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PRELIMINARY ECONOMIC ASSESSMENT OF THE RIVER VALLEY PALLADIUM PROJECT, DANA, JANES, MCWILLIAMS, AND PARDO TOWNSHIPS, SUDBURY MINING DIVISION, ONTARIO

UTM NAD 83 Zone 17N 557,800 m E, 5,169,700 m N
LONGITUDE 80º15' W AND LATITUDE 46º41'N

FOR
NEW AGE METALS INC.

NI 43-101 & 43-101F1
TECHNICAL REPORT

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P&E Mining Consultants Inc.
Report 444

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1.0 EXECUTIVE SUMMARY

The following Technical Report was prepared to provide a National Instrument ("NI") 43-101 Preliminary Economic Assessment for the River Valley Palladium Deposit ("the Deposit"), located approximately 60 km northeast of Sudbury, Ontario (Canada) that is 100% owned by New Age Metals Inc. ("NAM" or "the Company"). The River Valley Property ("the Property") mineralization is primarily platinum-group elements ("PGE"). Palladium is the dominant metal with lesser amounts of platinum, gold, rhodium, silver, copper, nickel, and cobalt.

The River Valley Property hosts a magmatic contact-type palladium-platinum-copper deposit located in northeastern Ontario, approximately 60 km northeast of Sudbury and 340 km northwest of Toronto, Ontario. Sudbury is one of the largest mining districts in North America with several operating mines, two sulphide process plants, two nickel-copper-PGE smelters, and a nickel refinery.

P&E Mining Consultants Inc. ("P&E") completed this PEA with assistance from:

- D.E.N.M Engineering Ltd. ("DENM") on metallurgical testing and process plant design and costing;

- Knight Piésold Ltd. ("KP") on open pit wall slopes, underground mine geotechnical input, site water management, tailings management facility and geochemistry aspects; and

- Story Environmental Inc. ("Story") on environmental, permitting, social and closure items.

NAM is a public company trading on the TSX Venture Exchange ("TSXV") with the symbol "NAM". The Mineral Resource Estimate herein has been prepared according to CIM Definition Standards - For Mineral Resources and Mineral Reserves (2014) and Best Practices Guidelines (2019), and has an effective date of June 29, 2023.

This NI 43-101 Technical Report and Preliminary Economic Assessment ("PEA") will be referred to as the "Technical Report". Qualified Persons, Authors and co-Authors of report sections are referred to as the "Authors".

1.1 PROPERTY DESCRIPTION, LOCATION, ACCESS, AND PHYSIOGRAPHY

The Property is contiguous and consists of two mining leases, 310 single cell mining claims and 18 boundary cell mining claims located within Dana, Janes, McWilliams, and Pardo Townships in the Sudbury Mining Division. The two mining leases and surrounding claims total approximately 10,700 ha. The Property is centered at approximately 557,800 m E and 5,169,700 m N (North American Datum 83 Universal Transverse Mercator Zone 17N) or at Longitude 80º14' W and Latitude 46º41' N. The mining leases and claims are currently 100% owned by NAM, subject to a 3% net smelter return ("NSR") royalty.

The Property is accessible from Sudbury by traveling east along paved Trans-Canada Highway 17 for approximately 50 km to the Town of Warren, and then north on Highway 539 for a distance of 22 km to the Village of River Valley. The center of the Property is approximately 12 km northwest of the Village of River Valley and is accessed by 539A to Glen Afton and the unpaved route 805. Several logging roads and trails access the mineralized zones from route 805.

The Property benefits significantly from being within close proximity to the City of Sudbury. Mineral exploration, mining, along with mineral processing and smelting are major components of the local economy. The local infrastructure, business community and populace of the region are very well-equipped to service the infrastructure and technical requirements of exploration and mining activities. Sudbury is serviced by a regional airport with regular scheduled service to Toronto and other Canadian destinations.

A 230 kV transmission line that passes through the Town of Warren on the Trans Canada Highway is located approximately 22 km south of the Project. A 115 kV transmission line that passes through the Village of Field is located approximately 15 km to the east of the Project. Water is abundant in the region from numerous lakes and rivers to support exploration programs and mining activities. The Property lies at a mean elevation of approximately 325 metres above sea level ("m asl"). Topographic relief is moderate and typical of the Precambrian Shield. Forest cover is mainly poplar with regrowth of white pine after previous logging activities. The Property is located in the watershed of the Sturgeon River that flows in a southerly direction toward Lake Nipissing and ultimately into Georgian Bay of Lake Huron through the French River. The climate of the region is typical of the southern part of the Canadian Shield with temperatures ranging from summer averages of 19°C to winter averages of -13°C. Exploration and development activities can be conducted year-round.

1.2 HISTORY

The exploration history of the region dates back to the 1960s, with original work by Tomrose Mines Ltd. from 1963 to 1965. In 1965, Falconbridge Ltd. optioned the Tomrose Property and completed an electromagnetic ("EM") survey, however, no further work was recommended. In 1968, Kenco Exploration Canada completed airborne magnetic and EM surveys and follow-up work in 1968 resulted in the exposure of surface sulphide mineralization in pits and trenches. In 1996, renewed interest in platinum group metals resulted in WMC International completing geological and geochemical exploration on the East Bull Intrusive Suite including the River Valley Intrusion.

In 1998, Prospectors Luhta, Bailey and Orchard acquired claims covering part of the current Property and completed prospecting and sampling work that identified platinum group metal mineralization. Pacific North West Capital acquired claims covering part of the current Property in 1999. Since then, surface and airborne exploration programs, along with many drill programs have been completed. Pacific North West Capital acquired additional claims in 2016 and announced a name change to New Age Metals Inc. in 2017.

1.3 GEOLOGY, MINERALIZATION AND DEPOSIT TYPE

The River Valley Palladium Deposit is part of the Paleoproterozoic East Bull Lake Intrusive Suite, dated between 2,491 and 2,475 Ma. The mineralization occurs as 13 structurally offset zones hosted in gabbronorite to gabbroic anorthosite. The East Bull Lake Suite Intrusions exhibit geochemical characteristics consistent with being derived from fractionated tholeiitic or high-alumina tholeiitic parental magmas.

The River Valley Intrusion is the largest and easternmost of the East Bull Lake Intrusive Suite intrusions and has an area of approximately 200 km^2. The intrusion occurs within the Grenville Front Tectonic Zone. The copper-nickel-PGE mineralized host rocks are mainly in the Breccia Unit, which is situated at the base of the intrusion above the basal contact with the Archean medium to high-grade regionally metamorphosed footwall rocks.

The mineralized Breccia Unit occurs along most of the 16 km strike length of the River Valley Intrusion on the Property. The mineralization is divided into 13 zones based on variable offsets along north and northeast trending faults and shear zones. The zones of mineralized breccia starting in the northwest and proceeding to the southeastern extent of the contact on the Property are: Pardo, Dana North, Pine, Dana South, Banshee, Lismer North, Lismer Main, Varley, Azen, Drop, Jackson Flats, Razor, and Mustang (also known as River Valley Extension). Of these zones, Pardo, Drop and Jackson Flats are not included in the current Mineral Resource Estimate.

Two types of mineralization have been observed at the Project: 1) contact-type PGE mineralization, which is hosted mainly in the Breccia Unit, and 2) reef-type PGE mineralization, which occurs internally within the River Valley Intrusion. All of the Mineral Resources described in this Technical Report are the contact-type mineralization. The presence of several highly-anomalous assays from rocks lying within higher portions of the River Valley Intrusion's stratigraphy suggests that there may be opportunities for notable PGE mineralization in reef or stratabound-type targets.

A multi-stage model for the formation of the mineralization in the River Valley intrusion has been proposed in the scientific literature. Therefore, a major magmatic contamination event at depth with the addition of sulphur from local crustal rocks, induced sulphide saturation. Sulphide droplets were subsequently enriched in PGE within a conduit system with possible further upgrading of sulphide metal tenors via partial dissolution of sulphide. The PGE-enriched sulphide liquid then settled in a staging chamber and partially crystallized before a major pulse of magma entrained sulphide liquid, eroded blocks of prior crystallized and mineralized gabbro and footwall rocks, and emplaced an inclusion-bearing package as the lower approximate 100 m of the River Valley Intrusion. Subsequent emplacement of main River Valley magma was from a sulphur-undersaturated, PGE-fertile magma. Post-emplacement hydrothermal alteration resulted in localized remobilization of the platinum metals.

1.4 EXPLORATION AND DRILLING

NAM has carried out exploration programs on the Property since 1999. The programs consisted of surface exploration, numerous ground and airborne geophysical surveys, a LiDAR topographical survey, and extensive drill programs.

In 2000, a total of 6,779 m in 40 drill holes was completed in the Dana North Zone to Dana South Zone area in the northern part of the River Valley Deposit. A total of 16,027 m in 98 drill holes were completed in 2001, and 83 drill holes were completed in 2002 at Lismer Ridge Zone, Dana South Zone and Banshee Zone. From late 2002 to May 2004 a total of 44,131 m in 208 drill holes were completed, followed by 24,198 m in 123 drill holes in 2005. During 2011 and 2012 a total of 12,767 m in 46 drill holes were completed, mainly at the Dana North and Dana South Zones.

In 2015, a total of 474 m in two drill holes completed at Dana North resulted in discovery of the Pine Zone. In 2016, five drill holes were completed for a total of 1,267 m at the Pine Zone. In 2017, a total of 3,728 m in 14 drill holes were completed at the Pine Zone and Dana North Zone.

In 2018, a trench was excavated and channel sampled on the Dana North/Pine Zone area. After a hiatus in 2018 and 2019, exploration and drilling on the Property resumed in 2020 and continued in 2021 and 2022.

Exploration work completed in 2020 through 2022 at River Valley consisted of a rhodium (“Rh”) assay study of historical drill core, trench excavation and surface mineral prospecting near the Dana South Zone, surface prospecting at Pardo Zone, and an IP geophysical survey at Banshee Zone. In 2020 and 2021, successful exploration drill holes were completed on the Pine and Banshee Zones and four metallurgical drill holes were completed on the Dana North, Dana South, Lismer North and Lismer Ridge Zones. Mineralized intervals in the four metallurgical drill holes were sampled and assayed for PGM, including Rh. In 2022, five geomechanical drill holes were completed at Dana North (2), Dana South (1), Lismer North (1) and Lismer Ridge (1). Two of the five drill holes (Dana South and Lismer Ridge) encountered significant Fe-Cu (PGE) sulphide mineralization and were therefore also logged and sampled as exploration drill holes. The Dana South drill hole intersected a thick interval of higher-grade PGM mineralization outside of the modelled extents of this Zone. This result was followed up by completion of four, more orthogonally oriented drill holes in this area, all of which intersected mineralization.

1.5 SAMPLE PREPARATION, ANALYSES, SECURITY AND DATA VERIFICATION

NAM implemented a robust quality assurance/quality control (“QA/QC”) program from the commencement of the Phase 5 drilling program in 2002 at the Property.

It is the Authors opinion that NAM’s sample preparation, analytical procedures, security and QA/QC program meet industry standards, and that the data are of good quality and satisfactory for use in the Mineral Resource Estimate reported in this Technical Report. It is recommended that the Company continue with the current QC protocol, which includes the insertion of appropriate in-house reference materials, blanks and duplicates, and to further support this protocol with umpire assaying (on at least 5% of samples) at a reputable secondary laboratory.

Mr. Antoine Yassa, P.Geo., an independent Qualified Person in terms of NI 43-101 visited the Property from June 6 to June 8, 2021, for the purpose of carrying out a site visit and completing an independent verification sampling program. The River Valley drill core was examined during the June site visit, with 21 samples taken from five drill holes. The archived half-core samples were sawn into ¼ splits, with one ¼ split sent for analysis and the remaining ¼ drill core split returned to its storage box. An effort was made to sample a range of grades. The samples were selected by Mr. Yassa, and placed into sample bags that were sealed with tape and placed in a rice bag. The samples were sent by courier by Mr. Yassa to AGAT Laboratory, ("AGAT") in Mississauga, Ontario for analysis.

AGAT has developed and implemented at each of its locations a Quality Management System ("QMS") designed to ensure the production of consistently reliable data. The system covers all laboratory activities and takes into consideration the requirements of ISO standards. AGAT maintains ISO registrations and accreditations (ISO 9001:2015 and ISO/IEC 17025:2017).

Platinum, gold and palladium samples were analyzed by fire assay with ICP-OES finish and copper, nickel, cobalt and silver were analyzed using sodium peroxide fusion with ICP-OES/ICP-MS finish. The Authors consider there to be good correlation between the majority of its independent verification samples analyzed by AGAT Labs and the original analyses in the NAM database. The Authors consider the due diligence results to be acceptable and results are suitable for verification use in the current Mineral Resource Estimate.

1.6 MINERAL PROCESSING AND METALLURGICAL TESTING

Between 1999 and 2006, intermittent metallurgical testwork was performed on high-grade samples of limited size from some of the mineralized zones at River Valley. Scoping level metallurgical studies were completed in 2012-2013 on a composite sample from the Dana South Zone ("DSZ") and Dana North Zone ("DNZ"). Testwork was conducted for:

- Bond Rod Mill Index ("RWI");
- Ball Mill Work Index ("BWI");
- Abrasion Index ("AI");
- Modal Analysis and Deportment;
- Mineral Liberation Analysis ("MLA"); and
- Flotation testwork including Regrind Effect, Rougher Kinetic testwork and Locked Cycle Testwork ("LCT").

The LCT produced a concentrate grading 15.5% Cu, 1.67% Ni, and 189 g/t PGE at respective recoveries of 84.4%, 22.2% and 68.7%.

Mineralogical testwork was completed at Expert Process Solutions ("XPS") in 2018 on four composites samples from the Pine and Dana Zones of the River Valley Deposit. The work focussed on both PGM and base metals mineralogy. QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscope), EPMA (Electron Probe Micro Analysis) and LA-ICP-MS (Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry) were utilized to characterize the samples.

In 2022, Pre-Feasibility-level metallurgical testing was completed at SGS. The test program focused on assayed drill core interval samples from the Dana and Lismer Zones to determine initial concentrations and form numerous variability composite samples to represent the Lismer, Dana North, and Dana South Zones. In total, 11 variability composites were created to represent the whole Deposit and two master composites were also created to generate a Dana Master Composite ("DMC") and a Lismer Master Composite ("LMC") which graded 0.05% Cu and 0.88 g/t PGE, and 0.04% Cu and 0.94 g/t PGE, respectively.

A mineralogical study was performed to investigate the mineral composition and occurrence of the PGEs. Results indicated that ~0.5% of the feed contained sulphide-bearing minerals, half of which were associated with chalcopyrite and pentlandite, while the remaining half were associated with iron sulphides.

Copper and nickel minerals were mostly free and liberated, ~73 to 74%, at a P_{80} of ~106 microns. The silicates were 99.8% free and liberated from the other minerals. The PGE minerals were mostly liberated and free, 73.6%, however, the remaining were associated with chlorite/micas/clays, 14.9%, or complexed with multiple other minerals, 6.5%.

Comminution testwork was performed to determine grindability properties. SMC and Bond Ball millwork index test results indicated the samples were generally "hard" in response to SAG and ball milling. The samples were also considered "medium" to "high" in abrasivity.

A sample of combined dried rougher tailings from the Dana and Lismer LCTs was compiled and tested as the "River Valley Tailings" to determine its dewatering properties. Environmental metallurgical testwork was also performed using the reconstituted tailings and was subjected to air drying, Atterberg limit, and settling density testwork.

Mineralized material sorting was demonstrated to have limited potential for River Valley with no additional testing recommended by the Authors.

Flotation testwork was completed to determine the metallurgical performance of each sample. The in-depth flotation work included LCT to project the overall performance of the conceptual flow sheet in terms of expected recovery and concentrate grade. LCT on the DMC sample projected a final concentrate grading 13.1% Cu and 127 g/t PGE at projected copper and PGE recoveries of 87.5% and 68.0%, respectively. LCT on the LMC sample projected a final concentrate grading 13.0% Cu and 133 g/t PGE at projected copper and PGE recoveries of 83.8% and 65.9%, respectively. There did not appear to be clear relationships between feed grades and metallurgical performance based on the response of the variability composite samples.

Indicative metallurgical recoveries from the LCT testwork at SGS in 2022 are 55.4% Au, 56.8% Pt, 71.1% Pd, 85.6% Cu, 21.1% Ni, 25% Co, 60% Ag, and 40% Rh. Anticipated concentrate grades are 13.0% Cu, 1.35% Ni, 0.261% Co, 31.0% S, 5.80 g/t Au, 28.0 g/t Pt, 95.0 g/t Pd and 1.88 g/t Rh.

1.7 UPDATED MINERAL RESOURCE ESTIMATE

Historical resource estimates of the River Valley Deposit were completed in 2001, 2002, 2004 and 2006 by NAM and more recently, Mineral Resource Estimates were completed in 2012, 2018, 2019 and 2021. The current Mineral Resource Estimate is based on the 2021 estimate and has an updated effective date of June 29, 2023. The Property was also the subject of a PEA by P&E in 2019, which is presented in an NI 43-101 Technical Report titled "Technical Report, Updated

Mineral Resource Estimate and Preliminary Economic Assessment of the River Valley Deposit, Sudbury Mining Division, Ontario."

The Mineral Resource Estimate presented in this Technical Report has been prepared following the guidelines of the Canadian Securities Administrators' National Instrument 43-101 and Form 43-101F1 and in conformity with generally accepted "CIM Estimation of Mineral Resource and Mineral Reserves Best Practices" guidelines (2019). Mineral Resources have been classified in accordance with the "CIM Standards on Mineral Resources and Reserves: Definition and Guidelines" as adopted by CIM Council on May 10, 2014. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into a Mineral Reserve. Confidence in the estimate of Inferred Mineral Resources is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure.

The Mineral Resource Estimate in this Technical Report was prepared by the Authors using a drill hole database provided by NAM. The drill hole database consisted of 723 diamond drill holes totalling 156,421 m, that were drilled in many exploration campaigns completed between 2000 and 2020. There was subsequent drilling in 2021 and 2022, however, these drill holes have not been incorporated into the current Mineral Resource Estimate.

The Authors validated the Mineral Resource Estimate database in GEMS™ by checking for inconsistencies in analytical units, duplicate entries, interval, length or distance values less than or equal to zero, blank or zero-value assay results, out-of-sequence intervals, intervals or distances greater than the reported drill hole length, inappropriate collar locations, survey and missing interval and coordinate fields. The Authors are of the opinion that the supplied database is suitable for Mineral Resource estimation.

A total of ten mineralized domains were determined from lithology, structure and grade boundary interpretation from visual inspection of drill hole vertical cross-sections. The domain outlines were influenced by the selection of mineralized material above CDN$10/t net smelter return ("NSR") that demonstrated lithological and structural zonal continuity. Minimum constrained drill core length for interpretation was approximately 2.0 m. To regularize the assay sampling intervals for grade interpolation, a 2.0 m compositing length was selected for the drill hole intervals that fell within the constraints of the Mineral Resource wireframes. Grade capping was performed on the 2.0 m composite values in the database within the constraining domains to control the possible bias resulting from erratic high-grade composite values in the database.

A total of 432 bulk density samples ranged from 2.61 t/m^3 to 3.26 t/m^3 with average of 2.94 t/m^3. A uniform bulk density 2.94 t/m^3 was applied for all mineralized domain model blocks for this Mineral Resource Estimate.

The River Valley block model was constructed using GEOVIA GEMS™ V6.8.4 modelling software with 5 m x 5 m x 5 m blocks. Each block model has attributes for estimated grades, NSR, rock type (mineralization domains), volume percent, bulk density, and classification. Palladium, platinum, gold, rhodium and silver grades were interpolated into the blocks using Inverse Distance weighting to the third power ("ID^3"), whereas copper, nickel and cobalt grades were interpolated with Inverse Distance squared ("ID^2"). Nearest Neighbour ("NN") grade estimation was utilized for validation purposes. For rhodium, the grades used for un-assayed intervals were calculated with a Robust Simple Regression analysis based on the relationship of Rh content with Pt.

In the opinion of the Authors, all drilling, assaying and exploration work on the River Valley Project supports this Mineral Resource Estimate, and spatial continuity of the mineralization within potentially mineable shapes is sufficient to indicate a reasonable potential for economic extraction, thus qualifying it as a Mineral Resource under the 2014 CIM Definition Standards. The Mineral Resource was classified as Measured, Indicated, and Inferred based on the geological interpretation, Pd variogram performance and drill hole spacing.

The River Valley Mineral Resource Estimate was derived from applying NSR cut-off values to the block model and reporting the resulting tonnes and grades for potentially mineable areas. Pit constrained and out-of-pit potentially economic portions of the constrained mineralization were based on NSR cut-off values calculated from three-year trailing average commodity prices and US$/CDN$ exchange rates, estimated process recoveries, estimated smelter payables, open pit marginal processing plus G&A costs of CDN$15/t; and combined underground mining, processing and G&A costs of CDN$50/t. The three-year trailing average US$ prices used were as follows: $1,850/oz Pd; $900/oz Pt; $1,600/oz Au; $18.50/oz Ag; $8,000/oz Rh; $6,50/lb Ni; $3.00/lb Cu; and $16.00/lb Co.

The NSR cut-off value of the pit constrained Mineral Resource is CDN$15/t and the out-of-pit Mineral Resource is CDN$50/t. The block model was further investigated with a pit optimization to ensure that a reasonable assumption of potential economic extraction could be made.

The current Mineral Resource Estimate for River Valley, with an effective date of June 29, 2023, is presented in Table 1.1. At cut-offs of CDN$15/t NSR (pit constrained) and CDN$50/t NSR (out-of-pit), the Mineral Resource Estimate consists of: 89.6 Mt grading 0.54 g/t Pd, 0.21 g/t Pt, 0.04 g/t Au and 0.06% Cu, or CDN$47.58/t in the Measured and Indicated classifications; and 94.3 Mt grading 0.35 g/t Pd, 0.16 g/t Pt, 0.03 g/t Au and 0.04% Cu, or CDN$31.69/t NSR in the Inferred classification. Contained metal contents are 2.3 Moz Pd+Pt+Au in the Measured and Indicated classifications and 1.6 Moz Pd+Pt+Au in the Inferred classification.

The Mineral Resource Estimates are sensitive to the selection of a reporting NSR cut-off value, as demonstrated in Table 1.2 for pit constrained Mineral Resources. At an NSR cut-off value of $CDN25/t, the pit sensitivity constrained Mineral Resources consist of: 60 Mt grading 0.71 g/t Pd, 0.26 g/t Pt, 0.05 g/t Au and 0.04% Cu, or CDN$60.54/t NSR in the Measured and Indicated classifications; and 48 Mt grading 0.48 g/t Pd, 0.20 g/t Pt, 0.04 g/t Au and 0.03% Cu, or CDN$41.48/t NSR in the Inferred classification (Table 1.2). Contained metal contents are 2.0 Moz Pd+Pt+Au in the Measured and Indicated classifications and 1.1 Moz Pd+Pt+Au in the Inferred classification.

TABLE 1.1
PIT CONSTRAINED MINERAL RESOURCES @ CDN$15/T NSR CUT-OFF (1-8)

Zone	Class	Tonnes (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
Total	**Measured**	15,485	0.70	347.1	0.25	122.4	0.05	22.7	0.07	23.7	0.003	0.9	0.02	5.2	0.02	10.8	0.49	242.3	59.53
	Indicated	73,513	0.51	1,198.9	0.20	476.7	0.03	82.7	0.06	89.9	0.002	4.0	0.01	22.4	0.02	42.3	0.22	512.7	44.70
	Meas + Ind	**88,998**	**0.54**	**1,546.0**	**0.21**	**599.1**	**0.04**	**105.4**	**0.06**	**113.6**	**0.002**	**4.9**	**0.01**	**27.6**	**0.02**	**53.1**	**0.26**	**755.0**	**47.28**
	Inferred	92,679	0.35	1,033.3	0.15	461.8	0.03	91.8	0.04	86.1	0.002	3.2	0.02	41.4	0.01	41.9	0.25	740.7	31.06

OUT-OF-PIT MINERAL RESOURCES @ CDN$50/T NSR CUT-OFF

Zone	Class	Tonnes (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
Total	**Measured**	2.9	1.05	0.10	0.37	0.03	0.07	0.01	0.10	0.01	0.003	0.00	0.03	0.00	0.033	0.00	0.51	0.05	89.72
	Indicated	639.3	1.08	22.21	0.35	7.26	0.06	1.25	0.08	1.06	0.003	0.04	0.02	0.28	0.032	0.66	0.23	4.79	88.46
	Meas + Ind	**642.1**	**1.08**	**22.31**	**0.35**	**7.29**	**0.06**	**1.25**	**0.08**	**1.07**	**0.003**	**0.04**	**0.02**	**0.28**	**0.032**	**0.66**	**0.23**	**4.84**	**88.47**
	Inferred	1,589.2	0.79	40.38	0.37	18.82	0.05	2.44	0.06	2.04	0.002	0.07	0.02	0.56	0.035	1.79	0.30	15.29	68.14

TOTAL MINERAL RESOURCES @ CDN$15 & CDN$50/T NSR CUT-OFF

Zone	Class	Tonnes (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
Total	**Measured**	15,488	0.70	347.2	0.25	122.4	0.05	22.7	0.07	23.7	0.003	0.9	0.02	5.2	0.022	10.8	0.49	242.4	59.54
	Indicated	74,152	0.51	1,221.1	0.20	484.0	0.04	84.0	0.06	91.0	0.002	4.0	0.01	22.7	0.018	43.0	0.22	517.5	45.08
	Meas + Ind	**89,640**	**0.54**	**1,568.3**	**0.21**	**606.4**	**0.04**	**106.7**	**0.06**	**114.7**	**0.002**	**4.9**	**0.01**	**27.9**	**0.019**	**53.8**	**0.26**	**759.8**	**47.58**
	Inferred	94,268	0.35	1,073.7	0.16	480.6	0.03	94.2	0.04	88.1	0.002	3.3	0.02	42.0	0.014	43.7	0.25	756.0	31.69

Notes: *Class = Classification, Meas + Ind = Measured and Indicated classifications.*

1 Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

2. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.

3. *The Inferred Mineral Resource in this estimate has a lower level of confidence than that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could potentially be upgraded to an Indicated Mineral Resource with continued exploration.*
4. *The Mineral Resources were estimated in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions (2014) and Best Practices Guidelines (2019) prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council.*
5. *The Mineral Resource Estimate is based on US$ metal prices of $1,850/oz Pd, $900/oz Pt, $1,600/oz Au, $3.00/lb Cu, $16/lb Co, $6.50/lb Ni, $8,000/oz Rh, $18.50/oz Ag. The US$:CDN$ exchange rate used was 0.75.*
6. *The NSR estimates use flotation recoveries of 80% for Pd, 80% for Pt, 80% for Au, 85% for Cu, 25% for Co, 30% for Ni, 80% for Rh and 65% for Ag and smelter payables of 80% for Pd, 80% for Pt, 85% for Au, 85% for Cu, 50% for Co, 90% for Ni, 80% for Rh and 65% for Ag.*
7 *The pit optimization used a mining cost of CDN$2.25/t mined, combined processing and G&A costs of CDN$15/t, and pit slopes of 50º. The out-of-pit Mineral Resources used combined underground mining, processing and G&A costs of CDN$50/t.*
8 *Out-of-pit Mineral Resources were determined to be potentially extractable with the longhole mining method.*

TABLE 1.2
PIT CONSTRAINED MINERAL RESOURCE SENSITIVITY @ CDN$25/T NSR CUT-OFF VALUE

Zone	Class	Tonnes (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
Total	**Measured**	11,272	0.89	322.2	0.30	109	0.06	20.0	0.10	19.5	0.002	0.7	0.01	4.4	0.03	9.8	0.53	191	74.51
	Indicated	48,795	0.67	1,047.8	0.25	397	0.04	68.3	0.04	64.7	0.002	3.1	0.01	16.0	0.02	35.7	0.24	378	57.31
	Meas + Ind	**60,066**	**0.71**	**1,370.0**	**0.26**	**506**	**0.05**	**88.4**	**0.04**	**84.2**	**0.002**	**3.8**	**0.01**	**20.4**	**0.02**	**45.4**	**0.29**	**569**	**60.54**
	Inferred	48,426	0.48	751.0	0.20	310	0.04	57.3	0.03	47.4	0.001	1.8	0.01	21.8	0.01	15.2	0.28	438	41.48

More detailed sensitivities of pit constrained and out-of-pit Mineral Resource Estimates by mineralized zones at River Valley are provided in Section 14 of this Technical Report.

The relative metal contribution to NSR for Measured and Indicated Mineral Resources is presented in Table 1.3. The predominant contribution of Pd + Pt (88.4%) is particularly noteworthy, given the sparsity of such true PGM deposits in secure and established mining jurisdictions globally.

TABLE 1.3
METAL CONTRIBUTION TO NSR OF MEASURED AND INDICATED MINERAL RESOURCES

Metal	Contribution (%)
Pd	74.6
Pt	13.8
Au	4.0
Cu	4.2
Ni	0.8
Co	0.2
Rh	2.1
Ag	0.3
Total	**100.0**

1.8 MINING METHODS

Compared to previous studies on the River Valley Project, this 2023 PEA is based on a smaller, higher-grade operation with lower initial capital costs, reduced open pit mining (both tonnage and number of open pits), inclusion of underground mining, and a much smaller environmental footprint, to provide mineralized feed to an on-site 2.5 Mtpa process plant (6,850 tpd).

Initial mining is by open pit at the northwest end of the Deposit, close to the proposed process plant site location. A series of five open pits will be mined, starting at the Dana Zones and progressing in a southeasterly direction to the Lismer Zones and finally the Varley Zone. The Dana Pit contains approximately half of the life-of-mine ("LOM") mineralized process plant feed. The open pits will produce a total of 35.7 Mt of process plant feed. The average open pit strip ratio is planned to be 3.4:1 over the LOM. It is anticipated that a fleet of 90 t haul trucks, 10 m3 excavators and 254 mm hole diameter rotary drills will be utilized, following industry standard conventional open pit mining techniques. The mine fleet will be owned and operated by the Company.

The Tailings Management Facility ("TMF") is planned to be operated for the first seven years of mine production. The Dana Pit is planned to be mined out by the end of production Year 7. Tailings will be pumped to the pit starting in Year 8 and will continue to the end of mine life.

Higher grade underground mineralization is planned to be mined during production years two to seven and will total approximately 3 Mt of process plant feed. The underground mining method is planned to be sublevel longitudinal and transverse longhole stoping with cemented rock backfill, at a mineralized material mining rate of 1,500 tpd. The lower extents of the Dana South Zone and the Lismer North Zone are planned to be ramp-accessed from portals at surface. All underground mine and stope development will be carried out by a mining contractor. Company personnel and equipment will carry out all other underground mining activities.

Separate open pit mining, underground mining and processing schedules have been developed for the Project. The production plan utilizes Measured, Indicated and Inferred Mineral Resources. Inferred Mineral Resources are considered too speculative geologically to have the economic considerations applied to them to be categorized as Mineral Reserves, and there is no certainty that the Inferred Mineral Resources will be upgraded to a higher Mineral Resource classification. There is no certainty that this Preliminary Economic Assessment will be realized.

1.9 RECOVERY METHODS

Metallurgical testwork results detailed in Section 13 were utilized in the flowsheet development and design criteria for the Project's two main zones, Dana and Lismer. The process plant design is based on nominal 6,850 mtpd throughput crushing, grinding, flotation, and dewatering circuits. The plant will process sulphide material via conventional flotation operations with process water recovery completed via a tailings thickener and TMF water recapture and return.

The process plant flowsheet design consists of conventional crushing, a semi-autogenous ("SAG") mill with a pebble crusher, and a closed-circuit ball mill circuit with cyclones to ensure product (P_{80}) size feed to the flotation circuit. The cyclone overflow is conditioned prior to rougher flotation with reagents, including collectors, frother, and suitable depressants, to produce a bulk rougher concentrate. The rougher concentrate is re-ground in a closed circuit regrind ball mill and further upgraded in a series of cleaner flotation cells to produce the final cleaner concentrate. The final concentrate is thickened, filtered, and dried prior to shipping to a smelter.

The cleaner circuit consists of 1st, 2nd, and 3rd cleaning circuits as well as cleaner scavenger. Associated recycling is completed between the stages. The rougher flotation circuit tailings feeds the tailings thickener to reduce impounded TMF density and return process water internally. Process water is recycled from the concentrate and tailings thickener as well as the settled water in the TMF pond. These three water streams are pumped to the main process water tank for reuse in the process plant.

1.10 SITE INFRASTRUCTURE

There is currently no mining infrastructure at the River Valley Project site. The process plant, mineralized stockpile, offices, initial open pit to be mined and the TMF will be located in the northwest area of the Property. The initial mine site infrastructure is compact, and NAM will strive to contain this small footprint during future operations. A security building and gate will be located at the entrance to the mine site.

Major infrastructure for the Project includes five open pit mines, two underground mines, the process plant with laboratory and main electrical substation and power distribution, the TMF, and three waste rock storage facilities. Infrastructure to be installed by the Company includes the main access road and gatehouse, administration building, warehouse, maintenance building, change room, water and sewage treatment plants, and a diesel fuel tank farm with a fueling station.

There will be no camp facilities at site. Personnel and contractors will be responsible for their own housing and will travel from local communities. Infrastructure to be installed by contractors includes a maintenance building, bulk explosives storage and magazines, offices and a warehouse.

A 230 kV transmission line is located passing through the town of Warren, approximately 22 km from the Project. A 115 kV transmission line passes through the village of Field, located approximately 15 km to the east of the Project. However, after discussions with Hydro One it is planned that electrical power will be provided by a dedicated 44 kV feeder line from the Crystal Falls Transformer Station and will require 45 km of new powerline. The total connected electrical power for the process plant is estimated at 10.2 MW. A diesel generator at the process plant will be used for emergency power generation.

Minimal fresh water for the process plant will be withdrawn from local fresh water sources. A combined raw and firefighting water tank will hold sufficient quantities of water to meet the instantaneous demands of the process plant. The use of external make-up water for the process plant has been minimized as part of the process plant design. There will be sufficient water available from the combined TMF and water management pond operations to use as reclaim water. Under average conditions, water from the water management pond will be periodically pumped to the water treatment plant for processing and discharge at an annualized average rate of approximately 66 m^3/hr.

The tailings throughput is currently envisioned to average 2,500 tpd over a planned 16 year mine life (38.6 Mt in total mineralized tonnage). During Years 1 through 7 of operations, approximately 17.2 Mt of tailings will be stored in the TMF. Tailings will be conveyed and deposited via a thickened tailings slurry pipeline with discharge spigots located around the perimeter of the TMF basin during this period. The remaining tailings after Year 7 (21.4 Mt) will be stored in the mined-out Dana Pit. Tailings will be pipeline end discharged into the Dana Pit during this period.

Based on preliminary geochemical characterization results, the bulk of the mine waste rock is assumed to be Non-Acid Generating. Some of the waste rock will be used for TMF embankment construction and the remainder will be stored in the waste rock storage facilities.

The TMF will be constructed in three stages to reduce initial capital expenditure. Stage 1 will consist of a starter cell at the north end of the valley and is sized to provide two years of storage. The Stage 1 impoundment will be formed through the construction of two dams (North and Divider Embankments), with the remaining containment provided by the natural topography. Stage 2 includes the North, Divider, and South Embankments, and all embankments will be raised using the downstream construction method as required to reach the approximate 7-year facility life.

The TMF perimeter embankments will consist of zoned rock fill, including the following materials, from upstream to downstream:

- 100 mm HDPE geomembrane (textured one side) will be installed to provide an impervious barrier, contain the process water, runoff, and tailings, and reduce seepage from the facility;

- 12 oz/yd^2 non-woven geotextile will be installed immediately below the geomembrane to act as a cushion layer and protect the geomembrane from damage;

- A filter zone will be placed and compacted to provide a bedding layer for the geomembrane/non-woven geotextile, maintain filter relationships with the tailings, and provide drainage within the embankment fill. The zone will have a true thickness of 0.3 m. Processing may be required to meet the material specifications;

- A transition zone will be placed and compacted to maintain filter relationships with the upstream filter zone and provide drainage within the embankment fill. The transition zone will have a true thickness of 3.4 m and will consist of a sand and gravel. Processing will be required to meet the material specifications; and

- Rock fill will be placed and compacted to form the downstream shell zone.

The upstream slope of each embankment will be 2.5H:1V. The downstream slope will be 2H:1V during all stages of construction. Slope benches (typically 3 m wide) will be included on the upstream slopes between the embankment stages to facilitate the geomembrane installation. The crest width will be 10 m at all stages of construction.

1.11 MARKET STUDIES AND CONTRACTS

The Author followed the approximate May 31, 2023 three-year monthly trailing average metal prices and CDN$:US$ exchange rate. The metal prices and FX are listed in Table 1.4. It should be noted that only Au, Pd, Pt, and Cu are considered as payable in potential smelter/refinery agreements.

TABLE 1.4
METAL PRICE ASSUMPTIONS AND FX (US$)

Commodity	Au ($/oz)	Pd ($/oz)	Pt ($/oz)	Rh ($/oz)	Ag ($/oz)	Ni ($/lb)	Cu ($/lb)	Co ($/lb)	CDN$:US$
Price	1,830	2,150	1,010	5,450	23.50	9.60	4.00	26.00	1.35

There are no existing contracts in place related to the River Valley Project.

An independent marketing and logistics study was commissioned for the concentrate to be produced from the River Valley Project. The expected analysis of the concentrate has been based on metallurgical testwork performed by SGS-Lakefield. The projected levels of PGMs in the River Valley concentrate are considerably higher than those found in most copper concentrates, and particularly those traded in the global custom concentrate market.

Copper smelters/refineries recover PGMs which report to refinery anode slimes along with gold, silver and other by-product metals such as selenium and tellurium. However, PGM production at most copper refineries will typically be very low due to the contained metal characteristics of the inputs. As such, only a small number of copper smelters measure and track their PGM recoveries and few are thus prepared to pay for platinum and palladium in concentrate.

Although PGMs are relatively common in nickel concentrates, copper is typically an ‘undesirable’ at most nickel smelters. The River Valley concentrate is likely unsuitable as a feed for either of the Sudbury nickel smelters, however, this requires further investigation.

Metallurgical testwork indicates that the copper grade in the River Valley concentrate will range from 11% to 20% with a weighted average grade of 14% to 15%. Although unlikely to cause significant marketing issues based on the annual output and likely destinations, these copper grades are well below what most western copper smelters consider desirable and may either limit the volumes to which any single smelter might be prepared to commit or, more probably, lead to the imposition of penalties via a lower (net) copper payable. With most smelters targeting higher average feed blends, the River Valley concentrate will have to be blended with diminishing volumes of higher grade concentrates to ensure an optimal smelter feed mix.

It was assumed that the River Valley concentrate will be evenly split between two buyers (one domestic, one offshore). Feedback was received from two of the most likely buyers of the River Valley concentrate.

The net payable amounts for each of the payable metals is expected to be 91% copper, 96% palladium, 91% platinum and 82% gold. Silver and rhodium are not expected to be at high enough concentrations to be payable. Nickel and cobalt are not expected to be payable as part of a copper concentrate.

A benchmark treatment charge of US$85.00/dry metric tonne (“dmt”) and copper refining charge of US$0.085/lb payable copper have been used. Refining charges of US$28.00/payable oz platinum and palladium, US$5.00/payable oz gold and US$0.50/payable oz silver have been assumed. Other charges, such as freight capture and container handling charges, are incorporated into the logistics costs.

The concentrate to be produced will be very low in deleterious elements commonly seen in copper concentrates. Based on expected concentrate specifications it is assumed that a penalty will apply to the combined MgO + Al_2O_3 content and such penalty will apply to all buyers. It is assumed that total penalties will be in the order of US$4.00/dmt.

For concentrate sales to a domestic buyer, the concentrate will be delivered overland direct by truck from the mine to the smelter. Costs are expected to be lower for shipments via container and handling losses will be reduced. With the ability to ship in smaller parcel sizes, additional benefits associated with container shipments include expedited cash flow and lower financing costs. It has been assumed that concentrate sales will also involve an overseas smelter and an ‘all-in’ average logistics cost will be US$166.00/dmt. This figure includes a domestic sale freight capture component and all other logistics related costs.

1.12 ENVIRONMENTAL STUDIES, PERMITS AND SOCIAL OR COMMUNITY IMPACT

NAM has been working to refine several aspects of this Project since issuing a press release on the status of the Project in the fall 2022. These have included significantly decreasing the environmental impact of the Project by eliminating the open pit mining within Pine Lake, which is a recognized lake trout habitat, as well as significantly reducing the size of the Dana South and Lismer North open pits. NAM has focussed on maximizing the extraction of high-grade mineralization via underground mining as opposed to open pit mining in these areas. Therefore, the Project no longer requires the construction of a large dam across the south-end of Pine Lake and eliminates the associated impact on fish and fish habitat. Impacts to Pine Lake have been virtually eliminated due to this refinement to the Project. By focussing on maximizing the extraction of high-grade mineralization, NAM has also been able to reduce the rate of mineralization extraction and processing for the Project. This modification has reduced the footprint of the process plant area and the size of the equipment in this area which in turn has reduced the carbon footprint associated with processing.

NAM has developed an Environmental and Social Governance ("ESG") Strategy and will prepare an ESG Sustainability Report annually to disclose and communicate ESG related information to NAM's stakeholders. The first ESG Sustainability Report has been posted on the NAM website. As outlined in NAM's ESG Strategy, NAM is committed to managing and operating their assets in a manner that is protective of human health and safety and the environment. It is NAM's policy to comply, in all material respects, with applicable health, safety and environmental laws and regulations.

The Project will be required to obtain numerous provincial and federal approvals and permits and it is anticipated that it will be subject to provincial environmental assessments and a federal Impact Assessment. The Project will proceed with a coordinated process to increase efficiencies and reduce duplication of effort during these assessments. However, the permitting for the Project will be less onerous now, than the Project presented in the fall 2022, since, as indicated above, the large dam across the south-end of Pine Lake and the associated impact on fish and fish habitat have been eliminated.

The Project is located approximately 3 km east from the Sturgeon River Provincial Park and 9 km east of the Temagami River Provincial Park. The Dana Township Jack Pine Forest Conservation Reserve is located immediately to the east of the Project. There is one hunt camp located near the north end of Pine Lake. The closest cottagers/residents to the Project are located approximately 5 km to the north on Silver Lake and 2 km south in Glen Afton.

The Property is situated on Crown Land within the Emerald Lake Area (Policy ID G1938), which is designated as a general use area. Timber production is an important use of this area. Mineral potential is recognized as being high and mining opportunities are supported, therefore, the policy indicates that mining activities should not be obscured by other development. Wildlife management, recreation, and tourism are also important land uses in this area.

The Project is situated on the traditional territory of Temagami First Nation and Nipissing First Nation. A Memorandum of Understanding was signed by Temagami First Nation in 2014 and amended in 2017. Temagami First Nation has assisted with the completion of baseline archaeological, surface water quality, groundwater, and hydrology studies and members of the community also participated in a site visit in September 2022. A Memorandum of Understanding was signed with Nipissing First Nation in late-January 2022. In 2023, NAM is anticipating that Nipissing First Nation will also participate in the Project's ongoing baseline data collection. Regular Project updates are provided to each of these communities.

Story has been retained since 2021 to conduct baseline environmental studies to support the Project's future permitting, provincial environmental assessments, and the federal Impact Assessment. The environmental baseline studies are well advanced and consist of: Stage 1 and 2 Archaeological Assessments, aquatics (fish and fish habitat), atmospheric, terrestrial (species at risk and habitat assessments), surface water quality, groundwater (quality and levels), aquifer permeability (i.e., slug tests), and hydrology. KP completed geochemical characterization of the tailings and waste rock material and hydrogeological modelling of the dewatering of the proposed open pits and underground workings.

A production phase Closure Plan, and associated financial assurance, will be filed with the Ministry of Mines before development of the Project. The production phase Closure Plan will be prepared for submission to the Ministry of Mines in accordance with O. Reg. 240/00: Advanced Exploration, Mine Development and Closure Under Part VII of the Act. Closure of the Project will be completed in accordance with the O. Reg. 240/00 (as amended) and will meet the requirements of the Mine Rehabilitation Code of Ontario (Schedule 1 of O. Reg. 240/00 (as amended)); with the fundamental considerations being to ensure physical and chemical stability of the Property to protect human health and the environment.

1.13 CAPITAL COSTS

Capital and operating costs are listed in Q2 2023 Canadian dollars ("$") with no provision for inflation.

Initial capital costs are for construction of a 2.5 Mtpa flotation process plant and conventional tailings facility, and to set up an open pit mining site with the necessary infrastructure and conduct pre-production activities. The total initial capital cost of the River Valley Project is estimated at $269M. Sustaining capital costs incurred during the 16 production years are estimated to total $163M and include development of two underground mines. A summary of the Project capital cost estimates is presented in Table 1.5.

TABLE 1.5 **CAPITAL COST ESTIMATE**			
Item	**Initial ($M)**	**Sustaining ($M)**	**Total ($M)**
Site development	9.7	11.6	21.3
Open pit mining equipment and pre-stripping	27.3	47.8	75.1
Process plant directs	74.6		74.6
Process plant indirects	24.6		24.6
Site infrastructure	17.4		17.4
Electrical powerline connection	30.0		30.0
Tailings and water management facilities	25.3	32.0	57.3
EPCM	19.9		19.9
Owner's costs	10.0		10.0
Underground mine development and equipment[1]		37.1	37.1
Reclamation and closure		16.3	16.3
Contingency (13%)	29.9	18.1	48.0
Total[2]	**268.7**	**163.0**	**431.7**

[1] Underground mine development and equipment includes underground closure and salvage. [2] Totals may not sum due to rounding.

1.14 OPERATING COSTS

Operating costs are estimated to average $30.98/t processed over the LOM as presented in Table 1.6. Open pit mining costs are applicable to 16 years of production whereas underground mining costs are only for six years of production. The operating costs have been estimated from first principles and consumable quotes, with factoring and estimates from the Authors experience at other mines.

TABLE 1.6 **OPERATING COST ESTIMATE**			
Item	**Unit**	**Unit Cost ($/t)**	**LOM Total ($M)**
Open pit mining	$/t mined	2.95	
Open pit mining	$/t processed	12.63	450.8
Underground mining	$/t processed	60.61	178.2
Process plant	$/t processed	12.69	490.4
General and administration	$/t processed	2.01	77.5
Total[1]	**$/t processed**	**30.98**	**1,196.9**

[1] Totals may not sum due to rounding.

General and Administration costs are estimated at $5.0M annually.

Company peak year site manpower is estimated at 325 people, consisting of 193 mining, 109 process plant and 23 G&A. Maintenance personnel are included in the mining and process plant numbers. Underground mine development contractors are additional.

The Project is subject to a 1.0% NSR royalty after a $2.0M payment that is planned at the start of production. Total costs associated with this NSR royalty over the LOM are estimated at $24.6M including the $2.0M lump sum payment.

Cash costs over the LOM, including royalties, are estimated to average US$1,231/oz PdEq. All-In Sustaining Costs ("AISC") over the LOM are estimated to average US$1,518/oz PdEq and include closure costs.

1.15 FINANCIAL EVALUATION

Cautionary Statement - The reader is advised that this PEA Technical Report is intended to provide only an initial, high-level review of the Project potential and design options. The PEA mine plan and economic model include numerous assumptions and the use of Inferred Mineral Resources. Inferred Mineral Resources are considered to be too speculative to be used in an economic analysis except as allowed by NI 43-101 in PEA studies. There is no guarantee the Project economics described herein will be achieved.

The River Valley Project's economic results are summarized in Table 1.7 and indicate an after-tax net present value ("NPV") of $140M at a 5% discount rate, an internal rate of return ("IRR") of 11% and a 6.9-year payback.

TABLE 1.7
PAYBACK PERIOD, NPV AND IRR FOR BASELINE FINANCIAL MODEL

Item	Payback Period (years)	NPV ($M) (5% discount rate)	IRR (%)
Pre-Tax	6.1	296	16
After-Tax	6.9	140	11

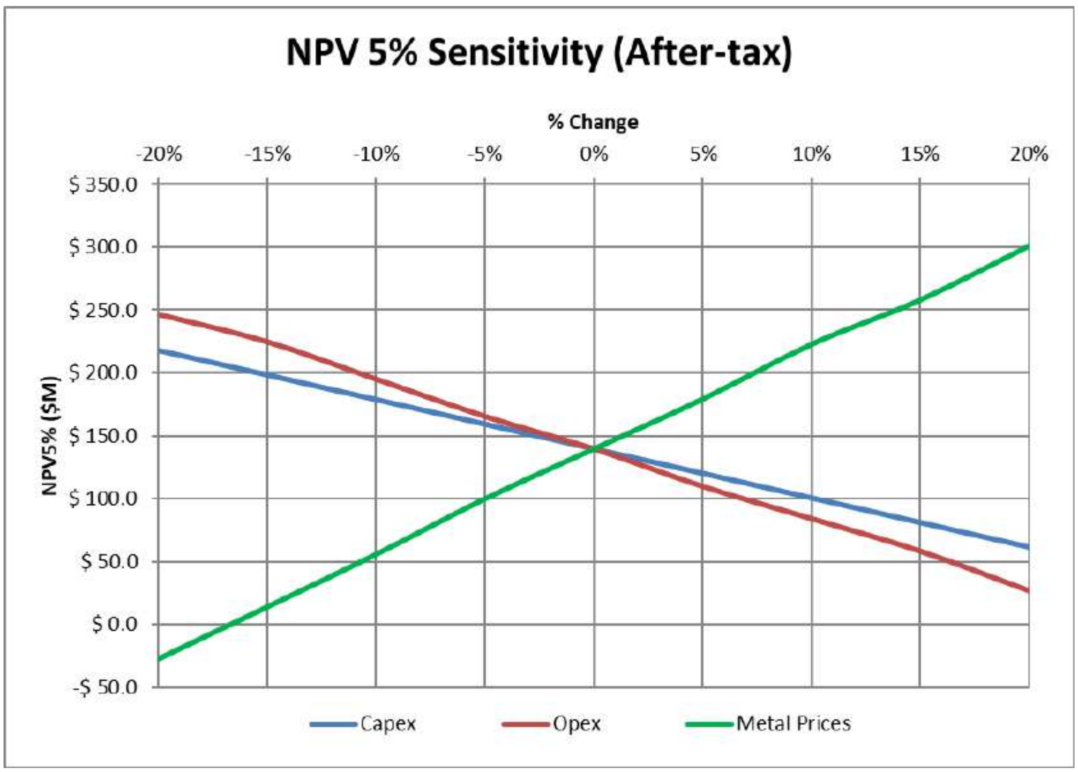
A summary of the key economic assumptions and results is presented in Table 1.8.

Table 1.8 **PEA Summary Parameters and Results**	
Parameter	**Amount ($)**
Palladium Price (Base case) US$/oz	2,150
Exchange Rate US$:CDN$	1.35
Production Profile	
Open Pit Feed Mined (t)	35,700,000
Underground Feed Mined (t)	2,941,000
LOM Tonnes Processed (t)	38,641,000
Average Process Plant Head Grade (PdEq g/t)	1.19
Mine Life (years)	16
Daily Process Plant Throughput (tpd)	6,850
Palladium Process Plant Recovery (%)	71.5
LOM Payable Palladium Equivalent (ozs)	735,000
Average Annual Palladium Production (ozs)	47,400
Revenue ($ M)	2,263.1
Operating Costs	
Unit Average LOM Operating Costs ($ per tonne processed)	30.98
Open Pit Mining Costs ($ per tonne processed)	12.63
Underground Mining Costs ($ per tonne processed)	60.61
Processing Costs ($ per tonne processed)	12.69
G&A ($ per tonne processed)	2.01
Total LOM Operating Cost ($ M)	1,196.9
LOM Average Cash Cost (US$/oz PdEq)	1,231
LOM Average AISC (US$/oz PdEq)	1,518
Capital Requirements	
Pre-Production Capital Cost ($ M)	268.7
LOM Sustaining Capital Cost ($ M)	163.0
Project Economics	
Royalties After $2M Buy Down (%)	1.0
Royalty Payable Including $2M Buy Down to 1% ($ M)	24.6
Taxes ($ M)	258.2
Pre-Tax	
NPV (5% Discount Rate) ($ M)	296.3
IRR (%)	16.1
Payback (years)	6.1
Cumulative Undiscounted Cash Flow ($ M)	609.9

TABLE 1.8 PEA SUMMARY PARAMETERS AND RESULTS	
Parameter	**Amount ($)**
After-Tax	
NPV (5% Discount Rate) ($ M)	139.7
IRR (%)	11.3
Payback (years)	6.9
Cumulative Discounted Cash Flow ($ M)	351.6

The Project IRR is most sensitive to changes in metal prices, then CAPEX and OPEX. When comparing the impacts of the same factors the Project NPV remains most sensitive to changes in metal prices, followed by OPEX, then CAPEX. The Project NPV sensitivities are shown in Figure 1.1.

FIGURE 1.1 PROJECT AFTER-TAX NPV 5% SENSITIVITY



1.16 ADJACENT PROPERTIES

The only property of significance adjacent to River Valley is the Pardo Gold Property owned by Inventus Mining Inc. ("Inventus"). The Pardo Gold Property is located west and north adjacent to the River Valley Palladium Property. Pardo consists of 3.8 sq. km of mining leases and 180 sq. km of mining claims. According to Inventus, Pardo is the largest and most advanced paleoplacer gold occurrence in North America. The style of gold mineralization is similar to paleoplacer gold deposits found in the Witswatersrand gold fields of South Africa (Whymark and Frimmel, 2018). Gold mineralization occurs in conglomerate layers or "reefs" that are horizontal and typically 1 m to 4 m in thickness.

1.17 RISKS AND OPPORTUNITIES

Risks and opportunities have been identified for the Project. The two most significant potential risks for impact on the Project are that lower metal prices, particularly palladium, would decrease the Project economics, and that the operating and capital cost estimates could increase with more detailed study.

Opportunities consist of a Mineral Resource that is open along strike and down dip, and that new innovative technologies including hydrometallurgical techniques to improve PGE recoveries can be investigated.

1.18 CONCLUSIONS

NAM's 100% owned River Valley Property is a dominantly palladium property consisting of two mining leases, 310 single cell mining claims, and 18 boundary claims covering an area of approximately 10,700 ha in the Sudbury Mining Division of Ontario. Contact-type palladium mineralization associated with disseminated copper-nickel sulphides is currently defined in ten zones of various sizes over a strike length of approximately 16 km. Three additional mineralized occurrences are known, and with further exploration drilling are opportunities to delineate additional Mineral Resources.

The Property benefits significantly from excellent access and close proximity to the Sudbury mining district. Mineral exploration, mining, along with mineral processing and smelting are major components of the local economy. Access and weather conditions allow for exploration and development work to be conducted year-round.

NAM has carried out exploration programs on the Property since 1999 including surface exploration, numerous airborne and ground geophysical surveys, a LiDAR topographical survey, and extensive diamond drilling programs. At least 742 diamond drill holes totalling 161,256 m have been completed on 13 mineralized zones, and 10 of the 13 mineralized zones are included in the current Mineral Resource Estimate. In 2021 four drill holes were completed for metallurgical testing. In 2022 five geomechanical drill holes were completed for open pit wall slope purposes.

It is the Authors opinion that NAM's sample preparation, analytical procedures, security and QA/QC program meet industry standards, and that the data are of good quality and satisfactory for use in the Mineral Resource Estimate reported in this Technical Report.

Indicative metallurgical recoveries from LCT testwork at SGS in 2022 are 55.4% Au, 56.8% Pt, 71.1% Pd, 85.6% Cu, 21.1% Ni, 25% Co, 60% Ag, and 40% Rh. Anticipated concentrate assays are 13.0% Cu, 1.35% Ni, 0.261% Co, 31.0% S, 5.80 g/t Au, 28.0 g/t Pt, 95.0 g/t Pd and 1.88 g/t Rh.

At cut-off values of CDN$15/t NSR (pit constrained) and CDN$50/t NSR (out-of-pit), the Mineral Resource Estimate consists of: 89.6 Mt grading 0.54 g/t Pd, 0.21 g/t Pt, 0.04 g/t Au and 0.06% Cu, or CDN$47.58/t NSR in the Measured and Indicated classifications; and 94.3 Mt grading 0.35 g/t Pd, 0.16 g/t Pt, 0.03 g/t Au and 0.04% Cu, or CDN$31.69/t NSR in the Inferred classification. Contained metal contents are 2.3 Moz Pd+Pt+Au in the Measured and Indicated classifications and 1.6 Moz Pd+Pt+Au in the Inferred classification.

The River Valley Project includes a conventional open pit mining operation. The mine equipment fleet, with 90 t haul trucks, 10 m^3 excavators and 254 mm hole diameter rotary drills, will be owned and operated by the Company. A contractor will be responsible for drill and blast activities. The Company will provide overall mine management and technical services. One year of pre-production mining is planned, followed by 16 years of production.

Higher grade underground mineralization is planned to be mined during production years two to seven, and will total approximately 3 Mt of process plant feed. The underground mining method is planned to be sublevel longitudinal and transverse longhole stoping with cemented rock backfill, at a rate of 1,500 tpd. The lower extents of the Dana South Zone and the Lismer North Zone are planned to be ramp-accessed from portals at surface. All underground mine and stope development will be carried out by a mining contractor. Company personnel and equipment will carry out all other underground mining activities.

Mining operations are planned to deliver 6,850 tpd to the process plant, equivalent to 2.5 Mtpa. The TMF is planned to be operated for the first seven years of mine production. The Dana Pit is planned to be mined out by the end of production Year 7. Tailings will be pumped to the pit starting in Year 8 and will continue to the end of mine life.

The process plant will consist of conventional crushing, a semi-autogenous ("SAG") mill with a pebble crusher, and a closed-circuit ball mill circuit with cyclones to ensure product (P_{80}) size feed to the flotation circuit. The cyclone overflow is conditioned prior to rougher flotation with reagents, including collectors, frother, and suited depressants, to produce a bulk rougher concentrate. The rougher concentrate is re-ground in a closed circuit regrind ball mill and further upgraded in a series of cleaner flotation cells to produce the final cleaner concentrate. The final concentrate is thickened, filtered, and dried prior to shipping to a smelter.

Major infrastructure for the Project includes five open pit mines, two underground mines, the process plant with laboratory and main electrical substation and power distribution, the TMF, and three waste rock storage facilities. Infrastructure to be installed by the Company includes the main access road and gatehouse, administration building, warehouse, maintenance building, change room, water and sewage treatment plants, and a diesel fuel tank farm with a fueling station.

There will be no camp facilities at site. Personnel and contractors will be responsible for their own housing and will travel from local communities. Infrastructure to be installed by contractors includes a maintenance building, bulk explosives storage and magazines, offices and a warehouse.

It is assumed that the River Valley concentrate will be evenly split between two buyers (one domestic, one offshore). Feedback was received from two of the most likely buyers of the River Valley concentrate. The net payable amounts for each of the payable metals is expected to be 91% copper, 96% palladium, 91% platinum and 82% gold. Silver and rhodium are not expected to be at high enough concentrations to be payable. Nickel and cobalt are not expected to be payable as part of a copper concentrate.

The Project will have to obtain numerous provincial and federal approvals and permits and it is anticipated that it will be subject to provincial environmental assessments and a federal Impact Assessment. The environmental baseline studies are well advanced and consist of: Stage 1 and 2 Archaeological Assessments, aquatics (fish and fish habitat), atmospheric, terrestrial (species at risk and habitat assessments), surface water quality, groundwater, aquifer permeability, and hydrology. KP completed geochemical characterization of the tailings and waste rock material and hydrogeological modelling of the dewatering of the proposed open pits and underground workings. A production phase Closure Plan, and associated financial assurance, will be filed with the Ministry of Mines before development of the Project.

Open pit mining costs (all in Canadian dollars) have been estimated to average $2.95/t material mined or $12.63/t processed over the production years. Underground mining costs have been estimated to average $60.61/t processed. Processing costs ($12.69/t processed, including tailings) and site G&A ($2.01/t processed) contribute to a total LOM average cost estimated at $30.98/t processed. The average operating cash cost over the production years is estimated at US$1,231/oz PdEq, and the average all-in sustaining cost is estimated at US$1,518/oz PdEq and includes closure costs.

Initial capital costs are estimated at $269M and include a 13% contingency. Initial capital costs are for construction of a 2.5 Mtpa flotation process plant and conventional tailings storage facility, provide electrical grid power, and set up an open pit mining site with the necessary infrastructure and carry out pre-production activities. Sustaining capital costs to increase the capacity of the tailings storage facility, develop two underground mines, lease open pit mining equipment, and provide for closure costs are estimated at $163M.

Using three-year monthly trailing average metal prices as of May 31, 2023 of US$1,830/oz Au, US$2,150/oz Pd, US$1,010/oz Pt and US$4.00/lb Cu, the Project has an estimated pre-tax NPV at a 5% discount rate of $296M and an IRR of 16%. After-tax NPV and IRR are estimated at $140M and 11%, respectively. Simple after-tax payback is 6.9 years. Project economics are most sensitive to metal prices. The Project NPV is more sensitive to overall operating costs than capital costs.

It is the opinion of the Authors that the River Valley Project has potential to be financially viable. Therefore, it is recommended to advance the Project to the next phase of study.

1.19 RECOMMENDATIONS

Additional exploration and study expenditures are warranted to advance the Project towards a Pre-Feasibility Study. The Authors recommendations include zone in-fill, expansion and step-out drilling to increase the size of the Mineral Resource; geological, geophysical, and geochemical and mineralogical studies; metallurgical testwork; an updated Mineral Resource Estimate; geotechnical studies; environmental studies; and a Pre-Feasibility Study.

The Authors recommend additional drilling on the Property to convert Inferred Mineral Resources to Indicated Mineral Resources, expand the current Mineral Resources, and add new Mineral

Resources. Higher-grade Inferred Mineral Resources at the Lismer North and Varley Zones, in particular, should be drilled to upgrade to Indicated Mineral Resources. The current Mineral Resources are locally open to expansion by drilling along strike, particularly at Dana South Zone, and are more generally open to expansion by drilling down-dip. Mineralized zones at Pardo, Drop and Jackson Flats remain to be drilled at sufficiently density for Mineral Resource estimation.

IP geophysical surveys and limited drilling programs east of the footwall contact of the River Valley Intrusion previously discovered the Pine Zone. This discovery opens up the potential for new exploration opportunities on the Property. Completion of 3-D geological modelling of the mineralized host units and cross-cutting faults could aid in prioritizing ground and borehole IP chargeability features of interest for drill testing. Additionally, historical targets with characteristics of reef-style mineralization internally within the River Valley Intrusion warrant further investigation.

Additional recommendations by the Authors include:

- Collect more bulk density samples from all zones, various rock types and mineralization types, in order to create future bulk density models;

- Additional metallurgical testwork to improve concentrate grades for all metals including rhodium;

- Hydrometallurgical techniques should be investigated as part of a strategy to improve metal recoveries;

- Continued Rh assay studies and mineralogical investigations of fresh mineralized drill core, particularly from the Lismer Zones and the Varley Zone; and

- Geomechanical drilling should be used to advance the viability of an expanded underground mining component at River Valley, in parallel to open pit mining.

The Company re-commenced permitting and baseline studies in 2020 and it is recommended that this work continue on these initiatives, including:

- Continued and expanded aquatic, terrestrial and atmospheric field studies to support permitting activities;

- Ongoing groundwater and hydrogeology monitoring on a quarterly basis; and

- Community and government engagement and consultation.

When all of these recommendations are addressed the Authors recommend that a Pre-Feasibility Study be completed to estimate Mineral Reserves.

The recommended exploration and development work program is presented in Table 1.9. The program should be completed in two phases. Phase 1 is estimated to cost $2.0M and should be completed in the next 12 to 18 months. The Phase 2 program, estimated to cost $24.7M, would be contingent on the results of Phase 1.

TABLE 1.9
RECOMMENDED WORK PROGRAM AND BUDGET

PHASE 1

Activity	Purpose	Zone	Units/ Samples/ Metres	Cost	Budget Estimate (CDN$)
Drilling - Expansion	Expand Mineral Resources	DSZ	4,500	300	1,350,000
Lithostructural 3-D Modelling	Improve drill targeting using IP	Pine-DNZ-DSZ-LNZ			100,000
Geophysics - BHIP Surveys	Better zone definition	DSZ	2	35,000	70,000
Hydrometallurgy - PLATSOL	Increase metal recoveries	Dana & Lismer	2	35,000	70,000
Environment & Permitting	Local FN & Govt engagement	general			150,000
Sub-Total					**1,740,000**
Contingency (15%)					260,000
Total					**2,000,000**

PHASE 2

Activity	Purpose	Zone	Units/ Samples	Cost	Budget Estimate (CDN$)
Drilling - Infill	Convert HG INF to IND	LNZ-DSZ-LRZ-VZ-AZ	25,000	300	7,500,000
Drilling - Expansion	Expand Mineral Resources	PZ, DNZ-DSZ, LNZ, LRZ, VZ, AZ	25,000	300	7,500,000
Drilling - Discovery	Define new mineralized zones	new mineralized zones	10,000	300	3,000,000
Geophysics: Ground & BHIP	Discovery of new HG mineralization	new mineralized zones			500,000
Lithostructural 3-D Modelling	Improve drill targeting using IP	LRZ-VZ-AZ			100,000

Table 1.9 **Recommended Work Program and Budget**					
Sulphide Flotation	Improve conc grades for metallurgy	Dana, Lismer, Varley			210,000
Hydrometallurgy	PLATSOL process optimization	general	2	150,000	300,000
Geomechanical Drilling	Advance viability of UG mining	DSZ-LNZ			600,000
Environment & Permitting	Local FN & Govt engagement	general			125,000
Updated MRE	Increase HG IND MRE	general			150,000
Pre-Feasibility Study	Next stage of engineering study	general			1,500,000
Sub-Total					**21,485,000**
Contingency (15%)					3,223,000
Total					**24,708,000**

2.0 INTRODUCTION AND TERMS OF REFERENCE

2.1 TERMS OF REFERENCE

This NI 43-101 Technical Report has been prepared by P&E Mining Consultants Inc. (“P&E”) to provide a Preliminary Economic Assessment (“PEA”) on the mineralization at the River Valley Palladium Deposit (the “Project” or the “Property”), located approximately 60 km northeast of Sudbury, Ontario, Canada. The Property is 100% owned by New Age Metals Inc. (“NAM” or “the Company”).

The Property mineralization is primarily platinum-group elements (“PGE”) in a magmatic contact-type deposit. Palladium is the dominant metal with lesser amounts of platinum, gold, silver, copper, nickel, rhodium, and cobalt. The Mineral Resource Estimate reported herein is based on a Technical Report issued by P&E on November 19, 2021 with an effective date of September 14, 2021. NAM conducted additional drilling on the Property in 2022, however, this drilling is not included in the Mineral Resource Estimate.

Assistance on the preparation of this PEA was provided by:

- D.E.N.M. Engineering Ltd. (“DENM”) for items related to metallurgical testing, process plant flowsheets and design, site infrastructure and associated cost estimates.

- Knight Piésold Ltd. (“KP”) on open pit wall slopes, underground mine geotechnical input, site water management, tailings management facility and geochemistry aspects; and

- Story Environmental Inc. (“Story”) on environmental, permitting, social and closure items.

This Technical Report was prepared at the request of Mr. Harry Barr, Chairman and CEO of NAM. The Company is a reporting issuer trading on the TSX Venture Exchange (“TSX-V”) with the trading symbol NAM.

The Company has its head office at 101-2148 West 38th Avenue, Vancouver, BC, Canada, V6M 1R9 and a regional office at 59 Burtch’s Lane, Rockport, ON, Canada, K0E 1V0. Prior to January 31, 2017, NAM was known as Pacific North West Capital Corp.

This Technical Report has an effective date of June 29, 2023. There has been no material change to the River Valley Project between the effective date of this Technical Report and the signature date.

The present Technical Report is prepared in accordance with the requirements of National Instrument 43-101 (“NI 43-101”) and in compliance with Form NI 43-101F1 of the Ontario Securities Commission (“OSC”) and the Canadian Securities Administrators (“CSA”).

This NI 43-101 Technical Report and PEA will be referred to as the "Technical Report". Qualified Persons, Authors and co-Authors of report sections are referred to as the "Authors".

NAM accepts that the qualifications, expertise, experience, competence and professional reputation of P&E's Principals and Associate Geologists and Engineers, and Engineers at DENM, KP and Story, are appropriate and relevant for the preparation of this Technical Report. The Company also accepts that the Authors are members of professional bodies that are appropriate and relevant for the preparation of this PEA. The Authors understand that this PEA will support the public disclosure requirements of NAM and will be filed on SEDAR as required under NI 43-101 disclosure regulations. The Authors understand that this Technical Report will be used for internal decision-making purposes and may also be used to support public equity or private placement financings.

2.2 SITE VISITS

Mr. Eugene Puritch, P.Eng., FEC, CET, of P&E, a Qualified Person under the regulations of NI 43-101, conducted a site visit to the Property on September 10, 2018. The purpose was to review drill core, geologic and engineering aspects of the Project for the Preliminary Economic Assessment of 2019 (P&E, 2019).

Mr. Andrew Bradfield, P.Eng., of P&E, a Qualified Person under the regulations of NI 43-101, conducted a site visit to the Property on September 10, 2018. The purpose was to review drill core, geologic and engineering aspects of the Project for the Preliminary Economic Assessment of 2019 (P&E, 2019).

Mr. Antoine Yassa, P.Geo., of P&E, a Qualified Person under the regulations of NI 43-101, visited the Property from June 6 to June 8, 2021 and took independent drill core samples for verification purposes. Mr. Yassa also located a selection of previous drill hole sites with a handheld GPS. Mr. Yassa is a professional geologist with more than 40 years of experience in exploration and operations, including several years working in magmatic PGE-nickel sulphide deposits. Mr. Yassa was accompanied on the Property by Mr. Richard Zemoroz, Senior Project Geologist with NAM, or delegates.

Mr. David Salari, P.Eng., of DENM, a Qualified Person under the regulations of NI 43-101, conducted a site visit to the Property on August 20, 2021. The purpose was to review drill core, access to the Property, infrastructure, nearby powerlines and engineering aspects of the Project.

Ms. Jessica Breault, P.Eng., of KP, a Qualified Person under the regulations of NI 43-101, conducted a site visit to the Property on October 4, 2021 for the geotechnical site investigation program kick-off. Ms. Breault also visited site on August 17, 2022 for a review of the overall site and for further tailings management facility investigations.

Ms. Maria Story, P.Eng., of Story, a Qualified Person under the regulations of NI 43-101, conducted a site visit to the Property on July 21, 2022. The purpose was to become familiar with the physical and environmental setting of the Project and with the Project's environmental monitoring stations established by Story. Ms. Story also assisted with the scheduled hydrology monitoring program on the day of her site visit.

2.3 SOURCES OF INFORMATION

The data used in the November 19, 2021 Mineral Resource Estimate Technical Report was provided by NAM to the Authors. Parts of Sections 4 to 14 and 23 in this Technical Report have been excerpted, updated, and revised from the 2021 Mineral Resource Estimate Technical Report. The Property was the subject of a PEA by P&E, which is presented in an NI 43-101 Technical Report titled "Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the River Valley Deposit, Sudbury Mining Division, Ontario" dated August 7, 2019 (effective date of June 27, 2019), and is filed on SEDAR under NAM's profile.

In addition to the site visits, the Authors held discussions with technical personnel from the Company regarding all pertinent aspects of the Project and carried out a review of available literature and documented results concerning the Property. The reader is referred to those data sources, which are listed in Section 27 (the References section) of this Technical Report, for further detail.

The Authors and Co-authors of each section of this Technical Report are listed in Table 2.1, who in acting as independent Qualified Persons as defined by NI 43-101, take responsibility for those sections of this Technical Report as outlined in the "Certificate of Author" included in Section 28 of this Technical Report. The Authors and Co-authors acknowledge the helpful cooperation of NAM's management and consultants, particularly Mr. William (Bill) Stone and Mr. Richard Zemoroz, who quickly addressed all data and material requests, and responded openly and helpfully to all questions.

TABLE 2.1
QUALIFIED PERSONS RESPONSIBLE FOR THIS TECHNICAL REPORT

Qualified Person	Employer	Sections of Technical Report
Andrew Bradfield, P.Eng.	P&E Mining Consultants Inc.	2, 3, 15, 19, 22, 24 and Co-author 1, 16, 21, 25, 26, 27
Jarita Barry, P.Geo.	P&E Mining Consultants Inc.	11 and Co-author 1, 12, 25, 26, 27
James L. Pearson, P.Eng.	P&E Mining Consultants Inc.	Co-author 1, 16, 21, 25, 26, 27
Eugene Puritch, P.Eng.	P&E Mining Consultants Inc.	23 and Co-author 1, 14, 25, 26, 27
Richard Sutcliffe, Ph.D., P.Geo.	P&E Mining Consultants Inc.	4, 5, 6, 7, 8, 9, 10 and Co-author 1, 25, 26, 27
Yungang Wu, P.Geo.	P&E Mining Consultants Inc.	Co-author 1, 14, 25, 26, 27
Antoine Yassa, P.Geo.	P&E Mining Consultants Inc.	Co-author 1, 12, 14, 25, 26, 27
Jessica Breault, P.Eng.	Knight Piésold Ltd.	Co-author 1, 18, 21, 25, 26, 27
Benjamin Peacock, P.Eng.	Knight Piésold Ltd.	Co-author 1, 16, 20, 25, 26, 27
David Salari, P.Eng.	D.E.N.M. Engineering Ltd.	13, 17 and Co-author 1, 18, 21, 25, 26, 27
Maria Story, P.Eng.	Story Environmental Inc.	Co-author 1, 20, 25, 26, 27

2.4 UNITS AND CURRENCY

In this Technical Report, all currency amounts are stated in Canadian dollars (“$”) unless otherwise stated. At the effective date of this Technical Report, the 24-month trailing average exchange rate between the US dollar and the Canadian dollar is 1 US$ = 1.33 CDN$ or 1 CDN$ = 0.75 US$.

Commodity prices are typically expressed in US dollars (“US$”) and will be noted where appropriate. Quantities are generally stated in Système International d’Unités (“SI”) metric units including metric tons (“tonnes”, “t”) and kilograms (“kg”) for weight, kilometres (“km”) or metres (“m”) for distance, hectares (“ha”) for area, grams (“g”) and grams per tonne (“g/t”) for metal grades. Platinum group elements (“PGE”), gold, silver and rhodium grades may also be reported in parts per million (“ppm”) or parts per billion (“ppb”). Copper, nickel and cobalt metal values are reported in percentage (“%”) and parts per billion (“ppb”). Quantities of precious metals may also be reported in troy ounces (“oz”), and quantities of base metals in avoirdupois pounds (“lb”). The terms and their abbreviations used in this Technical Report are listed in Table 2.2. Units of measurement and their abbreviations are listed in Table 2.3. Grid coordinates for maps are given in the UTM NAD 83 Zone 17N or as latitude and longitude.

