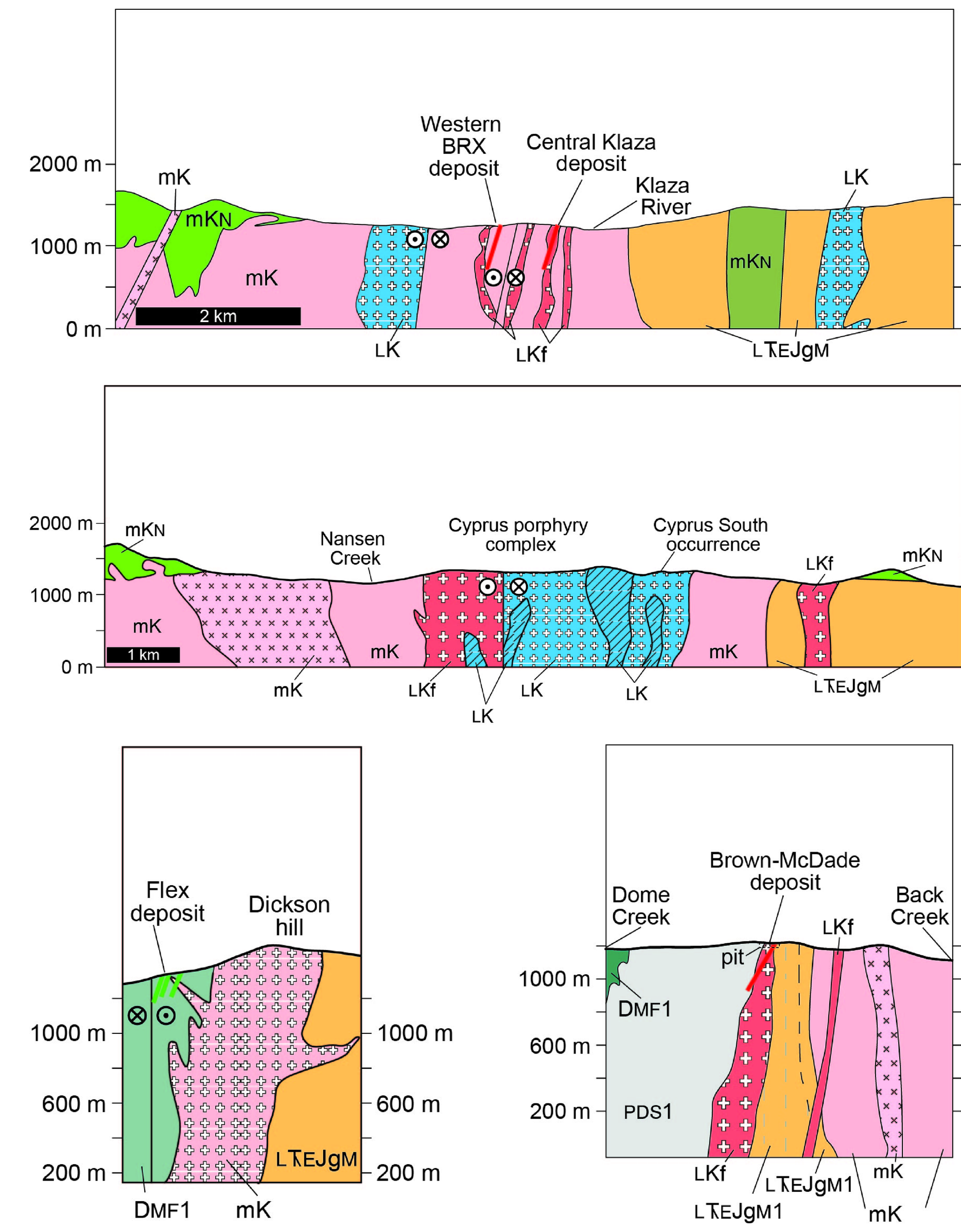
