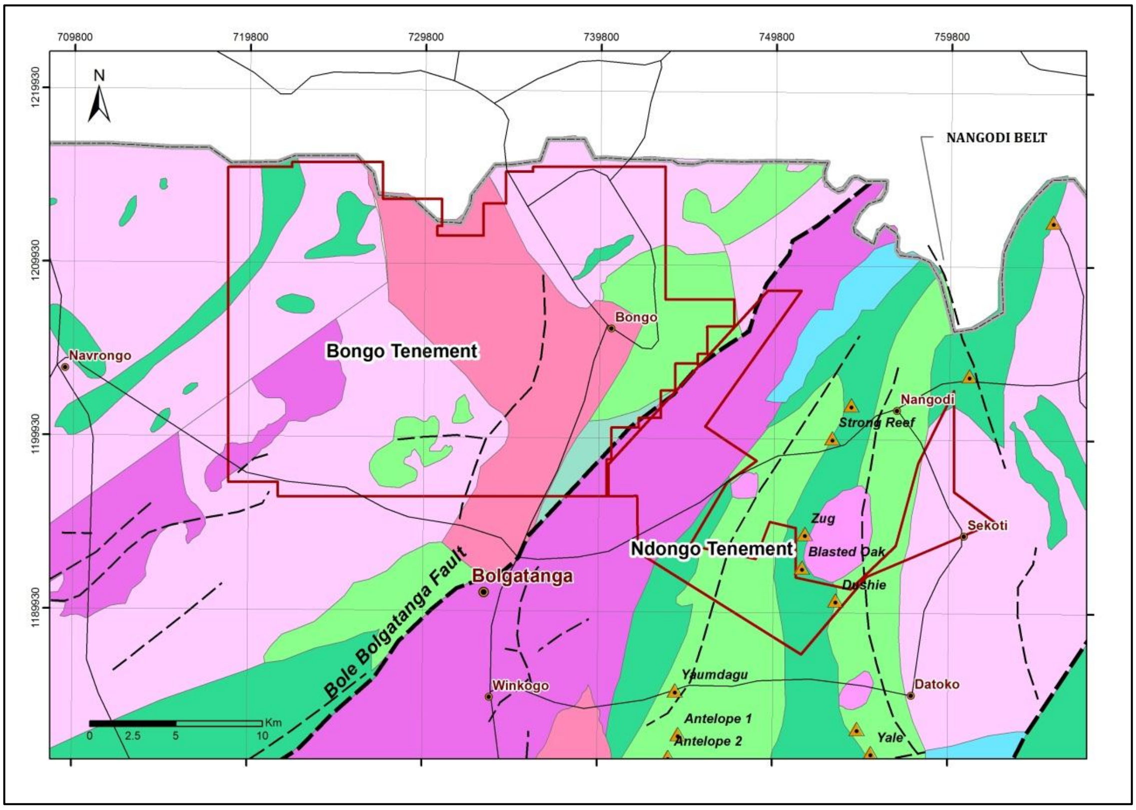


Figure 1-3: Plan of the location of the Bongo and Ndongo tenements in relation to the geology and main population centres

Note: Co-ordinates in UTM Zone30 North

1.1.2 Ndongo tenement

The Ndongo tenement is located in NE Ghana, some 5 km east of the town of Bolgatanga and centered on the village of Nangodi. The tenement is situated across two areas – Bolgatanga Municipality and the Talensi-Nabdan District. The tenement covers an area of some 106 km^2.

The granted prospecting licence is in Bolgatanga, Nangodi and Environs; field sheet 1001 A1 and A2. The geographic co-ordinates of the tenements are given in Table 1-2 and the detailed location map in Figure 1-3.

Table 1-2: Location of the Ndongo tenement corners in latitude and longitude

Pillar	Latitude	Longitude
P1	10°52'28"	0°37'33"
P2	10°49'12"	0°37'27"
P3	10°48'17"	0°36'00"
P4	10°46'47"	0°40'20"
P5	10°44'05"	0°42'07"
P6	10°47'25"	0°47'18"
P7	10°49'00"	0°47'20"
P8	10°49'00"	0°48'09"
P9	10°50'00"	0°48'09"
P10	10°55'42"	0°43'10"
P11	10°55'42"	0°42'05"
P12	10°51'18"	0°45'07"
P13	10°50'10"	0°43'46"
P14	10°49'43"	0°44'38"
P15	10°47'46"	0°45'55"
P16	10°47'03"	0°43'49"
P17	10°48'19"	0°43'04
P18	10°48'00"	0°42'23"
P19	10°46'45"	0°42'23"
P20	10°46'08"	0°40'52"
P21	10°47'44""	0°39'10"
P22	10°50'01"	0°38'40"

1.1.3 Kungongo tenement

The Kungongo tenement is located in NE Ghana some 25 km southwest of Bolgatanga and centered on the village of Naga. The tenement is situated in the Kassena-Nankani East District. The tenement covers an area of some 120 km^2. The granted reconnaissance license is in Kungongo; field sheet 1001 A3 and 1002 B4. The geographic co-ordinates of the tenements are given in Table 1-3 and the detailed location map in Figure 1-4.

Table 1-3: Location of the Kungongo tenement corners in latitude and longitude

Pillar	Latitude	Longitude	Pillar	Latitude	Longitude
P1	10°38'30"	0°05'15"	P14	10°33'45"	1°03'30"
P2	10°38'30"	0°59'45"	P15	10°34'15"	1°03'30"
P3	10°37'30"	0°59'45"	P16	10°34'15"	1°03'45"
P4	10°37'30"	0°59'15"	P17	10°35'00"	1°04'00"
P5	10°37'00"	0°59'15""	P18	10°35'00"	1°04'00"
P6	10°37'00"	0°59'00"	P19	10°36'00"	1°04'00"
P7	10°30'45"	0°30'45"	P20	10°36'00"	1°04'30"
P8	10°30'45"	1°02'45"	P21	10°36'45"	1°04'30"
P9	10°32'00"	1°02'45"	P22	10°36'45"	1°04'45"
P10	10°32'00"	1°03'00"	P23	10°37'30"	1°04'45"
P11	10°33'00"	1°03'00"	P24	10°37'30"	1°05'00"
P12	10°33'00"	1°03'15"	P25	10°38'00"	1°05'00"
P13	10°33'45"	1°03'15"	P26	10°38'00"	1°05'15"

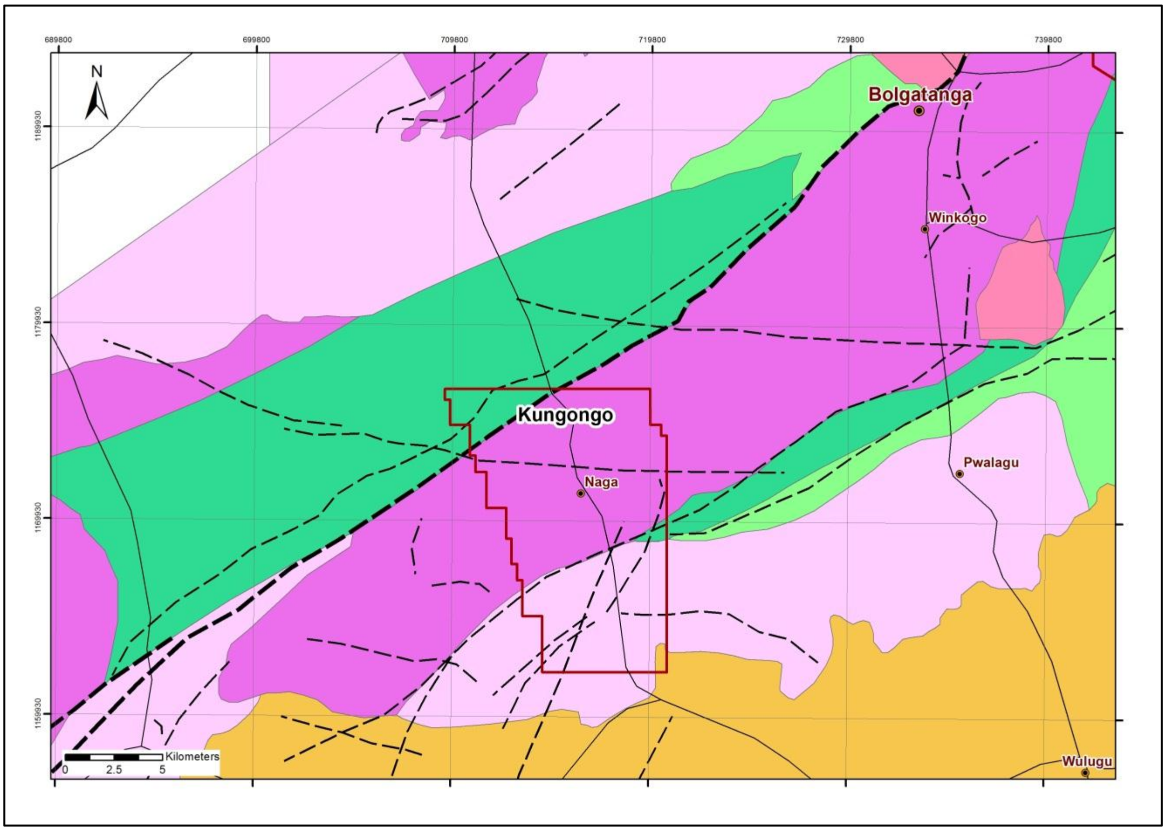


Figure 1-4: Plan of the location of the Kungongo tenements in relation to the geology and main population centres

Note: Co-ordinates in UTM Zone 30 North

1.1.4 Subranum tenement

The Subranum tenement is situated in the southern portion of Ghana, approximately 45 km northwest of the city of Kumasi, and 240 km northwest of the capital city Accra, in the Sabranomu district. The granted prospecting license is in Subin-Kasu; field sheet 0702 C3.

The tenement covers an area of 68.7 km^2. Corner points for the tenement are presented in Table 1-4.

Table 1-4: Location of the Subranum Project tenement corners in latitude and longitude (WGS84)

Pillar	Latitude	Longitude	Pillar	Latitude	Longitude
P1	7°04’52.36”	-1°54’59.36”	P3	7°00’00”	-1°50’49.16”
P2	7°04’51.60”	-1°50’49.16”	P4	7°00’00”	-1°54’58.00”

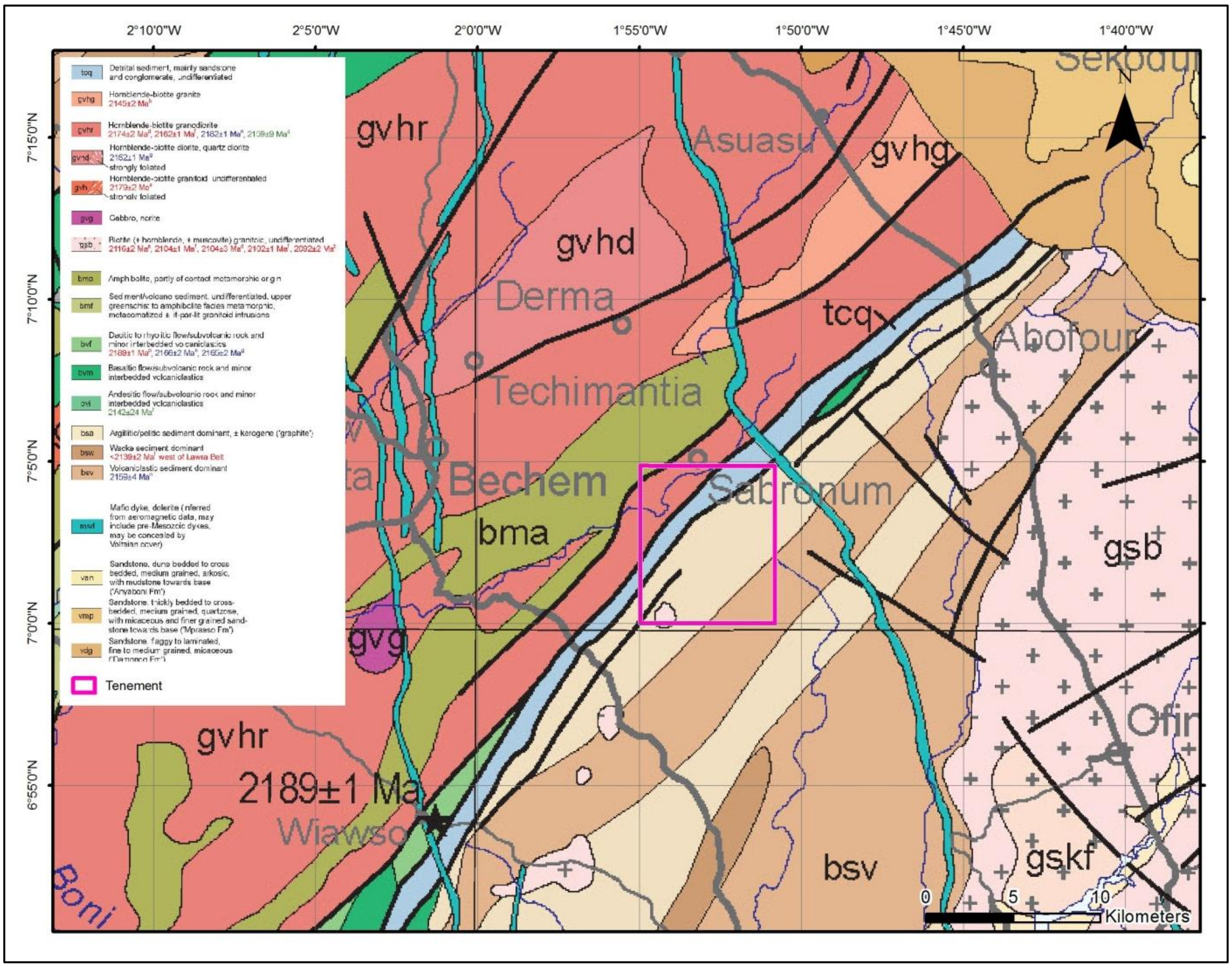


Figure 1-5: Location and Geology of the Subranum tenement

Note: Co-ordinates in DMS (WGS84) North

2 Regional Geology

2.1 Geology

The Bolgatanga Project is located in a Paleoproterozoic granite-greenstone belt in northeast Ghana close to the border with Burkina Faso. The Subranum Project is situated in the south-western portion of the country, also within a Palaeoproterozoic granite-greenstone belt. Gold mineralisation in Ghana and along strike in Burkina Faso is principally located within the greenstone belts. There is significant production from a number of gold mines in the region, as well as from numerous small artisanal workings (Figure 2-1).

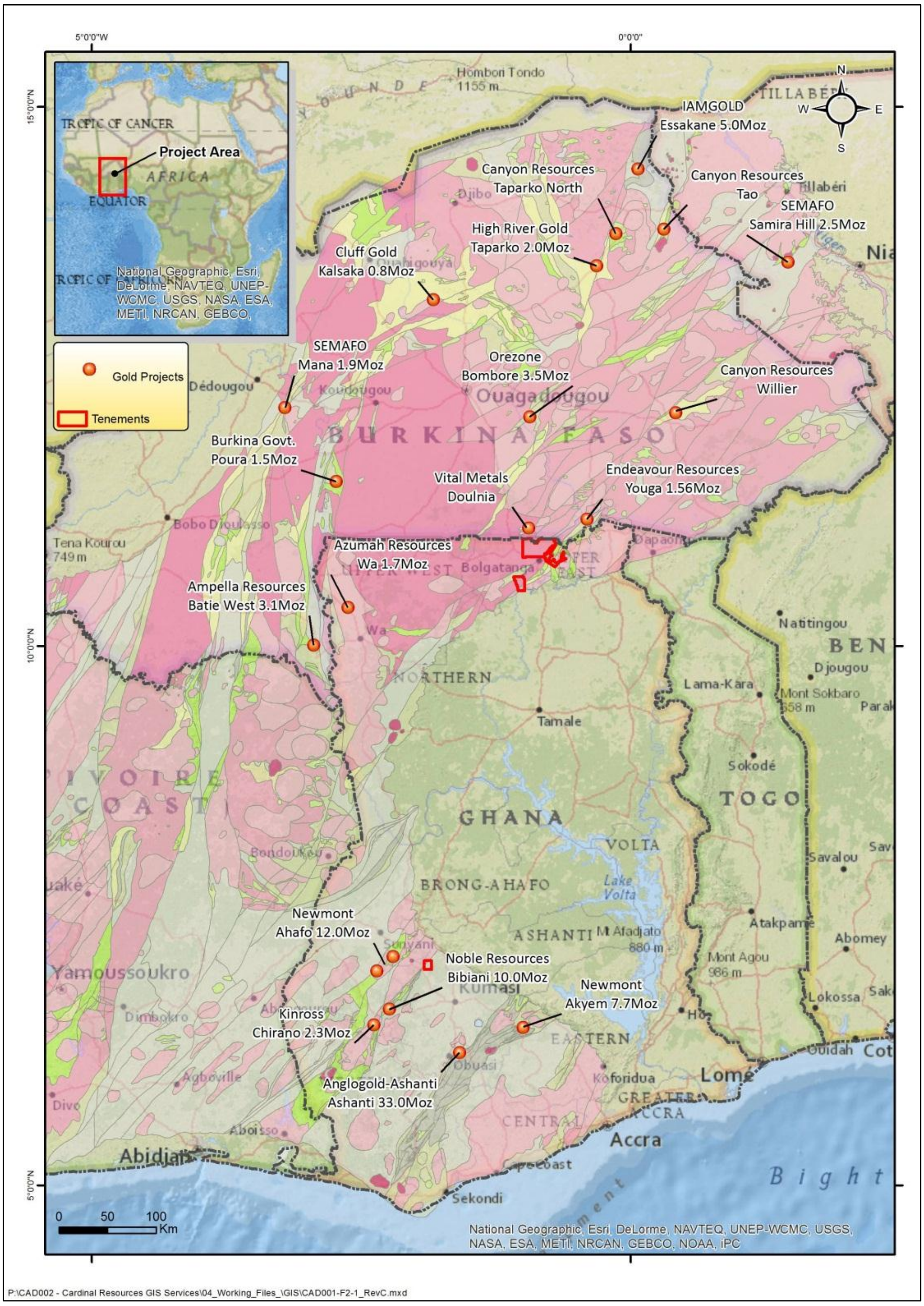


Figure 2-1: Location of the Bolgatanga and Subranum projects in relation to nearby gold projects

Geologically, the Bolgatanga Project area is located within a series of highly prospective granite-greenstone belts (Bole-Bolgatanga and Nangodi belts). Similarly, the Subranum Project is hosted within the Sefwi-Bibiani granite-greenstone belt. The belts are a NE extension to the Paleoproterozoic aged Birimian basins that formed during the collision between the West African and Guyana Archean Shields. In Ghana, there are six Paleoproterozoic granite-greenstone belts, five of which strike in NE-SW orientations (Abbott, 2010).