TABLE 2.2
TERMINOLOGY AND ABBREVIATIONS

Abbreviation	Meaning
$	dollar(s)
°	degree(s)
°C	degrees Celsius
<	less than
>	greater than
%	percent
µm	micron, micrometre
2-D	two-dimensional
3-D	three-dimensional
3E	three elements: Au + Pt + Pd
ABA	acid base accounting
Actlabs	Activation Laboratories Ltd.
Accurassay	Accurassay Laboratories Ltd.
Ag	silver
AGAT	AGAT Laboratories Ltd.
AI or Ai	abrasion index
AISC	all-in sustaining costs
Al	aluminum
Amplats	Anglo American Platinum Limited
ANFO	ammonium nitrate fuel oil mixture
Au	gold
ATV	all-terrain vehicle

TABLE 2.2 **TERMINOLOGY AND ABBREVIATIONS**	
Abbreviation	**Meaning**
BFA	Bench Face Angle
BHIP	borehole induced polarization
Bondar Clegg	Bondar Clegg Laboratories
BMS	base metal sulphides
BR	bedrock
btu	British thermal unit
BWI or BWi	ball mill work index
BX	breccia
BZ	Boundary Zone
CAPEX	capital cost expenditure
cfm	cubic feet per minute
CDN$	Canadian dollar(s)
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
cm	centimetre
CMC	carboxymethyl cellulose - cellulose, carboxymethyl ether, sodium salt (reagent)
Co	cobalt
Company, the	New Age Metals Inc.
COPC	contaminants of potential concern
Cr	chromium
CRF	cemented rock fill
CRM(s)	certified reference material(s)
CSA	Canadian Securities Administrators
Cu	copper
DCP	direct current plasma
deg	degree (°)
D.E.N.M.	D.E.N.M. Engineering Ltd.
Deposit, the	River Valley Palladium Deposit
DMB & W	Derry Michener Booth and Wahl
DMC	Dana Master Composite
dmt	dry metric tonne
DNZ	Dana North Zone
DRA	DRA Americas Inc.
DSZ	Dana South Zone
DSZ-X	DSZ-Extension (target area)
DWT	drop-weight test
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada

TABLE 2.2 **TERMINOLOGY AND ABBREVIATIONS**	
Abbreviation	**Meaning**
EDS	Environmental Design Storm
EL	elevation
EM	electromagnetic
EPCM	engineering, procurement, and construction management
EPMA	electron probe micro analysis
ESG	Environmental and Social Governance
FAR	fresh air raise
Fe	iron
FMZ 11	Fisheries Management Zone 11
ft	foot, feet
FW	Footwall
FZ	Fault Zone
G&A	General and Administration
g/t	grams per tonne
GeoSim	GeoSim Consultants
GET	ground-engaging tools
H	high
H:V	horizontal to vertical ratio
ha	hectare(s)
HP	horsepower
HUR	Huronian Metasediment
IA	impact assessments
IBZ	Inclusion-Bearing Zone
ICP	inductively coupled plasma
ICP-AES	inductively coupled plasma-atomic emission spectroscopy
ICP-OES	inductively coupled plasma-optical emission spectroscopy
ICP-MS	inductively coupled plasma-mass spectrometry
ID	identification
ID^2	inverse distance squared
ID^3	inverse distance cubed
IDF	Inflow Design Flood
Inventus	Inventus Mining Inc.
IP	induced polarization
Ir	iridium
IRA	Inter-Ramp Angle
IRM(s)	in-house reference material(s)
IRR	internal rate of return
ISO	International Organization for Standardization

TABLE 2.2 TERMINOLOGY AND ABBREVIATIONS	
Abbreviation	**Meaning**
ISO/IEC	International Organization for Standardization/International Electrotechnical Commission
JV	joint venture
JVX	JVX Ltd.
k	thousand(s)
km	kilometre
koz	thousands of ounces
kt	thousands of tonnes
Kaymin	Kaymin Resources Ltd.
KP	Knight Piésold Ltd.
L	litre
L	low
LA-ICP-MS	laser ablation-inductively coupled plasma-mass spectrometry
lb	pound (weight)
LCT(s)	locked cycle test(s)
LiDAR	light detection and ranging
LIL	large ion lithophile
LMC	Lismer Master Composite
LOM	life-of-mine
LOW-A	low-grade control sample
LU	Layered Unit
M	medium
M	million(s)
m	metre(s)
m asl	metres above sea level
Ma	millions of years
mag	magnetic(s)
MCC	Motor Control Centre
MD	Mafic Dykes
MDL	minimum detection limit
MENDM or MNDM	Ontario Ministry of Energy, Northern Development and Mines (was Ministry of Northern Development and Mines)
Mg	magnesium
MIBC	methyl isobutyl carbinol (reagent)
ML	metal leaching
MLA	mineral liberation analysis
Mlb	millions of pounds
mm	millimetre

TABLE 2.2 TERMINOLOGY AND ABBREVIATIONS	
Abbreviation	**Meaning**
MNRF	Ontario Ministry of Natural Resources and Forestry
Moz	millions of ounces
mpd	metres per day
MRSD	moving range standard deviation
Mt	million(s) of tonnes
Mtpy	million(s) of tonnes per year
MTU	Michigan Technological University
n	total number of samples used in statisics
NHIC	Natural Heritage Information Centre
NAD	North American Datum
NAG	net acid generation
NAM	New Age Metals Inc.
NAP	North American Palladium Ltd.
Ni	nickel
NI or NI 43-101	National Instrument or National Instrument 43-101
NN	Nearest Neighbour
NPAG or N-PAG	non-acid generating
KP	Knight Piésold Ltd.
NPV	net present value
NSR	net smelter return
NZ-2	North Zone 2
NZ-2E	high-grade control sample
OK	ordinary kriging
OPEX	operating cost expenditure
OSC	Ontario Securities Commission
oz	ounce
P_{80}	80% passing size
P&E	P&E Mining Consultants Inc.
Pb	lead
Pd	palladium
PdEq	palladium equivalent
PEA	Preliminary Economic Assessment
P.Eng.	Professional Engineer
PET	potential evapotranspiration rate
PFN	Pacific North West Capital
PFS	Pre-Feasibility Study
PGA	peak ground acceleration
PGE(s) or PGM(s)	platinum group elements or platinum group metals

Table 2.2 **Terminology and Abbreviations**	
Abbreviation	**Meaning**
P.Geo.	Professional Geoscientist
PLOUT	the outlet of Pine Lake
PMF	Probable Maximum Flood
PoF	Probability of Failure
ppb	parts per billion
ppm	parts per million
Pt	platinum
Project, the	River Valley Project
Property, the	River Valley Property
PWQO(s)	provincial (surface) water quality objective(s)
Q1, Q2, Q3, Q4	first quarter, second quarter, third quarter, fourth quarter of the year
QA/QC	quality assurance / quality control
QC	quality control
QEMSCAN	quantitative evaluation of materials by scanning electron microscope
QMS	quality management system
R^2 or R2	the coefficient of determination
RAR	return air raise
Rh	rhodium
ROM	run-of-mine
RQD	rock quality designation
Ru	ruthenium
RV-1	high-grade sample
RV-2	mid-grade sample
RV-3	low-grade sample
RVX	River Valley Extension
RWI	bond rod mill index
S	sulphur
SAG	semi-autogenous grinding (mill)
SAR	species at risk
SARA	Species at Risk Act
SD	standard deviation
SEDAR	System for Electronic Document Analysis and Retrieval
SEM	scanning electron microscopy
SET	Dana South-Southeast Trench
SFE	shake flask extraction
SGS	SGS Canada Inc. / SGS Lakefield Research
SiO_2	silicon dioxide
SIBX	sodium isobutyl xanthate (reagent)

Table 2.2 **Terminology and Abbreviations**	
Abbreviation	**Meaning**
Sn	tin
SPT(s)	Standard Penetration Test(s)
Story	Story Environmental Inc.
SZ	South Zone
t	metric tonne(s)
Te	tellurium
Technical Report	(this) NI 43-101 Technical Report
the Company	New Age Metals Inc.
the Deposit	River Valley Deposit
the Project	River Valley Project
the Property	River Valley Property
TMF	tailings management facility
tpa or tpy	tonnes per annum/year
tpd	tonnes per day
TSXV or TSX-V	Toronto Venture Stock Exchange
US$	United States dollars
UTM	Universal Transverse Mercator
V	vanadium
VH	very high
W x H	width times height
WMP	water management pond
WSC	Water Survey of Canada
WSF(s)	waste rock storage facility(ies)
WSP	WSP Canada Inc.
WRA	whole rock analysis
WRF	waste rock storage facilities
XPS	Expert Process Solutions
XRAL	X-Ray Assay Laboratories
XRD	x-ray diffraction

TABLE 2.3
UNIT MEASUREMENT ABBREVIATIONS

Abbreviation	Meaning	Abbreviation	Meaning
µm	microns, micrometre	m^3/s	cubic metre per second
$	dollar	m^3/y	cubic metre per year
$/t	dollar per metric tonne	mØ	metre diameter
%	percent sign	m/h	metre per hour
% w/w	percent solid by weight	m/s	metre per second
¢/kWh	cent per kilowatt hour	Mt	million tonnes
°	degree	Mtpy	million tonnes per year
°C	degree celsius	min	minute
cm	centimetre	min/h	minute per hour
d	day	mL	millilitre
ft	feet	mm	millimetre
GWh	Gigawatt hours	MV	medium voltage
g/t	grams per tonne	MVA	mega volt-ampere
h	hour	MW	megawatts
ha	hectare	oz	ounce (troy)
hp	horsepower	Pa	Pascal
k	kilo, thousands	pH	Measure of acidity
kg	kilogram	ppb	part per billion
kg/t	kilogram per metric tonne	ppm	part per million
km	kilometre	s	second
kPa	kilopascal	t or tonne	metric tonne
kV	kilovolt	tpd	metric tonne per day
kW	kilowatt	t/h	metric tonne per hour
kWh	kilowatt-hour	t/h/m	metric tonne per hour per metre
kWh/t	kilowatt-hour per metric tonne	t/h/m^2	metric tonne per hour per square metre
L	litre	t/m	metric tonne per month
L/s	litres per second	t/m^2	metric tonne per square metre
lb	pound(s)	t/m^3	metric tonne per cubic metre
M	million	ton	short ton
m	metre	tpy	metric tonnes per year
m^2	square metre	V	volt
m^3	cubic metre	W	Watt
m^3/d	cubic metre per day	wt%	weight percent
m^3/h	cubic metre per hour	y	year

3.0 RELIANCE ON OTHER EXPERTS

The Authors have assumed, and relied on the fact, that all the information and existing technical documents listed in the References section of this Technical Report are accurate and complete in all material aspects. Although the Authors have carefully reviewed all available information presented, they cannot guarantee its accuracy and completeness. The Authors reserve the right, however, will not be obligated, to revise the Technical Report and conclusions if additional information becomes known to the Authors subsequent to the effective date of this Technical Report.

Copies of the tenure documents, operating licenses, permits, and work contracts were not reviewed. Information on land tenure was obtained from NAM. The Authors relied on tenure information from NAM and have not completed an independent detailed legal verification of title and ownership of the River Valley Palladium Property. Ownership of the mining claims was independently verified by the Authors on June 29, 2023, utilizing Ontario's Ministry of Northern Development and Mines website at:

https://www.lioapplications.lrc.gov.on.ca/MLAS/Index.html?viewer=MLAS.MLAS&locale=en-CA.

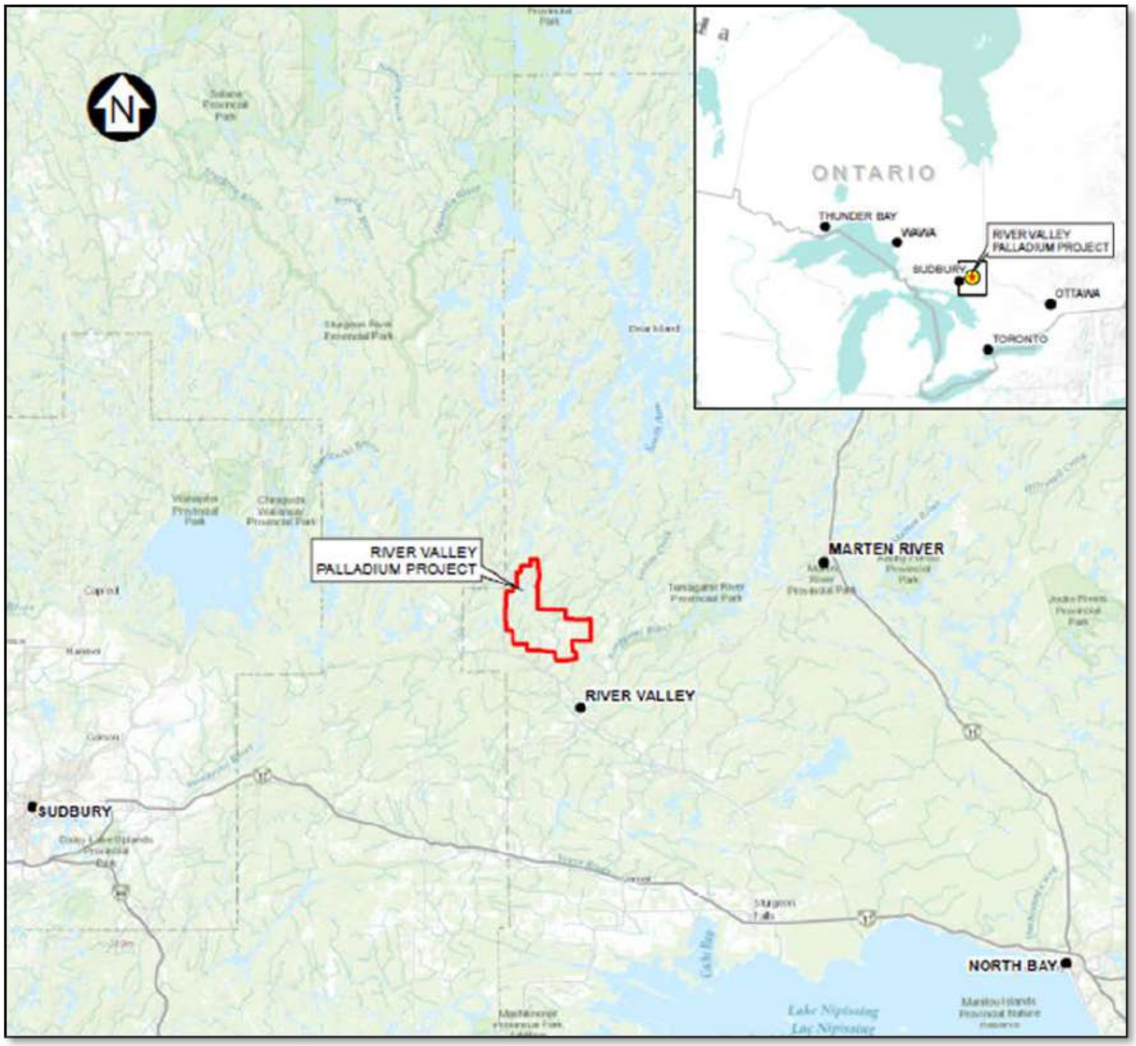
The Authors have not verified the legality of any underlying agreement(s) that may exist concerning the land tenure, or other agreement(s) between third parties, however, has relied on and considers it has a reasonable basis to rely on NAM to have conducted the proper legal due diligence.

Select technical data, as noted in this Technical Report, were provided by NAM and the Authors have relied on the integrity of such data. A draft copy of the Technical Report has been reviewed for factual errors by NAM and Authors have relied on NAM's knowledge of the Property in this regard. All statements and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are not false and misleading at the effective date of this Technical Report.

4.0 PROPERTY DESCRIPTION AND LOCATION

The River Valley Property is located approximately 100 km by road (60 km direct) northeast of the City of Greater Sudbury, Ontario (Figure 4.1). The Property lies within Dana and Pardo Townships and is centered at approximately 557,800 m E and 5,169,700 m N (NAD83 UTM Zone 17N), or Longitude 80º15’ W and Latitude 46º41’ N.

FIGURE 4.1 RIVER VALLEY PROPERTY LOCATION MAP

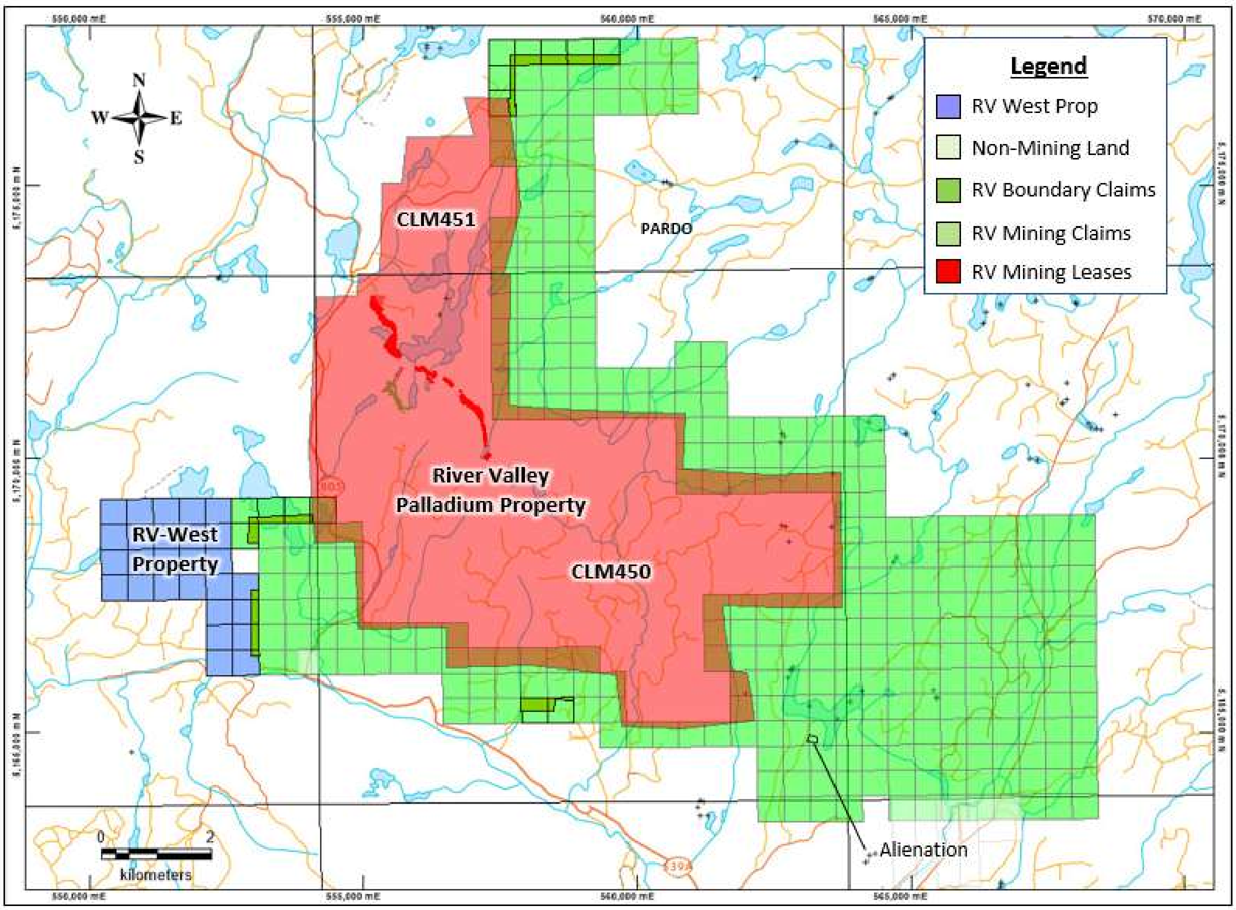


Source: *Knight Piésold (September 2022).*
Note: *The mining leases are outlined in* ***red.***

4.1 LAND TENURE

The Property land position consists of two mining leases, 310 single cell mining claims and 18 boundary cell mining claims (Appendix I, Table I.1), all 100% owned by NAM (formerly Pacific North West Capital Corp) (Figure 4.2). The two mining leases total 5,402 ha in area (Table 4.1). Mining lease CLM450 was granted in November 2011 and covers the majority of the Mineral Resources reported in Section 14 of this Technical Report (Table 4.1). Mining lease CLM451 was granted in January 2021 and covers the Pardo Zone, which has yet to be drilled sufficiently for Mineral Resource estimation. These two mining leases each have surface and mining rights, 21-year renewal terms, and remain in good standing subject to annual lease payments to the provincial government. The most recent payments totalling CDN$16,206.38 and CDN$21,034.76 were made September 09, 2022 and November 29, 2022, respectively. Banked credits on CLM450 total over CDN$11 million which will cover the Property assessment requirements of CDN$112,200/annum for many decades.

FIGURE 4.2 LAND TENURE MAP OF THE RIVER VALLEY PROPERTY



Source: *P&E (June 2023)*

Notes: *Land tenure information effective June 29, 2023, RV = River Valley, The Alienation refers to a third party permit for aggregate.*

TABLE 4.1 RIVER VALLEY MINING LEASES				
Mining Lease	**Area (ha)**	**Township**	**Effective Date**	**Current Expiry Date**
CLM450	4,777.18	Dana	01-Nov-2011	31-Oct-2032
CLM451	624.94	Pardo	01-Nov-2011	31-Oct-2032

Source: *MLAS on-line database - Tenure Disposition Information*
Note: *Land tenure information effective June 29, 2023*

The 310 single cell mining claims and 18 boundary claims are located within Dana, Janes, McWilliams, and Pardo Townships and surround the two mining leases (Figure 4.2). The Mineral Resources not covered by the two mining leases are covered by 11 of the single cell mining claims to the southeast of CLM450; specifically mining claims 183413, 147429, 183414, 279263, 131411, 131410, 163968, 183415, 107066, 165173 and 338225, all of which are on the River Valley Extension ("RVX") part of the River Valley Property (mainly in McWilliam Township). These 11 single cell mining claims are all in good standing as of the effective date of this Technical Report (see Appendix I). The total area of NAM's land position at River Valley is approximately 10,700 ha. Adjacent and nearby claim holdings also held by NAM are 70% ownership of the River Valley West Joint Venture Property (30% owned by Freegold Ventures Limited). River Valley West is not included in the claims total for this Technical Report.

4.2 TENURE AGREEMENTS AND ENCUMBRANCES

On April 7, 2011, Pacific North West Capital Corp. ("PFN") (now NAM) announced that it had closed the purchase of the remaining 50% interest in the unincorporated joint venture covering the Project from Anglo American Platinum Limited ("Amplats") through its wholly-owned subsidiary, Kaymin Resources Ltd. ("Kaymin"). Pursuant to the terms of the agreement with Amplats and Kaymin, as announced in PFN's news release of January 31, 2011, a total of 8,117,161 fully paid and non-assessable common shares of PFN (reflecting a 12% interest in PFN based upon the issued and outstanding common shares of PFN as of November 30, 2010 (67,643,008) and three-year warrants to purchase up to 3,000,000 common shares of PFN at a price of CDN$0.30 per common share have been issued to Kaymin for its 50% interest in the joint venture. The transaction provided PFN with 100% interest in the Property.

According to the Property Purchase Agreement dated January 15, 1999, PFN's 100% interest in the Property is subject to a 3% Net Smelter Return ("NSR") royalty to the original vendors of the Property. NAM will pay each of the three original Vendors (Robert Bailey, Lorne Luhta and Ron Orchard) a 1% NSR royalty from future commercial production from the Property. NAM has the right to purchase up to two-thirds of each 1% NSR royalty from each vendor, for an aggregate of CDN$666,667 for each two-thirds of 1% of each Vendor's NSR, or the pro-rata lesser amount for a lesser percentage interest. Essentially, the 3% NSR royalty can be bought down to 1% for CDN$2M.

In a Company press release dated August 4, 2016, PFN announced that it signed an agreement with Mustang Minerals Corp. to acquire 100% interest in the six claims of its PGM property near

Sudbury, Ontario. These claims were located southeast adjacent to and contiguous with NAM's mining lease CLM450 (Figure 4.2), and extended NAM's ownership of the River Valley Deposit by an additional 4 km to 16 km in total. The six claims were acquired for CDN$50,000 cash and shares. Mustang Minerals Corp. retained a 1% NSR royalty on any production from the six claims. The NSR royalty can be purchased at any time for CDN$500,000. On January 31, 2017, PFN announced a name change to New Age Metals Inc ("NAM).

4.3 PROPERTY AND TITLE IN ONTARIO REGULATIONS

In 2018, the Ontario Ministry of Energy, Northern Development and Mines ("MNDM") converted from a system of ground staking to a system of online registration of mining claims. Ontario Crown lands are available to licensed prospectors for the purposes of mineral exploration. A licensed prospector must first stake a mining claim to gain the exclusive right to explore on Crown land. Claim staking is governed by the Ontario Mining Act and is administered through the Provincial Mining Recorder and Mining Lands offices of the MNDM.

A claim remains valid as long as the claim holder properly completes and files the assessment work as required by the Mining Act and the Minister approves the assessment work. A claim holder is not required to complete any assessment work within the first year of recording a mining claim. In order to keep a mining claim current, the mining claim holder must perform $400 worth of approved assessment work per single cell mining claim unit and $200 per single boundary cell mining claim unit, per year; immediately following the initial staking date, the claim holder has two years to file one-year worth of assessment work. Claims are forfeited if the assessment work is not done.

A claimholder may prospect or carry out mineral exploration on the land under the claim, however, the land covered by these claims must be converted to leases before any development work or mining can be performed. Mining leases are issued for 21-year terms and may be renewed for further 21-year periods. Leases can be issued for surface and mining rights, mining rights only or surface rights only. When issued, the lessee pays an annual rent to the province. Furthermore, prior to bringing a mine into production, the lessee must comply with all applicable federal and provincial legislation.

4.4 ENVIRONMENTAL AND PERMITTING

Exploration permits are required from the Ontario government for trenching, ground geophysical and drilling programs. NAM has been granted the permits required for all historical, previous and current work programs.

4.5 ABORIGINAL GROUP COMMUNICATIONS

Initial contact and meetings have been made with aboriginal groups whose traditional land claims overlap the Property. These groups include the Temagami First Nation and Nipissing First Nation. Temagami First Nation and Nipissing First Nation representatives visited the Project in 2017 and 2018. An Exploration Memorandum of Understanding between NAM and Temagami First Nation was signed in 2014 and amended in 2017 and 2022. An Exploration Memorandum of Understanding between NAM and Nipissing First Nation was signed in 2022.

4.6 OTHER SIGNIFICANT FACTORS AND RISKS

The Author is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform work on the River Valley Property that has not been discussed in this Technical Report.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

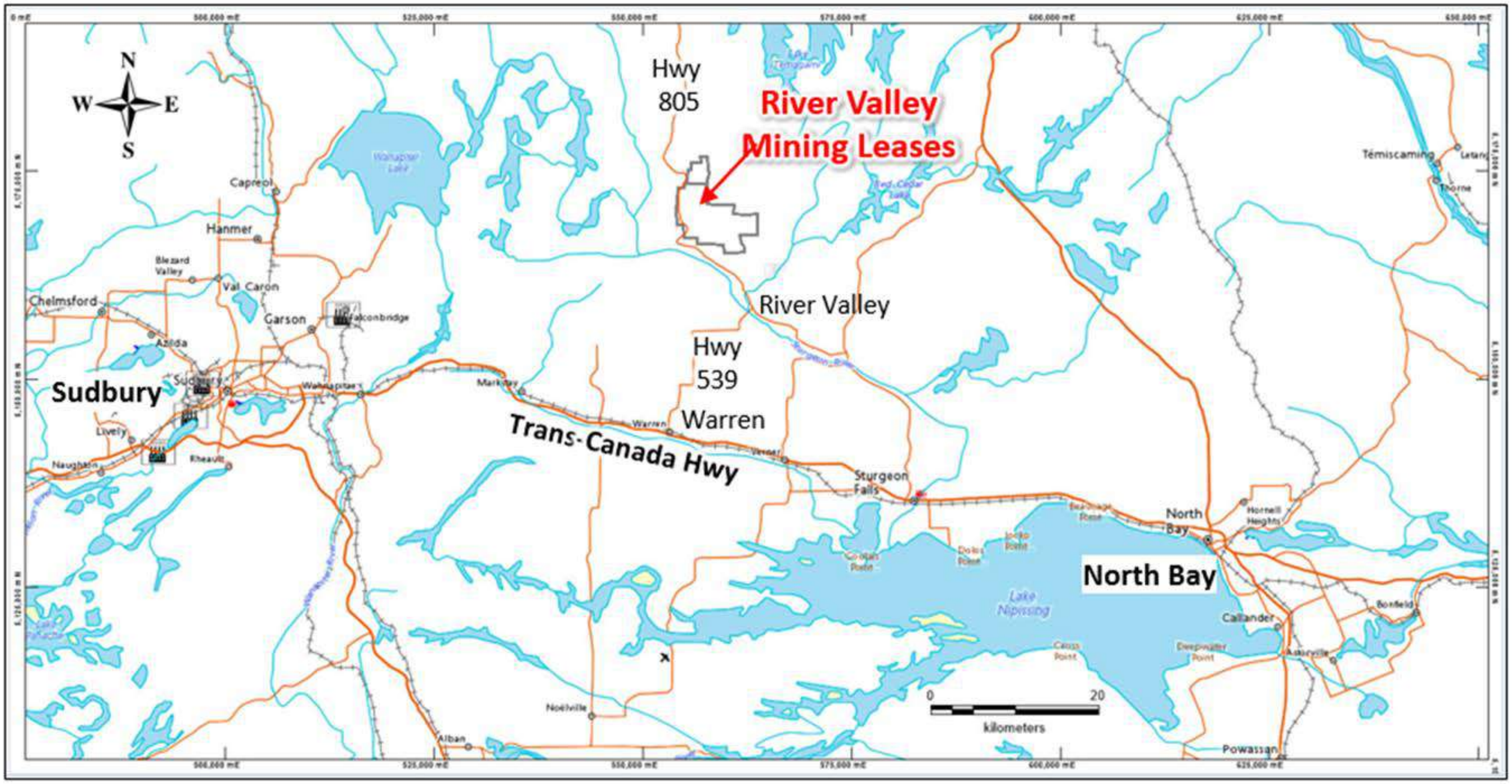
5.1 ACCESS

The River Valley Property is accessed from Sudbury by travelling east along Trans-Canada Highway 17 for 50 km to the Town of Warren, and north on Highway 539 (Figure. 5.1) for 22 km to the junction of Highway 805. Drive northwest along Highway 805 from the Village of River Valley, a distance of about 19.5 km from the Temagami River. Turn right onto a logging road, for about 800 m, then right at a fork in the road, and continue an additional 200 m. At this point several skidder roads and access trails lead south toward the Dana mineralized zones (Dana North Zone and Dana South Zone) and the Banshee Zone of the River Valley Palladium Deposit (Figure 5.2).

The Lismer North and Lismer Ridge Zones can be accessed by an all-terrain vehicle ("ATV") trail from Highway 805 by turning east at a gravel pit at kilometre 14 (ATV trail at north edge of pit) and following the trail northwards for approximately 6 km.

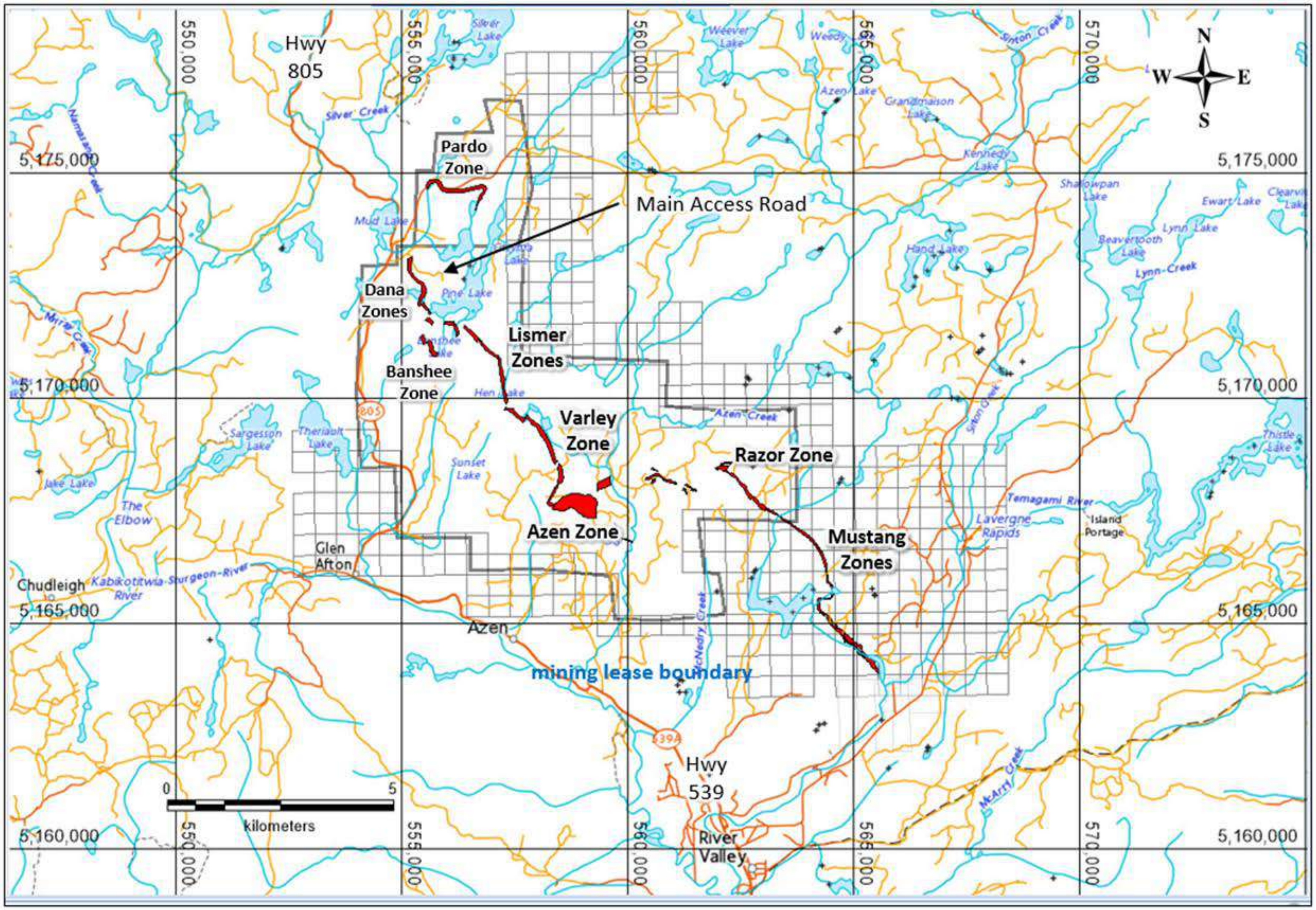
The nearest airport is the Sudbury Regional Airport, located 40 km west of the Property. The airport has regularly scheduled flights to Thunder Bay, Toronto, Timmins and Ottawa.

FIGURE 5.1 PROPERTY ACCESS AND INFRASTRUCTURE SETTING



Source: *P&E (September 2022)*

FIGURE 5.2 RIVER VALLEY PROPERTY ACCESS



Source: *P&E (September 2022)*

5.2 SITE TOPOGRAPHY, ELEVATION AND VEGETATION

The Property lies at a mean elevation of approximately 325 m above sea level. Topographic relief is moderate and typical of the Precambrian Shield. The Azen Creek area of the Property is lower and marshy. Forest cover is mainly poplar with approximately 25% to 33% white pine regrowth.

Outcrop exposure on the Property is limited to approximately 20% locally. The remaining areas are covered mostly by generally <1 m thick deposits of glacial till, gravel, outwash sand, and silt. Locally, these deposits can be up to tens of metres thick. Most of the area around the Dana, Lismer, Varley and Azen Zones has been logged within the past 20 years.

The Property is located in the watershed of the Sturgeon River that flows in a southerly direction toward Lake Nipissing and ultimately into Georgian Bay of Lake Huron through the French River.

5.3 CLIMATE

There is no active weather station at the village of River Valley. The climate in the region is typical Canadian Shield summers and winter, with temperatures averaging from 19°C in the summer to -13°C in the winter. Precipitation is in the form of 30 cm to 64 cm of snow in the winter months, and 77 mm to 101 mm of rain in the summer, according to the website below:

http://www.theweathernetwork.com/statistics/cl6068150

Drilling and geophysical surveys can be carried out year-round from skidder roads. Surface bedrock exploration can be carried out for about seven to eight months of the year.

5.4 INFRASTRUCTURE

The City of Greater Sudbury, a major mining-processing and manufacturing city, can provide all of the infrastructure and technical requirements for any mineral exploration and project development work. Labourers can be hired in the local community of River Valley and other nearby communities.

The Canadian National Railway main line passes through the nearby community of River Valley, 10 km south of the Property boundary. A 230 kV transmission line is located passing through Warren, approximately 22 km from the Property. A 115 kV transmission line passes through the village of Field, located approximately 15 km to the east of the Project. A gas pipeline passes through the River Valley community.

Water is abundant in the region from numerous lakes and rivers to support exploration programs and mining activities. However, NAM will minimize the use of fresh water by using mine water and recycling process water to the maximum extent possible.

6.0 HISTORY

6.1 HISTORICAL EXPLORATION SUMMARY

The exploration history of the River Valley Property region dates back to the 1960s, with work on the Property starting in earnest in 1999 (Zemoroz, 2008). The history of the Property and historical resource estimates are summarized and disclosed in Table 6.1. Exploration and drilling activities in 2020 to 2022 that postdate the 2019 PEA are summarized in Sections 9 and 10 of this Technical Report.

The historical estimates summarized in Table 6.1 and in Section 6.6 below are considered relevant, however, not reliable. **A Qualified Person has not done sufficient work to classify the historical estimates as current Mineral Resources. NAM is not treating the historical estimates as current Mineral Resources and the historical estimates should not be relied upon.**

TABLE 6.1
PROJECT HISTORY

Year	Company	Activities
1963	Tomrose Mines Ltd.	Prospecting and trenching over Prospectus, furthering prospecting was recommended.
1963	Tomrose Mines Ltd.	Diamond drill program on Tomlinson Property; additional work recommended.
1964	Tomrose Mines Ltd.	Geochemical exploration of overburden areas recommended over Prospectus; several areas across Property were recommended for specific drilling targets.
1965	Falconbridge Ltd.	An electromagnetic (“EM”) survey was conducted over Tomrose Option; no further work was recommended.
1966	Azen Mines Ltd.	Magnetometer survey over Harper property; further prospecting of anomalous areas was recommended.
1968	Kenco Exploration (Canada) Ltd.	Airborne mag-EM survey over Janes, Davis, Henry, and Dana Townships.
1969	Kenco Exploration (Canada) Ltd.	J. P. Patrie exposed mineralization in trenches and pits.
1996	WMC International	Geological and geochemical exploration along the Project included: reconnaissance traversing, regional airborne geophysical survey, ground truthing weak EM anomalies, and regional till-sampling program.
1997	Tenajon Resources	Two phases of exploration; the first consisted of mapping/prospecting while the second included stripping, detailed mapping, and channel sampling focused on the Pardo property.
1998	Luhta, Bailey, and Orchard	Prospecting and sampling on 18 contiguous claims in Pardo and Dana Townships.
1999	Aquiline Resources	Reconnaissance exploration fieldwork along the edges of intrusion.

TABLE 6.1 PROJECT HISTORY		
Year	**Company**	**Activities**
1999	Mustang Minerals	Prospecting and grab samples on Mustang South and North Grid (Dana Township), 78 km line cutting and magnetic surveying by Dan Patrie Exploration Ltd.
1999	Pacific North West Capital ("PFN")/ Amplats	Surface exploration program included: establishing detailed and regional exploration grids, regional prospecting and sampling, grid prospecting and sampling, preliminary geological grid mapping, stripping and cleaning of selected outcrops areas, detailed sampling, preliminary mapping, orientation biogeochemical survey, and orientation IP and ground magnetometer geophysical surveys.
2000	Platinum Group Metals Ltd.	Exploration along Brady Janes property included soil and rock samples, prospecting on claims at Henry Township and south-central Janes Township, geological mapping and geochemical sampling program over Henry Block.
2000	Mustang Minerals	Geological exploration along Mustang North Grid which included mapping, sampling, prospecting, and a ground magnetic survey.
2000	Mustang Minerals	Quantec Geoscience conducted IP/resistivity surveys along the North Grid (Dana and McWilliams Townships).
2000	PFN-Amplats JV	Surface program consisted of; grid cutting, geophysical surveys, and regional mapping/prospecting and detailed mapping/sampling of new cleared areas over the Dana Lake Area and Lismer Ridge. From February to March, drilling program consisted of 13 holes totalling 2,000 m on the mineralization at the Dana Lake Area. From June to July, drilling totalled 2,820.8 m in 14 holes with focus on the Dana Lake Area. In September, drilling consisted of 10 holes totalling 1,958.5 m in the Dana Lake Area and 3 holes at the Lismer Ridge area.
2001	Aquiline Resources	Geological mapping and sampling on Anaconda Project. Ironbank International was commissioned to complete channel sampling across IP targets. JVX conducted IP/resistivity and magnetometer surveys over Dana North Zone.
2001	Mustang Minerals	Second phase of mapping and sampling was conducted on the North, Southeast, and Regional Central grids. Geophysical survey along Henry Grid, Diagonal Grid. Magnetometer and IP survey carried out on Mustang Mineral's Dana-McWilliams Property conducted by Vision Exploration. Line-cutting in Upper Canada Claim Group by Vision. Quantec Geoscience conducted IP surveying on North Extension of the River Valley Property and Upper Canada Claim Property. 17,000 m diamond drill program completed.
2001	PFN-Amplats JV	Surface program consisted of sample collections from the property with concentrations in the southeastern and western

TABLE 6.1
PROJECT HISTORY

Year	Company	Activities
		contact areas. From February to July, drilling program consisted of 98 holes totalling 16,027 m.
2002	Aquiline Resources	JVX Ltd. refurbished gridlines and conducted IP/Resistivity and Magnetometer surveys on Anaconda Project, five IP anomalies identified.
2002	Mustang Minerals	Vision Exploration conducted a Magnetometer Survey over Southeast Grid. Two target areas were drilled within the North Grid totalling nine holes. LG Property added to Mustang in 2001 and consisted of line cutting, ground magnetometer, IP survey, mapping, sampling, and prospecting.
2002	PFN-Amplats JV	From period of October to December, Phase IV surface included regional geological mapping and sampling, stripping, detailed mapping and sampling, and line cutting and IP and ground magnetometer geophysical surveys. From period of November to August, drilling consisted of 83 holes with 22,319 assay samples from the Lismer Ridge, Dana South, and Banshee mineralized zones.
2003	Aquiline Resources	Ironbank International was commissioned for design and implementation a drilling program to test geophysical (IP) targets on Aquiline's AQI Project (formerly Anaconda). 15 holes were drilled totalling 2,000 m.
2003	PFN-Amplats JV	SPECTREM Air flew airborne EM, mag and radiometric surveys over the River Valley Property.
2004	PFN-Amplats JV	From period May to October, surface work included extensive geological mapping of the eastern portion of the Property with the collection of samples. From period November 2002 to May 2004, drilling consisted of 208 holes totalling 44,131 m of drilling at the Dana Lake, Banshee Lake, Lismer Ridge, MacDonald, Varley, Azen Creek, Razor, Jackson Flats, and Pardo mineralized zones.
2005	PFN-Amplats JV	From December to October, a 35 t to 40 t rock bulk sample was taken from four sites (two at Dana South, one at Road Zone, and one Dana North). Samples shipped to Amplats in South Africa for metallurgical testing. D.S. Dorland Ltd. surveyed the perimeter of the 33-claim block joint venture property in Dana and Pardo Townships. A trenching operation was undertaken on the northeast end of Lismer North. Follow-up geological mapping and sampling was carried out. From September to March, drilling consisted of 103 holes totalling 20,516.4 m on Lismer North, Varley, Azen, Pardo, Jackson Flats, and Casson. From October to November, drilling consisted of 20 holes totalling 3,681.15 m with focus on Spade Lake, Jackson's Flat South, Varley Extension/Azen Drop Zone, and Casson.

TABLE 6.1 PROJECT HISTORY		
Year	**Company**	**Activities**
2006	PFN-Amplats JV	Mapping prospecting and sampling follow-up from the 2005 program. Cut 50 line-km of grid in the Jackson Flats south to perform IP and magnetic survey. Gravity survey in selected traverse. Completed mobile metal ion orientation survey.
2007	PFN-Amplats JV	Power stripping and channel sampling program commenced in September and continued into November. A total of 371 m was stripped and 326 samples taken.
2008	PFN	Starting in April of 2008, Gord Trimble, an independent consultant, was engaged to conduct a geological compilation study on Dana North and Dana South. During June and July, channels samples were cut across three stripped zones in the Dana Lake area. 129 samples were taken and all were approximately 0.35 m long. The channel sampled areas were mapped at a scale of 1:100.
2011-2012	PFN	From April 2011 to January 2012, drilling consisted of 46 holes totalling 12,767 m on Dana North and Dana South. Completed a surface water, sediment and bathymetric study. Updated Mineral Resource Estimate completed by Tetra Tech. Two holes totalling 600 m were drilled at Dana North and Dana South for metallurgical testwork materials.
2014	PFN	LiDAR survey flown over the two River Valley mining leases (project summary dated November 14, 2014).
2015	PFN	Two holes totalling 474 m drilled on footwall to Dana North, resulting in discovery of Pine Zone in the footwall to the Dana North Zone.
2016	PFN	In August acquired six mineral claims from Mustang Minerals Corp to extend the PGE mineralized trend by 4 km to the southeast of River Valley (River Valley Extension). In October, 8 mining claims adjacent to the River Valley Extension were staked. In November, an additional 14 mining claims were staked. Selected grab samples collected from River Valley Extension and Dana South. Five holes totalling 1,267 m drilled at Pine Zone.
2017	NAM	PFN changed name to New Age Metals Inc. IP geophysical survey completed over the Pine Zone and Banshee Zone. Drilled 14 holes totalling 3,729 m on Dana North and Pine Zones.
2018	NAM	IP geophysical survey completed over the footwall from Dana North to Dana South Zones. Updated Mineral Resource Estimate completed by WSP.
2019	NAM	Amended updated Mineral Resource Estimate completed by WSP. Preliminary Economic Assessment completed by P&E.

Pertinent aspects of the 2000 to 2019 drilling and exploration programs are summarized below.

6.2 HISTORICAL DRILLING 2000 TO 2019

NAM has completed many diamond drilling programs on the River Valley Palladium Property since 2000. In 2000, a total of 6,779 m in 40 drill holes were completed in the Dana North Zone to Dana South Zone area. A total of 16,027 m in 98 drill holes were completed in 2002 and 83 drill holes were completed in 2002 at the Dana South Zone, Banshee Zone and Lismer Ridge Zone. From late 2002 to May 2004, 44,131 m in 208 drill holes were completed, followed by 24,198 m in 123 drill holes in 2005. During 2011 and 2012, a total of 12,767 m in 46 holes were completed, mainly at the Dana North and Dana South Zones. By early January 2012, 689 drill holes totalling 154,972 m had been completed on the Property.

Since early 2012, two metallurgical drill holes were completed at Dana North and Dana South for a total of 600 m of NQ size drill core. Drilling subsequently paused until 2015. The 2015 drilling program commenced on January 28, 2015 and was completed on February 2, 2015. Jacob and Samuel Drilling Ltd., based in Sudbury, Ontario, was contracted to carry out the diamond drill program using a hydraulic VD 5000 diamond drill rig. A total of two drill holes were completed totalling 474 m of NQ sized drill core. Dip tests were taken approximately every 50 m with a REFLEX tool.

The 2016 drilling program was carried out on the Property in the fall of 2016. Jacob and Samuel Drilling Ltd. was again contracted to conduct the diamond drill program using a hydraulic VD 5000 diamond drill rig. A total of five drill holes were completed totalling 1,267 m of NQ size drill core. Dip tests were taken approximately every 50 m with a REFLEX tool.

The 2017 drilling program carried out on the Property commenced in June 2017 and was completed in September 2017. Jacob and Samuel Drilling Ltd. was contracted to carry out the diamond drill program and complete the drilling with a hydraulic VD 5000 diamond drill rig. A total of 14 drill holes were completed totalling 3,728 m of NQ size drill core. Dip measurements were made every 50 m with a REFLEX tool.

The collar locations and orientation information for the drill holes completed between 2015 and 2017 are presented in Table 6.2. The drill hole collar locations are shown in Figure 6.1. Assay result highlights are presented in Table 6.3. There was no drilling on the Property in 2018 and 2019.

TABLE 6.2
2015 TO 2017 DRILL HOLE COLLARS

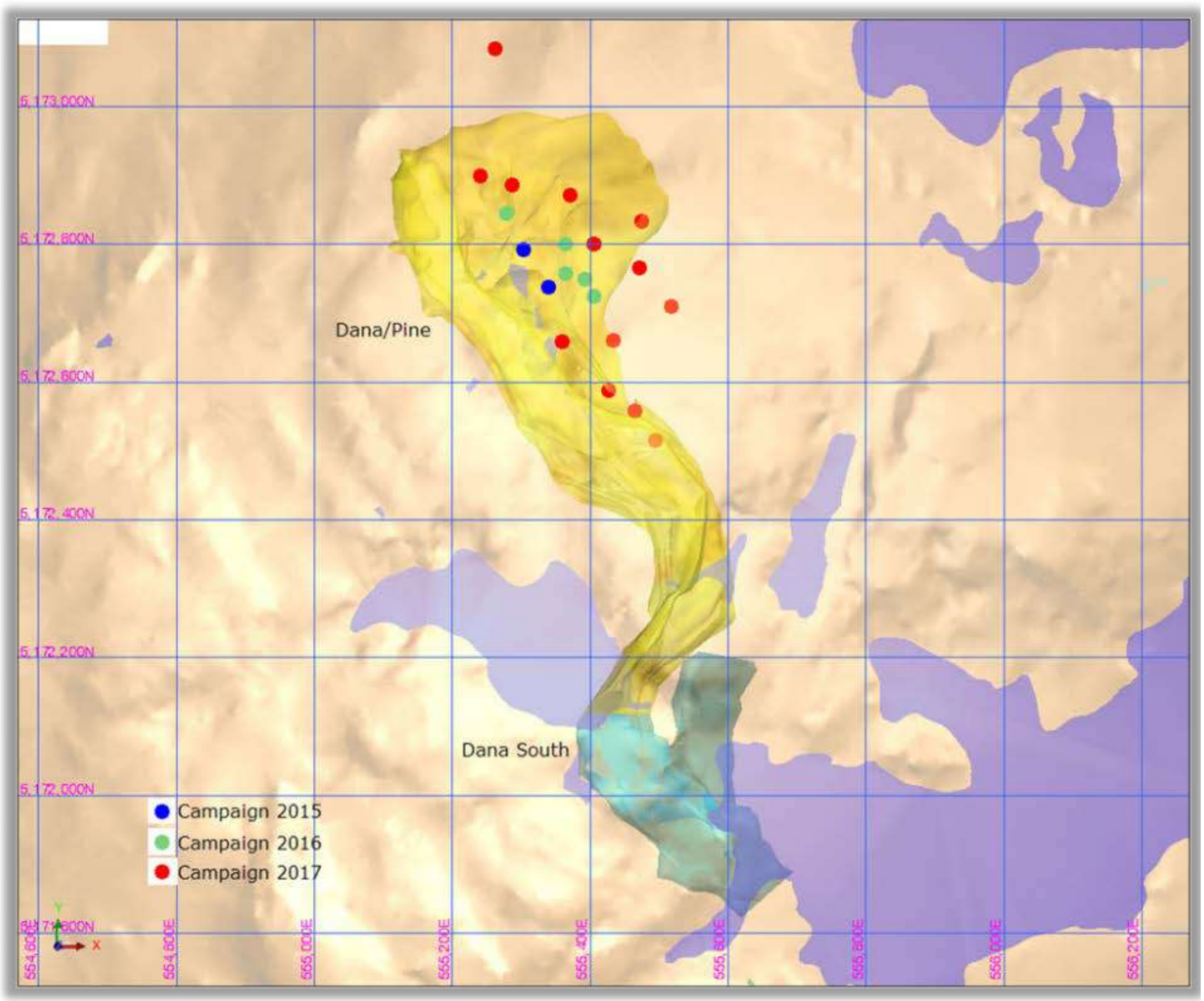
Drill Hole ID	Zone	Coordinates *		Elevation (m asl)	Azimuth (°)	Dip (°)	Length (m)
		Easting	Northing				
2015-DN001	Dana North	555,339	5,172,738	323	325	-60	258
2015-DN002	Dana North	555,304	5,172,792	321	325	-60	216
DN-16-T2-03	Pine	555,278	5,172,845	319	325	-60	171
DN-16-T2-06	Pine	555,364	5,172,800	326	325	-60	249
DN-16-T2-10	Pine	555,393	5,172,750	327	325	-60	281

TABLE 6.2
2015 TO 2017 DRILL HOLE COLLARS

Drill Hole ID	Zone	Coordinates *		Elevation (m asl)	Azimuth (°)	Dip (°)	Length (m)
		Easting	Northing				
DN-16-T2-11	Pine	555,406	5,172,724	325	325	-60	298
DN-16-T2-13	Pine	555,364	5,172,757	324	325	-60	268
PZ-17-01	Pine	555,475	5,172,833	325	325	-60	229
PZ-17-02	Pine	555,471	5,172,765	325	325	-60	278
PZ-17-03	Pine	555,370	5,172,871	325	325	-60	182
PZ-17-04	Pine	555,262	5,173,084	325	325	-50	325
PZ-17-05	Pine	555,405	5,172,800	325	325	-60	251
PZ-17-06	Pine	555,364	5,172,800	325	325	-50	212
PZ-17-07	Pine	555,286	5,172,886	325	325	-60	150
PZ-17-08	Pine	555,240	5,172,899	325	325	-60	124
T3-17-01	Dana North	555,360	5,172,659	325	325	-60	282
T3-17-02	Dana North	555,427	5,172,588	325	325	-60	344
T3-17-03	Dana North	555,433	5,172,660	325	325	-60	303
T3-17-04	Dana North	555,494	5,172,516	325	325	-60	381
T3-17-05	Dana North	555,517	5,172,709	325	325	-60	312
T3-17-06	Dana North	555,465	5,172,558	325	325	-60	356

Note: ** Easting and northing coordinates are in UTM NAD83 Zone 17N.*

FIGURE 6.1 2015 TO 2017 DRILL HOLE COLLAR LOCATIONS



Source: *WSP (2019)*
Note: *Map grid coordinates are in NAD83 UTM Zone 17N.*

TABLE 6.3 2015 TO 2017 DIAMOND DRILL RESULT HIGHLIGHTS								
Drill Hole ID	**Interval (m)**	**Length (m)**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**3E (g/t)**	**Cu (%)**	**Ni (%)**
2015-DN001*	184 to 200	16	1.55	0.50	0.09	2.14	0.18	0.04
2015-DN002*	137 to 155	18	2.12	0.67	0.10	2.89	0.22	0.05
DN-16-T2-06	169 to 187	18	1.90	0.67	0.11	2.68	0.18	0.04
DN-16-T2-10	202 to 222	20	1.44	0.48	0.07	1.99	0.14	0.03
DN-16-T2-11	217 to 234	17	1.37	0.47	0.07	1.91	0.15	0.04
DN-16-T2-13	181 to 184	3	1.56	0.60	0.09	2.25	0.16	0.03
PZ-17-06	170 to 192	22	1.08	0.37	0.06	1.51	0.10	0.02
PZ-17-07	77 to 84	7	0.77	0.25	0.04	1.06	0.06	0.02
PZ-17-08	56 to 70	14	1.30	0.48	0.08	2.01	0.15	0.03
T3-17-01	193 to 202	9	1.11	0.37	0.08	1.56	0.14	0.32
T3-17-02	288 to 299	8	1.00	0.33	0.07	1.41	0.17	0.39
T3-17-03	262 to 279	17	0.81	0.26	0.05	1.12	0.11	0.03
T3-17-04	4 to 32	28	1.77	0.57	0.11	2.45	0.11	0.02
T3-17-04	37 to 41	4	2.35	0.83	0.13	3.30	0.19	0.04
T3-17-04	348 to 355	7	1.15	0.39	0.09	1.64	0.11	0.02
T3-17-06	331 to 334	3	0.21	0.11	0.02	0.34	0.02	0.02

Notes: ** Discovery drill holes for the Pine Zone; 3E = 3 elements: Au + Pt + Pd.*

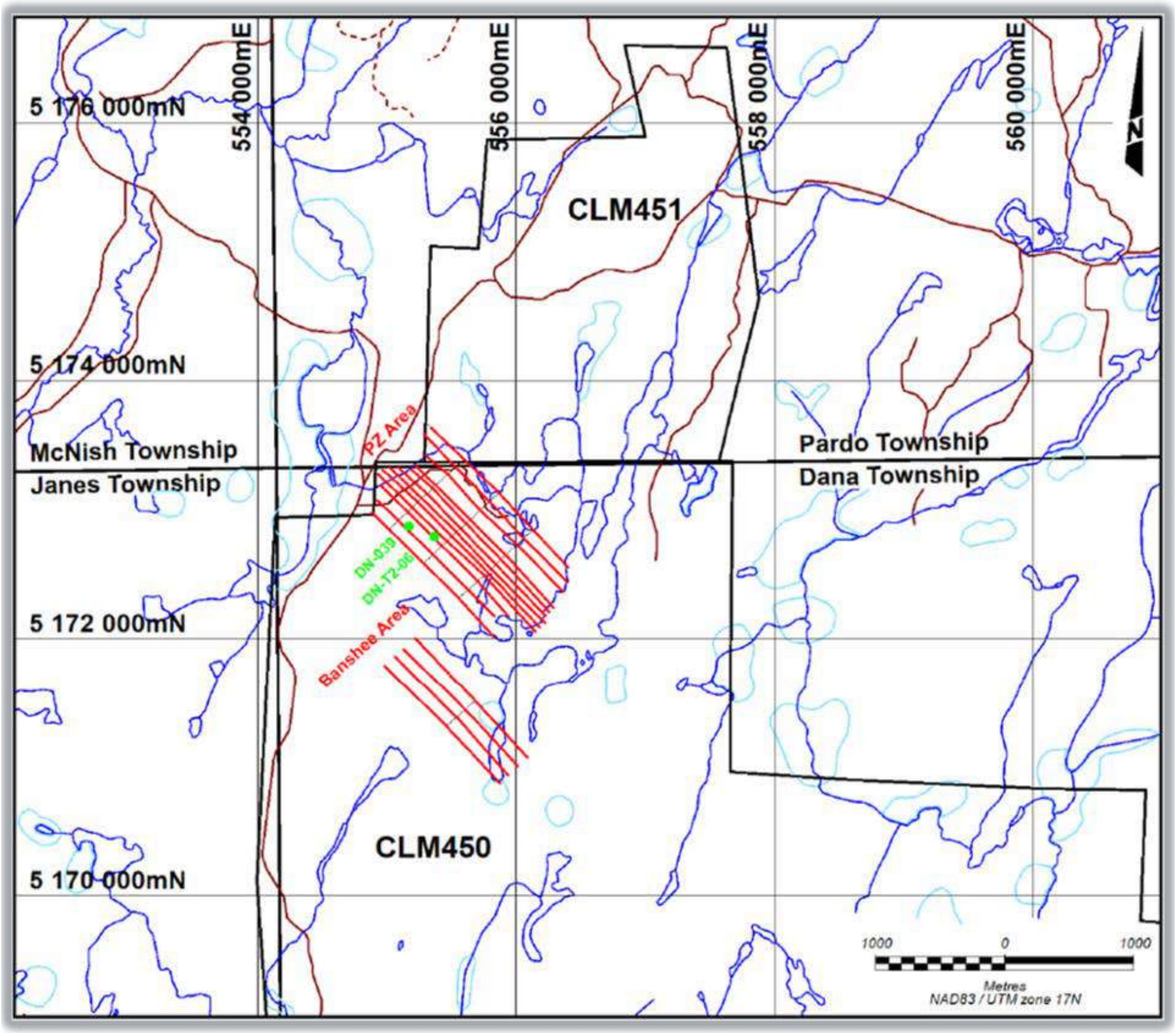
6.3 2017 AND 2018 IP GEOPHYSICAL SURVEYS

With the drill hole discovery of the Pine Zone in the footwall to Dana North in 2015, the footwall to the River Valley Palladium Deposit became a major focus of exploration. Induced polarization (“IP”) geophysical surveys were completed by Abitibi Geophysics in 2017 and 2018 and exploration targets were generated for drill testing.

6.3.1 2017 Induced Polarization Survey

Abitibi Geophysics (Thunder Bay, Ontario) were contracted by NAM to conduct an IP survey along a total of 23.55 line-km of cut-line grids over the Pine Zone and the Banshee Zone, and down two historical drill holes (DN-039 and DN-T2-06) at Dana North Zone (Figure 6.2). The surface IP survey data was acquired in June 2017 (Cole, 2017) by a five-member crew. The downhole survey data were acquired on June 18, 2017, with a field crew of two. A team in the Abitibi Geophysics office in Thunder Bay completed the QC review and interpreted the results.

FIGURE 6.2 2017 IP SURVEY GRIDS



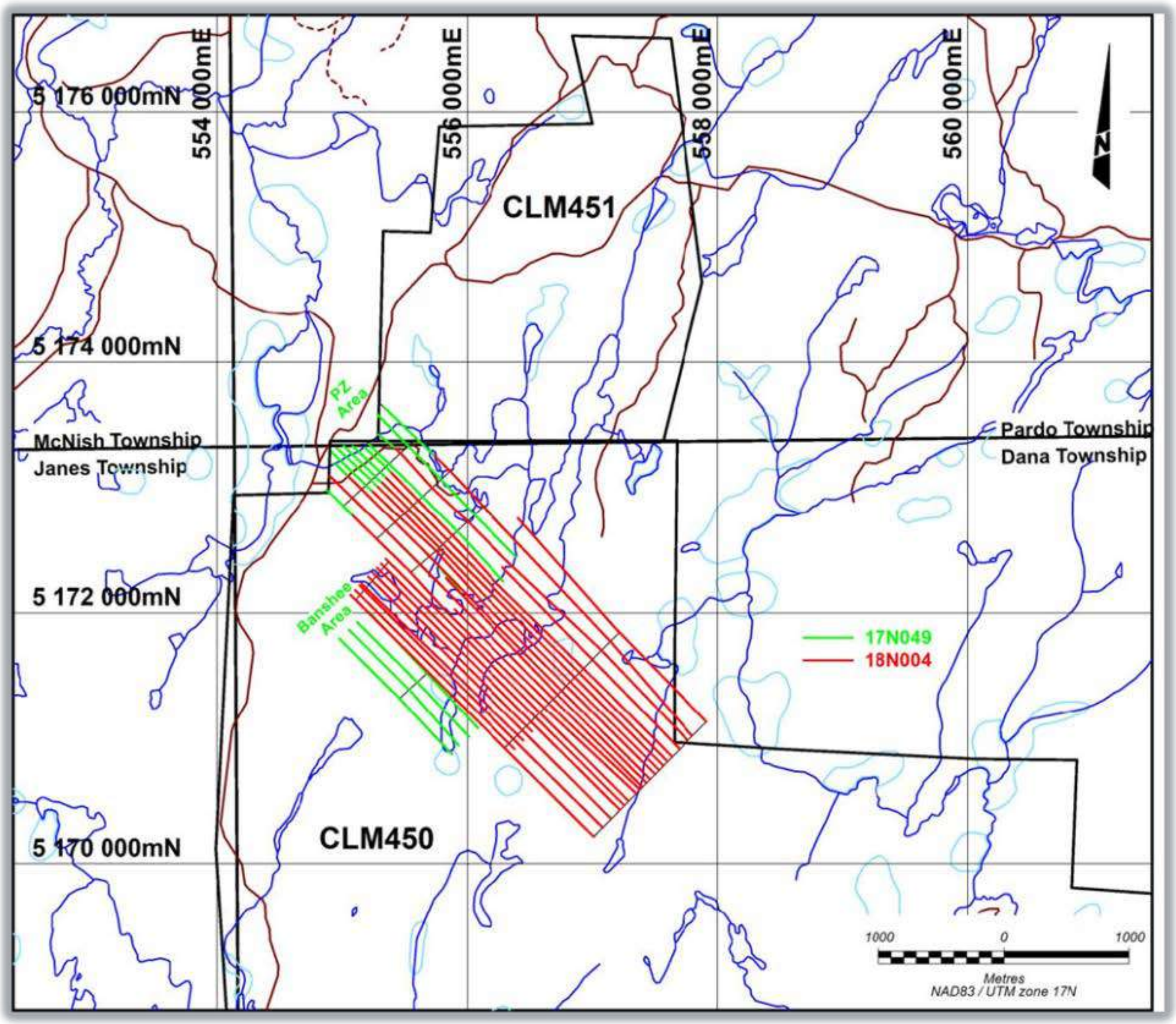
Source: *WSP (2019)*

Following an interpretation of the pseudo-sections and the downhole survey, a total of 40 chargeable sources were modelled. The chargeable sources trend primarily northeast-southwest, similar to the trend displayed at the Pine Zone. 16 of the sources were near-surface on the Pine Zone grid and six were near-surface on the Banshee grid. All near-surface sources were field checked by prospecting and, where possible, stripping. 18 chargeability sources were deeper and required drilling to evaluate: 13 from the Pine Zone grid and five from the Banshee Zone grid. Most of the sources/targets were 150 to 200 m vertically below surface, with a few targets being 400 m vertically in depth.

6.3.2 2018 Induced Polarization Survey

Abitibi Geophysics was engaged by NAM to conduct a total of 63.79 line-km of IP survey on the Project (Figure 6.3). The survey grid filled-in the gap between the two 2017 grids and extended coverage as far south as the Lismer Ridge Zone. The field data were acquired in January and February 2018 (Cole, 2018) with one field crew consisting of five members. A team in the Abitibi Geophysics office in Thunder Bay completed the QC review and interpreted the results.

FIGURE 6.3 2018 IP SURVEY GRID

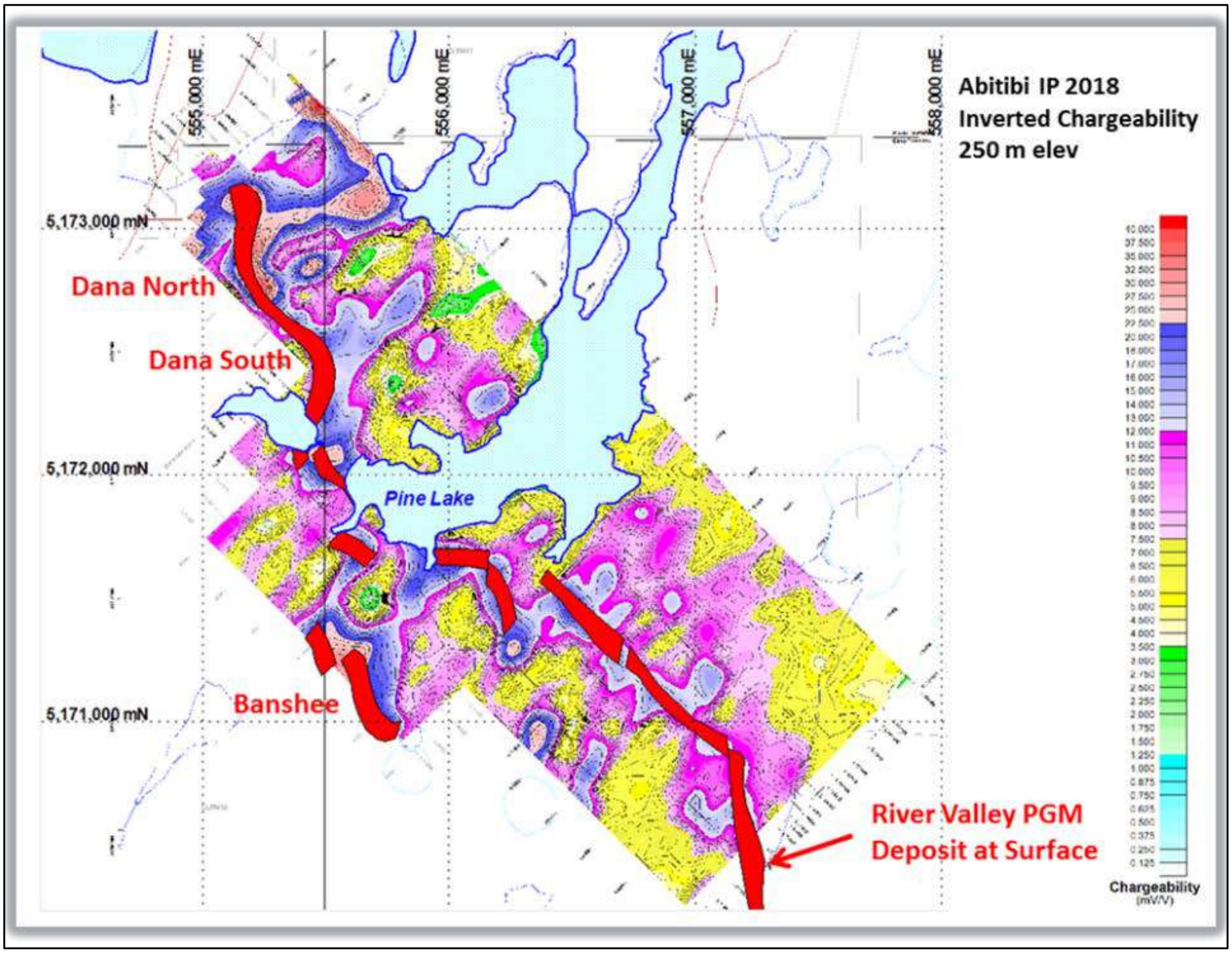


Source: *Cole (2018)*

Following detailed interpretation of pseudo-sections and VOXI vertical sections, a total of 46 chargeable sources were interpreted. The chargeable sources trended primarily northeast-southwest, which would be a similar trend displayed at the Pine Zone. 15 of the sources were near-surface and could be field checked with prospecting and stripping. 27 sources were deeper and required drilling to evaluate. Most of the targets were in the range of 200 m to 300 m vertical depth below surface. A few targets were located at 400 m vertical depth.

An interpretation of the chargeability at around the 250 m elevation (approximately 75 m below surface) is shown in Figure 6.4. The areas in the footwall with chargeability above 12,000 mV/V were considered to be of interest for possible follow-up.

FIGURE 6.4 2018 IP CHARGEABILITY RESULTS



Source: *WSP (2019)*
Note: *Easting and Northing coordinates are in NAD83 UTM Zone 17N.*

Follow-up drill testing of the targets generated by the 2017 and 2018 IP surveys was carried out in 2020 and the results are summarized in Section 10 of this Technical Report.

6.4 2016 MINERAL PROSPECTING AND SURFACE SAMPLING PROGRAM

A field program completed in 2016 consisting of geological mapping and mineral prospecting, confirmed the presence of high-grade platinum metal mineralization on the River Valley Extension and expanded the overall footprint of mineralization at the Dana South Zone. Assay results for grab samples are presented in Table 6.4.

TABLE 6.4
2016 GRAB SAMPLE SUMMARY

Sample Number	Zone	Coordinates *		Pd (g/t)	Pt (g/t)	Pd+Pt (g/t)	Au (g/t)	Cu (%)	Ni (%)
		Easting	Northing						
20429	RV Extension	565,467	5,164,103	0.516	0.554	1.070	0.120	0.073	0.060
20426	RV Extension	565,441	5,164,148	1.540	0.901	2.441	0.020	0.183	0.051
25264	RV Extension	564,562	5,165,932	0.771	0.334	1.105	0.123	0.201	0.130
RZ2016-33	RV Extension	565,449	5,164,142	0.612	0.553	1.165	0.019	0.019	0.003
RZ2016-38	RV Extension	564,922	5,164,616	9.524	3.071	12.595	0.070	0.034	0.025
RZ2016-40	RV Extension	564,922	5,164,607	0.678	1.294	1.972	0.054	0.149	0.027
TR2-2016	Dana South	555,465	5,172,050	3.536	1.215	4.751	0.158	0.248	0.064
TR1-2016	Dana South	555,482	5,172,043	0.716	0.264	0.980	0.052	0.082	0.010
LH-2016	Dana South	555,588	5,172,015	3.222	1.138	4.360	0.126	0.150	0.015
RZ2016-30	Dana South	555,582	5,172,030	2.716	0.738	3.454	0.164	0.297	0.026
RZ2016-31	Dana South	555,582	5,172,026	1.854	0.499	2.353	0.123	0.282	0.022

Note: ** Easting and Northing coordinates are in NAD83 UTM Zone 17N.*

Three of four targeted areas on the River Valley Extension were mapped and sampled. A grab sample from Target Area 1 returned assay values of 12.60 g/t Pd + Pt from a rusty sulphide zone that extended across the width of the outcrop exposure (Table 6.4). Three surface grab samples from Target Area 4 returned Pd + Pt assay values of >1 g/t, with a maximum of 2.44 g/t Pd+ Pt, 0.2% Cu, and 0.05% Ni from mineralized outcrops of melagabbronorite with pegmatitic clinopyroxenite fragments and quartz veins. A grab sample from Target Area 2 returned a Pd + Pt assay value of 1.11 g/t. Target Area 3 was not sampled, due to limited access.

At Dana South, three grab samples from the footwall to that Zone returned assays of >2 g/t Pd + Pt and 0.15% Cu (Table 6.4). These three samples were taken from outcrops of River Valley Intrusion along the shoreline of Dana Lake, approximately 50 m from the east boundary of the Dana South Zone trench. The area between the outcrop and stripped area was covered, the indications of high-grade mineralization where sampled suggested that the Dana South Zone could potentially be expanded farther eastward, or that an additional mineralized zone may be present.

6.5 HISTORICAL METALLURGICAL STUDIES

Historical metallurgical studies completed on the Project should be considered as limited and selective. Between 1999 and 2006, intermittent testwork was performed on high-grade samples of limited size and not all mineralized zones were tested. These testwork results are described in the sub-sections below. The first comprehensive metallurgical studies were completed in 2012-2013, which are described in Section 13 of this Technical Report.

6.5.1 1999 Metallurgical Feasibility Study

The initial testwork program conducted was for the Dana Lake Area and included a pilot plant grinding and flotation metallurgical testwork program carried out in 1999 by two graduate students from the Michigan Technological University (“MTU”). Approximately 4,264 lb (1,934 kg) of high-grade mineralized rock were extracted from trench exposures of the Dana North and South Zones.

The mineralogy of the samples was determined through x-ray diffraction (“XRD”), reflective light microscopy and Scanning Electron Microscopy (“SEM”). The sulphides identified were chalcopyrite ($CuFeS_2$), pyrrhotite ($Fe_{1-x}S$) and cubanite ($CuFe_2S_3$). The bulk density of the samples was also measured and found to be 2.9 t/m^3.

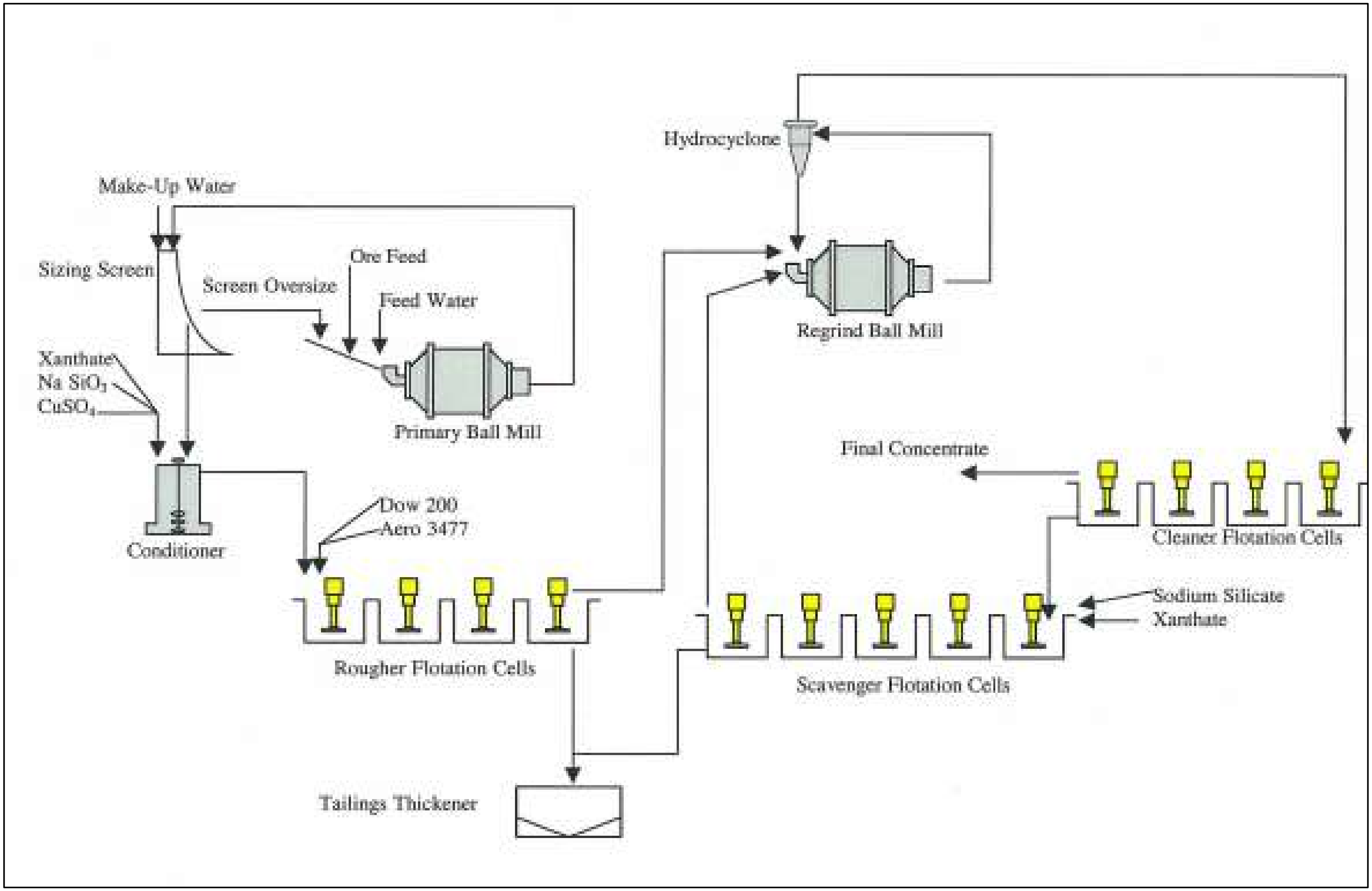
Pilot plant flotation was carried out in three separate stages: rougher, cleaner, and scavenger flotation.