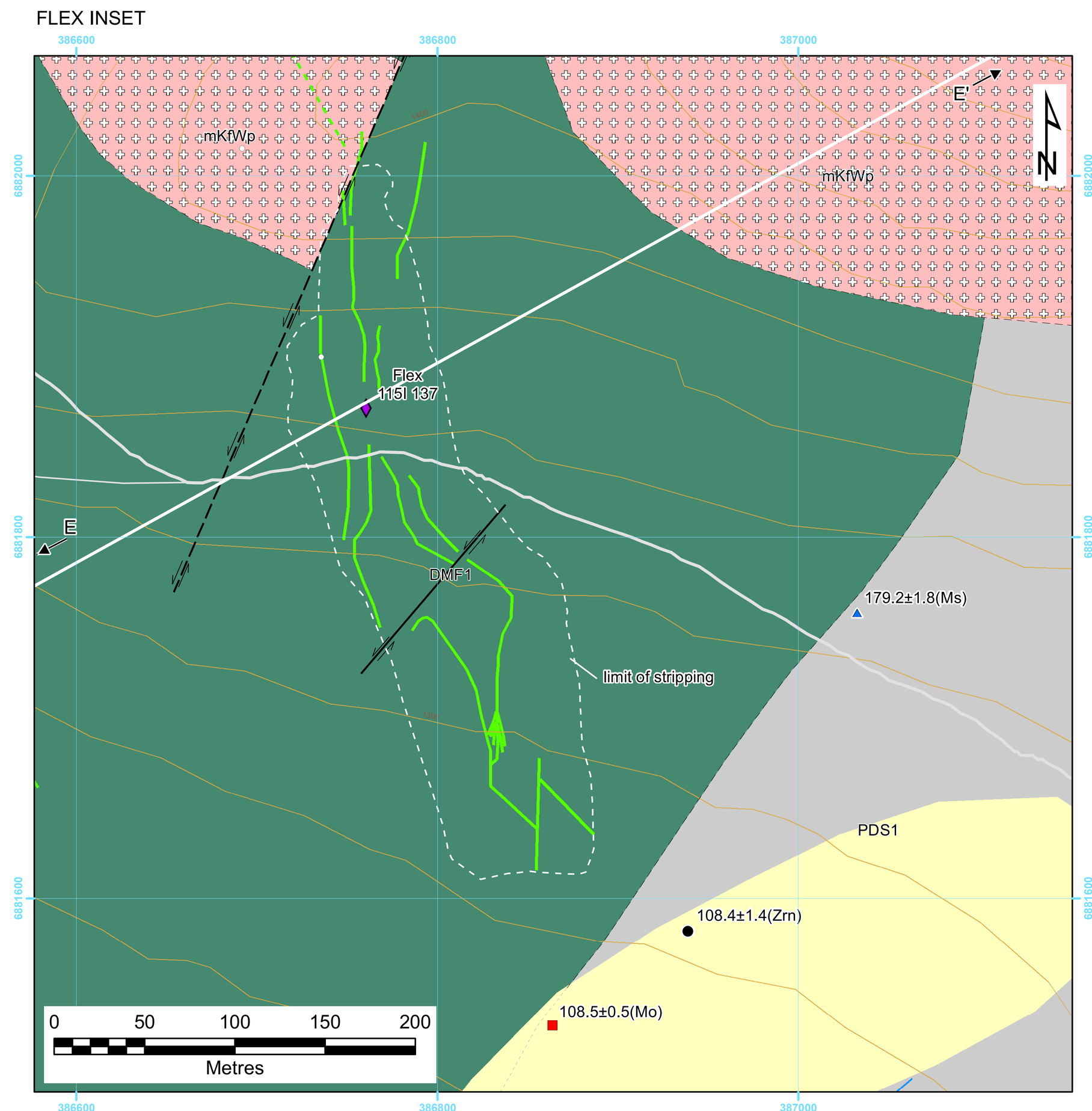
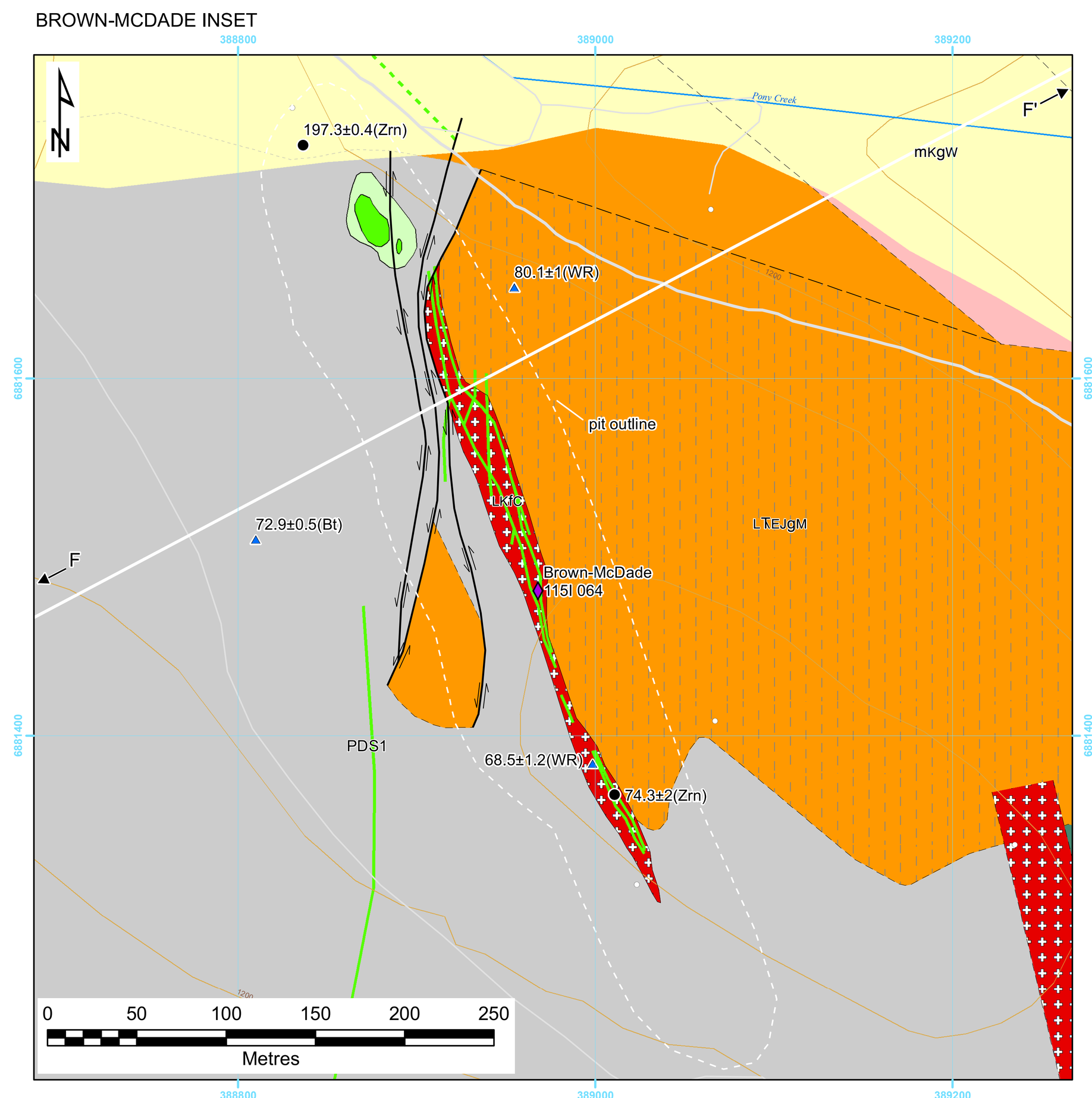
MOUNT NANSEN PORPHYRY DISTRICT INSET