The principal Birimian metavolcanic (greenstone) belts and intervening metasedimentary basins in Ghana are:

- Kibi-Winneba Belt
- Cape Coast Basin
- Ashanti Belt
- Kumasi Basin
- Sefwi-Bibiani Belt
- Sunyani Basin
- Bui Belt

Other important greenstone belts exist in neighbouring Burkina Faso, these are:

- Boromo Belt
- Hounde Belt

Figure 2-2 shows the Birimian metasedimentary belts and basins in Ghana and Burkina Faso.

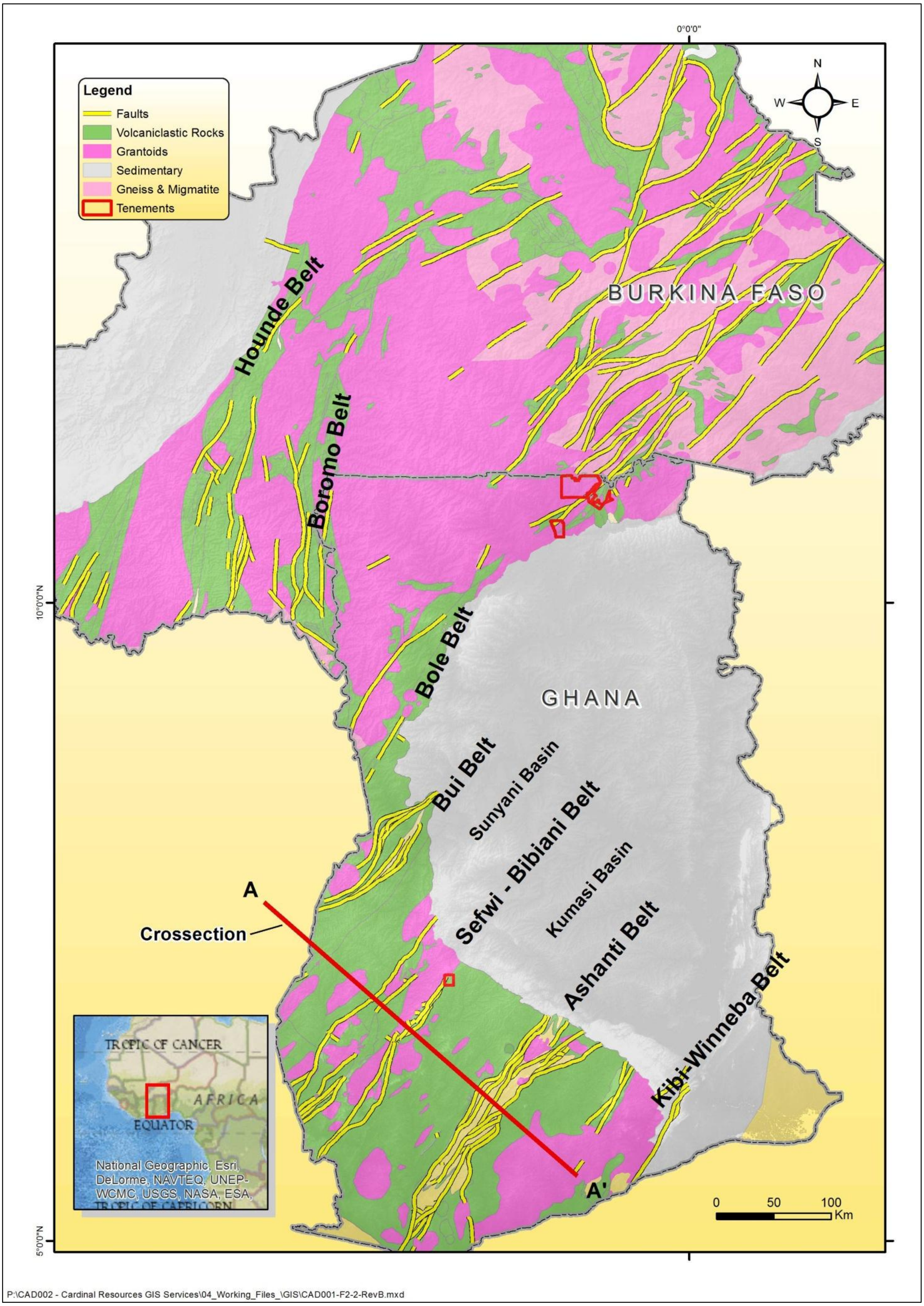


Figure 2-2: Birimian metasedimentary belts and basins in Ghana and Burkina Faso

The main lithologies in the belts are volcanic-sediment sequences of Birimian age (interbedded basic to intermediate flows, felsic tuffs and fine grained sediments) overlying the earlier intervening sedimentary basins (greywackes and phyllites). These basins are separated by major faults. These faults probably controlled early syn-Birimian sedimentary basin down faulting. Figure 2-3 is a schematic cross-section through the basins showing the relationships of the basins. There are various granitoids intrusions along with the sedimentary rocks. The granitoids intrusions can be divided into two types – belt-type and basin-type (Allibone 2004).

The belt-type intrusions have a metaluminous character, are often tonalitic and are confined to the Birimian greenstone belts (Allibone 2004). The basin-type intrusions have a peraluminous character and are higher in potassium and rubidium relative to the belt granitoids and are mainly granodiorites. Late-stage intermediate diorite stocks and dykes intrude the belts themselves. These granite-greenstone belts extend NE into Burkina Faso and are geologically identical. Figure 2-4 shows the stratigraphical relationships of the main formations in Ghana.

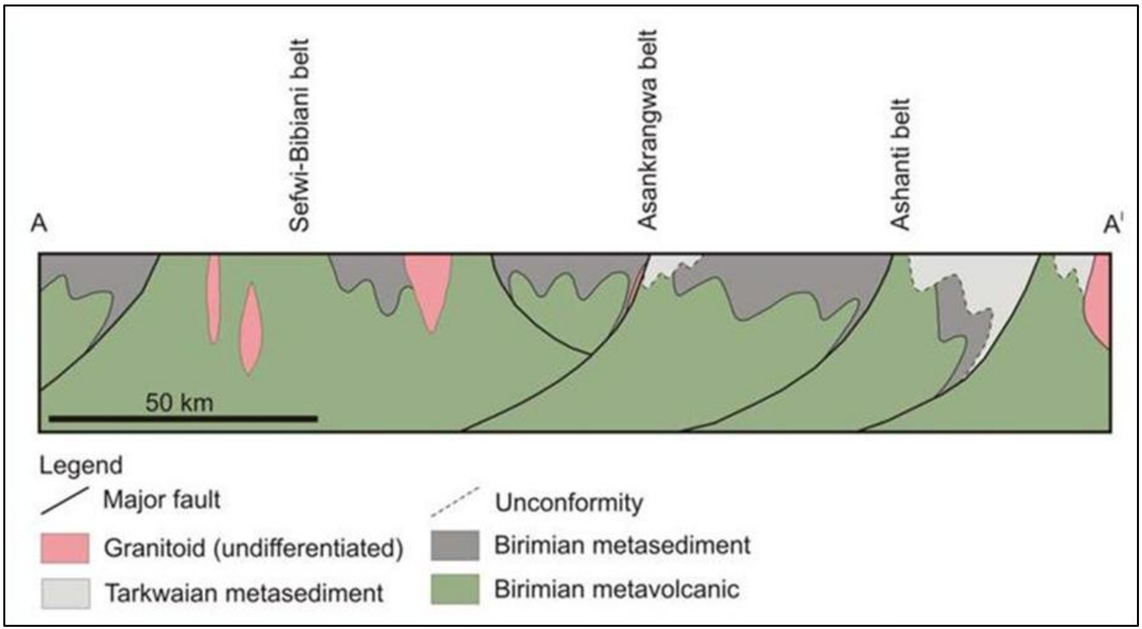


Figure 2-3: Cross-section along line A-A in Figure 2-2 showing the relationship of the main belts and basins

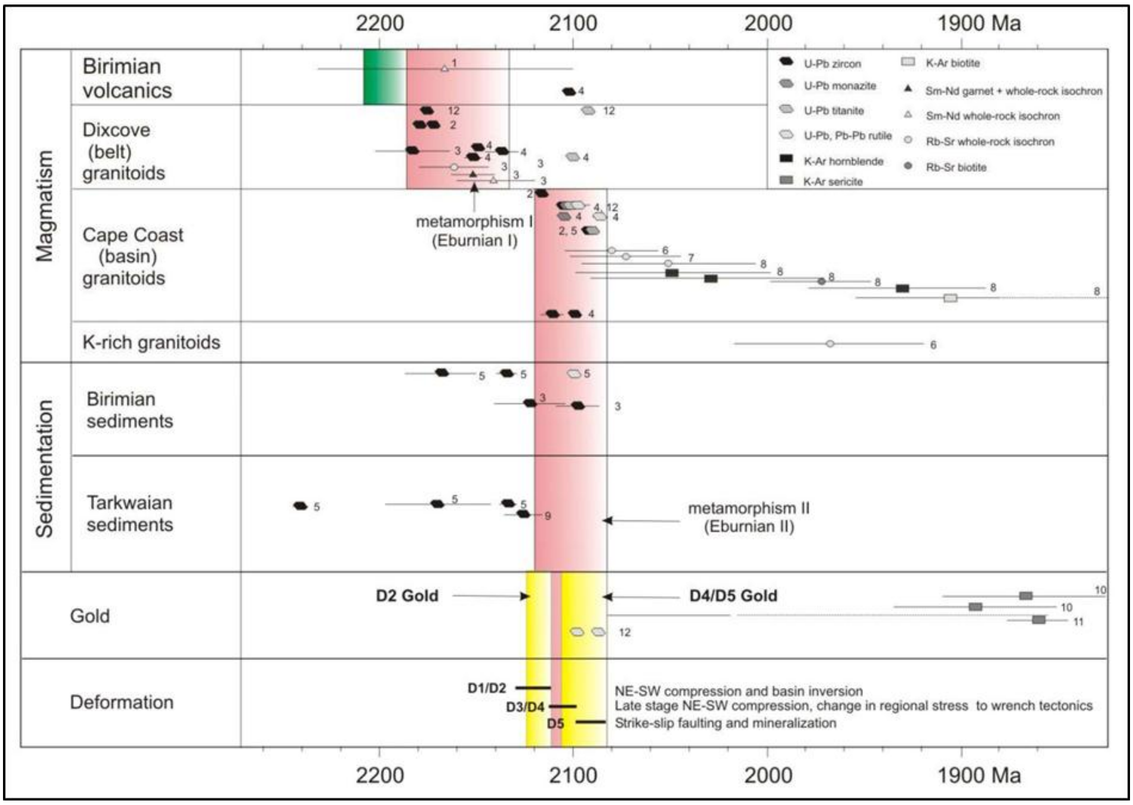


Figure 2-4: Stratigraphic column and geological time line for Ghana (Allibone, 2002)

A geological map of NE Ghana where Cardinal's Bolgatanga Project is located is shown in Figure 2-5. The Subranum Project's location is presented in Figure 2-5, underlain by a geological map of the region. The Bolgatanga Project lies along the NW trend of the Bole Greenstone Belt and is separated from the Nangodi Belt by the Bole–Bolgatanga Fault. Much of the area to the south of the tenements is covered by younger sediments of the Volta Basin, although this cover may be shallow and the NE striking Paleoproterozoic greenstone belts certainly continue underneath it.

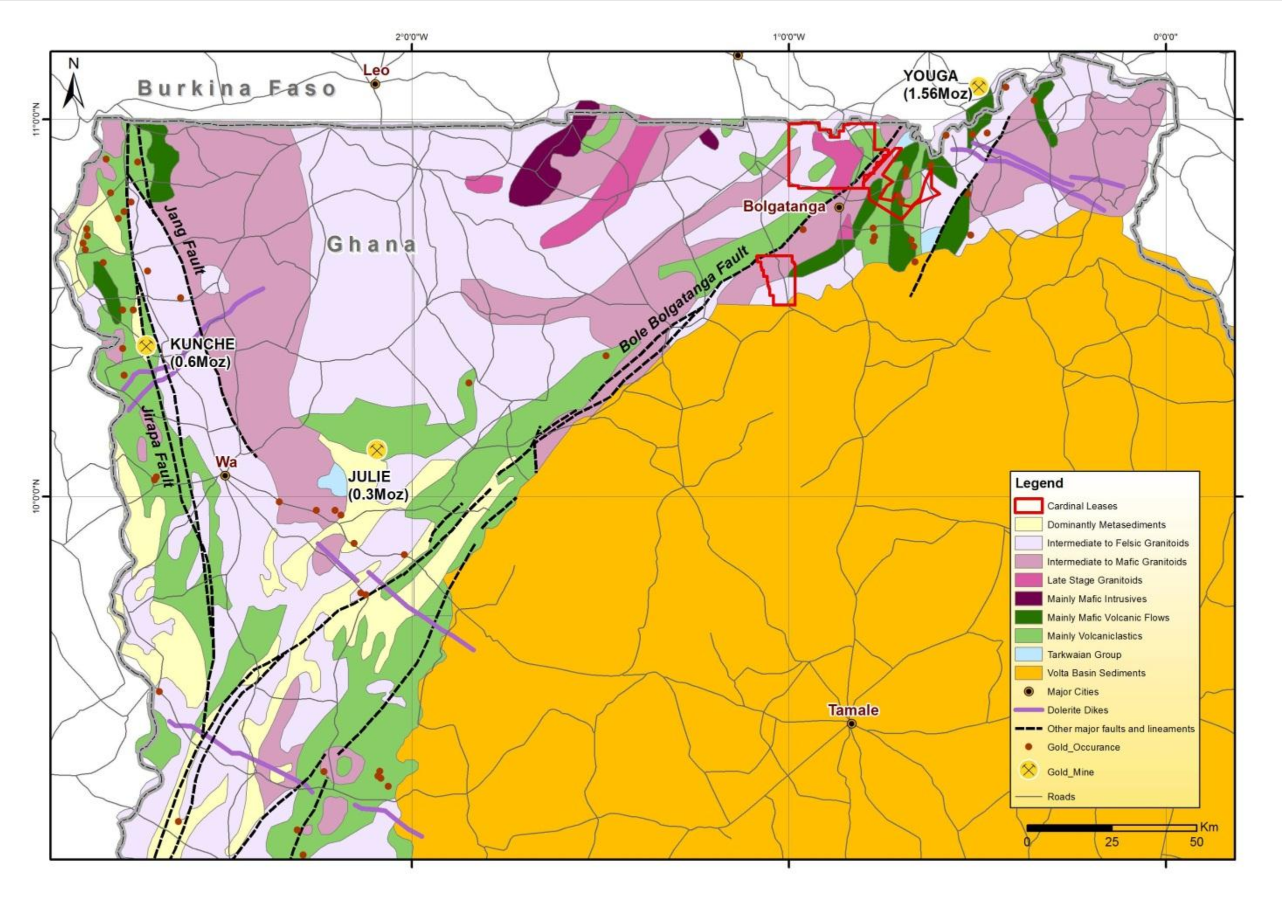


Figure 2-5: Regional geology of northern Ghana showing Cardinal's Bolgatanga permits (in red)

2.1.1 Structure

Regionally there are five (D_1 – D_5) recognised deformation events within the Paleoproterozoic rocks of NE Ghana. The earliest of these events is a NE-SW compression, which occurred during the early Paleoproterozoic (ca. 2200 to 2150 Ma) and represented a phase of basin inversion and compression which corresponds to regional gold mineralising events. This compression has resulted in the development of a strong tectonic fabric in rocks of this age and has resulted in the formation of a series of tightly-folded sedimentary basin and greenstone belts (Allibone, 2002).

Two discrete orogenic events have been recognised in Ghana, the earliest termed the Eburnian I orogeny, is associated with the eruption of the Birimian aged volcanic rocks and the intrusion of granites. This was followed by regional metamorphism between ca. 2200 and 2150 Ma. Regional NW-SE extension and formation of the Birimian metasedimentary basins followed the Eburnian I orogeny, between ca. 2150 and 2116 Ma (Figure 2-4). Subsequently Eburnian II orogeny caused deformation, metamorphism of all of the Birimian and Tarkwaian rocks, and intrusion of basin-type granites between 2116 and 2088 Ma. The presence of foliated clasts of Birimian metasedimentary rocks within the Tarkwaian Group rocks implies that deformation of the Birimian metasediments commenced prior to the deposition of the Tarkwaian rocks (Allibone, et al., 2002a). Deformation related to the Eburnian II orogeny dominates the structural geology of southwest Ghana, and is subdivided into five different phases (D_1 to D_5). D_1 resulted in the formation of a weakly developed bedding parallel cleavage (S_1) in the Birimian metasediments, and minor folds related to early NW-SE compression, thrust faulting, and basin inversion. D_2 formed major thrust faults, gently plunging, tight to isoclinal doubly plunging folds and a second cleavage (S_2).

The S_2 cleavage typically strikes northeast and dips steeply towards the northwest. D_2 thrust faults have had significant displacements across them and part, or all, of the shortening in southwest Ghana occurred during D_2.

In the SW of Ghana, D_3 is recognised as a relatively minor deformation event that did not substantially modify the structural architecture of the Birimian Supergroup. D_3 deformation is recognised in the field as locally overprinting F_2 folds and having a crenulation cleavage (S_3) that is parallel to the axial planes of F_3 folds. S_3 cleavage and F_3 axial planes generally strike towards the northeast and dip variably between 5° SE and 40° NW.

D_4 structures are recognised in the field as having upright folds (F_4) with axial planes and cleavage (S_4) that strike E-W. The F_4 folds have a moderate to steep NE dip and the axial planar cleavage (S_4) strikes toward E-NE and dips steeply to the N-NW. In some F_4 hinges, bedding S_0, S_1 and S_2 are transposed into S_4, which bounded by east-striking zones of weakly graphitic schist.

Syn- to post- D_4, D_5 reactivation of D_2 faults represents the last major deformation event in southwest Ghana. Slickenlines on these faults and the surfaces of internal veins generally plunge gently towards the southwest. This indicates the D_5 reactivation involved largely strike-slip movement with a small component of dip-slip. Asymmetric dilatant breccias, quartz vein arrays, and boudinaged quartz veins are localised along these faults in the Ashanti deposit which imply a component of sinistral movement during D_5. None of the faults appear to have been folded during D_4, despite evidence that most formed prior to D_4. These apparent contradictions imply that the F_4 folds and D_5 sinistral strike-slip offset on the adjacent faults may both be products of D_4 rather than separate D_4 and D_5 events.

Fault-bounded blocks containing mafic rocks, such as those immediately east of the Ashanti deposit, occur throughout the Kumasi Basin and are atypical of those found in the Birimian. Mafic rocks are generally absent in the Birimian metasediments and the blocks are bounded by D_5 faults with a geometry suggesting they are blocks of basement which have been thrust over the Birimian metasedimentary rocks (Allibone, et al., 2002a).