A comparable disseminated sulphide sample to the Dana Lake Zone was at this time being processed by North American Palladium Ltd. (“NAP”) at the Lac Des Iles Mine in Northern Ontario. Operational information on reagent levels and operating parameters obtained from NAP was used as a basis for the flotation tests conducted on the Dana Lake sample. The flotation tests in this study were conducted using variable flotation addition rates of reagents while comparing the recoveries achieved.

A pilot-scale plant was constructed to process the Dana Lake sample using equipment supplied by MTU. The process flowsheet was developed based on the results of numerous bench scale laboratory tests varying grind size and flotation conditions. The main pilot equipment consisted of a variable rate screw feeder, primary ball mill, sizing screen, conditioner, rougher flotation cells, regrind mill, cleaner and scavenger flotation cells, hydrocyclone and a tailings thickener. The pilot plant flowsheet utilized is shown in Figure 6.5.

The Ball Mill Work Index was measured and determined to be 19.7 kWh/t. The pilot plant testwork completed on the Dana Lake sample proved successful in producing a single high-grade sulphide concentrate containing copper, nickel, gold and PGEs. The overall analytical results of each flotation product and the respective metallurgical recoveries are given in Table 6.5 and Table 6.6.

FIGURE 6.5 FLOWSHEET OF PILOT PLANT CIRCUIT USED TO CONCENTRATE SULPHIDES CONTAINING PGE



Source: *P&E, DRA and WSP (2019)*

Table 6.5 **Analytical Results for Dana Lake Metallurgical Sample**							
Sampling Point	**Cu (%)**	**Ni (%)**	**Au (g/t)**	**Pd (g/t)**	**Pt (g/t)**	**Rh (g/t)**	**Au+Pd+ Pt+Rh (g/t)**
Process Plant Feed	0.32	0.07	0.222	4.22	1.19	0.15	5.782
Rougher Feed	0.34	0.08	0.191	3.91	1.12	0.14	5.361
Rougher Conc.	3.18	0.62	3.700	48.20	15.00	1.30	68.200
Cleaner Conc.	26.60	1.86	10.100	214.70	62.60	4.16	291.560
Scav. Conc.	0.58	0.26	0.302	8.24	2.44	0.45	11.432
Rougher Tails	0.03	0.03	0.056	0.728	0.229	0.07	1.083
Scav. Tails	0.22	0.18	0.081	3.46	1.33	0.34	5.211
Calculated Tails	0.06	0.05	0.060	1.11	0.38	0.11	1.660
Enrichment Ratio on Cleaner Conc.	83	27	45	51	53	27	50

Table 6.6 **Metallurgical Recoveries Determined for Metals Contained in the Dana Lake Sample**	
Metal	**Recovery (%)**
Copper (Cu)	81.4
Nickel (Ni)	29.4
Gold (Au)	73.4
Palladium (Pd)	74.1
Platinum (Pt)	68.5
Rhodium (Rh)	27.5
Au+Pd+Pt+Rh	71.7

6.5.2 2001 Mineralogical and Metallurgical Investigation of 13 Drill Holes

13 drill hole core intervals from the River Valley Deposit were submitted for metallurgical and mineralogical examination by Anglo-Platinum in 2001. The drill core intervals supplied were then sampled using the highest-grade intersections from each of the drill holes. The individual intersections were crushed to less than 3 mm and small subsections of this crushed material were retained for future reference. The remainder of the crushed material from each drill core was combined into one composite sample and a split was taken for mineralogical examination. The rest of the material was used for flotation testwork.

The 13 composited samples were examined by QEM-SEM technology using a bulk modal analysis. The results are given in Table 6.7.

TABLE 6.7
BULK MINERALOGICAL COMPOSITION OF DRILL CORE, USING QEM-SEM

Mineral	RV00-01	RV00-02	RV00-03	RV00-04	RV00-05
Amphibole	53.3	57.7	48.1	44.9	49.0
Feldspar	24.4	23.0	25.8	32.9	30.8
Mica	6.2	4.2	8.4	8.3	8.0
Chlorite	5.0	6.0	9.4	7.0	6.5
Pyroxene/Olivine	0.1	0.3	0.3	0.2	0.1
Total sulphides	2.0	0.8	0.7	1.1	0.9
Oxides*	1.8	0.4	0.8	0.5	0.8
Carbonates	0.3	0.3	0.3	0.5	0.3
Other minerals (mainly quartz)	6.4	7.2	6.1	4.4	3.4
Others	0.5	0.1	0.2	0.2	0.2

Mineral	RV00-06	RV00-07	RV00-08	RV00-09	RV00-10
Amphibole	48.7	53.6	48.8	57.7	47.2
Feldspar	29.4	29.6	38.9	27.6	29.9
Mica	9.9	3.0	3.4	5.4	5.3
Chlorite	4.8	9.8	4.8	5.3	10.0
Pyroxene/Olivine	0.1	0.5	0.1	0.2	0.4
Total sulphides	1.5	1.1	1.8	1.4	1.2
Oxides*	0.5	0.5	0.3	0.3	0.4
Carbonates	0.2	0.2	0.3	0.5	0.3
Other minerals (mainly quartz)	4.6	1.7	1.3	1.4	5.2
Others	0.3	0.1	0.2	0.2	0.2

Mineral	RV00-11	RV00-12	RV00-13
Amphibole (mainly actinolite)	48.9	51.3	48.4
Feldspar	23.9	28.3	33.0
Mica	8.6	3.8	3.4
Chlorite	8.4	11.0	12.6
Pyroxene/Olivine	0.1	0.2	0.3
Total sulphides	0.5	1.1	0.7
Oxides*	0.5	0.5	0.8
Carbonates	0.2	0.4	0.2
Other minerals (mainly quartz)	8.7	3.3	0.5
Others	0.2	0.2	0.2

These results show that actinolite is the predominant mineral present with lesser feldspar and minor amounts of mica and chlorite.

Chalcopyrite and pyrrhotite are the predominant base metal sulphides ("BMS") present with lesser amounts of pentlandite.

Four samples were chosen for detailed mineralogical examination based on the preliminary flotation results. These drill holes were RV00-03, RV00-08, RV00-12 and RV00-13, which showed good and moderate Pd recoveries, respectively (Table 6.8).

TABLE 6.8
PGE DISTRIBUTION PD MINERALS ACCOUNT FOR >70% OF THE PGES

Mineral Species	RV00-03	RV00-08	RV00-12	RV00-13
Pd-tellurides	39.2	9.4	61.5	45.9
Pt-tellurides	-	0.1	-	2.4
Pd-arsenides	49.8	82.0	9.9	5.2
Pt-arsenides	5.5	7.4	25.4	19.9
Pd-alloys	5.3	-	1.3	16.1
PtFe-alloys	-	-	-	1.3
PtPd-sulpharsenides	-	0.2	0.2	-
PtPd-sulphides	-	0.6	-	-
Electrum and Gold	0.2	0.4	1.7	9.4
Total	**100.0**	**100.0**	**100.0**	**100.0**
No. of particles	65	66	229	80

The PGE association data shows that most of the PGEs are enclosed in silicate. In RV00-03, a relatively large (45 µm x 30 µm) particle of Pd-arsenide attached to pyrrhotite was observed. This one particle accounts for all the PGE associated with BMS (Table 6.9).

TABLE 6.9
PGE ASSOCIATION DATA

PGE Association	RV00-03	RV00-08	RV00-12	RV00-13
Enclosed in silicate	49.5	82.6	82.2	83.5
Attached to silicate	0.9	3.81	0.1	4.9
Liberated	7.5	-	4.7	11.6
Attached to BMS	42.1	11.8	12.3	-
Enclosed in BMS	-	1.8	0.8	-
Total	**100.0**	**100.0**	**100.0**	**100.0**

The 108 sub-sections that made up the 13 drill core intervals were individually crushed to <3 mm, and then combined to make 13 composite samples (4 kg). Standard flotation tests were completed in triplicate using 1 kg for each test. A single stage grind of 60% passing 74 µm was used throughout the test program (Tables 6.10 and 6.11).

TABLE 6.10
PT, PD, RH AND AU ASSAYS FOR THE ROUGHER TAILINGS (AVERAGE OF TRIPLICATE) AND HEAD SAMPLES

OD Number	Sample Origin	Description	Pt:Pd Ratio	PGE (g/t)			
				Pt	Pd	Rh	Au
1145	RV00-01	Head	0.36	0.8	2.23	0.05	0.16
		Tails	0.44	0.19	0.43	0.03	0.04
1146	RV00-02	Head	0.32	0.85	2.65	0.08	0.16
		Tails	0.50	0.25	0.5	0.03	0.04
1147	RV00-03	Head	0.34	0.54	1.59	0.02	0.07
		Tails	0.43	0.2	0.47	0.02	0.02
1148	RV00-04	Head	0.52	0.61	1.18	0.07	0.08
		Tails	0.43	0.12	0.28	0.02	0.03
1149	RV00-05	Head	0.24	0.53	2.21	0.06	0.11
		Tails	0.43	0.15	0.36	0.02	0.03
1150	RV00-06	Head	0.27	1.03	3.78	0.09	0.15
		Tails	0.43	0.30	0.53	0.04	0.05
1151	RV00-07	Head	0.30	0.54	1.81	0.05	0.10
		Tails	0.36	0.29	0.81	0.03	0.05
1152	RV00-08	Head	0.57	0.45	0.79	0.05	0.12
		Tails	0.39	0.22	0.57	0.03	0.05
1153	RV00-09	Head	0.30	0.67	2.26	0.04	0.16
		Tails	0.44	0.28	0.64	0.03	0.05
1154	RV00-10	Head	0.50	1.55	3.12	0.15	0.18
		Tails	0.33	0.42	1.26	0.01	0.08
1155	RV00-11	Head	0.42	0.86	2.06	0.15	0.18
		Tails	0.36	0.21	0.58	0.02	0.03
1156	RV00-12	Head	0.28	0.79	2.83	0.09	0.09
		Tails	0.35	0.18	0.52	0.01	0.03
1157	RV00-13	Head	0.35	0.82	2.37	0.08	0.14
		Tails	0.34	0.34	0.99	0.02	0.07

There are discrepancies between assay head and reconstituted head for these assays. They have been repeated three times and have yielded a range of head grades, which is indicative of nugget effects. The best correlation with reconstituted head has been used.

Samples RV00-03 and RV00-13 have the worst grade and recovery for both palladium and platinum (Table 6.11). The reason for this is the very high silicate association and fine-grain size of the PGEs. For RV00-03 the PGE association data has been skewed by a relatively large particle associated with the pyrrhotite. Ignoring this particle would mean that approximately 87% of the PGEs would be associated with silicates and no association with base metal sulphides ("BMS"). It would also mean that 50% of the grains, by area, would be <7 µm in size. The better recoveries and slightly better grades of RV00-08 and -12 are due to the slightly coarser PGE grain size and a small association with BMS. The latter criteria would allow the PGEs to float "piggy-back" with the BMS at a coarser grind.

TABLE 6.11
PT, PD ULTIMATE METALLURGICAL RECOVERY AND FINAL GRADE FOR THREE SAMPLES

Sample ID		Mass Pull (%)	Pt Rec. (%)	Final Pt Grade (g/t)	Pd Rec. (%)	Final Pd Grade (g/t)	Pt Recon. Head Grade (g/t)	Pd Recon. Head Grade (g/t)
1145	RV00-01	10.45	77.18	5.60	82.08	16.87	0.76	2.15
1146	RV00-02	10.53	76.46	7.03	84.55	23.07	0.97	2.87
1147	RV00-03	8.13	56.42	2.99	67.49	11.13	0.43	1.34
1148	RV00-04	11.21	85.85	5.81	86.41	14.02	0.76	1.82
1149	RV00-05	8.84	74.14	4.41	80.22	15.36	0.53	1.69
1150	RV00-06	7.91	74.61	10.26	82.85	29.81	1.09	2.85
1151	RV00-07	14.33*	70.80	4.20	69.44	11.00	0.85	2.27
1152	RV00-08	9.77	75.47	6.15	77.50	18.10	0.80	2.28
1153	RV00-09	10.63	74.15	6.02	78.59	17.84	0.94	2.64
1154	RV00-10	11.60	68.64	7.06	68.58	21.01	1.19	3.56
1155	RV00-11	11.58	71.01	3.86	72.66	11.70	0.63	1.87
1156	RV00-12	13.37	82.66	5.47	84.18	18.05	0.89	2.87
1157	RV00-13	11.45	63.00	4.41	63.41	13.22	0.80	2.39

** High mass pull, and therefore a lower grade expected.*
Note: *Rec. = recovery, Recon. = reconstituted.*

The overall metallurgical results are reasonably encouraging in terms of recovery. Further work on larger samples of complete mining intersections, not just the higher-grade zones, will have to be carried out in order to determine whether the final concentrate grade achieved can be improved on, either through re-cleaning or a different reagent regime. Finer grinding may also lead to improved recoveries.

The treatment of the complete life-of-mine ("LOM") tonnage will change the grade recovery relationship.

6.5.3 2004 SGS – Production of Rougher Concentrate

The following analysis presents results obtained by SGS Lakefield Research from a testwork program on the production of a rougher concentrate from River Valley Project drill core:

- The drill core was stage crushed and riffled into 10 kg charges; five 2 kg charges and a representative head sample. The head sample was submitted for Cu, Ni, S, Au, Pt, and Pd analyses;

- Two separate grinds were conducted to determine the time required for producing a product size P_{80} of 70 µm; and

- A laboratory rougher test of 2 kg was conducted to determine the kinetics of Cu, Au, Pt and Pd. A rougher residence time was selected.

20 batch rougher flotations in a 10 kg cell were completed over a five-day period. The first day confirmed the grind and flotation time estimations. Flotation residence time was guided by copper and sulphur assays only. Concentrate assays of Cu, Au, Pt, and Pd were conducted on the combined concentrates from all three flotation tests. Head analysis of the feed composite is shown in Table 6.12.

TABLE 6.12
HEAD ANALYSIS OF THE FEED COMPOSITE

Method/Element	Assay
Fire Assay (g/t)	
Au	0.08
Pt	0.35
Pd	1.27
XRF (%)	
Cu	0.099
Ni	0.032
Leco (%)	
S_T	0.23

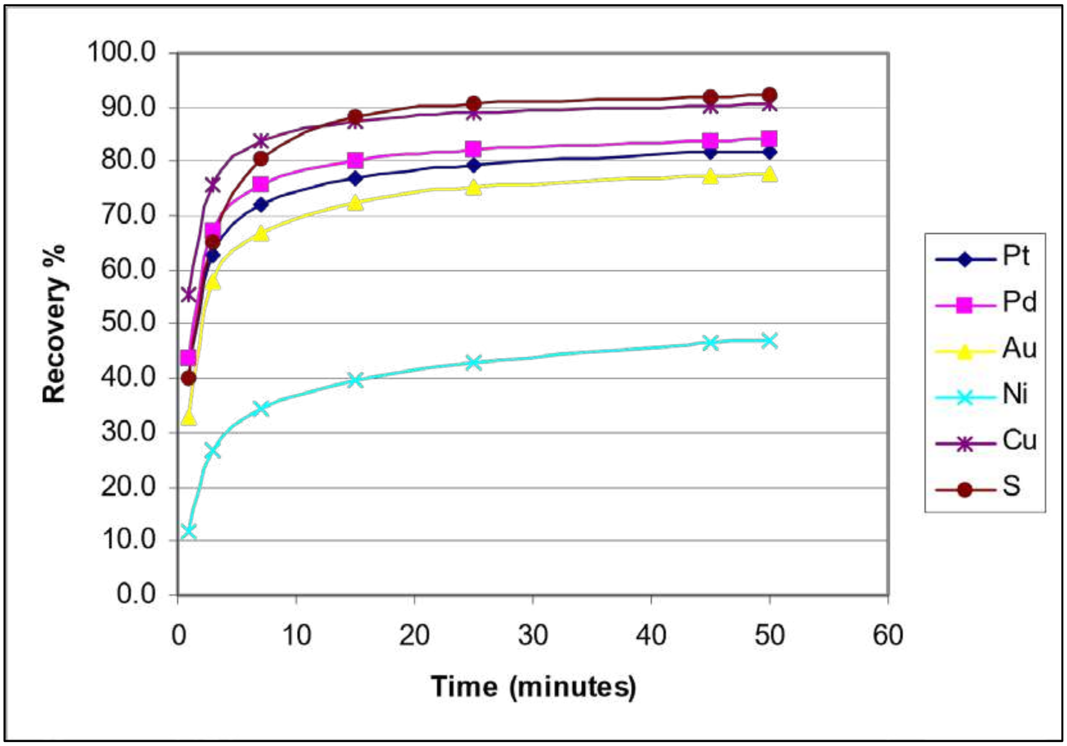
6.5.3.1 Grinding Tests

Grind determination tests were conducted on each of the composites to identify the grind time requirements for generating a feed size P_{80} (80% passing size) of 70 µm.

Based on the tests, grind times 50 and 55 minutes were selected for the 2 kg mill. Based on a scale-up factor of 1.4, a grind time of 70 minutes was selected for the 10 kg mill.

The metallurgical balances of individual products and combined products are shown in Table 6.13. The cumulative recovery curve is presented in Figure 6.6.

FIGURE 6.6 CUMULATIVE RECOVERY CURVE



Source: *SGS (2004)*

TABLE 6.13
KINETIC TEST ASSAYS AND METALLURGICAL BALANCE

Product	Weight		Assays						% Distribution					
	(g)	(%)	Pt (g/t)	Pd (g/t)	Au (g/t)	Ni (%)	Cu (%)	S (%)	Pt (%)	Pd (%)	Au (%)	Ni (%)	Cu (%)	S (%)
Rougher Con 1	21.1	1.07	13.90	49.8	2.31	0.33	5.24	8.18	40.2	43.6	32.9	11.7	55.6	40.0
Rougher Con 2	23.7	1.20	6.91	23.9	1.56	0.38	1.69	4.59	22.4	23.5	24.9	15.1	20.2	25.2
Rougher Con 3	52.3	2.64	1.30	4.02	0.26	0.09	0.30	1.26	9.3	8.7	9.2	7.7	7.9	15.3
Rougher Con 4	70.8	3.57	0.50	1.50	0.12	0.04	0.11	0.48	4.8	4.4	5.7	5.0	3.9	7.9
Rougher Con 5	64.1	3.24	0.29	0.76	0.06	0.03	0.049	0.15	2.5	2.0	2.6	3.3	1.6	2.2
Rougher Con 6	76.3	3.85	0.22	0.55	0.04	0.03	0.032	0.08	2.3	1.7	2.1	3.5	1.2	1.4
Rougher Scav Con	9.7	0.49	0.13	0.33	0.04	0.03	0.075	0.12	0.2	0.1	0.3	0.5	0.4	0.3
Rougher Tailing	1,663.0	83.95	0.08	0.23	0.02	0.02	0.011	0.02	18.2	15.9	22.4	53.1	9.2	7.7
Head (calc.)	1,981.0	100.00	0.37	1.22	0.07	0.03	0.10	0.22	100.0	100.0	100.0	100.0	100.0	100.0
Head (direct)			0.35	1.27	0.08	0.03	0.10	0.23						

Combined Products	Weight		Assays						% Distribution					
	(g)	(%)	Pt (g/t)	Pd (g/t)	Au (g/t)	Ni (%)	Cu (%)	S (%)	Pt (%)	Pd (%)	Au (%)	Ni (%)	Cu (%)	S (%)
Rougher Con 1	21.1	1.1	13.90	49.80	2.31	0.33	5.24	8.18	40.2	43.6	32.9	11.7	55.6	40.0
Rougher Con 1-2	44.8	2.3	10.20	36.10	1.91	0.36	3.36	6.28	62.6	67.1	57.8	26.8	75.8	65.2
Rougher Con 1-3	97.1	4.9	5.41	18.82	1.02	0.21	1.71	3.58	71.9	75.8	66.9	34.6	83.7	80.5
Rougher Con 1-4	167.9	8.5	3.34	11.52	0.64	0.14	1.04	2.27	76.8	80.2	72.7	39.6	87.6	88.4
Rougher Con 1-5	232.0	11.7	2.50	8.54	0.48	0.11	0.76	1.68	79.3	82.3	75.3	42.9	89.2	90.6
Rougher Con 1-6	308.3	15.6	1.93	6.57	0.37	0.09	0.58	1.29	81.6	84.0	77.3	46.4	90.4	92.0
Rougher Con 1-Scav	318.0	16.1	1.88	6.38	0.36	0.09	0.57	1.25	81.8	84.1	77.6	46.9	90.8	92.3

6.5.3.2 Batch Rougher Flotation - 10 kg

Concentrates collected from all three batches were combined, filtered and a representative subsample submitted for Pt, Pd, Au and Cu analysis. The consistency of the grind was checked for tests number F8, F17 and F18, and K80 was found to be 62, 74 and 75 microns, respectively. The preliminary assay results of the 10 kg floats showed similar trends on the rougher concentrate grade. The assay results for the composite rougher floats are shown in Table 6.14.

TABLE 6.14
ASSAY RESULTS FOR THE 10 KG FLOATS

Product	Assays			
	Pt (g/t)	Pd (g/t)	Au (g/t)	Cu (%)
F4-6 Ro Conc	1.99	7.15	0.30	0.61
F7-9 Ro Conc	2.68	9.19	0.41	0.80
F10-12 Ro Conc	2.94	11.2	0.56	0.97
F13-15 Ro Conc	3.22	11.5	0.52	0.98
F16-18 Ro Conc	2.78	9.09	0.48	0.82
F19-21 Ro Conc	2.43	8.80	0.50	0.77
F16-18 Ro Conc	2.63	9.58	0.58	0.81

6.5.3.3 Conclusions and Recommendations

- The copper and sulphur assays were used as a guide for the estimation of flotation time. The copper recovery was 90% after floating for 25 minutes, the corresponding sulphur recovery was 92%.

- The copper head grade was 0.099% and PGE grade was 1.7 g/t.

- Pt, Pd, and Au recoveries were 81.8%, 84.1% and 77.6%, respectively. The recovery of nickel was low at 46.9%.

- A cleaner stage was recommended to provide basic information on probable final concentrate grade.

- The process parameters were required to be optimized to identify probable flow-sheet configuration.

6.5.4 2006 Anglo-American Metallurgical Services Flotation Testwork

A poor flotation response of valuable minerals was previously obtained on the River Valley samples (Malysiak, 2006). The objective of the study described below was to investigate possible treatment routes to improve the Pt, Pd and Ni metallurgical recoveries and the concentrate grade. During the testwork, the effect of grind, collector dosage, as well as, type, dispersant, complexing agent and a higher energy input during flotation on grade-recovery relationship was evaluated.

The Pt, Pd, Cu, and Ni analyses obtained on the composite head sample are given in Table 6.15.

TABLE 6.15
PT, PD, CU AND NI CHEMICAL ANALYSES

River Valley	Pt (g/t)	Pd (g/t)	Cu (%)	Ni (%)
Composite Sample	0.77	2.15	0.19	0.10

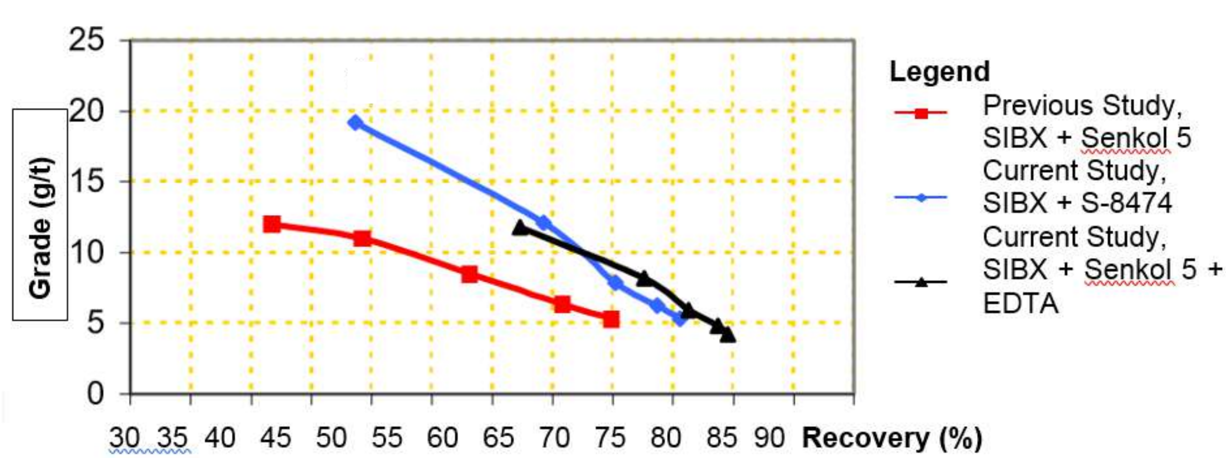
The total Pt and Pd recoveries increased with the fineness of grind. This is, however, more noticeable up to a grind of 80% passing 75 µm. In fact, grinding of the River Valley material finer than this size did not enhance the total Pd-bearing minerals recovery.

The Pt and Pd grade-recovery curves obtained previously on the River Valley sample at a grind of 60% passing 75 µm (Malysiak, 2006) and the most favourable ones achieved during this study at a grind of 80% passing 75 µm are compared in Figure 6.7. The rougher Pt and Pd recoveries obtained at a single-stage grind were enhanced by up to 10% during this study when compared to previously achieved metallurgical results.

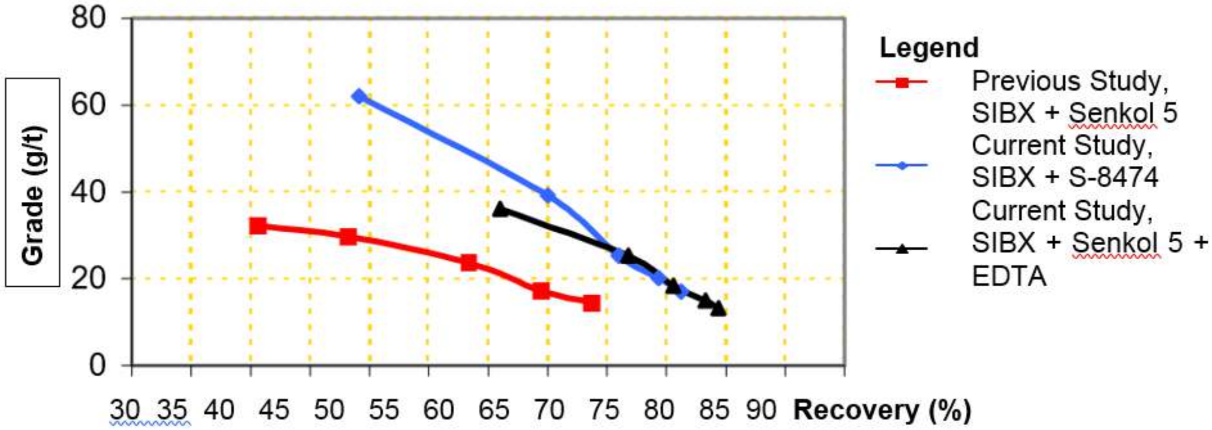
Further investigations, involving a locked cycle test and a possible pilot plant test, was therefore recommended to optimize the valuable minerals grade-recovery relationship and determine the overall possible recovery and concentrate grade.

FIGURE 6.7 GRADE-RECOVERY CURVES
A. PT BEARING MINERALS, AND B. PD BEARING MINERALS

A. PT GRADE VS. RECOVERY CURVES



B. Pd Grade vs. Recovery Curves



Source: *Anglo-American Metallurgical Services (2006)*

The results obtained during the testwork carried out on the River Valley sample showed the following:

- A grind of 80% passing 75 µm gave the most favourable Pt and Pd bearing minerals grade-recovery relationship from the grind sizes investigated;
- The combination of SIBX and Senkol 5 increased the total Pt and Pd recoveries compared to SIBX only, however, at a noticeably lower concentrate grade during the initial stages of flotation;
- EDTA, SIBX and Senkol 5 combination gave a higher concentrate grade during the early stages of flotation and a similar total Pt and Pd recovery when compared to SIBX and Senkol 5 only;
- A higher depressant dosage (200 g/t) slightly increased the concentrate grade during the early stages of flotation, at similar total combined Pt and Pd recovery; and
- A higher energy input during flotation did not enhance the flotation response of Pt and Pd minerals present in the River Valley sample.

It was recommended that the River Valley mineralized material be processed at a grind of 80% passing 75 µm. Further testwork was required to optimize the reagent dosages and types. However, based on the laboratory data obtained during this study, there is an indication that a collector with low frothing properties would be necessary to achieve an optimal valuable minerals grade-recovery relationship. Nevertheless, in order to assess the overall flotation response of Pt- and Pd-bearing minerals, a locked cycle test and potentially a pilot plant testwork would be required.

6.7 HISTORICAL MINERAL RESOURCE ESTIMATES

The historical Mineral Resource Estimates of River Valley are summarized below. They are considered relevant, however, not reliable. **A Qualified Person has not done sufficient work to classify the historical Mineral Resources as current Mineral Resources. NAM is not treating the historical Mineral Resources as current Mineral Resources and the historical Mineral Resources should not be relied upon.**

Historical resource estimates of River Valley completed in 2001, 2002, 2004 and 2006 and more recent Mineral Resource Estimates completed in 2012, 2018 and 2019 are summarized in the sub-sections below. The previous Mineral Resource Estimate of River Valley completed in 2018 and amended in 2019 is superseded by the Mineral Resource Estimate described in Section 14 of this Technical Report.

6.7.1 2001 DMB and W Mineral Resource Study

In 2001, NAM (then Pacific North West Capital) engaged Derry Michener Booth and Wahl ("DMB & W") to complete an Independent Mineral Resource Study of the Dana North, Dana South and Lismer Ridge Zones of the River Valley Palladium Deposit. The Technical Report is dated October 15, 2001, and available on SEDAR. A summary of the Revised Mineral Resource Estimate using a 0.7 g/t Pd + Pt cut-off is presented in Table 6.16.

The database for the 2001 Revised Mineral Resource Study consisted of data from 138 drill holes totalling 22,791.74 m.

A Qualified Person has not done sufficient work to classify the above historical estimate as a current mineral resource. The Issuer is not treating the historical estimate as a current mineral resource and it should not be relied upon.

The Independent 2001 Mineral Resource Study was superseded by the 2002 Revised Mineral Resource Estimate.

TABLE 6.16
2001 MINERAL RESOURCE ESTIMATE
AT 0.7 G/T PD + PT CUT-OFF GRADE

Zone	Class	Tonnes	Au (g/t)	Pt (g/t)	Pd (g/t)	Rh (g/t)	Ni (%)	Cu (%)	Pd+Pt (g/t)	3E (g/t)	3E (oz)
Dana North	M & I	5,005,435	0.072	0.356	1.066	0.036	0.022	0.110	1.422	1.494	240,446
Dana South	M & I	2,734,707	0.073	0.398	1.337	0.039	0.021	0.115	1.735	1.808	159,006
Lismer Ridge	M & I	7,740,142	0.057	0.315	0.860	---	0.020	0.091	1.174	1.231	174,157
All Zones	**M & I**	**15,480,284**	**0.065**	**0.343**	**1.011**	**0.019**	**0.021**	**0.101**	**1.353**	**1.418**	**573,609**
Lismer Ridge	Inferred	570,415	0.046	0.298	0.740	---	0.016	0.068	1.038	1.084	19,879

Notes: *Class = classification; M & I = Measured plus Indicated Mineral Resources; 3E = 3 elements: Au + Pt + Pd*

Source: *DMB & W (2001)*

6.7.2 2002 DMB and W Revised Mineral Resource Estimate

DMB and W completed a Revised Mineral Resource Estimate to incorporate the Phase V drill program for the Dana North, Dana South and Lismer Ridge Zones. The Technical Report is dated October 31, 2002, and available on SEDAR. A summary of the Revised Mineral Resource Estimate using a 0.7 g/t Pd + Pt cut-off is presented in Table 6.17.

TABLE 6.17
2002 MINERAL RESOURCE ESTIMATE
AT 0.7 G/T PD + PT CUT-OFF GRADE

Zone	Class	Tonnes	Au (g/t)	Pt (g/t)	Pd (g/t)	Ni (%)	Cu (%)	PGE (g/t)	3E (g/t)	3E (oz)
Dana North	M & I	5,077,000	0.072	0.362	0.072	0.021	0.110	1.434	1.506	245,800
Dana South	M & I	5,290,000	0.069	0.387	1.269	0.020	0.114	1.655	1.724	293,200
Lismer Ridge	M & I	7,685,000	0.053	0.304	0.804	0.020	0.085	1.108	1.161	286,800
All Zones	**M & I**	**18,053,000**	**0.063**	**0.344**	**1.016**	**0.021**	**0.100**	**1.360**	**1.423**	**825,900**
Dana North	Inferred	956,000	0.065	0.338	0.968	0.018	0.088	1.305	1.371	42,100
Dana South	Inferred	1,326,000	0.043	0.260	0.825	0.016	0.085	1.128	1.128	48,100
Lismer Ridge	Inferred	3,100,000	0.048	0.288	0.771	0.022	0.087	1.107	1.107	110,300
All Zones	**Inferred**	**5,382,000**	**0.050**	**0.290**	**0.819**	**0.020**	**0.086**	**1.159**	**1.159**	**200,600**

Source: *DMB & W (2002)*
Notes: *Class = classification; M & I = Measured and Indicated; Numbers rounded after calculation; 3E = 3 elements: Pt + Pd + Au.*

The 2002 Revised Mineral Resource Estimate is based on 221 drill holes totalling 42,627 m.

A Qualified Person has not done sufficient work to classify the above historical estimate as a current mineral resource. The Issuer is not treating the historical estimate as a current mineral resource and it should not be relied upon.

The Revised 2002 Mineral Resource Estimate was superseded by the 2004 Revised Mineral Resource Estimate.

6.7.3 2004 DMB and W Revised Mineral Resource Estimate

DMB and W completed a Revised Mineral Resource Estimate to incorporate the Phase VI drill program for the Dana Lake, Lismer Ridge and Varley Zones. The Technical Report is dated June 10, 2004, and is available on SEDAR. A summary of the Mineral Resource Estimates using a 0.7 g/t Pd + Pt cut-off is presented in Table 6.18.

TABLE 6.18
2004 MINERAL RESOURCE ESTIMATE
AT 0.7 G/T PD + PT CUT-OFF GRADE

Zone	Class	Tonnes	Au (g/t)	Pt (g/t)	Pd (g/t)	Cu (%)	Ni (%)	PGE (g/t)	3E (g/t)	3E (oz)
Dana North	Measured	2,623,000	0.080	0.428	1.327	0.12	0.02	1.755	1.835	154,800
Dana South	Measured	1,496,000	0.100	0.625	2.122	0.16	0.03	2.747	2.847	136,900
Lismer Ridge	Measured	4,411,000	0.062	0.357	0.982	0.10	0.02	1.339	1.401	198,600
Total	**Measured**	**8,530,000**	**0.074**	**0.426**	**1.288**	**0.12**	**0.02**	**1.714**	**1.788**	**490,400**
Dana North	Indicated	5,881,000	0.054	0.278	0.777	0.09	0.02	1.055	1.109	209,600
Dana South	Indicated	3,516,000	0.071	0.380	1.229	0.11	0.02	1.609	1.680	189,900
Lismer Ridge	Indicated	7,439,000	0.046	0.255	0.667	0.08	0.02	0.922	0.968	231,500
Total	**Indicated**	**16,836,000**	**0.054**	**0.289**	**0.823**	**0.09**	**0.02**	**1.112**	**1.166**	**631,000**
Dana North	M & I	8,504,000	0.062	0.324	0.947	0.10	0.02	1.271	1.333	364,400
Dana South	M & I	5,012,000	0.079	0.453	1.496	0.13	0.02	1.949	2.028	326,800
Lismer Ridge	M & I	11,850,000	0.052	0.293	0.784	0.09	0.02	1.077	1.129	430,200
Total	**M & I**	**25,366,000**	**0.061**	**0.335**	**0.979**	**0.10**	**0.02**	**1.314**	**1.375**	**1,121,200**
Dana North	Inferred	41,000	0.035	0.209	0.559	0.07	0.02	0.769	0.803	1,100
Dana South	Inferred	552,000	0.047	0.229	0.648	0.08	0.02	0.876	0.923	16,400
Lismer Ridge	Inferred	303,000	0.039	0.219	0.529	0.08	0.02	0.748	0.788	7,700
Varley	Inferred	2,741,000	0.051	0.295	0.812	0.07	0.02	1.107	1.158	102,000
Total	**Inferred**	**3,636,000**	**0.049**	**0.278**	**0.760**	**0.07**	**0.02**	**1.038**	**1.087**	**127,100**

Source: *DMB & W (2004)*
Notes: *Class = classification; Numbers rounded after calculation.*
No allowance made for the respective precious metal prices, or recoveries
Block grades interpolated using the ID^3 *method*
3E = 3 elements: Pt + Pd + Au

The database for the 2004 Revised Mineral Resource Estimate consisted of data from 416 drill holes totalling 83,838 m.

A Qualified Person has not done sufficient work to classify the above historical estimate as a current mineral resource. The Issuer is not treating the historical estimate as a current mineral resource and it should not be relied upon.

The Revised 2004 Mineral Resource Estimate was superseded by the 2006 Revised Mineral Resource Estimate.

6.7.4 2006 PFN and GeoSim Mineral Resource Estimate

NAM commissioned GeoSim Consultants ("GeoSim") to complete a Revised Mineral Resource Estimate on the River Valley Property in 2006 (GeoSim and Londry, 2006). The Technical Report is dated May 2006 and is available on SEDAR. The 2006 Mineral Resource estimation concentrated on higher-grade material using a 1.0 g/t Pt + Pd cut-off for five mineral zones. A summary of the 2006 Mineral Resource Estimate is presented in Table 6.19.

TABLE 6.19
2006 MINERAL RESOURCE ESTIMATE
AT 1.0 G/T PD + PT CUT-OFF GRADE

Zone	Class	Tonnes	Au (g/t)	Pt (g/t)	Pd (g/t)	Cu (%)	Ni (%)	Pd+Pt (g/t)	3E (g/t)	3E (oz)
Dana North	Measured	2,523,000	0.082	0.435	1.354	0.12	0.02	1.790	1.87	151,800
Dana South	Measured	1,495,000	0.100	0.626	2.122	0.16	0.03	2.748	2.85	136,900
Lismer Ridge	Measured	3,976,000	0.064	0.368	1.018	0.10	0.02	1.385	1.45	185,300
All Zones	**Measured**	**7,994,000**	**0.076**	**0.437**	**1.331**	**0.12**	**0.02**	**1.768**	**1.84**	**474,000**
Dana North	Indicated	3,067,000	0.061	0.320	0.920	0.09	0.02	1.240	1.301	128,300
Dana South	Indicated	3,304,000	0.072	0.389	1.266	0.11	0.02	1.655	1.73	183,400
Lismer Ridge	Indicated	2,140,000	0.054	0.302	0.824	0.09	0.02	1.127	1.180	81,200
Lismer North	Indicated	716,000	0.071	0.394	1.183	0.13	0.03	1.577	1.65	37,900
Varley	Indicated	2,082,000	0.075	0.448	1.224	0.09	0.02	1.671	1.75	117,000
All Zones	**Indicated**	**11,309,000**	**0.066**	**0.365**	**1.076**	**0.10**	**0.02**	**1.441**	**1.51**	**547,700**
Dana North	M & I	5,590,000	0.070	0.372	1.116	0.11	0.02	1.488	1.56	280,000
Dana South	M & I	4,800,000	0.080	0.463	1.533	0.13	0.02	1.995	2.08	320,300
Lismer Ridge	M & I	6,116,000	0.060	0.345	0.950	0.10	0.02	1.295	1.36	266,600
Lismer North	M & I	716,000	0.071	0.394	1.183	0.13	0.03	1.577	1.65	37,900
Varley	M & I	2,082,000	0.076	0.448	1.224	0.08	0.02	1.672	1.75	117,000
All Zones	**M & I**	**19,303,000**	**0.070**	**0.365**	**1.181**	**0.11**	**0.02**	**1.576**	**1.65**	**1,021,700**

TABLE 6.19
2006 MINERAL RESOURCE ESTIMATE
AT 1.0 G/T PD + PT CUT-OFF GRADE

Zone	Class	Tonnes	Au (g/t)	Pt (g/t)	Pd (g/t)	Cu (%)	Ni (%)	Pd+Pt (g/t)	3E (g/t)	3E (oz)
Dana South	Inferred	104,000	0.053	0.276	0.819	0.09	0.02	1.094	1.15	3,800
Lismer North	Inferred	345,000	0.091	0.524	1.586	0.03	0.03	2.110	2.2	24,400
Varley	Inferred	432,000	0.063	0.464	1.301	0.01	0.01	1.765	1.83	25,400
All Zones	**Inferred**	**881,000**	**0.073**	**0.465**	**1.356**	**0.02**	**0.02**	**1.821**	**1.89**	**53,600**

Source: *DMB & W (2006)*
Notes: *Class = classification, M & I = Measured and Indicated*
Numbers rounded after calculation.
No allowance made for the respective precious metal prices, or recoveries
Block Au, Pt and Pd grades estimated using the ordinary kriging method; Block grades for Ni and Cu interpolated using the ID^3 method.
3E = 3 elements: Pt + Pd + Au.

The database for the 2006 Revised Mineral Resource Estimate was based on 416 drill holes. The 2006 revised Mineral Resource Estimate was completed for the Dana North, Dana South, Lismer North, Lismer Ridge and Varley Zones. For Dana North and Dana South, precious metal grades were estimated by the ordinary kriging method, whereas Ni and Cu grades were estimated by the ID^2 method on a capped and composited drill hole dataset consistent with industry standards. For Lismer North, Lismer Ridge and Varley Zones, all metal grades were estimated by the ID^2 method on a capped and composited drill hole dataset consistent with industry standards. Validation of the results was conducted by visual inspection. Validation of the model was completed by visual comparison of colour coded blocks and composites on plans and vertical cross-sections. Statistical comparisons between global average model grades using a zero cut-off and composite grades showed reasonable correlation.

A Qualified Person has not done sufficient work to classify the above historical estimate as a current mineral resource. The Issuer is not treating the historical estimate as a current mineral resource and it should not be relied upon.

The Revised 2006 Mineral Resource Estimate was superseded by the 2012 Updated Mineral Resource Estimate.

6.8 RECENT HISTORICAL MINERAL RESOURCE ESTIMATES

6.8.1 2012 Tetra Tech Updated Mineral Resource Estimate

The 2012 updated Mineral Resource Estimate was completed by Tetra Tech with an effective date of June 13, 2012. This was the first Mineral Resource Estimate for River Valley that was based on a large, bulk tonnage mining scenario and reported at a PdEq cut-off, and the first to include the Banshee, Azen and Razor Zones. A summary of the Mineral Resource Estimate using a 0.8 g/t PdEq cut-off is presented in Table 6.20.

The database for the 2012 updated Mineral Resource Estimate contained 492 drill hole records. The 2012 updated Mineral Resource Estimate was completed for the Dana North, Dana South, Banshee, Lismer North, Lismer Ridge, Varley, Azen, and Razor Zones using the ordinary kriging ("OK") methodology on a capped and composited drill hole dataset consistent with industry standards. Validation of the results was conducted by visual inspection, swath plots, and global statistical comparison of the model against inverse distance squared ("ID^2") and nearest neighbour ("NN") models. The updated Mineral Resources were considered to be amenable to open pit mining.

A Qualified Person has not done sufficient work to classify the above historical estimate as a current mineral resource. The Issuer is not treating the historical estimate as a current mineral resource and it should not be relied upon.

The updated 2012 Mineral Resource Estimate was superseded by the 2018 Updated Mineral Resource Estimate.

TABLE 6.20
2012 MINERAL RESOURCE ESTIMATE
AT 0.8 G/T PDEQ CUT-OFF GRADE

Zone	Class	Tonnes	Au (g/t)	Pt (g/t)	Pd (g/t)	Rh (g/t)	Ag (g/t)	Cu (%)	Ni (%)	Co (%)	PdEq (g/t)
Dana North	Measured	9,622,180	0.1	0.24	0.66	0.023	0.70	0.07	0.02	0.003	1.56
Dana South	Measured	5,980,550	0.1	0.26	0.79	0.027	0.6	0.06	0.01	0.003	1.68
Lismer Ridge	Measured	9,982,120	0	0.20	0.50	0.018	0.40	0.05	0.02	0.003	1.24
All Zones	**Measured**	**25,584,850**	**0**	**0.23**	**0.63**	**0.022**	**0.6**	**0.06**	**0.02**	**0.003**	**1.46**
Dana North	Indicated	14,076,300	0	0.22	0.60	0.021	0.52	0.07	0.02	0.003	1.45
Dana South	Indicated	8,040,000	0	0.24	0.70	0.024	0.59	0.05	0.01	0.003	1.49
Lismer Ridge	Indicated	16,300,300	0	0.19	0.48	0.018	0.05	0.06	0.02	0.003	1.25
Lismer North	Indicated	13,690,300	0	0.23	0.57	0.021	0.12	0.06	0.02	0.002	1.37
Varley	Indicated	13,647,800	0	0.21	0.53	0.019	0.17	0.05	0.01	0.002	1.27
All Zones	**Indicated**	**65,754,700**	**0**	**0.21**	**0.56**	**0.020**	**0.26**	**0.06**	**0.02**	**0.003**	**1.35**
Dana North	M & I	23,698,480	0	0.23	0.63	0.022	0.6	0.07	0.02	0.003	1.49
Dana South	M & I	14,020,550	0	0.25	0.74	0.025	0.6	0.05	0.01	0.003	1.57
Lismer Ridge	M & I	26,282,420	0	0.19	0.49	0.018	0.2	0.06	0.02	0.003	1.25
Lismer North	M & I	13,690,300	0	0.23	0.57	0.021	0.1	0.06	0.02	0.002	0.37
Varley	M & I	13,647,800	0	0.21	0.53	0.019	0.2	0.05	0.01	0.002	1.27
All Zones	**M & I**	**91,339,550**	**0**	**0.22**	**0.58**	**0.021**	**0.3**	**0.06**	**0.02**	**0.003**	**1.38**

TABLE 6.20 **2012 MINERAL RESOURCE ESTIMATE** **AT 0.8 G/T PDEQ CUT-OFF GRADE**												
Zone	**Class**	**Tonnes**	**Au (g/t)**	**Pt (g/t)**	**Pd (g/t)**	**Rh (g/t)**	**Ag (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**PdEq (g/t)**
Azen	Inferred	16,095,000	0	0.15	0.37	0.014	0.1	0.05	0.03	0.001	1.11
Banshee	Inferred	3,320,000	0	0.19	0.35	0.015	---	0.05	0.01	---	1.00
Lismer Ridge	Inferred	303,000	0	0.13	0.31	0.012	---	0.06	0.02	0.002	0.92
Razor	Inferred	16,163,000	0	0.12	0.36	0.013	0.2	0.06	0.03	0.003	1.05
Varley	Inferred	30,000	0	0.15	0.30	0.012	---	0.07	0.01	0.002	0.94
All Zones	**Inferred**	**35,911,000**	**0**	**0.14**	**0.36**	**0.014**	**0.1**	**0.06**	**0.03**	**0.003**	**1.07**

Source: *Tetra Tech (2012)*

Notes: *Class = classification, M & I = Measured + Indicated, PdEq = palladium equivalent.*
Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
Long-term forecast metal prices (US$): $896.oz Pd, $1,885/oz Pt, $1,271/oz au, $3.0/lb Cu, $9.7/lb Ni and $15.9/lb Co.

6.8.2 2018 WSP Updated Mineral Resource Estimate

The 2018 updated Mineral Resource Estimate was completed by WSP with an effective date of May 4, 2018. This was the first Mineral Resource Estimate for River Valley that included the Pine Zone, which was discovered in 2015, and the River Valley Extension Zone, which was acquired in 2016 from Mustang Minerals. A summary of the Mineral Resource Estimate using a 0.4 g/t PdEq cut-off is presented in Table 6.21.

TABLE 6.21 **2018 MINERAL RESOURCE ESTIMATE** **AT 0.4 G/T PDEQ CUT-OFF GRADE**										
Zone	**Class**	**Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Ni (%)**	**Cu (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Dana North	Measured	32,631,150	0.52	0.20	0.04	0.01	0.06	0.002	0.02	1.05
Pine	Measured	2,568,000	0.55	0.20	0.03	0.02	0.06	0.004	0.01	1.11
Dana South	Measured	9,433,730	0.58	0.21	0.04	0.01	0.05	0.003	0.02	1.10
Lismer Ridge	Measured	18,244,630	0.38	0.16	0.03	0.01	0.04	0.002	0.01	0.80
Total	**Measured**	**62,877,510**	**0.49**	**0.19**	**0.03**	**0.01**	**0.05**	**0.002**	**0.02**	**0.99**
Dana North	Indicated	2,175,700	0.53	0.22	0.02	0.02	0.06	0.003	0.01	1.00
Pine	Indicated	271,600	0.49	0.21	0.02	0.01	0.07	0.001	0.01	0.97
Dana South	Indicated	13,573,600	0.51	0.18	0.03	0.01	0.04	0.003	0.02	0.97
Lismer Ridge	Indicated	33,356,300	0.35	0.14	0.03	0.02	0.05	0.002	0.01	0.77

Table 6.21 2018 Mineral Resource Estimate at 0.4 g/t PdEq Cut-off Grade										
Zone	**Class**	**Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Ni (%)**	**Cu (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Lismer North	Indicated	19,836,300	0.46	0.19	0.03	0.01	0.05	0.002	0.02	0.93
Varley	Indicated	28,632,100	0.37	0.14	0.02	0.01	0.05	0.002	0.01	0.76
Banshee	Indicated	9,600	0.26	0.16	0.03		0.03		0.01	0.55
Total	**Indicated**	**97,855,200**	**0.40**	**0.16**	**0.03**	**0.01**	**0.05**	**0.002**	**0.02**	**0.83**
Dana North	M & I	34,806,850	0.52	0.20	0.04	0.01	0.06	0.002	0.02	1.05
Pine	M & I	2,839,600	0.55	0.20	0.03	0.02	0.06	0.003	0.01	1.10
Dana South	M & I	23,007,330	0.54	0.19	0.03	0.01	0.04	0.003	0.02	1.02
Lismer Ridge	M & I	51,600,930	0.36	0.14	0.03	0.02	0.05	0.002	0.01	0.78
Lismer North	M & I	19,836,300	0.46	0.19	0.03	0.01	0.05	0.002	0.02	0.93
Varley	M & I	28,632,100	0.37	0.14	0.02	0.01	0.05	0.002	0.01	0.76
Banshee	M & I	9,600	0.26	0.16	0.03		0.03		0.01	0.55
Total	**M & I**	**160,732,710**	**0.44**	**0.17**	**0.03**	**0.01**	**0.05**	**0.002**	**0.02**	**0.90**
Dana North	Inferred	272,000	0.56	0.21		0.01	0.05		0.02	0.94
Pine	Inferred	5,100	0.37	0.21			0.04			0.66
Lismer Ridge	Inferred	2,453,000	0.22	0.10	0.02	0.01	0.04	0.002	0.01	0.54
Varley	Inferred	125,000	0.20	0.11	0.03	0.02	0.05	0.002	0.01	0.58
Razor	Inferred	42,744,000	0.26	0.11	0.02	0.03	0.04	0.001	0.01	0.63
Banshee	Inferred	13,893,000	0.25	0.14	0.03	0.01	0.04		0.01	0.57
Azen	Inferred	35,903,000	0.27	0.09	0.02	0.03	0.05		0.01	0.70
River Valley Extension	Inferred	32,221,000	0.29	0.17	0.02	0.03	0.05		0.01	0.70
Total	**Inferred**	**127,662,000**	**0.27**	**0.12**	**0.02**	**0.02**	**0.05**	**0.002**	**0.01**	**0.66**

Source: *WSP (2018)*

Notes: *Class = classification, M & I = Measured and Indicated.*

CIM definition standards were followed for the Mineral Resource calculation.

The 2018 Mineral Resource models used Ordinary Kriging grade estimation within a 3-D block model with mineralized zones defined by wireframed solids.

A base cut-off grade of 0.4 g/t PdEq was used for reporting Mineral Resources.

Palladium Equivalent (PdEq) was calculated using (US$): $1,000/oz Pd, $1,000/oz Pt, $1,350/oz Au, $1,750/oz Rh, $3.20/lb Cu, $5.50/lb Ni, $36/lb Co.

Numbers may not add exactly due to rounding.

Mineral Resources that are not Mineral Reserves do not have economic viability.

The database for the 2018 updated Mineral Resource Estimate contains 710 drill holes with 106,554 assay records and 2,642 surface channel samples. Updated Mineral Resource Estimates were completed for the Dana North, Dana South, Pine, Banshee, Lismer, Lismer Extension, Varley, Azen, Razor, and River Valley Extension (Mustang) Zones, using the OK methodology on a capped and composited drill hole dataset consistent with industry standards. Validation of the results was conducted by visual inspection, swath plots, and global statistical comparison of the model against ID^2 and NN models. The updated Mineral Resources were considered to be amenable to open pit mining.

A Qualified Person has not done sufficient work to classify the above historical estimate as a current mineral resource. The Issuer is not treating the historical estimate as a current mineral resource and it should not be relied upon.

6.8.3 2019 WSP Mineral Resource Estimate

In 2019, the 2018 Updated Mineral Resource Estimate was amended by WSP and reported with pit constrained and out-of-pit Mineral Resources, with an amended effective date of January 9, 2019. Detailed summaries of the updated Mineral Resource Estimate using a 0.35 g/t PdEq cut-off grade for pit-constrained Mineral Resources and a 2.0 g/t PdEq cut-off grade for out-of-pit Mineral Resources are presented in Table 6.22 and Table 6.23, respectively.

TABLE 6.22
2019 PIT CONSTRAINED UPDATED MINERAL RESOURCE ESTIMATE AT 0.35 G/T PDEQ CUT-OFF GRADE (1-6)

Zone	Class	Tonnes	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Ni (%)	Co (%)	Rh (g/t)	PdEq (g/t)
Dana North-Pine	Measured	26,745,200	0.57	0.22	0.04	0.07	0.02	0.002	0.020	1.00
Dana south	Measured	10,083,500	0.76	0.26	0.04	0.07	0.02	0.003	0.014	1.22
Lismer Ridge	Measured	19,196,700	0.39	0.16	0.02	0.04	0.03	0.013	0.003	0.70
Total	**Measured**	**56,025,400**	**0.54**	**0.20**	**0.03**	**0.06**	**0.02**	**0.006**	**0.013**	**0.94**
Dana North-Pine	Indicated	1,137,400	0.48	0.23	0.02	0.06	0.02	0.001	0.011	0.86
Dana South	Indicated	540,200	0.43	0.17	0.03	0.05	0.01	0.011	0.009	0.73
Lismer Ridge	Indicated	10,190,800	0.46	0.18	0.04	0.05	0.02	0.003	0.008	0.82
Lismer North	Indicated	14,645,600	0.52	0.21	0.01	0.06	0.03	0.014	0.002	0.89
Varley	Indicated	16,639,300	0.49	0.19	0.03	0.05	0.01	0.002		0.81
Total	**Indicated**	**43,153,300**	**0.49**	**0.19**	**0.03**	**0.05**	**0.02**	**0.006**	**0.003**	**0.84**
Dana North-Pine	M & I	27,882,600	0.57	0.22	0.04	0.07	0.02	0.002	0.020	1.00
Dana South	M & I	10,623,700	0.74	0.25	0.04	0.07	0.02	0.003	0.013	1.20
Lismer Ridge	M & I	29,387,500	0.41	0.17	0.02	0.05	0.02	0.010	0.004	0.74
Lismer North	M & I	14,645,600	0.52	0.21	0.01	0.06	0.03	0.014	0.002	0.89
Varley	M & I	16,639,300	0.49	0.19	0.03	0.05	0.01	0.002		0.81
Total	**M & I**	**99,178,700**	**0.52**	**0.20**	**0.03**	**0.06**	**0.02**	**0.006**	**0.008**	**0.90**

TABLE 6.22 **2019 PIT CONSTRAINED UPDATED MINERAL RESOURCE ESTIMATE** **AT 0.35 G/T PDEQ CUT-OFF GRADE (1-6)**										
Zone	**Class**	**Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Dana North-Pine	Inferred	139,000	0.40	0.20		0.03	0.01		0.003	0.66
Dana South	Inferred	1,000	0.36	0.06		0.03	0.01		0.006	0.50
Lismer Ridge	Inferred	103,000	0.32	0.09	0.02	0.05	0.02	0.003		0.57
Razor	Inferred	10,957,000	0.36	0.15	0.03	0.05	0.03	0.001		0.70
Banshee	Inferred	3,359,000	0.29	0.17	0.03	0.04	0.01			0.55
Azen	Inferred	17,566,000	0.30	0.10	0.02	0.05	0.03	0.003		0.59
Mustang	Inferred	20,181,000	0.31	0.18	0.06	0.03			0.031	0.65
Total	**Inferred**	**52,306,000**	**0.31**	**0.15**	**0.04**	**0.04**	**0.02**	**0.001**	**0.012**	**0.63**

Source: *WSP (2019)*

Notes: *Class = classification, M & I = Measured and Indicated.*

1. *CIM definition standards were followed for the Mineral Resource Estimate.*
2. *The 2018 Mineral Resource models used Ordinary Kriging grade estimation within a three-dimensional block model with mineralized zones defined by wireframed solids.*
3. *A base cut-off grade of 0.35 g/t PdEq was used for reporting Mineral Resources in a constrained pit and 2.00 g/t PdEq was used for reporting the Mineral Resources under the pit.*
4. *Palladium Equivalent (PdEq) was calculated using (US$): $950/oz Pd, $950/oz Pt, $1,275/oz Au, $1,500/oz Rh, $2.75/lb Cu, $5.25/lb Ni, $36/lb Co.*
5. *Numbers may not add exactly due to rounding.*
6. *Mineral Resources that are not Mineral Reserves do not have economic viability.*

TABLE 6.23 **2019 OUT-OF-PIT UPDATED MINERAL RESOURCE ESTIMATE** **AT 2.0 G/T PDEQ CUT-OFF GRADE (1-6)**										
Zone	**Class**	**Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Dana North-Pine	Measured	13,200	2.14	0.67	0.09	0.19	0.04	0.001	0.021	3.23
Dana South	Measured	58,100	2.37	0.77	0.09	0.10	0.02	0.002	0.040	3.41
Total	**Measured**	**71,300**	**2.33**	**0.75**	**0.09**	**0.12**	**0.02**	**0.002**	**0.036**	**3.38**
Dana North-Pine	Indicated	400	2.56	0.53	0.09	0.21	0.04		0.029	3.46
Dana South	Indicated	400	2.60	0.84	0.02	0.02	0.01	0.002	0.019	3.44
Lismer North	Indicated	4,400	2.17	0.58	0.13	0.02	0.04			3.15
Total	**Indicated**	**5,200**	**2.23**	**0.60**	**0.11**	**0.03**	**0.04**		**0.004**	**3.20**

TABLE 6.23 2019 OUT-OF-PIT UPDATED MINERAL RESOURCE ESTIMATE AT 2.0 G/T PDEQ CUT-OFF GRADE (1-6)										
Zone	**Class**	**Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Dana North-Pine	M & I	13,600	2.15	0.67	0.09	0.19	0.04	0.001	0.021	3.24
Dana South	M & I	58,500	2.37	0.77	0.09	0.10	0.02	0.002	0.040	3.41
Lismer North	M & I	4,400	2.17	0.58	0.13	0.02	0.04			3.15
Total	**M & I**	**76,500**	**2.32**	**0.74**	**0.09**	**0.11**	**0.02**	**0.002**	**0.034**	**3.36**

Source: *WSP (2019)*

Notes: *Class = classification, M & I = Measured and Indicated.*

1. *CIM definition standards were followed for the Mineral Resource Estimate.*
2. *The 2018 Mineral Resource models used Ordinary Kriging grade estimation within a three-dimensional block model with mineralized zones defined by wireframed solids.*
3. *A base cut-off grade of 0.35 g/t PdEq was used for reporting Mineral Resources in a constrained pit and 2.00 g/t PdEq was used for reporting the out-of-pit Mineral Resources.*
4. *Palladium Equivalent (PdEq) calculated using (US$): $950/oz Pd, $950/oz Pt, $1,275/oz Au, $1500/oz Rh, $2.75/lb Cu, $5.25/lb Ni, $36/lb Co.*
5. *Numbers may not add exactly due to rounding.*
6. *Mineral Resources that are not Mineral Reserves do not have economic viability.*

The amended updated Mineral Resource Estimates were completed on the Dana North, Dana South, Pine, Banshee, Lismer, Lismer Extension, Varley, Azen, Razor, and River Valley Extension (Mustang) Zones, using the OK methodology on a capped and composited drill hole dataset consistent with industry standards. Validation of the results was completed by visual inspection, swath plots and global statistical comparison of the model against ID^2 and NN models.

This amended, updated Mineral Resource Estimate is superseded by the updated Mineral Resource Estimate described in Section 14 of this Technical Report.

6.9 2019 PRELIMINARY ECONOMIC ASSESSMENT

A Preliminary Economic Assessment (“PEA”) study of the River Valley Project was completed by P&E in 2019 (P&E, 2019).

In a Company press release dated August 8, 2019, NAM announced receipt of a positive PEA for the River Valley Project, with an effective date of June 27, 2019. The PEA was based in part on the pit-constrained updated Mineral Resource Estimate by WSP dated January 9, 2019. Results of the PEA are presented in Table 6.24 and indicate an after-tax net present value (“NPV”) of $138M at a 5% discount rate, an internal rate of return (“IRR”) of 10% and a 7-year payback. The initial capital expenditure was estimated at $495M. All currency values are expressed in Q2 2019 Canadian dollars.

The 2019 PEA is superseded by the PEA results noted in this Technical Report. The Issuer is not treating the 2019 PEA as current and it should not be relied upon.

TABLE 6.24 2019 PEA ECONOMIC RESULTS		
Item	**Pre-Tax**	**After Tax**
Undiscounted NPV ($M)	586	384
NPV (5%) ($M)	262	138
IRR (%)	13	10
Payback (years)	6.6	7.0

6.10 PAST PRODUCTION

The River Valley Palladium Deposit has never been mined.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The River Valley Intrusion is part of the Paleoproterozoic East Bull Lake Intrusive Suite, age-dated between 2,491 Ma and 2,475 Ma. The East Bull Lake Suite consists of several gabbronorite to gabbroic anorthosite plutons that occur in the Southern and Grenville Provinces at the southern margin of the Superior Province (Figure 7.1) (Easton, 1999; James *et al*., 2002a). The plutons intrude Archean host rocks and are associated with the Paleoproterozic supracrustal rocks of the Southern Province (Figure 7.2).

FIGURE 7.1 REGIONAL GEOLOGY

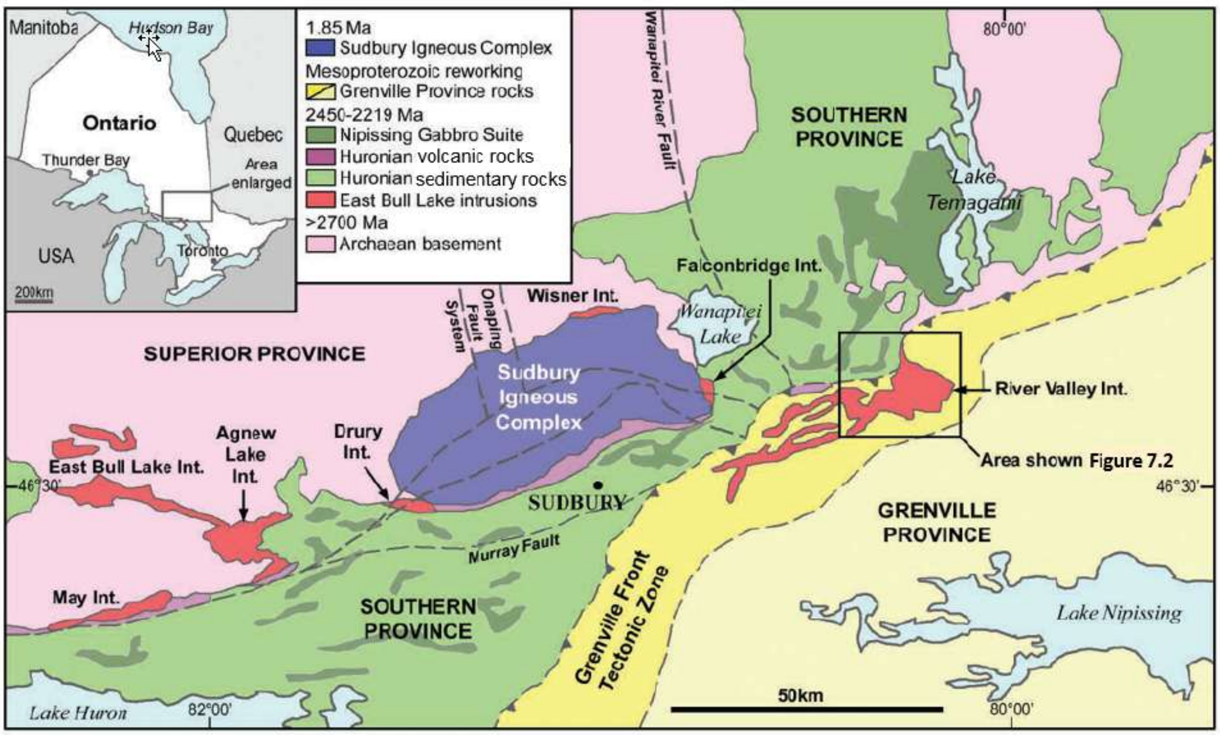
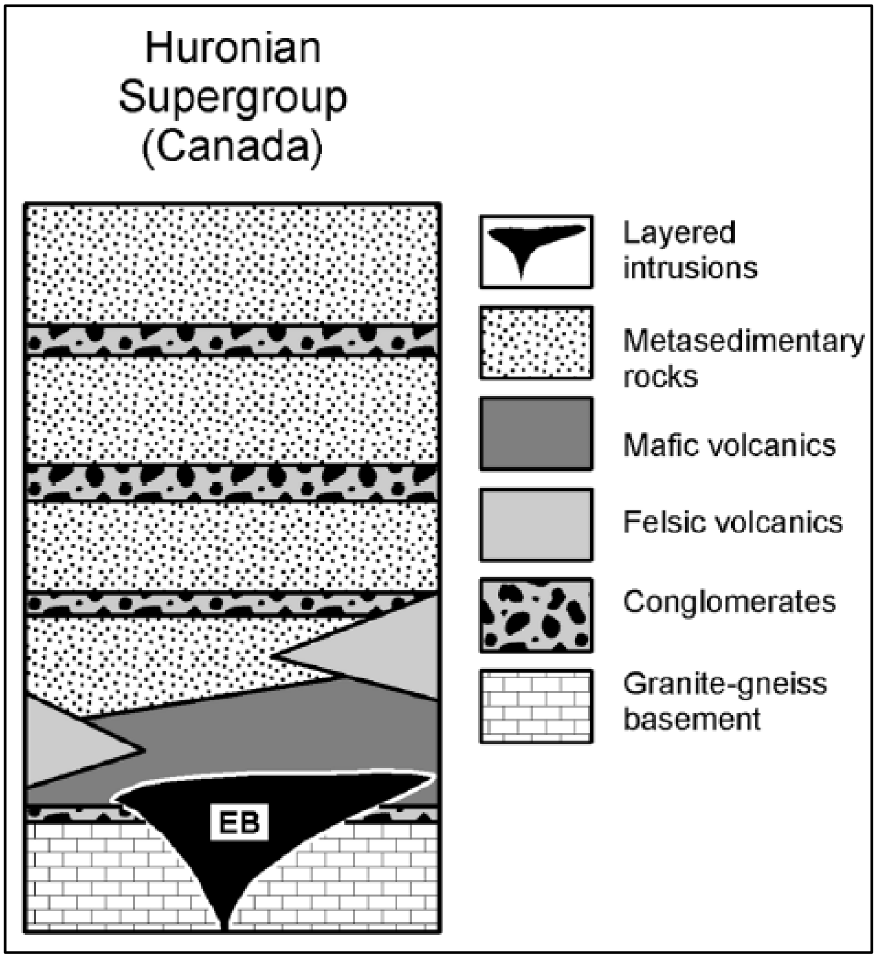


FIG. 1. Geologic map of the Sudbury area, Ontario, showing the major intrusions in the East Bull Lake intrusive suite (after James et al., 2002a).

Source: *Holwell et al. (2014) and P&E (2021)*

FIGURE 7.2 STRATIGRAPHIC COLUMN OF THE PALEOPROTEROZOIC SUPRACRUSTAL SEQUENCE ON THE SOUTHERN SUPERIOR PROVINCE



Source: *Easton et al. (2010)*
Notes: *EB = East Bull Lake intrusive suite, which includes the River Valley Intrusion*

Intrusions of the East Bull Lake Intrusive Suite share a number of common characteristics in addition to lithology, including typically sill-like to lopolithic forms, igneous layering, and anomalous PGE content. The emplacement of the East Bull Lake Intrusive Suite bodies, the subsequent eruption of volcanic rocks belonging to the Huronian Supergroup, and the formation of the depositional basin filled by Huronian Supergroup sediments is attributed by most authors to a Paleoproterozoic intracontinental rifting event, which resulted from a mantle plume that was centered near Sudbury (Easton, 2003; Easton *et al*., 2004). Rift related magmatic activity is also manifested in the gabbroic rocks of the Hearst Matachewan dyke swarm.

The East Bull Lake Suite Intrusions exhibit geochemical characteristics (high aluminum, relatively low magnesium and Large Ion Lithophile ("LIL")-enriched trace element profiles), consistent with derivation from fractionated tholeiitic or high-alumina tholeiitic parental magmas (Peck *et al*., 1993; Peck *et al*., 1995; Vogel *et al*., 1998). The estimated parental magma compositions for the East Bull Lake Intrusive Suite are thus broadly similar to those postulated for the intrusive suite in the world class Noril'sk-Talnakh nickel copper-PGE camp in Siberia (Findlay, 2001).

The three largest and most economically interesting bodies of the East Bull Lake Intrusive Suite are the East Bull Lake and Agnew Lake Intrusions (situated within the Sudbury Province) and the River Valley Intrusion (situated in the Grenville Front Tectonic Zone). Smaller bodies include the intrusions in Drury, Falconbridge, May, Street, and Wisner Townships (Easton *et al*., 2004).

The most completely preserved of the three largest mineralized bodies is the Agnew Lake Intrusion with approximately 2 km of preserved stratigraphy, whereas the East Bull Lake and River Valley Intrusions have roughly only 1 km. The significant volume of melanocratic norites and troctolites in the River Valley Intrusion are not present in the intrusions west of the Grenville Front and may indicate that the former represents a deeper level of intrusion (Easton *et al*., 2004).

An economically important feature commonly shared by the River Valley, Agnew Lake and East Bull Lake Intrusions is the occurrence of the copper-nickel-PGE-bearing Breccia Unit on the base of the intrusions. The breccia units are characterized by inclusions of footwall and cognate mafic to ultramafic xenoliths and autoliths set within a gabbronorite to olivine-bearing gabbronorite matrix. Near the contact, marginal footwall breccias and zones of extensive footwall dykes may also be present. Blebby to disseminated chalcopyrite and pyrrhotite in amounts from 0.5% to 2.0% occur in the matrix of the marginal and brecciated rocks, and within the mafic fragments. This sulphide mineralization commonly contains between 1 g/t and 5 g/t combined platinum-palladium-gold and remains the focus of current mineral exploration (James *et al.*, 2002a; 2002b).

7.2 PROPERTY GEOLOGY

The River Valley Intrusion, the largest of the East Bull Lake Intrusive Suite by area, covers an area of approximately 200 km^2 (Figure 7.3). On the ground held by NAM, the contact between the River Valley Intrusion and the Archean basement trends southeasterly for approximately 16 km. The mineralized breccia unit occurring on the contact has been identified along most of this 16 km strike length. The mineralized breccia unit contact is divided into many zones. Starting in the northwest and proceeding to the southeastern extent of the Property, these areas are: Dana North, Dana South, Banshee, Lismer Extension, Lismer Ridge, Varley, Azen, Jackson's Flats, Razor and Mustang (also known as River Valley Extension). Drill data suggests that the dip between the contact of the mineralized breccia and the Archean footwall gneiss ranges from about 65º to 75° west, toward the intrusion. The dip is, however, highly variable along strike, ranging from 65º to 85° west to 65º to 85° east (overturned). East of the Dana South Zone, drill data suggests that the River Valley Intrusion/Archean footwall contact generally dips 60º to 70°W.

FIGURE 7.3 PROPERTY GEOLOGY

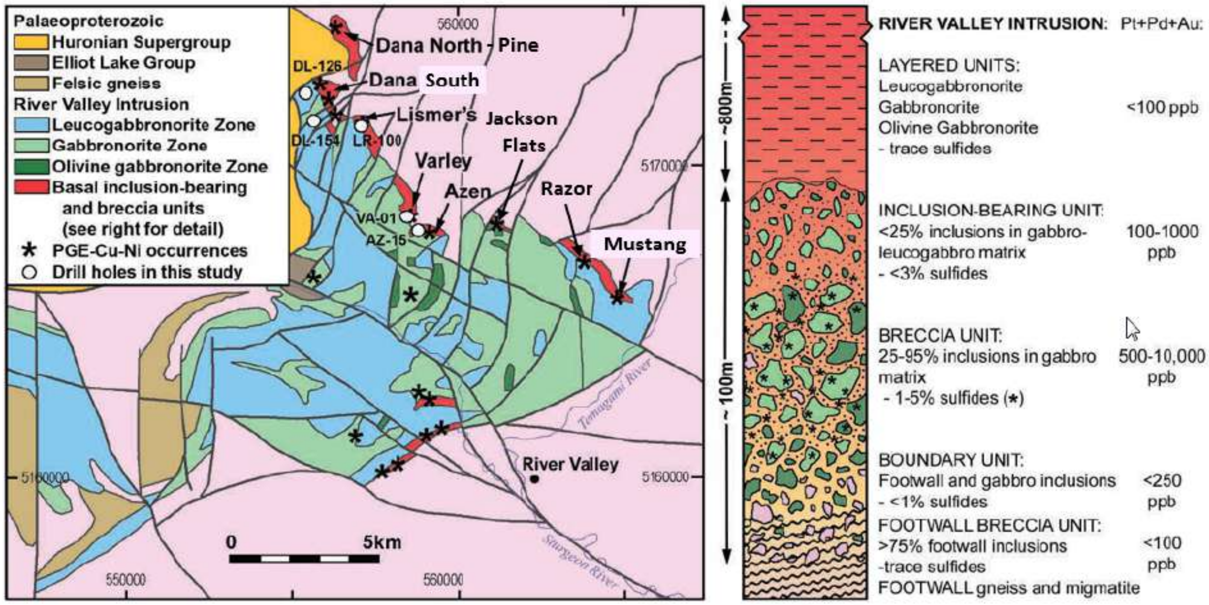


FIG. 2. Geologic map and generalized stratigraphy of the River Valley intrusion (after James et al., 2002b). The stratigraphic column shows in detail the units defined in the basal 100 m of the River Valley intrusion, together with an indication of typical precious metal concentrations (after James et al., 2002b).