FLEX INSET



BROWN-MCDADE INSET



MINFILE NUMBER	NAME	DEPOSIT TYPE	STATUS	HOST LITHOLOGY	COMMODITY	MINERALIZATION AGE	LATITUDE	LONGITUDE
115I 016	Val	Vein/breccia	Showing	Granodiorite	Gold, Lead, Silver	Late Cretaceous?	62.07699	-137.13679
115I 064	Brown-McDade	Epithermal	Past Producer	Granodiorite in north and schist/gneiss in south	Gold, Silver, Lead, Copper, Zinc	Early Cretaceous; 109 ± 0.7 Ma OR Late Cretaceous; 74.3 ± 2 Ma, 72.9 ± 0.5 Ma	62.04922	-137.12355
115I 065	Webber	Epithermal	Deposit	Schist and gneiss	Silver, Gold	Early Cretaceous; 107 ± 0.9 Ma	62.05404	-137.17349
115I 066	Cyprus	Porphyry	Drilled Prospect	Quartz feldspar porphyry	Copper, Molybdenum, Gold	Late Cretaceous; 71.1 ± 0.3 Ma	62.09596	-137.17392
115I 067	Klaza	Epithermal	Deposit	Granodiorite	Copper, Gold, Zinc, Silver, Lead	Late Cretaceous; 74 to 71 Ma	62.13154	-137.25379
115I 068	Maverick	Vein/breccia	Drilled Prospect	Syenite	Gold, Silver	Unknown	62.14655	-137.16087
115I 080	Rico	Epigenetic	Anomaly	Granodiorite	Copper, Lead, Zinc, Gold	Uknown	62.14189	-137.33466
115I 084	Lonely	Vein/breccia	Showing	Quartz feldspar porphyry	Copper, Silver, Gold	Late Cretaceous?	62.07534	-137.32722
115I 085	Car	Vein/breccia	Showing	Rhyolite to dacite and granodiorite felsenmeer	Copper, Tungsten, Lead, Silver, Gold	Unknown	62.08888	-137.02666
115I 086	Rowlinson	Vein/breccia	Showing	Biotite schist	Silver, Gold	Unknown	62.13932	-136.96440
115I 093	Eliza S	Epithermal	Drilled Prospect	Quartz diorite, schist and gneiss, minor andesite (along the edge of a volcanic-granodiorite contact)	Copper, Gold, Zinc, Molybdenum, Silver, Lead	Unknown	62.07874	-137.18265
115I 096	Rusk	Vein/breccia	Showing	Rhyolite to dacite(near quartz feldspar porphyry plug contact)	Copper, Gold, Silver, Molybdenum, Lead	Late Cretaceous; 65.0 ± 0.8 Ma to 70.5 ± 2.2 Ma	62.08231	-137.25357
115I 110	Row	Epigenetic	Anomaly	Biotite schist	Copper, Zinc, Silver, Lead	Unknown	62.15361	-137.09500
115I 117	Dic	Epithermal	Drilled Prospect	Granodiorite (near andesite contact)	Copper, Zinc, Lead, Silver, Gold	Late Cretaceous	62.11359	-137.25123
115I 119	Dows	Vein/breccia	Drilled Prospect	Feldspar porphyry dykes cutting schist	Gold	Late Cretaceous?	62.04179	-137.24330
115I 122	Grizzly	Vein/breccia	Showing	Granodiorite to diorite gneiss	Gold, Tungsten, Silver	Late Cretaceous?	62.11216	-137.08217
115I 123	Ang	Vein/breccia	Showing	Quartz feldspar porphyry cutting schist	Gold	Late Cretaceous?	62.05555	-137.05055
115I 133	Dickson	Epithermal	Drilled Prospect	Granodiorite	Gold, Silver, Copper	Early Cretaceous?	62.05839	-137.14629
115I 134	Orloff-King	Epithermal	Deposit	Andesite	Gold, Silver, Copper	Unknown	62.06336	-137.16306
115I 135	Spud	Vein/breccia	Showing	Andesite	Gold, Silver, Copper	Unknown	62.06044	-137.16090
115I 136	Vince	Vein/beccia	Drilled Prospect	Schist and gneiss	Gold, Silver, Copper	Early Cretaceous; 108.3 ± 07 Ma	62.05127	-137.13262
115I 137	Flex	Epithermal	Deposit	Schist and gniess, mineralization within highly altered and bx veins	Gold, Silver, Copper, Lead , Zinc	Early Cretaceous; 108.5 ± 0.5 Ma	62.05207	-137.16598