The number and size of Birimian gold occurrences and deposits in Ghana are not evenly distributed. To date a high percentage of all gold occurrences and almost all major gold mines occur in the Kumasi Basin region (Leube and Hirdes, 1990). Two periods of gold mineralisation are recognised in Ghana, an early D_2 gold mineralising even occurred during regional NE-SW compression and reverse faulting, and later D_5 gold formed during regional strike-slip faulting. U-Pb geochronology on ore-related titanites in the Ashanti deposit indicates that gold mineralisation occurred at ca. 2100-2090 Ma (Oberthür, et al., 1998).

Structural styles presented within the Tarkwaian are different in each of the five belts. In the Ashanti Belt, the Tarkwaian sediments are folded into overall symmetric synforms and antiforms. The central part of the belt is characterised by open symmetric or gently asymmetric folding. Locally, the open folding becomes tighter vertical or isoclinal folding. The central portion of the belt folding becomes tighter and overturns the stratigraphy. Reverse faulting with axial planes dipping away from the centre, towards the margin of the belt (i.e. beds are overturned and over-thrust towards the centre of the belt). Reverse faulting has repeated stratigraphy locally within the centre of the belt, whereas towards the edge of the belt, the faults become less steep and thrust Birimian rocks over the Tarkwaian sediments.

Ridge's project area is located in the NE of Ghana where structures are characterised by steep isoclinal folds with near vertical axial planes. The greenstone belts also have well-developed open symmetric folds. Locally, in the steeply dipping strata, axial planar cleavages are well developed parallel to bedding, and a less well developed second cleavage occurring perpendicular to the first.

2.1.2 Mineralisation

This review is based on public domain data, but also draws from SRK's experience concerning the geological and structural controls on mineralisation at the Ashanti, Bogoso, Obotan, and Chirano deposits of SW Ghana. Whilst this review focuses on deposits in the south, they are thought to be close geological analogues to those in the north.

All the Ghanaian greenstone belts contain gold mineralisation occurring within a variety of different styles and sizes. Local variation in lithology and deformational history contribute to the unique size and character of each deposit.

Commonly, two-broad deposit models are presented for gold mineralisation in Ghana:

1 Paleoplacer disseminated gold deposits in Tarkwaian conglomerates

2 Structurally-hosted lode gold deposits

This review outlines only the characteristics of structurally-hosted lode gold deposits. Table 2-1 outlines the important characteristics of the structurally-hosted gold deposits in Ghana. Most of these deposits are hosted in Birimian metasediments, often close to major lithological contacts with either Birimian metavolcanics or Tarkwaian metasediments. Two distinct gold events are recognised in Ghana – D_2 gold, related to regional NE-SW compression and reverse faulting (ca. 2110 Ma.), and D_4/ D_5 gold, related to regional sinistral strike-slip faulting (ca. 2090 Ma) (Griffis, 2006).

Gold mineralisation occurs along major NE-striking, faults zones which are typically between 5 to 40m wide and have graphite-chlorite-sericite alteration. Gold mineralisation is developed where the NE fault zones intersect major E-NE-striking fault zones, and especially where they are recognised to have influenced granite emplacement, alteration and Au geochemical trends. Left-stepping flexures (10 to 30 km scale) in the NE-striking fault zones (which produce more northerly striking fault sections) are important for the localisation of gold mineralisation. Other local complexities in stratigraphy and fault geometry, associated with major NE-striking faults are also important; for example, folds in stratigraphy that may produce saddle reef-style mineralisation, or fault duplexes.

The (Ashanti and Bogoso deposits of SW Ghana are analogous to gold deposits in the Nangodi Belt. These deposits are all hosted in shear zones and close to, or at the contact between Birimian metasediments and Birimian metavolcanics or Tarkwaian metasediments. The shear zones that host the Bogoso deposit occur at the contact between Birimian metasediments and Tarkwaian metasediments (Allibone, et al., 2002b). The shear zones also display imbricated structures in a series of moderately magnetic mafic igneous rocks (doleritic sills) concordant with the NE strike of the shear zones. The Ashanti deposit is hosted in shear zones either within the Birimian metasediments (Obuasi and Ashanti fissures) or at the contact between Birimian metasediments and Birimian metavolcanics (Cote d'Or fissure; Allibone, et al., 2002a). The Ashanti and Bogoso deposits are both dominated by D_5 regional strike-slip gold, formed in reactivated D_2 reverse faults (Allibone, et al., 2002a and 2002b). They both contain quartz vein free-milling gold lodes and disseminated sulphide (arsenopyrite-rich) refractory gold lodes. The sulphide lodes are interpreted to form alteration haloes around the quartz vein lodes. Alteration is typically graphite, quartz, ankerite, sericite, tourmaline, chlorite, arsenopyrite, and pyrite.

The Chirano and Obotan deposits are both hosted in shear zones cross-cutting granitoids (Chirano – belt-type granite, Obotan – basin-type granite). The Chirano deposit is situated close to the contact between Birimian metavolcanics and Tarkwaian metasediments. The Obotan deposit is situated within the Birimian metasediments, but the granitoid and mineralisation both occur at contacts between greywacke and carbonaceous phyllite units. The Chirano and Obotan deposits are both dominated by D_2 regional reverse faulting gold, and only contain quartz vein-hosted free-milling gold lodes.

Table 2-1: Geological characteristics of Ghanaian gold deposits

Scale	Type	Geological characteristics		
		Ashanti Belt	Sefwi-Bibiani Belt	Asankrangwa Belt
Regional	Lithological	Birimian metasediments (in proximity to Birimian metavolcanics/Tarkwaian sediments)		
Regional	Structural	NE trending fault zones at/close to major lithological contrasts		
Regional	Structural	Flexures in NE trending fault zones (esp. N trending left stepping flexures)		
Regional	Structural	Intersections of NE trending fault zones with ENE transfer faults		
Regional	Lithological	Graphite bearing fault zones with associated As anomalies	Sericite-chlorite bearing fault zones	Graphite-sericite-chlorite bearing fault zones with associated As anomalies
Regional	Timing	D_5 sinistral strike slip related Au (ca. 2090 Ma)	D_2 thrust related Au (ca. 2110 Ma)	
Regional	Au mineralisation styles	Sulphide-refractory lodes (high in Asp, lower grade Au) Quartz free-milling lodes (higher grade Au)	Quartz free-milling lodes	
Local	Structural	North striking orientations may be more favourable		
Local	Lithogical/Structural	NE trending fault zones cross-cutting Belt and Basin granitoids		
Local	Ore styles	Quartz-carbonate lodes with Sulphide lodes forming outer mineralisation halo	Quartz-carbonate lodes	
Local	Ore mineralogy	Au-Py-Po-Asp (Ashanti, Bogoso)	Au-Py-He-Ru (Chirano)	Au-Py-Po-Asp (Obotan)

The greenstone belts of the Bole-Bolgatanga areas contain many of the geological features discussed above. The gold deposits of southern Burkina Faso should also be considered in any exploration model, as they are also extensions of the greenstone belts seen in NE Ghana. At this stage, little is known about the geology and mineralisation of the adjacent Youga gold deposit in the northern extension of the Nangodi Belt. From the information available (Endeavour Mining, 2011), it is reported to be hosted in arkosic sediments of Tarkwaian age overlain by older Birimian sediments. The deposit lies adjacent to the Bole-Bolgatanga Fault shear zone, displays a strong structural control, strikes NE-SW and is located in a quartz vein stockwork within the altered sediments. The deposit is characterised by pervasive silicification, quartz veining and sulphides.

2.2 Project Area Geology

2.2.1 Bolgatanga Area

The Bolgatanga Project area (Kungongo, Bongo and Ndongo tenements) covers an area of Paleoproterozoic greenstone belts in the NE of Ghana. The Kungongo and Bongo leases cover part of the NE extensions of the Bole-Bolgatanga Belt whilst the Ndongo lease straddles the Nangodi Greenstone Belt (Figure 2-6).

From both a geological and tenement point of view, the project can be broken down in two areas:

1 Nangodi Belt (Ndongo tenement)

2 Bole–Bolgatanga Belt (Bongo and Kungongo tenements)

The Nangodi Greenstone Belt

The Nangodi Greenstone Belt is the southern portion of the greenstone belt that crosses into Burkina Faso where the Youga gold mine is located (Figure 2-6). Locally, the belt trends NNE-SSW over a distance of 30 km and turns to a more ENE-WSW trend in the south of the area. The belt is comprised of Birimian-aged interbedded metavolcanics (mainly basalt flows), metasediments (phyllites) and occasional cherty horizons. Some small basic to intermediate intrusions occur within the belt and are associated with gold mineralisation. Metasediments of Tarkwaian age occur adjacent and beneath the belt. This is recognised as important as the gold mineralisation of the nearby Youga mine is hosted in sediments of similar age.

The belt is highly folded with at least two phases of deformation being noted (D_1, D_2) and as such, is regarded as a series of refolded folds.

The main axis (D_1) trends NNE-SSW and form a series of tight isoclinal folds with the second fold axis trending approximately WNW-ESE (Figure 2-7).

Evidence of these two deformation events is clearly seen in several outcropping cherty sediments in the south of the Ndongo tenements, where they display well-developed pencil cleavages (Figure 2-8) formed by the intersection of the two cleavage planes and clearly map out as refolded folds on the western flanks of the Nangodi Fold Belt. This structural complexity is considered highly favourable in the development of structural traps and pathways for mineralising fluids.

A study by Griffis (2000) of the cherty chemical sediments outcropping in the Nangodi area in which they occur interbedded with the basaltic flows, and transition with metasediments and volcaniclastic units. The chemical sediments feature a variety of facies including manganese-rich varieties (gondites and manganese oxides), chert, carbonates, pyritic carbonaceous cherts, barium-rich phyllites, carbonaceous phyllites, and tourmalinites. These sedimentary rocks are enriched in gold with average background values commonly in the range 20-30 Au ppb, which are about 4 to 5 times those of most of the volcanic, sedimentary and intrusive suites in the area. Virtually all of the gold deposits in the immediate vicinity of Nangodi occur in shear zones quite close to these transition zone chemical sediments, and it has been proposed that the gold in the vein deposits are remobilised from the chemical sediments by hydrothermal fluids of metamorphic origin.

In addition to the Birimian sediments, the belts are flanked by sedimentary basin of Tarkwaian age, which feature conglomerates, quartzites and cross-bedded sandstones. The coarse clastic component of the conglomerates consists mainly of phyllite and fine-grained, pink granitoids in a matrix of dark grey sandstone (greywacke). The contacts of these clastic sequences generally feature considerable shearing, so that stratigraphic relationships with adjacent units are not very clear.

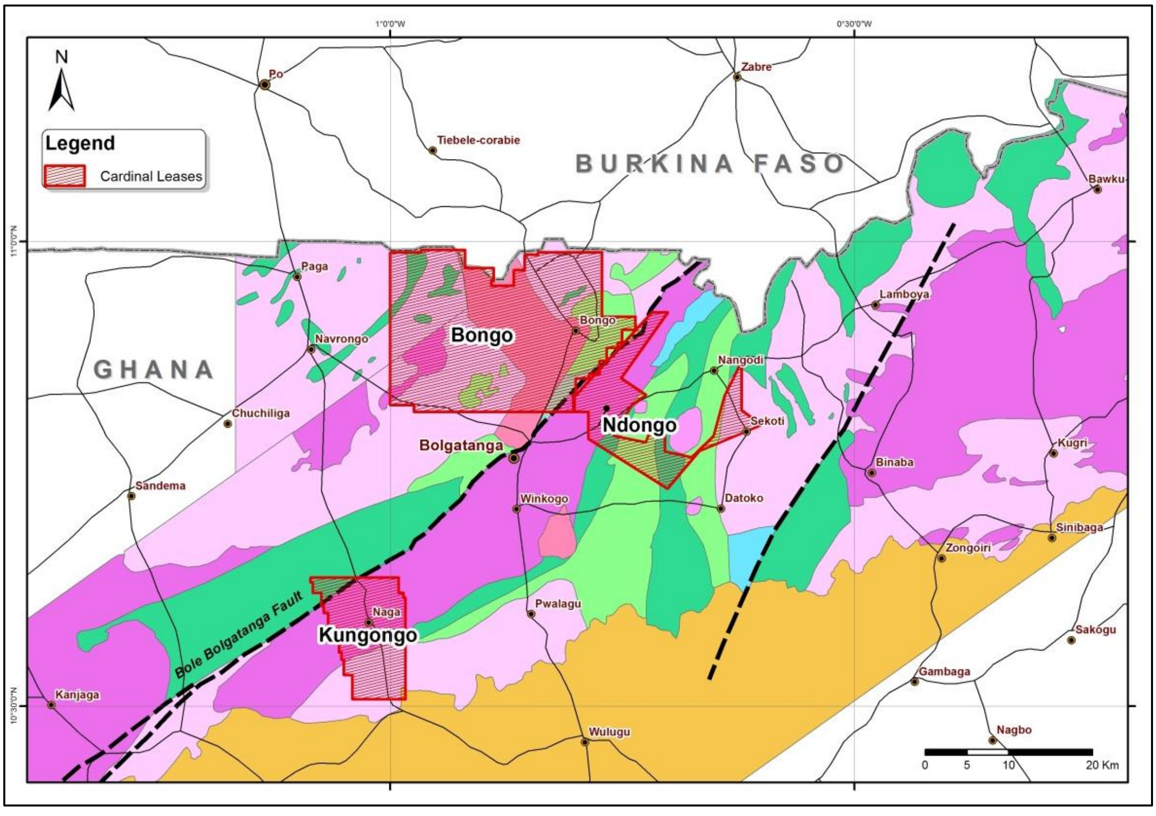


Figure 2-6: Geological map of northern Ghana with the Cardinal tenements overlaid

Gold mineralisation in the belt appears to be associated with the highly sheared, possibly thrusted margins of the belts and the contacts between the metasedimentary and volcanic rock units. The currently producing Shaanxi gold mine occurs on one such contact, as does the historical Nangodi gold mine which produced over 18,620 oz Au from 23,600 tonnes (Ghana Department of Mines records 1938). Numerous artisanal workings also occur along this contact. A recent rock chip sampling program by Cardinal has returned gold grades of up to 4.5 g/t Au from sheared quartz vein material adjacent to the Shaanxi mine. In addition to the sheared contacts, there is the potential for a low-grade high-tonnage stockwork-style mineralisation to be associated with the basic to intermediate intrusive bodies that exist in the belt and on its margins. Soil sampling by Red Back has shown the larger Pelungu granodiorite-diorite intrusion is anomalous in gold (1.2 g/t Au anomaly).

The southern part of the project area is covered by younger Volta Basin clastic sediments which are easily distinguished from the granite-greenstones on the airborne geophysical maps (Amoako, et al., 2004). Immediately south of the White Volta is the Gambaga escarpment, a very prominent topographic feature marking the edge of a very thick section (approximately 300 m) of essentially flat-lying Voltaian sediments. In the project area, the Voltaian sediments are probably relatively thin, as the magnetic signature of the underlying granite-greenstone complex is visible in the aeromagnetic imagery.

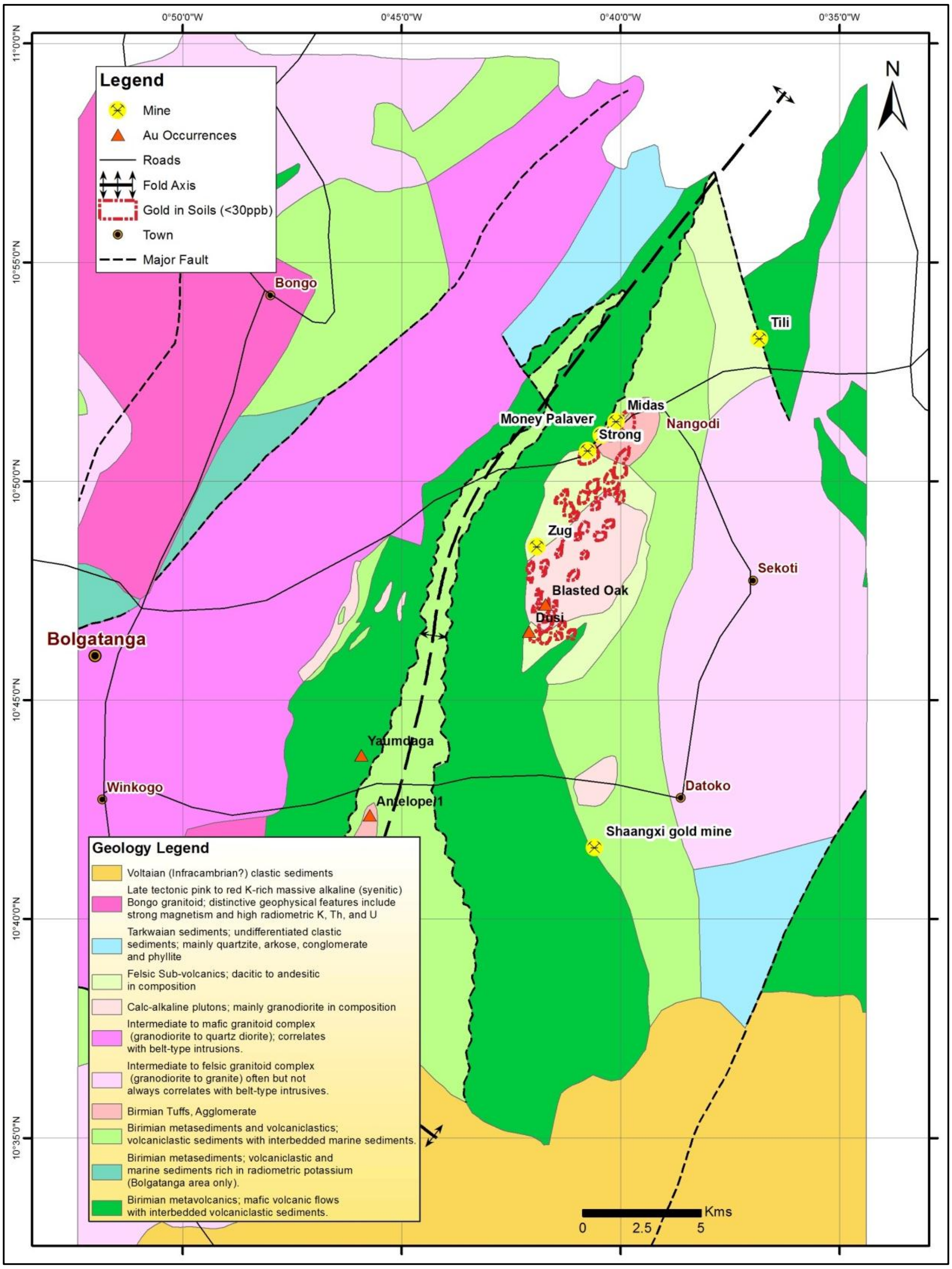


Figure 2-7: Geological map of the Nangodi Greenstone Belt

Figure 2-8: Pencil cleavages showing cherty sediments in the western flanks of the Nangodi Belt indicating the intersection of two cleavage directions (NNW and ESE)

The gold mineralisation at the Pelungu intrusive including the Zug and Dushe deposits which occur in narrow steep-dipping veins and are consistent with dextral (right lateral) movement along the shear zone, causing clockwise rotation and the development of lower pressure zones (“pressure shadows”) in the SW and N-NE of the granitoid. These are preferred exploration targets; as dilated zones, they preferentially focus the flow of hydrothermal fluids. It is a classic site for localising gold mineralisation in both Archean and Paleoproterozoic gold terrains. The +1 Moz Au resource at the Makabingui Project in eastern Senegal (Bassari Resources, ASX: BSR) provides a local example of this mineralisation style. Other similar, but smaller, intrusives occur within the belt.