Source: *Holwell et al. (2014).*

Along the Grenville Front, in northwest Dana Township, the River Valley Intrusion is in thrust contact with quartzite of the Mississagi Formation (Davidson, 1986). In west-central and southwest Dana Township, the River Valley Intrusion is in contact with mafic and felsic metavolcanic rocks of the lower Huronian Supergroup (Easton and Hrominchuk, 1999).

On the basis of surface mapping and diamond drilling, the idealized sectional stratigraphy of the mineralized environment within the margin of the River Valley Intrusion consists of five major units (see Figure 7.3), which from west to east are as follows:

- **Layered Sequence**: units of massive pyroxenite to anorthosite, forming the bulk of the River Valley Intrusion; layering is poorly developed but where present is subvertical;

- **Inclusion-bearing Zone**: 1.65 m to 98.50 m wide; scattered, elevated PGE values; mainly leucogabbro-gabbro fragments (<20% volume) with either fine-grained mafic matrix or medium-grained felsic matrix; fragments are generally larger (dm to m scale) than those in the Breccia Zone;

- **Breccia Zone**: 11.50 m to 193.05 m wide; elevated PGE values (Main Zone); mainly gabbro melagabbro fragments (>20% volume) with fine- to medium grained mafic matrix; fragments are generally small (centimetre to decimetre scale). This Unit is the most important host rock for PGE mineralization at River Valley;

- **Boundary Zone:** 0 m to 40 m wide; also referred to as footwall breccia; where present, consists of country rock (Archean paragneiss/migmatite) mixed with River Valley Intrusive rocks; and

- **Country Rock:** Footwall or hanging wall Archean paragneiss-migmatite-gabbro and Huronian metasedimentary rocks.

7.3 HYDROTHERMAL, METAMORPHIC AND STRUCTURAL OVERPRINTS

In general, the rocks of the River Valley Intrusion are hydrothermally altered, metamorphosed to low- and medium-grade regional metamorphic mineral assemblages, and structurally deformed.

7.3.1 Regional Metamorphism and Structural Geology

The River Valley Intrusion north of the Sturgeon River Fault, shows an increase in metamorphic grade to southeast from the Grenville Front and into the main Grenville Terrane (Figure 7.1). River Valley Intrusion rocks west of Dana Lake show a mid- to upper-greenschist facies regional metamorphic overprint. At the Lismer Ridge Zone, the regional metamorphic grade is lower amphibolite facies. From the Varley to Razor to Mustang Zones, the regional metamorphic grade is mid- to upper-amphibolite facies.

North of the Sturgeon River Fault, numerous northeast-trending discreet shears/faults transect the River Valley Intrusion and are interpreted to be synchronous with development of the Grenville Front Thrust and Grenville Thrust Boundary Fault. In addition, north-trending faults cut the River Valley Intrusion. These north-south faults occur approximately 0.5 km to 1.0 km apart and bound segments of the intrusion that have apparent displacements of up to 1.3 km to the south-southwest or north-northeast. These faults may be part of the Upper Wanapitei River Fault system, which has a protracted history dating back to at least 2,170 Ma (Buchan and Ernst, 1994; Easton, 2003).

A zone of northwest-trending faults transects the River Valley Property parallel to the Sturgeon River Fault (Figure 7.3). The Sturgeon River Fault juxtaposes highly deformed and recrystallized River Valley Intrusion rocks of the Grenville Province against River Valley Intrusion rocks of the Southern-Grenville Province Boundary Zone (Easton, 2003; Figure 7.1). River Valley Intrusion rocks north of the Sturgeon River Fault generally are much less deformed and commonly exhibit preserved or partly preserved primary magmatic textures and even minerals.

7.3.2 Hydrothermal Alteration and Metamorphic Overprints

The manifestations of the hydrothermal and metamorphic overprints of the primary magmatic mineral assemblage and textures are highly variable (Price, 2010; Holwell *et al*., 2014). The following descriptions and interpretations are derived largely from Holwell *et al.* (2014).

7.3.2.1 Mafic Igneous Inclusions

The mafic igneous inclusion rock types are melano-, meso-, and leucogabbros, made up of varied proportions of clinopyroxene and plagioclase. The gabbroic mineralogy is altered in two texturally different ways, with some samples displaying a hydrothermal alteration assemblage and texture (Figure 7.4A) that is possibly related to greenschist metamorphism, and others a recrystallized amphibolite-facies metamorphic assemblage (Figure 7.4B). In the hydrothermally altered rocks, the mineralogy is dominated by partial to total replacement of the pyroxenes by fine-grained acicular tremolite and actinolite. Sulphides are overprinted by the secondary amphiboles and appear to have been present in the interstices to the original silicate minerals.

In rocks with a metamorphic texture, all clinopyroxene is recrystallized to fine-grained hornblende and biotite (Figure 7.4B). Plagioclase remains largely unaltered, although it does show evidence of recrystallization. The recrystallized fine to medium-grained amphiboles and biotite lack fabric. Sulphides are blebby and show minor replacement by amphibole around their margins.

FIGURE 7.4 HYDROTHERMAL ALTERATION AND METAMORPHISM IN THE BRECCIA UNIT

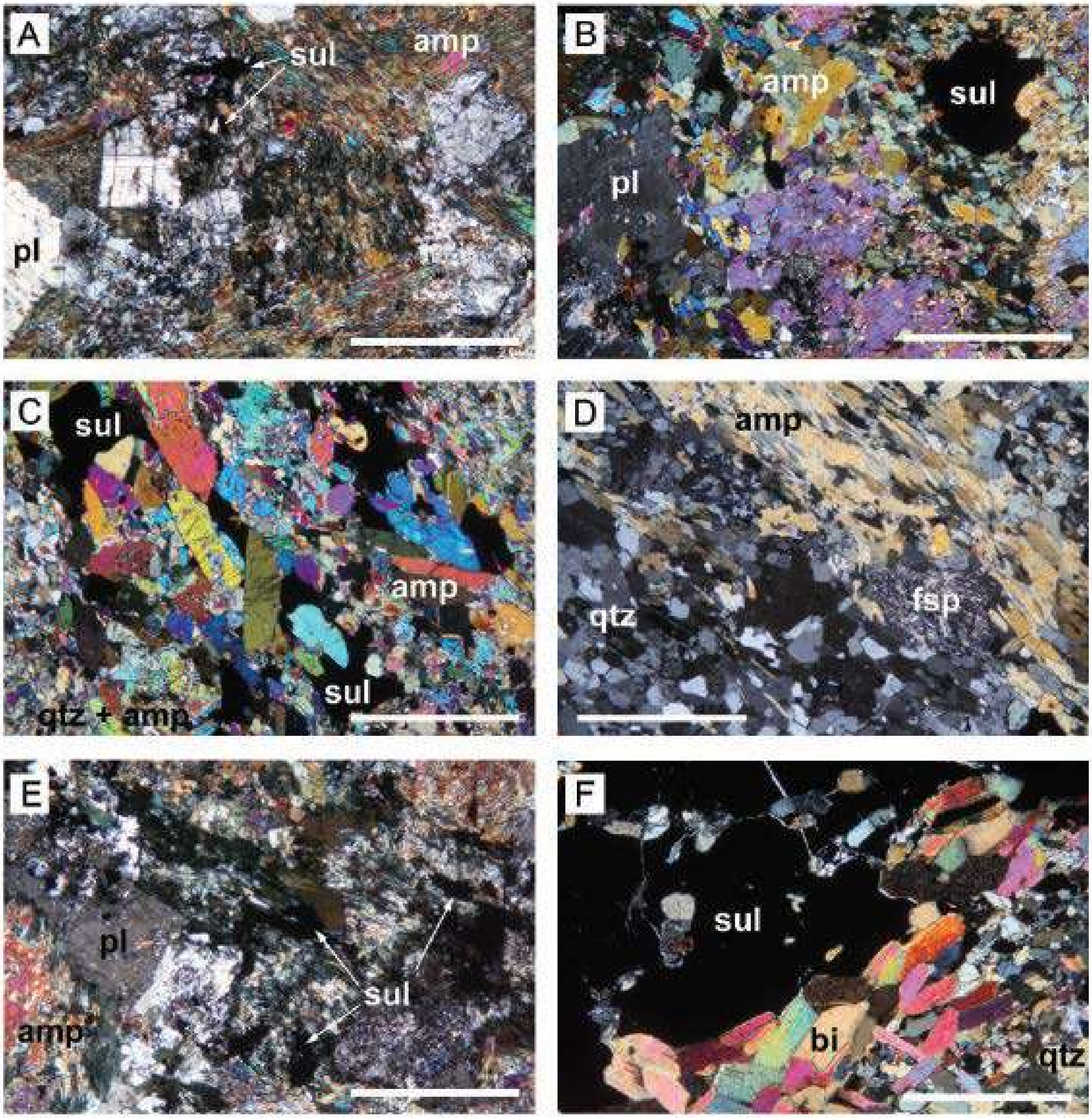


FIG. 4. Petrology (crossed polarized transmitted light) of the main rock types and textural associations in the Breccia zone of the River Valley intrusion. All scales bars = 1 mm. A. hydrothermally altered gabbro inclusion showing relatively unaltered plagioclase (pl), patchily disseminated sulfides (sul), and acicular amphibole (amp) after clinopyroxene. B. Metamorphosed gabbro inclusion showing recrystallized plagioclase and amphibole with blebby sulfides. Amphibole is seen to overprint sulfide around the margins of the blebs. C. Amphibolite inclusion showing both medium- and very fine grained bands of quartz (qtz) and amphibole, with amphibole overprinting sulfide. D. Amphibolite inclusion showing foliation defined by bands of aligned amphiboles and bands of recrystallized quartz. E. Hydrothermally altered leucogabbro matrix showing variably altered plagioclase, patchy sulphides, and alteration amphiboles after clinopyroxene. F. Metamorphosed gabbro matrix with a large bleb of sulfide slightly replaced by biotite (bi) in a recrystallized groundmass of amphibole and quartz.

Source: *Holwell et al., (2014)*

7.3.2.2 Amphibolite Inclusions

Amphibolite inclusions show a recrystallized metamorphic texture of amphibolite grade, composed of aligned hornblende crystals that define a predominant fabric in the rock (Figure 7.4C, D). Hornblende makes up 70 to 80% of the mineralogy and is present in bands of very fine and medium-grain size, with individual bands several millimetres in thickness. Quartz makes up the remainder of the rock and is recrystallized with 120° triple junctions and lacks evidence for post-crystallization strain. Minor feldspar grains are also present and invariably altered to sericite. Base metal sulphides are overprinted by the metamorphic amphiboles and occur predominantly in the medium-grained bands.

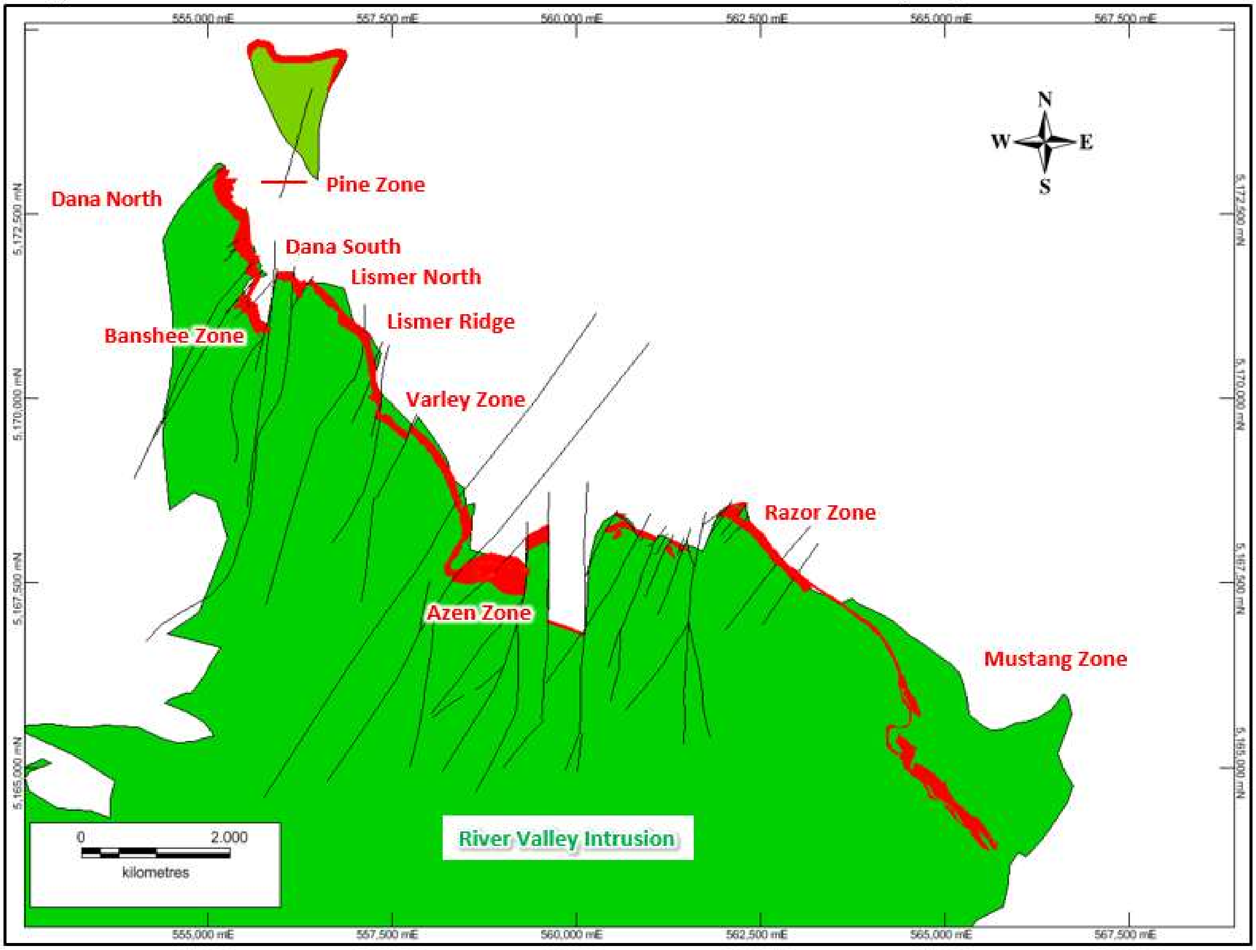
7.3.2.3 Matrix

The matrix of the inclusion-bearing units is composed of mesocratic gabbro that is more homogeneous in terms of modal mineralogy compared with the leuco-, meso-, and melanocratic mafic inclusions. However, the constituent mineralogy and textures of the matrix are almost identical to that of the mafic inclusions, being composed of clinopyroxene (extensively altered or recrystallized to amphibole) and smaller amounts of altered plagioclase. Grain size is medium to coarse and the proportion of plagioclase to ferromagnesian minerals varies and as such, the rocks may be classified as altered leuco-, meso-, or melano-gabbros. In the mafic inclusions, some samples show a hydrothermal alteration of the clinopyroxenes to fine-grained tremolite and actinolite, which overprint the sulphides producing patches of fine-grained dissemination of sulphides (Figure 7.4E). Other samples show metamorphic textures, with all clinopyroxene recrystallized to fine-grained hornblende and biotite with blebby sulphides with only minor replacement (Figure 7.4F).

7.4 DEPOSIT GEOLOGY

The River Valley Deposit is offset along the high-angle north-northeast trending faults into 13 separate mineralized zones. Ten of these mineralized zones comprise the Mineral Resource Estimates described in Section 14 of this Technical Report. These ten Zones are: Pine, Dana North, Dana South, Banshee, Lismer North (also known as Lismer Extension), Lismer Ridge (also known as Lismer Main), Varley, Azen, Razor, and Mustang (Figure 7.5). Each of them is described briefly below.

FIGURE 7.5 DISTRIBUTION OF THE MINERALIZED ZONES OF THE RIVER VALLEY DEPOSIT

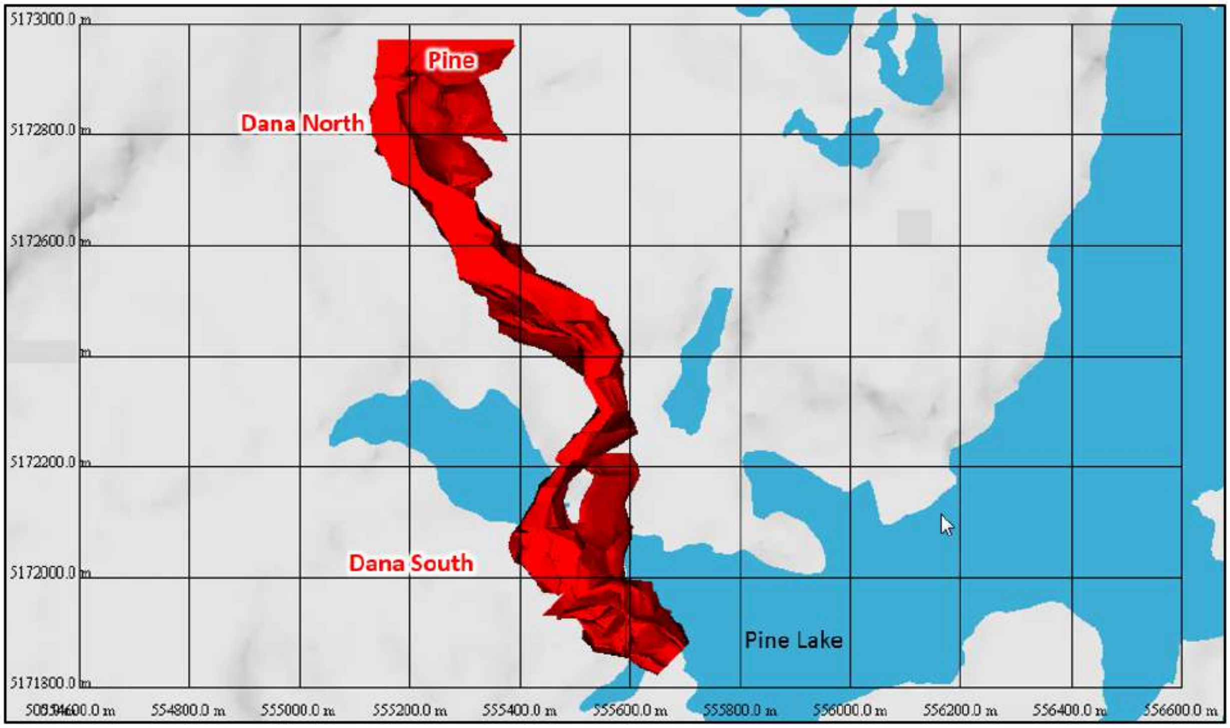


Source: *NAM (2021)*
Figure Description: *Geological map showing the offsets of the River Valley Deposit (**red**) along north and northeast-trending faults into the separate mineralized zones. Note that the Pine Zone is situated at depth, to the east of the Dana North Zone.*

7.4.1 Dana North Zone

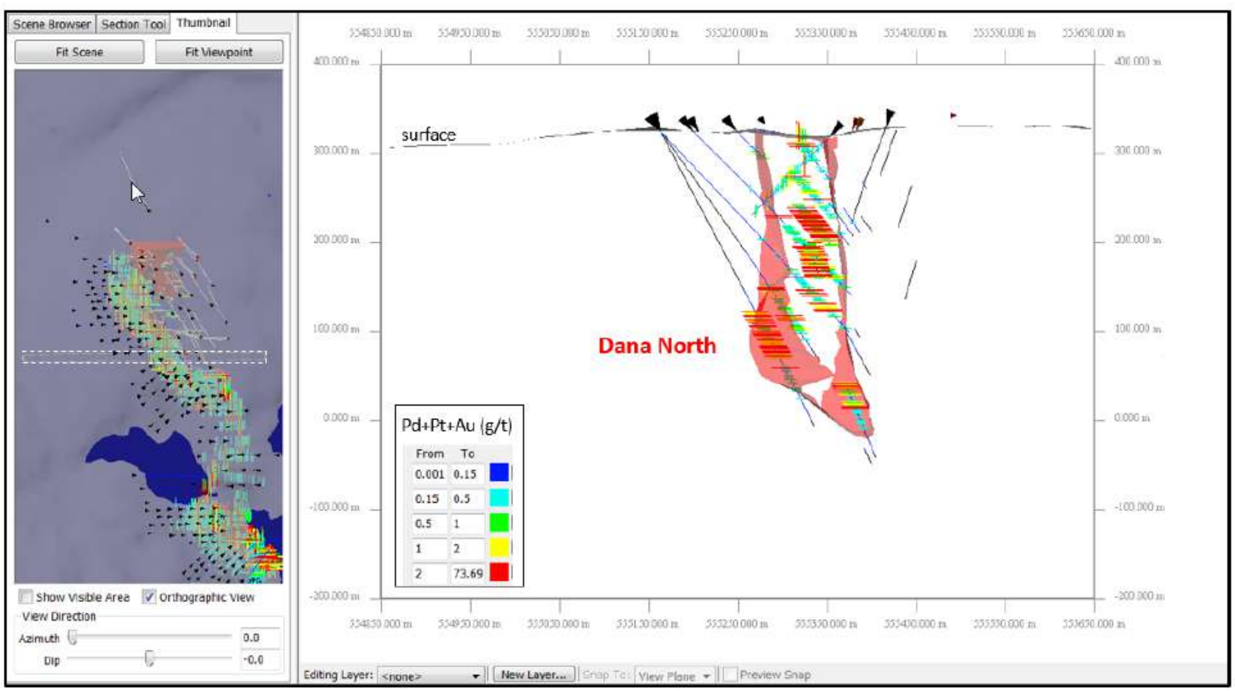
The Dana North Zone is the most northern major mineralized zone of the River Valley Deposit (Figures 7.5 and 7.6). The Zone is well defined by five large, excavated trenches, surface sampling and extensive drilling since 2000. Dana North has a strike length of approximately 1,000 m and dips 80 to 85° to the west-southwest, however, locally is overturned. The Zone averages 100 m in apparent thickness (Figure 7.7) and varies greatly between drill holes and vertical cross-sections.

FIGURE 7.6 PLAN VIEW OF DANA NORTH-PINE-DANA SOUTH ZONE 3-D MODELS ON TOPOGRAPHY



Source: *P&E (2021)*

FIGURE 7.7 DANA NORTH 3-D CROSS-SECTION PROJECTION 5,172,600 M N



Source: *P&E (2021)*

Figure Description: *Left: Plan view showing line-of-section; Right: View looking north through 25 m wide projection window.*

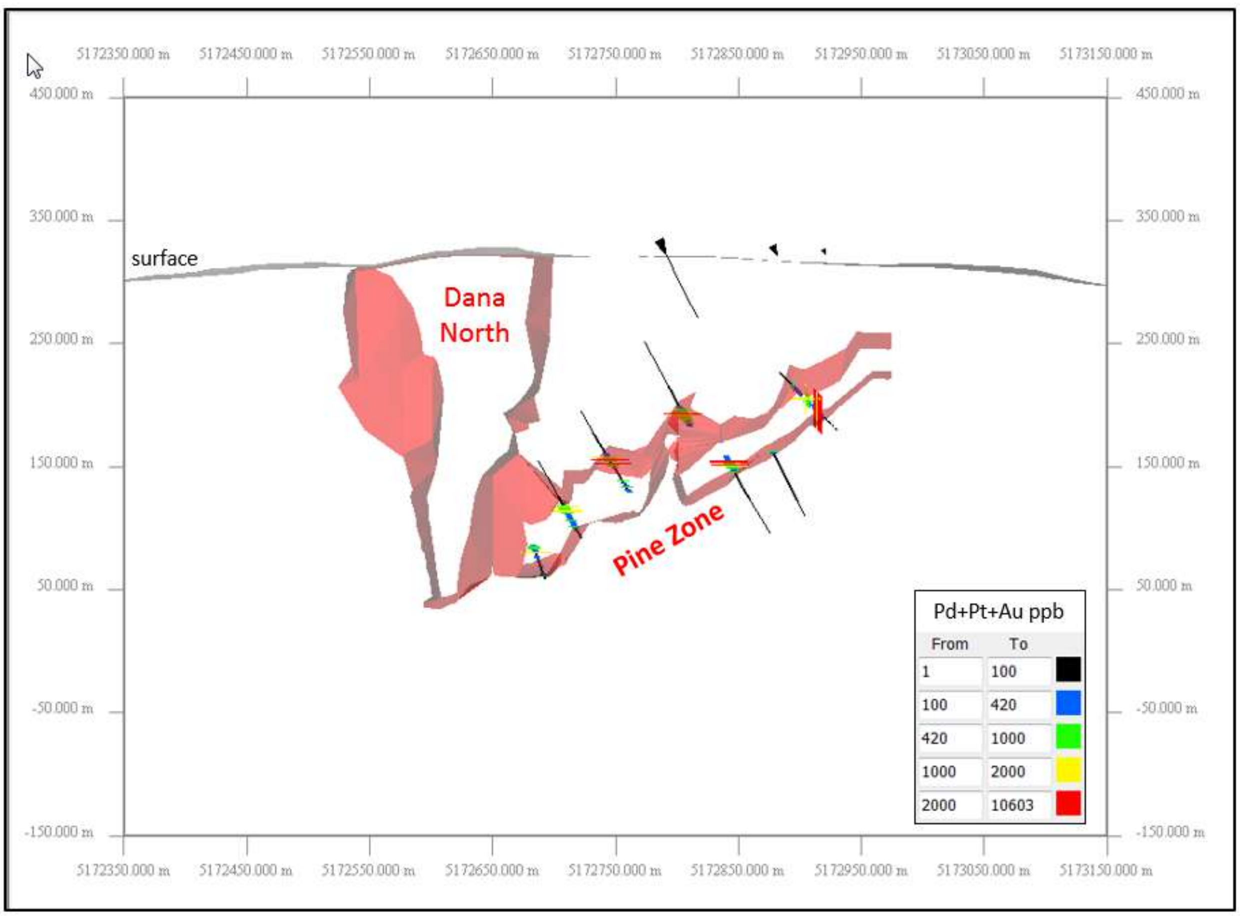
The host rocks of the Dana North Zone have undergone upper greenschist facies regional metamorphism and appears to have been deformed into an open "S-shape". Magmatic pyroxene and plagioclase is largely replaced by metamorphic amphibole and albite. However, primary igneous textures are generally well preserved. Dana North is bound to the north and at depth by the West Boundary Shear Zone and is separated from Dana South by the northeast-trending Platadium Pond Deformation Zone.

7.4.2 Pine Zone

The Pine Zone is a small zone located to the east of Dana North (Figure 7.6). This Zone is defined completely by drilling. The Pine Zone was discovered as a result of two drill holes completed to test an IP chargeability high in 2015. The Pine Zone strikes roughly perpendicular to Dana North and dips to the southeast at approximately 40º to 45° (Figure 7.8). The average apparent thickness of the Zone is 45 m, however, eastwards it thins to 15 m and ultimately appears to pinch out, based on limited drilling.

The Pine Zone is bound to the north and at depth by the West Boundary Shear Zone. Whether the Pine Zone is structurally emplaced or a relict magmatic feeder feature remains to be determined.

FIGURE 7.8 PINE ZONE 3-D MODEL CROSS-SECTION PROJECTION 555,300 M E

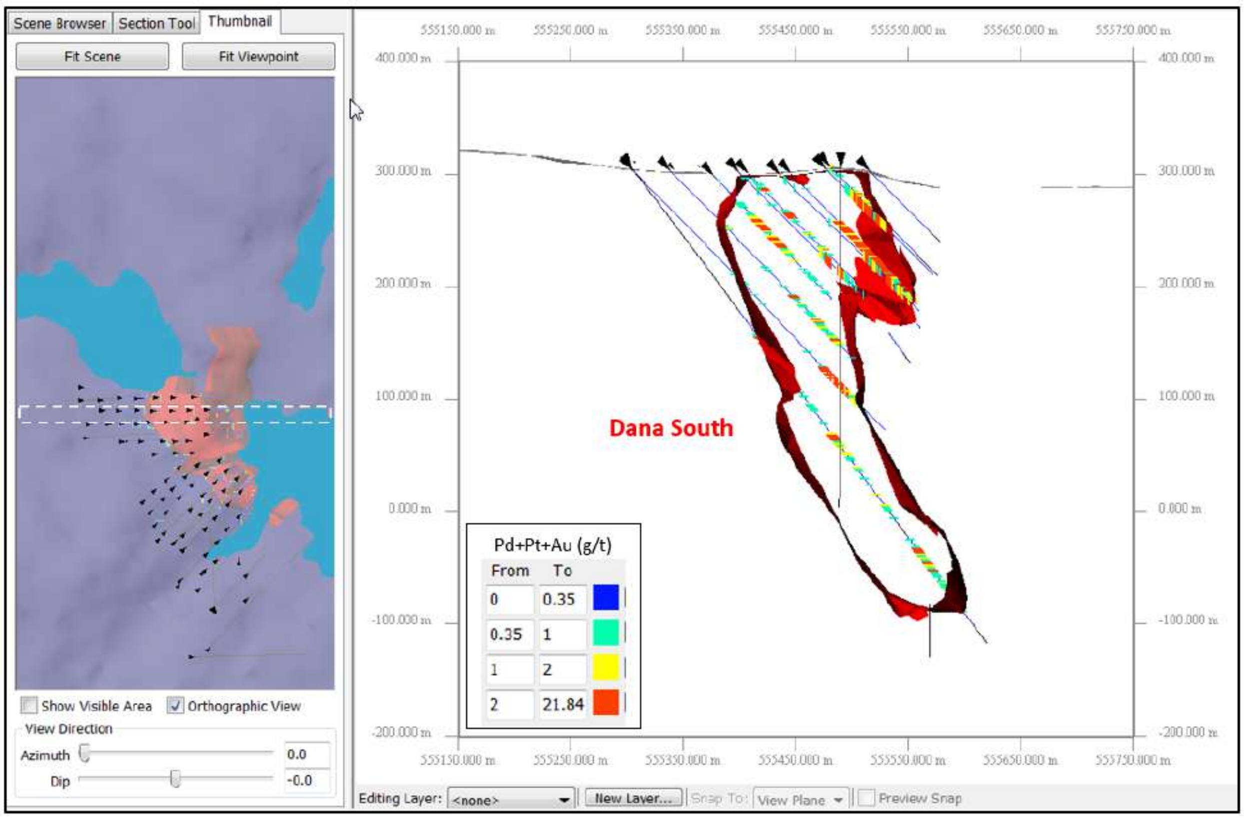


Source: *P&E (2021)*
Figure Description: *View looking west through 25 m wide projection window.*

7.4.3 Dana South Zone

The Dana South Zone is a moderate size zone located south of Dana North (Figure 7.5). This Zone is defined by exposure in an excavated trench (South Zone) and in extensive drilling and surface sampling. This Zone is approximately 250 m in length, strikes roughly north-northwest to northwest and dips 80º to 85° to the west-southwest, however, is locally overturned at depth and varies greatly in apparent thickness between drill holes and vertical cross-sections (Figure 7.9). Dana South has been traced in drilling to depths of 500 m below surface, in the deepest drilling completed to date at River Valley.

FIGURE 7.9 DANA SOUTH 3-D MODEL CROSS-SECTION PROJECTION 5,172,050 M N



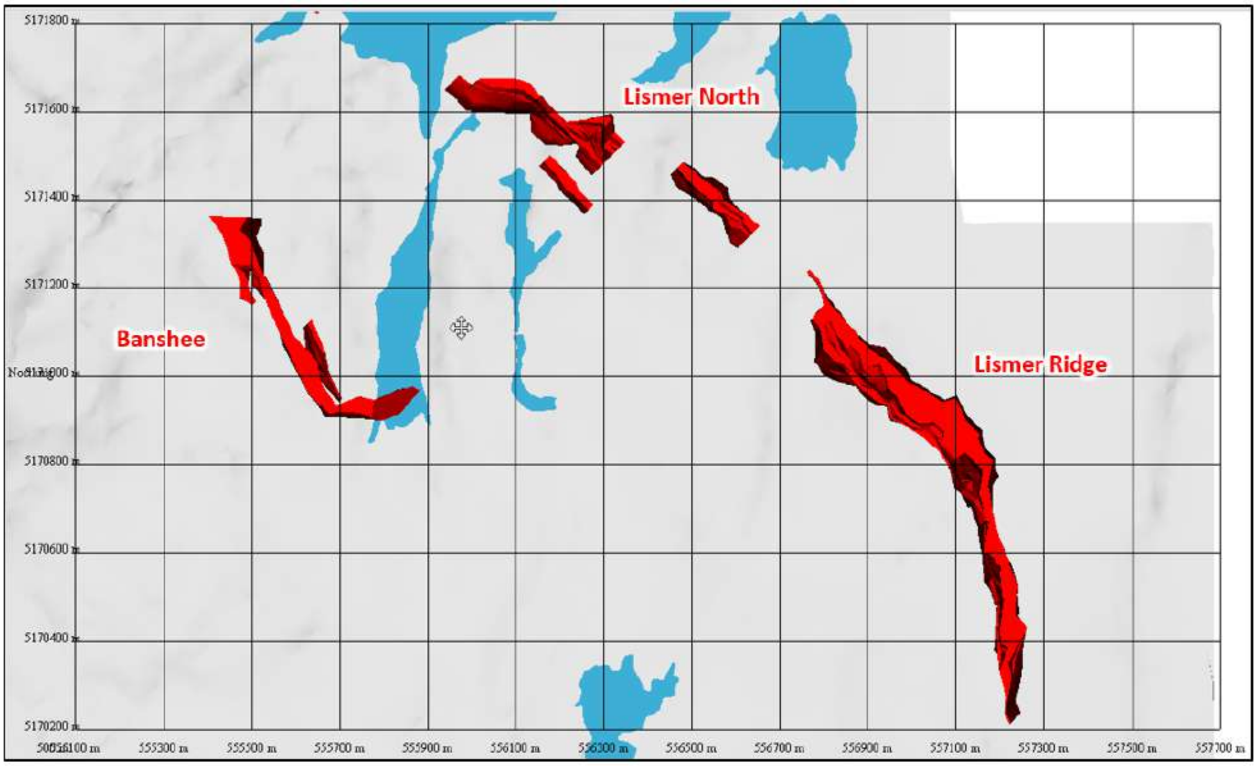
Source: *P&E (2021)*
Figure Description: *View looking north through 35 m wide projection window.*

The rocks at Dana South have undergone mid- to upper-greenschist metamorphism and the southern extent of this Zone exhibits structural disturbance, due to the proximity of the Dana Lake Shear Zone.

7.4.4 Banshee Zone

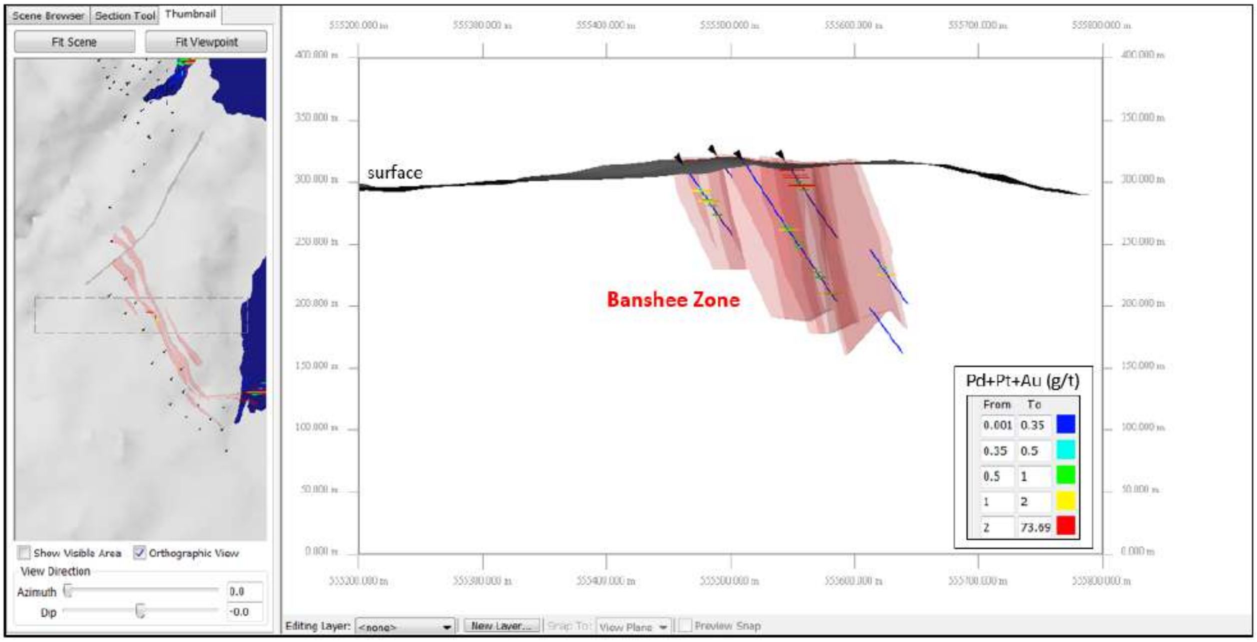
The Banshee Zone is situated to the south of Dana South (Figure 7.5) and has been displaced between 400 and 700 m southwestward relative to the adjacent Dana Zones and Lismer Zones (Figure 7.10). This Zone is defined in surface exposures and in widely spaced drilling to 2020 (22 drill holes totalling 4,274 m). Banshee is 550 m long, up to 100 m in apparent thickness, strikes generally north-northwest, dips from 60 to 70° southwest to steeply northeast (overturned) and has been traced in drilling to an average depth of 135 m and a maximum depth 261 m below surface (Figures 7.10 and 7.11).

FIGURE 7.10 PLAN VIEW OF BANSHEE, LISMER NORTH AND LISMER SOUTH ZONES 3-D MODELS



Source: *P&E (2021)*

FIGURE 7.11 BANSHEE ZONE 3-D MODEL CROSS-SECTION PROJECTION 5,171,150 M N



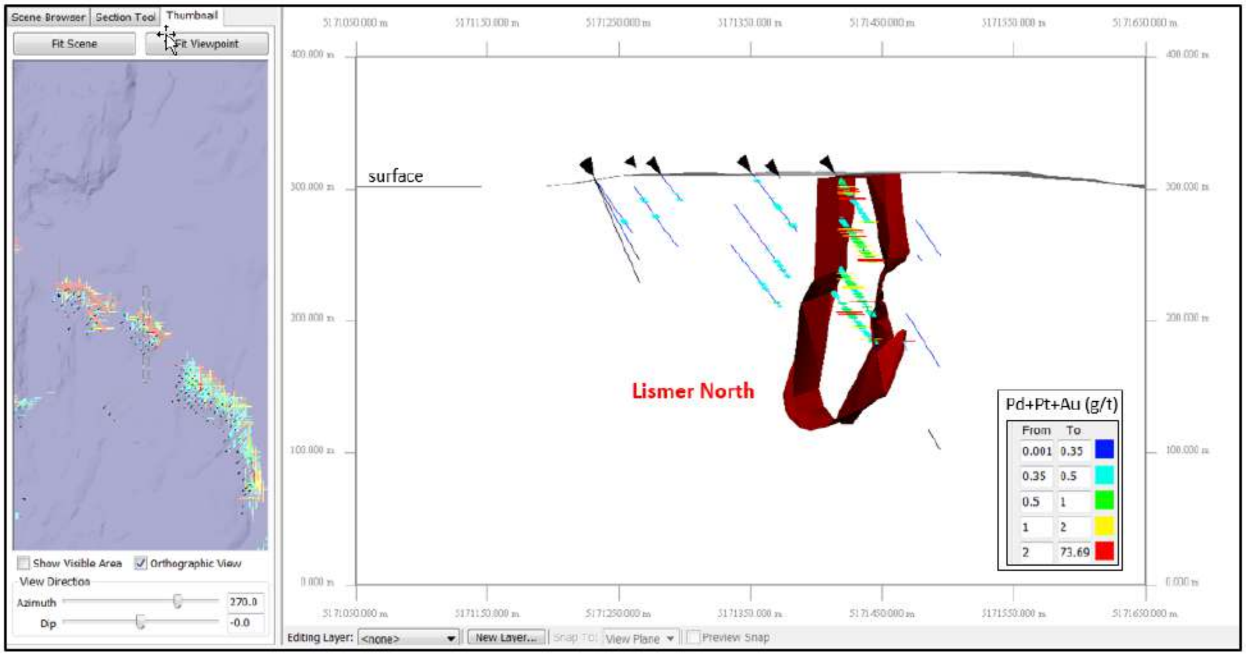
Source: *P&E (2021)*
Figure Description: *View looking north through 100 m wide projection window.*

The Banshee Zone host rocks have undergone lower amphibolite facies regional metamorphism and show more fractures and penetrative deformation fabrics (shears and foliation) compared to the Dana Zones.

7.4.5 Lismer North Zone

The Lismer North Zone (also known as Lismer Extension) is a structurally complex zone located northeast of the Banshee Zone and to the east of the Dana Lake Fault Zone system (Figures 7.5 and 7.10). Lismer North has been defined based on surface exposure and drilling. The Lismer North Zone is 850 m long, up to 100 m in apparent thickness, dips from vertical to 60º to 70° south and southwest, and has been traced to depths of approximately 200 m in drilling (Figure 7.12). As in the Dana Zones, the majority of the mineralization is hosted in the Breccia Unit. The Breccia Unit at Lismer North Zone is irregular in shape and widens from 5 m to 10 m at surface to >100 m at depth.

FIGURE 7.12 LISMER NORTH ZONE 3-D MODEL CROSS-SECTION PROJECTION 5,171,350 M N



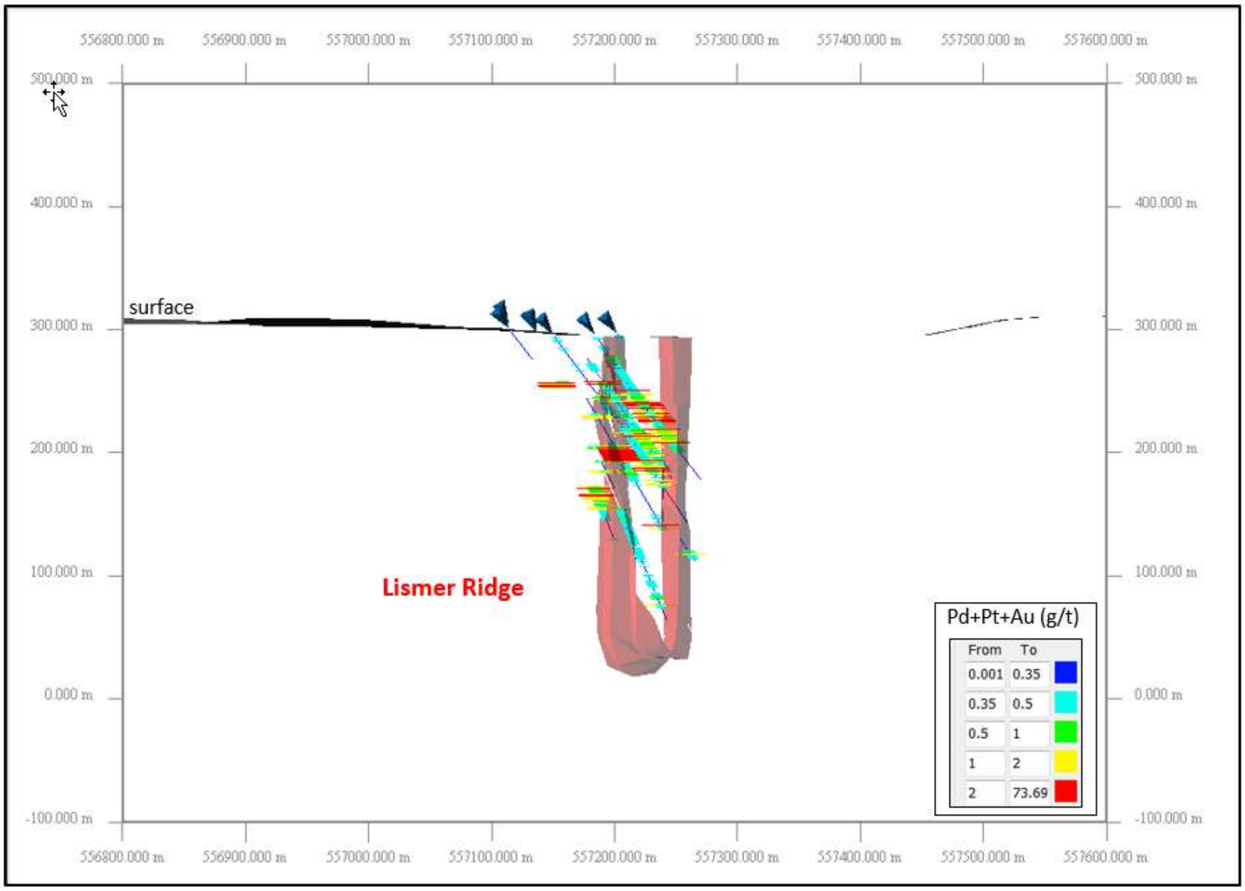
Source: *P&E (2021)*
Figure Description: *View looking west through 35 m wide projection window.*

The Lismer North Zone is broken by oblique faults and gabbro dykes into three sub-zones that trend east-west and northwest (Figure 7.10). The regional metamorphic grade is lower- to mid-amphibolite facies and the host rocks exhibit more penetrative structural foliation than the Zones farther north. The rocks are more highly chloritized and contain more biotite relative to the other zones. Trace amounts of talc have been detected in recent QEMSCAN work on Lismer MC-LCT material at SGS (SGS, 2022).

7.4.6 Lismer Ridge Zone

The Lismer Ridge Zone is located to the southeast of Lismer North (Figure 7.10). Lismer Ridge is defined from surface exposures and extensive drilling. This Zone is 1,600 m long, 25 m to 50 m thick, dips vertically to steeply northeast (i.e., overturned), and has been traced in drilling to a vertical depth of up to 300 m (Figure 7.13). Metamorphic and structural overprints are similar to those at the Lismer North Zone.

FIGURE 7.13 LISMER RIDGE 3-D MODEL CROSS-SECTION PROJECTION 5170450 M E



Source: *P&E (2021)*
Figure Description: *View looking north through 100 m wide projection window.*

According to Derry *et al*. (2004), mineralization at Lismer Ridge occurs as planar sheets that are steeply dipping to vertical in orientation. The sheets vary in thickness from 5 m to 35 m (average 10 m to 25 m) and show excellent continuity along strike. There is also a higher proportion of chalcopyrite relative to pentlandite + pyrrhotite at Lismer Ridge and chalcopyrite is more commonly recrystallized along foliation planes. At Lismer Ridge, blue quartz is not as common in the mineralized rocks as in the Dana Zones. Trace amounts of talc have been detected in recent QEMSCAN work on Lismer MC-LCT material at SGS (SGS, 2022).

7.4.7 Varley Zone

The Varley Zone lies southeast of the Lismer Ridge Zone (Figure 7.5) and is similar in geologic setting, mineralization, and geometry. According to GeoSims (2006), between October 2003 and May 2005, 70 drill holes were completed totalling 12,811 m at Varley. The drill sites were initially located on 100 m spaced vertical cross-sections, with subsequent in-fill drilling on 50 m spaced vertical cross-sections. A total of 7,183 samples have been analyzed for Pd, Pt, Au, Cu and Ni. The Varley Zone was also included in the detailed lithogeochemical study of Howell *et al.* (2014). A total of 46 samples were analysed for platinum metals. In addition to Pd, Pt and Au, minor PGE values of up to 372 ppb Rh, 32 ppb Ru and 71 ppb Ir were reported.

The drilling defined a continuous zone of low-grade (>0.2 g/t Pd + Pt) mineralization extending for approximately 1,600 m near the steep contact between the gabbro breccia and footwall rocks. At about 5,169,000 m north, the strike of this contact veers from about 345° to 315° as it trends north. Barren mafic dykes were encountered near 5,168,173 m and 5,168,412 m north (in UTM NAD83 Zone 17N).

A relatively higher grade (>1 g/t Pd + Pt) portion is located near the south end of the Varley Zone. This part has been traced in drilling for approximately 400 m along strike and up to 150 m vertically below surface.

7.4.8 Azen Zone

At the Azen Zone, the strike of the basal contact of the River Valley Intrusion changes from north-south to roughly east-west (Figure 7.5). As defined in outcrops, surface excavations, and drilling, the Azen Zone has a strike length of approximately 1,000 m, an apparent thickness of up to 400 m, and dips 30 to 50° south. 20 drill holes were completed totalling 5,166 m, 17 of which were drilled between 2003 and 2005 and three drill holes were completed in 2011. Unlike the other Zones to the north, the mineralization at Azen is hosted in the inclusion-bearing or fragment-bearing units rather than the Breccia Unit (Easton *et al.*, 2010). Like Varley, the Azen Zone was also included in the detailed geochemistry study of Howell *et al.* (2014). A total of 39 samples were analyzed for platinum metals and minor PGE values of up to 37 ppb Rh, 6 ppb Ru and 6 ppb Ir were reported.

The host rocks at Azen have been regionally metamorphosed to the mid-amphibolite facies. The mineralization exposed in excavated trenches is described by Hrominchuk and Jobin-Bevans (2000), Easton *et al*. (2004), and Easton and Bevans (2010). The stripped area outcrops contain inclusions of medium-grained gabbronorite, troctolite, amphibolite, alkali feldspar granite and other felsic material within a medium-grained, grey-green olivine gabbronorite. The abundance of inclusions varies and the size ranges from centimetre- to metre-scale (up to 100 m mega-rafts – Easton *et al*., 2006). A variety of pegmatitic veins and pods are also present. The pegmatitic pods are commonly cored by inclusions of felsic material, likely incorporated from the footwall of the intrusion. Mineralization consists of finely disseminated chalcopyrite and pyrrhotite in the matrix and sulphide-rich inclusions. Hrominchuk and Jobin-Bevans (2000) suggest that the Inclusion-Bearing Zone at Azen might be intrusive into the contact zone of the River Valley Intrusion.

7.4.9 Razor Zone

The Razor Zone is located approximately 2 km east of the Azen Zone (Figure 7.5). Razor has a strike length of approximately 1,600 m and is up to 150 m in apparent thickness. Dips are 80° southwest at Razor's north end and steeply northeast (overturned) at its south end. This Zone has been defined in 25 diamond drill holes totalling 4,988 m, all completed in 2003.

The host rocks have undergone upper amphibolite grade regional metamorphism. Metal grades in drill hole intercepts are relatively low.

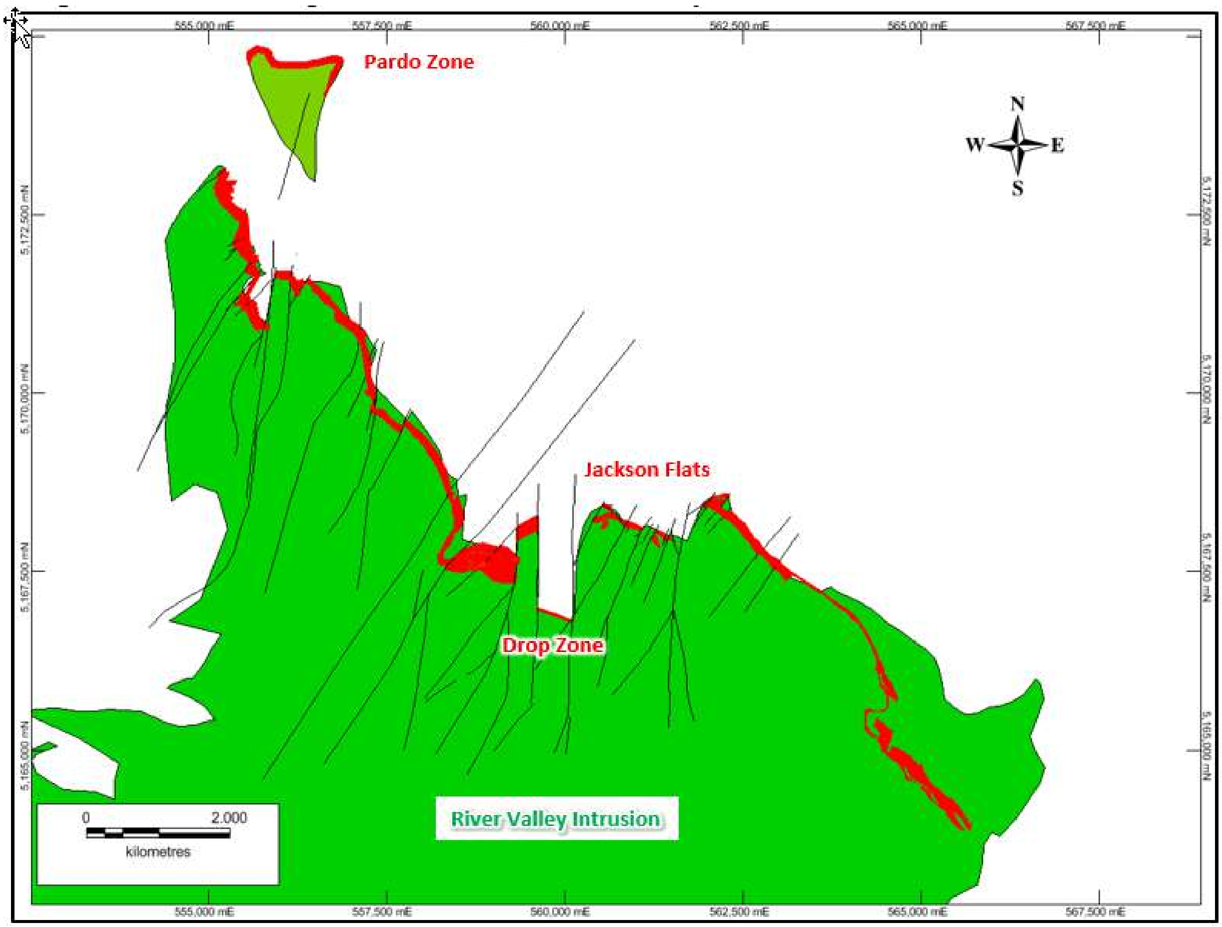
7.4.10 Mustang Zone

The Mustang Zone is located to the southeast and along strike of Razor (Figure 7.14). Mustang is well defined from outcrops and historical excavated trenches and diamond drilling. This Zone has a strike length of 4,000 m, dips 80° to the southwest or northeast (overturned), and is up to 250 m in apparent thickness. In plan view, the Mustang Zone shows a broad "Z-shape". Rather than being on or near the basal contact, much of the Mustang Zone appears to occur within the River Valley Intrusion. However, further geological mapping in the Mustang Zone area is required to confirm this interpretation.

7.4.11 Other Prospects

The Pardo, Drop and Jackson Flats Zones (Figure 7.14) were not included in the Mineral Resource Estimate described in Section 14 of this Technical Report. These Zones were excluded due to lack of drilling, and therefore can be considered targets for future exploration work and potential Mineral Resource estimation.

FIGURE 7.14 OTHER PROSPECTS OF INTEREST AT RIVER VALLEY



Source: *NAM (2021)*
Figure Description: *Geological map showing the offsets of the River Valley Deposit (**red**) along north and northeast-trending faults into the separate mineralized zones. The Pardo, Drop and Jackson Flat Zones are prospects of interest at River Valley.*

The **Pardo Zone** is the northernmost extent of known mineralization in the River Valley Intrusion (Figure 7.14). The Pardo Zone is hosted in River Valley Intrusion located north of the Grenville Front. Its geological relationships with the main body of the River Valley Intrusion, to the south of the Grenville Front, requires further investigation.

The Pardo Zone has been traced in outcrops and in drilling for a strike length of approximately 1,000 m. Of 106 surface grab samples, nine assayed between 0.35 g/t to 0.50 g/t 3E (Pt + Pd + Au), six assayed between 0.50 g/t and 1.00 g/t 3E, and one assayed >1.00 g/t 3E. A surface IP survey in 2002 was followed-up by limited drilling in 2004. 11 drill holes totalling 2,709 m were completed on nine 100 m spaced vertical cross-sections. Nine of the drill holes intersected PGE mineralization. The best intersection was 0.631 g/t 3E over 4 m from 188 m downhole in PA-04. In 2020, one of four surface grab assay samples from Pardo returned 0.921 g/t Pd, 0.480 g/t Pt, 0.057 g/t Au and 0.023 g/t Rh.

The **Drop Zone** is located to the east of the Azen Zone (Figure 7.14). This Zone appears to have been fault offset to the south, somewhat like the Banshee Zone relative to the Dana and Lismer Zones. Drop Zone has a strike length of 500 m and an apparent thickness of 25 m, as defined in eight holes that have been drilled in the area.

The **Jackson Flats Zone** is located between the Drop Zone to the southwest and the Razor Zone to the east (Figures 7.5 and 7.14). This Zone is defined in outcrops (Figure 7.15) and in very limited drilling. The drilling consists of four drill holes totalling 1,436 m, all completed in 2005. Within the Zone, mineralization appears to be distributed in five to seven sub-zones (Easton *et al*., 2010), with a total combined strike length of 1,000 m and an apparent thickness of up to 100 m.

FIGURE 7.15 JACKSON FLATS ZONE OUTCROP

Source: *Easton et al. (2010)*
Figure Description: *Typical outcrop exposure of mineralized olivine gabbro-norite in the vicinity of the Jackson's Flats Zone, River Valley Intrusion. Note sulphide "burns" to the right of the 8.5 cm long scale card.*

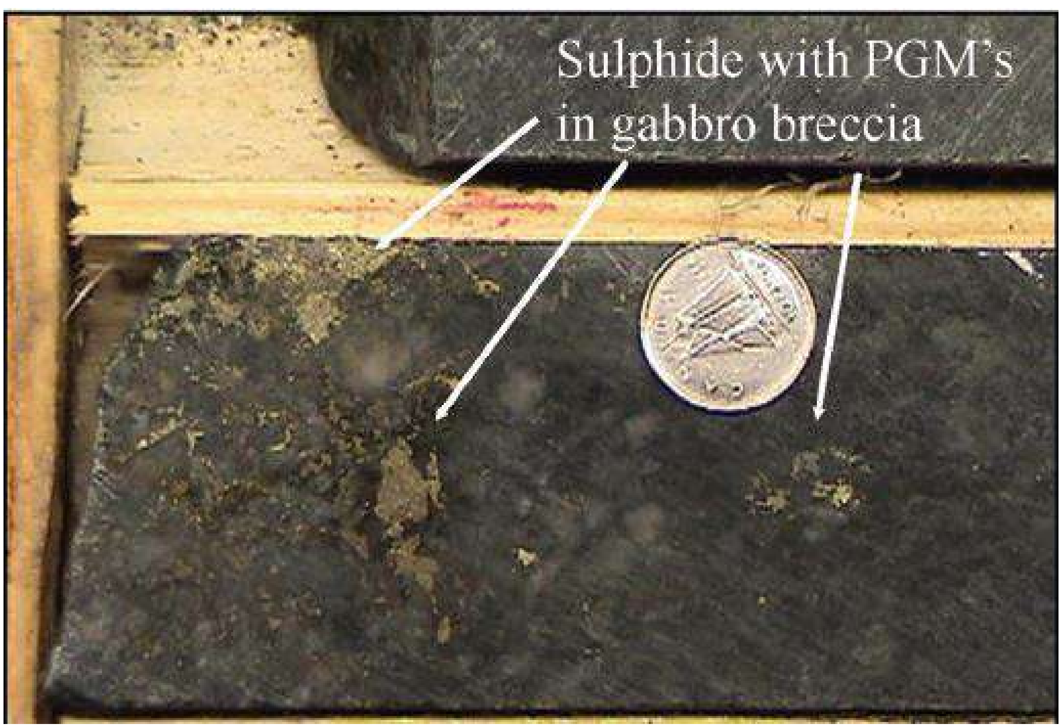
7.5 MINERALIZATION

Disseminated, bleb, fragment, interstitial and veinlet chalcopyrite-pyrrhotite-pentlandite mineralization (<1% to 5% sulphide minerals, up to 10 g/t Pt+Pd) occurs in autolith-rich gabbronorite breccia within 5 to 50 m of the basal contact of the River Valley Intrusion. The mineralization is spatially associated with gabbro-norite cumulates and autoliths that are elsewhere poorly represented in the igneous stratigraphy of the River Valley Intrusion.

7.5.1 Sulphide Minerals and Assemblages

The sulphide mineralogy is predominantly pyrrhotite, chalcopyrite and pentlandite, with minor amounts of pyrite and millerite and rare bornite, cubanite, mackinawite and arsenopyrite. Typical sulphides and sulphide mineral associations are shown in Figures 7.16 and 7.17. Large bodies of sulphide are variably altered and replaced by fine-grained secondary amphibole, minor quartz and biotite, which gives many of the bodies irregular contacts or resulted in larger sulphides being reduced in size to small patches of disseminated grains within the alteration silicates. Locally, pyrrhotite altered to pyrite and pentlandite to millerite. Chalcopyrite is also present and may have recrystallized textures. Similar sulphide assemblages, alteration and recrystallization textures have previously been reported associated with PGM mineralization at the Lac des Iles Complex, northwestern Ontario (Djon and Barnes, 2012) and in the Bushveld Complex, South Africa (Smith *et al.*, 2011).

FIGURE 7.16 SULPHIDE MINERALS IN RIVER VALLEY DRILL CORE



Source: *NAM (2021)*

FIGURE 7.17 SULPHIDE MINERALS AND ASSEMBLAGES – MICROSCOPIC

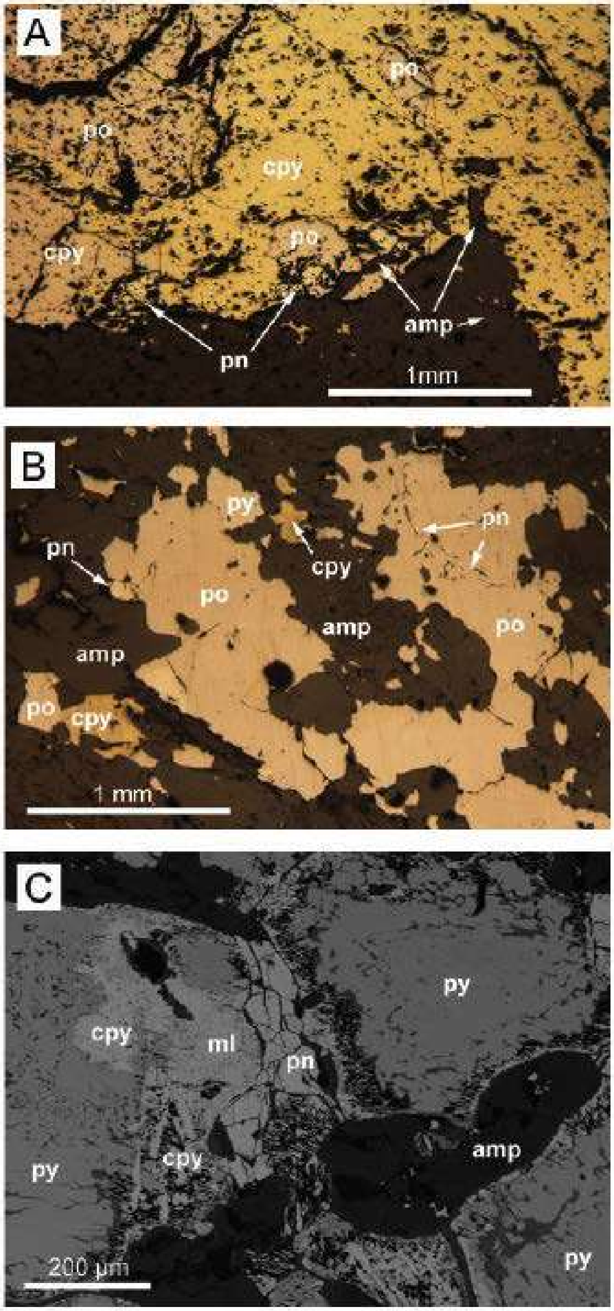


FIG. 5. Mineralogy of the base metal sulfides. A. Reflected light image of typical centimeter-scale bleb of magmatic sulfide from a mafic inclusion containing pyrrhotite (po), chalcopyrite (cpy), and pentlandite (pn) with minor replacement by amphibole (amp) around the margins. B. Reflected light image of magmatic sulfide assemblage of pyrrhotite, pentlandite, and chalcopyrite with minor pyrite (py), overprinted by metamorphic amphibole in an amphibolite inclusion. C. Backscattered electron image of low-temperature alteration of a magmatic sulfide assemblage from a metamorphosed matrix sample, showing total replacement of pyrrhotite by pyrite, partial replacement of pentlandite by millerite (ml), and recrystallization of chalcopyrite, overprinted by amphibole.

Source: *Holwell et al., (2014)*

7.5.1 Platinum Group Minerals

Holwell *et al.* (2014) identified a total of 172 PGM in ten polished thin-sections from mineralized (>1 g/t Pd) samples of mafic inclusions, amphibolite inclusions, and gabbroic matrix from River Valley. Each individual grain was classified by compositional type and textural association (Table 7.1). The vast majority of minerals were Pd and Pt phases; with a few grains of platarsite, hollingworthite and laurite (the latter two phases being the sole carriers of Rh and Ru). Minerals containing Os or Ir were not identified. The PGM identified were grouped as: (1) Pd, Pt tellurides; (2) Pd antimoarsenides; (3) Pt arsenides; (4) Pd arsenides; (5) Pd stannides; (6) PGE sulpharsenides; (7) Pt, Pd sulphides; and (8) Au- and Ag-bearing minerals. Each occurrence was also classified by its textural association: that is, enclosed in other PGM or enclosed in silicates, at silicate-silicate boundaries, enclosed in base metal sulphides, at sulphide-silicate boundaries, or sulphide-sulphide boundaries.

TABLE 7.1
PLATINUM-GROUP MINERALS AT RIVER VALLEY BY COMPOSITION AND TEXTURAL ASSOCIATION

			Mafic inclusions			Matrix		
Name	Ideal formula	Type	Hydrothermal	Metamorphic	Amphibolite inclusions	Hydrothermal	Metamorphic	Total
Kotulskite	PdTe	Pt/Pd telluride	11	3	7	58	20	99
Sperrylite	$PtAs_2$	Pt arsenide	1	20		7	3	31
Merteite I	$Pd_{11}(Sb,As)_4$	Pd antimoarsenide	3		2	5		10
Hollingworthite	RhAsS	PGE arsenosulfide				6	1	7
Vysotskite	PdS	PGE sulfide			3	1	2	6
Stillwaterite	Pd_8As_3	Pd arsenide				4	1	5
Electrum	Au-Ag	Au/Ag minerals		1	1	1		3
Moncheite	$PtTe_2$	Pt/Pd telluride		1	1			2
Arsenopalladinite	$Pd_8As_{2.5}Sb_{0.5}$	Pd antimoarsenide				1		1
Atokite	$(PdPt)_3Sn$	Pd stannide			1			1
Braggite	(Pt,Pd)S	PGE sulfide			1			1
Cooperite	PtS	PGE sulfide			1			1
Laurite	RuS_2	PGE sulfide					1	1
Platarsite	PtAsS	PGE arsenosulfide				1		1
Unconstrained	Pd-Te-Bi-As	Pd-Pt telluride				1		1
Unconstrained	Pt-S-As	PGE sulfide				1		1
Unconstrained	(Pd,Pt)-S-Bi	PGE sulfide			1			1
							Total:	172

Source: *Holwell et al. (2014)*

7.5.1.1 PGM Grain Size and Relative Area Analysis

According to Holwell *et al.* (2014), the grain sizes of the PGM ranged from <1 µm to 41 µm, with most <10 µm in their longest dimension. The long and short axes of each mineral grain were measured in micrometres. Relative proportions of the various mineral phases and mineral species type (Table 7.2) are based on an estimation of area by using the long and short axes of each grain to approximate each to the area of an ellipse, as described by Holwell *et al.* (2006). This procedure produces data which accurately reflect the relative proportions of each mineral type within an assemblage and is preferable to proportions of mineral type by number of grains, which can be biased by a relatively large amount of very small grains.

TABLE 7.2
PLATINUM-GROUP MINERALS AT RIVER VALLEY BY MINERAL PHASE

	Mafic inclusions		Amphibolite inclusions	Matrix		
	Hydrothermal	Metamorphosed		Hydrothermal	Metamorphosed	All PGM
Pd/Pt tellurides	27.70	64.07	77.62	47.85	82.85	60.02
Pd antimoarsenides	67.63		1.67	8.55		15.57
Pt arsenides	4.67	35.65		5.89	7.25	10.69
PGE sulfides			14.52	13.26	9.79	7.51
Pd arsenide				19.09	0.03	3.82
PGE sulfarsenides				5.33	0.09	1.08
Pd stannides			5.24			1.05
Au-Ag minerals		0.28	0.95	0.04		0.25

Source: *Holwell et al. (2014)*

7.5.1.2 PGM Assemblages

The PGM assemblage in each lithology is shown in Table 7.2 and the textural associations of the minerals within each lithology are shown in Figure 7.18. Overall, the assemblage is fairly restricted with only six minerals being identified more than five times. The vast majority are Pd phases, with fewer Pt minerals, and rare other phases. Pd-Pt tellurides make up 60% by area of all the minerals identified, with kotulskite (PdTe), making up 58% by area of all the minerals identified, with a single grain of moncheite (PtTe2) accounting for the other 2%. Sperrylite ($PtAs_2$) is common and Pd arsenides, Pd antimoarsenides, and Pt-Pd sulphides also make up a small, however, significant proportion of the overall assemblage. The sulpharsenides hollingworthite (RhAsS) - platarsite (PtAsS) - ruarsite (RuAsS) series carry all of the Rh and most of the Ru observed, however, are relatively minor. Electrum is very rare with only four grains identified. Texturally, most PGM identified occur as single-phase grains and although the majority of grains were associated with silicates (Figure 7.18). Note, however, that all mineral grains identified were located less than a mm away from sulphides. In other words, PGM grains were not found in areas free of sulphides.

FIGURE 7.18 PLATINUM-GROUP MINERAL ASSOCIATIONS AT RIVER VALLEY

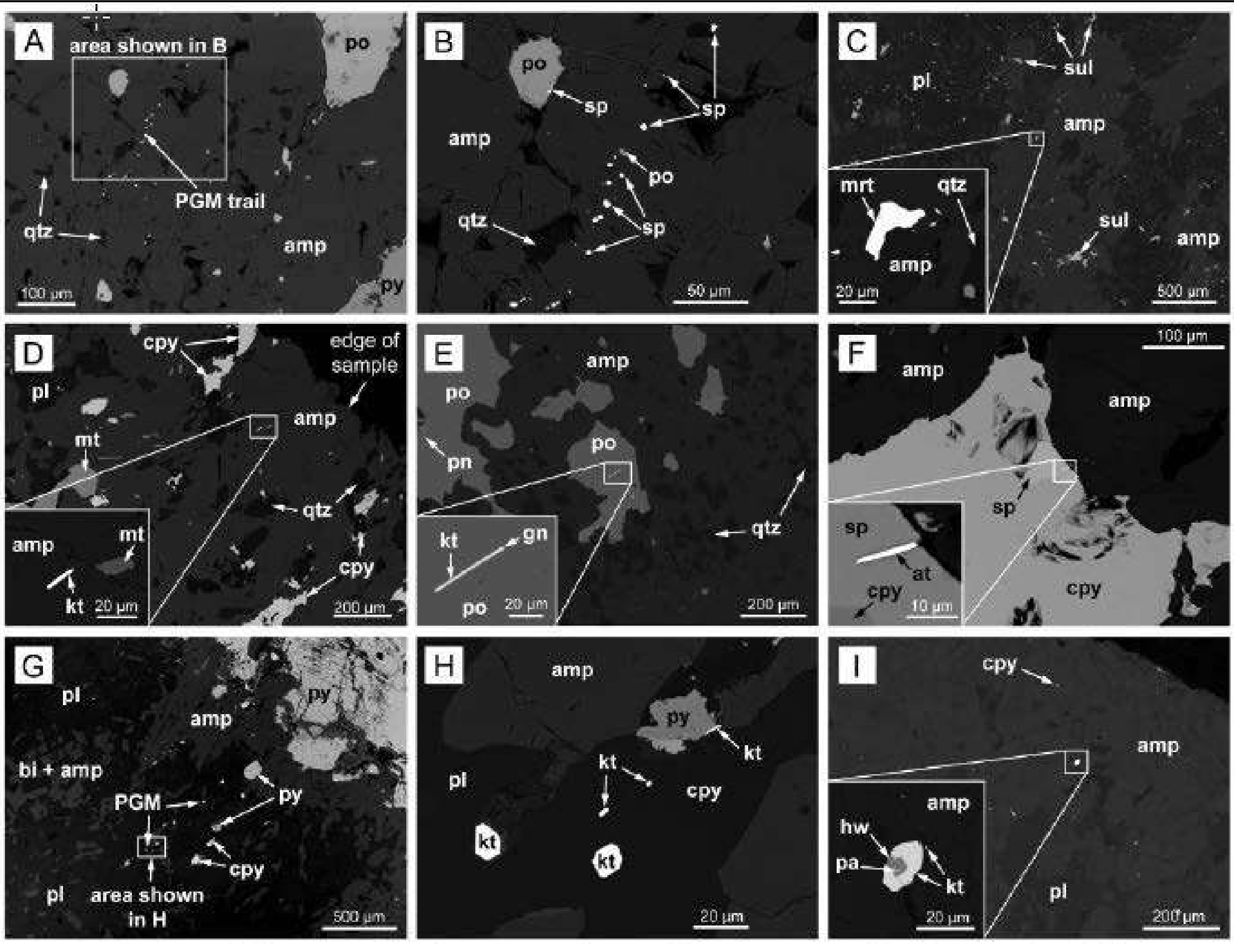


FIG. 6. Typical platinum group mineral associations in the River Valley intrusion. A-C. Mafic inclusions. D-F. Amphibolite inclusions. G-I. Matrix samples. A. Trail of PGM hosted by recrystallized amphiboles (amp) and minor quartz (qtz) close to, but not in contact with, large grain of pyrrhotite (po) and pyrite (py). B. Close-up view of the PGM trail shown in (A), with several euhedral sperrylite (sp) grains hosted by amphibole and a single sperrylite hosted on the margin of a small pyrrhotite grain. C. Fine-grained disseminated PGM and sulfides within hydrothermally altered gabbro made up of plagioclase (pl) and secondary amphiboles. The PGM grain shown in the inset is a merteite I (mrt), hosted in the margin of an amphibole. D. Amphibolite inclusion made up of amphibole and minor quartz with chalcopyrite (cpy) and minor magnetite (mt), showing a lath of kotulskite (kt) included in recrystallized amphibole. E. Amphibolite inclusion showing the replacement of the sulfide blebs composed of pyrrhotite and minor pentlandite (pn) by amphibole and quartz. A lath of kotulskite is present as an inclusion in pyrrhotite, in association with a small grain of galena (gn). F. Amphibolite inclusion showing chalcopyrite and minor sphalerite (sp) being replaced by amphibole. A small lath of atokite (at) is present within the sphalerite. G. Metamorphosed gabbro matrix with recrystallized plagioclase, amphibole, and biotite, and sulfides altered to pyrite and replaced by amphibole. Minor chalcopyrite, pyrite and PGM are present within 1 mm of the main sulfide bleb. H. Close-up view of several euhedral kotulskite grains and minor sulfide hosted by plagioclase shown in (C). I. Polyphase PGM hosted by recrystallized amphibole within metamorphosed gabbro matrix. The PGM grain is made up of kotulskite, hollingworthite (hw), and platarsite (pa).

Source: *Holwell et al. (2014).*

In detail, the PGM assemblages vary with host rock type. The different mineral assemblages are not preferentially associated with the matrix or a particular inclusion type, however, rather with the type of alteration the rocks underwent. The hydrothermally altered rocks host Pd antimoarsenides and Pd arsenides; however, these minerals were not observed in the metamorphosed rocks. There is almost twice the amount of Pd-Pt tellurides in the metamorphic textured rocks than in their hydrothermally altered equivalents (Table 7.2).