115I 138	Huestis	Epithermal	Past Producer	Schist and gneiss	Gold, Silver, Copper	Unknown	62.04789	-137.15339
115I 139	Mill	Epithermal	Prospect	Schist and gneiss	Gold, Silver, Copper	Unknown	62.04308	-137.14599
115I 140	Cyprus South	Porphyry	Showing	Granodiorite and quartz feldspar porphyry	Copper, Molybdenum	Late Cretaceous?	62.08851	-137.15914
115I 141	Old Timer	Vein/breccia	Showing	Granodiorite and quartz feldspar porphyry	Gold, Silver, Copper, Lead, Zinc	Late Cretaceous; 71 to 70 Ma	62.08992	-137.19750
115I 142	Eliza N	Epithermal	Drilled Prospect	Quartz diorite and andesite	Gold, Silver, Copper, Lead, Zinc	Late Cretaceous?	62.08308	-137.18575
115I 143	Eliza E	Epithermal	Drilled Prospect	Quartz feldspar porphyry crosscutting granodiorite and andesite	Gold, Silver, Copper, Lead, Zinc	Late Cretaceous?	62.08582	-137.19687
115I 144	Transition	Porphyry	Showing	Granodiorite	Gold, Silver, Copper, Molybdenum	Late Cretaceous?	62.08453	-137.17302
115I 145	Rusk W	Vein/breccia	Drilled Prospect	Quartz feldspar porphyry	Gold, Silver, Copper, Lead, Molybdenum	Late Cretaceous?	62.07691	-137.25135
115I 146	J Bill	Vein/breccia	Showing	Quartz feldspar porphyry	Gold, Silver, Lead, Zinc	Late Cretaceous?	62.07070	-137.24609
115I 147	Sked	Vein/breccia	Drilled Prospect	Quartz feldspar porphyry	Gold, Silver, Copper	Late Cretaceous?	62.04331	-137.27963
115I 149	Herc	Epithermal	Drilled Prospect	Granodiorite	Gold, Silver	Late Cretaceous	62.12485	-137.24794
115I 150	BRX	Epithermal	Deposit	Granodiorite	Gold, Silver, Lead, Zinc, Copper	Late Cretaceous	62.12272	-137.25782
115I 151	BYG	Epithermal	Drilled Prospect	Granodiorite	Gold, Silver	Late Cretaceous	62.12950	-137.25766
115I 152	Chevron	Epithermal	Drilled Prospect	Granodiorite	Gold, Silver	Late Cretaceous	62.11903	-137.27565
115I 153	Pika	Epithermal	Drilled Prospect	Granodiorite	Gold, Silver	Late Cretaceous	62.11812	-137.24451
115I 154	Stroshein	Epithermal	Drilled Prospect	Granodiorite	Gold, Silver	Late Cretaceous	62.11760	-137.23602
115I 155	AEX	Epithermal	Drilled Prospect	Granodiorite	Silver, Gold	Late Cretaceous	62.11705	-137.24954
115I 156	Kelly	Porphyry	Drilled Prospect	Granodiorite and quartz feldspar porphyry	Gold, Copper, Molybdenum	Late Cretaceous; 76.3 ± 0.4 Ma	62.10149	-137.22178
115I 157	Kelly South	Porphyry	Drilled Prospect	Granodiorite and quartz feldspar porphyry	Gold, Copper, Molybdenum	Late Cretaceous	62.09384	-137.22437
115I 158	Pearl	Epithermal	Drilled Prospect	Granodiorite	Gold, Silver	Late Cretaceous	62.11061	-137.20463
115I 159	Willow Creek	Epithermal	Showing	Andesite-granodiorite contact	Gold, Silver, Lead, Zinc	Unknown	62.07793	-137.16113
115I 160	Bear	Vein/breccia	Showing	Granodiorite to diorite gneiss	Gold, Silver	Unknown	62.10159	-137.03874
115I 161	Wind	Vein/breccia	Showing	Quartz feldspar porphyry crosscutting gneiss	Gold	Late Cretaceous?	62.07426	-137.03507
115I 162	Montgomery	Epigenetic	Anomaly (Float)	Andesite float	Gold, Silve	Unknown	62.07113	-137.05317