Local hydrothermal alteration (silica-chlorite-sericite-epidote) is often associated with these sheared contacts and along the intrusive margins (Figure 2-9). The rocks in these shear zones themselves are often highly altered, deformed and contain minor disseminated sulphides and quartz veins.

Commonly, the gold mineralisation occurs in the quartz-veined altered wall rock, with the more massive quartz reefs being barren. The shear zones themselves appear relatively narrow (2 to 5 m wide), but can be followed along strike for several kilometres, commonly these shears have many artisanal workings along their length (Figure 2-10).

Figure 2-9: Sample of highly altered (sericite-chlorite-silica) and sheared wall rock from artisanal workings on the eastern contact of the Nangodi Belt, adjacent to the Shaanxi gold mine

Note: Sample grades at 4.5 g/t Au and 4566 ppm As

Figure 2-10: Artisanal workings along a shear zone in the Nangodi Belt adjacent to the Pelungu Intrusive

Bole-Bolgatanga Greenstone Belt

The regional Bolgatanga-Bole Fault strikes NE-SW, and separates the Nangodi Belt from the Bole Greenstone Belt. It crosses into the project area and both the Bongo and Kungongo tenements sit adjacent to this shear zone (Figure 2-11). The belts within the two tenements appear to be dominated by metasediments with few, if any, volcanics. These belts also show evidence of refolding and a high level of structural complexity, as with the Nangodi Belt. Several outcrops were noted in the Bongo permit within the metasediments, again showing evidence of intersecting foliations (pencil structures) plunging shallowly (20^o) to the SW (Figure 2-12). The belts strike in a NE-SW orientation and exhibit a more open style of folding compared to the Nangodi Belt. The principal fold axis (D_1) trends NE-SW, and a later (D_2) event trends SE-NW. The belt is intruded by numerous late granitoid complexes of both alkaline and calc alkaline affinities. A large intrusion of intermediate granodioritic material separates the Nangodi Fold Belt from the Bole Belt.

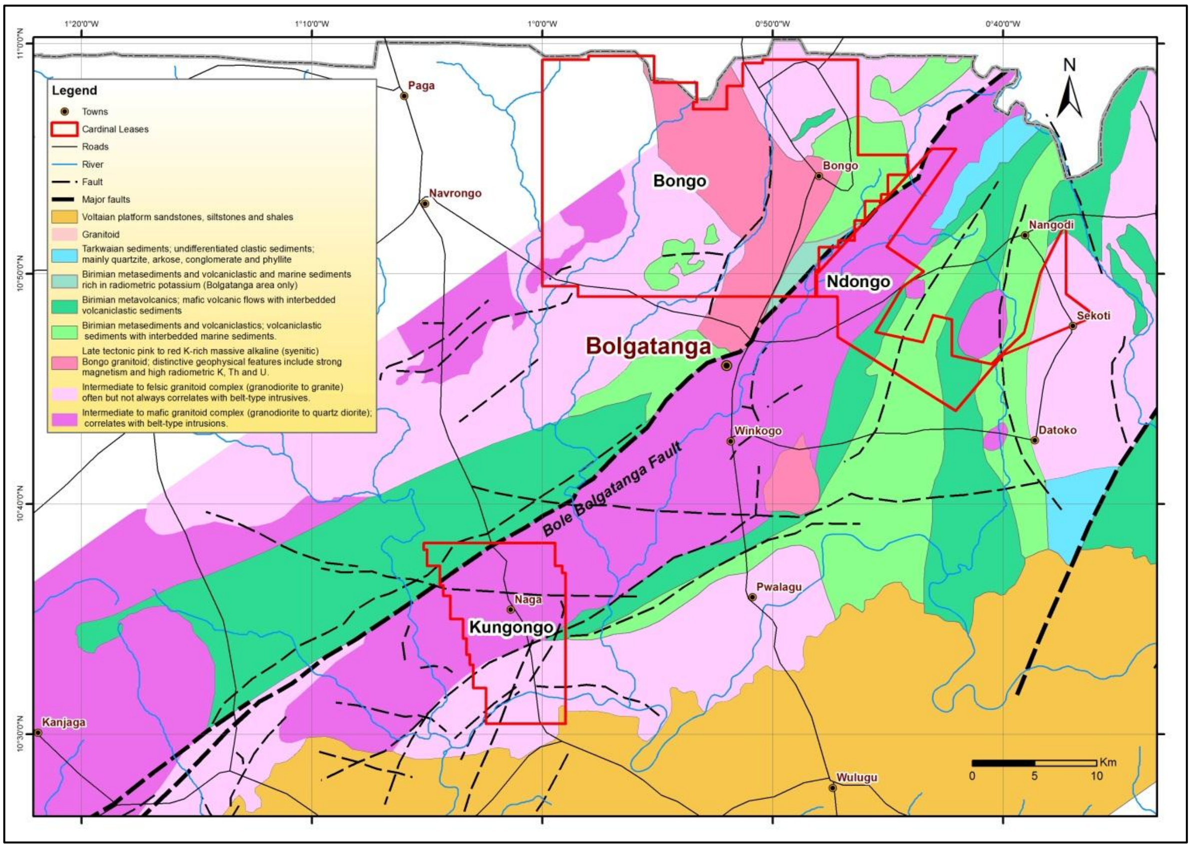


Figure 2-11: Geological map of the Bole Belt and Bole-Bolgatanga Fault Zone

Evidence of shearing along the faulted contact zone between the granites and the metavolcanics is found in numerous roadside outcrops along the Bole-Bolgatanga Fault (Figure 2-13). To date, no significant artisanal workings are noted along this contact which extends for at least 30 km through Cardinal's permits Although this is a prospective shear zone and requires further investigation, the project area largely consists of granite which appear to be relatively unaltered and of limited prospectivity, although there is evidence of shear zones cross-cutting the granites. There are also several internal intrusive complexes that provide competency contrasts adjacent to shear zones; thereby creating suitable depositional sites for gold-mineralising fluids. The Kungongo permit straddles the contact between the Bole Greenstone Belt and the granodiorite intrusive for some 6 km.

Randgold Resources has identified several prospects along this contact (Randgold 2005). Some late alkaline intrusives are known to have gold associated with them along their margins.

Again, it is worth noting that the Bole Belt is regarded as prospective as it displays a level of structural complexity that would possibly provide structural trap positions for mineralising fluids.

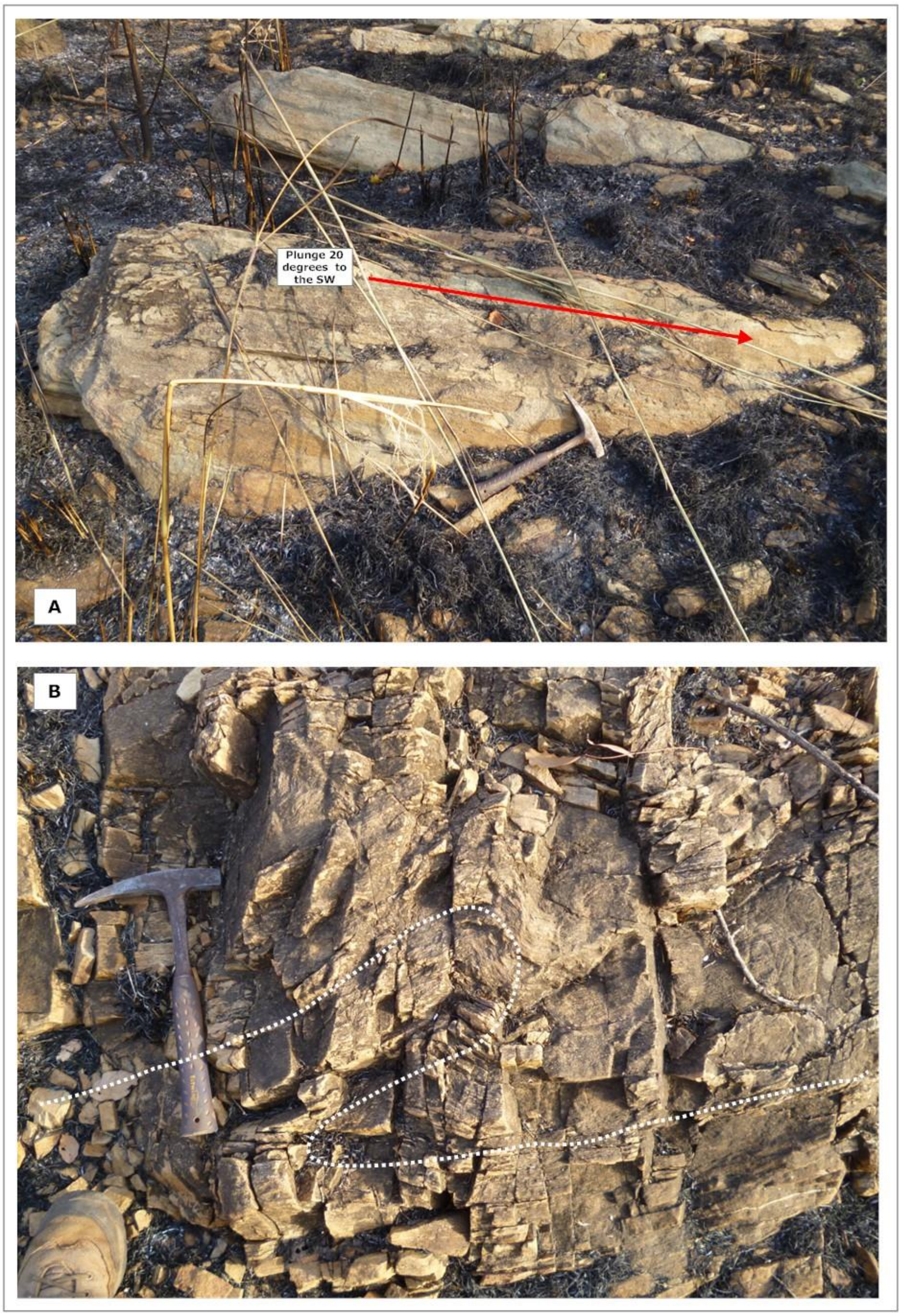


Figure 2-12: Photo A: Plunging fold noses with pencil cleavage at the Bole Belt (Bongo permits); Photo B: Refolded folds in metasediments (Bole Belt)

Figure 2-13: Sheared and foliated sediments along the Bole-Bolgatanga Fault contact at the Bongo tenements

From the work to date it is clear that structure will play an important part in localising gold-bearing fluids into trap sites such as fault splays and around intrusions. Therefore, mapping of the geological structures is essential for successful exploration in the region. Given the radiometric and magnetic contrasts of the main rock types in the area, the use of a detailed airborne geophysical survey over the area would assist in identifying and mapping out these features at the scale required for prospect identification.

2.2.2 Subranum Project Area

The Subranum Project is situated on the extreme eastern margin of the Sefwi-Bibiani greenstone belt, and covers a portion of the contact between the Birimian metasedimentary volcaniclastic rocks to the southeast, and metavolcanic and volcaniclastic rocks to the northwest. The metavolcanic and volcaniclastic rocks along the eastern margin of the Sefwi-Bibiani belt are characterised by the intrusion of highly magnetic mafic sills, however the lack of distinguishing flow scale features in the host volcanic rocks, makes sill / host determination difficult in outcrop. The lower southeastern corner of the project comprises the metasedimentary rocks of the western margin of the Kumasi basin (Griffis,1998, see Figure 1-5). The Subranum Project area is also known to contain minor felsic intrusives in the form of dykes and sills intruded into the volcaniclastic pile.

Typically, the rocks of the Subranum Project are tightly isoclinally folded with steep axial planes parallel with the major NE strike of the greenstone margin. The contact to the Kumasi Basin is considered to be a major fault contact. Gold is known to be hosted by quartz veins within the metamorphosed argillaceous and intermediate volcaniclastic sediments of the area. Typically, this mineralisation is accompanied by chlorite-sericite-carbonate alteration haloes (Griffis, 2006).

2.3 Geological models for Au mineralisation

Both the Nangodi and Bole belts are structurally complex, with complex refolded D_1 (NNE-SSW) and D_2 folds (WNW-ESE). The main contacts between the granites and greenstones are structurally controlled and may represent thrust contacts. Regionally known gold mineralisation occurs on or adjacent to these contacts. Many of the contacts between the metasedimentary and volcanic units and the late granitoids contain artisanal workings. Many of the workings are hosted within strongly sheared sediments, granites or volcanics with strong hydrothermal alteration including chlorite, sericite and silica with minor sulphides (pyrite-arsenopyrite). The shear zones observed in outcrop and in artisanal workings appear narrow (2 to 5 m wide). The geological review of the tenements highlighted the need for detailed structural geological mapping of the belt to understand the controls on gold mineralisation in the area.

Development of a mineralisation model for the belt prior to detailed exploration being undertaken is necessary to provide a framework for methodical exploration and targeting. From the review of the geology and other known deposits in SW Ghana, the most appropriate model for controls on gold mineralisation in the area is the "source-pathway-trap" (SPT) model (Figure 2-14). The SPT model has been used successfully and extensively in similar greenstone terranes around the world (Norseman-Wiluna Belt, Australia and Red Lake, Canada).

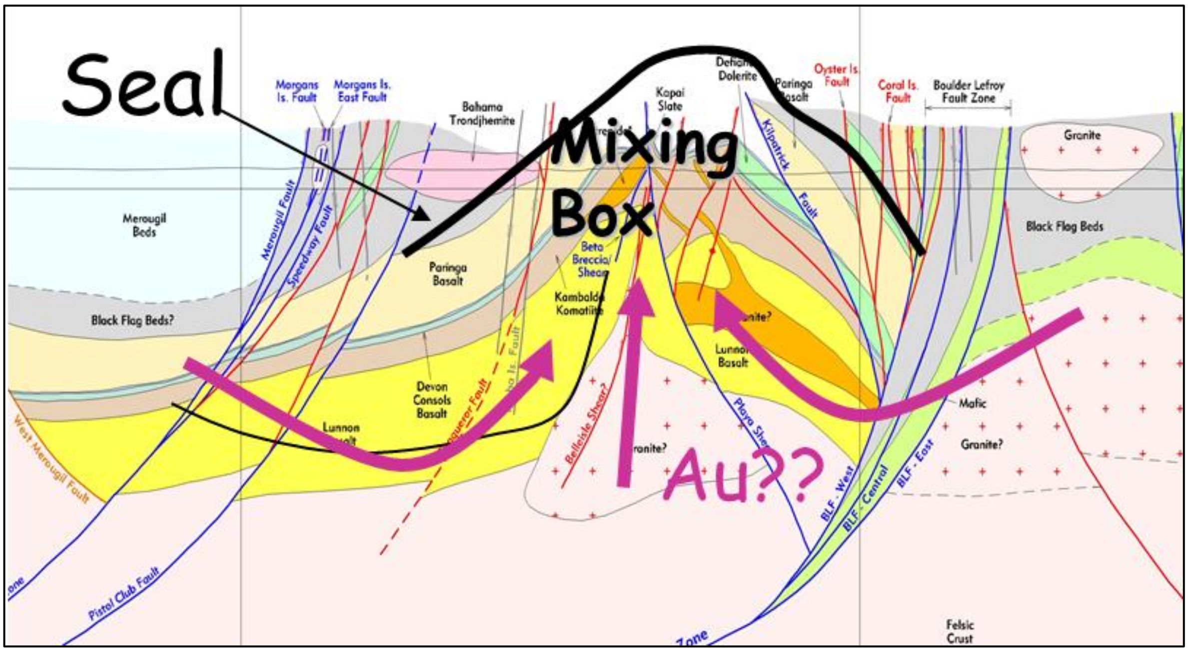


Figure 2-14: Diagrammatic section showing principal components of the SPT model

The major components of the SPT model are:

1 Major domain boundary faults (Bole-Bolgatanga Fault), unconformities, basin margins impart first order control for ascending fluids, especially deep tapping thrusts

2 Net upward fluid flux into antiform and dome structural positions, fold culminations caused by refolded folds such as occur in the Nangodi Belt

3 Gold trapped by permeability/ rheology contrasts – impermeable seals allow hydrostatic build-up

4 Permissive host rocks – Fe-enriched, brittle host rocks increase fracture-induced permeability and favour Au precipitation (basic metavolcanics and intrusions of the fold belts)

5 Source possibly at a deep crustal level, as gold is known to occur within the belt and NE Ghana. This component of the model is fundamental to the regional prospectivity.

At both Bolgatanga and Subranum, there is potential for all five of the major components of the SPT model to exist within the fold belts, as follows:

- Major boundary faults such as the Bole-Bolgatanga Fault
- Anticlinal culminations caused by refolded folds
- Traps caused by interbedded sediments and volcanics
- Permissive Fe-rich host rocks in the basalts and basic intrusives of the fold belts
- Known presence of gold mineralisation the area; several producing mines (1+ Moz)

The SPT model allows for three possible levels of fluid focusing, as discussed below and shown in Figure 2-15.