7.5.1.3 PGM in Mafic Inclusions

The mafic inclusions can be divided into those that show hydrothermal alteration and those that show recrystallized metamorphic textures (Holwell et al., 2014). Both show a very restricted assemblage made-up of tellurides, arsenides, and antimoarsenides (Figure 7.18A-C). In the hydrothermally altered samples, the majority of the PGM are Pd antimoarsenides (Figure 7.18C) with only 28% Pd-Pt tellurides, whereas in the metamorphosed inclusions, 64% are Pd-Pt tellurides and there are no Pd antimoarsenides (Table 7.2).

In terms of the PGM associations, the hydrothermally altered mafic inclusions also show some differences when compared to the metamorphosed mafic intrusions. In both rock types, the PGM are strongly associated with silicates, commonly as inclusions, and generally in amphibole (Figures 7.18A-C). In Figures 7.18A-B, a trail of sperrylites is apparent included within metamorphic amphiboles, rather than occurring along boundaries, and do not show post-metamorphic mobilization along fractures. In the altered samples, PGM are located within silicates enclosed by patches of altered sulphides (Figure 7.18C).

7.5.1.4 PGM in Amphibolite Inclusions

The PGM assemblages in the amphibolite inclusions are similar to those in the metamorphosed mafic inclusions. They are dominated by Pd-Pt tellurides (Figures 7.18D-E), with minor PGE sulpharsenides, and a single grain of the Pd stannide (atokite; Pd_3Sn) (Figure 7.18F) and Pd antimoarsenides (Table 7.2). The kotulskite grains in amphibolite inclusions commonly form laths and are found as inclusions in silicates (Figure 7.18D) and sulphides (Figures 7.18E-F). Although the PGM in the amphibolite inclusions have the most varied number of associations out of all rock types, the minerals commonly have a close proximity to sulphides. The example shown in Figure 7.18E shows a kotulskite lath included in pyrrhotite overprinted by amphiboles. Figure 7.18D shows a more extreme degree of alteration, in which the sulphide has been more completely replaced by amphibole, although the PGM lath grain appears unaffected by this alteration and now occurs as an inclusion in the silicate.

7.5.1.5 PGM in the Matrix

The rock matrix can also be subdivided into samples that have been altered hydrothermally and those that have undergone metamorphic recrystallization. The difference between the metamorphic and hydrothermal assemblages and associations of matrix rocks is almost identical to those observed for the mafic inclusions (Table 7.2). The most abundant PGM type is Pd-Pt tellurides (Figures 7.18G-I) with almost double the amount in metamorphosed than the hydrothermal matrix rocks (Table 7.2). There are no Pd antimoarsenides in the metamorphosed matrix and only 0.03% Pd arsenides, whereas these two mineral types combined make up 28% of the hydrothermally altered matrix rocks.

The PGM in the matrix rocks are present predominantly as inclusions in silicates with variable amounts of associated base metal sulphides (Figures 7.18G-I). In Figure 7.18G, the PGM are included in silicates, however, located at the original boundary of a base metal sulphide grain. Although the PGM are no longer attached to the sulphide, they appear to have undergone little or no recrystallization during alteration of the sulphide. The hydrothermally altered matrix sample shown in Figure 7.18I shows an example of a polyphase crystal of hollingworthite, kotulskite and platarsite included within silicates, with only a few small sulphides within a mm of the PGM. This is an example of where sulphide alteration is most progressive, with little of the original sulphide remaining.

8.0 DEPOSIT TYPES

River Valley is a contact-type PGE mineralization deposit (Peck *et al.*, 2001; Kaykowski *et al.*, 2018) (Figure 8.1). Mineral exploration at River Valley has traditionally focused on the contact-type PGE mineralization in the known zones. However, presence of several highly-anomalous assays of surface grab samples of outcrops within higher portions of the River Valley Intrusion stratigraphy suggests that opportunities may exist for notable reef or stratiform-type PGE mineralization, or narrow, high-grade breccia zones internally within the Intrusion.

FIGURE 8.1 CONTACT-TYPE PGM MINERALIZATION

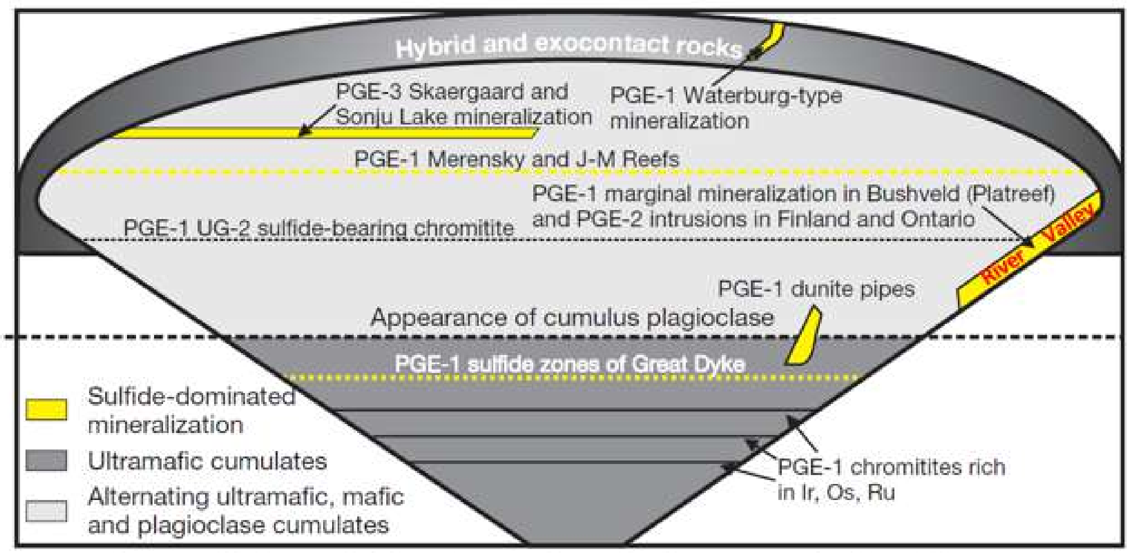


FIG. 4. Schematic model of an LIP-related layered intrusion, showing the relative position and petrological affinities (e.g., chromite vs. sulfide dominated; ultramafic vs. mafic; reef vs. contact styles of mineralization) of the differing types of LIP-related PGE-dominated magmatic sulfide deposits discussed in the text; adapted from Hoatson et al. (2006) and Naldrett (2010a). Note that a single layered intrusion is unlikely to host all of these styles of mineralization, and that PGE deposits with differing magmatic affinities can occur in similar positions within an intrusive system, as exemplified by the similar positions of PGE-1 contact-type mineralization of the Platreef section of the Bushveld Complex, part of the Bushveld LIP, and PGE-2 contact-type mineralization hosted by 2500 to 2450 Ma intrusions of the Baltic LIP (BLIP) of Finland and Russia and the 2490 to 2450 Ma Matachewan LIP of Ontario and Quebec in Canada.

Source: *Modified by P&E (September 2021) after Kaykowski et al. (2018)*

8.1 CONTACT-TYPE PGE MINERALIZATION

Contact-type PGE mineralization develops as the result of sulphur-saturation brought on by the interaction of the fertile parental magma with the surrounding country rock lithologies. The contamination of the initial fertile parental magma by the addition of either SiO_2 and (or) sulphur can directly result in sulphur-saturation and the separation of a PGE-rich immiscible sulphide. The addition of SiO_2 and (or sulphur) is typically achieved by the assimilation of either local country rock lithologies and (or) the assimilation of breccia fragments previously developed along the contact margin. Analogues for this model include the Paleoproterozoic Platreef Deposit (South Africa) (McDonald and Holwell, 2011) and Paleoproterozoic Portimo Complex (Finland) (Alapieti and Lahtinen, 2002), and possibly the Archean Lac des Iles Deposit (northwestern Ontario) (Djon and Barnes, 2012; Djon *et al.*, 2018).

Contact-style PGE mineralization is the most common form of PGE mineralization within the East Bull Lake Intrusive Suite, which includes the River Valley Intrusion. Mineralized zones occur within 100 m of the footwall contact and are commonly 20 m to 100 m wide. Mineralization occurs as fine- to medium-grained disseminated to blebby chalcopyrite, pyrrhotite and pentlandite within heterolithic and brecciated gabbro or norite.

Vigorous convection and explosive breccia-producing emplacement of sulphide-saturated magma formed PGE-rich zones at the margins of the host intrusion. The magmatic sulphide zones are overprinted and enclosed by a broader envelope of metamorphic and (or) hydrothermal sulphide mineralization of similar mineralogy (± pyrite) that extends into adjacent leucogabbronorite to anorthosite units, and less so into the country rocks. The hydrothermally enriched zones contain up to 2% to 10% sulphide minerals with up to 1 g/t to 10 g/t Pt+Pd (and higher), and represent the main exploration target. The higher-grade zones are enclosed by broader, lower-grade mineralization with 20 ppb to 50 ppb Pt + Pd.

8.2 REEF-TYPE PGE MINERALIZATION

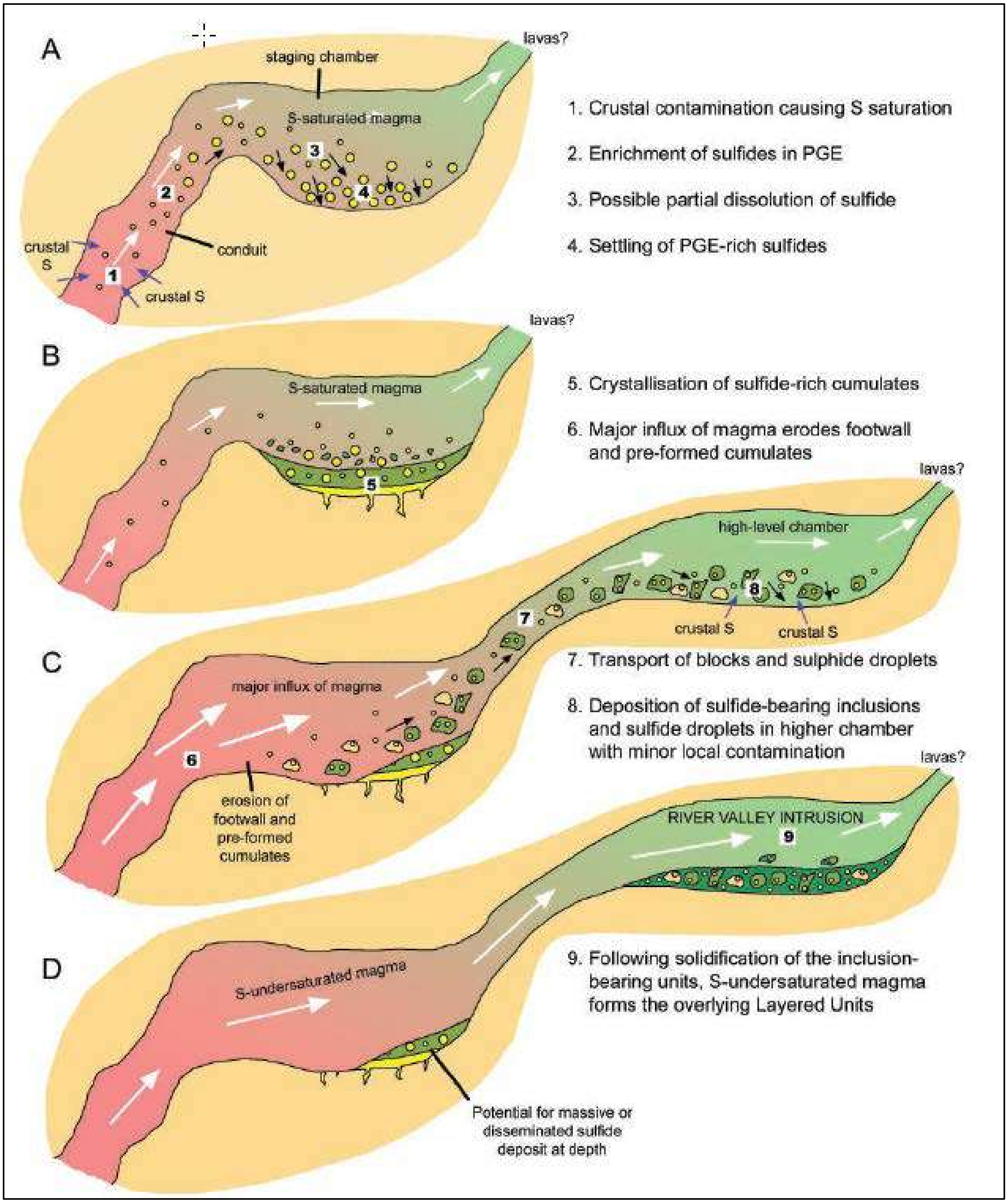
Reef-type PGE mineralization is a stratabound or stratiform style of mineralization that occurs higher in the stratigraphy of an intrusion at the contact between two separate and distinct lithological units (Naldrett, 2010). Sulphur-saturation and therefore sulphide segregation can be the result of the interaction between distinctly different types of magma, with sulphur-saturation occurring at their interface. Geochemical evolution of the overlying magma can also cause sulphur-saturation and the separation of immiscible sulphides can accumulate between the two units.

Due to the stratigraphic control and narrow target widths (1 to 10 m) of reef-style PGE mineralization, exploration programs must focus on the productive horizon. In order to identify the proper horizon, geochemical traverses are essential with the goal being to find systematic variations in PGE and (or) nickel-copper tenors across lithological boundaries. When the specific horizon is identified, grid sampling and ground-based geophysics should be used over the target area.

8.3 RIVER VALLEY PGE MINERALIZATION MODEL

Holwell *et al*. (2014) propose a multi-stage, dynamic magma conduit-based model for the formation of the contact-type PGE mineralization in the River Valley Intrusion (Figure 8.2).

FIGURE 8.2 SCHEMATIC MODEL FOR PGE MINERALIZATION IN THE RIVER VALLEY INTRUSION



Source: *Holwell et al. (2014)*

This model is summarized in the following 10 sequential steps:

1. A major contamination event at depth with the addition of S from crustal wall rocks, inducing sulphide saturation in parental magma (Figure 8.2A);

2. Enrichment of sulphide droplets with PGE during turbulent interaction with magma within conduit feeder system (Figure 8.2A);

3. Further upgrading of sulphide metal tenors via dissolution of sulphide (Figure 8.2A);

4. Settling of PGE-enriched sulphide liquid in a staging magma chamber (Figure 8.2A);

5. Partial crystallization of the staging chamber, with PGE-enriched sulphide liquid becoming trapped in mafic cumulates (and some percolating into the footwall) (Figure 8.2B). Some sulphide liquid remains in the magma chamber above the crystallization front;

6. A major pulse of magma entrains sulphide liquid, erodes blocks of crystallized gabbro and blocks of footwall rocks (Figure 8.2C);

7. Transport of mineralized inclusions, footwall inclusions, and PGE-rich sulphide liquid to a higher-level chamber by this mafic magma (Figure 8.2C);

8. Emplacement of an inclusion-bearing package with mineralization present in the inclusions and the matrix, forming the lower approximate 100 m of the River Valley Intrusion. Localized minor contamination by immediate floor rocks occurs (Figure 8.2C);

9. Subsequent emplacement of the main River Valley Intrusion magma, forming an erosive contact on top of basal units (with some entrainment of inclusions near base), and formation of the Layered Unit (Figure 8.2D); and

10. Hydrothermal alteration remobilizing S, Cu and Au on a minor scale, and altering primary magmatic minerals, possibly during subsequent metamorphism.

9.0 EXPLORATION

Exploration work completed in 2020 and ongoing in 2021-2023 at River Valley consists of a rhodium assay study of historical and recent drill core samples, trench excavation and surface mineral prospecting near the Dana South Zone, surface prospecting at the Pardo Zone, and an IP geophysical survey at the Banshee Zone. These exploration activities and the results are described below. Drilling results since 2021 at the Banshee Zone, Dana South Zone, and Lismer Ridge are described in Section 10 of this Technical Report.

9.1 RHODIUM GEOCHEMISTRY STUDY

9.1.1 Background

The primary purpose of the rhodium assay program is to evaluate the concentration and distribution of Rh in the River Valley Deposit. The highest-grade assay is 0.873 g/t Rh for a drill core sample from the Lismer North Zone. However, the overall number of Rh assays and their distribution are very limited, due to the high cost of assaying. This precious metal was included in the 2001, 2012, 2018, 2019 and 2022 Mineral Resource Estimates (see Sections 6 and 14 of this Technical Report). Although included in the 2019 Mineral Resource Estimate for the River Valley Palladium Deposit, Rh was excluded in the 2019 Preliminary Economic Assessment as payable metal in the NSR estimates, due to insufficient data points and very limited metallurgical recovery testwork. This Rh assay study is meant to address the insufficient data points issue.

In the 2019 updated Mineral Resource Estimate, rhodium grades were estimated based on Rh assay data for 7,471 drill core samples and 2,641 channel samples, for a total of 10,112 assays. Of these, 8,268 drill core and channel sample Rh assays records are for the Dana North Zone, 1,338 drill core and channel sample Rh assay records for the Dana South Zone, and 506 drill core sample assays for the Lismer North Zone. There were no Rh assays available for the Pardo, Pine, Banshee, and RVX Zones. Furthermore, a rhodium mineral phase, probably hollingworthite (Rh,Pt,Pd)AsS or irasite (Ir,Ru,Rh,Pt)AsS, was identified during historical mineralogical, metallurgical and scientific studies of drill core from the Dana North, Dana South, Pine and Lismer Ridge Zones (James, 2004; Holwell et al., 2014; XPS, 2018).

In addition, a relatively small amount of additional Rh assay data (337 analyses) are available for drill core samples analyzed during an academic research study of River Valley (Holwell *et al.* 2014) and for surface grab samples (158) assayed during mineral prospecting programs. The highest grades were 0.372 g/t Rh for the drill core and 0.309 g/t Rh for the surface grab samples. However, the surface grab and Holwell et al. (2014) data sets are not suitable to be used directly for Mineral Resource estimation purposes.

The Rhodium Assay Study is based, in part, on re-assaying historical drill core samples. The historical drill holes sampled were carefully selected from representative drill vertical cross-sections of prioritized mineralized zones, specifically the Pine Zone (Phase 1) and Lismer North Zone (Phase 2). Samples from mineralized drill core intervals above the lower cut-off grade and adjacent material were submitted to the Geoscience Laboratory in Sudbury for PGM assay with enhanced lower detection limits. In addition to Rh (and palladium, platinum and gold), the minor PGM ruthenium (Ru) and iridium (Ir) were also assayed.

9.1.2 Phase 1: Rhodium at Pine Zone – Early 2021

In a Company press release dated March 2, 2021, NAM announced completion of Phase 1 of the Rh assay program. A total of 303 pulp samples from 17 mineralized intervals in 14 drill holes through the Pine Zone were submitted to Geoscience Laboratories of Sudbury for assay. The samples were selected from year 2015 to 2020 drill core sample pulps to provide Rh data for mineralization in two vertical cross-sections spaced 50 m apart through the Pine Zone, located near the north end of the River Valley Deposit. In addition to Rh, the samples were also assayed for gold (Au), iridium (Ir), palladium (Pd), platinum (Pt), and ruthenium (Ru).

The assay values returned for the Pine Zone samples ranged from below the lower limit of detection to 0.177 g/t Rh. Ten samples returned assays of equal to or greater than 0.100 g/t Rh and 50 samples returned assays higher than 0.050 g/t Rh (Table 9.1). The highest assay result for Ir is 0.039 g/t and for Ru is 0.013 g/t. Compared to the other mineralized zones, the range of Rh assay values for the Pine Zone appears to be most similar to the Dana South Zone (Table 9.2).

TABLE 9.1
RHODIUM ASSAY HIGHLIGHTS FOR THE PINE ZONE

Drill Hole ID	Sample Number	Au (g/t)	Ir (g/t)	Pd (g/t)	Pt (g/t)	Rh (g/t)	Ru (g/t)
DN-T2-06	RV2016-180	0.368	0.039	5.653	1.898	0.177	0.013
DN-T2-06	RV2016-186	0.135	0.031	2.982	1.018	0.136	0.011
DN-T2-06	RV2016-184	0.238	0.028	3.832	1.237	0.130	0.010
2015-DN002	RV2015-0207	0.148	0.024	3.460	1.266	0.109	0.010
DN-T2-10	RV2016-490	0.072	0.023	4.041	1.404	0.106	0.009
2015-DN002	RV2015-0201	0.116	0.022	5.199	1.115	0.102	0.009
DN-T2-13	RV2016-581	0.142	0.025	3.288	1.144	0.102	0.009
PZ-20-04	RV2020-0434	0.085	0.019	2.223	0.783	0.102	0.008
2015-DN002	RV2015-0206	0.188	0.022	4.420	1.289	0.100	0.009
2015-DN002	RV2015-0208	0.119	0.021	2.200	1.053	0.100	0.008
DN-T2-03	RV2016-037	0.014	0.021	1.078	0.708	0.097	0.007
PZ-17-06	RV2017-0913	0.178	0.021	1.890	1.050	0.096	0.010
DN-T2-11	RV2016-342	0.102	0.021	3.488	1.053	0.096	0.008
2015-DN001	RV2015-0074	0.161	0.020	1.890	0.852	0.093	0.009
DN-T2-10	RV2016-491	0.057	0.020	2.874	0.864	0.090	0.008
DN-T2-06	RV2016-183	0.165	0.020	2.669	0.809	0.087	0.007
DN-T2-11	RV2016-347	0.164	0.016	1.784	0.549	0.087	0.007
DN-T2-11	RV2016-341	0.063	0.019	2.631	0.684	0.085	0.008
PZ-17-08	RV2017-1048	0.060	0.016	1.573	0.519	0.085	0.006
PZ-17-08	RV2017-1054	0.083	0.019	2.700	0.790	0.083	0.009
2015-DN001	RV2015-0075	0.137	0.018	2.620	0.861	0.082	0.009
T3-17-04	RV2017-0633	0.212	0.019	2.582	0.938	0.081	0.008

TABLE 9.1
RHODIUM ASSAY HIGHLIGHTS FOR THE PINE ZONE

Drill Hole ID	Sample Number	Au (g/t)	Ir (g/t)	Pd (g/t)	Pt (g/t)	Rh (g/t)	Ru (g/t)
DN-T2-10	RV2016-498	0.143	0.018	2.482	0.798	0.080	0.008
PZ-17-06	RV2017-0914	0.115	0.017	3.074	0.820	0.078	0.007
PZ-17-06	RV2017-0915	0.129	0.016	2.402	0.725	0.077	0.007
2015-DN001	RV2015-0030	0.125	0.016	2.695	0.821	0.076	0.007
PZ-17-06	RV2017-0919	0.077	0.017	1.797	0.607	0.076	0.007
2015-DN001	RV2015-0066	0.117	0.016	2.456	0.833	0.075	0.008
2015-DN001	RV2015-0076	0.103	0.017	2.164	0.650	0.075	0.007
T3-17-03	RV2017-0446	0.052	0.016	2.607	0.699	0.073	0.006
2015-DN002	RV2015-0193	0.125	0.016	2.112	0.691	0.072	0.007
2015-DN002	RV2015-0194	0.051	0.022	1.282	0.552	0.072	0.008
DN-T2-11	RV2016-355	0.100	0.017	2.189	0.712	0.072	0.007
DN-T2-06	RV2016-177	0.111	0.015	2.118	0.726	0.071	0.007
PZ-17-06	RV2017-0921	0.107	0.015	2.171	0.774	0.070	0.006
2015-DN002	RV2015-0204	0.149	0.015	2.700	0.845	0.070	0.006
PZ-17-08	RV2017-1047	0.087	0.013	1.968	0.593	0.067	0.006
PZ-17-08	RV2017-1057	0.098	0.014	2.252	0.750	0.066	0.006
T3-17-02	RV2017-0378	0.094	0.015	2.052	0.620	0.065	0.006
2015-DN002	RV2015-0200	0.059	0.015	1.465	0.430	0.065	0.007
DN-T2-06	RV2016-181	0.075	0.015	1.693	0.627	0.063	0.006
2015-DN002	RV2015-0209	0.074	0.013	2.016	0.583	0.060	0.005
PZ-17-08	RV2017-1056	0.034	0.014	1.557	0.571	0.060	0.007
2015-DN001	RV2015-0067	0.081	0.013	1.667	0.526	0.059	0.006
DN-T2-11	RV2016-343	0.056	0.013	2.193	0.736	0.057	0.005
DN-T2-10	RV2016-502	0.051	0.013	1.609	0.566	0.054	0.006
DN-T2-13	RV2016-600	0.313	0.012	1.599	0.663	0.054	0.004
DN-T2-10	RV2016-499	0.140	0.012	1.533	0.528	0.054	0.008
DN-T2-13	RV2016-597	0.090	0.013	1.659	0.568	0.053	0.005
2015-DN002	RV2015-0203	0.041	0.011	1.844	0.564	0.053	0.005
PZ-17-06	RV2017-0918	0.063	0.012	1.508	0.546	0.052	0.005
2015-DN002	RV2015-0196	0.078	0.011	1.825	0.545	0.052	0.005
DN-T2-06	RV2016-189	0.070	0.012	1.249	0.384	0.051	0.005
2015-DN002	RV2015-0197	0.106	0.012	1.739	0.533	0.051	0.005
PZ-17-08	RV2017-1055	0.070	0.012	1.858	0.639	0.051	0.006
2015-DN002	RV2015-0202	0.063	0.011	2.099	0.557	0.051	0.005
DN-T2-06	RV2016-187	0.181	0.012	1.231	0.429	0.051	0.004
DN-T2-10	RV2016-503	0.055	0.012	1.520	0.515	0.050	0.005

Source: *NAM (September 2022).*

TABLE 9.2
RHODIUM COMPARISONS TO OTHER ZONES

Zone	Number of Samples*	Proportion of Rh Total Assays (%)	Minimum Rh (g/t)**	Maximum Rh (g/t)
Pine	303	3.8	0.025	0.177
Dana North	6,709	83.3	<0.01	0.410
Dana South	392	4.9	<0.01	0.150
Lismer North	654	8.1	0.0001	0.873
Total	**8,058**	**100**		

Notes:
** contiguous drill core samples of mineralized intervals*
(channel, surface rock and academic study samples not included)
*** <0.01 g/t (<10 ppb) was lower limit of detection limit at the time of assay*

Rhodium at Pine Zone was determined from 303 samples out of a total of 2,443 (12.4%) assayed drill core samples from that Zone. The results show very strong positive correlation of Rh with the other four PGM (R^2 >0.9) (Table 9.3), consistent with presence in the mineral phase hollingworthite [(Rh,Pt,Pd)AsS]. Rh shows strong correlation (R^2 >0.8) with copper (Cu) and moderate correlation (R^2 >0.5) with sulphur (S). On the other hand, Rh does not correlate (R^2 = -0.015) with chromium, and therefore is not held in Cr-bearing phases (chromite). The occurrence of Rh with sulphides and not chromite differs from other Rh-bearing PGM deposits elsewhere, and could potentially simplify metallurgical recovery processes.

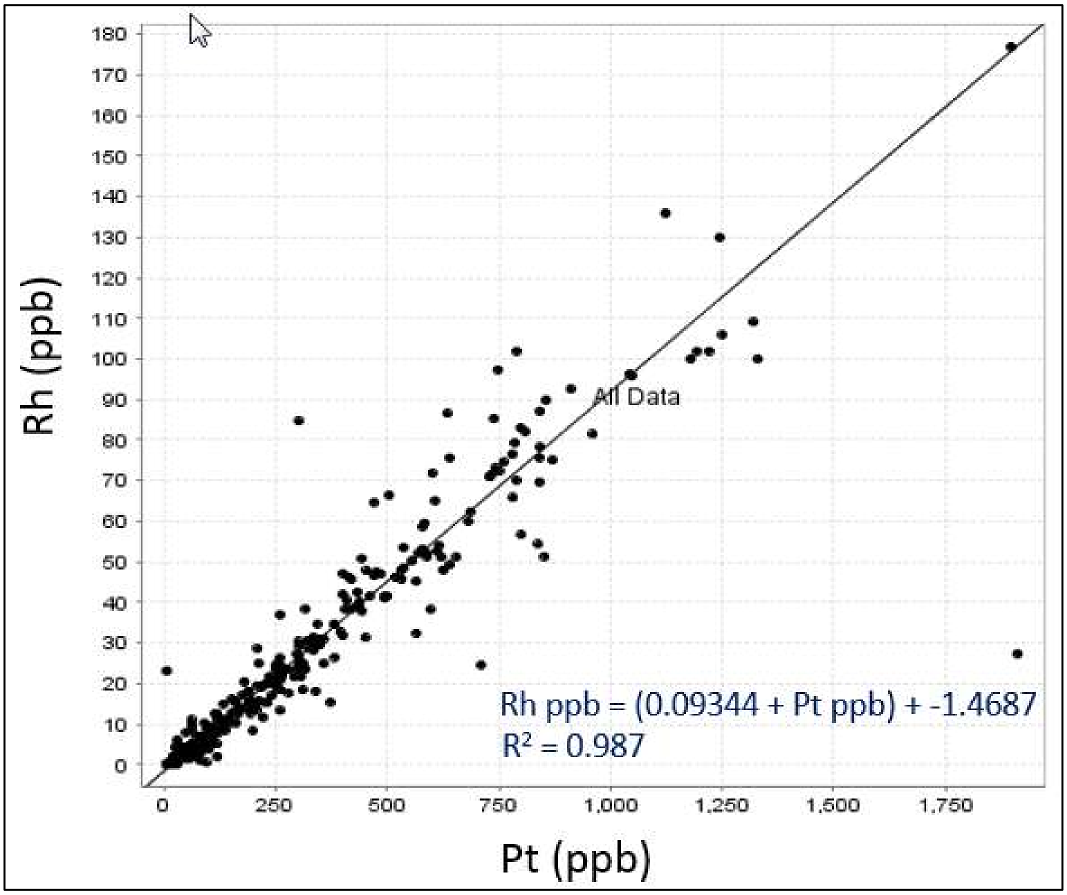
TABLE 9.3
STATISTICAL SUMMARY OF 2021 AND PREVIOUS ASSAY DATA FOR THE PINE ZONE

Parameter	2021 Data - Pine Zone						2015-2019 Data - Pine Zone				
	Au	Ir	Pd	Pt	Rh	Ru	Cu	Ni	Co	S	Cr
Number of Samples*	303	303	303	303	303	303	303	303	303	303	303
Maximum Value**	0.368	0.039	2.700	1.898	0.177	0.013	0.533	0.108	0.014	2.20	0.056
Average Value**	0.045	0.006	0.814	0.292	0.028	0.003	0.101	0.023	0.004	0.32	0.011
Median**	0.034	0.004	0.590	0.213	0.018	0.002	0.080	0.020	0.004	0.27	0.009
Correlation Coefficient***	0.830	0.995	0.940	0.969	1	0.978	0.839	0.756	0.540	0.589	-0.015

Notes:
** 2021 assay data from Geoscience Laboratories and 2015-2019 previous assay data are for the same samples*
***Au, Ir, Pd, Pt, Rh and Ru values in g/t; Cu, Ni, Co, S and Cr values in %*
**** Correlation coefficient for rhodium*

Statistical analysis indicates that Rh values for the remaining 2,140 samples from the Pine Zone can be estimated on the basis of Pt values through regression analysis. Results of this study indicate that Rh contents are equivalent to be approximately 12% of the Pt grades. A plot of measured Pt values versus Rh values for the 303 drill core samples from the Pine Zone and the robust simple regression line with its derived equation are shown in Figure 9.1.

FIGURE 9.1 PINE ZONE MEASURED PT VERSUS RH VALUES AND THE ROBUST SIMPLE REGRESSION LINE WITH DERIVED EQUATION



Source: *NAM press release (March 2, 2021)*
Note: *Number of drill core samples = 303*

9.1.3 Phase 2: Rhodium at Lismer North Zone – Late 2021

In Phase 2 of the Rhodium Assay Study, Rh data were generated for the Lismer North Zone. To this end, pulp and reject samples from eight mineralized intervals in four historical diamond drill cores on a key vertical cross-section through Lismer North were sampled for Rh assay analysis. In total, 187 samples (plus blind QC samples) delivered to Geoscience Labs in Sudbury for sample processing, preparation and high-sensitivity assay analysis. Of the 187 samples, 33 were from mineralized drill core intervals with historical Rh assay results and 154 were for drill core intervals lacking Rh assays. The Rh assay values returned range from <0.00005 g/t (below the lower limit of detection) to 0.565 g/t Rh (Table 9.4). Eight samples returned assays of ≥ 0.100

g/t Rh and 25 samples returned assays higher than 0.050 g/t Rh. The highest assay result for Ir is 0.113 g/t and for Ru is 0.088 g/t.

TABLE 9.4
RHODIUM ASSAY HIGHLIGHTS FROM THE LISMER NORTH ZONE

Drill Hole ID	Lab ID	Au (g/t)	Ir (g/t)	Pd (g/t)*	Pt (g/t)	Rh (g/t)	Ru (g/t)
LR-02	RV-9151	0.164	0.113	7.003	2.777	0.565	0.088
LR-01	RV-9010	0.062	0.045	2.237	1.210	0.228	0.024
LR-40	RV-52286	0.179	0.042	3.428	1.455	0.171	0.023
LR-01	RV-9005	0.266	0.037	4.049	1.598	0.146	0.019
LR-40	RV-52280	0.159	0.025	4.345	0.907	0.141	0.015
LR-02	RV-9154	0.099	0.024	3.166	1.482	0.126	0.016
LR-40	RV-52305	0.173	0.026	4.801	1.398	0.121	0.013
LR-40	RV-52275	0.139	0.027	3.264	0.994	0.114	0.017
LR-40	RV-52306	0.117	0.022	3.441	1.275	0.103	0.010
LR-40	RV-52271	0.107	0.022	1.354	0.731	0.093	0.011
LR-40	RV-52277	0.165	0.020	2.551	0.771	0.086	0.011
LR-40	RV-52304	0.087	0.019	2.946	0.931	0.081	0.009
LR-40	RV-52307	0.133	0.016	2.944	0.885	0.077	0.007
LR-40	RV-52278	0.415	0.017	2.016	0.679	0.075	0.009
LR-40	RV-52269	0.132	0.019	1.663	0.774	0.072	0.011
LR-86	RV-99421	0.032	0.016	1.864	0.714	0.067	0.010
LR-86	RV-99433	0.025	0.014	1.673	0.541	0.066	0.011
LR-86	RV-99429	0.010	0.016	1.170	0.563	0.063	0.010
LR-86	RV-99419	0.038	0.016	1.731	0.664	0.062	0.009
LR-40	RV-52285	0.114	0.015	2.044	0.825	0.061	0.008
LR-01	RV-9011	0.147	0.011	1.867	0.614	0.055	0.006
LR-86	RV-99351	0.006	0.019	0.195	0.390	0.055	0.029
LR-02	RV-9160	0.104	0.013	1.445	0.681	0.054	0.007
LR-86	RV-99423	0.039	0.013	>2.700	0.461	0.053	0.010
LR-01	RV-9013	0.511	0.013	2.978	1.019	0.052	0.006

Source: *NAM (September 2022)*
Note: **2.700 g/t Pd is the validated upper limit for this analytical method.*

The re-assay results for the 33 historical samples show moderately strong positive correlation with the historical Rh assay results (Rh $R^2 = 0.714$). At this point, Rh assay data are available for 654 out of a total of 10,719 (6%) assayed drill core samples from Lismer North. The results show moderate to strong positive correlation of Rh with the other four PGM (R^2 >0.7 to 0.9) (Table 9.5), consistent with presence in the mineral phases Hollingworthite [(Rh,Pt,Pd)AsS], platarsite [(PtAsS) with minor Rh and Ru), and laurite [(RuS_2 with minor Rh], which have all been reported in previous mineralogical studies of the River Valley Deposit.

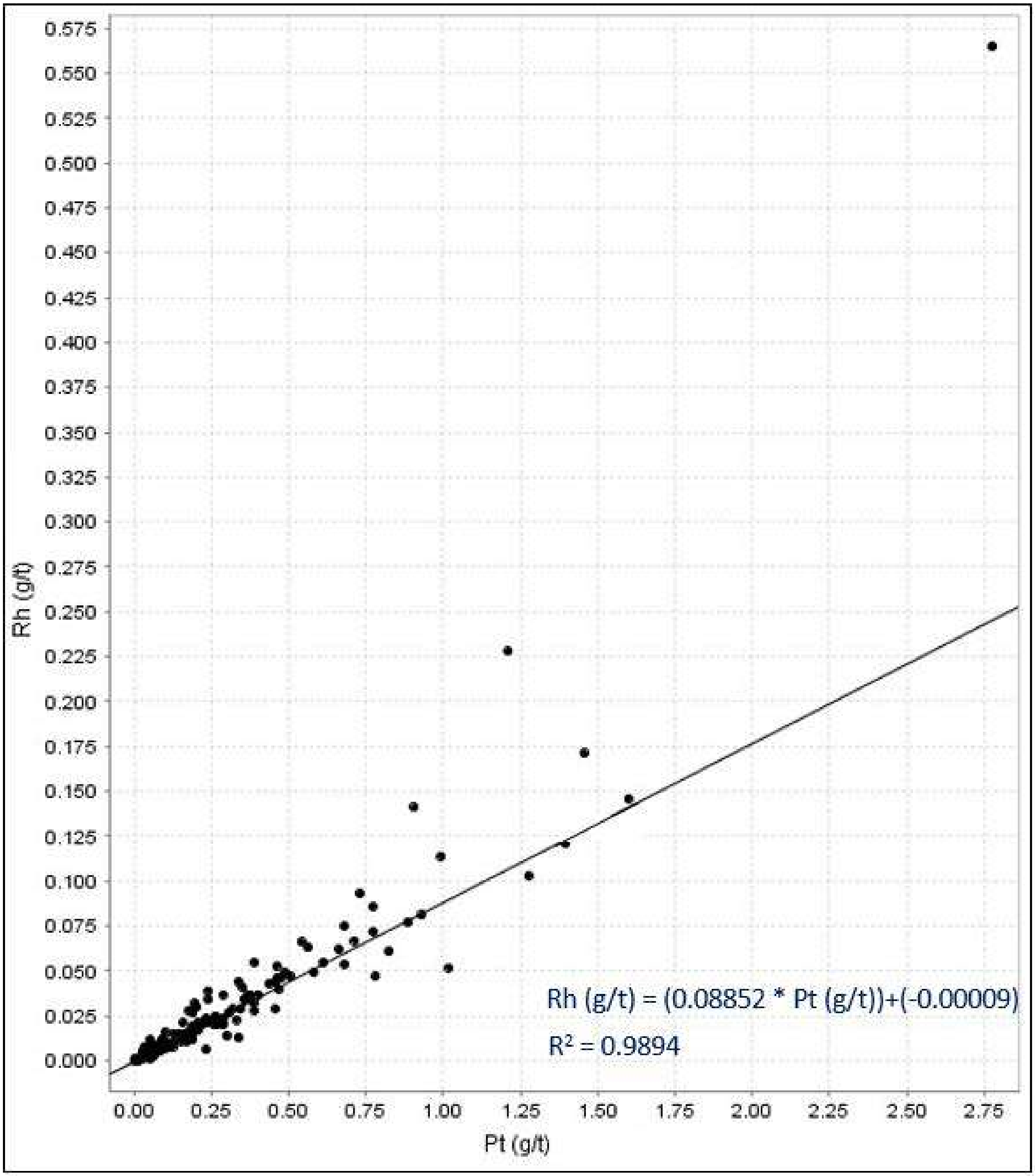
TABLE 9.5 STATISTICAL SUMMARY OF 2021 AND PREVIOUS ASSAY DATA FOR THE LISMER NORTH ZONE											
Parameter	**2021 Data**						**Historical Data**				
	Au	**Ir**	**Pd**	**Pt**	**Rh**	**Ru**	**Cu**	**Ni**	**Co**	**S**	**Cr**
Number of Samples*	187	187	187	187	187	187	186	186	106	0	106
Maximum Value**	0.511	0.113	7.003	2.777	0.565	0.013	0.335	0.044	0.007	na	214
Average Value**	0.041	0.006	0.606	0.256	0.026	0.004	0.056	0.011	0.002	na	73
Median**	0.019	0.003	0.185	0.213	0.010	0.003	0.035	0.008	0.002	na	68
Correlation Coefficient* **	**0.471**	**0.992**	**0.709**	**0.909**	**1**	**0.948**	**0.301**	**0.247**	**0.083**		**0.001**

Source: *NAM press release (December 15, 2021)*
Notes:
**2021 assay data from Geoscience Laboratories and 2015-2019 previous assay data are for the same samples.*
***Au, Ir, Pd, Pt, Rh and Ru values in grams per tonne (g/t); Cu, Ni, and Co values in %; Cr values in ppm.*
**** Correlation coefficient for rhodium.*
na = not analysed.

In contrast to the Pine Zone, Rh shows only weak correlation (R2 >0.3) with copper and very weak correlation (R2 >0.2) with nickel (Table 9.5). On the other hand, and like the Pine Zone, Rh (and Ru) do not correlate with chromium (Rh R2 = 0.001 and Ru R2 = -0.016), and therefore is unlikely to be held in Cr-bearing phases like chromite. The evident occurrence of Rh independently of chromite differs from other Rh-bearing PGM deposits elsewhere and could potentially simplify metallurgical recovery processes. Similarly, the presence of laurite might perhaps bode well for potential Ru recovery.

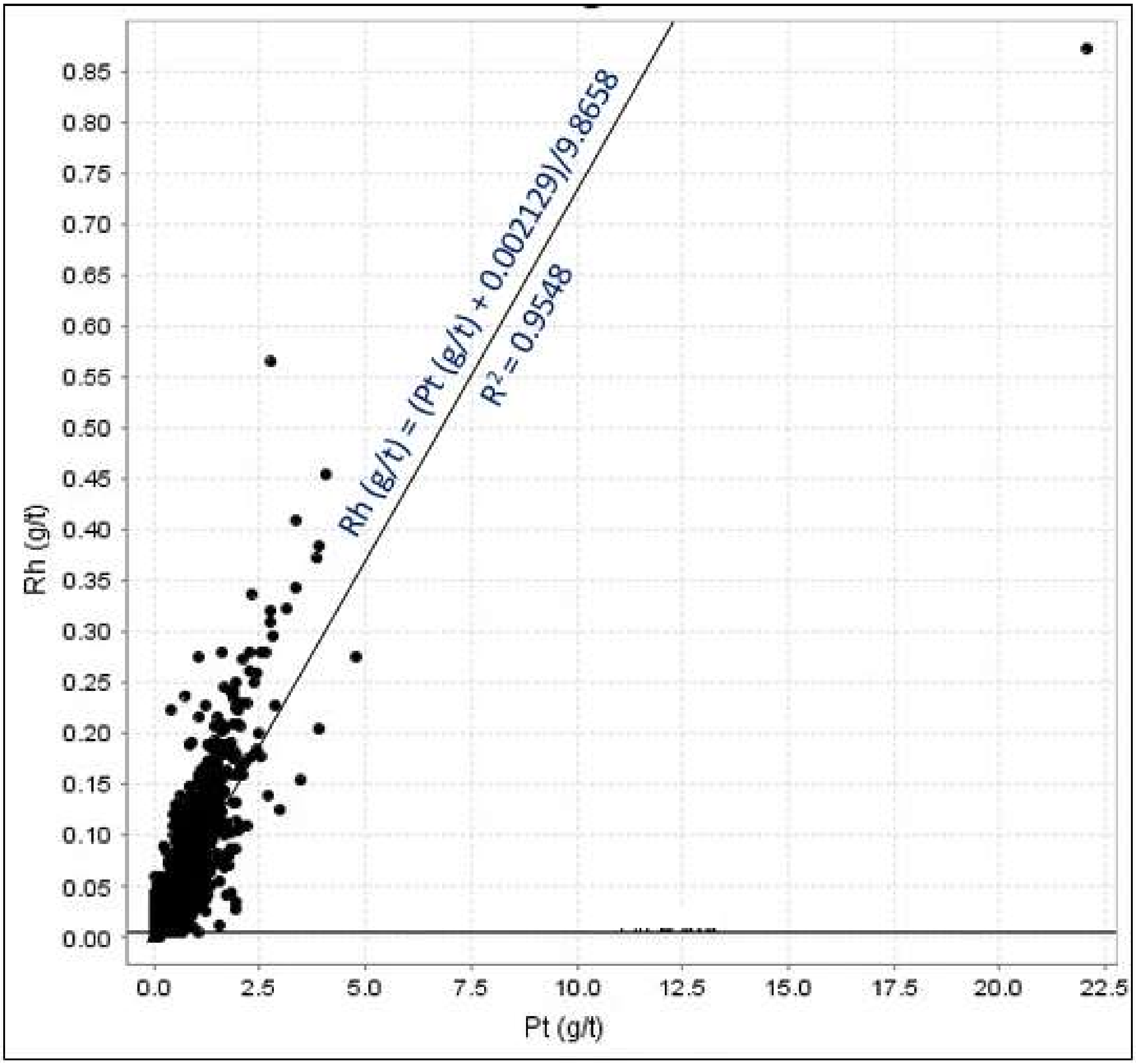
A plot of measured Pt values versus Rh values for the 187 drill core samples from the Lismer North Zone and the robust simple regression line with its derived equation are shown in Figure 9.2. Statistical analysis indicates that Rh values for the remainder of the River Valley Deposit can be estimated on the basis of Pt values through regression analysis. A plot of measured Pt values versus Rh values for all the drill core samples from River Valley and the robust simple regression line with its derived equation are shown in Figure 9.3.

FIGURE 9.2 LISMER NORTH MEASURED PT VERSUS RH VALUES AND THE ROBUST SIMPLE REGRESSION LINE WITH DERIVED EQUATION



Source: *NAM press release (December 15, 2021)*
Note: *Number of drill core samples = 187*

FIGURE 9.3 RIVER VALLEY DEPOSIT MEASURED PT VERSUS RH VALUES AND THE ROBUST SIMPLE REGRESSION LINE WITH DERIVED EQUATION



Source: *NAM press release (December 15, 2021)*
Notes: *Based on assay results for 8,097 drill core samples.*

9.1.4 Phase 3: Rhodium at Dana North, Dana South, Lismer North, Lismer Ridge Zones - 2023

Phase 3 of the Rh geochemistry study involved selection of 552 ¼ HQ drill core samples from the four metallurgical drill holes that were completed in 2021 at the Dana North, Dana South, Lismer North and Lismer Ridge Zones for assay analyses. The Rh assay data results for these 552 samples are described below.

In total, 552 samples of mineralized drill core intervals in the four metallurgical holes were selected for Rh assay: 200 from Dana North Zone drill hole DN-21-01m; 148 from Dana South Zone drill hole DS-21-01m; 84 from Lismer North Zone drill hole LN-21-01m; and 120 from Lismer Ridge Zone drill hole LR-21-01m. The assay analyses were completed at the Geoscience Laboratory in 2022 and 2023. Overall, the returned Rh assays values range from 0.0007 g/t to 0.306 g/t Rh. 34 drill core samples returned assays of ≥0.100 g/t Rh (Table 9.6) and 113 samples returned assays >0.050 g/t Rh. The highest assay result for Ir is 0.069 g/t and for Ru is 0.039 g/t, also for samples from the Lismer Ridge Zone.

TABLE 9.6
PHASE 3 RHODIUM ASSAY HIGHLIGHTS

Mineralized Zone	Sample No.	From (m)	To (m)	Rh (g/t)	Ru (g/t)	Ir (g/t)	Pd (g/t)	Pt (g/t)	Au (g/t)	3E (g/t)
Lismer Ridge	LR21-216	205	206	**0.306**	0.039	0.069	7.286	2.793	0.254	10.333
Dana South	DS21-127	120	121	**0.269**	0.028	0.066	7.172	2.261	0.370	9.804
Dana North	DN21-119	113	114	**0.267**	0.022	0.055	4.644	1.402	0.125	6.171
Dana South	DS21-169	160	161	**0.241**	0.026	0.057	4.484	1.012	0.231	5.726
Dana North	DN21-082	78	79	**0.235**	0.020	0.050	7.801	1.936	0.257	9.995
Dana North	DN21-059	56	57	**0.234**	0.020	0.049	8.284	2.373	0.404	11.061
Dana North	DN21-095	90	91	**0.219**	0.017	0.045	6.479	1.911	0.162	8.552
Dana North	DN21-060	57	58	**0.195**	0.017	0.041	6.457	1.909	0.328	8.694
Dana South	DS21-160	152	153	**0.195**	0.020	0.044	3.803	1.299	0.106	5.208
Dana South	DS21-159	151	152	**0.183**	0.018	0.035	5.061	1.660	0.181	6.902
Dana North	DN21-013	12	13	**0.174**	0.015	0.036	6.260	1.680	0.220	8.161
Dana South	DS21-002	1	2	**0.170**	0.017	0.041	4.696	1.424	0.133	6.253
Dana South	DS21-141	134	135	**0.164**	0.017	0.033	3.957	1.316	0.095	5.368
Dana South	DS21-008	7	8	**0.159**	0.016	0.037	5.008	1.243	0.176	6.427
Dana South	DS21-172	163	164	**0.156**	0.016	0.032	4.698	1.479	0.150	6.328
Dana South	DS21-134	127	128	**0.154**	0.015	0.031	5.309	1.486	0.306	7.101
Dana North	DN21-006	5	6	**0.149**	0.014	0.034	4.310	1.220	0.207	5.737
Lismer North	LN21-154	146	147	**0.141**	0.027	0.036	1.870	0.897	0.112	2.879
Dana South	DS21-135	128	129	**0.141**	0.013	0.030	4.885	1.477	0.102	6.464
Dana South	DS21-164	156	157	**0.136**	0.013	0.029	4.841	1.403	0.303	6.548
Dana South	DS21-003	2	3	**0.135**	0.014	0.030	3.910	1.457	0.125	5.492
Dana South	DS21-180	171	172	**0.134**	0.011	0.020	4.460	0.699	0.067	5.226
Dana North	DN21-140	133	134	**0.133**	0.013	0.028	3.855	1.077	0.121	5.054
Dana South	DS21-007	6	7	**0.121**	0.013	0.027	3.688	0.961	0.227	4.876
Dana South	DS21-211	200	201	**0.120**	0.011	0.024	3.513	1.071	0.153	4.738
Lismer Ridge	LR21-215	204	205	**0.119**	0.016	0.026	3.037	1.045	0.134	4.215
Dana North	DN21-083	79	80	**0.117**	0.010	0.023	4.116	1.172	0.179	5.466

TABLE 9.6 **PHASE 3 RHODIUM ASSAY HIGHLIGHTS**										
Mineralized Zone	**Sample No.**	**From (m)**	**To (m)**	**Rh (g/t)**	**Ru (g/t)**	**Ir (g/t)**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**3E (g/t)**
Dana South	DS21-181	172	173	**0.113**	0.011	0.023	2.711	0.944	0.041	3.696
Dana South	DS21-168	159	160	**0.109**	0.010	0.019	10.327	1.311	0.285	11.922
Dana North	DN21-011	10	11	**0.109**	0.012	0.027	3.358	1.115	0.129	4.602
Dana North	DN21-118	112	113	**0.107**	0.009	0.023	3.450	1.003	0.092	4.545
Dana South	DS21-186	176	177	**0.106**	0.011	0.025	3.555	1.671	0.309	5.534
Dana South	DS21-173	164	165	**0.105**	0.012	0.024	2.584	0.698	0.117	3.399
Dana South	DS21-162	154	155	**0.101**	0.008	0.019	2.708	0.860	0.157	3.725

The announcement of these 552 results increases the total inventory of Rh data assays for River Valley to 8,610 (Table 9.7). At 80.2% of the total, the results for Dana North still dominate the Rh data inventory. Nevertheless, the maximum Rh assay in this dataset is reported for the Lismer Ridge Zone, located 3 km south along strike from Dana North.

TABLE 9.7 **RHODIUM DATA INVENTORY OF THE RIVER VALLEY PALLADIUM PROJECT**				
Zone	**Number of Individual Drill Core Samples***	**Count (%)**	**Minimum Rh (g/t)****	**Maximum Rh (g/t)**
Pine	303	3.5	0.0250	0.177
Dana North	6,909	80.2	0.0007	0.410
Dana South	540	6.3	0.0013	0.269
Lismer North	738	8.6	0.0014	0.873
Lismer Ridge	120	1.4	0.0002	0.306
Total	**8,610**	**100**		

Notes: **drill core samples of mineralized intervals only (channel samples, surface rock samples and academic study samples excluded).*
***lower limit of detection = 0.000008 ppm Rh.*

Statistically, the assay results show strong positive correlation of Rh with the other four PGE (R^2 >0.9) and moderate to strong correlation with Au (R^2 >0.6) (Table 9.8), consistent with presence in the mineral phases Hollingworthite [(Rh,Pt,Pd)AsS], platarsite [(PtAsS) with minor Rh and Ru), and laurite [(RuS_2 with minor Rh], each of which has been identified in previous mineralogical studies of the River Valley Deposit. In contrast, Rh shows moderate correlation (R^2 >0.6) with Cu, Ni and S at the Dana Zones and weak correlation (R^2 <0.5) with Cu, Ni and particularly S at the Lismer Zones. On the other hand, and as previously reported for the Pine and Lismer North Zones, Rh and Ru do not correlate with chromium (Rh R^2 <0.010), and therefore these metals are very unlikely to be held in Cr-bearing phases like chromite. The evident occurrence of Rh independently of chromite differs from other Rh-bearing PGE deposits elsewhere and could potentially benefit metallurgical recovery processes. Similarly, the presence of laurite could bode well for potential Ru recovery.

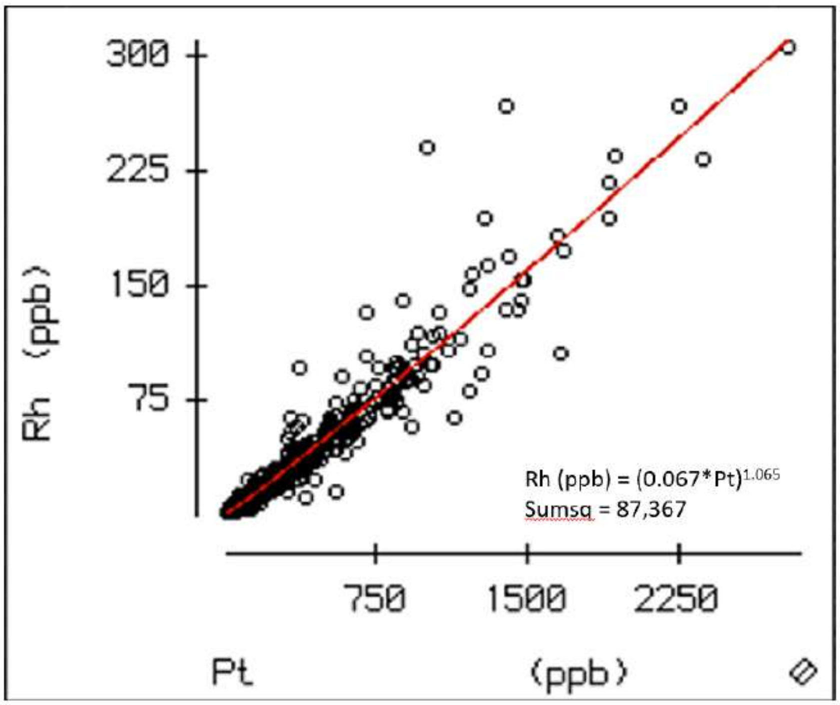
TABLE 9.8
2021 TO 2023 PGE AND BASE METAL ASSAY DATA PER MINERALIZED ZONE

Parameter	2022-2023 GeoLabs Assay Data							2021 SGS Assay Data				
	Rh	**Ru**	**Ir**	**Pd**	**Pt**	**Au**	**Pt/Rh**	**Cu**	**Ni**	**Co**	**S**	**Cr**
Dana North Zone												
Number of Samples*	**200**	200	200	200	200	200	200	200	200	200	200	200
Maximum Value**	**0.267**	0.022	0.055	2.373	0.267	0.404	20	0.372	0.070	0.007	0.93	537
Average Value**	**0.038**	0.004	0.008	1.260	0.380	0.067	11	0.111	0.024	0.004	0.28	111
GeoMean**	**0.024**	0.002	0.005	0.751	0.246	0.050	10	0.093	0.212	0.004	0.23	95
Correlation Coefficient (Rh)* **	**1**	**0.990**	**0.996**	**0.968**	**0.968**	**0.850**	**-0.308**	**0.713**	**0.691**	**0.515**	**0.605**	**-0.230**
Dana South Zone												
Number of Samples*	**148**	148	148	148	148	148	148	148	148	148	148	148
Maximum Value**	**0.269**	0.028	0.066	10.327	2.261	0.370	38	0.660	0.073	0.012	1.08	413
Average Value**	**0.032**	0.004	0.009	1.294	0.381	0.064	11	0.104	0.018	0.003	0.22	86
GeoMean**	**0.016**	0.002	0.004	0.453	0.173	0.035	11	0.067	0.014	0.003	0.16	76
Correlation Coefficient (Rh)* **	**1**	**0.981**	**0.992**	**0.902**	**0.939**	**0.815**	**-0.333**	**0.697**	**0.618**	**0.208**	**0.459**	**-0.054**
Lismer North Zone												
Number of Samples*	**84**	84	84	84	84	84	84	84	84	84	84	84
Maximum Value**	**0.141**	0.027	0.036	3.674	0.996	0.142	32	0.434	0.041	0.007	0.60	253
Average Value**	**0.024**	0.005	0.004	0.536	0.235	0.004	12	0.081	0.071	0.016	0.19	88
GeoMean**	**0.014**	0.003	0.004	0.281	0.158	0.022	11	0.047	0.010	0.003	0.12	74
Correlation Coefficient (Rh)* **	**1**	**0.950**	**0.991**	**0.836**	**0.900**	**0.643**	**-0.428**	**0.447**	**0.206**	**0.016**	**0.392**	**-0.194**
Lismer Ridge Zone												
Number of Samples*	**120**	120	120	120	120	120	120	117	117	117	117	117
Maximum Value**	**0.306**	0.039	0.069	7.286	2.793	0.254	41	0.328	0.084	0.009	1.36	486
Average Value**	**0.024**	0.004	0.006	0.658	0.260	0.037	13	0.053	0.016	0.003	0.22	91
GeoMean**	**0.012**	0.002	0.003	0.343	0.149	0.020	12	0.036	0.012	0.002	0.13	81
Correlation Coefficient (Rh)* **	**1**	**0.951**	**0.985**	**0.965**	**0.957**	**0.810**	**-0.293**	**0.409**	**0.370**	**0.212**	**0.193**	**0.088**

Notes: **2022-2023 assay data from Geoscience Laboratories and 2021 assay data from SGS Canada Inc. are for the same sampled drill core interval.*
***Au, Ir, Pd, Pt, Rh and Ru assay values in grams per tonne (g/t); Cu, Ni, and Co assay values in percent (%); Cr assay values in ppm.*
**** Correlation coefficient for rhodium.*

Statistical analysis indicates that Rh assay values for the remaining River Valley Deposit (>100,000 samples) can be estimated on the basis of measured Pt values through regression analysis. A plot of measured Pt values versus Rh values for the 552 drill core samples assayed at Geoscience Labs and the non-linear regression line with its derived equation are shown in Figure 9.4. At this stage, non-linear regression models appear to be better than linear regression models for predicting Rh assay values, particularly higher ones.

FIGURE 9.4 RH VERSUS PT NON-LINEAR REGRESSION



Source: *NAM press release (May 9, 2023)*
Notes: *Power equation solved in DataDesk® version 8.2.1.*
N= 552 samples.

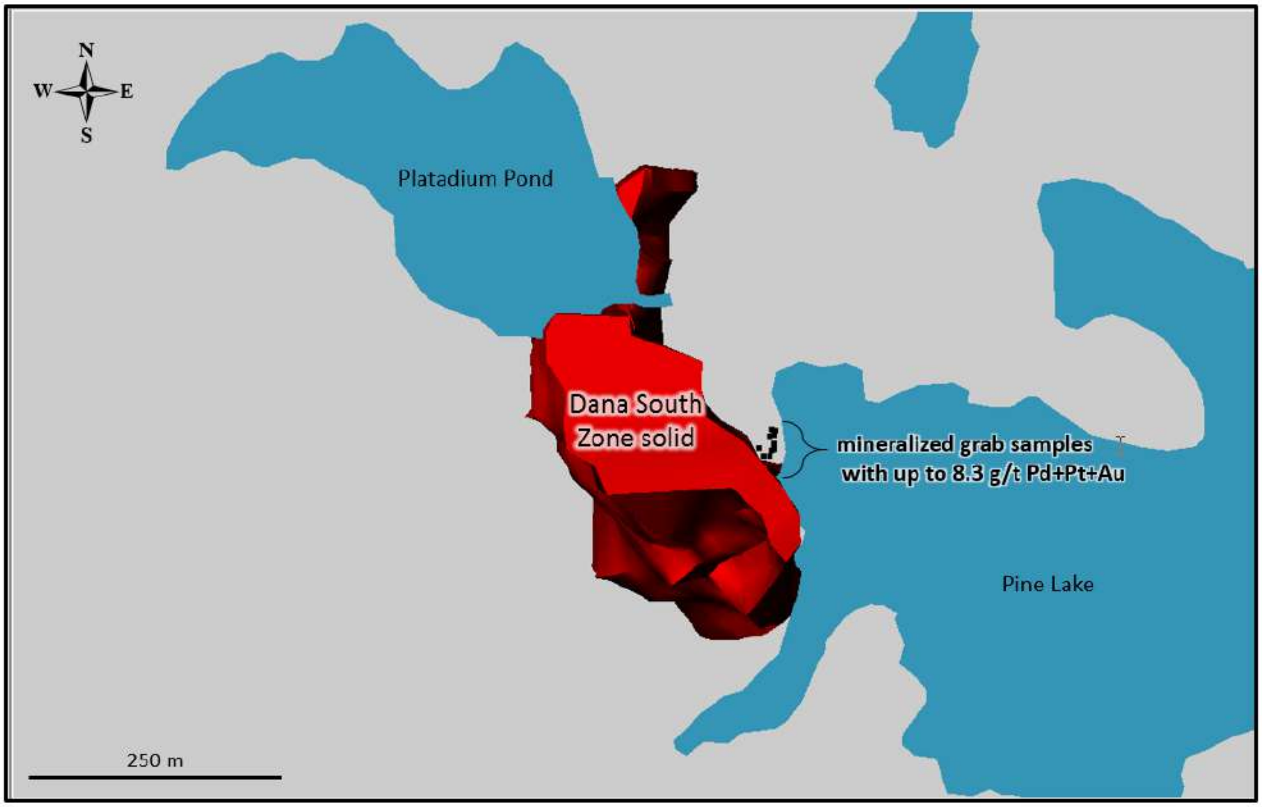
9.2 2020-2021 SURFACE EXPLORATION PROGRAMS

Surface exploration programs completed since 2019 include outcrop grab samples and trench excavation and channel sampling. These programs are described below.

9.2.1 Outcrop Grab Samples 2020

Mineral prospecting activities in 2020 focused on the Dana South and Pardo Zones. At the Dana South Zone (Figure 9.5), the largely covered area between the eastern boundary of the Mineral Resources and the western shoreline of Pine Lake was prospected and sampled. Samples previously collected from this area returned assays of up to 4.91 g/t Pd+Pt+Au and 0.25% Cu (see Company press release dated December 6, 2016). The purpose of returning in 2020 was to confirm the presence of the favourable River Valley Breccia Unit and especially the Cu-Fe sulphide mineralization in outcrop.

FIGURE 9.5 MINERALIZED SURFACE GRAB SAMPLE LOCATIONS BETWEEN THE DANA SOUTH MINERAL RESOURCES MODEL AND DANA LAKE



Source: *NAM (press release dated September 24, 2020)*

Significant assays were returned for seven of the 14 outcrop samples of Breccia Unit (Table 9.9). The highest assay result was 8.29 g/t Pd+Pt+Au and 0.24% Cu. Evidently, the confirmed surface mineralization means that either the footprint of the Dana South is larger than modelled or it represents discovery of a potential new zone approximately 50 to 100 m to the east of the Zone.

In 2021, the surface mineralized area between the Dana South Zone and Pine Lake was stripped, in order to better define the extent of the mineralization at surface and investigate whether it was obviously connected to Dana South.

Table 9.9 Assay Results for Surface Grab Samples from Dana South Zone Footwall and Pardo Zone												
Zone	**Sample**	**Coordinates**		**Au (g/t)**	**Pd (g/t)**	**Pt (g/t)**	**3E (g/t)**	**Ni (%)**	**Cu (%)**	**Co (%)**	**S (%)**
		Easting	**Northing**								
Dana South	RZ-005DS	555,584	5,172,012	0.289	6.210	1.790	8.289	0.013	0.242	0.003	0.33
Dana South	RZ-006DS	555,580	5,172,017	0.080	1.470	0.360	1.910	0.013	0.087	0.002	0.14
Dana South	RZ-002DS	555,583	5,172,021	0.058	1.110	0.290	1.458	0.018	0.078	0.003	0.10
Dana South	RZ-003DS	555,584	5,172,018	0.045	0.813	0.230	1.088	0.015	0.044	0.003	0.06
Dana South	RZ-001DS	555,584	5,172,022	0.060	0.416	0.120	0.596	0.014	0.108	0.003	0.15
Dana South	RZ-004DS	555,581	5,172,023	0.011	0.208	0.090	0.309	0.008	0.012	0.002	0.02
Dana South	RZ-011DS	555,571	5,172,007	0.001	0.068	0.050	0.119	0.006	0.001	0.002	<0.01
Dana South	RZ-008DS	555,582	5,172,005	0.001	0.046	0.050	0.097	0.005	0.002	0.002	<0.01
Dana South	RZ-009DS	555,582	5,172,005	0.001	0.045	0.020	0.066	0.006	0.001	0.002	<0.01
Dana South	RZ-007DS	555,584	5,172,006	0.003	0.026	0.030	0.059	0.003	0.005	0.001	0.02
Dana South	RZ-014DS	555,565	5,172,002	0.001	0.048	0.010	0.059	0.004	0.001	0.002	<0.01
Dana South	RZ-013DS	555,575	5,172,001	0.001	0.011	0.010	0.022	0.002	0.002	0.001	<0.01
Dana South	RZ-012DS	555,580	5,172,001	0.001	0.008	0.010	0.019	0.002	0.002	0.001	<0.01
Dana South	RZ-010DS	555,584	5,172,008	0.001	0.007	0.010	0.018	0.007	0.000	0.002	<0.01
Pardo	RZ2020-01	555,963	5,174,603	0.057	0.921	0.480	1.458	0.020	0.116	0.006	0.42
Pardo	RZ2020-04	555,862	5,174,462	0.009	0.227	0.130	0.366	0.006	0.016	0.003	0.13
Pardo	RZ2020-02	555,963	5,174,603	0.012	0.118	0.040	0.170	0.009	0.045	0.004	0.10
Pardo	RZ2020-03	555,844	5,174,445	0.002	0.018	0.020	0.040	0.004	0.008	0.003	0.02

Notes: ** Easting and Northing coordinates are in NAD83 UTM Zone 17N, 3E = 3 elements: Pt + Pd + Au.*

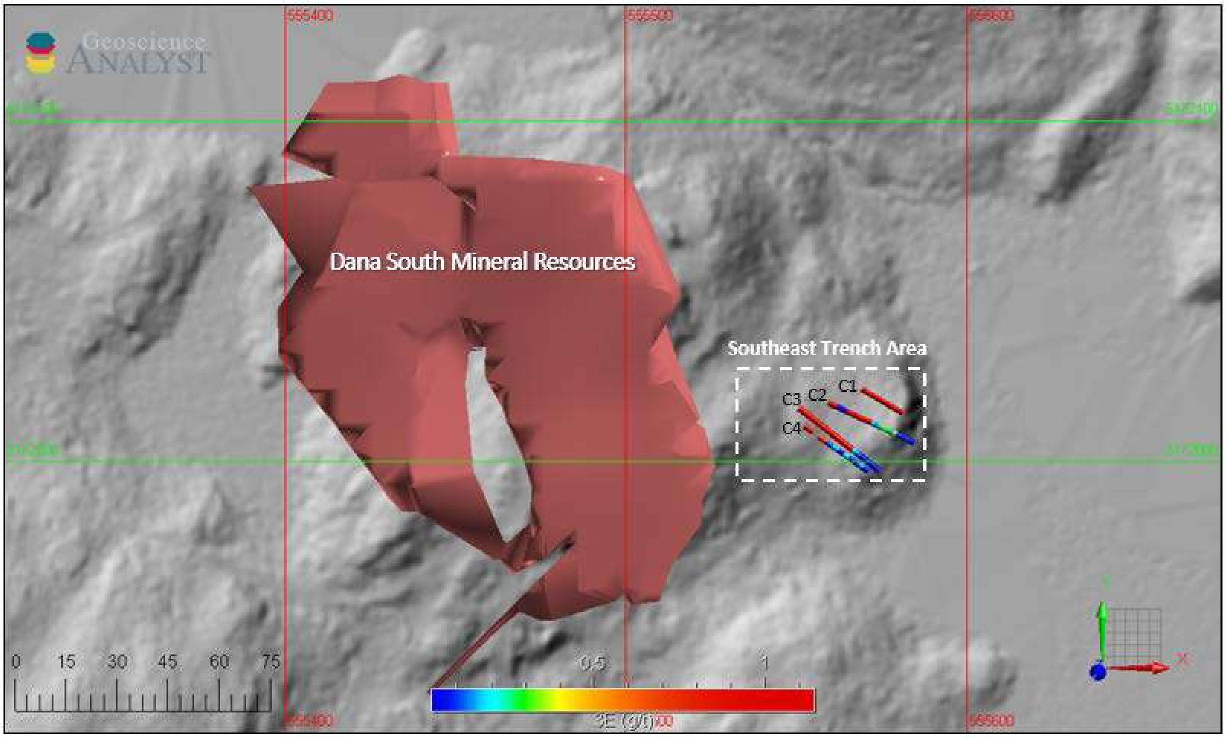
In addition to the Pd and Pt, six of the Dana South area grab samples were assayed for Rh, Au and other minor platinum metals at the Geoscience Laboratory. The assay results for this small sample number range from 0.005 to 0.124 g/t Rh. This range overlaps with historical assays of <0.010 to 0.322 g/t Rh in 618 drill core samples from eight drill holes and <0.010 to 0.343 g/t Rh in 632 surface channel samples of Dana South. Statistically, Rh correlates strongly and positively with the other PGE and Cu and moderately with S, however, not with Co, Ni and Cr.

At the Pardo Zone, the northernmost mineralized zone of the River Valley Deposit (2 km north of the Dana North Zone and north of the Grenville Front), four grab samples of Breccia Unit were taken in 2020 to confirm the presence of surface mineralization indicated in historical sampling. Three of the four samples returned assays indicative of palladium mineralization, with the highest assay result 1.46 g/t Pd+Pt+Au and 0.12% Cu (Table 9.9). With such confirmed indications of palladium mineralization on surface, in addition to presence of such mineralization in historical drilling (11 holes drilled in 2004), the Pardo Zone is under consideration for additional mineral prospecting and mapping surveys and trenching and drilling work, in order to ultimately support an NI 43-101 Mineral Resource Estimate.

9.2.2 Trench Excavation and Channel Sampling 2021

In 2021, the Dana South-Southeast Trench ("SET") was excavated on the mineralized outcrops to investigate the continuity of this mineralization, particularly westward towards the Dana South Zone (Figure 9.6). Subsequently, four channels totalling 95 m in length were cut in the SET and contiguously sampled in 1 m intervals, as summarized in Table 9.10 The samples were submitted to SGS Canada Inc. for assay and the results are summarized in Table 9.11.

FIGURE 9.6 SET CHANNEL SAMPLING



Source: *NAM (September 2022)*
Figure Description: *Location of the four sampled channels (C1 to C4) in Dana South-Southeast Trench, 50 m to 100 m east of the Dana South Mineral Resource. Note that the palladium mineralization in the trench area is open to the north, west and possibly to the south. Details of the Dana South Mineral Resource estimate are available on the Company website (www.newagemetals.com) and under the Company profile on SEDAR.*

TABLE 9.10 LOCATION, ORIENTATION AND LENGTH OF SAMPLED CHANNELS AT DANA SOUTH - SE TRENCH						
Channel	**Easting (m)**	**Northing (m)**	**Elevation (m)**	**Azimuth (deg)**	**Dip (deg)**	**Length (m)**
C1 start	555,569	5,172,022	293.1	300	0	
C1 end	555,581	5,172,014	294.8	300	0	14
C2 start	555,556	5,172,021	293.7	115	0	
C2 end	555,581	5,172,010	294.9	115	0	28
C3 start	555,552	5,172,013	294.0	308	0	
C3 end	555,579	5,172,003	293.8	308	0	30
C4 start	555,552	5,172,009	293.8	125	0	
C4 end	555,573	5,172,000	294.4	125	0	23

Source: *Story Environmental (June 2022)*
Note: *Measurements made by Story Environmental using a differential GPS method.*

TABLE 9.11 **SUMMARY OF MINERALIZED INTERVALS AT DANA SOUTH SET**												
Channel	**From (m)**	**To (m)**	**Interval (m)***	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**3E (g/t)**	**Cu (%)**	**Ni (%)**	**S (%)**	**NSR ($/t)****	**Remarks**
C1	0	14	14	1.09	0.42	0.05	1.55	0.069	0.013	0.17	84.57	started/ended in mineralization
including	9	14	5	2.36	0.70	0.08	3.14	0.127	0.026	0.32	174.57	
C2	0	3	3	0.63	0.20	0.05	0.89	0.079	0.013	0.14	51.96	started in mineralization
and	6	14	8	0.68	0.27	0.04	0.99	0.057	0.012	0.21	54.52	
C3	10	30	20	0.69	0.28	0.04	1.01	0.251	0.037	0.19	55.70	ended in mineralization
including	21	30	9	1.20	0.39	0.08	1.66	0.130	0.020	0.20	95.67	
C4	0	3	3	1.61	0.46	0.11	2.18	0.205	0.025	0.81	129.05	started in mineralization
and	5	8	3	0.50	0.20	0.02	0.73	0.038	0.010	0.20	39.93	

Notes:
**Interval widths are apparent, not true. Extents and orientation of the Pd mineralization at the SET location remains to be determined.*
*** NSR formula given in NAM press release dated October 5, 2021.*

The highlights of the palladium mineralized intervals are as follows:

- **Channel 1:** This channel is mineralized along its entire 14 m length. Assays for the 14 samples returned 1.55 g/t 3E (Pd+Pt+Au) and 0.069% Cu or $84.57/t NSR over 14 m, including 3.14 g/t 3E and 0.127% Cu or $174.57/t NSR over 5 m;

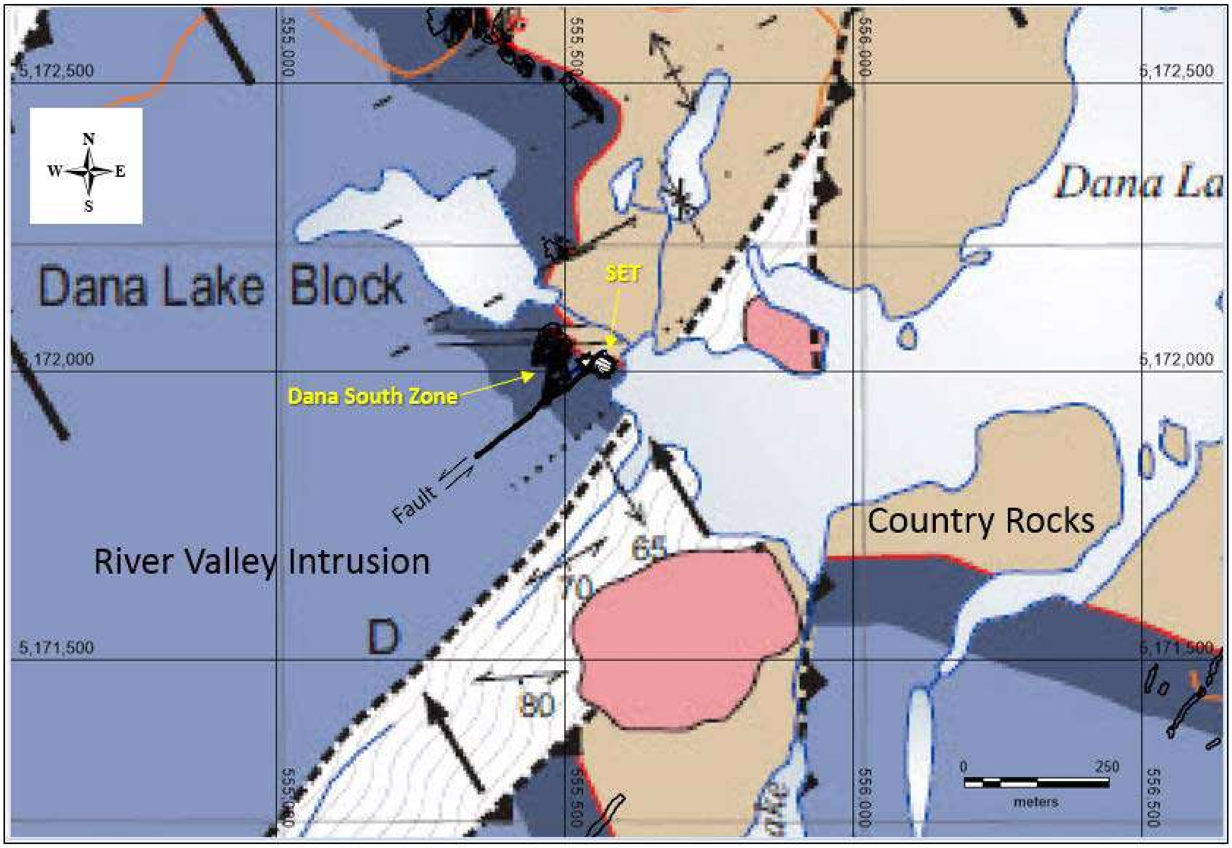
- **Channel 2:** Assays for 28 samples returned 0.89 g/t 3E and 0.079% Cu or $52.96/t NSR over 3 m and 0.99 g/t and 0.057% Cu or $54.42/t NSR over 8 m;

- **Channel 3:** Assays for 30 samples returned 1.01 g/t 3E and 0.251% Cu or $55.79/t NSR over 20 m, including 1.66 g/t 3E and 0.130% Cu or $95.67/t NSR over 9 m; and

- **Channel 4:** assays for 23 samples returned 2.18 g/t 3E and 0.205% Cu or $129.05/t NSR over 3 m and 0.73 g/t 3E and 0.038% Cu or $39.93/t NSR over 3 m.