Legend

LATE CRETACEOUS (LK / LKf)

LKdP — pyroxene±biotite porphyritic monzodiorite to monzogabbro; brown to black-weathered and fresh, massive, medium-grained, melanocratic; equivalent to uKCg of Colpron et al. (2007)

LKfPp — quartz-plagioclase-biotite porphyritic quartz latite; pink weathered and fresh

LKfxPp — intrusive breccia; light grey to orange-weathered, heterolithic, clast-supported breccia containing subangular to rounded sand to pebble-sized clasts of light grey porphyritic rocks in a fine-grained cream to pink matrix; locally quartz-sericite-pyrite altered; hypogene mineralization associated with the Cyprus porphyry complex contains chalcopyrite-pyrite ± molybdenite and is ca. 71 Ma (Selby et al., 2001; Lee, 2021)

LKyP — biotite±hornblende quartz syenite to quartz monzonite; pink weathering, pink fresh, fine-grained equigranular; ca. 70 Ma (Allan and Friend, 2018)

LKfCp — rhyolite to dacite dikes and plugs; light grey to orange-weathered, typically light grey fresh; locally plagioclase-quartz porphyritic (p) with plagioclase>quartz; plagioclase is white, 2-3 mm and subround, quartz is clear, 3-5 mm and angular to subround, commonly embayed

rhyolite to dacite dikes and plugs; light grey to orange-weathered, typically light grey fresh

UPPER CRETACEOUS

uKfT — rhyolite crystal tuff; flaggy, pale pink weathered, light grey fresh with 5-10% quartz shards; ca. 78 Ma (Allan and Friend, 2018)

EARLY CRETACEOUS (mK)

mKgWKb — hornblende-plagioclase porphyritic intermediate dikes and plugs; 103.8 ± 0.5 Ma (Klöcking et al., 2016)

mKgWKa — hornblende±pyroxene diorite; fine-grained, equigranular; late or border phase of the Dawson Range batholith, best exposed in the vicinity of Slate Creek

mKgWT — biotite-hornblende granodiorite; fine to medium-grained, equigranular; main phase of the Dawson Range batholith ca. 107 to 105 Ma (Klöcking et al., 2016; Mortensen et al., 2016)

mKfWp — rhyolite to dacite dikes and plugs; light grey to orange-weathered, typically light grey fresh; plagioclase-quartz porphyritic with plagioclase>quartz; plagioclase is white and commonly clay altered, quartz is clear, angular to subround and commonly embayed; at the Flex deposit, dikes of this lithology are altered by veins with a 108.5 Ma ± 0.5 Ma Re/Os molybdenite age. This lithology is very similar to LKfCp.

LOWER CRETACEOUS (mKN)

mKNAaph — aphanitic to fine-grained, massive andesite; interpreted as feeder plugs to Nansen volcanic rocks, but could also be related to Carmacks volcanism

mKNFt — rhyolite tuff; aphanitic, light grey to buff-weathered and fresh, densely welded

mKNFf — rhyolite breccia and flow-banded rhyolite; 107.4 ± 0.7 Ma (Klöcking et al., 2016)

mKNEb — epiclastic breccia

mKNAb — andesite breccia; dark green to brown-weathered and dark green to black fresh, monomict with andesite groundmass; 115 to 112 Ma (Klöcking et al., 2016)

mKNAm — plagioclase-hornblende phyric andesite; dark green to black, massive, fine-grained; 115 to 112 Ma (Klöcking et al., 2016)

LATE TRIASSIC TO EARLY JURASSIC

LṪEJgM — K-feldspar porphyritic hornblende granodiorite; medium to coarse-grained, moderately foliated to unfoliated; ca. 197 to 196 Ma (Sack et al., 2020; Bennett, unpublished)

LṪEJgMC — hornblende granodiorite; medium to coarse-grained, moderately foliated to unfoliated, equigranular; best exposed on eastern margin of plutons; presumably ca. 197 to 196 Ma based on association with LTrEJgM