1 Fluid focused at the boundary of the middle and upper crust, and this boundary is domical.

2 Focused fluid is released via 1st order breaching faults (domain boundaries, unconformities).

3 Upper crust geometries and 2nd/ 3rd order hanging wall faults trap fluids.

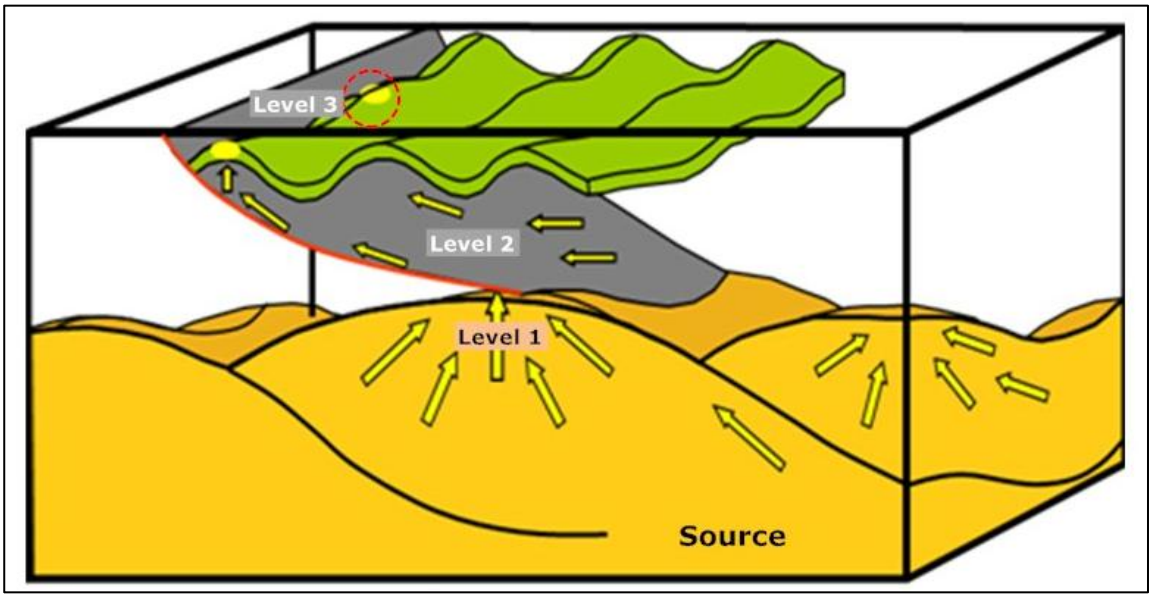


Figure 2-15: 3D view of the three foci for fluid flow in the SPT model

Major gold deposits commonly form at the apex of refolded folds (Figure 2-16). Such folds are likely to be present in the Nangodi and Bole greenstone belts.

- Gold deposits often located close to the apex of large domes (Golden Mile, Timmins, Callie, Telfer, Stawell, Ashanti etc.)
- Dome and basin geometries produced by orthogonal deformations provide a good regional focusing architecture
- Accentuated by diapiric emplacement or "buttress effect" – indentor tectonics

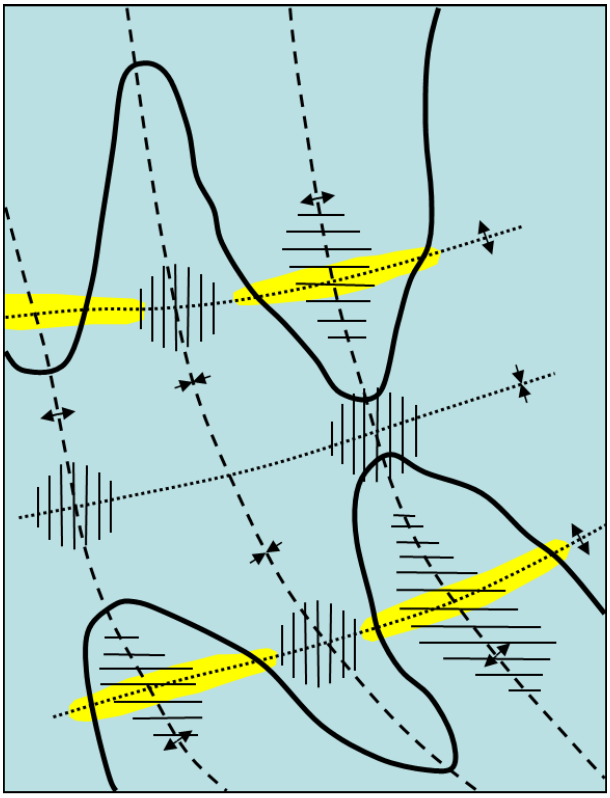


Figure 2-16: Hypothetical plan view of domical structures caused by refolded folds (D_1, D_2) and possible fluid trap sites (yellow shaded)

Structural controls (in terms of fluid pathways) are often as follows:

- 1st order "long" structure (e.g. Bole-Bolgatanga Fault)
- Au controlled by contractional jog along 2nd order fault (i.e. splays off major faults)
- Au hosted in 3rd and 4th order oblique to reverse faults
- Dilatational zones along structures or around intrusives (e.g. Pelungu Intrusion)
- Cross-cutting structures

Preferential location of gold mineralisation in pressure shadows around intrusions, dilational jogs along shears and faults combined with anticlinal traps in permissive (iron- or carbon-rich) host rocks. Cardinal needs to compile all data sets to identify such pathways and trap positions in the project area within the Nangodi Fold Belt and along the Bole-Bolgatanga Fault Zone. In any targeting exercise, the presence of magnetic lows due to magnetite destruction by alteration fluids around such dilational features should also be considered.

Based on the geological review of the project, the main theoretical exploration target sites are likely to occur in permissive host rocks at the apex of folds and in dilational zones along structures and adjacent to intrusions and major regional thrusts and shears. This is especially so in the hanging wall of thrust structures. Figure 2-17 shows an idealised geological cross-section through the Nangodi Belt and a geological plan showing the typical structural, fold and lithological relationships and possible traps that may host economic gold mineralisation in the region.

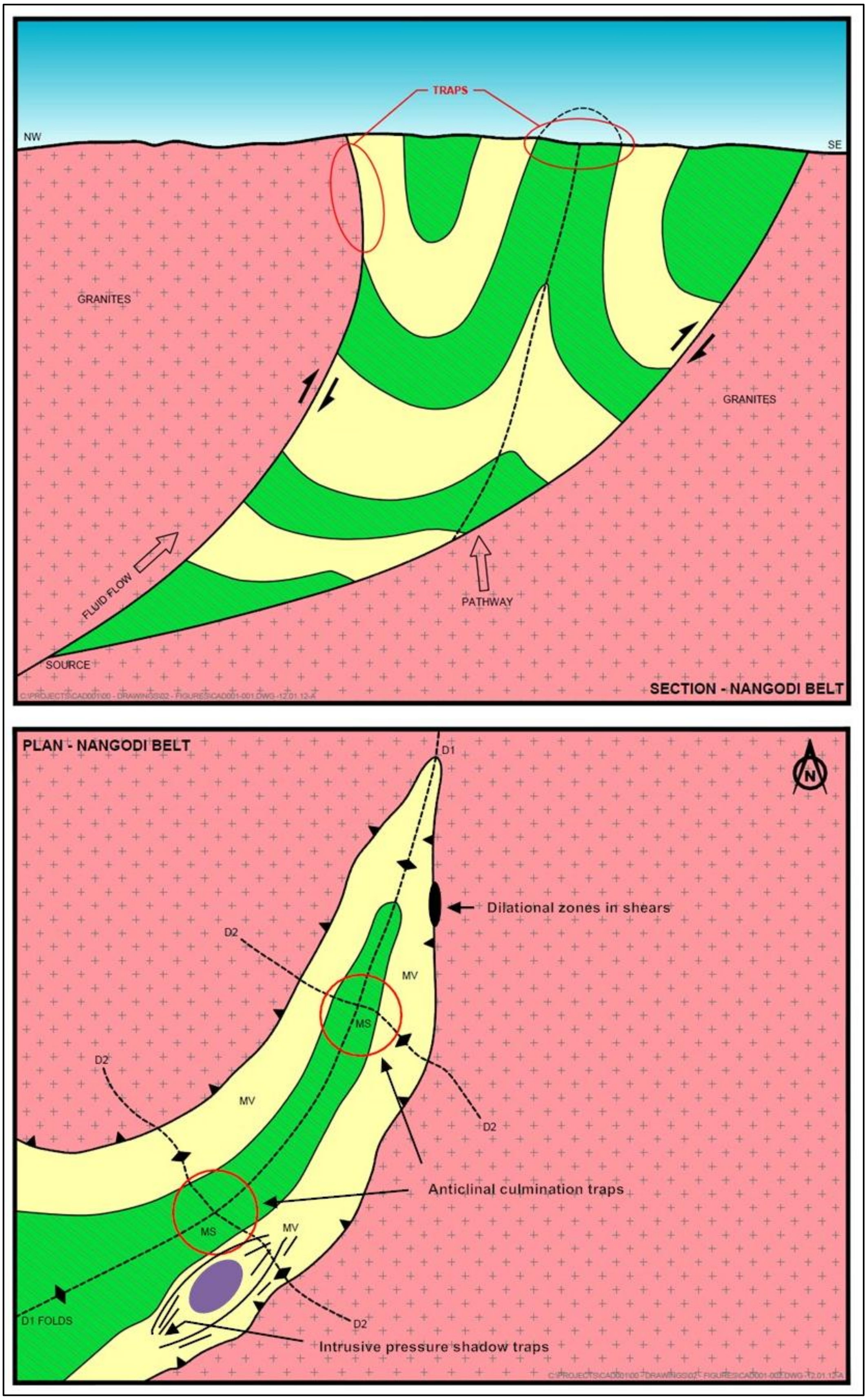


Figure 2-17: Schematic plan and section through the Nangodi Belt showing possible relationship of folds and lithological contacts for Au targets

To a large degree, successful exploration at the Bolgatanga Project depends on a sound geological and structural understanding of the area. To achieve this, SRK suggests an integrated targeting study be undertaken whereby all the main geological, geophysical and structural data sets are combined and interpreted based on the SPT model to identify possible target zones. These targets should be ranked in an 'objective' prospectivity analysis study or matrix. This includes integration of satellite imagery, topography data, geological maps, soil geochemistry, airborne geophysics and historical workings (along with rock chip geochemistry) into a single GIS database, and then careful interrogation of the database and interpretation of the data based on the above models to identify and rank targets prior to drilling. The key to driving the prospectivity targeting will be good structural understanding of the area. SRK recommends implementation of a detailed geophysical survey over the Bolgatanga region to provide a basis for this. The regional survey (Amoako, et al., 2004) carried out in1999 is probably too coarse for prospect-level identification

3 Previous Exploration

The following section is taken from Griffis (2006). The Nangodi area has not had extensive artisanal gold mining when compared to elsewhere in West Africa, such as southern Ghana, Côte d'Ivoire or southern Burkina Faso.

The discovery of gold in this region occurred in late 1930s when a British businessman was shown some gold-bearing quartz veins at Nangodi by a local farmer. A small underground operation was underway by 1934, which attracted the attention of Gold Coast Selection Trust (GCST) who optioned the property in 1936 and acquired a large prospecting licence area which covered most of the belt. GCST boosted the underground production, which peaked at about 5,000 ozs/annum in 1936-1937, but dropped thereafter as a result of lower grades (originally about 1 oz/ton and dropping to about 0.6-0.8 oz/ton in 1937-1939). GCST subsequently dropped the option in 1938, but mining continued on a very modest scale for a few years.

During the early 1960s Ghanaian Government was trying to stimulate interest and development in northern Ghana. The Ghana Geological Survey Department carried out limited shallow drilling around prospects which had been identified by earlier work in the 1930s. Again in the 1970s, some soil geochemistry and trenching were carried out over a 7 km stretch in the Nangodi area where most of the known prospects occur.

Driven by activity elsewhere in Ghana and Burkina Faso during the mid-1990s, numerous Canadian and Australian junior explorers started to explore the north of Ghana, in particular, the discovery of Youga deposit in Burkina Faso by International Gold Resources (IGR) is significant.

During this same period in the mid-1990s, small-scale miners inundated the area as the traditional small-scale mining sites in southern Ghana were closed (Tarkwa, Obuasi, Konongo, etc.). Environmental problems were created when the artisanal miners encroached on forest reserve areas southwest of Bolgatanga. Eventually, the Small-Scale Mining Division of the Minerals Commission set aside a 72 km^2 area south of Nangodi (Shiega-Datoko) for small-scale mining. A number of licences were taken out and up to several thousand people were living and working in the general area between 1996 and 1998.

BHP was the first to conduct a major reconnaissance exploration program in the mid-1990s, covering most of the Nangodi area. BHP's work was directed towards developing both gold and base metal prospects. After an initial regional program which identified promising geochemical and geophysical anomalies, the project was largely abandoned as a result of BHP's decision to cease exploration activity in Ghana. Other groups that acquired prospecting concessions in the mid-1990s including IGR, who picked up two areas on the margins of the belt; the western area covered a large area around Navrongo and the eastern area extended to the Bawku area. Cluff Resources held two concessions on the eastern side of the belt, adjacent to BHP's Nangodi licence area, and Teberebie Goldfields acquired a concession from just north of Nangodi to the Burkina Faso border. Subsequently, Ashanti Goldfields carried out extensive work on the IGR concessions after their take-over of the company, and an Australian junior, Africwest Gold, successfully applied for a reconnaissance concession in the Nangodi area in late 1996, after the BHP licence had lapsed. The market downturn in 1997 seriously affected Africwest's ability to raise additional equity funding and their licence in the Nangodi area lapsed.

Renewed interest in the area began around 2004, with an increase in the gold price, and as a result of the development of mines on the Burkina Faso side of the border. Etruscan in 2006 (Etruscan, 2008) carried out soil sampling, rock chip sampling, limited trenching, and reverse circulation (RC) and rotary air blast (RAB) drilling (139 holes) in the Zupliga, Fulani and Dumorlugu prospects.

The best drill intercepts were 18 m at 3.35 g/t Au. Randgold also explored the Nangodi-Bole belts from 2004 to 2009 (Randgold, 2005 and 2009) with soil geochemistry, stream sediment sampling and rock chip sampling. The company identified eight areas, but left the area when it failed to meet their economic criteria. Red Back Mining commenced exploration work over the Nangodi Belt and adjacent areas in 2005 (Red Back, 2005). This included a desktop study of satellite imagery, data compilation, mapping and rock chip sampling. Red Back came to the conclusion that the area has the potential to host significant gold mineralisation. Red Back is still active in the area.

Significantly, none of the recent exploration has made use of a detailed airborne geophysical survey to identify structural-lithological targets to support the ground work. In 1999, the Finnish Government (Amoaka, et al., 2004) flew a geophysical survey over selected areas of the country for the Geological Survey of Ghana as part of a World Bank-supported project. This survey included NE Ghana and the Bolgatanga concessions. However, this survey was done at relatively low resolution – 400 m line spacing and 80 m terrain clearance, with 045° flight lines.

Apart from small-scale artisanal workings, the only active mining is an underground gold operation run by a Chinese company (Shaanxi Mining Ghana Ltd). This mine is situated along the eastern contact of the Nangodi Fold Belt, a few kilometres south of the Ndongo tenements. No resource, reserve or production information is available for the operation (Figure 3-1). The mine is situated close to or on the old Yale prospects shown on the regional geology maps at the contact between the metavolcanics and metasediments. Numerous artisanal workings are also being operated by locals adjacent to the mine (Figure 3-2)

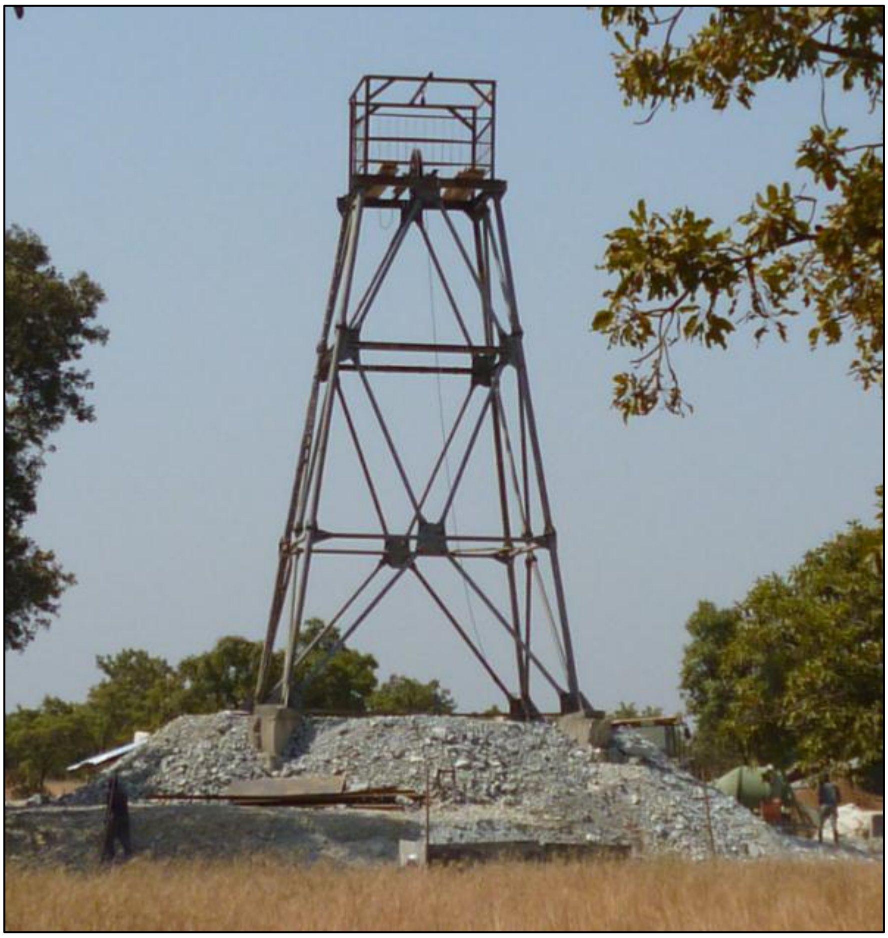


Figure 3-1: Head frame at the Shaanxi mine

Figure 3-2: Small-scale gold (artisanal) workings adjacent to Shaanxi mine

The Youga gold mine is located some 50 km to the northeast on the same greenstone belt in Burkina Faso. This mine is currently in production and operated by Endeavour Mining. It commenced production in 2008 and has quoted reserves of 4.5 million tonnes (Mt) @ 2.5 g/t Au (some 362,000 oz), with a resource of 1.56 Moz. This deposit was identified through regional exploration in the early 2000s. The location of both these mines can be seen in Figure 3-3.