In the structural geology model of Wetherup and Jobin-Bevans (2001), the Pd mineralization at SET can be explained as being offset from the main Dana South Zone by sinistral movement along a north-east trending fault (Figure 9.7). Accordingly, the mineralization in the SET area appears to remain open to expansion by drilling, particularly to the southeast and at depth. New drilling programs to further test continuity of this mineralization are under consideration.

FIGURE 9.7 GEOLOGICAL INTERPRETATION OF THE DANA SOUTH-SET AREA



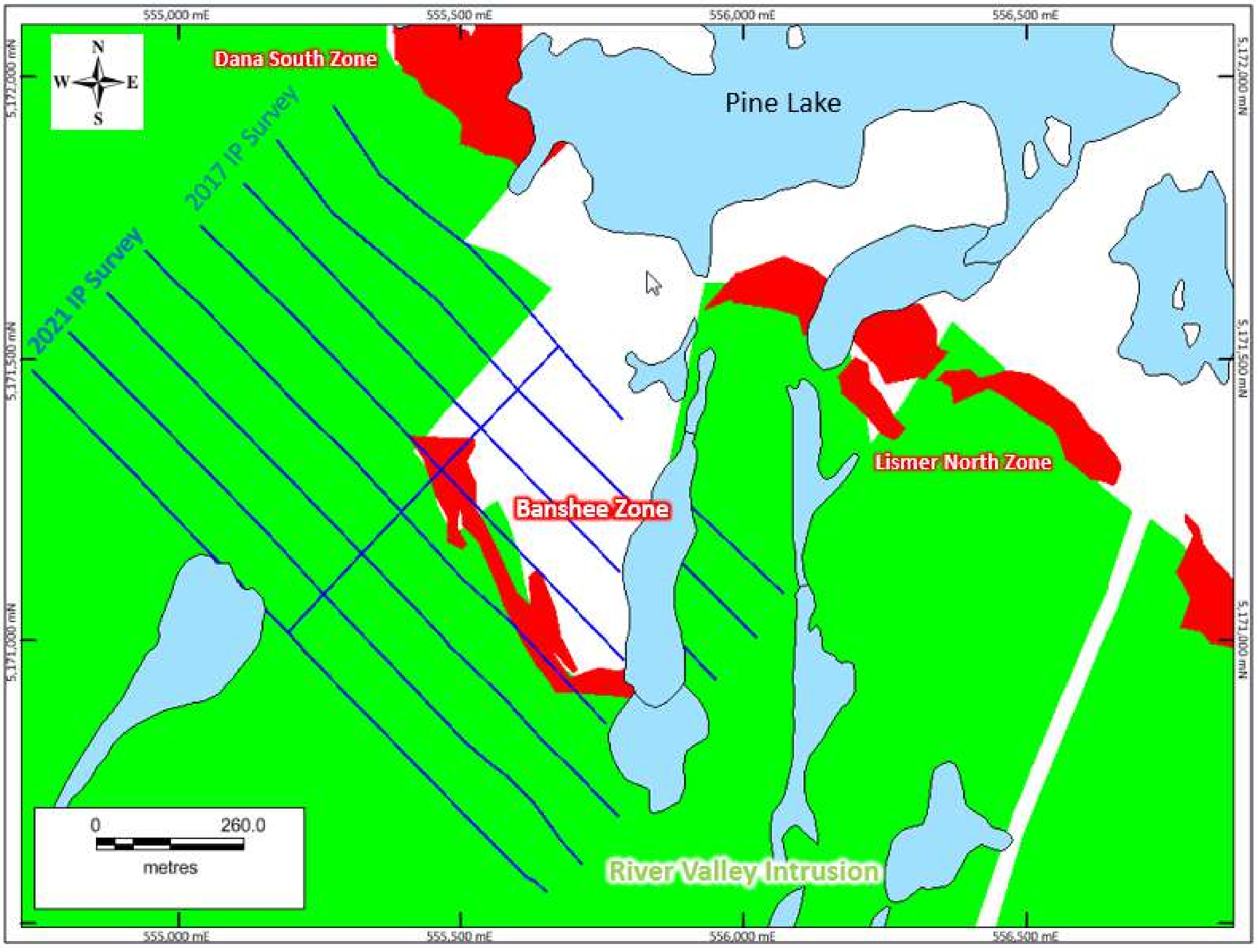
Source: *Adapted by P&E (September 2022) from Wetherup and Jobin-Bevans (2001)*

9.3 2021 INDUCED POLARIZATION SURVEY

An OreVision 3-D IP geophysical survey was completed by Abitibi Geophysics over the Banshee Zone in June 2021. The purpose of the survey was to extend IP coverage over the Banshee Zone to support the planning of Mineral Resource infill and expansion drill programs. The configuration of the OreVision 3-D survey deployed in the field has a depth of investigation of up to 485 m below surface. The IP survey is designed to detect chargeability features along the north-northeast trending faults cutting at high-angle to the basal contact, which could correspond to structurally-controlled mineralization, like the Pine Zone. The latter is the best-known example of what is probably structurally-oriented PGM mineralization at River Valley.

The IP survey was completed on a newly cut 6 line-km grid over the Banshee Zone (Figure 9.8). The new line-grid overlaps with the limit of the previous IP survey (2017) in the Grenvillian footwall, extends into the hanging wall to Banshee, and covers the Banshee Zone itself. The IP survey lines were oriented parallel to the known trend of the Banshee mineralization, in order to better detect discordant “Pine Zone-like” structurally transposed mineralization in the footwall.

FIGURE 9.8 LOCATION OF THE CUT-LINE GRID FOR THE OREVISION 3-D IP SURVEY OVER THE BANSHEE ZONE

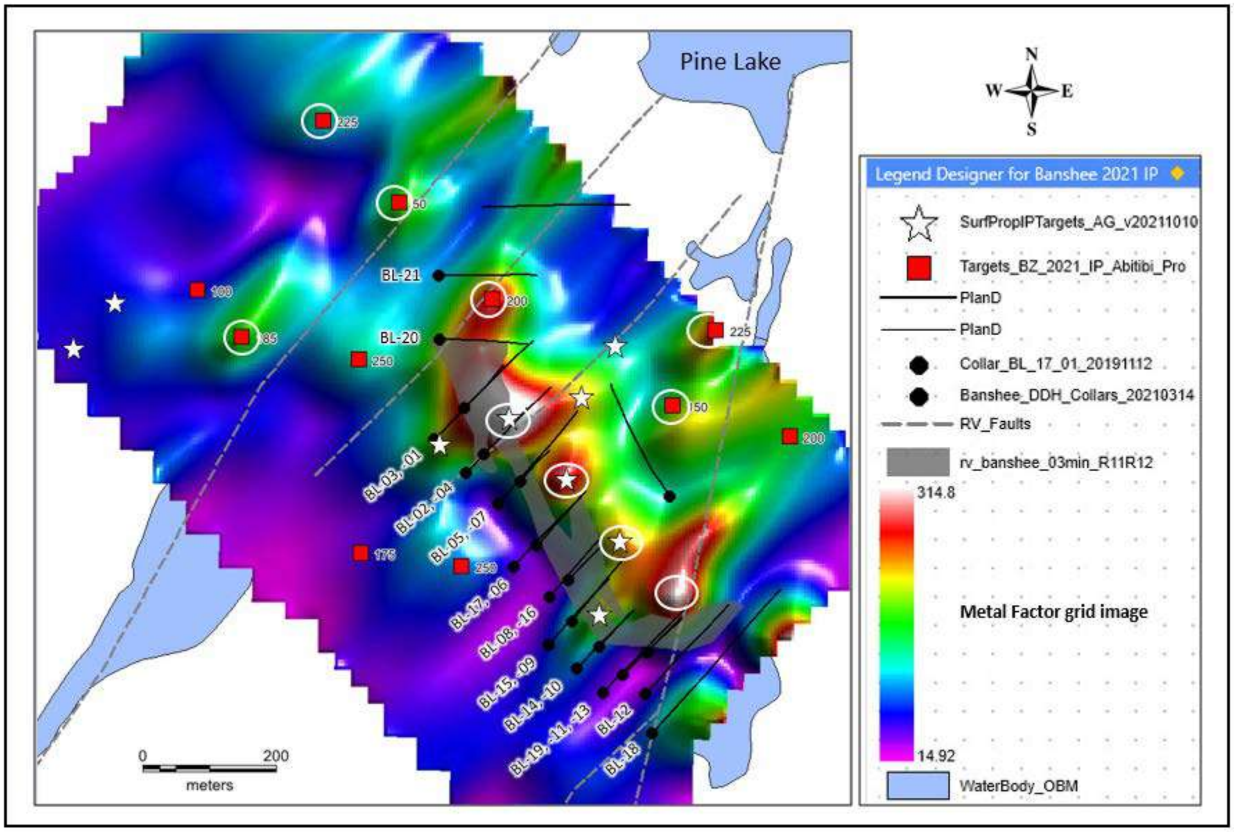


Source: *NAM (press release dated October 26, 2021)*
Notes: *blue lines – cut-line grids 2021 and 2017 for IP surveys, as indicated; red bodies = Banshee Zone, Dana South Zone and Lismer North Zone.*

Following QAQC protocols, data processing and integration with the 2017 survey data, and inversion and interpretation, Abitibi Geophysics delivered 11 sub-surface targets and three surface targets to NAM for further evaluation (Figure 9.9).

The targets situated on chargeability highs that continue to depths up to 400 m below surface were prioritized by NAM for follow-up evaluation work and potential drill testing. The prioritized targets on the Banshee Zone trend (the northwest trend) potentially coincide with contact-type palladium mineralization (historical drill hole BL-02: 1.11 g/t 3E over 7.5 m) and may indicate potential for Mineral Resource expansion by drilling down-dip and across strike, particularly in the north part Banshee. The prioritized targets on cross-cutting (north to northeast-trending) faults may indicate areas of mineralization transposed into the footwall during deformation, like the Pine Zone 1.5 km north. Such footwall structural targets (for example, near historical drill holes BL-19, -11 and -13 and BL-21 in Figure 9.9) represent an under-explored target type at Banshee and, more generally, on the River Valley Property.

FIGURE 9.9 BANSHEE AREA IP TARGETS



Source: *NAM press release (October 26, 2021)*
Figure Description: *Surface (white stars) and sub-surface (red squares) OreVision 3D targets overlain on calculated Metal Factor plan map at 250 m elevation (~60 m below surface) for Banshee Zone (grey). OreVision 3D products generated by Abitibi Geophysics. The targets (circled) that correspond to or overlap with high Metal Factor map values are prioritized by NAM for follow-up work. Also shown are the historical drill holes.*

The 2022-2023 exploration plan for Banshee Zone was to be revisited and revised in view of the new targets generated by the OreVision® 3D IP survey. The surface targets (outcrops or subcrops) were to be prospected or stripped when field conditions allow and exploration drilling was tentatively slated to resume in the Banshee Zone area in 2022. However, as of the effective date of this Technical Report, no further work has been completed at Banshee.

10.0 DRILLING

Drilling at River Valley commenced in February 2000 and the most recent program was completed in September 2022. At least 742 diamond drill holes totalling 161,256 m have been completed in total. A breakdown of the drilling per mineralized zone at River Valley is presented in Table 10.1.

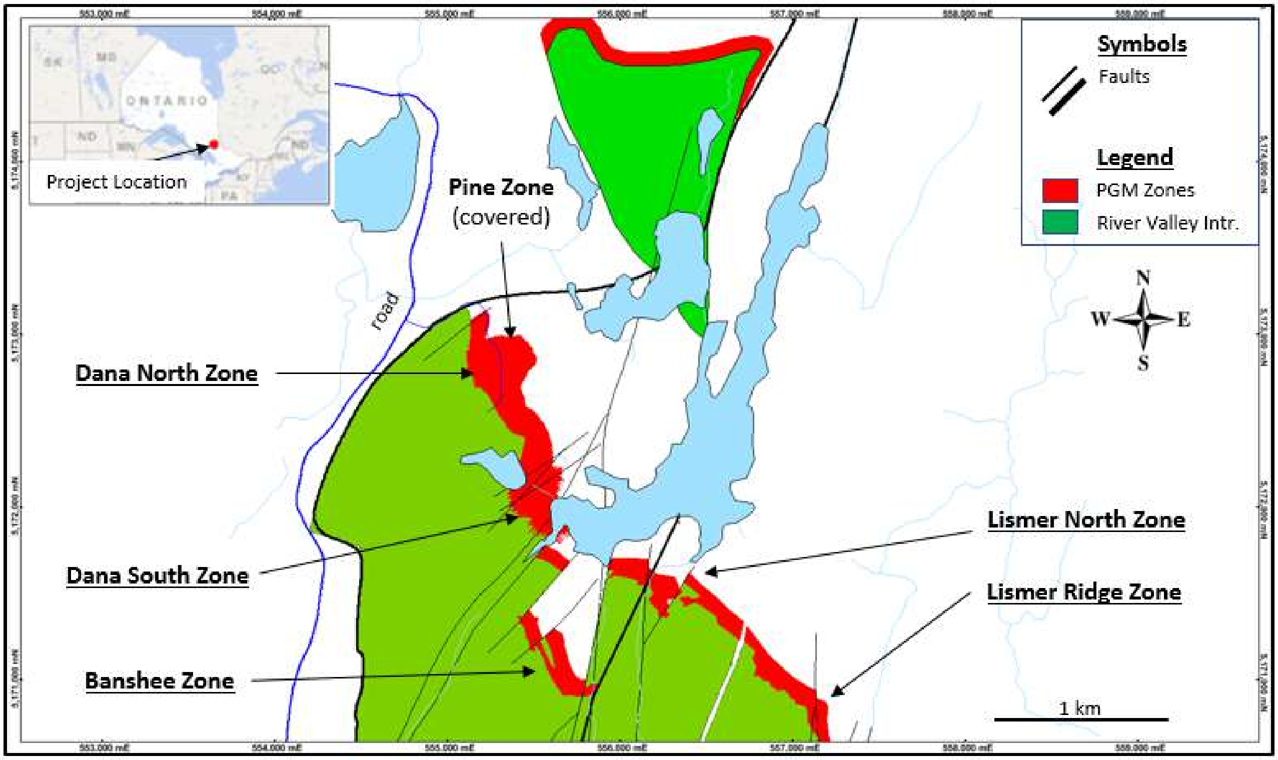
TABLE 10.1
RIVER VALLEY DRILL HOLE SUMMARY

Mineralized Zone	No. of Drill Holes	Metres Drilled
Dana North*	172	38,523
Pine**	15	2,895
Dana South	91	22,228
Banshee	26	5,566
Lismer North	56	11,969
Lismer Ridge	106	21,089
Varley	70	12,865
Azen	33	6,929
Razor	10	1,821
Mustang	67	16,442
Others***	96	20,930
Total	**742**	**161,256**

** Includes Pine Zone drill holes collared on and drilled through Dana North Zone.*
*** Includes target T3 drill holes.*
**** Includes Pardo (north of Dana North-Pine Zones), Casson (south of Banshee Zone, however, internally within the River Valley Intrusion), and Drop and Jackson's Flats "Zones" (between Azen and Razor Zones – see Figure 5.2).*

The drilling prior to 2020 is covered in Section 6 of this Technical Report. In 2020 to 2022, exploration drill holes were completed at the Pine, Banshee and Dana South Zones; metallurgical drill holes were completed at the Dana North, Dana South, Lismer North and Lismer Ridge zones; and geomechanical engineering holes were completed at Dana North, Dana South, Lismer North and Lismer Ridge (Figure 10.1), two of which (Dana South and Lismer Ridge) were also logged and sampled as exploration holes. These drilling programs and results are described below.

FIGURE 10.1 PINE, DANA NORTH, DANA SOUTH, BANSHEE, LISMER NORTH AND LISMER RIDGE ZONES



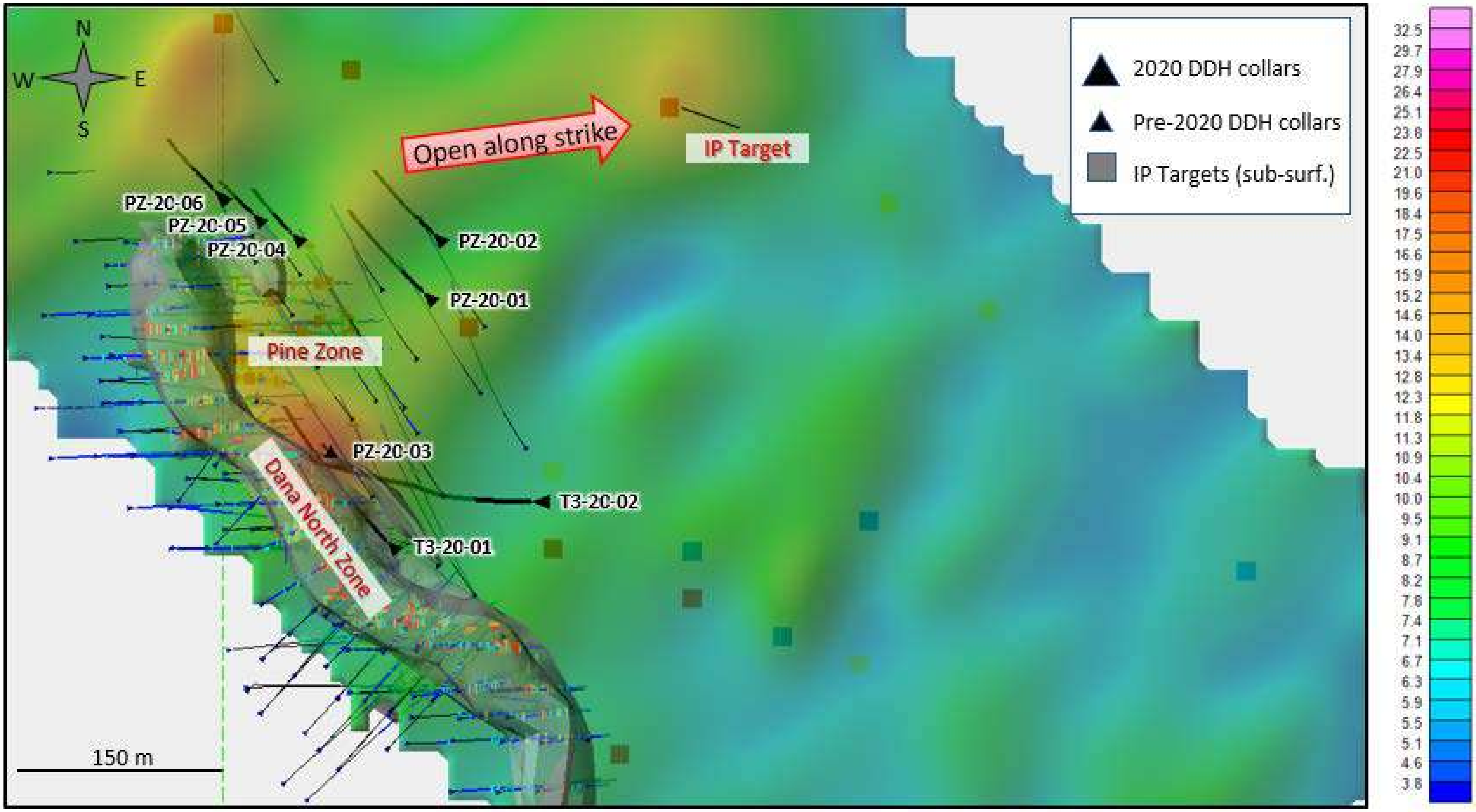
Source: *NAM (press release dated August 17, 2020)*

10.1 PINE ZONE

10.1.1 Phase 1 Drilling March-April 2020

Drilling at the Pine Zone commenced in 2020 with a 1,600 m program undertaken in March and April 2020. The program consisted of eight drill holes to test priority targets within and adjacent to the Pine Zone and the nearby Dana North Zone (Figure 10.2; Table 10.2). The drill program was the first phase of a planned two-phase 5,000 m program for 2020.

FIGURE 10.2 2020 PHASE 1 DRILL HOLES AT PINE ZONE



Source: *NAM (press release dated March 2020)*

TABLE 10.2
COLLAR LOCATIONS AND ORIENTATIONS FOR 2020 PHASE 1 DRILL HOLES AT PINE ZONE

Drill Hole ID	Zone	Coordinates*		Elevation (m)	Azimuth (°)	Dip (°)	Length (m)	Purpose/Target
		Easting	Northing					
PZ-20-01	Pine	555,416	5,127,856	323.5	315	-60	215	confirm block model
PZ-20-02	Pine	555,424	5,172,912	316.8	315	-60	170	expand zone
PZ-20-04	Pine	555,281	5,172,924	314.2	315	-60	116	expand zone
PZ-20-05	Pine	555,235	5,172,949	312.0	315	-60	92	expand zone
PZ-20-06	Pine	555,203	5,172,972	310.3	315	-45	102	expand zone
PZ-20-03	Dana North	555,318	5,172,698	320.4	0	-90	283	Pine-Dana linkage
T3-20-01	Dana North	555,383	5,172,602	325.9	315	-60	314	Pine-Dana linkage
T3-20-02	Dana North	555,523	5,172,645	331.0	270	-50	394	Pine-Dana linkage

Notes: ** Collar coordinates are UTM NAD83 Zone 17N*

The Pine Zone was discovered by drilling an IP chargeability high in 2015-2016, in the footwall to the main River Valley Deposit at the Dana North Zone. Seven drill holes were completed into the Pine Zone-T3 area in 2015-2016 and 14 in 2017. Prior to 2015, seven drill holes had been completed through the Dana North Zone and into the Pine Zone prior to recognition of the latter as a separate, differently oriented mineralized zone.

The objectives of the 2020 drill program at Pine Zone were threefold: 1) expand the limits of the Pine Zone palladium mineralization; 2) investigate possible connection of the Pine Zone to the Dana North Zone at depth; and 3) test palladium mineralization continuity within the 2019 Block Model. The drill program was successful in extending the Pine Zone mineralization up-dip to the north and along strike to the east, thereby demonstrating opportunity for further expansion of the 2019 Mineral Resources.

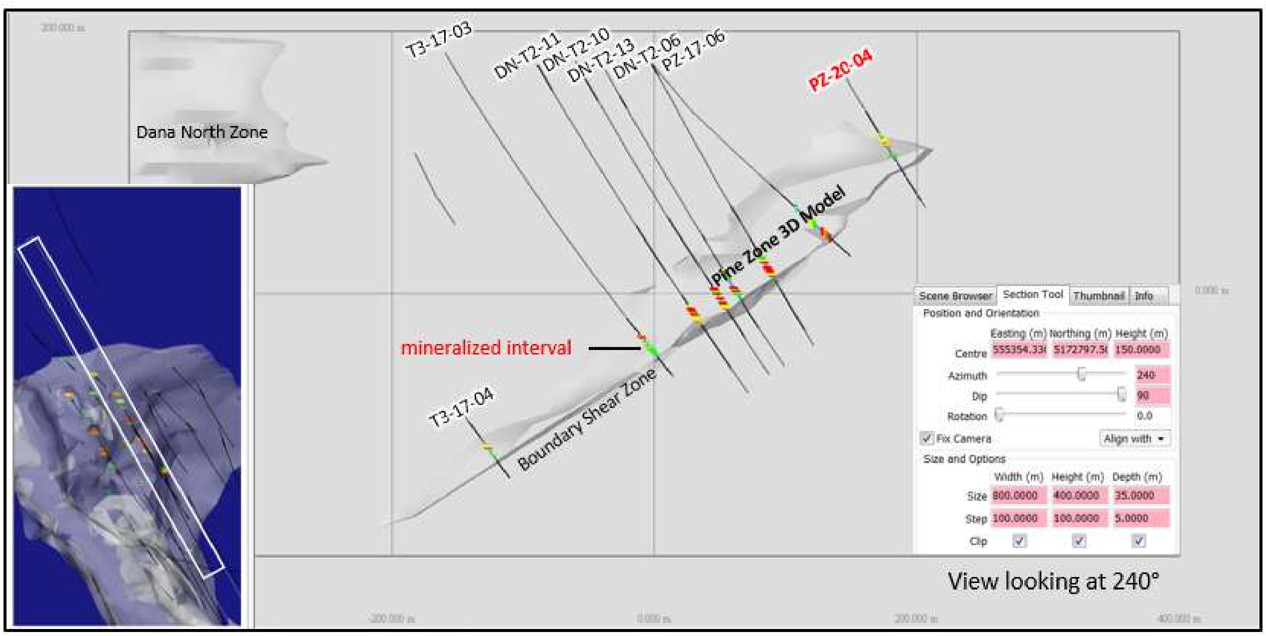
10.1.2 Phase 1 Results

Drill holes PZ-20-02 and PZ-20-04, PZ-20-05 and PZ-20-06 were completed to expand the palladium mineralization beyond the 2019 Mineral Resources at the Pine Zone. Drill hole PZ-20-02 targeted an IP chargeability high and intersected 0.447 g/t Pd+Pt+Au and 0.07% Cu from 125 m downhole (Table 10.3), which expands the mineralization 50 m along strike to the east from the Mineral Resource Block Model. Drill holes PZ-20-04, PZ-20-05 and PZ-20-06 were completed to expand the Palladium mineralization up-dip to the north, by 10 m, 50 m and 100 m, respectively (Figures 10.3 and 10.4). Drill hole PZ-20-04 targeted an IP chargeability high and intersected 12 m grading 1.101 g/t Pd+Pt+Au and 0.07% Cu from only 50 m downhole, including 8 m at 1.361 g/t Pd+Pt+Au and 5 m grading 0.454 g/t Pd+Pt+Au from 66 m downhole. Hole PZ-20-05 intersected 3 m grading 0.603 g/t Pd+Pt+Au and 0.13% Cu from only 50 m downhole. The mineralization in this intersection appears to be slightly more copper rich. Drill hole PZ-20-06 lacked significant assay results, however, did intersect the favourable Breccia Unit host rock.

TABLE 10.3 **PALLADIUM ASSAY HIGHLIGHTS IN 2020 PHASE 1 DRILLING AT PINE ZONE**										
Drill Hole ID	**From (m)**	**To (m)**	**Length (m)**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Pd+Pt+Au (g/t)***	**Cu (%)**	**Ni (%)**	**Co (%)**
PZ-20-01	168	171	3	0.939	0.287	0.061	1.287	0.092	0.021	0.004
PZ-20-02	125	129	4	0.308	0.115	0.024	0.447	0.070	0.015	0.003
PZ-20-03	197	209	12	0.195	0.073	0.017	0.285	0.039	0.019	0.003
PZ-20-04	50	62	12	0.778	0.291	0.032	1.101	0.068	0.021	0.004
incl	54	62	8	0.974	0.346	0.041	1.361	0.090	0.023	0.004
and	66	71	5	0.279	0.164	0.010	0.453	0.014	0.009	0.002
PZ-20-05	50	53	3	0.282	0.253	0.068	0.603	0.135	0.018	0.005
PZ-20-06	nsa	nsa	nsa	nsa	nsa	nsa	nsa	nsa	nsa	nsa
T3-20-01	248	265	17	0.382	0.146	0.030	0.558	0.072	0.023	0.004
T3-20-02	318	335	17	0.331	0.134	0.023	0.488	0.042	0.019	0.004

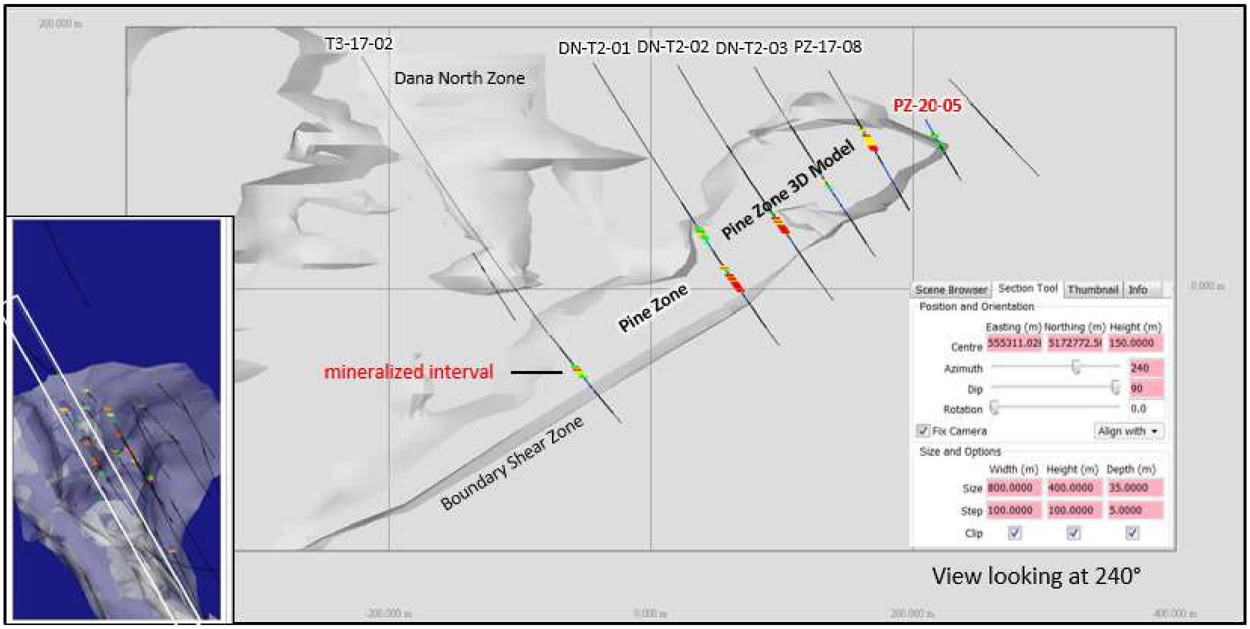
Notes: ** Pd+Pt+Au = 3E = 3 elements, nsa = no significant assays.*
The lengths reported are drill core lengths, however, should approximate true widths.

FIGURE 10.3 PINE ZONE VERTICAL CROSS-SECTION PROJECTION 555,350 M E



Source: *NAM Internal Report (October 2020)*

FIGURE 10.4 PINE ZONE VERTICAL CROSS-SECTION PROJECTION 555,300 M E



Source: *NAM Internal Report (October 2020)*

Drill holes T3-20-01, T3-20-02 and PZ-20-03 were completed to test for the presence of palladium mineralization where the Pine Zone may be connected to the main River Valley Deposit at the Dana North Zone. Palladium mineralization was intersected in all three holes: Drill hole T3-20-01 intersected 17 m grading 0.599 g/t Pd+Pt+Au and 0.07% Cu from 248 m downhole; drill hole T3-20-02 intersected 17 m of 0.488 g/t Pd+Pt+Au and 0.04% Cu from 318 m downhole; and drill hole PZ-20-03 intersected 0.285 g/t Pd+Pt+Au and 0.04% Cu from 197 m downhole.

Drill hole PZ-20-01 was designed to test palladium grade continuity within the 2019 Mineral Resource Model. Drill hole PZ-20-01 was collared 50 m from the nearest previously drilled hole and intersected 3 m grading 1.287 g/t Pd+Pt+Au and 0.092% Cu from 168 m downhole. This intersection lies within the 2019 Block Model volume.

10.1.3 Discussion

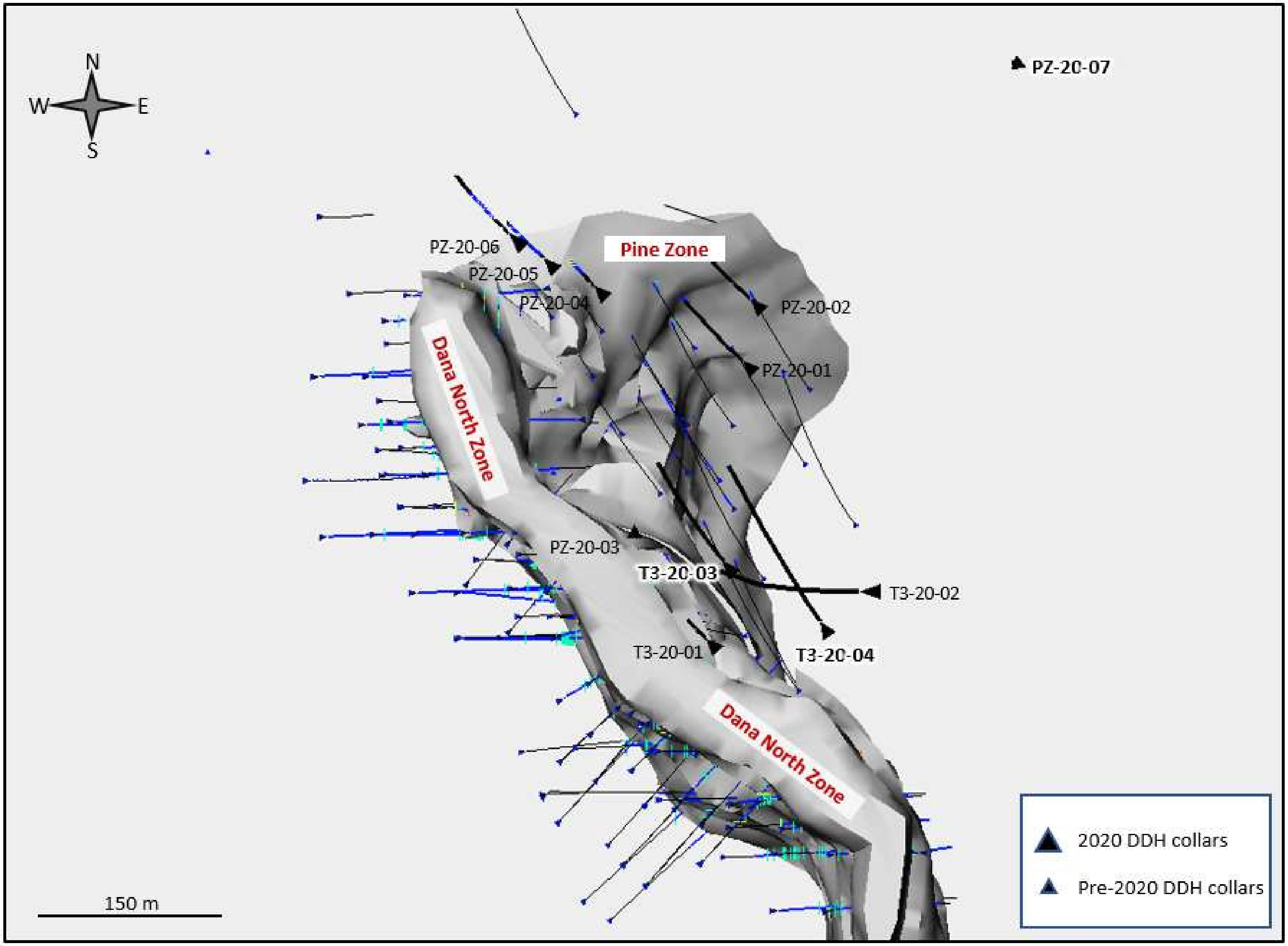
Phase 1 of the 2020 drill program was successful in extending the known limits of the Pine Zone palladium mineralization 50 m up-dip to the north (see Figures 10.3 and 10.4) and 50 m along strike to the east. The palladium mineralization is still open to expansion by drilling to the east, particularly testing a strong IP chargeability high located approximately 400 m along strike, and also by drilling down-dip to the south. The 2020 drilling was also successful at broadly establishing the presence of palladium mineralization at the connection of the Pine Zone to the Dana North Zone.

The 2020 Phase 1 drilling results brought the cumulative total number of holes intersecting the Pine Zone to 33. The number of palladium mineralized intersections within the Pine Zone now totals 41, over an area measuring approximately 250 m along strike and 550 m down-dip. Note again that the Pine Zone remains open down-dip and particularly to the east, where the most tantalizing IP chargeability high is located. A Phase 2 drill program was planned to follow-up.

10.1.4 Phase 2 Drill Plan

Following completion of its successful Phase 1 drill program in May, Phase 2 of the 2020 field season commenced in July with exploration drilling continuing through August. The objectives of the Phase 2 drill program were threefold: 1) in-fill a gap in the previous drilling of the T3 target; 2) expand the T3 target along strike and southwards, and 3) test an undrilled IP chargeability high 300 m along strike from the Pine Zone (Figures 10.5 and 10.6). The T3 target is located downdip/down-plunge of the Pine Zone (originally the T2 target).

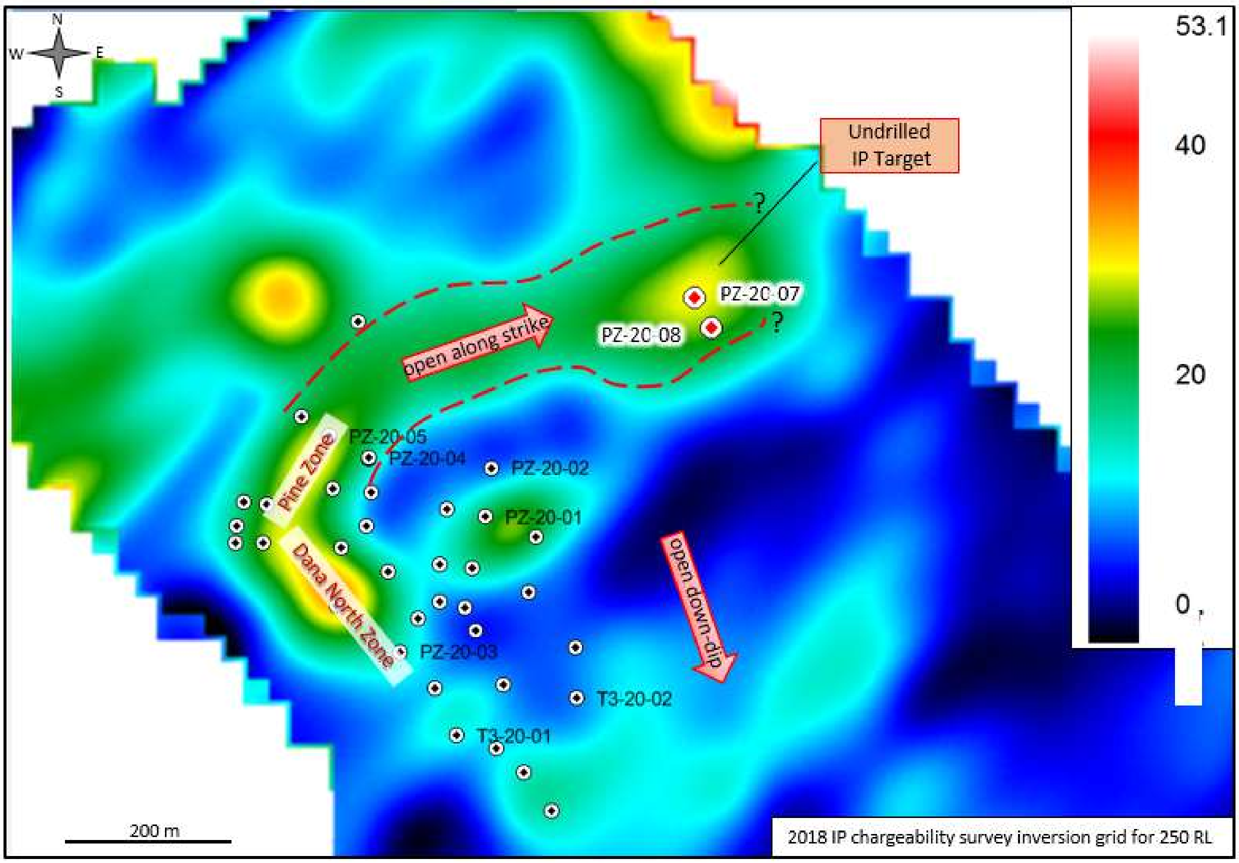
FIGURE 10.5 2020 PHASE 2 DRILL HOLES AT PINE ZONE



Source: *NAM press release dated September 24, 2020*
Figure Description: *Location of 2020 Phases 1 and 2 drill holes (labelled) and historically drilled holes plotted on 3-D wireframe model of the Dana North Zone (exposed) and Pine Zone (covered).*

The drill target prioritized for testing is a large chargeability high detected in the 2017 IP survey (Figure 10.6), which was performed over the Pine Zone and footwall at the northern end of the River Valley Palladium Deposit. The IP target appears to be strongly chargeable, links to the eastern known extent of the Pine Zone Deposit via an apparent curvilinear chargeability trend about 300 m long, and extends from approximately 120 m to 340 m below surface in geophysical inversion modelling of the IP survey results.

FIGURE 10.6 PRIORITY IP CHARGEABILITY-GENERATED TARGET FOR TESTING IN 2020 PHASE 2 DRILL PROGRAM AT PINE ZONE



Source: *NAM press release dated June 24, 2020*
Figure Description: *Undrilled priority target from interpretation of 2018 merged IP chargeability maps. The Phase 2 program included two vertical drill holes (PZ-20-07 and PZ-20-08) totalling 750 m. However, drill hole PZ-20-08 was cancelled following the termination of PZ-20-07.*

The Phase 2 drill program as planned consisted of three drill holes totalling 800 m (Table 10.4). Drilling commenced in the third week of July and was completed by mid-August. The drilling tested for the presence of the favourable Breccia Unit, fault and fold structures, and palladium mineralization, either an along strike continuation of the Pine Zone or a new zone (Figure 10.2).

TABLE 10.4 **COLLAR LOCATIONS AND ORIENTATIONS FOR 2020 PHASE 2 DRILL HOLES AT PINE ZONE**								
Drill Hole ID	**Zone**	**Coordinates***		**Elev-ation (m)**	**Azimuth (°)**	**Dip (°)**	**Length (m)**	**Purpose / Target**
		Easting	**Northing**					
T3-20-03	Pine	555,399	5,172,618	328.07	325	-60	285	expansion
T3-20-04	Pine	555,487	5,172,618	330.87	325	-60	341	expansion
PZ-20-07	---	555,667	5,173,126	301.10	315	-60	166	expansion

***Notes:* *** *Collar coordinates are UTM NAD83 Zone 17N*

10.1.5 Phase 2 Drill Results

Drill holes T3-20-03, T3-20-04 and PZ-20-07 were completed in Q3 2020 for a total of 792 m (Table 10.5). Drill hole T3-20-03 was completed as an in-fill hole within the Pine Zone-T3 Target. The drill hole intersected three mineralized intervals: 1) 5 m grading 0.21 g/t Pd+Pt+Au and 0.05% Cu from 236 m down hole; 2) 9 m grading 0.27 g/t Pd+Pt+Au and 0.02% Cu from 247 m downhole; and 3) 6 m grading 0.30 g/t Pd+Pt+Au and 0.02% Cu from 259 m downhole. The results confirm presence of the Pine Zone mineralization.

TABLE 10.5 **ASSAY INTERVALS FROM 2020 PHASE 2 DRILL PROGRAM AT PINE ZONE**										
Drill Hole ID	**From (m)**	**To (m)**	**Interval (m)**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Pd+Pt+Au (g/t)***	**Ni (%)**	**Cu (%)**	**Co (%)**
T3-20-03	236	241	5	0.155	0.046	0.012	0.213	0.006	0.045	0.001
T3-20-03	247	256	9	0.192	0.073	0.008	0.273	0.006	0.015	0.002
T3-20-03	259	265	6	0.179	0.103	0.014	0.296	0.011	0.019	0.003
T3-20-04	307	308	1	0.413	0.200	0.030	0.643	0.018	0.021	0.004
PZ-20-07	-		-	-	-	-	-	-	-	-

***Note:* *** *Pd+Pt+Au = 3E (3 elements).*

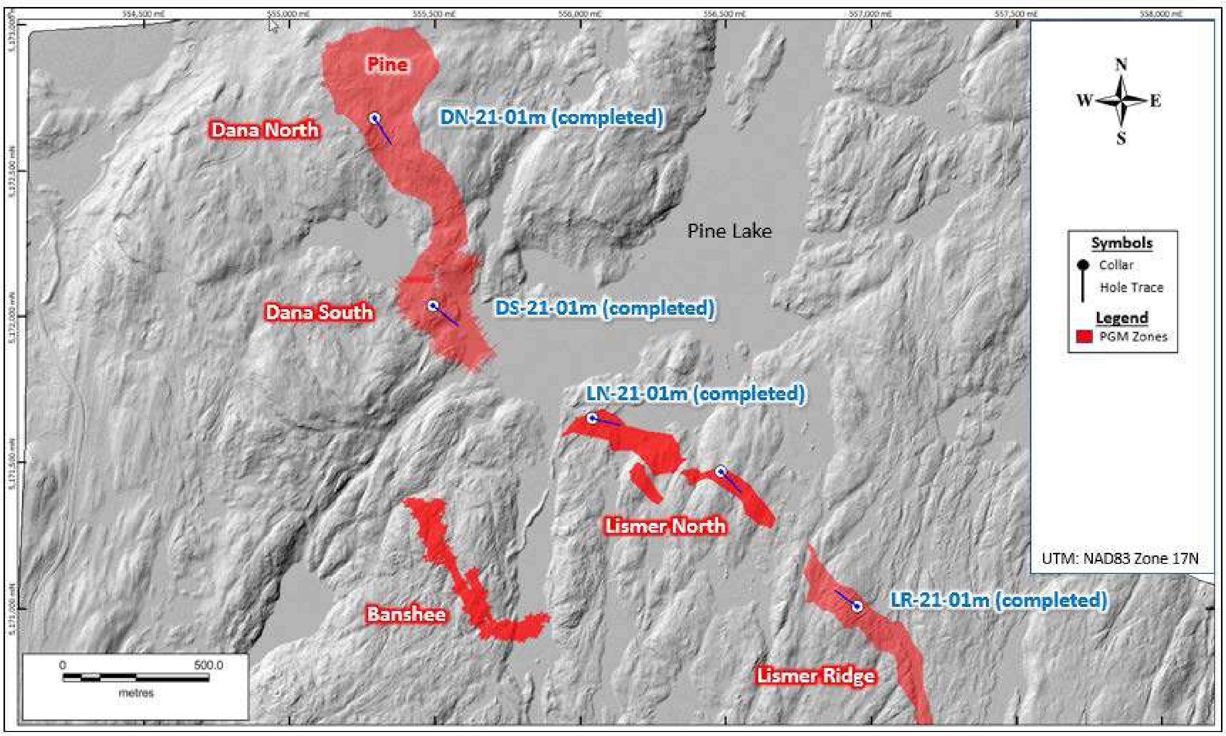
Drill hole T3-20-04 was completed to expand the boundaries of the Pine Zone-T3 Target eastwards and southwards. This drill hole did encounter the favourable Breccia Unit, however, failed to intersect significant intervals of mineralization. The best assay result was 1 m grading 0.64 g/t Pd+Pt+Au and 0.02% Cu from 307 m downhole.

Drill hole PZ-20-07 was completed to test a compelling IP chargeability feature 250 m east along strike from the Pine Zone. The hole was abandoned at 166 m depth, due to the presence of lengthy intersections of heavy pyrite coatings on fractures in core of the Archean basement. No assays were generated, however, the IP chargeability feature was explained.

10.2 METALLURGICAL DRILLING - 2021

In June and July 2021, four drill holes totalling 802 m were completed to provide fresh mineralized rock material for mineral processing and metallurgical testwork. One drill hole was completed on each of the Dana North, Dana South, Lismer North and Lismer South Zones, as shown in Figure 10.7. Drill hole collar locations and orientations are listed in Table 10.6. Each of these drill holes was completed downwards for approximately 200 m, in order to intersect as much Pd mineralization as possible for the mineral processing and metallurgical testwork by SGS Canada Inc. at Lakefield ("SGS").

FIGURE 10.7 FOUR METALLURGICAL DRILL HOLES COMPLETED IN 2021



Source: *NAM (press release dated August 17, 2021)*
Figure Description*: Collar location and traces of the four drill holes completed in 2021 for mineral processing and metallurgical testwork samples. The fifth (not labelled) drill hole was planned at Lismer North Zone for contingency purposes, however, not drilled. The background is a topography image from the 2014 LiDAR survey of the River Valley Property. The Banshee Zone shown here for information only. The Pine Zone is covered, however, is projected to surface here for clarity.*

From each drill hole, HQ-size drill core was retrieved, logged and sampled in 1-m intervals by NAM. In total, 795 1-m long ½ drill core samples plus blind quality control ("QC") samples were then delivered to SGS for processing and preparation for assaying and metallurgical testwork studies.

Table 10.6 Four Metallurgical Drill Holes Completed in 2021							
Drill Hole ID	**Zone**	**Coordinates***		**Elevation (m)**	**Length (m)**	**Azimuth (°)**	**Dip (°)**
		Easting	**Northing**				
DN-21-01MET	Dana North	555,285	5,172,680	326.7	201	146	-57
DS-21-01MET	Dana South	555,489	5,172,040	303.3	201	128	-55
LN-21-01MET	Lismer North	556,033	5,171,644	292.7	185	104	-57
LR-21-01MET	Lismer Ridge	556,953	5,171,004	312.2	215	306	-64

***Note:* *** *Coordinates UTM NAD83 Z17N and measured in differential GPS survey by Story Environmental.*

The Dana North Zone drill hole (DN-21-01m) was completed 201 m obliquely down-dip, sub-parallel to the metallurgical drill hole completed nearby in 2012. DN-21-01m intersected 2.08 g/t 3E and 0.12% Cu (or $117/t NSR) over 141.5 m from 0.5 m downhole from surface, including 2.24 g/t 3E and 0.13% Cu (or $126/t NSR) over 124.5 m, and 1.21 g/t 3E and 0.09% Cu (or $68/t NSR) over 55 m from 145 m downhole, including 1.37 g/t 3E and 0.09% Cu ($77/t NSR) over 45 m (Table 10.7). This drill hole ended in mineralization.

The Dana South Zone drill hole (DS-21-01m) was completed for 200 m obliquely down-dip, in contrast to the vertical metallurgical hole drilled in 2012. DS-21-01m intersected 2.74 g/t 3E and 0.20 % Cu over 11 m from surface, and 3.00 g/t 3E and 0.15% Cu (or $166/t NSR) over 66 m from 111 m downhole, including 3.48 g/t 3E and 0.17% Cu over 47 m (or $192/t NSR) (Table 10.7). These are the highest grade intersects in the four drill holes, consistent with Dana South having the highest average grade of these four mineralized zones. This drill hole also ended in mineralization.

The Lismer North Zone drill hole (LN-21-01m) was completed for 185 m obliquely down-dip. LN-21-01m intersected 1.02 g/t 3E and 0.13% Cu (or $59/t NSR) over 23 m from 21 m downhole, 1.01 g/t 3E and 0.06% Cu (or $55/t NSR) from over 7 m from 131 m downhole, 0.99 g/t 3E, and 0.08% Cu (or $55/t NSR) over 11 m from 143 m downhole, including 1.63 g/t 3E and 0.12% Cu (or $89/t NSR) over 3 m from 145 m downhole, 1.61 g/t 3E and 0.06% Cu (or $87/t) over 3 m from 151 m downhole, and 2.34 g/t 3E and 0.07% Cu (or $129/t NSR) over 14 m from 162 m downhole (Table 10.7). Compared to the Dana North and Dana South results, the mineralization at Lismer North appears in this drill hole to be lower grade and less continuous.

The Lismer Ridge Zone drill hole (LR-21-01m) was completed for 215 m obliquely down-dip. LR-21-01m intersected 1.06 g/t 3E and 0.06% Cu (or $58/t NSR) over 27 m from 6 m downhole, 0.82 g/t 3E and 0.05% Cu (or $45/t NSR) over 30 m from 130 m downhole, including 2.32 g/t 3E and 0.17% Cu (or $130/t NSR) over 4 m from 156 m downhole, 1.16 g/t 3E and 0.07% Cu (or $83/t NSR) over 21 m from 170 m downhole and 2.39 g/t 3E and 0.07% Cu (or $128/t NSR) over 4 m from 205 m downhole (Table 10.7). Unlike the other three drill holes, LR-21-01m deviated more than usual and exited the wireframed mineralized domain at 175 m downhole, however, remained in mineralization for an additional 40 m until the end of the drill hole. This surprising result makes the area east-adjacent to Lismer Ridge a promising exploration target of interest.

The assay results for these four 2021 metallurgical drill holes were not included in the current Mineral Resource Estimates presented in Section 14 of this Technical Report.

TABLE 10.7 2021 METALLURGICAL DRILL HOLE ASSAY INTERSECTIONS														
Drill Hole ID	**Mineralized Zone**	**Mineralized Interval ID**	**From (m)**	**To (m)**	**Length (m)[1]**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**3E (g/t)[2]**	**Cu (%)**	**Ni (%)**	**S (%)**	**NSR ($/t)[3]**
DN-21-01m	Dana North	1	0.5	142	141.5	1.524	0.467	0.087	2.078	0.122	0.027	0.31	117.27
		including	0.5	125	124.5	1.644	0.502	0.093	2.239	0.128	0.028	0.31	126.16
		2	145	200	55	0.868	0.285	0.052	1.205	0.086	0.019	0.23	68.44
		including	145	190	45	0.986	0.324	0.055	1.366	0.088	0.019	0.23	77.00
DS-21-01m	Dana South	1	0	11	11	2.028	0.587	0.123	2.738	0.202	0.035	0.43	157.90
		2	75	94	19	0.238	0.083	0.018	0.339	0.057	0.010	0.18	21.09
		3	98	109	11	0.315	0.109	0.022	0.446	0.058	0.013	0.17	26.86
		4	112	178	66	2.193	0.694	0.110	2.997	0.145	0.022	0.25	166.15
		including	117	164	47	2.523	0.819	0.135	3.477	0.168	0.025	0.27	192.31
		including	167	177	10	2.459	0.666	0.076	3.201	0.137	0.018	0.21	179.06
		5	197	200	3	2.018	0.587	0.126	2.730	0.148	0.022	0.23	153.51
LN-21-01m	Lismer North	1	2	17	15	0.141	0.109	0.032	0.282	0.044	0.007	0.09	15.75
		2	21	44	23	0.639	0.314	0.065	1.018	0.130	0.021	0.31	59.02
		including	21	40	19	0.746	0.361	0.077	1.184	0.152	0.023	0.35	68.73
		3	49	68	19	0.281	0.154	0.013	0.447	0.027	0.015	0.09	23.81
		including	55	65	10	0.458	0.224	0.017	0.698	0.036	0.019	0.12	37.40
		4	131	138	7	0.682	0.291	0.037	1.010	0.063	0.014	0.21	55.08
		including	133	138	5	0.904	0.368	0.042	1.315	0.065	0.015	0.22	71.05
		5	143	154	11	0.657	0.287	0.047	0.991	0.078	0.014	0.24	54.89
		including	145	148	3	1.065	0.497	0.071	1.633	0.119	0.020	0.36	89.32
		including	151	154	3	1.149	0.400	0.061	1.611	0.062	0.011	0.18	87.22
		6	162	176	14	1.800	0.469	0.067	2.335	0.073	0.015	0.30	129.32
LR-21-01m	Lismer Ridge	1	6	33	27	0.738	0.288	0.042	1.058	0.057	0.018	0.23	58.47
		including	9	32	23	0.838	0.307	0.048	1.192	0.063	0.019	0.25	65.67
		2	38	44	6	0.313	0.112	0.016	0.441	0.034	0.014	0.20	25.07

TABLE 10.7
2021 METALLURGICAL DRILL HOLE ASSAY INTERSECTIONS

Drill Hole ID	Mineralized Zone	Mineralized Interval ID	From (m)	To (m)	Length (m)[1]	Pd (g/t)	Pt (g/t)	Au (g/t)	3E (g/t)[2]	Cu (%)	Ni (%)	S (%)	NSR ($/t)[3]
		3	47	44	7	0.318	0.117	0.017	0.452	0.047	0.027	0.46	26.98
		4	130	160	30	0.551	0.233	0.030	0.815	0.052	0.017	0.20	44.76
		including	139	160	21	0.718	0.285	0.038	1.041	0.069	0.022	0.27	57.90
		including	156	160	4	1.600	0.623	0.094	2.316	0.167	0.042	0.47	130.07
		5	170	191	21	0.766	0.335	0.063	1.164	0.068	0.016	0.20	63.05
		including	172	189	17	0.908	0.396	0.073	1.377	0.076	0.018	0.22	74.41
		6	194	202	8	0.765	0.280	0.050	1.095	0.072	0.018	0.26	61.10
		7	205	209	4	1.697	0.623	0.072	2.391	0.068	0.022	0.26	127.78

Source: *NAM press release dated MARCH 1, 2022*
Notes: *[1] drill core length.*
[2] Pd+Pt+Au.
[3] NSR formula from NAM press release dated October 5, 2021.

In addition to these assays, a total of 543 mineralized samples from the four mineralized zones were delivered to the Geoscience Laboratory in Sudbury for Rh assay. The results are described in Section 9 of this Technical Report.

10.3 BANSHEE ZONE DRILLING – 2021

The Banshee Zone was a focus of the 2021 exploration program (see Figure 10.8). The Banshee Zone was discovered by mineral prospecting and diamond drilling between 2002 to 2004. Despite its central location between the Dana Zones to the north and the Lismer Zones to the east and south, the Banshee Zone has been overlooked in post-2004 exploration programs. Prior to 2021, just 22 diamond drill holes totalling 4,274 m were drilled at Banshee, with an average depth of <200 m below surface. Below that depth, the palladium mineralization remains open to expansion by drilling down-dip along the 700 m strike-length of the Zone. A combination of near-historic high Pd price and its central location relative to the Dana and Lismer Zones means that the Banshee Zone could potentially be included in any future mining operation at River Valley.

The 2021 exploration plan for Banshee consisted of completing 13 drill holes totalling 4,175 m. These drill holes were designed to expand the known extents of mineralization mainly down-dip. The exploration drilling commenced at the south end of Banshee in late July 2021, following completion of the IP geophysical survey in June (see Section 9 of this Technical Report). To date, four of the drill holes have been completed and contact-type Cu-Fe sulphide (Pd+Pt) mineralization was encountered in each hole. The drill program was paused at that point.

The four drill holes totalling 1,295 m were completed at the south end of the Banshee Zone (Figure 10.8) (Table 10.8). Three of the drill holes (BZ1-1, BZ1-2 and BZ1-3) were completed on the southernmost vertical cross-section and the fourth drill hole (BZ2-1) on the next vertical cross-section 50 m to the north. All four holes intersected palladium mineralization. The drilling results are summarized below and assay highlights are shown in Table 10.9.

- Drill Hole BZ1-1: Intersected 1.47 g/t 3E and 0.16% Cu or $87.58/t NSR over 4 m of disseminated and blebby sulphide mineralization from 118 m downhole. This drill hole was completed 25 m above historical drill hole BL-12 and confirmed that strong Pd mineralization extends towards surface (i.e., overburden/bedrock interface). This drill hole also intersected four additional, lower-grade, mineralized intervals within the favourable Breccia Unit.

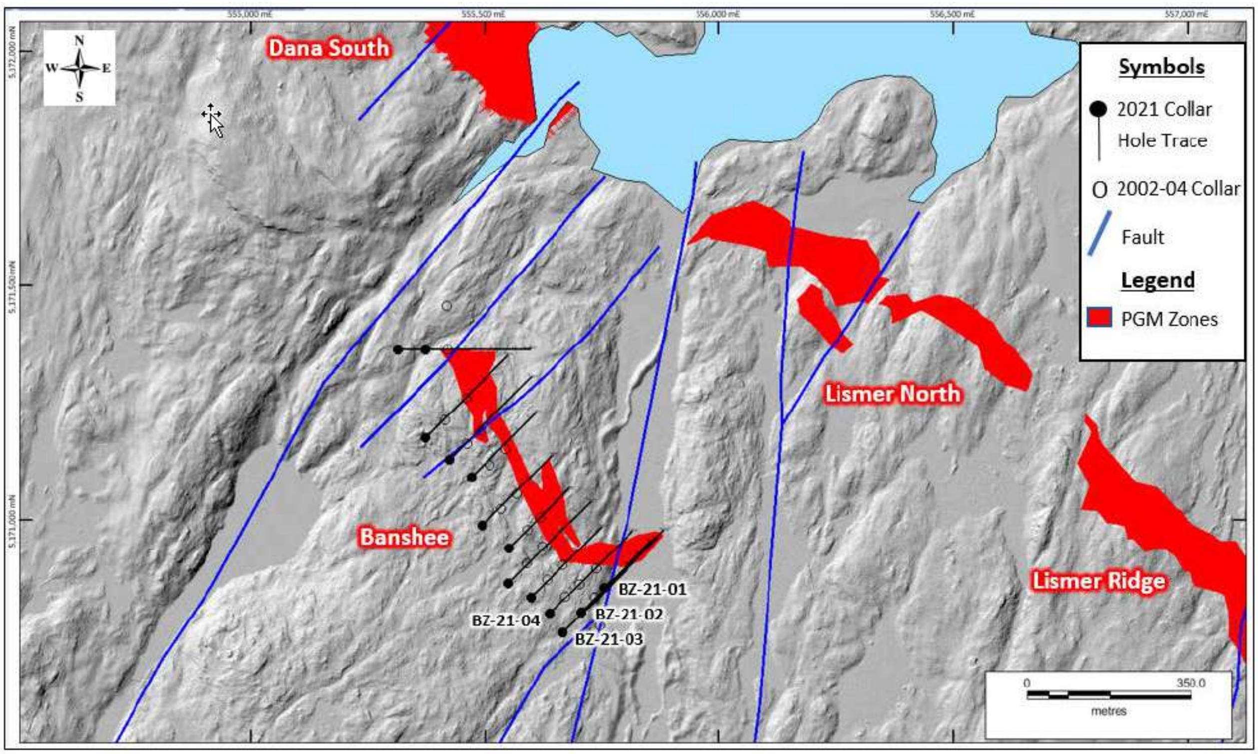
- Drill Hole BZ1-2: Intersected 0.33 g/t 3E and 0.09% Cu or $21.59/t NSR over 9 m of disseminated and blebby sulphide mineralization from 154 m downhole. Six additional similar grade intervals ranging from 3 to 13 m in downhole thickness were encountered before the drill hole was completed, all in the favourable Breccia Unit. This drill hole was completed below historical drill hole BL-12.

- Drill Hole BZ1-3: Intersected 2.92 g/t 3E and 0.06% Cu or $153.91/t NSR over 6 m of disseminated and blebby sulphide mineralization from 251 m downhole and 0.88 g/t 3E and 0.04% Cu over 4 m from 348 m downhole. This was the deepest hole completed on the drill section and it extended mineralization for 30 m below the 2021 Updated Mineral Resources; and

- Drill Hole BZ2-1: Intersected 0.40 g/t 3E and 0.04% Cu over 11 m of disseminated sulphide mineralization from 204 m downhole. Two additional, similar grade intervals 7 m and 20 m in downhole thickness of disseminated and blebby sulphide mineralization were also encountered, again all in the favourable Breccia Unit. Moreover, BZ2-1 also intersected 3.09 g/t 3E and 0.02% Cu over 2 m from 194 m downhole, including 5.28 g/t 3E and 0.01% Cu over 1 m. These assay results extend mineralization 25 m below the 2021 updated Mineral Resources (Figure 10.9).

These assay results were not included in the current Mineral Resource Estimate presented in Section 14 of this Technical Report.

FIGURE 10.8 2021 EXPLORATION DRILLING AT BANSHEE ZONE



Source: *NAM (press release dated August 17, 2021)*
Figure Description: *The four holes labelled have been drilled as of the effective date of this Technical Report.*

TABLE 10.8
COLLAR LOCATIONS AND ORIENTATIONS FOR 2021 EXPANSION DRILLING AT BANSHEE ZONE

Drill Hole ID	Section	Coordinates*		Elevation (m)*	Depth (m)	Azimuth (°)	Dip (°)	Length (m)
		Easting (m)*	Northing (m)*					
BZ1-1	1	555,755	5,170,859	293.9	0	45	-45	200
BZ1-2	1	555,705	5,170,801	300.3	0	45	-45	350
BZ1-3	1	555,669	5,170,763	299.6	0	45	-45	400
BZ2-1	2	555,646	5,170,797	303.7	0	45	-45	350
Total								**1,277**

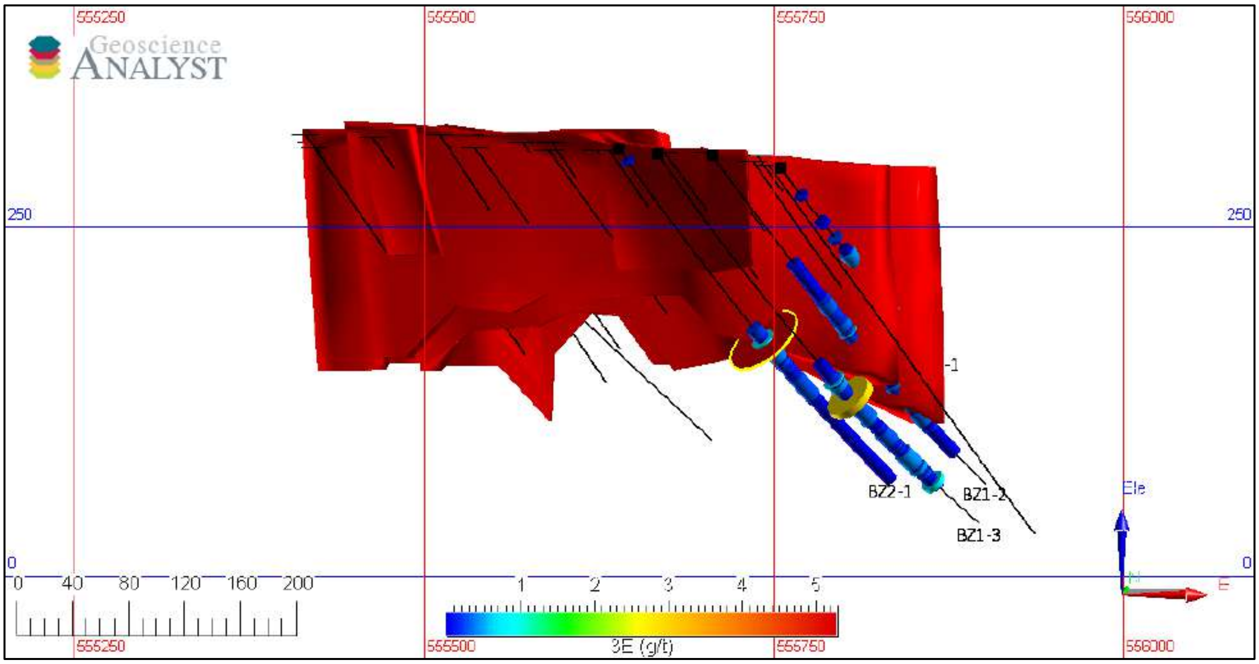
Source: *NAM (2021)*
Notes: ** Coordinates in UTM NAD83 Z17N and measured in differential GPS survey by Story Environmental.*

TABLE 10.9
ASSAY INTERVAL HIGHLIGHTS FROM 2021 BANSHEE DRILLING

Drill Hole ID	Intercept No.	From (m)	To (m)	Interval (m)[1,2]	Pd (g/t)	Pt (g/t)	Au (g/t)	3E (g/t)	Cu (%)	Ni (%)	S (%)	NSR ($/t)[3]
BZ1-1	1	88	104	16	0.302	0.137	0.013	0.452	0.024	0.011	0.13	24.85
BZ1-1	2	109	112	3	0.349	0.120	0.014	0.483	0.039	0.018	0.02	28.55
BZ1-1	3	118	122	4	1.039	0.358	0.070	1.466	0.160	0.035	0.33	87.58
BZ1-1	4	155	174	19	0.152	0.135	0.049	0.336	0.090	0.011	0.18	21.45
BZ1-1	5	177	183	6	0.111	0.122	0.019	0.251	0.033	0.005	0.06	13.31
BZ1-2	1	154	163	9	0.154	0.132	0.044	0.330	0.093	0.013	0.26	21.59
BZ1-2	2	176	182	6	0.145	0.150	0.053	0.348	0.148	0.014	0.28	25.50
BZ1-2	3	198	208	10	0.099	0.083	0.037	0.219	0.189	0.028	0.58	23.28
BZ1-2	4	244	247	3	0.231	0.097	0.022	0.349	0.049	0.023	0.23	22.02
BZ1-2	5	250	254	4	0.170	0.068	0.043	0.281	0.082	0.021	0.20	20.44
BZ1-2	6	263	268	5	0.234	0.086	0.021	0.341	0.048	0.014	0.15	21.24
BZ1-2	7	273	286	13	0.193	0.122	0.022	0.337	0.063	0.016	0.23	20.98
BZ1-3	1	238	242	4	0.257	0.195	0.006	0.458	0.002	0.002	<0.01	21.47
BZ1-3	2	251	257	6	2.079	0.817	0.029	2.924	0.061	0.013	0.30	153.91
BZ1-3	3	261	278	17	0.192	0.114	0.018	0.324	0.037	0.011	0.11	18.55
BZ1-3	4	291	302	11	0.2073	0.087	0.013	0.308	0.047	0.024	0.22	19.82
BZ1-3	5	315	329	14	0.308	0.114	0.020	0.442	0.054	0.020	0.21	27.22
BZ1-3	6	332	335	3	0.299	0.157	0.035	0.490	0.092	0.034	0.45	31.69
BZ1-3	7	348	352	4	0.600	0.258	0.021	0.878	0.037	0.014	0.21	47.39
BZ2-1	1	183	190	7	0.108	0.100	0.009	0.216	0.003	0.003	0.03	10.10
BZ2-1	2	204	215	11	0.186	0.183	0.033	0.402	0.042	0.005	0.11	20.82
BZ2-1	3	235	255	20	0.165	0.106	0.017	0.287	0.075	0.016	0.36	19.25

Notes: *[1]Core length intervals are apparent, not true thickness; [2] Mineralized intervals calculated at 0.2 g/t 3E cut-offs over 3 m minimum widths; and [3] NSR formula given in NAM press release dated October 5, 2021.*

FIGURE 10.9 MINERALIZED ASSAY INTERVALS IN THE BANSHEE ZONE 2021 DRILL HOLES



Source: *NAM press release dated April 20, 2022*
Note: *View looking north*
Figure Description: *The assay results indicate that the Banshee Zone is open to expansion by drilling down-dip. Surface (top of the red body) at approximately 300 m above sea level. Red body = wireframed Banshee Zone domains for the 2021 updated Mineral Resource Estimate. Black = historical drill hole collar locations and traces.*

10.4 DANA SOUTH ZONE AND LISMER RIDGE ZONE DRILLING

10.4.1 Dana South Drilling

Two targets at the Dana South Zone were drill tested in 2022: 1) the DSZ-Extension target area ("DSZ-X"); and 2) the DSZ-SET target. Each of these two drill programs are described below.

10.4.1.1 DSZ-X Target Drilling: 2021-2022

Drill hole KP21-05 was completed in 2021 by Knight-Piésold Ltd ("KP") to test the location and geomechanical nature of the footwall contact to the Dana South Zone. The drill hole was collared at 555,579 m E and 5,171,905 m N and 293 m asl, and oriented to be drilled at azimuth 99º and inclination -57º.

The 290 m drill hole encountered a long interval of copper-iron sulphide mineralization in the favourable Breccia Unit, and was therefore logged and sampled by NAM geologists as an exploration drill hole. Assays returned 84 m grading 1.129 g/t 3E and 0.108% Cu from 197 m downhole, including an interval of 30 m grading 1.918 g/t 3E and 0.183% Cu, or $111/t NSR, from 242 m downhole, and 18 m grading 2.373 g/t 3E and 0.212% Cu, or $139/t NSR, from 243 m downhole (Table 10.10). At approximately 224 m downhole, drill hole KP21-05 exited the Dana South wireframed mineralized domain and continued in mineralization mainly within the Breccia Unit for an additional 57 m (Figure 10.10).

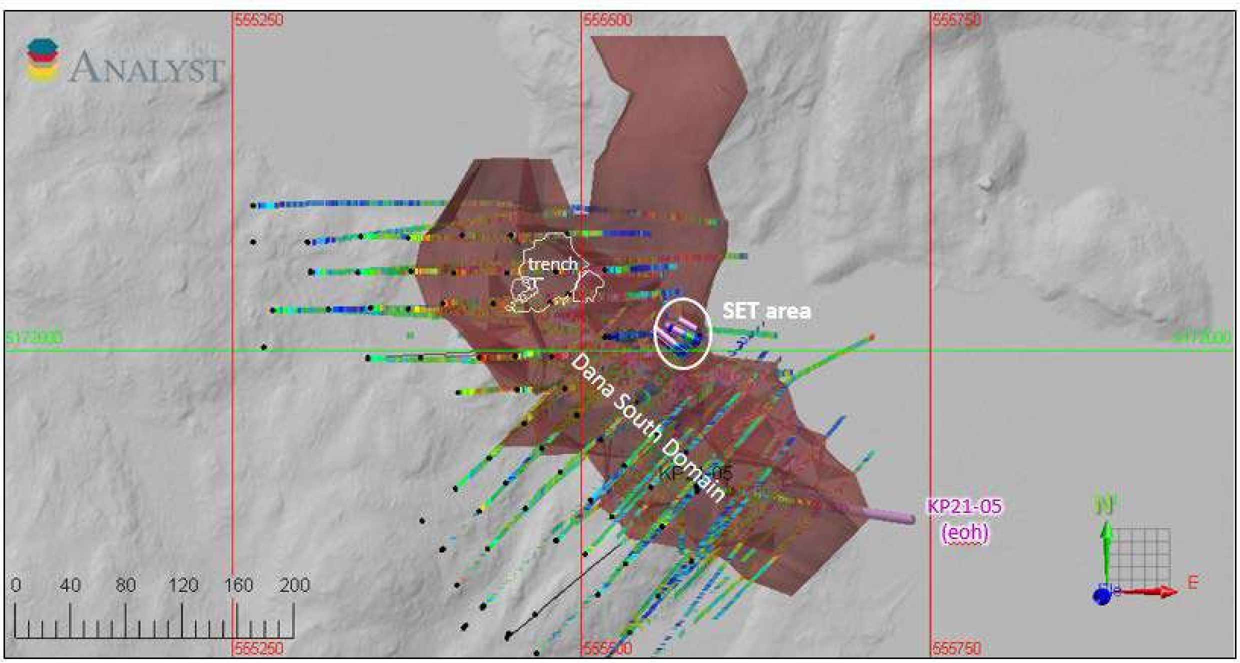
From the end of mineralization at 281 m downhole, the drill hole continued for an additional 9 m through largely barren rock before being stopped at a downhole depth of 290 m in the footwall.