LATE TRIASSIC

LṪgP — hornblende ± biotite tonalite; medium-grained, weakly foliated, equigranular; ca. 211 Ma (Klöcking et al., 2016)

YUKON-TANANA TERRANE

DEVONIAN TO MISSISSIPPIAN

MgSR — biotite ± hornblende metagranodiorite; light grey to orange-weathered and light grey fresh, foliated; local feldspar augen; locally well foliated and difficult to distinguish from quartzofeldspathic Snowcap rocks; 365 to 350 Ma (Joyce et al., 2020)

DMF1 — amphibolite; dark green; strongly foliated and locally compositionally layered; generally schistose, locally gneissic; micaceous relative to the Snowcap amphibolite (PDS3)

PROTEROZOIC TO DEVONIAN?

PDS3 — amphibolite; dark green weathered and fresh; fine to medium-grained, equigranular and foliated

PDS1 — quartzite and schist; grey to white quartzite, micaceous quartzite and quartz-muscovite-biotite (± garnet) schist; strongly foliated and layered; locally forms a quartzofeldspathic gneiss difficult to distinguish from Simpson Range metagranitoid (MgSR)

SYMBOLS

geologic contacts (defined, approximate, inferred, covered)...

fault; movement not known (defined, approximate, inferred, covered)...

dextral strike-slip fault (defined, approximate, inferred, covered)...

normal fault (defined, approximate, inferred)..................

fault movement towards (L) and away (R) from section

limit of outcrop, subcrop and felsenmeer... ....

jointing..

bedding or flow layering..............................

foliation (dominant)......................................

radiometric date ($^{238}U/^{206}Pb$, $^{187}Re/^{187}Os$, $^{40}Ar/^{39}Ar$) (age in Ma, ± 2s, Zrn = zircon; Ttn = titanite; Cal = calcite; Mo = molybdenite; Hbl = hornblende; Bt = biotite; Kfs = K-feldspar; Ms = muscovite; WR = whole-rock)................ ● 351 ± 1 ■ 71.0 ± 0.3 ▲ 195.2 ± 0.8

field station (this study)..................................

road (maintained, unmaintained, quad trail).

ALTERATION (only on sheet 2)

high grade Au-Ag | Quartz-tourmaline | argillic

low grade Au-Ag | phyllic | propylitic

MINFILE DEPOSIT TYPE

◊ epithermal veins

□ porphyry

○ unknown

vein trace (defined, approximate)

breccia body cemented by hydrothermal minerals such as tourmaline, magnetite and quartz

placer gold creek (major gold bearing stream, proven or high potential to be gold bearing)

MINERALIZATION AGE

Late Cretaceous

Early Cretaceous

unknown

NOTES

These three maps are larger-scale versions of the same geology presented in sheet 1 and are meant to display the increased level of detail over some of the key occurrences in the Mount Nansen porphyry district. In addition to the 1:20 000 district map are 1:2500 maps over the Flex and Brown-McDade deposits. Four cross sections (C-C', D-D', E-E' and F-F'), all look northwest at 1:20 000 with their locations shown on the district map; cross section C-C' is located along A-A'.

The geology and alteration of the composite Cyprus porphyry complex are shown in the Mount Nansen porphyry district inset map and cross section D-D'. The porphyry complex is approximately 4 km by 2 km, elongate east-west and is characterized by porphyritic rocks that occur as dikes, plugs and breccia bodies (Sawyer and Dickinson, 1976). Concentric phyllic-argillic-propylitic alteration zones are centered on quartz-tourmaline cemented breccia bodies, the inferred centres of magmatic-hydrothermal mineralization (Sawyer and Dickinson, 1976). Our preliminary interpretation is the complex includes both Casino and Prospector suite rocks. A single ca. 76 Ma age from the southeastern margin of the body, dated with U-Pb zircon by LA-ICPMS (Hart, unpublished) suggests Late Cretaceous Casino suite magmatism and is supported by our new Re/Os molybdenite date of 76.3 ± 0.4 Ma from the Kelly occurrence immediately northwest of the body. The presence of Prospector suite mineralization is indicated by two ca. 71 Ma Re-Os molybdenite ages from the southwestern and northeastern parts of the complex (Selby and Creaser, 2001; Lee, 2021); Prospector Mountain age magmatism has not yet been dated. The porphyry complex is sinistrally offset by northeast striking faults that appear to truncate Prospector Mountain suite rocks.