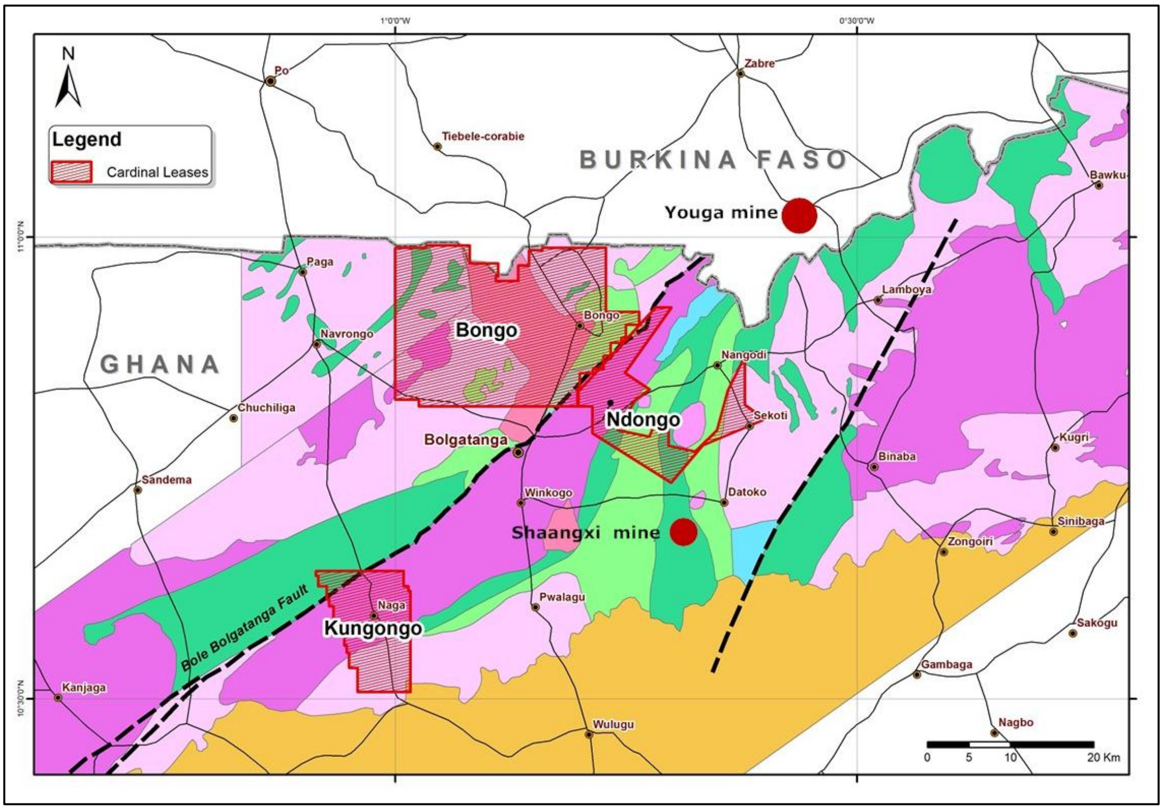


Figure 3-3: Location of the Shaanxi and Youga gold mines in relation to Cardinal tenements

The following excerpt has also been paraphrased from Griffis (2006):

The Bibiani area is located just inside the border of the Western Region and about 80 km in a WSW direction from the centre of Kumasi. As is evident in many early historical and geological reports of the area, the district of Bibiani was an important, longstanding site of artisanal mining and Junner (1935) notes that the area was being mined principally by the Apollonians (or Nzemas) who had migrated from the coast. The area may have been visited by European prospectors in the first, small 'jungle rush' of the late 1870s but the first substantive work by Europeans took place in the late 1890s. The early years of production were very modest (100-200 tpd) and yielded production of about 20-30,000 oz/yr; recovered grades were about 0.7 oz/short ton in 1904- 1906 but this dropped to less than 0.5 oz/ton later in the decade. The first mine closed down at the outbreak of war in 1914, after producing around 210,000 oz over about a 10-year period.

In the early 1920s, retreatment of old tailings was attempted. By the 1930's old shafts were deepened and new equipment installed and the mine was producing about 40,000 oz/yr (at peak mining production of about 400 tpd). Throughout the 1940s and 1950s, gold production was mainly in the range of 70-80,000 oz/yr from a mining rate of up to about 1000 tpd but recovered grades had dropped to just over 0.2 oz/ton.

The Bibiani mine was one of the mines purchased by the Government in the early 1960s. Production rates were maintained for a few years but the declining grades at depth resulted in much reduced gold production. By the mid-1960s gold production was less than 50,000 oz/yr and the mine was eventually closed later in the decade. Up to this point, the mine had produced almost 2.22 Moz of gold (Chamber of Mines statistics). The average recovered grade was just over 8 g/t.

In the early 1990s, an American company, International Gold Resources (IGR), assessed the open-pit potential of the Bibiani concession. Their early work (1994-5) at Bibiani consisted mainly of limited trenching and an extensive diamond and RC drill program, which revealed substantial widths of lower grade mineralisation on the margins of the mined-out areas and along strike of the known vein systems. This attracted the attention of Ashanti Goldfields who were in an aggressive acquisition mode and by 1996 they had taken over IGR, mainly because of their substantial interest in the Bibiani project.

Exploration conducted over the Subranum Project by various owners since grant of the tenement comprises an aeromagnetic survey and a soil sampling program, followed by a campaign of across strike trenching and RAB drilling and subsequent RC drilling. Soil sampling identified a strike parallel (NE trending) anomaly that coincided with the contact between Birimian metavolcanic rocks and metasedimentary volcaniclastic rocks (Figure 3-4). The results of drilling and trenching have identified a number of thin, moderately east dipping mineralised structures with grades generally less than 10 ppm and thicknesses ranging from 1 to ~5 m (Figure 3-5). Table 3-1 presents significant intercepts from RC drilling at a lower cut-off of 0.5 ppm.

Table 3-1: Significant intercepts from RC drilling: Subranum Project

Hole_ID	From	To	Interval	Ave. Au ppm
SKRC001	19	22	3	1.1
SKRC002	59	60	1	2.6
SKRC002	68	73	5	0.99
SKRC003	42	44	2	0.58
SKRC007	0	2	2	1.9
SKRC007	6	11	5	1.04
SKRC008	30	31	1	35.9
SKRC008	47	48	1	0.85
SKRC008	63	66	3	2.06
SKRC010	12	15	3	1.9
SKRC010	27	28	1	1.73
SKRC010	34	35	1	1.5
SKRC011	65	70	5	2.5
SKRC012	19	20	1	7.68
SKRC012	45	47	2	1.69
SKRC016	79	81	2	0.69
SKRC017	1	3	2	2.03
SKRC017	15	16	1	10.4
SKRC017	29	34	5	6.2
SKRC018	64	68	4	1.39
SKRC020	2	5	3	1.19
SKRC021	46	48	2	1.18
SKRC022	66	69	3	1.14
SKRC022	74	76	2	0.69
SKSRC027	128	129	1	1.66
SKSRC029	118	119	1	0.5

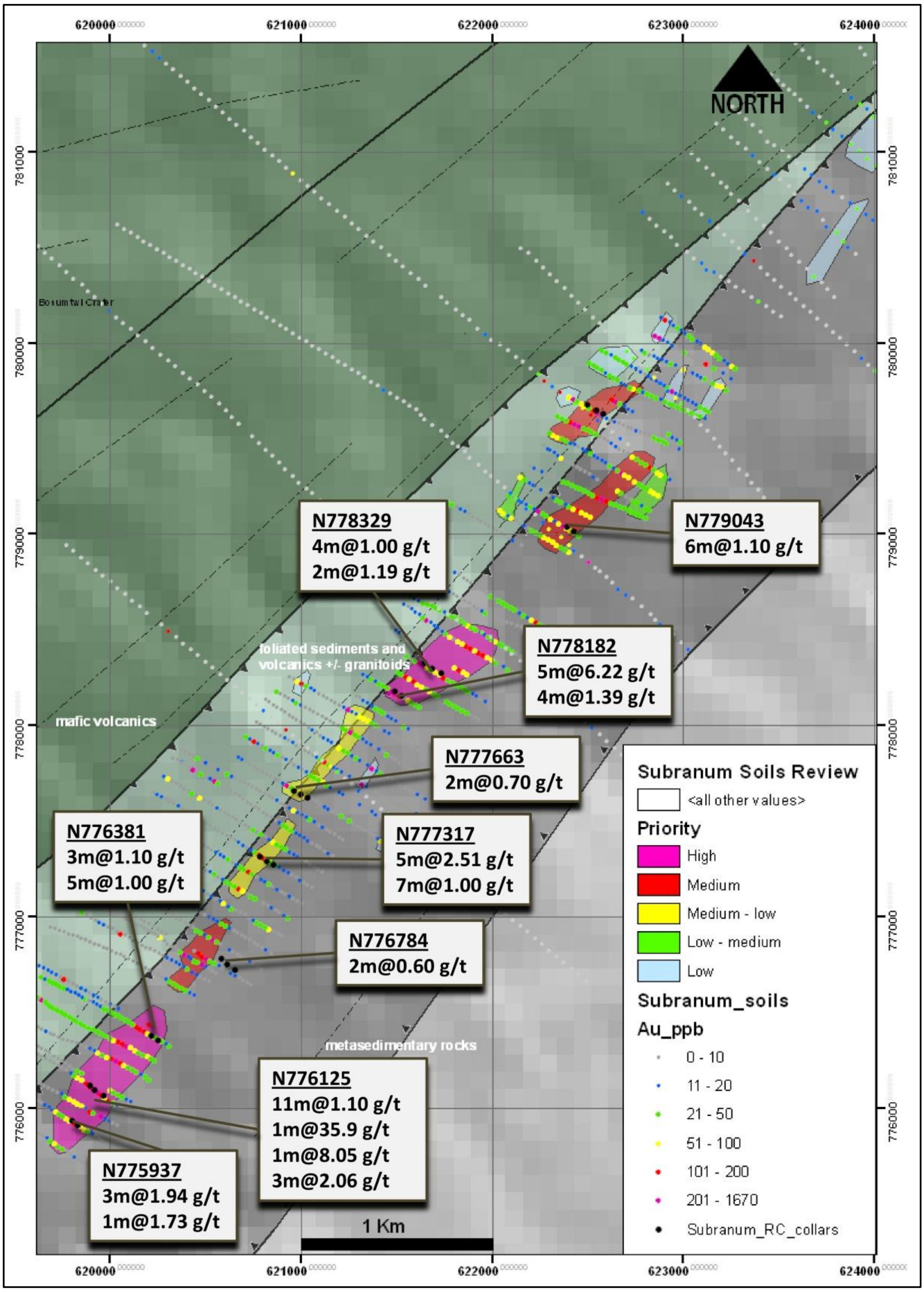


Figure 3-4: Soil anomalies and significant RC intercepts - Subranum Project

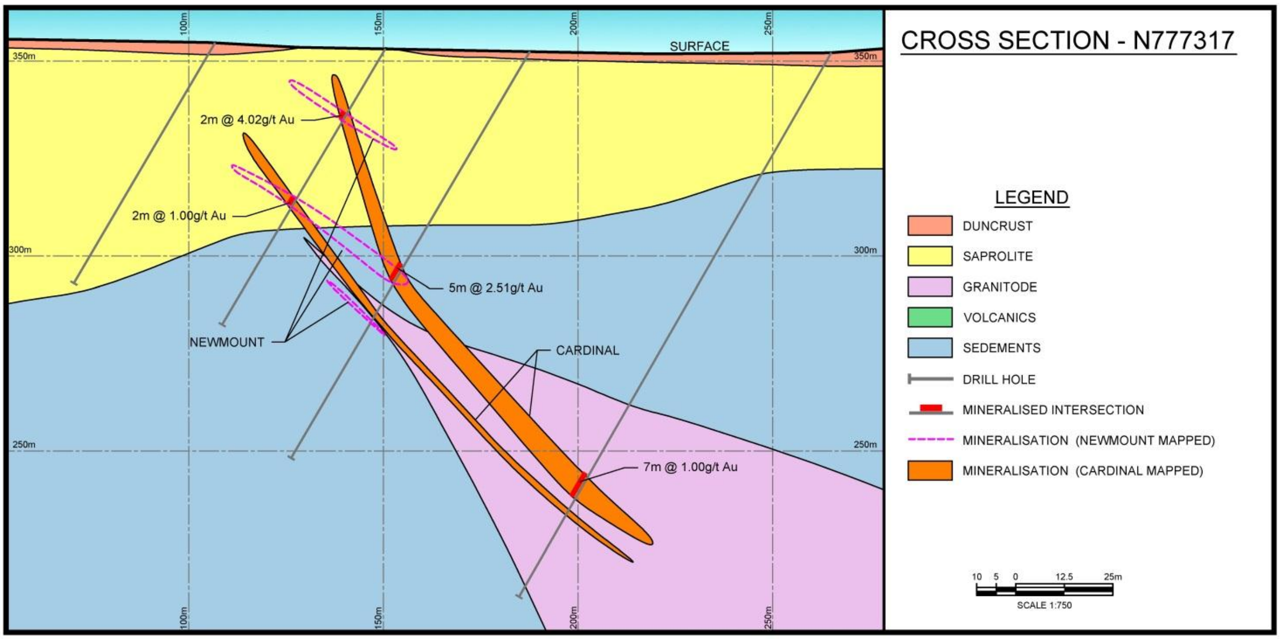


Figure 3-5: Subranum Project typical cross-section

4 Bolgatanga Project – Site Investigation

Mr Peter Gleeson, Principal Geologist (SRK), visited the Bolgatanga Project area in NE Ghana for a period of four days in early December 2011. Mr Gleeson was accompanied by Mr Paul Abbott, Cardinal's Exploration Manager. This section provides a brief description of the site observations.

During the course of the visit, Mr Gleeson and Mr Abbott visited the Ndongo, Bongo and Kungongo concessions. The purpose of the visit was to independently verify the geology and prospectivity of the leases. The site visit consisted of a day reviewing data at the exploration office in Bolgatanga, followed by three days in the field at each of the concessions reviewing geological outcrop, artisanal workings and historical workings, to establish an understanding of the mineralisation styles and potential prospectivity of the overall area. No site visit has been made to the Subranum or DRC projects, due to their late-stage introduction to the Independent Geologists' Study.

4.1 General geography and climate

The Nangodi Belt covered by the Ndongo tenements is a northern extension of the Bole Belt and extends into Burkina Faso and Niger. All of NE Ghana has a semi-arid climate with seasonal rains of less than 1,000 mm per annum. Most of the rain falls in a distinct wet season between July to September. In February, it is very dusty due to the onset of the Harmattan wind blowing in from the Sahara in a southerly direction. The area is covered by wooded savannah and some grasslands (Figure 4-1). Much of the area is comprised of low rolling hills with occasional tors formed by the weathering of granite outcrop. The general elevation is around 400 m amsl, with the highest hills reaching 600 m. The areas are generally well populated with numerous small villages every few kilometres. In general, the abundance of roads and local tracks along with the general savannah-like nature of the terrain facilitates easy access to all parts of the concessions.

Figure 4-1: View of the terrain in the Ndongo Project area showing low rolling hills and open savannah

The area is serviced by sealed roads from the regional administrative centre of Tamale (population 360,0000) and going through to the Burkina Faso border. Tamale is serviced by a twice-daily air service from the capital, Accra (1 hour). Tamale is located some 150 km south of Bolgatanga and 800 km north of Accra. Access to the NE from Accra is by sealed roads in varying levels of repair; this journey can take approximately 15 hours. The township of Bolgatanga (population 72,000) lies at the centre of the Ndongo and Bongo tenements and some 35 km NW of the Kungongo concessions. Bolgatanga is a busy commercial centre.

Recently, the electric power line was upgraded with a new 225 KV servicing the Bolgatanga region which was financed by the EU and World Bank.

The availability of power, good road network, general communications and location with regard to a large regional centre make it an ideal region for exploration and possible future mining operations.

4.2 Ndongo tenements – Nangodi Belt

The site visit to the Ndongo concessions focused mainly on the Nangodi Fold Belt and the known historic, current and artisanal mine workings along the eastern and western flanks of the fold belt. The sites visited are shown in Figure 4-2.

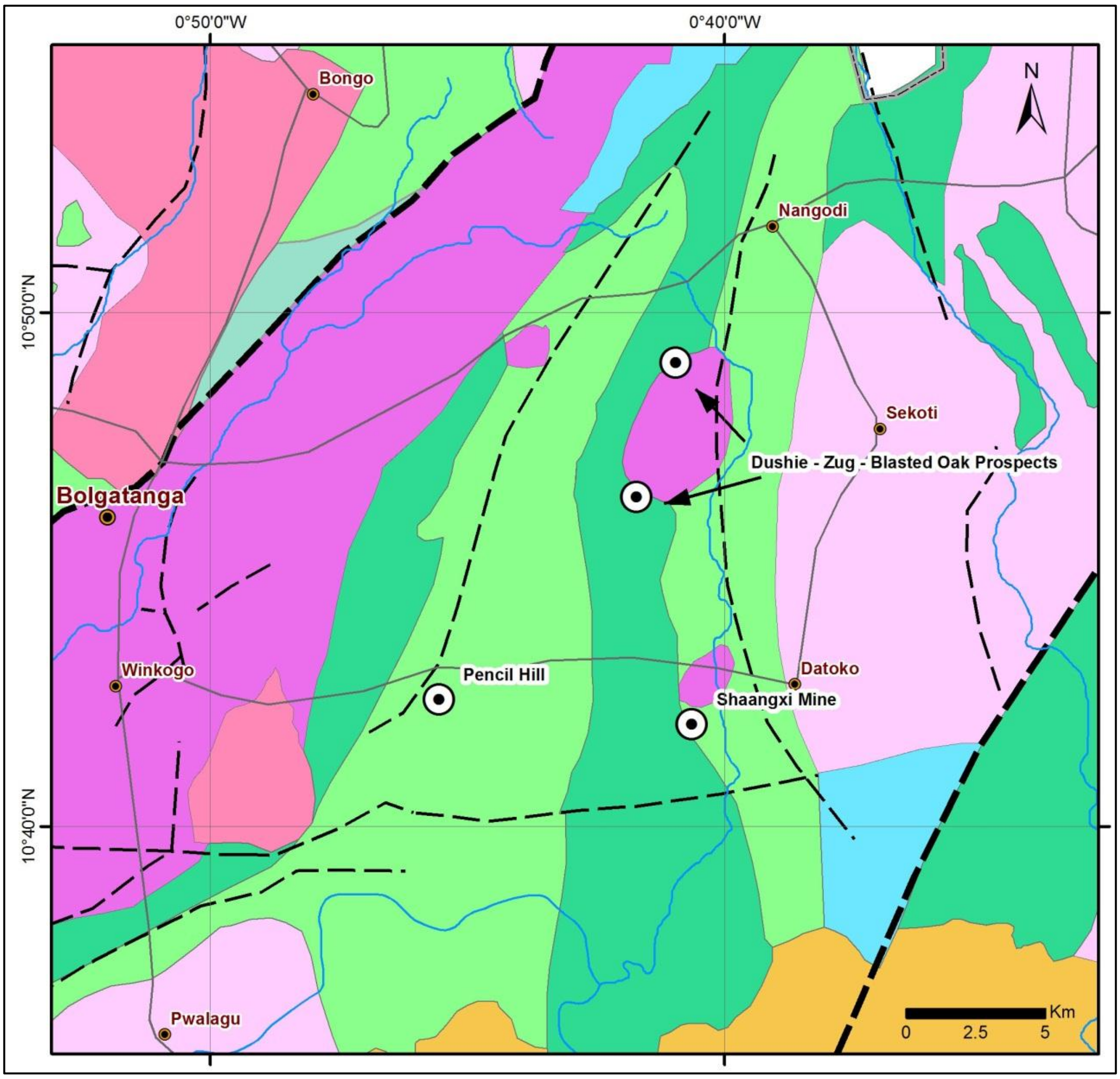


Figure 4-2: Ndongo tenement site visit showing locations of prospects and mines overlaid on government geology map

4.2.1 Shaanxi mine and artisanal workings

The Shaanxi gold mine and associated artisanal workings are located on the eastern side of the Nangodi Fold Belt along the sheared contact between the metasediments and the metavolcanics (Figure 4-2). Shaanxi is developing small-scale underground workings on a small concession purchased from local artisanal miners. The mining development is following narrow high-grade veins along a sheared lithological contact. There is no reliable information on the geology, resource or mine production from this mine, but two small headframes and a processing facility have been built. The mine and associated artisanal workings are shown in Figure 4-3.