TABLE 10.10
DANA SOUTH ZONE KP21-05 MINERALIZED INTERVALS

Drill Hole ID	Zone	Interval	From (m)[1,2]	Length (m)	Pd (g/t)	Pt (g/t)	Au (g/t)	3E (g/t)	Cu (%)	S (%)	NSR ($/t)[3]
KP21-05	Dana South	1	197	84	0.716	0.347	0.066	1.129	0.108	0.36	63.74
KP21-05	Dana South	incl. 1	242	30	1.306	0.510	0.102	1.918	0.183	0.58	111.08
KP21-05	Dana South	incl. 1.1	243	18	1.615	0.635	0.123	2.373	0.212	0.63	138.51

Notes:
[1] The mineralized length is based on a lower cut-off grade of 0.2 g/t 3E and a minimal width of 3 m, including up to 2.5 m of dilution.
[2] Lengths are apparent, not true thickness.
[3] NSR formula given in NAM press release dated October 5, 2021.

FIGURE 10.10 PLAN VIEW OF DRILL HOLE KP21-05 AT DANA SOUTH ZONE



Source: *NAM (press release dated June 9, 2022)*
Figure Description: *KP21-05 location relative to 3-D wireframed Dana South domain (red translucent) and historical drilling. The KP21-05 mineralized intersection protrudes east-southeast beyond the wireframed mineralized domain, indicating expansion potential with additional drilling. Trench = the historical Dana South Trench; SET = Southeast Trench area in the footwall to Dana South.*

Although intersected at a shallow angle by drill hole KP21-05, the occurrence of such higher-grade mineralization outside of the wireframed domain suggests that the Dana South Zone mineralization extends farther south-southeast than previously modelled. In other words, the previously interpreted fault boundary appears to have been misplaced and requires re-interpretation. The fault is likely present, given the apparent dextral offset of the Banshee Zone to the south-southwest, however, is potentially located significantly farther to the south-southeast than modelled. This recently recognized occurrence of mineralization is called the Dana South Zone – Extension Target ("DSZ-X").

As a result of the KP21-05 intercept, the mineralization at Dana South is open to expansion by drilling along strike to the south-southeast, in addition to down-dip. A follow-up four hole, 1,133 m drilling program was completed to test for a potential southeastward extension of the Dana South Zone (Table 10.11). All four drill holes intersected Pd mineralization (Table 10.12).

TABLE 10.11
DANA SOUTH ZONE 2022 DRILL HOLE COLLAR INFORMATION

Drill Hole ID	Target	Easting[1]	Northing[1]	Elevation (m asl)[2]	Azimuth (deg)	Dip (deg)	Length (m)
DS-22-01	DSZ-Extension	555,628	5,171,757	289.6	45	-45	293
DS-22-02	DSZ-Extension	555,661	5,171,794	290.1	45	-45	255
DS-22-03	DSZ-Extension	555,594	5,171,737	291.6	45	-45	330
DS-22-04	DSZ-Extension	555,661	5,171,724	297.6	45	-45	255
DS-22-05	DSZ-SET	555,536	5,171,963	288.8	45	-45	108
DS-22-06	DSZ-SET	555,567	5,172,013	293.3	0	-90	87

Notes:
[1] UTM NAD83 Zone 17N.
[2] m asl = metres above sea level.

Table 10.12 **Dana South Zone 2022 Highlight Assay Intercepts**											
Drill Hole ID	**Target**	**Intercept**	**From (m)**	**Length (m)[1]**	**Au (g/t)**	**Pt (g/t)**	**Pd (g/t)**	**3E (g/t)[2]**	**Cu (%)**	**Ni (%)**	**S (%)**
DS-22-01	Extension	1	210	10	0.028	0.087	0.164	0.279	0.021	0.011	0.11
DS-22-01	Extension	2	228	6	0.023	0.097	0.106	0.227	0.036	0.009	0.06
DS-22-01	Extension	3	237	7	0.059	0.233	0.296	0.588	0.111	0.019	0.39
DS-22-01	Extension	4	249	14	0.068	0.440	1.045	**1.553**	0.070	0.017	0.27
DS-22-01	Extension	incl.	250	12	0.073	0.485	1.161	**1.719**	0.067	0.0171	0.21
DS-22-02	Extension	1	183	8	0.009	0.071	0.133	0.213	0.018	0.006	0.07
DS-22-02	Extension	2	197	1	0.043	**1.390**	**5.370**	**6.803**	0.070	0.007	0.12
DS-22-02	Extension	3	203	3	0.020	0.133	0.127	0.280	0.051	0.016	0.30
DS-22-02	Extension	4	210	14	0.040	0.254	0.597	0.891	0.091	0.032	0.89
DS-22-02	Extension	incl.	214	4	0.070	0.318	0.914	**1.302**	0.148	0.037	1.04
DS-22-03	Extension	1	258	41	0.065	0.390	0.880	**1.335**	0.134	0.031	0.42
DS-22-03	Extension	incl. 1	268	15	0.084	0.539	**1.387**	**2.010**	0.1563	0.0378	0.53
DS-22-03	Extension	incl. 2	288	9	0.071	0.446	**1.065**	**1.582**	0.221	0.047	0.70
DS-22-04	Extension	1	1.56	10.44	0.047	0.2467	0.675	0.969	0.110	0.023	0.40
DS-22-04	Extension	2	15	20	0.019	0.143	0.381	0.543	0.052	0.014	0.14
DS-22-04	Extension	3	190	23	0.068	0.345	0.838	**1.251**	0.145	0.030	0.52
DS-22-04	Extension	incl.	195	13	0.103	0.475	**1.166**	**1.744**	0.205	0.037	0.73
DS-22-05	SET	1	12	63	0.085	0.450	**1.540**	**2.076**	0.131	0.027	0.39
DS-22-05	SET	incl. 1	13	14	0.143	0.691	**2.481**	**3.316**	0.191	0.027	0.38
DS-22-05	SET	incl. 2	30	15	0.105	0.606	**2.122**	**2.833**	0.157	0.031	0.41
DS-22-05	SET	incl. 3	48	12	0.100	0.608	**1.966**	**2.674**	0.155	0.033	0.47

TABLE 10.12
DANA SOUTH ZONE 2022 HIGHLIGHT ASSAY INTERCEPTS

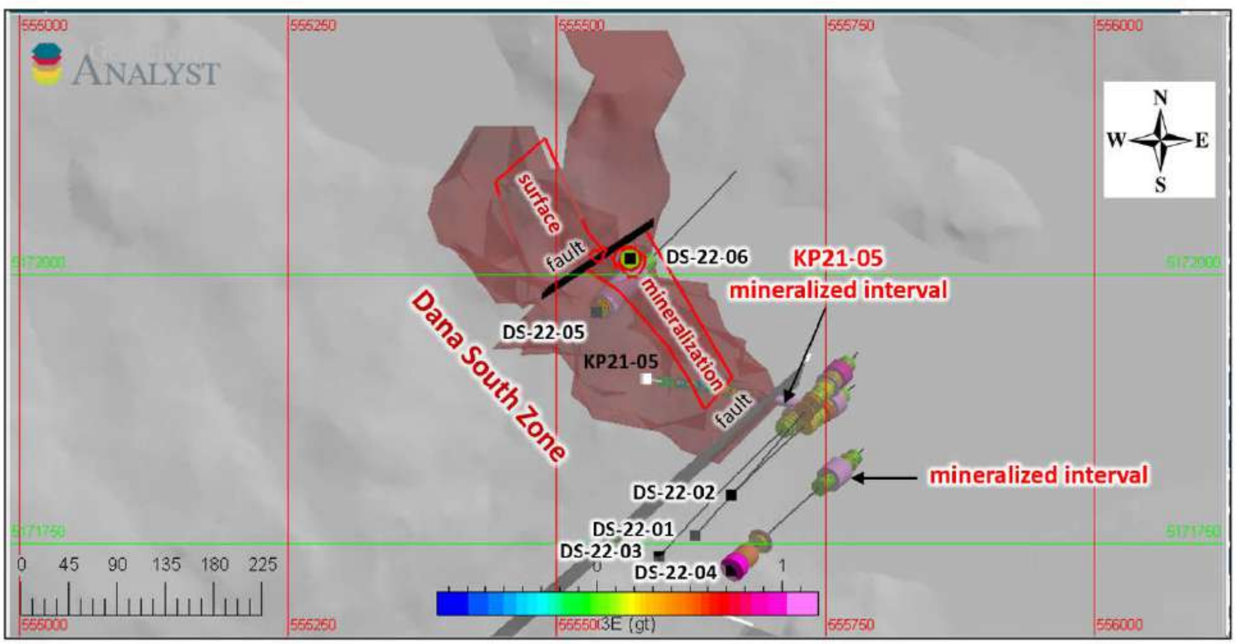
Drill Hole ID	Target	Intercept	From (m)	Length (m)[1]	Au (g/t)	Pt (g/t)	Pd (g/t)	3E (g/t)[2]	Cu (%)	Ni (%)	S (%)
DS-22-06	SET	1	3	4	0.032	0.150	0.447	0.629	0.063	0.010	0.18
DS-22-06	SET	2	11	3	0.046	0.250	0.777	**1.073**	0.085	0.018	0.23

Notes:
[1] Drill core length, not true thickness.
[2] 3E = Pd+Pt+Au.

Drill holes DS-22-01 to DS-22-03 were completed on a step-out vertical cross-section 50 m from the previously interpreted, faulted boundary of Dana South (Figure 10.11). Drill hole DS-22-01 tested the middle part of the section and returned four mineralized intersections, one of which is higher-grade than the average grade of the current Dana South Mineral Resources. Drill hole DS-22-02, drilled above DS-22-01, intersected 6.803 g/t 3E over 1 m from 197 m downhole. Drill hole DS-22-03, the deepest hole on the vertical cross-section, returned the best results: 1.335 g/t 3E and 0.134 % Cu over 41 m from 258 m downhole, including 2.010 g/t 3E and 0.156% Cu over 15 m from 268 m downhole and 1.582 g/t 3E and 0.221% Cu over 9 m from 288 m downhole.

Drill hole DS-22-04, completed on an additional 50 m step-out, returned three mineralized intersections. The best of these intersections was 1.251 g/t 3E and 0.145% Cu over 23 m from 190 m downhole, including 1.744 g/t and 0.205% Cu over 13 m from 195 m downhole. In addition, Drill hole DS-22-04 also intersected mineralization from surface; that is, 0.969 g/t 3E and 0.110% Cu over 10.4 m from bedrock surface. This shallower occurrence of mineralization is known from historical drilling, however, it is currently too sparsely drilled for Mineral Resource estimation.

FIGURE 10.11 PLAN VIEW OF THE 2022 DRILL HOLE RESULTS AT THE DSZ-X AND DSZ-SET TARGETS



Source: *NAM (press release dated January 19. 2023)*
Figure Description: *The 2022 drill program collar locations and hole traces collared by 3E (Pd+Pt+Au) mineralized interval. The mineralized intervals in drill holes DS-22-01 to DS-22-04 confirm presence of higher-grade Pd mineralization previous indicated in 2021 drill hole KP21-05 outside of the modelled Mineral Resource domain for Dana South (**red**). At the DSZ-SET Target, drill hole DS-22-05 was drilled vertically down through the mineralization exposed on surface, whereas drill hole DS-22-06 was drilled at an angle below that mineralization.*

10.4.1.2 DSZ-SET Target Drilling

Two drill holes totalling 195 m were completed at the Dana South-SET Target (Table 10.11). An inclined drill hole (DS-22-05) and a vertical hole (DS-22-06) were designed to test the mineralization in a trench and channels excavated in 2021 on mineralized outcrops 100 m to the east of the Dana South Mineral Resources (Figure 10.11). Both of the drill holes intersected significant mineralized intervals (Table 10.12).

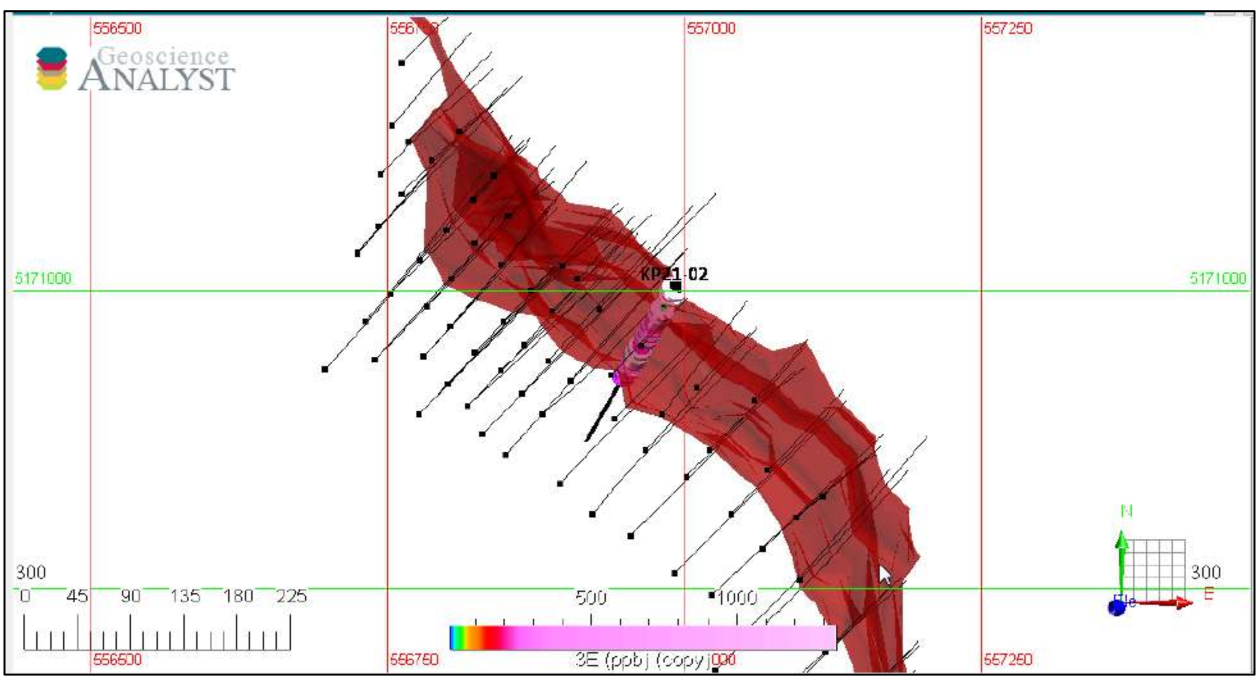
Drill hole DS-22-05 intersected 2.076 g/t 3E over 63 m from 12 m downhole, including 3.316 g/t 3E and 0.191% Cu over 14 m from 13 m downhole, 2.833 g/t 3E and 0.157% Cu over 15 m from 30 m downhole, and 2.674 g/t 3E and 0.155% Cu over 12 m from 48 m downhole. Drill hole DS-22-06 intersected 0.629 g/t 3E and 0.063% Cu over 4 m from 3 m downhole and 1.073 g/t 3E over 3 m from 11 m downhole. These drill results and preliminary surface mapping of the trench indicate that the mineralization at SET is the Dana South Zone offset sinistrally on the southeast side of an NNE-trending fault. Infill-drilling is required at SET for incorporation of this mineralization into future Mineral Resource estimations.

10.4.2 Lismer Ridge Zone

KP also completed drill hole KP21-02 to test the location and geomechanical nature of the footwall contact to the Lismer Ridge Zone. The drill hole was collared at 556,987 m E and 5,170,998 m N and 306 m asl on the footwall contact and oriented to be drilled at azimuth 210º and inclination of -57º for a length of 275 m (Figure 10.12) through the hanging wall contact of this mineralized zone.

Drill hole KP21-02 intersected many mineralized intervals (Table 10.13). The two best intersections were 2.165 g/t 3E and 0.121% Cu over 5 m from 1 m downhole and 2.315 g/t 3E and 0.127% Cu over 15 m from 12 m downhole.

FIGURE 10.12 PLAN VIEW OF DRILL HOLE KP21-02 AT LISMER RIDGE



Source: *NAM (September 2022)*

TABLE 10.13 **LISMER RIDGE KP21-02 MINERALIZED INTERVALS**											
Drill Hole ID	**Zone**	**Inter-val**	**From (m)**	**Length (m)**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**3E (g/t)**	**Cu (%)**	**S (%)**	**NSR ($/t)**
KP21-02	Lismer Ridge	1	1	5	1.585	0.498	0.083	2.165	0.121	0.274	121.80
KP21-02	Lismer Ridge	2	12	15	1.708	0.547	0.061	2.315	0.127	0.373	130.4
KP21-02	Lismer Ridge	3	38	7	0.251	0.128	0.018	0.397	0.033	0.140	22.43
KP21-02	Lismer Ridge	4	48	11	0.177	0.087	0.020	0.285	0.048	0.345	18.54
KP21-02	Lismer Ridge	5	68	4	0.145	0.083	0.014	0.241	0.016	0.030	13.05
KP21-02	Lismer Ridge	6	78	3	0.133	0.097	0.015	0.244	0.026	0.050	13.42
KP21-02	Lismer Ridge	7	86	5	0.177	0.060	0.026	0.263	0.046	0.078	17.39
KP21-02	Lismer Ridge	8	107	4	0.583	0.293	0.041	0.916	0.036	0.073	48.00
KP21-02	Lismer Ridge	9	118	10	0.589	0.251	0.027	0.867	0.032	0.067	46.34

Source: *NAM (May 2022)*

10.5 ROCK GEOMECHANICAL PROPERTY DRILLING: 2021

Three additional drill holes were completed by KP, however, not logged and sampled as exploration holes. Drill hole KP21-01 was completed at Lismer North Zone. Drill holes KP21-03 and KP21-04 were completed at Dana North Zone. Drill hole collar coordinates, orientation and length for all five KP drill holes completed at River Valley are given in Table 10.14.

TABLE 10.14 **GEOMECHANICAL DRILL HOLES**							
Drill Hole ID	**Zone**	**Easting (m)***	**Northing (m)***	**Elevation (m)**	**Azimuth (deg)**	**Dip (deg)**	**Length (m)**
KP21-01	Lismer North	556,077.2	5,171,569.3	292.628	225	-60	255
KP21-02**	Lismer Ridge	556,986.6	5,170,998.2	306.400	210	-57	275
KP21-03	Dana North	555,280.2	5,172,711.5	322.771	290	-55	290
KP21-04	Dana North	555,390.9	5,172,373.7	304.828	205	-58	300
KP21-05**	Dana South	555,579.4	5,171,905.0	292.675	99	-57	290

Source: *NAM (May 2022)*
Note: ** Coordinates UTM NAD83 Z17N and measured in differential GPS survey by Story Environmental.*
*** Drill holes also logged and sampled as exploration drill holes.*

11.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY

The following section describes the sample preparation, analyses and security procedures undertaken at the River Valley Property from 2000 through 2022.

11.1 DRILL CORE LOGGING AND SAMPLING PROCEDURES

Drill core logging and sampling were completed at the designated drill core logging facility by Company personnel and, in the case of the Knight Piésold Ltd. ("KP") geomechanical drilling in 2021, KP personnel were also present. The sampling procedure was as follows:

- Diamond drill core was delivered to the drill core logging facility on a daily basis;
- The sections of drill core to be sampled were delimited with a grease pencil;
- The drill core was photographed and racked for sampling;
- The drill core was split using a diamond saw by a technician. Half the drill core was sent out for assay, the other half kept for reference;
- Sampling was carried out by a technician. Each sample was placed in a plastic bag with appropriately numbered tag corresponding to a sampling interval also placed in the bag. That same number was also printed on the outside of the bag as a cross-check. The samples were then put in rice bags and shipped to SGS sample preparation facilities in Sudbury, Ontario;
- In-house reference materials ("IRM's) and blanks were inserted into the sample stream at designated intervals;
- As an additional quality assurance/quality control ("QA/QC" or "QC") procedure, a second split was prepared from the pulp by the primary laboratory, at designated sample intervals;
- The remaining half of the drill core was stored in a tagged drill core box indicating hole and box numbers and downhole interval. Drill core from some phases of drilling were stored temporarily at the designated logging facility; and
- The drill core was then transported and laid down in the Company's drill core storage yard near River Valley (Figure 11.1).

FIGURE 11.1 RIVER VALLEY DRILL CORE STORAGE FACILITY

Source: *P&E and DRA (2019)*

11.2 BULK DENSITY

A total of 432 bulk density samples were tested from the Dana North, Dana South and Lismer Ridge Zones. The bulk density measurements ranged from 2.61 t/m^3 to 3.26 t/m^3 with an average of 2.94 t/m^3. A uniform bulk density of 2.94 t/m^3 was applied for all mineralized domains for the current Mineral Resource Estimate. A total of 21 independent verification samples were collected by the Authors during a June 2021 site visit to the Property, and the drill core density of all samples was measured by Wet Immersion method at AGAT Laboratories in Mississauga, Ontario. A comparison between the Company's database results and the Authors independent verification samples analyzed at AGAT is given in Table 11.1. The Authors consider there is acceptable correlation between the two data sets for Dana and Lismer Ridge. However, it is recommended to collect more bulk density samples from all zones, various rock types and mineralization types, in order to create future bulk density models.

TABLE 11.1 SUMMARY OF BULK DENSITY MEASUREMENTS AT RIVER VALLEY PROJECT								
Zone	**NAM Database**				**P&E Site Visit Samples**			
	No. of Samples	**Minimum (t/m^3)**	**Maximum (t/m^3)**	**Average (t/m^3)**	**No. of Samples**	**Minimum (t/m^3)**	**Maximum (t/m^3)**	**Average (t/m^3)**
All	432	2.61	3.26	2.94	21	2.81	3.06	2.91
Dana North	90	2.66	3.04	2.86	9	2.81	2.92	2.88
Dana South	6	2.88	2.95	2.88				
Lismer Ridge	363	2.95	3.26	2.95	6	2.90	3.06	2.94
Azen Creek	--	--	--	--	3	2.84	2.98	2.90
Varley	--	--	--	--	3	2.84	3.02	2.96

Source: *P&E (2021)*

11.3 SAMPLE PREPARATION AND ANALYSES

NAM has utilized SGS Minerals ("SGS") for sample preparation and analyses during recent phases of drilling. When sufficient samples have accumulated, all samples, including IRMs and blanks, are place into rice bags and shipped to the SGS sample preparation facility in Sudbury, Ontario.

The following is a brief description of the sample preparation and analyses carried out on the samples submitted (prep code CRU25 and PUL45).

- Samples are sorted and dried;
- When dried, less than 3.0 kg of the sample is crushed to 90% passing at 2 mm (prior to 2021) or 90% passing 1.25 mm (from 2021);
- The sample is split to get a 250 g or 500 g sample (prior to 2021) or approximately 100 g sample (from 2021) for pulverizing;
- 250 g or 500 g of the crushed sample is then pulverized with chromium steel to allow 85% passing of 75 µm;
- Palladium, platinum and gold were assayed by fire assay with ICP-AES finish (GE-FAI30V5); and
- Copper, Nickel and 32 additional metals were assayed by two acid digestion and ICP-OES finish (GE-ICP21B20).

In earlier phases of drilling, all samples were submitted to X-Ray Assay Laboratories ("XRAL"), Rouyn-Noranda, Quebec, and assayed for Pt, Pd, Au, Cu and Ni. Phase 1 samples were also assayed for Rh.

On receipt of a sample shipment at XRAL, samples are unpacked and arranged in numeric order. Samples are first crushed to 90% passing a 10-mesh screen, and then pulverized to 80% passing a 200-mesh screen. Crushing and pulverizing equipment is cleaned with air and (or) brush between samples.

Concentrations of Pt-Pd-Au were determined using standard lead fire assay, followed by dissolution with aqua regia, and measurement with a DCP (direct current plasma) finish. Lower limits of detection (30 g sample) are 1 ppb for Au and Pd and 10 ppb for Pt; upper limits are 10,000 ppb by DCP. Concentrations of Cu and Ni were determined by ICP methods and generally have lower limits of detection of 0.5 ppm for Cu and 1 ppm for Ni; the upper limit for both Cu and Ni is 1%. Rhodium concentrations were determined using an arrested cupellation method that utilizes standard lead fire assay techniques with an ICP-MS finish; lower limit of detection for Rh was 30 ppb. Silver is used during the fire assay procedure.

SGS is an independent laboratory operating more than 2,600 offices and labs worldwide. Sample processing services at SGS are ISO/IEC 17025:2017 accredited by the Standards Council of Canada. Quality Assurance procedures include standard operating procedures for all aspects of the processing, and also include protocols for training and monitoring of staff. ONLINE LIMS is used for detailed worksheets, batch and sample tracking including weights and labeling for all the products from each sample.

XRAL was founded in 1954 as X-Ray Assay Laboratories to exploit the multi-element capabilities of newly developed X-Ray fluorescence instruments and was purchased by the SGS Group in 1988.

11.4 QUALITY ASSURANCE/QUALITY CONTROL REVIEW

NAM implemented a robust quality assurance/quality control ("QA/QC") program from the commencement of Phase 5 drilling in 2002 at the Property. Until this time, the only external check on the primary lab analyses (XRAL) were check analyses carried out by secondary labs: Accurassay Laboratories ("Accurassay") in Thunder Bay, ON and Bondar Clegg Laboratories ("Bondar Clegg", acquired by ALS Minerals in 2001) in Val d'Or, Quebec. IRMs were also inserted into the samples stream, during the latter stages of Phase 4.

11.4.1 2000 to 2001 – Phases 1 to 4 (138 Drill Holes)

11.4.1.1 Performance of Secondary Lab Checks

Samples for check analyses were submitted to both Accurassay and Bondar Clegg during the first four phases of drilling carried out between 2000 and 2001. A total of 1,935 samples (1,767 pulps and 168 coarse rejects) were submitted for Pt-Pd-Au check analyses for this period of drilling.

A summary of check assaying undertaken for each phase follows:

- **Phase 1:** 572 pulps/168 course rejects analyzed at Accurassay/Bondar Clegg, with acceptable reproducibility of ±25%. No additional QC samples were included;

- **Phase 2:** 296 pulps analyzed at Accurassay, with acceptable reproducibility of ±25%, R^2 values of 0.916 for Au, 0.952 for Pt and 0.958 for Pd and four outliers for Pt and one for Au. QC samples were not included;

- **Phase 3:** 94 pulps analyzed at Accurassay, with acceptable reproducibility of ±25% and four samples exceeding threshold. QC samples were not included; and

- **Phase 4:** 805 pulps analyzed at Bondar Clegg, with acceptable reproducibility of ±25% and <25% samples exceeding threshold. A low bias was revealed in the primary lab Pd+Pt+Au ("3E") data, with the Bondar-Clegg check assay results approximately 10% higher than the original XRAL assays. IRMs (n=42), NZ-2 and SZ, and barren quartzite blanks (n=30) were included with check assays to monitor for accuracy and contamination. Performance of IRMs indicated potential accuracy issues.

11.4.1.2 Performance of In-House Reference Materials

IRMs, NZ-2 and SZ, were inserted into the sample stream every 20th sample, for the final 14 drill holes of the Phase 4 program. The IRMs were prepared from mineralized material blasted from the North Zone 2 (NZ-2) and the South Zone (SZ) stripped areas and sent to Accurassay for both preparation and analysis. Recommended IRM values for Pd, Pt, Au, Cu and Ni were determined by averaging 25 results.

The 3E data from 61 NZ-2 IRM results and 18 SZ IRM results were analyzed and data for both IRMs implied either a high bias in Accurassay's original analyses, or a low bias in XRAL's Phase 4 results.

11.4.1.3 Performance of Additional Secondary Lab Checks with QC Samples

Subsequent to Phase 4 drilling and at the recommendation of Derry, Michener, Booth & Wahl Consultants Ltd. ("DMB & W"), the Company retrieved pulp material from 1,458 samples (560 samples from Phases 1 to 3 and 898 samples from Phase 4) representative of 23 selected drill holes, for the purpose of carrying out a more robust check assaying program. This recommendation was designed to improve confidence in the XRAL data not supported by external quality controls.

A total of 11 drill holes from Phases 1 to 3 drilling at the Dana Zone, six drill holes (434 samples) from Phase 4 drilling at the Dana Zone, and six drill holes (464 samples) from Phase 4 drilling at the Lismer Ridge Zone, were included in the check assaying program. Check assays were analyzed by XRAL and Accurassay for Au, Pt and Pd.

Accurassay's check assay results for Pt and Pd are consistently higher than XRAL results and, although the data indicate considerable dispersion about the mean value for both Pt and Pd, there appears to be good agreement between XRAL and Accurassay with substantial coefficient of determinations estimated for both Pt and Pd.

11.4.2 2002 – Phase 5 (83 Drill Holes)

The Phase 5 drilling program included the routine insertion of IRMs, duplicates and blanks at a rate of 1 in 20 sample into the sample stream. Throughout this phase of drilling, two new IRMs, one at cut-off grade and the other at mean deposit grade, were also included in QC protocol. QC sample results were monitored and follow up action was taken with failures encountered, including re-running certain samples if deemed necessary.

11.4.2.1 Performance of In-House Reference Materials

Phase 5 drilling utilized 96 IRMs to monitor for accuracy in drill core sample analyses. A total of eight IRMs were used: DH29-01, DZ-1, DZ-2, NZ-2, NZ-2a, NZ-2b, SZ and SZ-1. The results of the Pt-Pd-Au IRMs were all within ±2 standard deviations of the calculated mean value. Results for the NZ-2b, NZ-2, SZ and SZ-1 IRMs were acceptable. However, relative low biases were evident in the NZ-2 and SZ XRAL data.

Some of the data for the DZ-1, NZ-2a, DH29-01 and DZ-2 IRMs plotted outside of ±2SD from the mean and follow-up investigation determined the cause to be a malfunctioning DCP analytical unit. Corrective action included the use of an ICP analytical unit to analyze the remaining samples and undertaking a re-assaying program of 2,974 samples (1,014 samples prior to and 1,960 samples subsequent to the issue being discovered) at XRAL in Toronto. The Project database was updated with corrected assay results at the conclusion of the re-assaying program.

11.4.2.2 Performance of Blanks

Potential contamination in Phase 5 of drilling at the Property was monitored with the aid of three blanks: the SS-1, SS-2 and SS-3 blanks. The latter two blanks did not return anomalous results, whereas the SS-1 blank returned several anomalously high results (20 ppb to 85 ppb Pd) in drill holes DL-55 to DL-62, within the same sequence of anomalous values for the DZ-2 blank.

11.4.2.3 Performance of Duplicates

A total of 1,134 duplicate samples from 81 drill holes, were sent for analysis during Phase 5 drilling: 522 samples from 35 drill holes at the Dana Zone, 531 samples from 40 drill holes at the Lismer Ridge Zone and 81 samples from six drill holes at the Banshee Zone. Duplicate analyses were carried out in two parts, with Parts 1 and 2 including samples from the Dana and Lismer Ridge Zones and Part 2 also including samples from the Banshee Zone. All duplicate samples were analyzed at both XRAL and Accurassay and Part 2 Dana and Lismer Ridge Zone samples were also analyzed at Chemex.

Duplicate data for Pt, Pd and Au were plotted on scatter plots and examined. Acceptable coefficients of determination (R^2) were calculated for both Pd and Pt across all data, with R^2 values estimated between 0.927 to 0.989 for Pd and 0.793 to 0.962 for Pt. There were three extreme outliers noted in the Au data, which when removed, gave R^2 values between 0.746 to 0.893. Without these outliers included in the data, R^2 values for Au ranged from 0.553 to 0.893.

11.4.3 2004 – Phase 6 (208 Drill Holes)

The Phase 6 drilling program again included the routine insertion of IRMs, duplicates and blanks at a rate of 1 in 20 sample into the sample stream.

11.4.3.1 Performance of In-House Reference Materials

During Phase 6, a total of three IRMs were created using bulk material from the Property. The IRMs were prepared at Accurassay, Thunder Bay and the expected results were determined by round robin:

- 'LOW-A': a low-grade in-house control sample (~ 500 – 750 ppb 3E);
- A mid-grade in-house control sample (~ 1,000 – 1,500 ppb 3E); and
- NZ-2E: a high-grade in-house control sample (~ 6,000 ppb 3E) – 'NZ-2E'. (3E = three elements Au + Pt + Pd).

A total of 1,225 IRMs were inserted into the sample stream during Phase 6.

In January 2005, L. Bloom conducted a review of the QA/QC procedures and data at the Sudbury office. Based on the assays for Pt and Pd for NZ-2E and LOW-A, there was a possibility that SGS may be analyzing low, an observation that was also reported in the Phase 6 QC review.

The results of the IRMs indicate grouping of high biased Pt, Pd and Au, with Bloom concluding:

> *"It is difficult to estimate the bias across all grades, but as a rough estimate it is in the order of one standard deviation or possibly 50 ppb Pt and 100 ppb Pd." The pertinent work orders are 72182 to 72191 and 72234 to 72244. This affects about 5% of the over 25,000 samples of Phase 6."*

11.4.3.2 Performance of Duplicates

The 2004 Phase 6 program included 13 duplicates and 63 IRMs inserted into the sample stream. The results from the Pt-Pd-Au pulp duplicates assays indicated there was an issue duplicating the results at low grades. Gold had four samples that exceeded the 25% threshold, yet three of the samples had grades less than 50 ppb. Only two platinum duplicates exceeded the 25% threshold. However, all 13 duplicates of palladium exceeded the 25% threshold. NAM followed up on this issue with SGS and all samples were re-run using new equipment.

11.4.4 2005 – Phases 7 to 8 (123 Drill Holes)

11.4.4.1 Performance of In-House Reference Materials

During Phase 7, only LOW-A and NZ-2E were used as the supply of the mid-grade IRMs was depleted during the previous phase of drilling.

The results of the IRMs were reported to be primarily within ±2 Standard Deviations and show acceptable accuracy.

11.4.4.2 Performance of Blanks

A total of 54 blank results were reviewed by the Author for the Phase 7 program. The vast majority of blank results were at or close to detection levels and do not indicate any contamination issues with the data.

11.4.4.3 Performance of Duplicates

A total of 289 field duplicates and 589 pulp duplicates were analyzed during the 2005 Phase 7 drilling program. During Phase 8 drilling, 89 field duplicates and 170 pulp duplicates were analyzed. The results from the Pt-Pd-Au drill core and pulp duplicates assays again indicate difficulty in duplicating low-grade results.

11.4.4.4 Performance of Check Assays

During the 2005 Phase 7 drill program, a total of 595 check assays were sent to Chemex for umpire assaying to check the original SGS results. The results were plotted on a scatter plot and show acceptable agreement between labs, with a slight high bias evident in the Chemex results.

Later in 2005, for the Phase 8 drilling results, 156 samples were sent to Chemex for umpire assaying to again check the SGS results. The results were plotted on a scatter plot and show acceptable precision, with no bias evident.

11.4.5 2011 to 2012 – Phase 9 (46 Drill Holes)

11.4.5.1 Performance of In-House Reference Materials

IRMs created from bulk material from the Property were used to monitor for accuracy during Phase 9 drilling at the Property:

- RV-1: a high-grade (approximately 2,000 ppb 3E) sample;
- RV-2: a mid-grade (approximately 900 ppb 3E);
- RV-3: a low-grade (approximately 500 ppb 3E).

IRMs were inserted into the sample stream every 40 samples. There were 71 samples for the RV-1 IRM, 74 for RV-2 and 70 for RV-3. All data were plotted on process performance charts against the relevant upper and lower control limits (the median moving range standard deviation ("MRSD") is used to calculate control limits, with the upper and lower control limits calculated at ±3MRSD from the mean).

RV-1, the highest-grade IRM with expected values of 86.1 ppb gold, 486 ppb platinum and 1,525 ppb palladium returned periodic failures for all three elements on the process performance chart. There were six failures (8.5%) for gold and five (7.0%) each for platinum and palladium.

RV-2, the mid-grade IRM with expected values of 53.7 ppb gold, 246 ppb platinum and 644 ppb palladium, returned more failures at the commencement of the program. There were five failures (6.8%) for gold, four (5.4%) for platinum and six (8.1%) for palladium.

The lowest grade RV-3 IRM with expected values of 16.2 ppb gold, 160 ppb platinum and 327 ppb palladium, returned the least amount of failures throughout this phase of drilling. There were two failures (2.9%) for gold, four (5.7%) for platinum, and one (1.4.%) for palladium.

11.4.5.2 Performance of Blanks

Pulp blanks were inserted into the sample stream every 40 samples. In addition to pulp blanks, coarse blanks were submitted every 20 samples to test for contamination during sample preparation stages.

All blank data for gold, platinum and palladium were graphed. If the assayed value in the certificate was indicated as being less than detection limit, the value was halved for data treatment purposes. An upper tolerance limit of three times the detection limit value was set. There were 214 data points to examine.

The vast majority of data plots at or below set tolerance limits for gold and platinum, with eight blanks (3.7%) plotting above the set tolerance limit for gold and one (0.5%) for platinum. The highest-grade blank result returned for gold is 32 ppb and 30 ppb for platinum.

The palladium tolerance limit was set at 3 ppb and a total of 38 blanks (17.8%) fall above this set tolerance limit. The highest-grade blank result returned a grade of 38 ppb in the palladium data set and the majority of failures occur in the first three-quarters of the program, after which the majority of palladium blanks fall on or below 3 ppb. The distinct change at this time likely indicates improvement in laboratory protocol. The anomalous blank results generally follow higher grade palladium results and show between 1 to 3% carry-over contamination. The Author does not consider contamination to be significant to the integrity of the 2011-2012 drilling data.

11.4.6 2015 to 2022 – (35 Drill Holes)

11.4.6.1 Performance of In-House Reference Materials

The same RV-1, RV-2 and RV-3 IRMs used in Phase 9 were used to monitor accuracy at the Project during drilling carried out from 2015 through 2022 (as described in section 11.4.5.1). Data for the five years of drilling (2015, 2016, 2017, 2020, 2021 and 2022) were assessed together, due to the small amount of data gathered throughout each year, to allow for more robust statistical evaluation.

IRMs were inserted into the sample stream every 40 samples. There were 47 samples for the RV-1 IRM, 45 for RV-2 and 37 for RV-3. All data were plotted on process performance charts against the relevant upper and lower control limits (with the upper and lower control limits calculated at ±3MRSD from the mean).

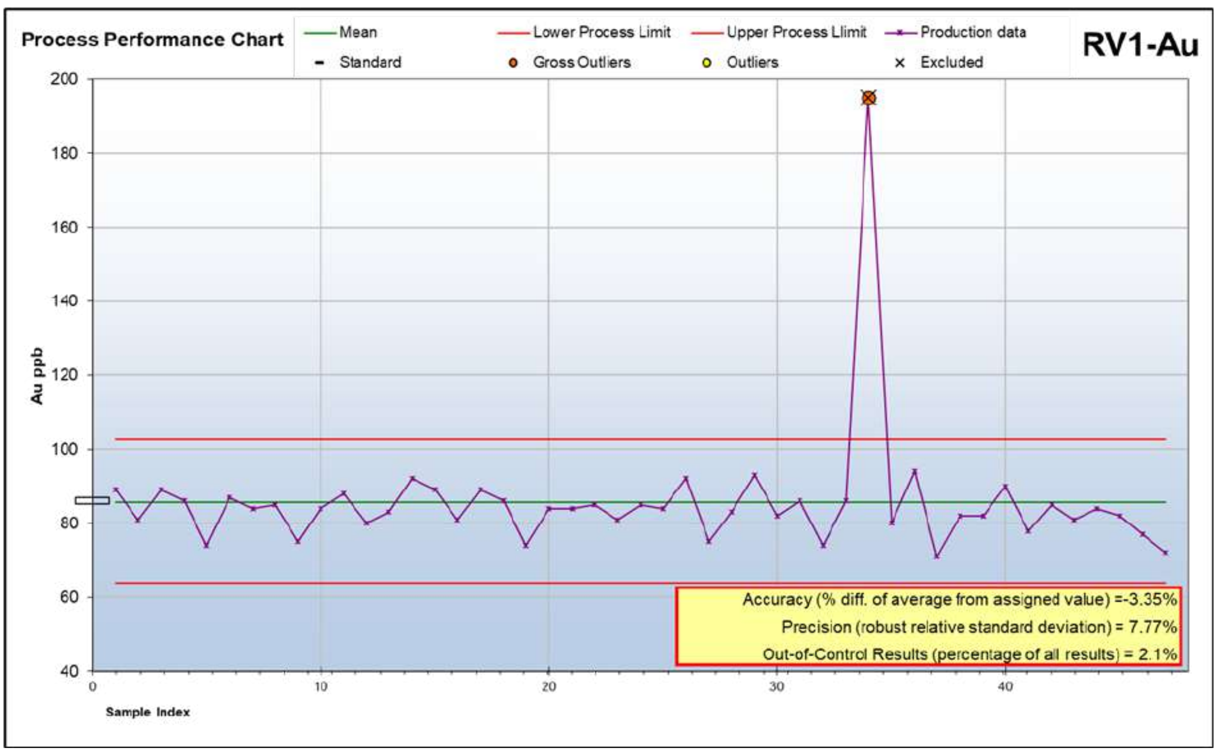
The majority of data for RV-1, the highest-grade IRM with expected values of 86.1 ppb gold, 486 ppb platinum and 1,525 ppb palladium, returned in-control results (see Figures 11.2 to 11.4). Single out of control results for gold and platinum were observed for the RV-1 reference material.

RV-2, the mid-grade IRM with expected values of 53.7 ppb gold, 246 ppb platinum and 644 ppb palladium, returned single failures (representing 2.3% of the data) for both gold and platinum and no failures for palladium. Gold results for RV-2 revealed a low bias (see Figures 11.5 to 11.7).

The lowest grade RV-3 IRM, with expected values of 16.2 ppb gold, 160 ppb platinum and 327 ppb palladium, returned four true failures for gold, and one failure each for platinum and palladium (see Figures 11.8 to 11.10). Data point number 31 in Figures 11.8 to 11.10 show a low failure close to zero, which is a misallocated blank and not RV-3 reference material.

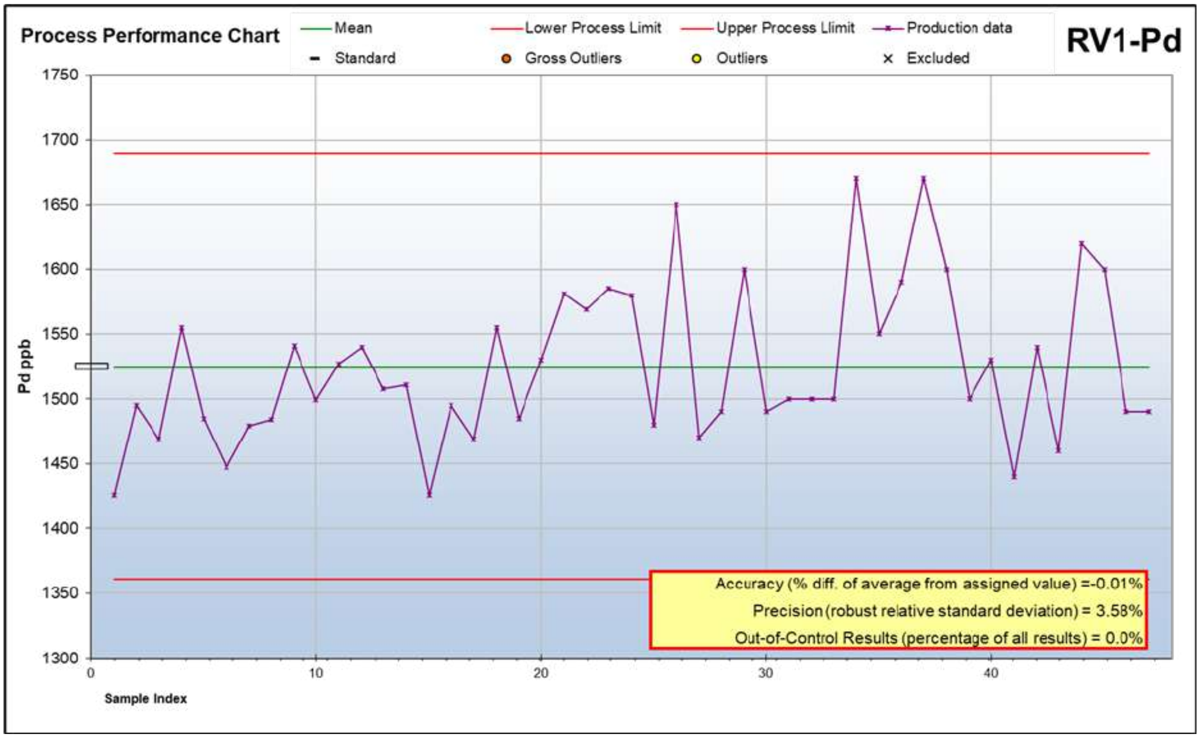
The Author considers the IRM data to demonstrate acceptable accuracy and does not consider the reported failures to be of material impact to the Mineral Resource data.

FIGURE 11.2 2015 TO 2022 RV-1 IRM PERFORMANCE - AU



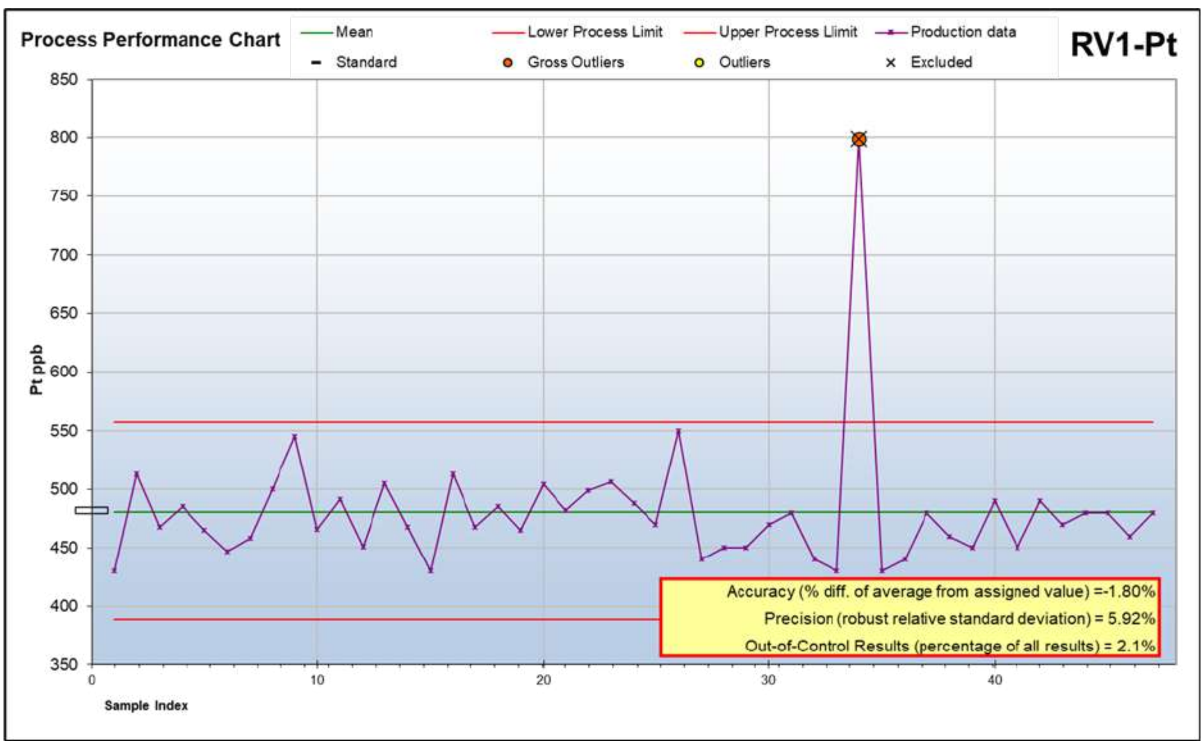
Source: *P&E (2023)*

FIGURE 11.3 2015 TO 2022 RV-1 IRM PERFORMANCE - PD



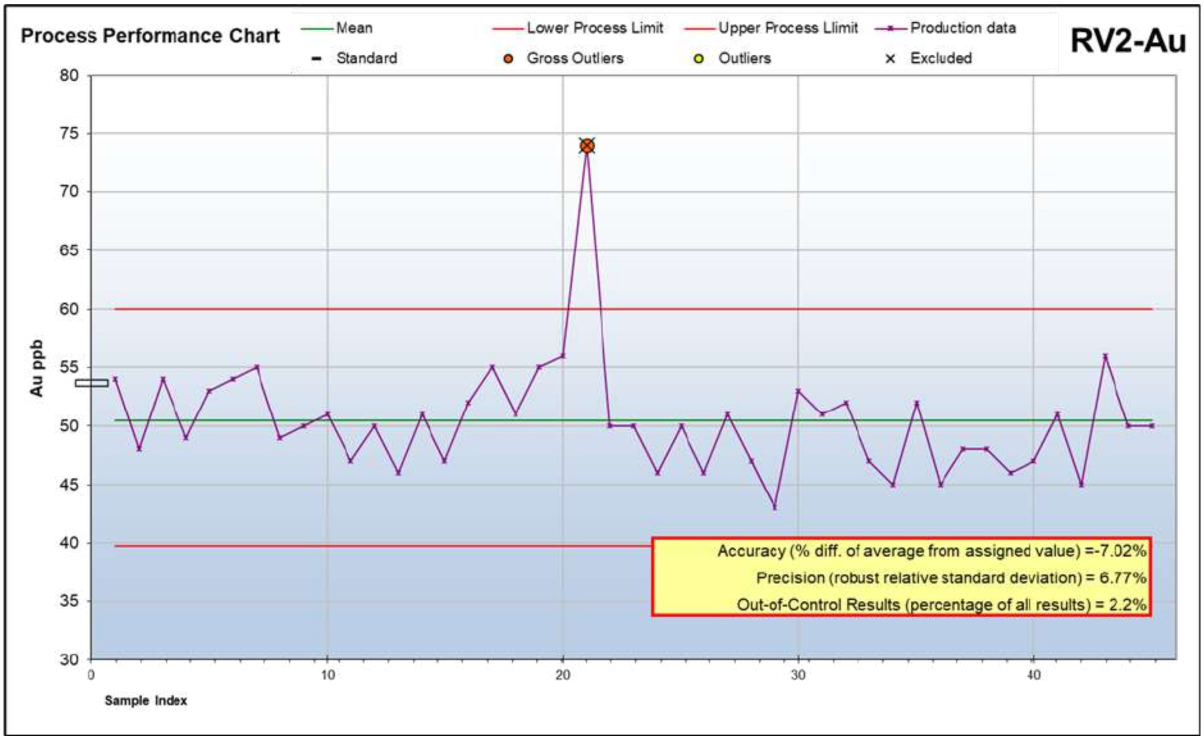
Source: *P&E (2023)*

FIGURE 11.4 2015 TO 2022 RV-1 IRM PERFORMANCE - PT



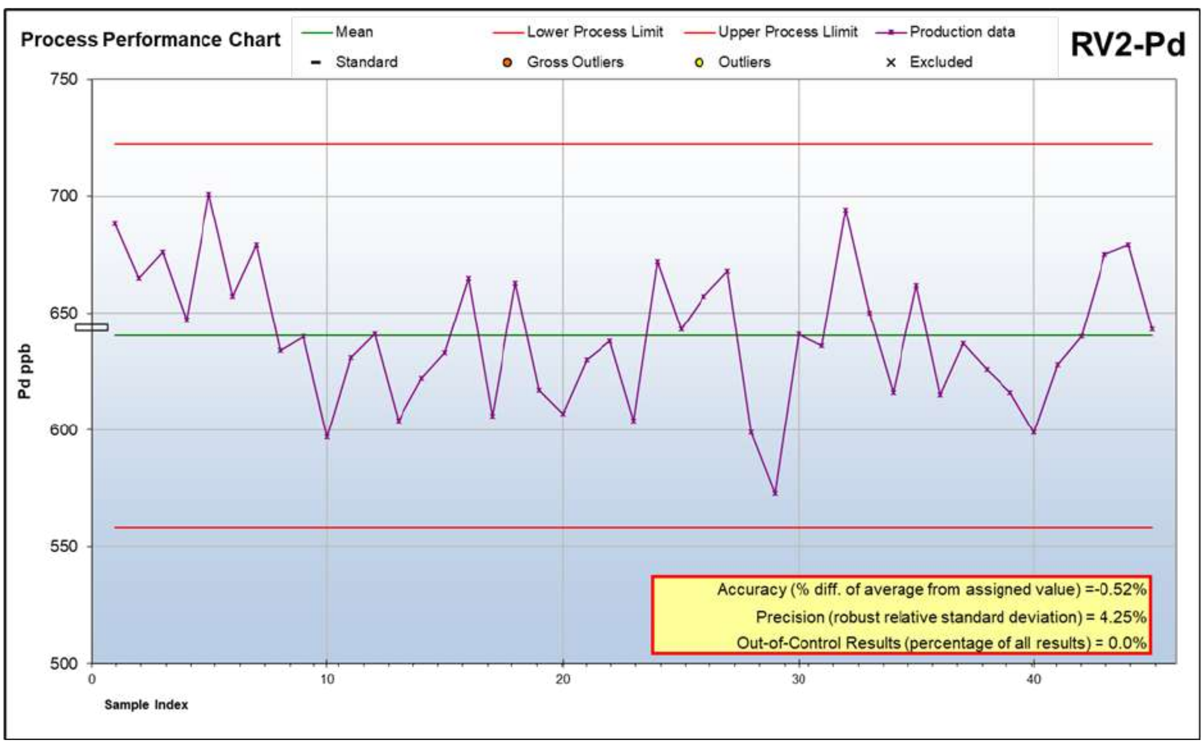
Source: *P&E (2023)*

FIGURE 11.5 2015 TO 2022 RV-2 IRM PERFORMANCE - AU



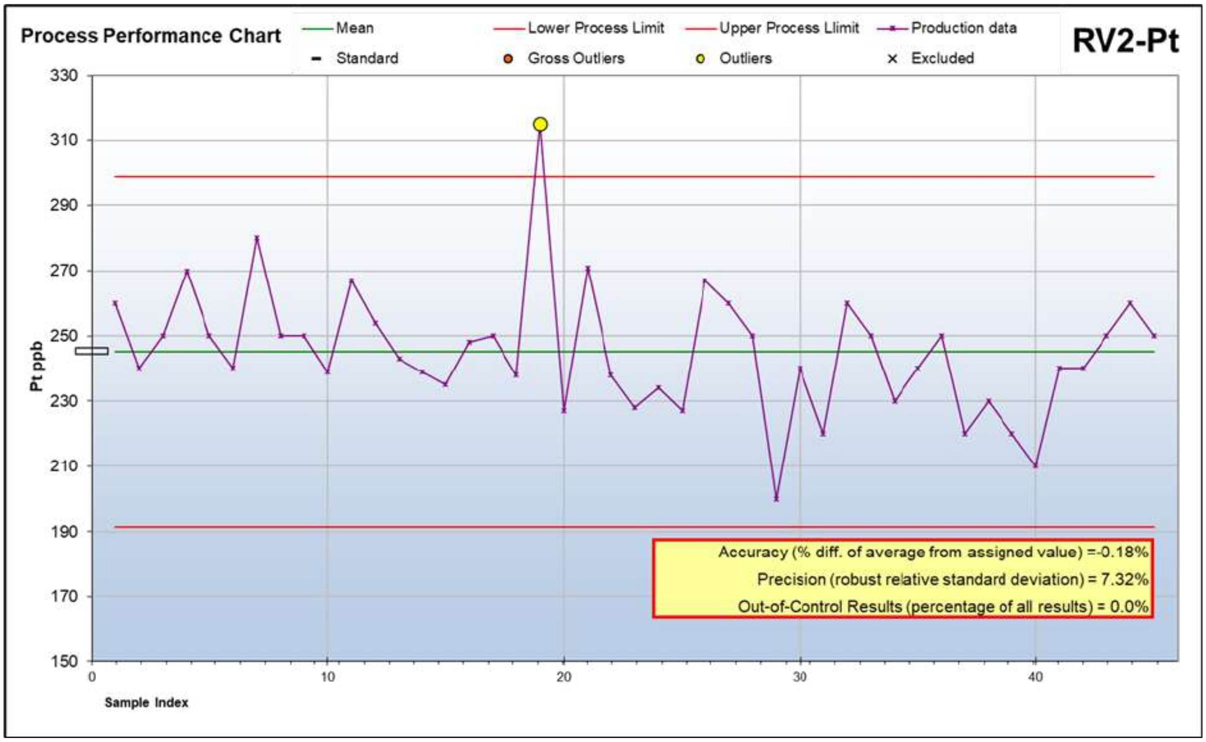
Source: *P&E (2023)*

FIGURE 11.6 2015 TO 2022 RV-2 IRM PERFORMANCE - PD



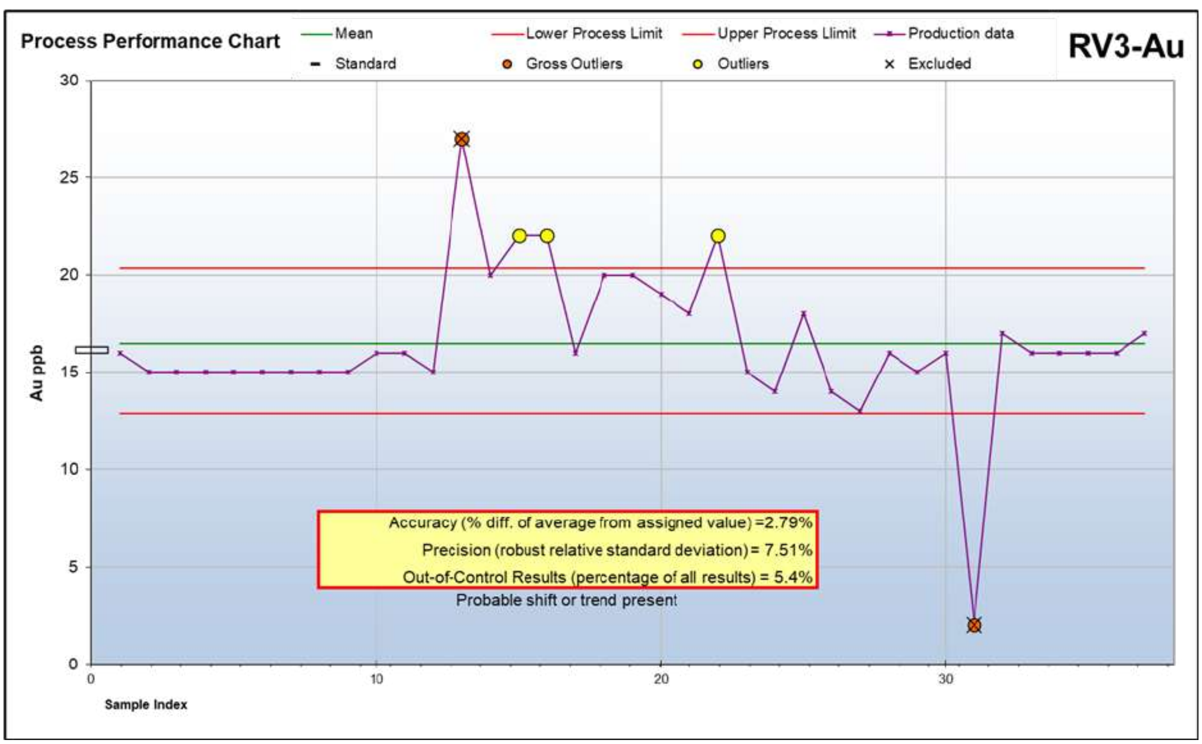
Source: *P&E (2023)*

FIGURE 11.7 2015 TO 2022 RV-2 IRM PERFORMANCE - PT



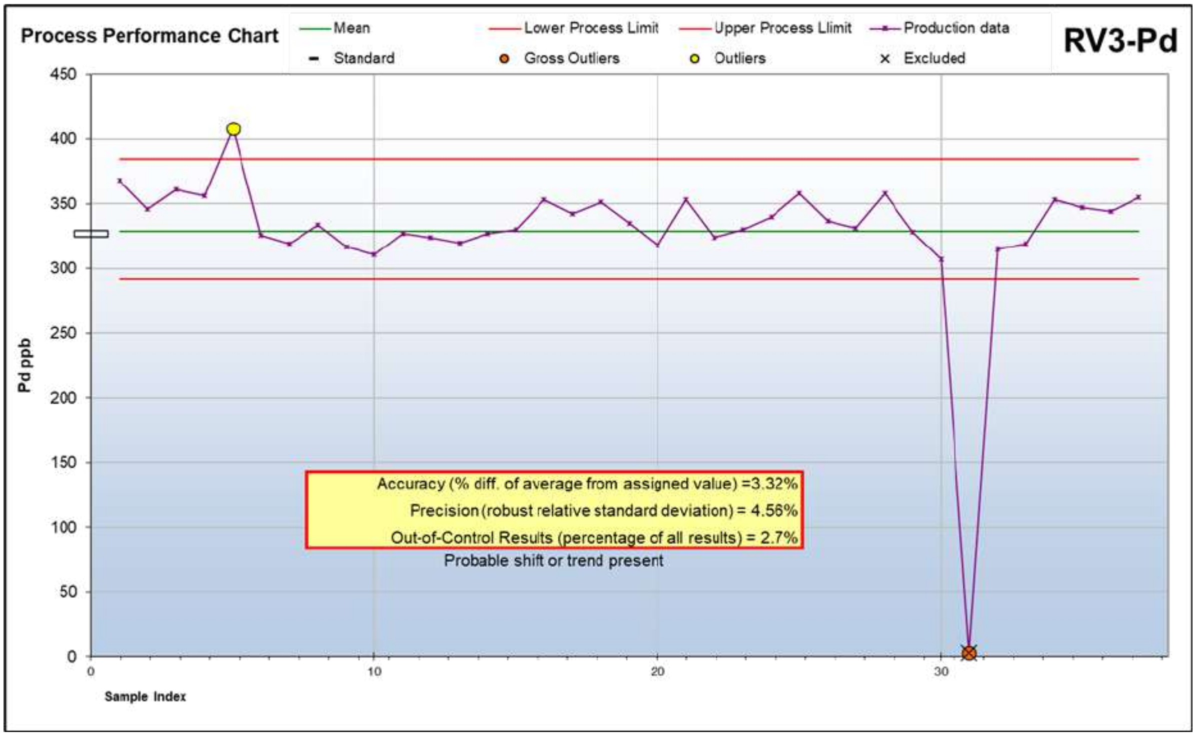
Source: P&E (2023)

FIGURE 11.8 2015 TO 2022 RV-3 IRM PERFORMANCE - AU



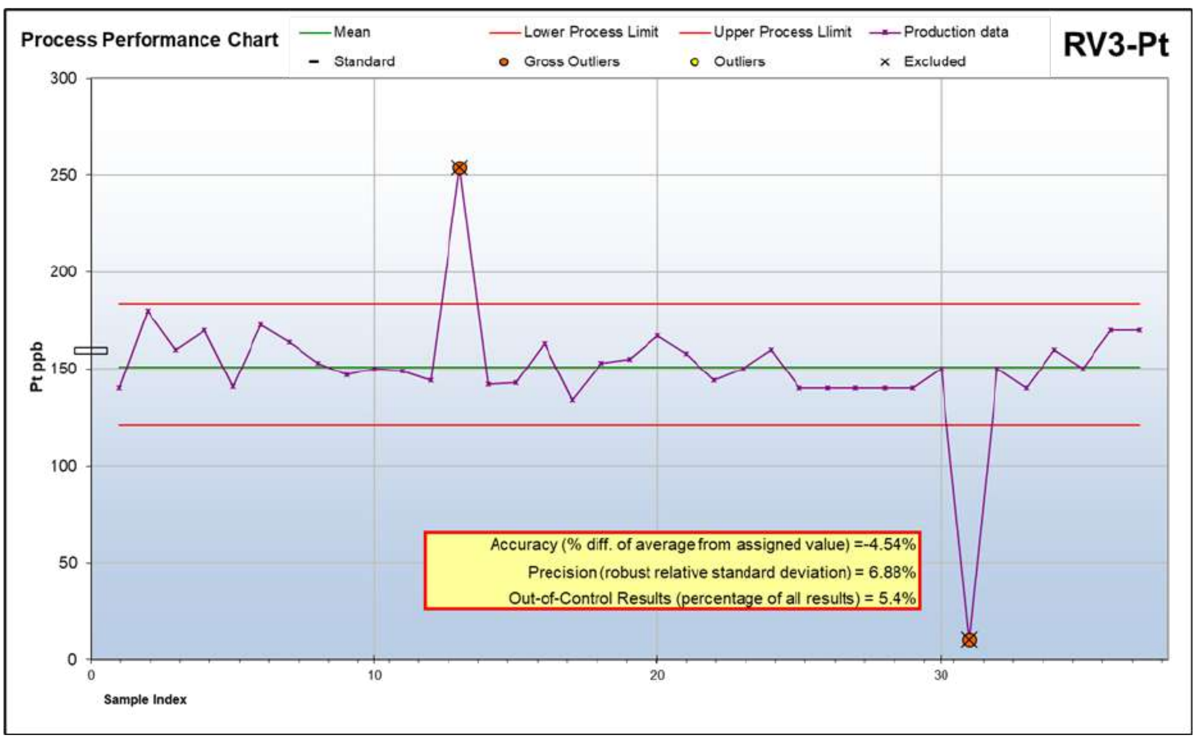
Source: P&E (2023)

FIGURE 11.9 2015 TO 2022 RV-3 IRM PERFORMANCE - PD



Source: *P&E (2023)*

FIGURE 11.10 2015 TO 2022 RV-3 IRM PERFORMANCE - PT



Source: *P&E (2023)*

11.4.6.2 Performance of Blanks

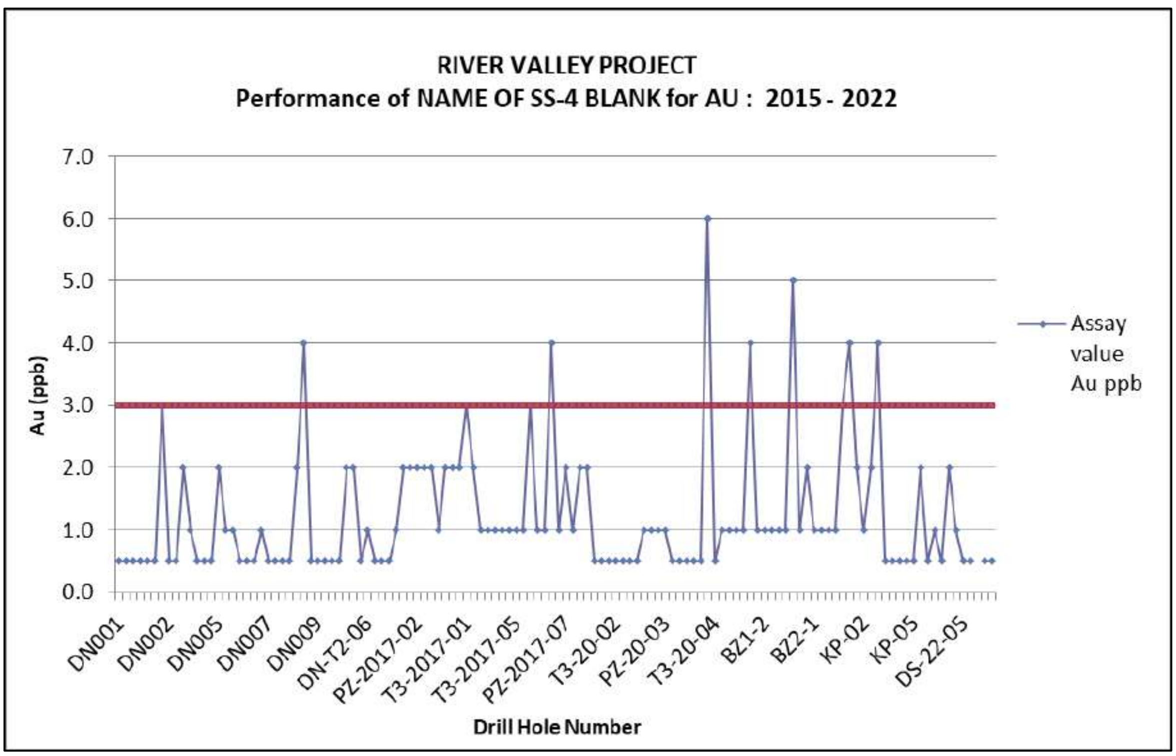
Pulp blanks were inserted into the sample stream every 40 samples.

All blank data for gold, platinum and palladium were graphed. If the assayed value in the certificate was indicated as being less than detection limit, the value was halved for data treatment purposes. An upper tolerance limit of three times the detection limit value was set. There were 124 data points to examine.

The vast majority of data returned results close to lower detection levels and plot below the set tolerance limits for all three elements (see Figures 11.11 to 11.13). Data plotting above the set tolerance limits generally falls very close to the limits and do not necessitate follow up or indicate material issues with contamination. During the 2021 program however, two blanks returned anomalous results above the set tolerance limit (Figure 11.12 shows platinum results of 60 ppb and 70 ppb and Figure 11.13 shows palladium results of 85 ppb and 109 ppb). The Company investigated the cause of the contamination and the likely source was traced to contamination in the drill core logging facility. These appear to be isolated incidents.

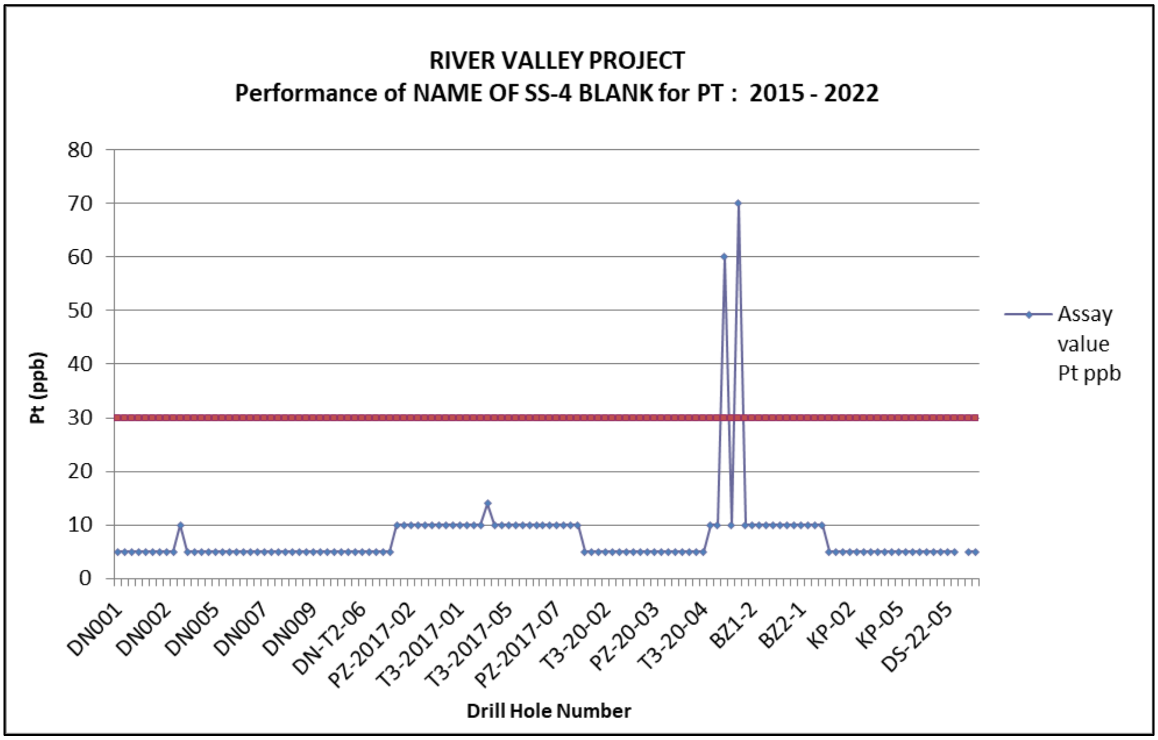
The Author does not consider contamination to be significant to the integrity of the drilling data.