The geology of the Klaza and BRX deposits is shown in the Mount Nansen porphyry district inset map and cross section C-C'. The deposits are hosted by mid-Cretaceous biotite-hornblende granodiorite of the Whitehorse plutonic suite. Abundant dikes of the Late Cretaceous Casino suite intrude the Whitehorse suite and are spatially associated with the gold-silver-zinc-lead epithermal veins (Turner and Dumala, 2017). The veins crosscut Late Cretaceous dikes, the majority of which are ca. 78 to 76 Ma and mineralization was ca. 74 to 71 Ma, broadly coeval with the Late Cretaceous Prospector Mountain suite (Lee, 2021). Early Late Cretaceous Casino suite age (78 to 74 Ma) porphyry mineralization has recently been recognized in the Kelly zone between the Klaza occurrences and the Cyprus porphyry complex (this study; Lee et al., 2020). Veins are sinistrally offset approximately 100 m along north northeast faults; a regional steep fault with unknown kinematics separates two structural styles of veining to the southeast of the deposits.

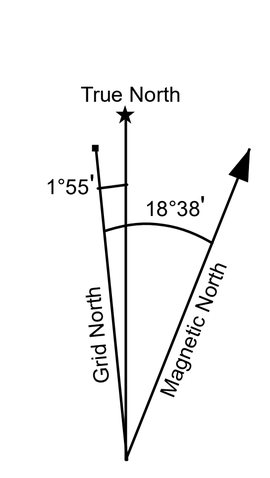
The geology of the Flex deposit is shown in the Flex inset map and cross section E-E'. The Flex deposit is an epithermal vein system hosted within amphibolite and felsic schist of the Finlayson assemblage (Andersen and Stroshein, 1998). High-grade gold and silver values are associated with north northwesterly trending, sulphide-rich quartz veins. The age of mineralization has previously been interpreted as mid-Cretaceous (ca. 110 to 106 Ma; Mortensen et al., 2016) based on U-Pb ages of zircon from mineralized quartz-feldspar porphyry dikes and is confirmed in this study by a 108.5 Ma ± 0.5 Ma Re/Os date from molybdenite in the centre of a white quartz-pyrite vein.

The geology of the past producing Brown-McDade deposit is shown in the Brown-McDade inset map and cross section F-F'. The Brown-McDade deposit contains two types of mineralized rock, gold-silver veins hosted in feldspar porphyry dikes running the length of the pit and a quartz-sulphide cemented breccia body hosted in metasedimentary rocks in the northern end of the pit. The feldspar porphyry dike intruded the contact between Early Jurassic foliated granodiorite of the Minto plutonic suite and metasedimentary rocks of the Snowcap assemblage (Stroshein, 1999). The crystallization age of the feldspar dike is ca. 74 to 73 Ma based on a single U-Pb zircon analysis (Bennett, unpublished) and Ar-Ar dating of biotite (Joyce et al., 2015). The age of mineralization is either mid-Cretaceous (Mortensen et al., 2016) or Late Cretaceous, coeval with dike emplacement. Veins are truncated by steep, northeast striking sinistral faults (Stroshein, 1999).

ONE THOUSAND METRE GRID
Universal Transverse Mercator Projection
North American Datum 1983
Zone 8

BEDROCK GEOLOGY
MOUNT NANSEN
YUKON
SCALE 1:20 000
CONTOUR INTERVAL 20 metres
Elevation in metres above mean sea level

0 1 2 3 4 5
Kilometres



Use diagram only to obtain numerical values
APPROXIMATE MEAN DECLINATION 2020
FOR CENTRE OF MAP

Yukon
Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Open File 2021-2

Revised geological map of Mount Nansen area (NTS 115I/3 and part of 115I/2) Sheet 2 of 2 (scale 1:20 000)

by

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