Figure 4-3: View of headframe at the Shaanxi gold mine and adjacent artisanal workings

The gold mineralisation at the artisanal workings was reviewed from spoil and examples of gold-bearing material from the mine shown by the artisanal miners. The mineralisation is associated with a shear zone that closely follows the contact between the metasediments and metavolcanics. According to artisanal miners, the shear is some 2 to 3 m wide, strikes NNE-SSW and contains laminated quartz veins some 10 to 20 cm wide (Figure 4-4). The quartz veins show occasional coarse and finely disseminated sulphides (including pyrite and arsenopyrite). The sheared host wall rocks are highly altered and display a sericite-chlorite-silica assemblage with minor sulphides (Figure 4-5). According to the local miners, most of the gold occurs in the altered wall rock, with only minor gold being present in the large laminated quartz veins. Grab samples from the artisanal workings recorded gold grades of 4.5 g/t Au.

Figure 4-4: Examples of laminated quartz vein material from artisanal workings adjacent to the Shaanxi mine

Artisanal workings are found along a structural contact with over 17 km of strike length. This same contact also hosts the Strong Reef to the north and Yale Reef to the south.

Figure 4-5: Examples of highly sheared and altered wall rock material and laminated quartz veins with sulphides from artisanal workings

The rocks in the Nangodi Project area show evidence of shearing as they have a well-developed foliation and quartz veining, suggesting the rocks in this area may be part of a major shear zone or multiple shear zones. Shearing in this area could correlate to a similar regional structure along the western and eastern margins of the Pelungu Intrusive (Section 4.2.2).

4.2.2 Pelungu Intrusion – Zug, Blasted Oak and Dushie reefs

The second area visited was to the north of the Shaanxi mine and around the Pelungu granodioritic intrusion where a number of artisanal workings have been developed along the margins of this intrusion. Many of the old workings are dug within the phyllites which are strongly deformed and sheared. This area shows the historic workings of the Zug, Blasted Oak and Dushie reefs that are shown on the government maps (Figure 4-2). The metasediments (phyllites) adjacent to the Pelungu Intrusion contain numerous and extensive old workings (Figure 4-6 and Figure 4-7) that follow the shear zones along strike over hundreds of metres in a NNE direction. Many of the workings are dug within highly altered and sheared sedimentary rocks which have conjugate quartz veining. The shear zones appear to dip steeply to the NW. In places, the contact between the hanging wall and sediments is clearly evident. These shear zones can be between 3 and 6 m wide.

Figure 4-6: Photo A: Historic artisanal working adjacent to the Pelungu Intrusion; Photo B: Conjugate quartz veins in highly sheared metasediments

Commonly, the major shear zones can be traced across country from the metasediments and into the granodiorite where they become less obvious, but are still apparent as a distinct foliation. SRK noted at least six locations of current small-scale artisanal workings on the granodiorite intrusive itself. There is visible free gold in some of the quartz samples taken from the workings. In this area, the intrusive is highly differentiated with at least three phases being noted in the field. Within the intrusion, the gold mineralisation appears to be associated with quartz veins that have no obvious orientation (unlike the shear zones in the metasediments). This may have resulted from the difference in competency between the two lithologies, and the intrusives behaving in a less ductile fashion to form a coarse stockwork array of veins. The intersection of the shear structures and the intermediate intrusives could have the potential to form low-grade stockwork-type mineralisation. The position of this mineralisation reflects pressure shadows on the margins of the intrusion, which is a favourable positions for the accumulation of mineralising fluids.

Figure 4-7: Small-scale artisanal workings currently in production along the west side of the Pelungu Intrusion

4.2.3 Pencil Hill – Western margins of the Nangodi Belt

The site visit included a traverse along the western contact of the Nangodi Belt between the granites and the metavolcanics; numerous outcrops of the basalt with steep dips to the east, were noted. Many of the outcrops displayed pillow textures (Figure 4-8), indicating a sub-aqueous environment of deposition and providing way-up information. More significantly from a mineralisation perspective, was the presence of several outcrops showing strong shearing, alteration and quartz veining along the contact (Figure 4-8). Many of these shear zones contained thin conjugate quartz vein sets. Several small prospect locations of historic working are noted along the contact, such as the Antelope and Yaumdaga reefs. These zones of shearing can be noted along the contact for a strike length of over 20 km.

There are several prominent ridges of cherty sediments, at least 2 km long, which strike NNE-SSW, just to the east of the village of Tongo and close to the western margins of the Nangodi Belt. This location has been named Pencil Hill due to the development of a distinct pencil cleavage seen in the sediments at the location (Figure 4-9).

Such pencil cleavages form at the intersection of two or more dominant foliations or cleavages. The intersections of the two planes plunge steeply to the east. The structures are developed in an outcrop of stratified crypto-crystalline quartz that is some 20 m thick, and occurs between basalt flows that themselves are strongly silicified, but identifiable from pillow structures.

The structures themselves are boudinaged. From initial mapping of the trace of the horizon (this unit makes an excellent marker horizon), it appears that the sediments are forming refolded folds, and that the pencil structures form at the axis of the folds and plunge with the fold axis. At this location the D_1 folding axes strike NNE and form the western flank of the Nangodi Belt which has been refolded by the D_2 along its ESE-WNW trend (Figure 4-10). In outcrop, these sediments are clearly seen to form a large steeply-plunging (D_2) fold structure on the flanks of the D_1 anticline–syncline (refolded fold) that dips steeply to the east.

Figure 4-8: Photo A: Pillow basalts along western margins of the fold belt; Photo B: Highly deformed and sheared metasediments along the contact between the metavolcanics and granites

These cherty sediments have previously been described in Griffis, 2000 and by Melcher & Stumpfl, 1994. They are described as cherty chemical sediments that occur in the transition zone between the sediment and volcanic units and include a variety of facies including manganese-rich varieties, chert, carbonates, pyritic carbonaceous cherts, barium rich phyllites, carbonaceous phyllites and tourmalinites. These sediments are reported to be enriched in gold values 4 to 5 times higher than normal background for the area. It has been proposed that the gold in the vein deposits (possibly hydrothermal in origin) has been re-mobilised from the chemical sediments by metamorphism. Only the cherty siliceous sediments were noted in the Pencil Hill area.

Figure 4-9: Photo A: Strong pencil cleavage developed on western margin of the Nangodi Belt; Photo B: Cherty chemical sediments outcropping on the western flank of the Nangodi Fold Belt

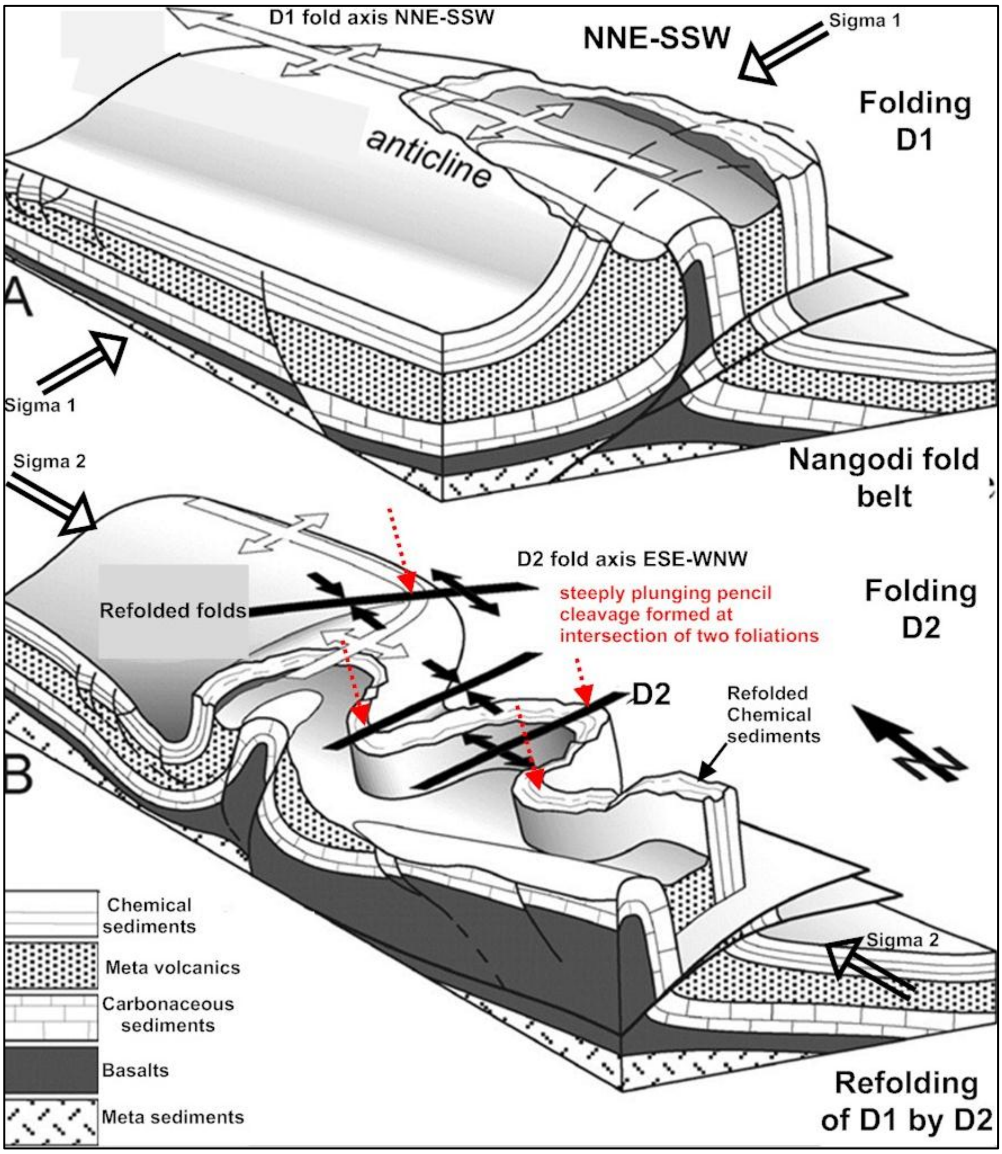


Figure 4-10: Diagrammatic model of the refolded folds at Pencil Hill

4.3 Bongo tenements – Bole Belt

The site visit included a day spent traversing the Bongo tenements to the west of Bolgatanga and inspecting the contact between the Bole greenstones and the granites (Figure 4-11). No major mineral occurrences are recorded in this belt or adjacent granites. Griffis (2002) reported a number of minor artisanal workings along the Bole-Bolgatanga Fault, though none could be found for inspection during the site visit.

Some of the greenstone belts recognised in Burkina Faso are also found in the NW corner of the Bongo tenements; however, due to time constraints, it was not possible to see these in the field. Several outcrops of Birimian metavolcanics were seen in Cardinal's tenements. These rocks were structurally complex with refolded folds close to the Bole-Bolgatanga Fault and had a similar structural character to that observed within the Ndongo concession. In this area, metasediments were clearly folded and showed pencil structures plunging shallowly (25°) to the SW (Figure 4-12). In addition, it could be seen from bedding in the sediments that the beds had been refolded during a D_2 event.

The implication of this structural information is that the presence of anticlinal culminations is possibly due to the interference folding forming traps. Again, it appears that the Bole greenstones display similar structural complexities to that seen at Nangodi. However, the dips of the beds and general plunges of fold noses seem to be less steep and tight than in the Nangodi Belt, indicating a more open style of folding.

Most of the Bongo and Kungongo concessions are intruded by granite and intermediate intrusions. The basin-type intrusives are the most common and are exposed as large batholitic bodies along the margins of the Bole greenstones. Other smaller stocks and intrusives occur throughout the region. These can vary in composition from intermediate to more basic diorite. Several highly porphyritic bodies have been identified, suggesting high levels of intrusion emplacement (Figure 4-13). Some of the granites have a strong foliation parallel to the general NE-SW strike of the greenstone belts and may have been emplaced along the axis of major fold structures. Figure 4-13 shows an example of the strong foliation that can be locally imparted on the granites.

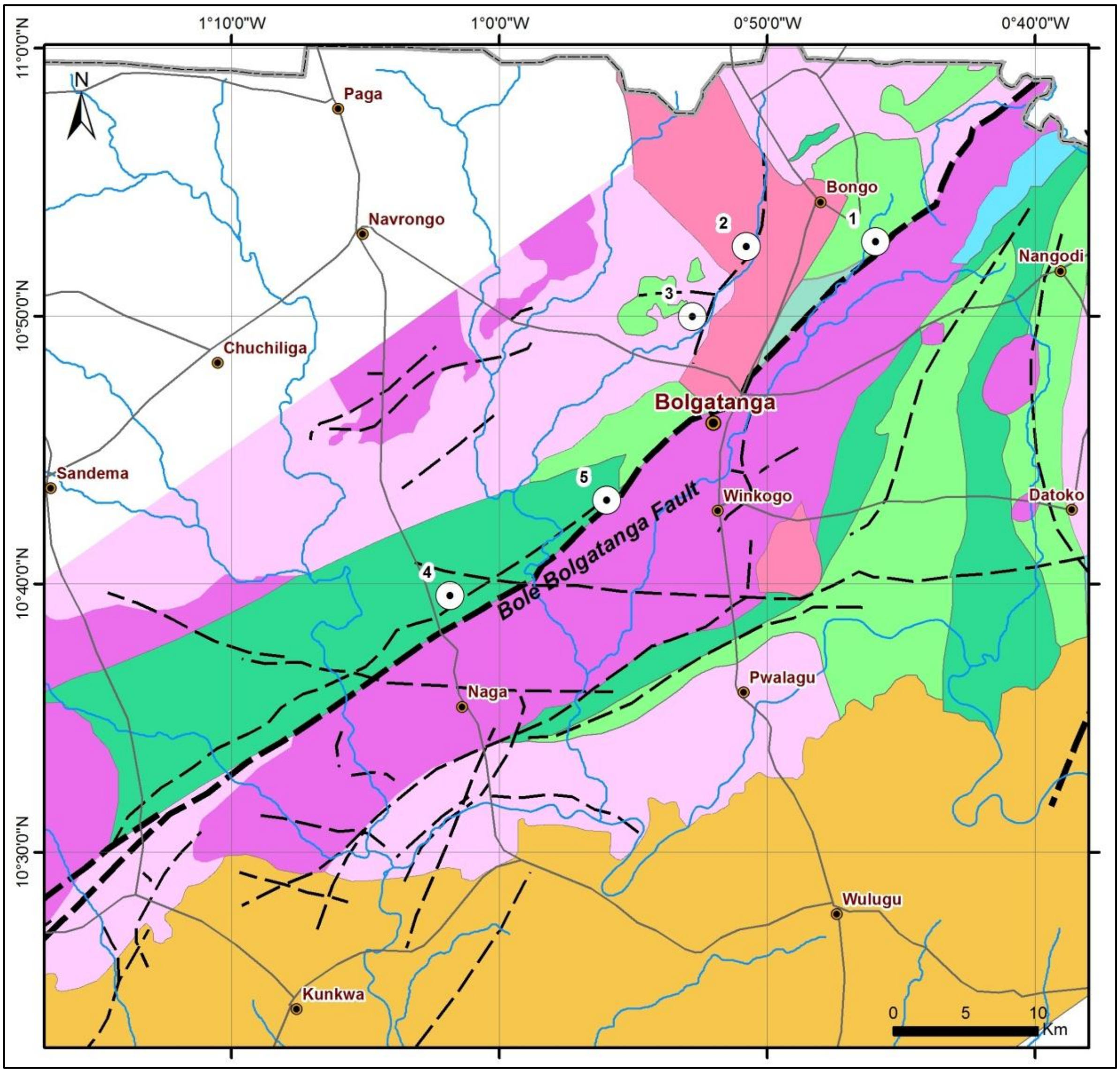


Figure 4-11: Field sites visited in the Bongo and Kungongo tenements of the Bole Belt and surrounding granites

Whilst the granites themselves are not considered highly prospective, the late-stage intrusions may be prospective, especially around their margins or where shear zones cross-cut them. The contacts between the granites and greenstones are considered prospective as they may form major fluid pathways and are often sheared. Numerous small outcrops were noted along the contact between the Bole-Bolgatanga structure and the adjoining granites and greenstones. Figure 4-14 shows a typical exposure of highly sheared and quartz veined sediments seen at Site 4 (Figure 4-11).

In summary, based on the evidence from the field visit, it is clear that both the Nangodi and Bole greenstone belts are prospective for gold mineralisation. Both areas show similar levels of structural complexity and have evidence of mineralisation based on the presence of artisanal workings, with Nangodi being more prospective and having the right lithological, structural and age relationships to host significant economic gold mineralisation. Based on the field evidence, initial focus should be on the Nangodi Belt. However, the Bole Belt project area should be regarded as having a high potential, especially along the Bole-Bolgatanga Fault Zone.

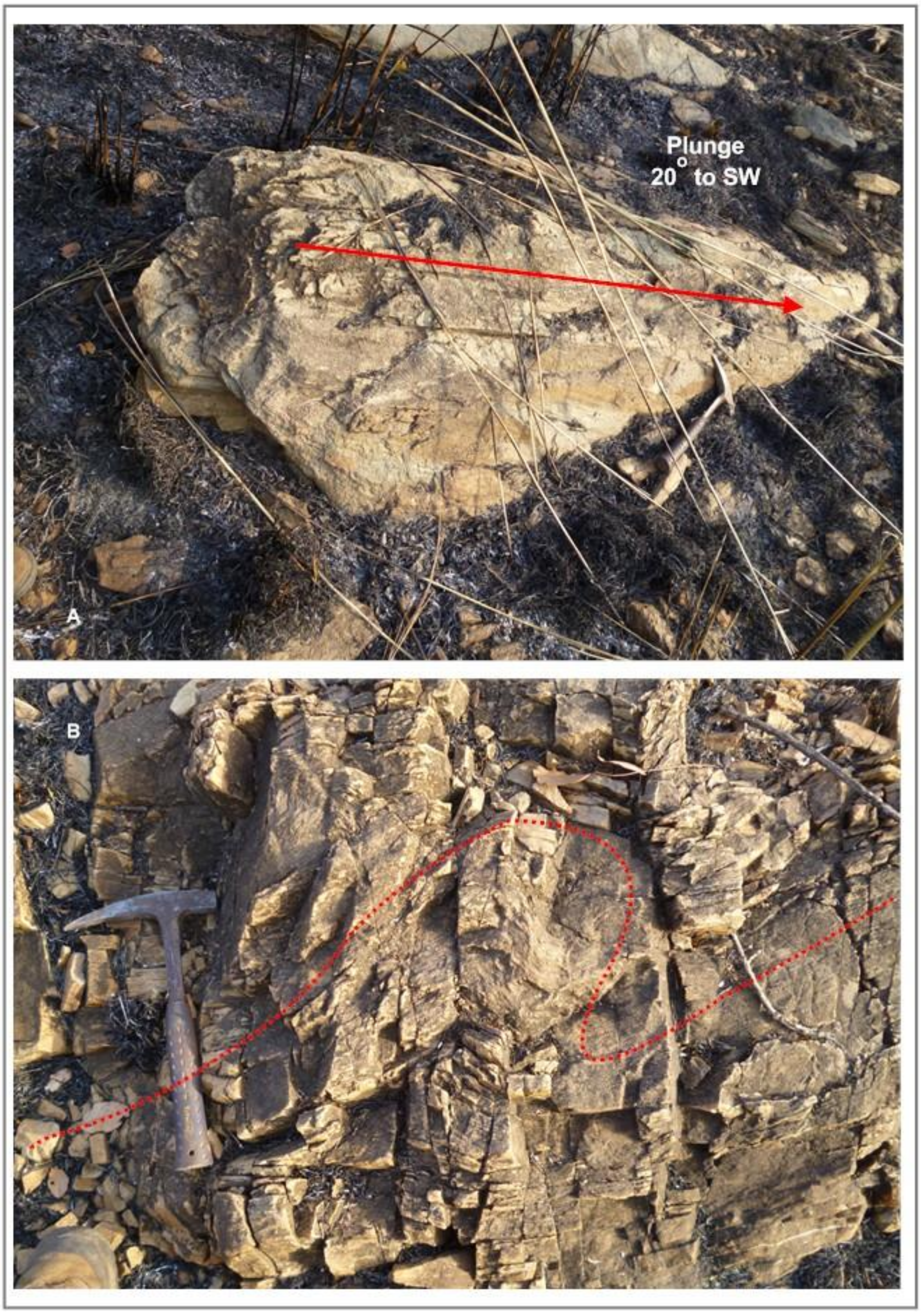


Figure 4-12: Photo A: Shallowly-dipping fold noses with pencil structures in metasediments in the Bongo lease; Photo B: Refolded sediments in the Bongo lease

Figure 4-13: Photo A: Strongly foliated granite from the Bongo lease; Photo B: Porphyritic intrusion seen at the Bongo lease

Figure 4-14: Sheared and veined metasediment along the Bole greenstone-granite contact close to the Bole-Bolgatanga Fault

4.4 Exploration Budget

The following key aspects of the exploration plan and budget for this project are given below:

1. Airborne geophysical survey to include magnetics and radiometrics of the Bolgatanga-Bole belts; some 66,000 line kilometres.
2. Soil geochemistry of selected areas of the Nangodi and Bole belts (some 10,000 assays and some 20,000 m of shallow rotary drilling).
3. RC and diamond drilling of selected target areas (10,000 m of drilling).
4. Structural mapping of the concessions.
5. Rock chip analysis.
6. Integrated geological targeting study for Bolgatanga-Bole belts.

The exploration budget expenditure for the Bolgatanga Project for the next two years is AUD4,956,000. SRK believes this is sufficient to achieve all the exploration objectives. The detailed breakdown for the exploration budget over the next two years is given in Table 4-1.

Table 4-1: Ridge Resources Ltd - Use of Funds

Period	Yr 1 ($)	Yr 2 ($)	Total ($)
Ghana Operating Costs			
Bolgatanga Licences			
Aerial Survey	750,000	-	750,000
Geochem Soil Program	280,000	120,000	400,000
Drilling Consumables	246,500	99,500	346,000
Assaying and Sample Prep	376,500	158,000	534,500
Mincom Licence Fees	45,000	-	45,000
Tenement Management	30,000	10,000	40,000
Total Bolgatanga Licences	**1,728,000**	**387,500**	**2,115,500**
Subranum Licences			
Newmont Progress Payment	50,000	50,000	100,000
Drilling Consumables	20,000	10,000	30,000
Assaying	68,000	136,000	204,000
RC / Diamond Drill Program	500,000	250,000	750,000
Resource Definition	25,000	50,000	75,000
Mincom Licence Fees	15,000	30,000	45,000
Tenement Management	10,000	10,000	20,000
Total Subranum Licences	**688,000**	**536,000**	**1,224,000**
Ghana Direct Country Costs	904,800	712,200	1,617,000
Total Ghana Operating Costs	**3,320,800**	**1,635,700**	**4,956,500**
Administration Overheads	295,000	245,000	540,000
Operating Loss	**(3,615,800)**	**(1,880,700)**	**(5,496,500)**
Source of Funds			AUD
Pro-forma Cash on Hand			2,177,000
Capital Raised under this Offer			5,014,000
Total Funds Available			**7,191,000**
Allocation of Funds			AUD
Exploration expenses			4,956,500
Administration and corporate overheads			540,000
Expenses of the offer			450,700
Working capital			1,243,800
Total Funds Applied			**7,191,000**
Expenses of the Offer			
Brokerage fees			250,700
Management fees			50,000
Legal Fees – Australia			25,000
Legal Fees – Ghana			25,000
Independent Accountant’s Report			15,000
Independent Geologist’s Report			85,000
Total Expenses of the Offer			**450,700**

5 Additional Project Investment Opportunities

5.1 Kilo-Moto Project, Democratic Republic of Congo

5.1.1 Project Brief

Ridge Resources Ltd are currently partner to a memorandum of agreement to acquire a 60% interest in two Mining Exploitation licences for gold, currently held by Société Miniere de Kilo-Moto; a state-owned resources company based in the Democratic Republic of Congo (DRC). These two licences; #5051 and #5053, are located over the Kilo-Moto greenstone belt in the far north eastern portion of DRC (Figure 5-1). No site visit has been made to this area, and this review is based on a desktop study only.

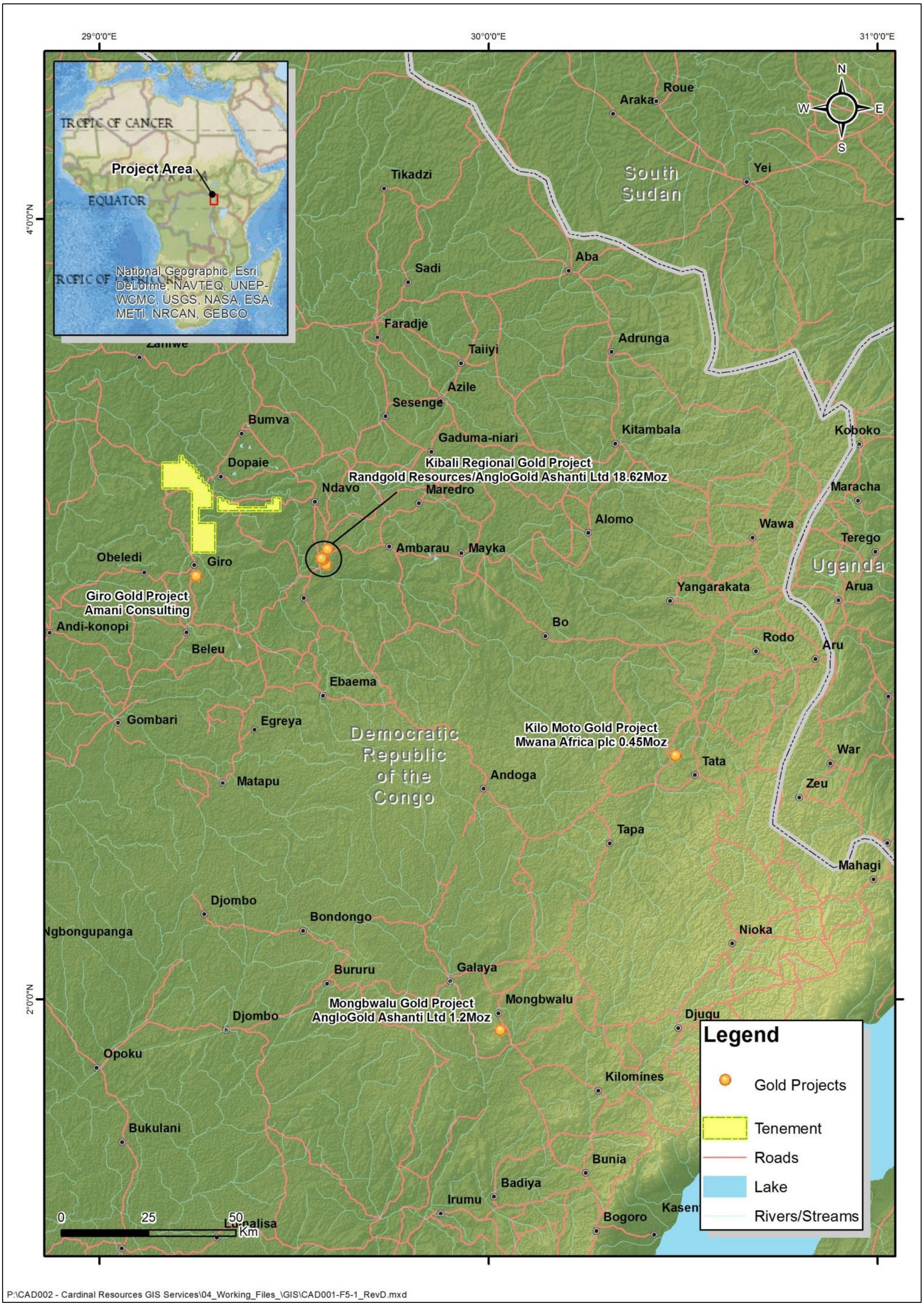


Figure 5-1: Licences 5051 and 5053 location, Democratic Republic of Congo

The Kilo-Moto Greenstone Belt (KMGB) is a Neo-Archaean suite of complexly interlayered volcano-sedimentary rocks comprising basalts, dolerites dykes and sills, intermediate to felsic volcanic rocks, and fine grained sedimentary rocks. This sequence has been metamorphosed to greenschist facies (Abbott, 2012).

Gold has been produced from a combination of small scale artisanal and modern mechanised methods from the Kilo-Moto region since its initial discovery in 1905 (Fahey, 2008) and the area remains prospective for the discovery of major gold deposits. The KMGB is known to host several large gold deposits, including the Kibali Gold Project, owned by Randgold Resources and AngloGold Ashanti, which is host to a resource of ~20 Moz Au (Randgold, 2010) and the Giro Gold Project which has been subject to more than 60 years of artisanal historic working, and is known to host gold in quartz veins with grades in excess of 50 g/t Au (Erongo, 2012). The two Mining Exploitation licenses under consideration for investment by Cardinal are directly adjacent to both the Kibali and Giro Gold projects. The greenstone package of rocks that hosts both the Kibali and Giro Gold projects extends into the two licences in question.

As mentioned previously, SRK has not conducted a site visit to the DRC licences, and no tenement schedule is currently available for the licenses under consideration.

6 Conclusions and Recommendations

6.1 Conclusions – General Overview

The Bolgatanga Project is at a very early stage of exploration; the projects held by Cardinal offer broad scope and potential for gold mineralisation. The project area is considered to be under-explored with respect to gold.

It has a geological setting similar to that of other mineralised Paleoproterozoic greenstone-granite terrains in Ghana; suggesting a similar level of prospectivity for these belts. Adjacent Tarkwaian sediments should also be regarded as prospective. There is a long history of small-scale gold mining and artisanal workings being carried out in the region, in addition to more recent discoveries such as Endeavour Mining's recently discovered 1.56 Moz Youga deposit.

Only a limited amount of modern exploration has been undertaken in the area. It is SRK's opinion that with a systematic exploration program, there is a good probability for economic-sized gold mineralisation for underground or open pit extraction to exist. From a review of the data and field studies, it is clear that the region contains significant gold mineralisation. The main targets for gold mineralisation at the Bolgatanga Project area are shear and structurally-hosted gold deposits within the greenstone terrains.

The two main areas of focus should be the Nangodi and Bole greenstone belts. SRK recommends the acquisition of additional ground, if possible, to broaden the exploration appeal and potential of the project. It is understood that Cardinal is currently active in acquiring new ground over the belts.

Cardinal has started a rigorous approach to gold exploration at all three Bolgatanga Project areas. Cardinal has demonstrated a good understanding of the main styles of gold mineralisation in which it has been working. The exploration programs outlined in this report are considered sound, and appropriate for the styles of mineralisation for which they have been designed.

6.2 Recommendations

6.2.1 Ghana

The Nangodi and Bole greenstone belts are a few examples of many Birimian-aged belts that trend NE-SW across northern Ghana and into Burkina Faso. These belts have a history of gold exploration and production from artisanal workings to modern open pit gold production on the Burkina Faso side of the border. However, due to the remote location, exploration to date has been minimal, and this area is relatively under-explored and there is, in SRK's opinion, potential to find significant near-surface and underground gold mineralisation.

This section of the report covers the recommendations and findings that are designed to facilitate Ridge's purchase of Cardinal shares, help with Cardinal's near-term exploration objectives, and prepare for a staged exploration program and budgets.

SRK's recommendations and observations resulting from the Bolgatanga site visit and data review are as follows:

- **Tenements:** Currently, the Cardinal tenements cover portions of both the Nangodi and Bole greenstone belts, which are considered the most highly prospective greenstone belts in the area.
- **Nangodi Belt**: This area of greenstone belt is considered the most prospective due to its extent, and the fact it appears structurally complex. Exploration in this area should be prioritised.

- **Geophysics:** The regional geophysical survey carried out by the Finland Government and World Bank on behalf of the Ghanaian Geological Survey is probably too coarse for use in detailed exploration at the scale required for locating gold prospects. SRK recommends that a more detailed survey (possibly 100 or 50 m flight lines) be flown normal to the main structural trends over the entire belt and project area. This coverage should include both radiometric and magnetic methods. The coverage should not be limited to Cardinal's current tenements, but include much of the areas surrounding the current leases in case of future acquisition.
- **Soil geochemistry:** The soil geochemical program currently underway at Bolgatanga is geologically sound. However, SRK recommends that once a detailed integrated geological study is carried out on the project area (with the aid of detailed airborne geophysics), the integrated study may show areas to better focus the geochemical sampling budget in a more selective fashion.
- **Structure/ Geology:** The Nangodi and Bole belts appear relatively structurally complex with a series of refolded folds. The main contacts on the belt appear to be structurally controlled and sheared (they may possibly be thrust contacts). All known gold mineralisation (to date) occurs along or close to these contacts. The geological review of the tenements highlights the importance and need for a detailed structural geological review and study (mapping) of the belt to understand the structural and geological environments that control gold mineralisation in the area, and may provide preliminary target areas for follow-up soil geochemistry and/ or exploratory drilling.
- **Controls on mineralisation:** Based on field evidence and its knowledge of the Ghanaian goldfields and other similar greenstone belts, SRK suggests that an SPT model for gold mineralisation be adopted. This requires a mineralisation model for the belt to be developed to provide a framework for methodical exploration, prior to detailed exploration being undertaken. The SPT model has been used extensively in similar greenstone terranes around the world. This will help define areas for the possible preferential location of gold mineralisation in shadow zones around intrusions, dilational jogs along shears and faults combined with anticlinal traps in permissive (Fe-rich) host rocks. Cardinal should compile all data sets to identify the pathways and trap positions in the project area.
- **Integrated structural and geological study:** SRK recommends that an integrated targeting study, whereby all the main geochemical, geological, geophysical and structural data sets are combined and interpreted based on the SPT model, be undertaken to identify possible target zones. These should be ranked in an 'objective' prospectivity analysis study or matrix. This includes integration of historical data, satellite imagery, topography data, geological maps, soil geochemistry, airborne geophysics and historical workings, along with rock chip geochemistry. This will require the establishment of a database, interpretation, and interrogation of the data using a computerised 2D GIS system (e.g. MapInfo or ARC GIS) with a series of layers for each aspect of the study. This approach is commonly used throughout Canada, Australia and Africa.
- **Geological database:** Cardinal has started to compile a digital geological database system to store and record all geological information. This includes assay data, drill data, drill logs, maps etc. After the tenements themselves, data are a company's most important asset, and require secure and efficient storage.

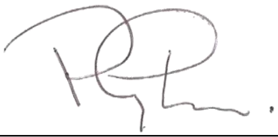
- **Five stages of exploration:** To help guide Ridge in its exploration program, SRK has outlined the five main stages of an exploration program. The number of opportunities that progress to the next stage decrease with each progressive move through the stages. Cardinal is currently between Stage I and Stage II.
  - **Stage I:** **Area selection** – deciding where to explore. The exploration team conducts a desktop study of geological, geochemical and geophysical data to find areas that have potential to contain gold mineralisation. Issues relating to political risks, historical gold productions etc. are identified at this stage. Cardinal has passed through this first stage and should be commencing Stage II. This stage takes place over an initial 6-month period.
  - **Stage II:** **Target identification** – determining whether and where a deposit may exist. Geological mapping, chip sampling, geophysics, geochemistry, satellite imagery etc. are all integrated and interpreted for a targeting study to select smaller areas for further work. This is integrated with the concept of a mineralisation model (in this case, the SPT model). The time frame for Stage II is 4 to 6 months.
  - **Stage III:** **Target testing** – assessing the nature of the mineralisation. The geological team performs the first sub-surface testing of the targets identified in Stage II. This may be via RC or diamond drilling, trenching or even soil sampling. The time frame for Stage III is 1 to 2 years after commencement of the project.
  - **Stage IV:** **Resource delineation** – determining deposit size, grade and metallurgy. If results from initial drilling are encouraging, additional drilling to estimate the extent of mineralisation takes place. This may result in a JORC-compliant Resource. The time frame for Stage IV is some 2 to 3 years from commencement of the project.
  - **Stage V:** **Resource evaluation** – judging the economic worth of a deposit. The team carries out scoping studies and possibly a pre-feasibility study to decide whether a resource will be economic to develop. This stage includes metallurgical, engineering, environmental studies and economic analysis. If the outcome is positive, the project is handed over to operation and mining teams. The time frame for Stage V is 4 to 5 years from commencement of the project.

At this stage no recommendations have been made for the Subranum Project area, but in general any work should follow the five stages of exploration outlined for Bolgatanga.

6.2.2 Democratic Republic of Congo

The two licences under consideration for investment in the DRC should be subject to a thorough process of due diligence in order to more suitably determine their investment and exploration potential. Again, it is generally recommended that the five stages of exploration outlined above should be followed.

Prepared by



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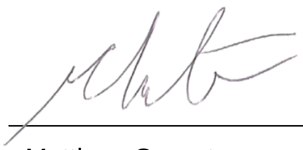

Matthew Greentree

Project Reviewer

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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