FIGURE 11.11 2015 TO 2022 BLANK PERFORMANCE - AU



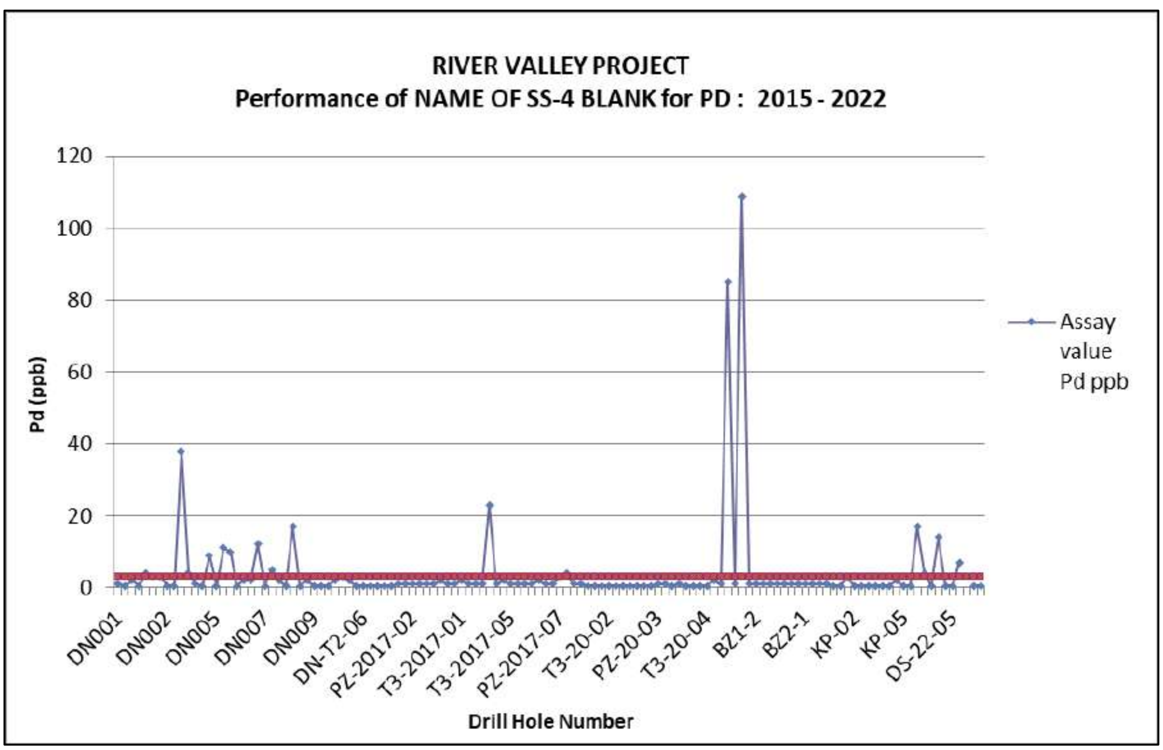
Source: *P&E (2023)*

FIGURE 11.12 2015 TO 2022 BLANK PERFORMANCE - PT



Source: *P&E (2023)*

FIGURE 11.13 2015 TO 2022 BLANK PERFORMANCE - PD

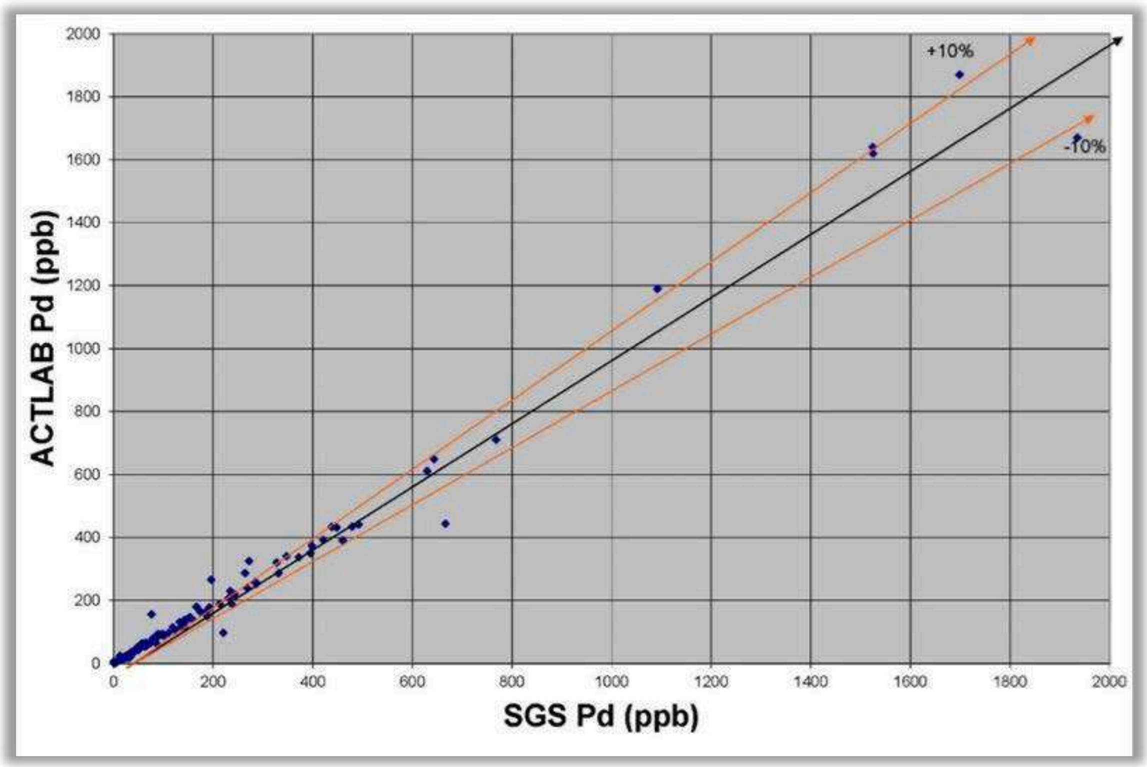


Source: *P&E (2023*

11.4.6.3 Performance of Check Assays

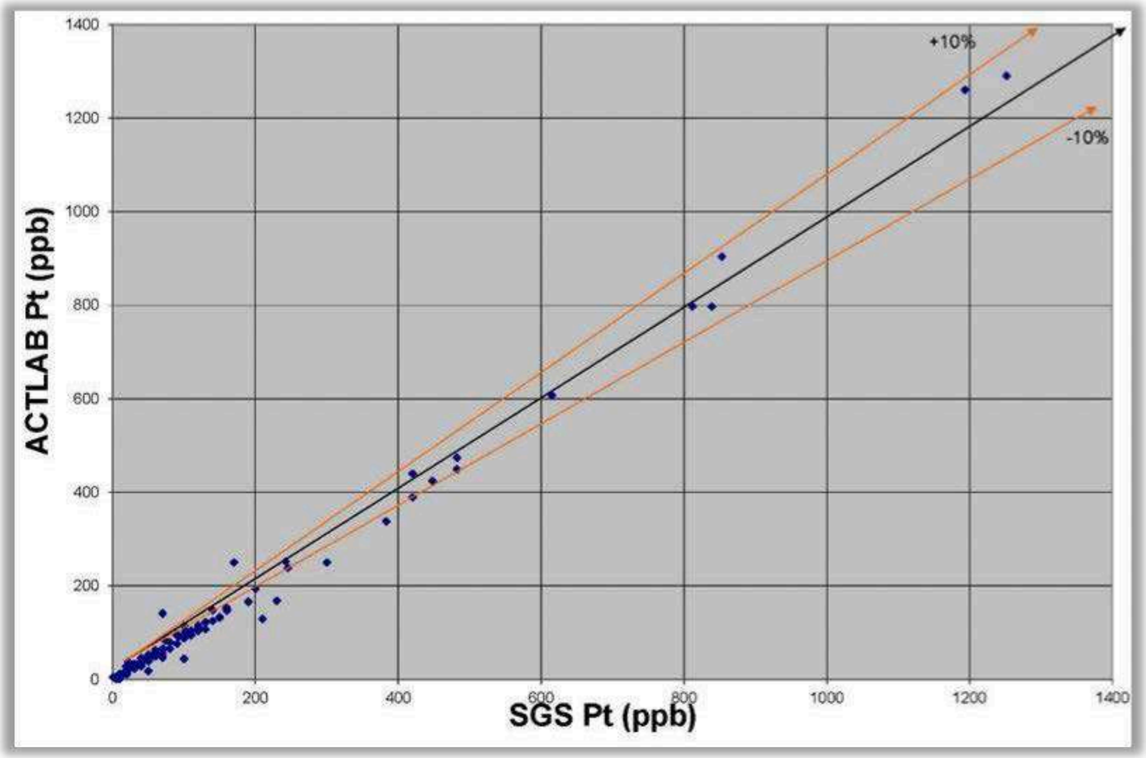
Check assaying was undertaken at Actlabs during the 2015 through 2017 drilling at the Property. The results for palladium and platinum were plotted on scatter plots and show acceptable agreement between labs (Figures 11.14 and 11.15). Between-lab bias is noted in results below ~200 ppb for both elements.

FIGURE 11.14 CHECK ASSAYING FOR PD



Source: WSP (2019)

FIGURE 11.15 CHECK ASSAYING FOR PT



Source: WSP (2019)

11.5 CONCLUSION

Information relating to sample preparation, analyses, and security measures carried out at the River Valley Project, and the associated QA/QC procedures, were reviewed by the Author. NAM has phased in industry standard QA/QC procedures from the commencement of Phase 5 drilling in 2002 at the Property and the Author recommends the following to further enhance those procedures:

- Increase the IRM insertion rate in each batch to around 3-5%; and
- Check assays of approximately 5% of samples post-2017 drilling.

It is the opinion of the Author that sample preparation, security and analytical procedures for the River Valley Project are adequate and that the data are of good quality and satisfactory for use in the Mineral Resource Estimate reported in this Technical Report.

12.0 DATA VERIFICATION

12.1 DATABASE VERIFICATION

12.1.1 Assay Verification

12.1.1.1 2000 to 2020 Assay Data

The Authors conducted verification of NAM's 2000 to 2020 drill hole data in the River Valley Project drill hole assay database for gold, palladium and platinum, by comparison of the database entries with assay certificates. Certificates were provided directly to the Authors by SGS in comma-separated values (csv) format or obtained from work assessment reports, provided to the Authors by NAM in portable document format (pdf).

Constrained assay data from 2000 to 2020 were verified for the Project, with 10.6% (6,120 out of a total of 58,007 entries) of the drilling assay data checked for Au, Pd and Pt against the SGS and XRAL certificates. Very few minor discrepancies were encountered during the verification process, which the Authors do not consider material to the current Mineral Resource Estimate.

12.1.1.2 2021 Assay Data

Verification of 2021 drill hole and channel assay data entry was performed by the Authors on 1,176 assay intervals for gold, palladium and platinum. All 1,176 assays were checked against original digital assay laboratory certificates provided directly to the Authors from SGS. A single discrepancy was encountered during the verification process, which NAM was advised of for correction in the database.

12.1.2 Drill Hole Data Verification

The Authors validated the Mineral Resource Estimate database in GEMS™ by checking for inconsistencies in analytical units, duplicate entries, interval, length or distance values less than or equal to zero, blank or zero-value assay results, out-of-sequence intervals, intervals or distances greater than the reported drill hole length, inappropriate collar locations, survey and missing interval and coordinate fields. A few minor errors were identified and corrected in the database.

12.2 P&E SITE VISIT AND INDEPENDENT SAMPLING

Mr. Antoine Yassa, P.Geo., visited the Property from June 6 to June 8, 2021, for the purpose of carrying out a site visit and completing an independent verification sampling program. The River Valley drill core was examined during the site visit, with 21 samples taken from five drill holes during the June 2021 site visit. The archived half-drill core samples were sawn into ¼ splits, with one ¼ split sent for analysis and the remaining ¼ drill core split returned to its storage box. An effort was made to sample a range of grades.

At no time were any employees of NAM advised as to the identification of the samples to be chosen during the visit.

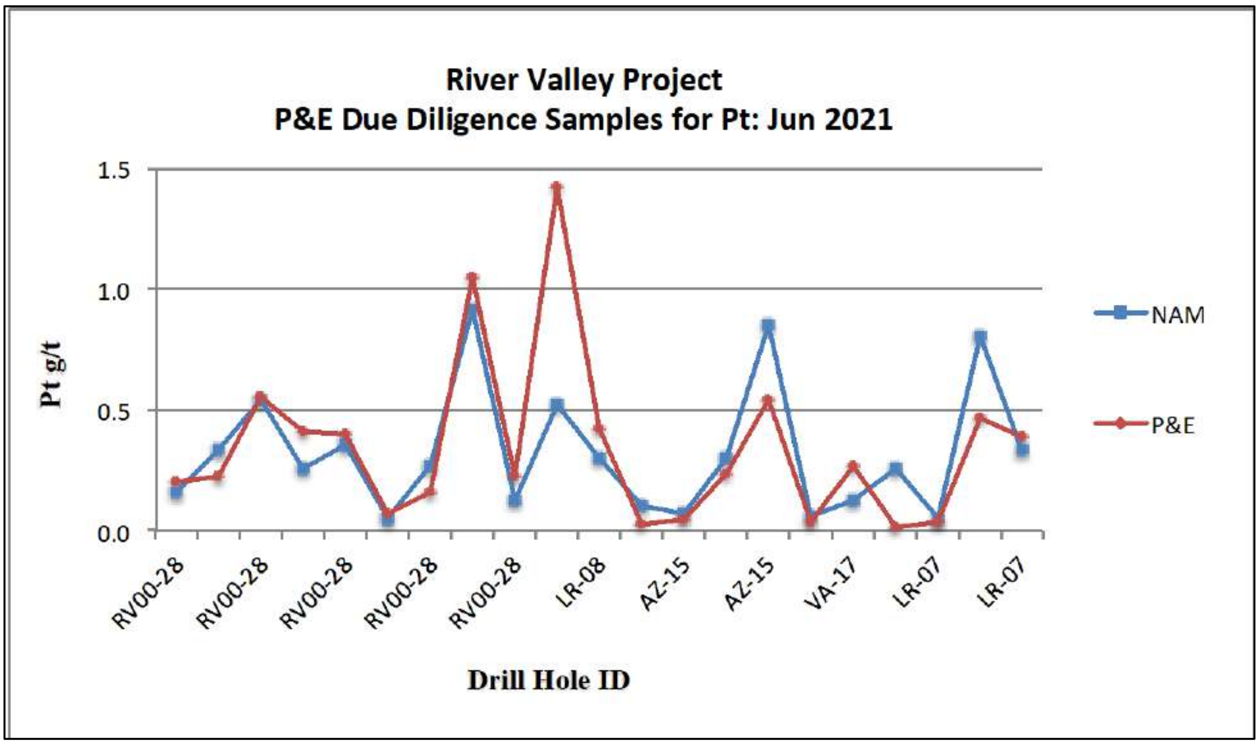
The samples were selected by Mr. Yassa and placed into sample bags that were sealed with tape and placed in a rice bag. The samples were sent by courier by Mr. Yassa to AGAT Laboratory, ("AGAT") in Mississauga, Ontario for analysis.

AGAT has developed and implemented at each of its locations a Quality Management System ("QMS") designed to ensure the production of consistently reliable data. The system covers all laboratory activities and takes into consideration the requirements of ISO standards. AGAT maintains ISO registrations and accreditations (ISO 9001:2015 and ISO/IEC 17025:2017).

Platinum, gold and palladium samples were analyzed by fire assay with ICP-OES finish and copper, nickel, cobalt and silver were analyzed using sodium peroxide fusion with ICP-OES/ICP-MS finish. Drill core density was also measured for all samples by Wet Immersion method.

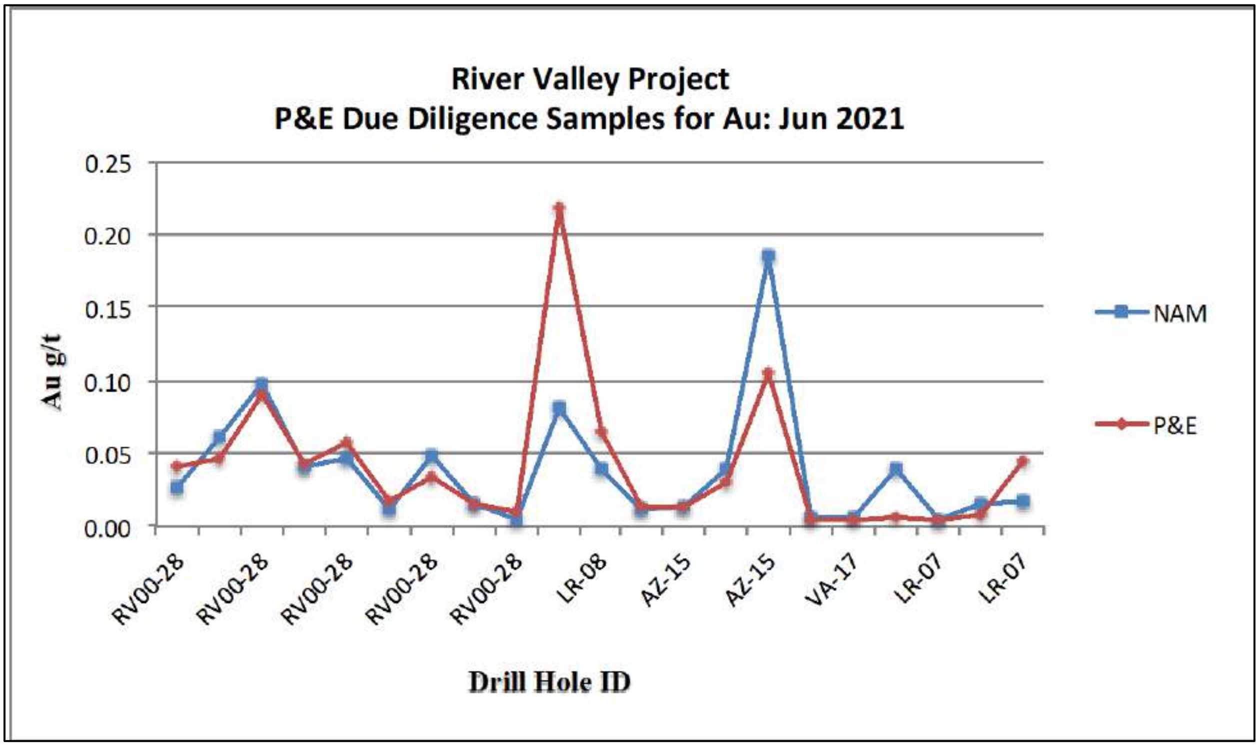
Results of the River Valley Project site visit samples are presented in Figures 12.1 through 12.7.

FIGURE 12.1 2021 SITE VISIT SAMPLE RESULTS FOR PT



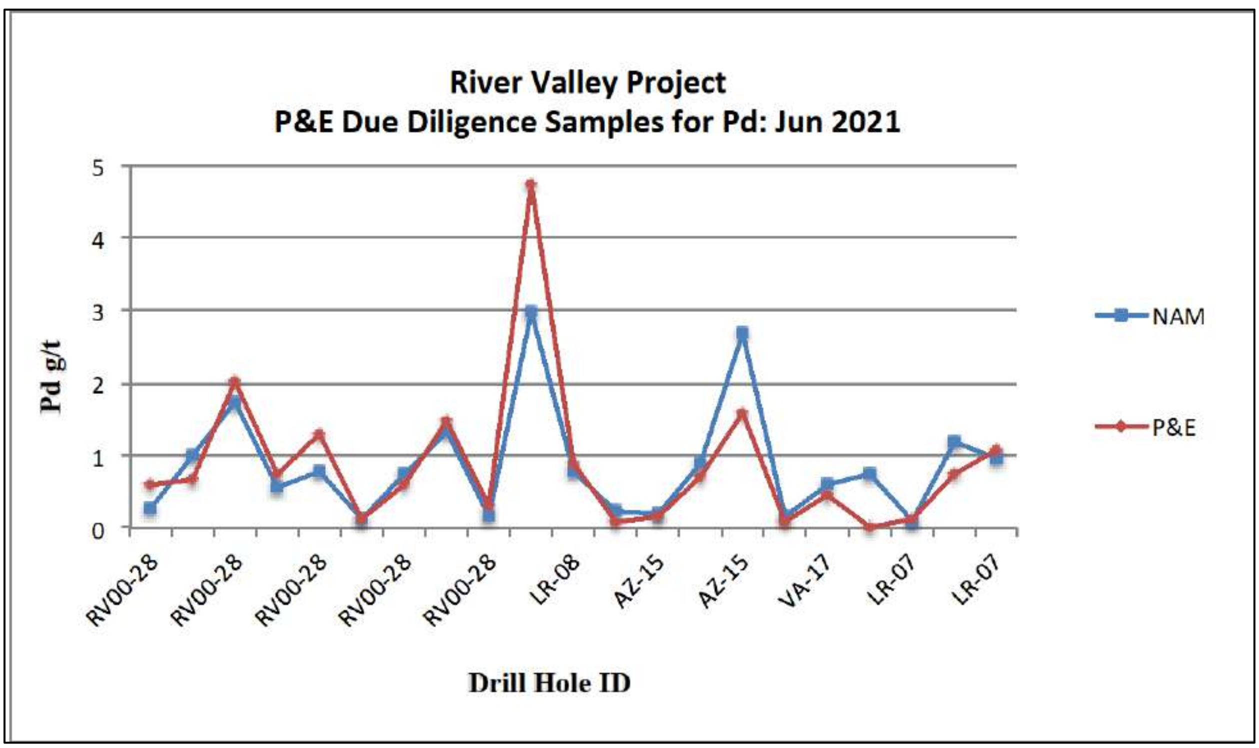
Source: *P&E (2021)*

FIGURE 12.2 2021 SITE VISIT SAMPLE RESULTS FOR AU



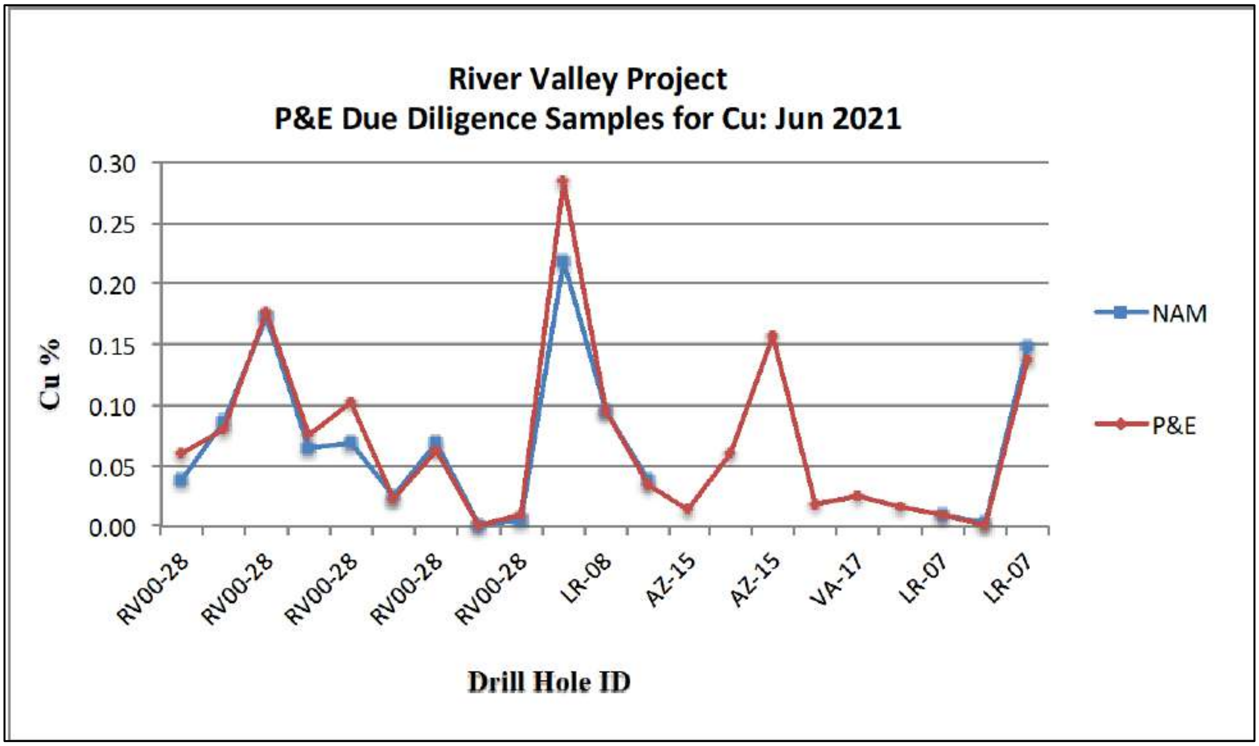
Source: *P&E (2021)*

FIGURE 12.3 2021 SITE VISIT SAMPLE RESULTS FOR PD



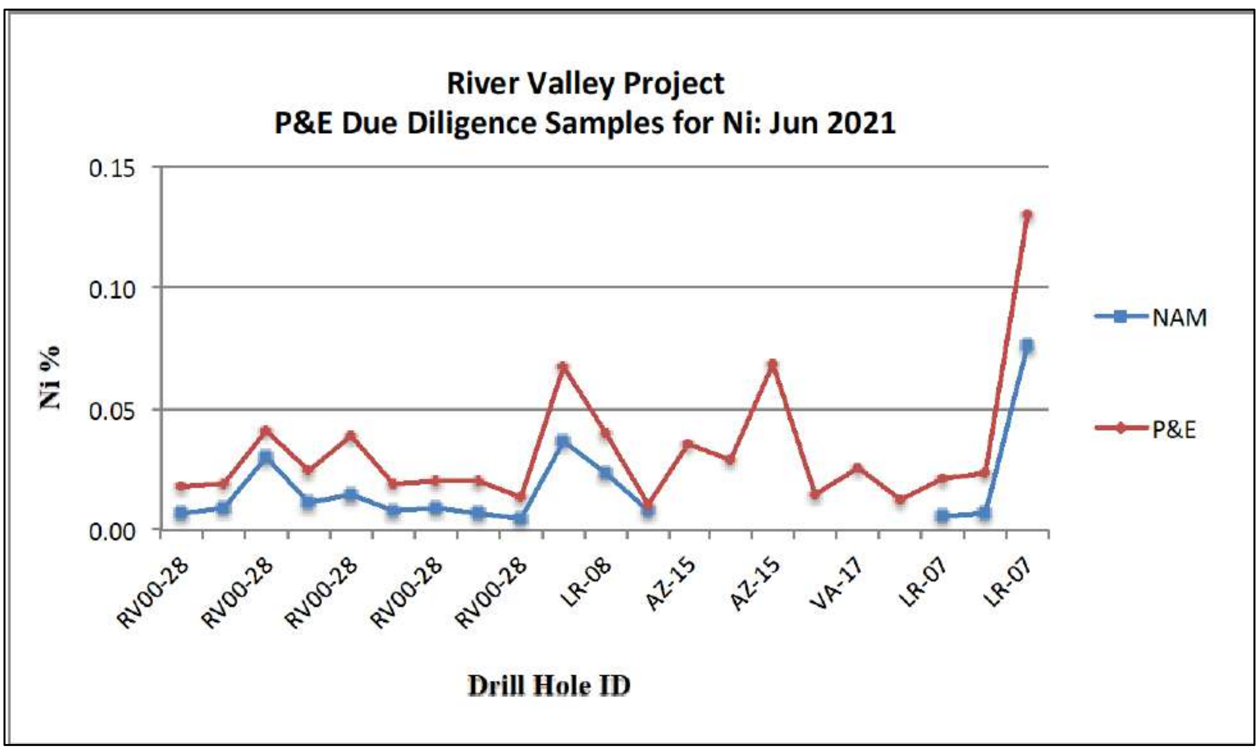
Source: *P&E (2021)*

FIGURE 12.4 2021 SITE VISIT SAMPLE RESULTS FOR CU



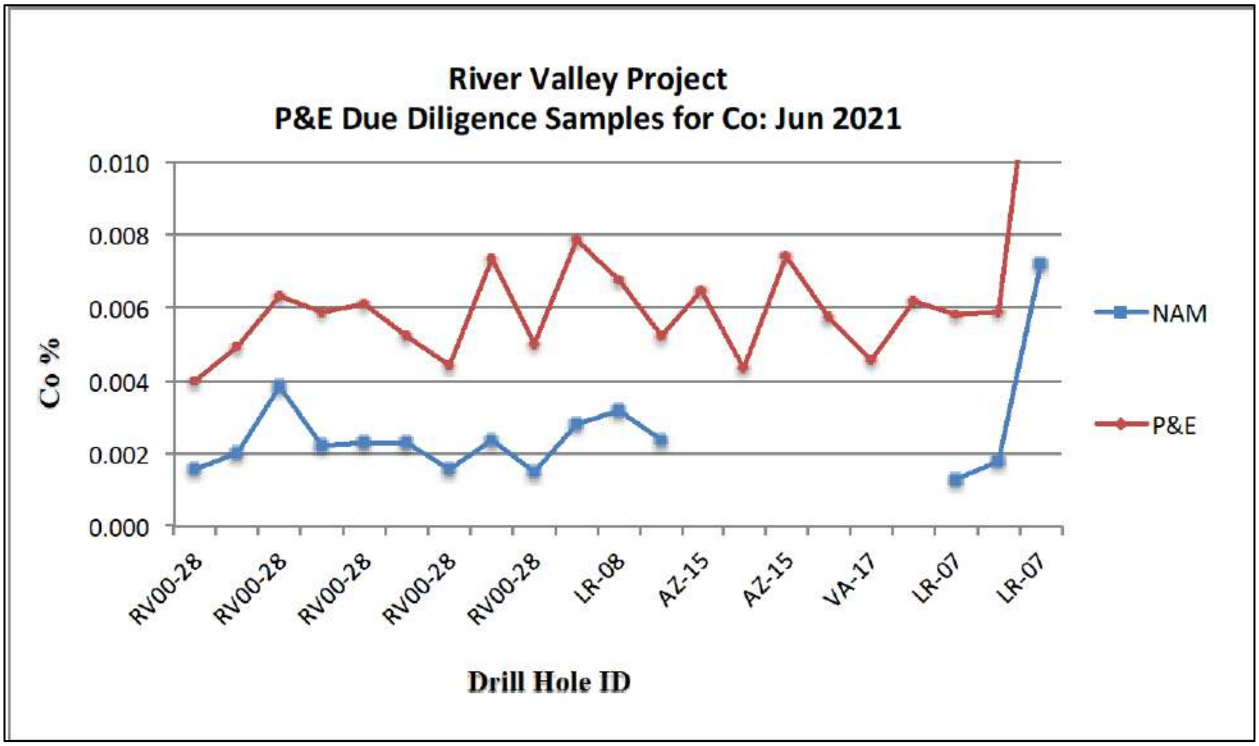
Source: *P&E (2021)*

FIGURE 12.5 2021 SITE VISIT SAMPLE RESULTS FOR NI



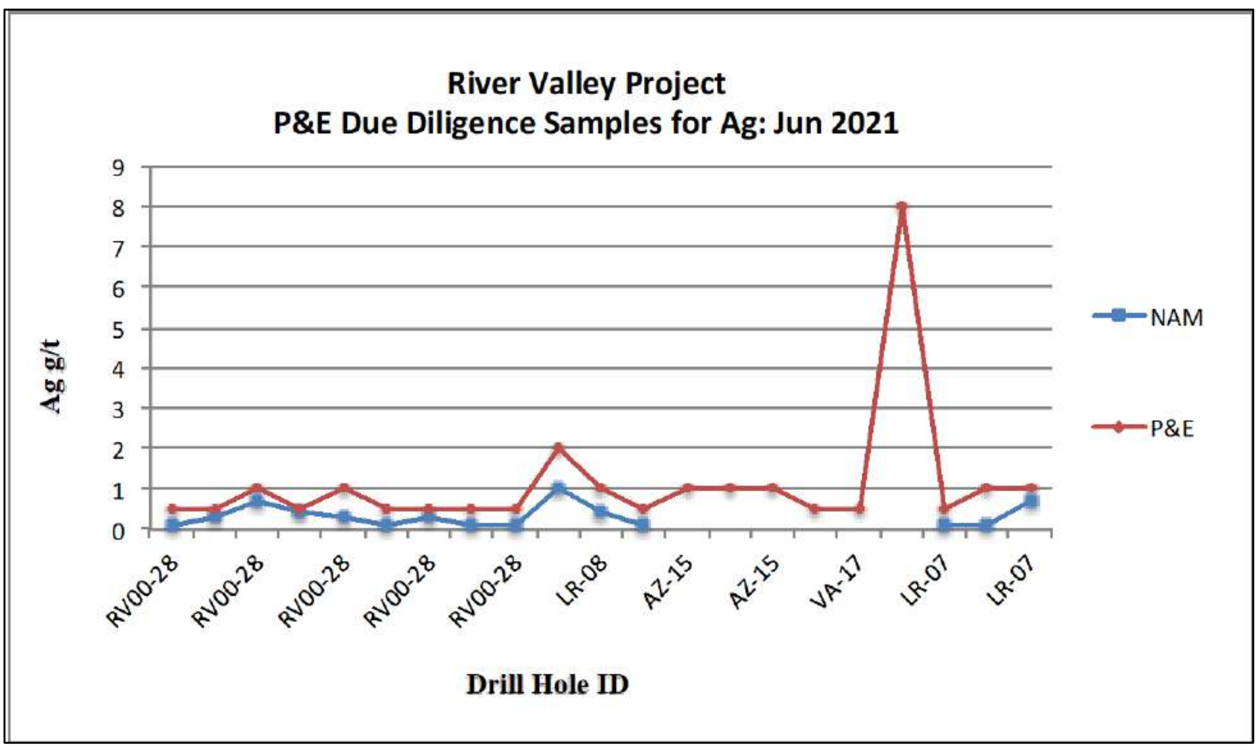
Source: *P&E (2021)*

FIGURE 12.6 2021 SITE VISIT SAMPLE RESULTS FOR CO



Source: *P&E (2021)*

FIGURE 12.7 2021 SITE VISIT SAMPLE RESULTS FOR AG



Source: *P&E (2021)*

The Authors consider that there is acceptable correlation between the Pt, Pd, Au, Cu, Ni, Co and Ag assay values in the Company's database and the independent verification samples collected by the Authors and analyzed at AGAT. Uniform increase in grade is evident in the Authors Ni, Co and Ag site visit samples. However, this is an anticipated outcome due to the difference in between-lab analyses. The original assays were carried out by two-acid digest/ICP, whereas the Authors site visit samples were analyzed by sodium peroxide fusion/ICP-OES/ICP-MS.

12.3 CONCLUSION

The Authors are satisfied that sufficient verification of the drill hole data has been undertaken and that the supplied data are of good quality and suitable for use in the current Mineral Resource Estimate for the River Valley Project.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 INTRODUCTION

Metallurgical testwork for the River Valley Project first commenced in 1999 at the Michigan Technological University ("MTU") and included mineralogical analysis, specific gravity measurements and physical characterization as well as a pilot plant grinding and flotation metallurgical testwork program.

A pilot-scale plant was constructed to process samples from Dana Lake area and utilized a variable rate screw feeder, primary ball mill, sizing screen, conditioner, rougher flotation cells, regrind mill, cleaner and scavenger flotation cells, hydrocyclone and a tailings thickener. A process flowsheet was developed based on the results of numerous bench scale laboratory tests, varying grind size and flotation conditions.

In 2013, scoping level metallurgical testing was completed at SGS Lakefield ("SGS") on an "overall" composite prepared from half drill core intervals from the Dana South and Dana North areas of the River Valley Deposit. Flotation testwork was completed to develop a viable flowsheet, evaluating various parameters such as primary grind and regrind fineness, reagent types and dosages, as well as the generation of a PGE concentrate.

Mineralogical testwork was completed at Expert Process Solutions ("XPS") in 2018 on four composites samples from the Pine and Dana Zones of the River Valley Deposit. The work focussed on both PGM and base metals mineralogy. QEMSCAN (Quantitative Evaluation of Materials by Scanning Electron Microscope), EPMA (Electron Probe Micro Analysis) and LA-ICP-MS (Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry) were utilized to characterize the samples.

In 2022, Pre-Feasibility-level metallurgical testing was completed at SGS with results summarized in a report titled, "Summary of Metallurgical Tests to Support a Prefeasibility Study for the River Valley Deposit: Project 18497-01 Final Report," dated November 18, 2022.

The test program focused on assayed drill core interval samples from the Dana and Lismer regions to determine initial concentrations and form numerous variability composite samples to represent the Lismer, Dana North, and Dana South Zones.

In total, 11 variability composites were created to represent the whole Deposit and two master composites were also created to generate a Dana Master Composite ("DMC") and a Lismer Master Composite ("LMC") which graded 0.05% Cu and 0.88 g/t PGE, and 0.04% Cu and 0.94 g/t PGE, respectively.

A mineralogical study was performed to investigate the mineral composition and occurrence of the PGEs. Results indicated that ~0.5% of the feed contained sulphide-bearing minerals, half of which were associated with chalcopyrite and pentlandite, while the remaining half were associated with iron sulphides.

Copper and nickel minerals were mostly free and liberated, ~73 to 74%, at a P_{80} of ~106 microns. The silicates were 99.8% free and liberated from the other minerals. The main platinum-bearing minerals were stillwaterite and kotulskite, and palladium was mostly found in sperrylite and braggite.

The PGE minerals were mostly liberated and free, 73.6%, however, the remaining were associated with chlorite/micas/clays, 14.9%, or complexed with multiple other minerals, 6.5%.

Comminution testwork was performed to determine grindability properties. SMC and Bond Ball millwork index test results indicated the samples were generally "hard" in response to SAG and ball milling. The samples were also considered "medium" to "high" in abrasivity. The summary of results is provided in Table 13.1.

TABLE 13.1
COMMINUTION SUMMARY OF VARIABILITY SAMPLES

Sample	A*b	SG	SCSE (kWh/t)	Ai	BWi Kwh/tonne
Dana	22.5 to 24.0	2.87 to 2.97	13.4 to 14.1	0.316 to 0.546	16.0 to 19.5
Lismer	24.0 to 29.1	2.95 to 2.98	12.4 to 13.8	0.210 to 0.456	14.0 to 15.5

Source: *SGS (2022)*

Flotation testwork was completed to determine the metallurgical performance of each sample. The in-depth flotation work included locked cycle testing ("LCT") to project the overall performance of the conceptual flow sheet in terms of expected recovery and concentrate grade. LCT on the DMC sample projected a final concentrate grading 13.1% Cu and 127 g/t PGE at projected copper and PGE recoveries of 87.5% and 68.0%, respectively.

LCT on the LMC sample projected a final concentrate grading 13.0% Cu and 133 g/t PGE at projected copper and PGE recoveries of 83.8% and 65.9%, respectively. There did not appear to be clear relationships between feed grades and metallurgical performance based on the response of the variability composite samples. The metallurgical projections for the tests are summarized in Table 13.2.

TABLE 13.2
LCT METALLURGICAL PROJECTIONS

Product	Mass Pull	Assays, %, g/t				% Distribution			
	%	Cu	Au	Pt	Pd	Cu	Au	Pt	Pd
DMC - 3rd Cleaner Conc	0.5	13.1	5.9	24.6	96.1	87.5	56.7	57.6	72.2
LMC - 3rd Cleaner Conc	0.5	13.0	5.7	31.9	95.2	83.8	53.3	56.7	70.8
Previous Projection	0.6	15.5	7.8	42.8	138	84.4	62.5	66.3	69.9

Source: *SGS (2022)*

A sample of combined dried rougher tailings from the Dana and Lismer LCTs was compiled and tested as the "River Valley Tailings" to determine its dewatering properties. Environmental metallurgical testwork was also performed using the reconstituted tailings and was subjected to air drying, Atterberg limit, and settling density testwork.

13.2 SUMMARY OF METALLURGICAL TESTWORK

13.2.1 Sample Receipt and Preparation

SGS received four shipments of ~2" diameter half interval drill core samples from the Dana North, Dana South, Lismer North, and Lismer Ridge Zones of the River Valley Deposit. All samples were prepared separately to determine the material concentration of each interval sample. Each interval sample was weighed, crushed to nominal 32 mm (1 1/4"), and split in half. One half of each interval was stored for future comminution testwork, while the other portion was crushed to -10 mesh and subsampled for assay.

A selected number of samples were chosen to build sample lots with variable grades for flotation testwork. The corresponding coarse reject samples were also compiled in the same manner as the flotation composites to generate material for comminution testwork.

Due to sample mass constraints, selected subsamples from Lismer North and Lismer Ridge were combined to form four composites to represent the Lismer region of the Deposit. Four levels of PGE grades were targeted to generate samples containing Low (L), Medium (M), High (H), and Very High (VH) grades of PGE.

The Dana North and Dana South samples had enough mass to form Medium (M), High (H), and Very High (VH) grade composites, whereas one Low (L) composite was created using samples from both Dana North and Dana South.

The flotation samples from each variable composite were grouped accordingly and combined to form the composite. Each composite was thoroughly homogenized and subsampled for head assays. The variable composites were then rotary split into 2 kg and 10 kg test charges for metallurgical testwork.

The Dana (DMC) and Lismer (LMC) master composites, were created by using equal portions of the variability composites to generate each master composite. Samples used for the master composite were combined, homogenized, and subsampled for head analysis. The remaining material was rotary split into 2 kg charges for flotation testing. All flotation charges and reject samples were placed in freezer storage prior to testing, to prevent sample aging.

Comminution samples were also generated using the corresponding coarse rejects of the flotation samples. For each variability composite, a test sample was generated according to test procedure requirements for the SMC, Bond abrasion index ("Ai"), and Bond ball mill work index ("BWi") tests.

13.2.2 Sample Characterization

The interval samples were initially assayed by fire assay and ICP determine their concentration for composite selection. The Dana and Lismer variability and master composite samples were then assayed to determine the feed grades. The resulting grades for each composite are summarized in Table 13.3.

TABLE 13.3
VARIABILITY SAMPLE HEAD GRADES

Sample ID	Assay, g/t, %							
	Cu	Ni	S	Au	Pt	Pd	PGM	Rh*
Lisner - L	0.06	0.03	0.16	0.06	0.23	0.28	0.57	-
Lisner - M	0.06	0.04	0.18	0.04	0.22	0.55	0.81	-
Lisner - H	0.06	0.03	0.25	0.03	0.25	0.62	0.90	-
Lisner - VH	0.08	0.03	0.25	0.06	0.33	0.78	1.17	-
Dana - L	0.06	0.02	0.16	0.04	0.14	0.36	0.54	-
Dana N - M	0.06	0.02	0.16	0.06	0.18	0.55	0.79	-
Dana N- H	0.07	0.03	0.16	0.04	0.13	0.40	0.57	-
Dana N - VH	0.09	0.04	0.22	0.05	0.56	1.27	1.88	-
Dana S - M	0.06	0.02	0.17	0.03	0.17	0.49	0.69	-
Dana S - H	0.08	0.03	0.31	0.04	0.30	0.91	1.25	-
Dana S - VH	0.06	0.03	0.15	0.06	0.32	0.80	1.18	-
Dana MC	0.07	0.02	0.20	0.05	0.19	0.64	0.88	0.018
Lismer MC	0.06	0.03	0.21	0.04	0.24	0.66	0.94	0.022

*Assay performed by a third party laboratory

Source*: SGS (2022)*

The copper, nickel, and sulphur grades were fairly consistent ranging between 0.05 to 0.09% Cu, 0.01 to 0.04% Ni, and 0.16 to 0.31% S. The PGE grades had the most variability, ranging from 0.5 to 1.9 g/t PGE (Pt + Pd + Au), and the composites generally followed their targeted grades. Rhodium analysis was performed on the master composites by a third-party laboratory and found to be 0.018 g/t for the DMC and 0.022 g/t for the LMC.

13.2.3 Mineralogy

A sample of the LMC was submitted for mineralogical study by QEMSCAN and is summarized in Table 13.4. The various sulphide mineral liberation and association characteristics are summarized in Table 13.5 and Table 13.6, respectively.

TABLE 13.4
LISMER MASTER COMPOSITE – MINERAL MODAL DISTRIBUTION

Fraction		Combined	+106um		-106/+53um		-53/+20um		-20um	
Mineral		**Sample**	**Sample**	**Fraction**	**Sample**	**Fraction**	**Sample**	**Fraction**	**Sample**	**Fraction**
Mineral Mass (%)	Chalcopyrite	0.21	0.02	0.08	0.04	0.18	0.05	0.21	0.10	0.30
	Other Cu Sulphides	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
	Pentlandite	0.03	0.00	0.00	0.01	0.02	0.01	0.03	0.02	0.06
	Pyrite	0.11	0.04	0.21	0.03	0.12	0.02	0.10	0.02	0.05
	Pyrrhotite/Troilite	0.19	0.04	0.21	0.09	0.38	0.04	0.16	0.02	0.07
	Other Sulphides	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.02
	Quartz	9.05	2.29	12.0	2.28	9.57	1.97	8.35	2.51	7.49
	Plagioclase	20.7	6.06	31.7	5.17	21.7	3.96	16.8	5.52	16.4
	K-Feldspar	2.13	0.67	3.49	0.48	2.02	0.42	1.77	0.57	1.69
	Olivine	0.26	0.00	0.02	0.01	0.02	0.01	0.06	0.24	0.71
	Chlorite	7.44	0.53	2.78	2.01	8.46	1.76	7.48	3.13	9.32
	Micas	8.86	0.86	4.53	1.92	8.06	1.95	8.29	4.13	12.3
	Amphibole	42.7	7.06	37.0	10.3	43.2	11.7	49.7	13.7	40.7
	Pyroxene	6.92	1.15	6.03	1.19	4.99	1.41	6.00	3.17	9.44
	Epidote	0.80	0.28	1.47	0.19	0.80	0.13	0.56	0.19	0.58
	Other Silicates	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	Talc	0.04	0.00	0.00	0.00	0.01	0.00	0.01	0.03	0.09
	Other Clays	0.14	0.06	0.29	0.03	0.14	0.03	0.11	0.03	0.08
	Fe-Oxides	0.08	0.00	0.01	0.00	0.01	0.01	0.03	0.07	0.20
	Other Oxides	0.14	0.01	0.07	0.03	0.11	0.04	0.16	0.07	0.20
	Carbonates	0.12	0.01	0.06	0.03	0.13	0.02	0.08	0.06	0.18
	Apatite	0.06	0.00	0.02	0.01	0.04	0.02	0.07	0.03	0.09
	Other	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
	Total	100.0	19.1	100.0	23.8	100.0	23.6	100.0	33.6	100.0

Source: *SGS (2022)*

TABLE 13.5
LISMER MASTER COMPOSITE - MINERAL LIBERATION

Copper Mineral Liberation	Combined	Nickel Mineral Liberation	Combined	Iron Mineral Liberation	Combined	Silicates Mineral Liberation	Combined
Free Cu-Sulphides	60.1	Free Ni-Sulphides	56.1	Free Fe-Sulphides	74.6	Free Silicates	99.3
Lib Cu-Sulphides	12.8	Lib Ni-Sulphides	17.8	Lib Fe-Sulphides	6.91	Lib Silicates	0.50
Cu-Sulphides Midds	7.49	Ni-Sulphides Midds	12.7	Fe-Sulphides Midds	2.89	Silicates Midds	0.13
Cu-Sulphides Sub-Midds	4.20	Ni-Sulphides Sub-Midds	4.86	Fe-Sulphides Sub-Midds	1.99	Silicates Sub-Midds	0.02
Locked Cu-Sulphides	15.4	Locked Ni-Sulphides	8.51	Locked Fe-Sulphides	13.6	Locked Silicates	0.01
Total	100.0	Total	100.0	Total	100.0	Total	100.0

Source: *SGS (2022)*

TABLE 13.6
LISMER MASTER COMPOSITE - MINERAL ASSOCIATION

Copper Mineral Association	Combined	Nickel Mineral Association	Combined	Iron Mineral Association	Combined	Silicates Mineral Association	Combined
Free Cu-Sulphides	60.1	Free Ni-Sulphides	56.1	Free Fe-Sulphides	74.6	Free Silicates	99.3
Lib Cu-Sulphides	12.8	Lib Ni-Sulphides	17.8	Lib Fe-Sulphides	6.91	Lib Silicates	0.50
CuS:Fe-Sulphides	1.49	NiS:Cu-Sulphides	13.6	FeS:Cu-Sulphides	1.37	Silicates:Fe-Sulphides	0.01
CuS:Ni-Sulphides	1.75	NiS:Fe-Sulphides	2.94	FeS:Ni-Sulphides	0.09	Silicates:Ni-Sulphides	0.00
CuS:Other Sulphides	0.00	NiS:Other Sulphides	0.00	FeS:Other Sulphides	0.00	Silicates:Cu-Sulphides	0.01
CuS:Talc	0.00	NiS:Talc	0.00	FeS:Talc	0.00	Silicates:Other Sulphides	0.00
CuS:Quartz	0.47	NiS:Quartz	0.22	FeS:Quartz	0.12	Silicates:Oxides	0.05
CuS:Plagioclase	0.55	NiS:Plagioclase	0.00	FeS:Plagioclase	0.01	Silicates:Carbonates	0.04
CuS:Amphiboles/Pyroxenes	5.51	NiS:Amphiboles/Pyroxenes	2.21	FeS:Amphiboles/Pyroxenes	0.25	Silicates:Other	0.01
CuS:Chlorite/Micas/Clays	0.96	NiS:Chlorite/Micas/Clays	0.66	FeS:Chlorite/Micas/Clays	0.03	Silicates:CuS:FeS Tern	0.00
CuS:Other Silicates	0.00	NiS:Other Silicates	0.00	FeS:Other Silicates	0.00	Complex	0.03
CuS:Oxides	0.00	NiS:Oxides	0.00	FeS:Oxides	0.02	Total	100.0
CuS:Carbonates	0.00	NiS:Carbonates	0.00	FeS:Carbonates	0.00		
CuS:Silicates	11.8	NiS:Silicates	0.29	FeS:Silicates	14.9		
CuS:Other	0.00	NiS:Other	0.00	FeS:Other	0.00		
CuS:FeS:Sil Tern	1.00	NiS:FeS:Sil Tern	1.47	FeS:CuS:Sil Tern	1.48		
Complex	3.52	Complex	4.69	Complex	0.20		
Total	100.0	Total	100.0	Total	100.0		

Source: *SGS (2022)*

The combined modal analysis indicated the chalcopyrite and pentlandite represented 0.21% and 0.03% of the feed, respectively. The remaining sulphides were mainly iron gangue minerals consisting of pyrite, pyrrhotite, and troilite, which cumulatively represented 0.3% of the feed. Other major minerals in this sample included quartz (9.1%), plagioclase (20.7%), chlorite (7.4%), micas (8.9%), amphibole (42.7%), and pyroxene (6.9%).

The copper minerals were found to be 72.9% liberated (free + liberated) while the remaining minerals were considered to be middlings, ~11.7%, or locked with other minerals,15.4%. The copper association was mostly within the sulphide group, 76.2%, however, had some notable associations with amphiboles/pyroxenes, 5.5%, silicates, 11.8%, and complexed with other minerals, 3.5%.

The nickel minerals had similar liberation, 73.9%. Most of the remaining nickel minerals were present in middlings, 17.6%, while the rest were locked with other minerals, 8.5%. The nickel association was mostly within the sulphide group, 90.5%, with some minor associations with amphiboles/pyroxenes, 2.2%, and complexed with other minerals, 4.7%.

The iron sulphides were slightly more liberated than copper and nickel, 81.5%, while some were middlings, 4.9%, and the remaining were considered locked with other minerals, 13.6%. The iron mineral association was mostly within the sulphide group, 83.0%, while most of the remaining was associated with the silicates.

The silicate liberation was very high, with 99.8% liberated.

A PGE deportment study was also performed to determine the host minerals for palladium and platinum and their mineral liberation, which are summarized in Table 13.7 and Table 13.8, respectively.

TABLE 13.7
LISMER MASTER COMPOSITE PLATINUM AND PALLADIUM-BEARING MINERALS

Platinum Bearing Minerals	Dist. (%)	Palladium Bearing Minerals	Dist. (%)
Kotulskite	13.6	Sperrylite	86.0
Isomertieite/Arsenopalladinite	3.81	Braggite	14.0
Braggite	2.56	-	-
Stillwaterite	80.1	-	-
Total	**100.0**	**Total**	**100.0**

Source: *SGS (2022)*

TABLE 13.8.
LISMER MASTER COMPOSITE PGE ASSOCIATION

Mineral Name	Dist. (%)
Pure PGM	24.1
Free PGM	49.5
Lib PGM	0.46
PGM: Fe-Sulphides	3.16
PGM: Cu-Sulphides	0.11
PGM: Ni-Sulphides	0.10
PGM: Other-Sulphides	0.00
PGM: Quartz/Feldspars	1.14
PGM: Chlorite/Micas/Clays	14.9
PGM: Amphibole/Pyroxene	0.00
PGM: Oxides	0.00
PGM: Carbonates	0.00
PGM: Other-Minerals	0.00
Complex	6.52
Total	100.0

Source: *SGS (2022)*

Platinum particles were mostly found to occur in stillwaterite, 80.1%, with some occurrences within kotulskite minerals, 13.6%. Palladium particles were only found in two minerals, of which most occurred in sperrylite, 86%, and the rest in braggite, 14%. The PGE mineral association was mostly considered free and liberated as it represented 73.6% of the minerals found.

Notable PGE associations were in the iron sulphides, 3.2%, chlorite/micas/clays, 14.9%, or complexed with multiple other minerals, 6.5%. The significant mineral associations with the chlorite/micas/clays may lower flotation recoveries of payable metals since these clays are generally depressed during flotation.

13.2.4 Grindability Testwork

Comminution testwork was performed to determine the grindability properties of each sample. SMC, Bond abrasion, and Bond ball mill work index tests were performed on most of the variability samples.

13.2.4.1 SMC Testwork

The SMC test is an abbreviated drop-weight test (“DWT”) that generates the A and the b parameters, which are used in the JKSimMet simulations. The results of each test are summarized in Table 13.9.

TABLE 13.9
SMC TEST RESULTS

Sample	A	b	A*b	SG	ta	SCSE (kWh/t)
Dana N - L	89.8	0.25	22.5	2.88	0.20	13.9
Dana N - M	100.0	0.24	24.0	2.89	0.22	13.4
Dana N - H	-	-	-	-	-	-
Dana N - VH	100.0	0.23	23.0	2.95	0.20	14.0
Dana S - L	95.0	0.24	22.8	2.97	0.20	14.1
Dana S - M	86.9	0.26	22.6	2.96	0.20	14.1
Dana S - H	71.5	0.33	23.6	2.87	0.21	13.4
Dana S - VH	-	-	-	-	-	-
Lismer - L	89.9	0.29	26.1	2.98	0.23	13.1
Lismer - M	100.0	0.27	27.0	2.95	0.24	12.8
Lismer - H	100.0	0.24	24.0	2.98	0.21	13.8
Lismer - VH	67.6	0.43	29.1	2.98	0.25	12.4

Source: *SGS (2022)*

The SMC tests resulted in A*b values between 22.5 to 29.1, which mostly classified the samples as "hard" in JKTech's database.

13.2.4.2 Bond Ball Mill Work Index

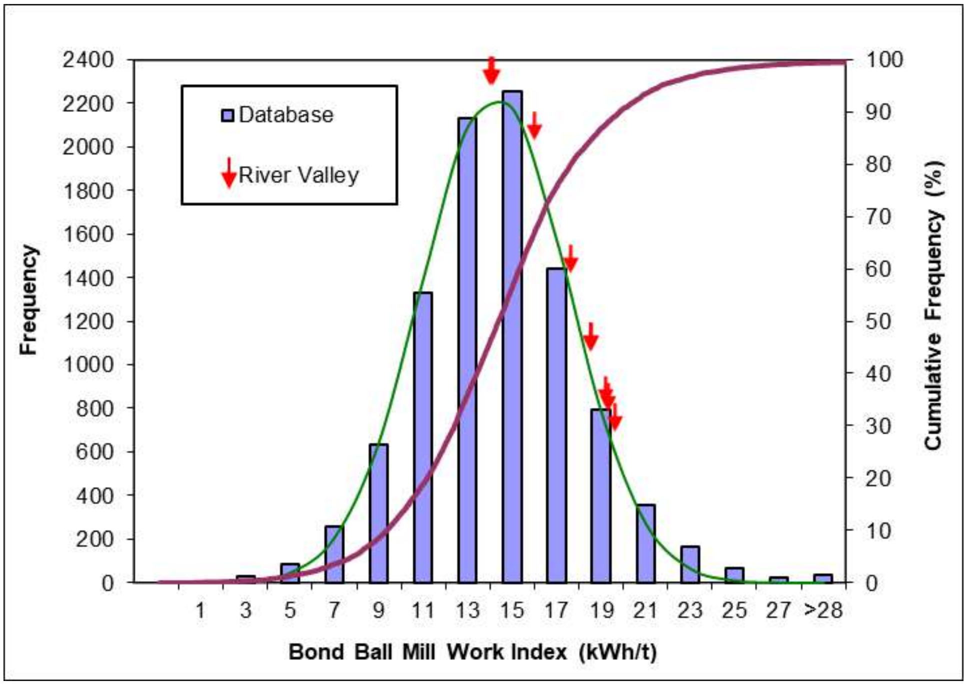
The Bond ball mill grindability test was performed according to the original Bond procedure. The test was performed in locked cycle mode with a circulating load equivalent of 250% until it reached a steady state. The test was performed at 170 mesh of grind (90 µm) on a representative variability subsample of the River Valley Deposit. The test results are summarized in Table 13.10 and are compared to the SGS database in Figure 13.1.

TABLE 13.10
BOND BALL MILL WORK INDEX TEST RESULTS

Sample	BWi kWh/tonne	Sample	BWi kWh/tonne	Sample	BWi kWh/tonne
Dana N - L	17.6	Dana S - L	18.5	Lismer - L	14.0
Dana N - M	19.5	Dana S - M	19.2	Lismer - M	14.3
Dana N - H	19.3	Dana S - H	19.6	Lismer - H	14.1
Dana N - VH	16.0	Dana S - VH	18.5	Lismer - VH	15.5

Source: *SGS (2022)*

FIGURE 13.1 BOND BALL MILL WORK INDEX RESULTS – SGS DATABASE COMPARISON



Source: *SGS (2022)*

The Bond Ball mill Work Indices ("BWI") for the Dana samples ranged between 17.6 to 19.6 kWh/t while the Lismer Samples ranged from 14.0 to 15.5 kWh/t. The Dana samples were mostly classified as "hard" to "very hard" material when compared to the SGS database, while the Lismer samples were classified as "medium" hard material.

13.2.4.3 Abrasion Work Index Test

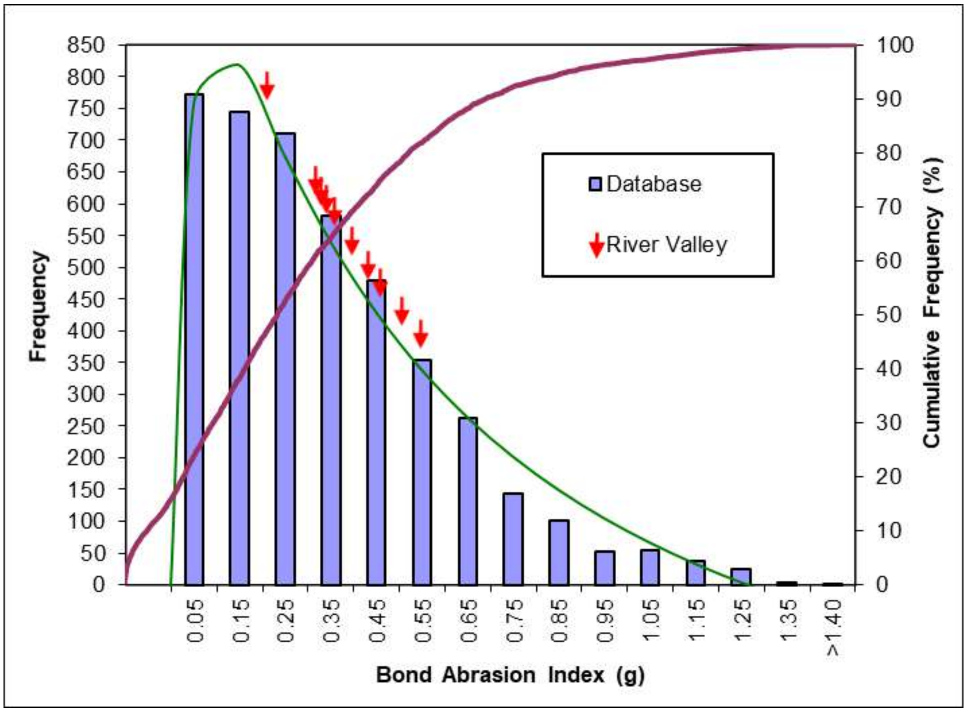
The Bond abrasion index test was completed on all the variability samples in accordance with the test procedure. The Bond abrasion test measures the abrasion index, which can be used to estimate steel media and liner consumption for crushers, rod mills, and ball mills. The test results are summarized in Table 13.11 and are compared to the SGS database in Figure 13.2.

TABLE 13.11
BOND ABRASION WORK INDEX TEST RESULTS

Sample	Ai	Sample	Ai	Sample	Ai
Dana N - L	0.394	Dana S - L	0.504	Lismer - L	0.328
Dana N - M	0.546	Dana S - M	0.429	Lismer - M	0.456
Dana N - H	-	Dana S - H	0.355	Lismer - H	0.339
Dana N - VH	0.316	Dana S - VH	-	Lismer - VH	0.210

Source: *SGS (2022)*

FIGURE 13.2 BOND ABRASION WORK INDEX RESULTS – SGS DATABASE COMPARISON



Source: *SGS (2022)*

The abrasion indexes ranged between 0.21 to 0.55 for all samples. The majority of the samples were considered "medium" to "highly" abrasive when compared to the SGS database. The Lismer VH sample was an exception to the group as they were "moderately soft" in regards to its ablativity.

13.2.5 Flotation Testwork

A series of flotation tests was performed on the Dana and Lismer master composites to determine the metallurgical performance of each sample. Testing conditions were formulated from an earlier test program and were used as initial inputs for the experiments. Variability testwork was performed on the individual samples of each master composite once favourable conditions had been established with the two main composites.

13.2.5.1 Dana Master Composite

Two rougher kinetics tests were performed on the DMC to determine the metallurgical behaviour at two primary grind sizes. The conditions and results are summarized in Table 13.12 and Table 13.13 with the copper and PGE performance curves illustrated in Figure 13.3 and Figure 13.4, respectively.

TABLE 13.12
DMC - ROUGHER TEST CONDITIONS

Test	Grind P80 (micron)	Reagents* (g/t)		Float Time (mins)	pH
		SIBX	3477		
F1	46	120	60	30	8.8 - 9.4
F2	69	120	60	30	8.8 - 9.2
*MIBC added as needed					

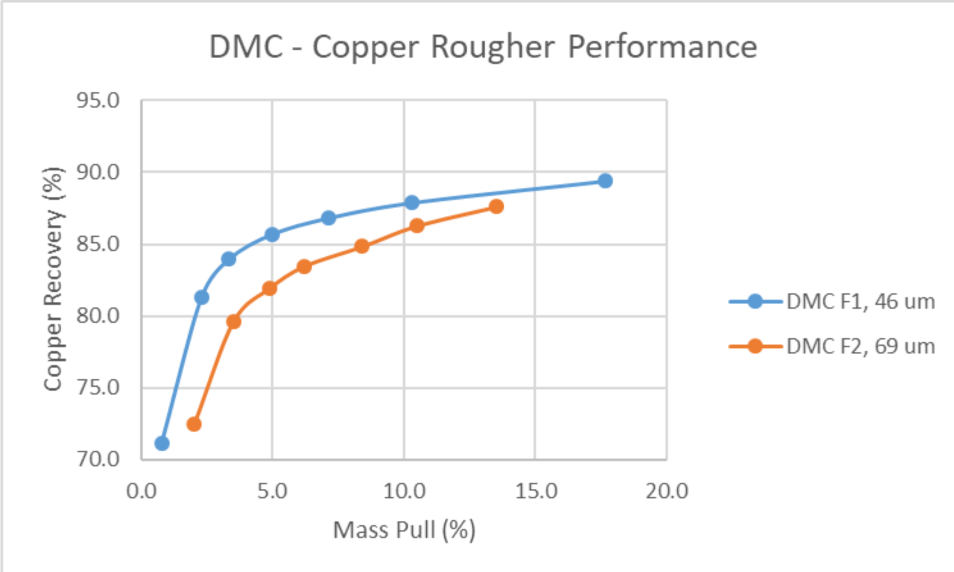
Source: *SGS (2022)*

Table 13.13
DMC - Rougher Test Results

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
DMC F1, 46 um	Rougher Conc 1	15.8	0.8	7.07	0.70	17.2	2.89	15.9	52.3	71.1	71.1	18.5	65.8	44.9	52.1	62.5	58.9
	Rougher Conc 1 - 2	46.5	2.3	2.75	0.32	7.16	1.21	6.34	20.6	28.1	81.3	25.2	80.6	55.2	61.1	72.3	68.5
	Rougher Conc 1 - 3	67.7	3.3	1.95	0.25	5.30	0.89	4.56	14.7	20.1	84.0	28.1	86.9	59.4	64.0	75.1	71.5
	Rougher Conc 1 - 4	100.9	5.0	1.33	0.18	3.73	0.62	3.15	10.1	13.9	85.7	30.8	91.2	61.3	66.0	77.0	73.4
	Rougher Conc 1 - 5	144.3	7.1	0.95	0.14	2.68	0.44	2.26	7.19	9.90	86.8	33.4	93.5	63.0	67.6	78.5	74.9
	Rougher Conc 1 - 6	208.7	10.3	0.66	0.10	1.88	0.31	1.60	5.07	6.98	87.9	36.7	94.9	64.3	69.3	79.9	76.4
	Rougher Conc 1 - 7	357.2	17.7	0.39	0.07	1.11	0.19	0.98	3.05	4.22	89.4	41.4	96.0	67.2	72.4	82.4	79.0
	Rougher Tail	1665.1	82.3	0.010	0.02	0.01	0.02	0.08	0.14	0.24	10.6	58.6	4.0	32.8	27.6	17.6	21.0
	Head (Calc.)	2022.3	100.0	0.08	0.03	0.20	0.05	0.24	0.65	0.94	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DMC F2, 69 um	Rougher Conc 1	41.1	2.0	2.73	0.31	6.9	1.12	6.4	19.4	26.9	72.5	22.6	65.8	46.4	61.0	61.0	60.2
	Rougher Conc 1 - 2	70.9	3.5	1.74	0.22	4.71	0.75	4.12	12.5	17.4	79.6	27.8	77.1	53.6	68.4	67.8	67.2
	Rougher Conc 1 - 3	98.2	4.9	1.29	0.18	3.63	0.57	3.10	9.4	13.0	81.9	31.0	82.4	56.1	71.1	70.2	69.7
	Rougher Conc 1 - 4	125.4	6.2	1.03	0.15	2.96	0.46	2.50	7.5	10.4	83.5	33.4	85.8	58.0	73.2	71.8	71.4
	Rougher Conc 1 - 5	169.8	8.4	0.77	0.12	2.25	0.35	1.90	5.67	7.92	84.8	37.4	88.5	60.3	75.3	73.6	73.3
	Rougher Conc 1 - 6	211.3	10.5	0.63	0.11	1.85	0.29	1.56	4.66	6.51	86.3	40.5	90.2	62.4	77.0	75.3	75.0
	Rougher Conc 1 - 7	272.7	13.5	0.50	0.09	1.46	0.24	1.25	3.71	5.19	87.6	44.4	91.9	64.8	79.6	77.3	77.2
	Rougher Tail	1742.7	86.5	0.011	0.02	0.02	0.02	0.05	0.17	0.24	12.4	55.6	8.1	35.2	20.4	22.7	22.8
	Head (Calc.)	2015.4	100.0	0.08	0.03	0.21	0.05	0.21	0.65	0.91	100.0	100.0	100.0	100.0	100.0	100.0	100.0

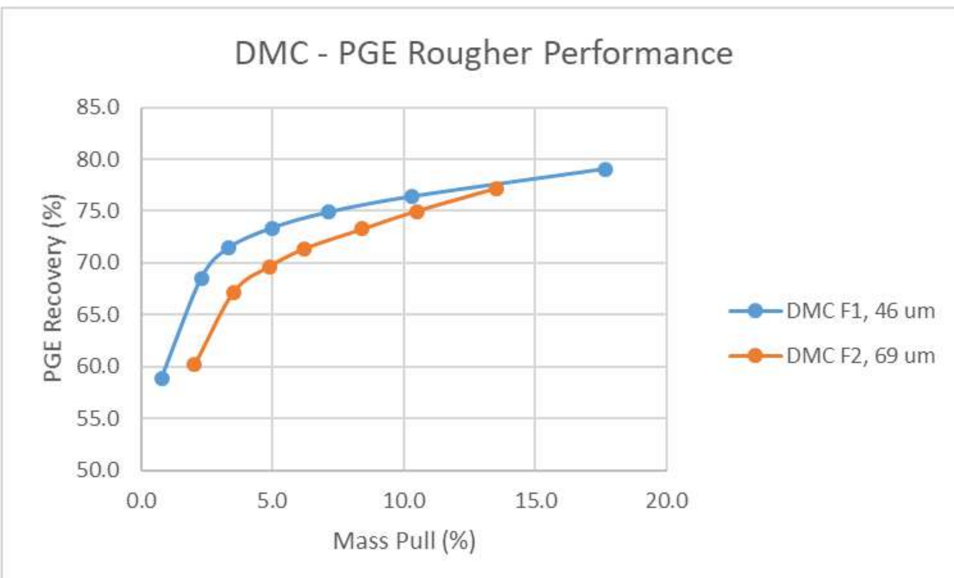
Source: *SGS (2022)*

FIGURE 13.3 DMC - F1 AND F2 COPPER ROUGHER PERFORMANCE



Source: *SGS (2022)*

FIGURE 13.4 DMC F1 AND F2 PGE ROUGHER PERFORMANCE



Source: *SGS (2022)*

Test F1 resulted in a cumulative rougher concentrate grade of 0.39% Cu with 4.22 g/t PGE, whereas F2's concentrate was 0.50% Cu with 5.19 g/t PGE. Test F1 copper and PGE recoveries were 89.4% and 79.0%, respectively, while they were 87.6% and 77.2%, respectively, for F2. The rougher results indicated better copper grades with finer primary grinds.

The cleaner test conditions using the DMC composite are summarized in Table 13.14 and Table 13.15 with results summarized in Table 13.16. The copper and PGE performance curves are illustrated in Figure 13.5 and Figure 13.6, respectively.

TABLE 13.14
DMC BATCH CLEANER TEST CONDITIONS

Test	Grind P80 (micron)		Reagents* (g/t)						Float Time (mins)		pH	
			Rougher		Cleaner							
	Primary	Regrind	SIBX	3477	CMC	$NaSiO_3$	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
F3	~46	37	60.0	30.0	90.0	-	25.0	12.5	20.0	20.0	8.9 - 9.4	8.3 - 9.0
F4	~46	12	60.0	30.0	90.0	-	25.0	12.5	20.0	14.0	9.1 - 9.5	7.7 - 9.2
F5	103**	14	60.0	30.0	90.0	10.0	25.0	12.5	20.0	14.0	8.9 - 9.2	7.6 - 8.9
F6	~46	11	60.0	30.0	90.0	-	25.0	12.5	20.0	16.0	8.9 - 9.5	7.8 - 9.0
F7	~46	10	60.0	30.0	90.0	10.0	25.0	12.5	30.0	19.0	8.8 - 9.3	8.1 - 9.2
F9	~69	19	60.0	30.0	152.5	10.0	25.0	12.5	30.0	19.0	8.9 - 9.3	7.5 - 9.1
									*MIBC added as needed, ** rougher tails			

Source: *SGS (2022)*

TABLE 13.15
DMC F8 BATCH CLEANER CONDITIONS

Test	Grind P80 (micron)			Reagents* (g/t)				Float Time (mins)			
				Copper		Nickel					
	Primary	Cu	Ni	Rougher				Copper		Nickel	
				SIBX	3477	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
F8	~46	25	17	20.0	10.0	40.0	20.0	20	20	20	20

Reagents* (g/t)								pH			
Copper				Nickel							
Cleaner								Copper		Nickel	
CMC	$NaSiO_3$	SIBX	3477	CMC	$NaSiO_3$	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
50.0	5.0	5	2.5	80.0	7.5	15	7.5	8.9 - 9.4	8.8	8.7 - 9.1	8.9 - 9.0
											*MIBC added as needed

Source: *SGS (2022)*

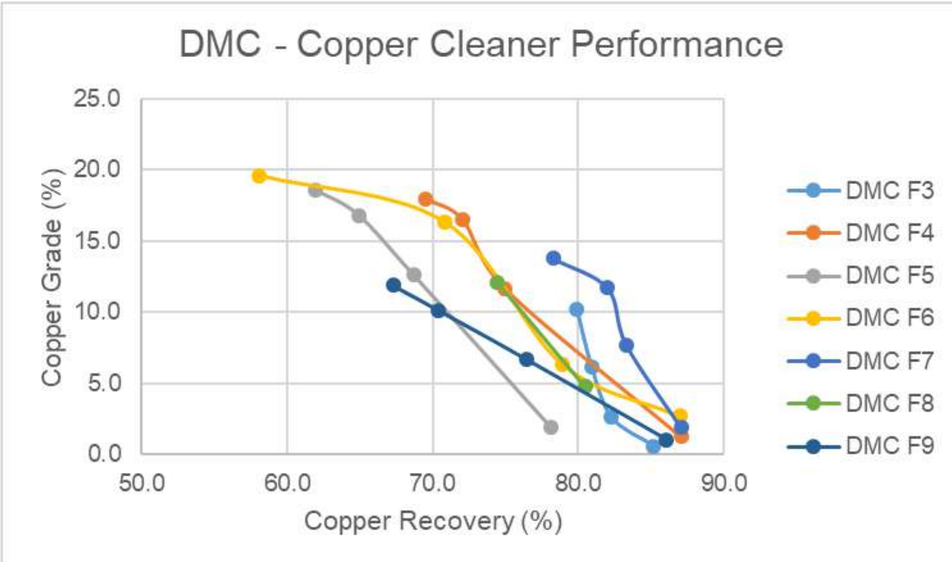
TABLE 13.16
DMC BATCH CLEANER TEST RESULTS

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
DMC F3	3rd Cleaner Conc.	12.3	0.6	10.2	0.94	24.5	4.46	17.2	66.5	88.2	79.9	18.7	70.8	51.0	55.3	68.6	64.5
	2nd Cleaner Conc.	20.5	1.0	6.20	0.61	15.2	2.74	10.7	40.7	54.2	80.9	20.2	73.0	52.2	57.5	70.0	66.0
	1st Cleaner Conc.	49.7	2.5	2.60	0.29	6.58	1.17	4.72	17.3	23.1	82.3	23.3	76.9	53.9	61.2	71.9	68.3
	Rougher Conc.	229.7	11.4	0.58	0.10	1.70	0.31	1.20	4.02	5.53	85.2	36.2	91.6	66.7	72.0	77.5	75.5
	1st Cleaner Scav Conc.	21.6	1.1	0.09	0.08	0.85	0.42	0.59	1.08	2.09	1.2	2.7	4.3	8.4	3.3	2.0	2.7
	1st Cleaner Scav. Tails	158.4	7.8	0.02	0.04	0.28	0.03	0.18	0.27	0.48	1.7	10.3	10.4	4.4	7.4	3.6	4.5
	Rougher Tail	1788.4	88.6	0.013	0.02	0.02	0.02	0.06	0.15	0.23	14.8	63.8	8.4	33.3	28.0	22.5	24.5
	Head (Calc.)	2018.1	100.0	0.08	0.03	0.21	0.05	0.19	0.59	0.83	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DMC F4	3rd Cleaner Conc.	11.4	0.3	18.0	1.09	38.7	8.18	29.4	122	160	69.5	9.7	38.0	45.7	42.7	55.6	52.1
	2nd Cleaner Conc.	12.9	0.3	16.5	1.08	36.1	7.23	26.0	108	141	72.1	10.9	40.1	45.7	42.7	55.6	52.1
	1st Cleaner Conc.	19.0	0.5	11.7	0.87	26.2	5.18	19.5	77.4	102	75.0	12.8	42.8	48.3	47.3	58.8	55.6
	Rougher Conc.	202.8	5.0	1.27	0.16	3.47	0.63	2.74	9.13	12.5	87.1	25.6	60.5	62.5	70.8	74.0	72.6
	1st Cleaner Scav Conc.	20.1	0.5	1.43	0.33	5.11	0.87	4.77	13.2	18.8	9.7	5.2	8.8	8.6	12.2	10.6	10.9
	1st Cleaner Scav. Tails	163.7	4.1	0.04	0.06	0.63	0.07	0.54	0.70	1.31	2.3	7.6	8.9	5.6	11.3	4.6	6.1
	Rougher Tail	3823.0	95.0	0.010	0.03	0.12	0.02	0.06	0.17	0.25	12.9	74.4	39.5	37.5	29.2	26.0	27.4
	Head (Calc.)	4025.8	100.0	0.07	0.03	0.29	0.05	0.19	0.62	0.87	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DMC F5	3rd Cleaner Conc.	10.6	0.3	18.6	1.00	39.2	8.29	23.8	123	155	61.9	9.0	50.8	44.5	29.3	50.0	44.8
	2nd Cleaner Conc.	12.3	0.3	16.8	1.02	36.2	7.14	20.5	106	134	64.9	10.7	54.4	44.5	29.3	50.0	44.8
	1st Cleaner Conc.	17.3	0.4	12.6	0.90	28.3	5.52	17.1	81.7	104	68.7	13.2	59.7	48.4	34.4	54.1	49.2
	Rougher Conc.	129.1	3.2	1.93	0.25	5.44	0.93	3.68	13.6	18.2	78.1	27.5	85.8	60.8	55.1	67.4	64.1
	1st Cleaner Scav Conc.	7.7	0.2	2.61	0.70	10.3	1.42	8.33	23.8	33.6	6.3	4.6	9.7	5.5	7.4	7.0	7.0
	1st Cleaner Scav. Tails	104.1	2.6	0.10	0.11	1.29	0.13	1.10	1.56	2.79	3.1	9.7	16.4	6.9	13.3	6.2	7.9
	Rougher Tail	3871.4	96.8	0.018	0.02	0.03	0.02	0.10	0.22	0.34	21.9	72.5	14.2	39.2	44.9	32.6	35.9
	Head (Calc.)	4000.5	100.0	0.08	0.03	0.20	0.05	0.22	0.65	0.92	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DMC F6	3rd Cleaner Conc.	8.9	0.2	19.6	1.12	36.8	8.05	29.0	126	163	58.1	9.0	39.5	39.8	37.1	48.8	45.7
	2nd Cleaner Conc.	13.0	0.3	16.4	1.09	33.0	5.51	19.9	86.3	112	70.8	12.8	51.8	39.8	37.1	48.8	45.7
	1st Cleaner Conc.	37.5	0.9	6.33	0.69	16.8	2.31	10.6	37.2	50.2	78.9	23.4	76.3	48.1	57.4	60.8	59.3
	Rougher Conc.	97.2	2.4	2.69	0.33	7.31	1.05	4.74	16.4	22.2	87.0	29.4	85.8	56.5	66.2	69.3	67.9
	1st Cleaner Scav Conc.	11.3	0.3	1.62	0.33	5.46	0.95	3.82	12.8	17.6	6.1	3.4	7.5	6.0	6.2	6.3	6.3
	1st Cleaner Scav. Tails	48.4	1.2	0.12	0.06	0.36	0.09	0.38	1.06	1.53	1.9	2.6	2.1	2.4	2.6	2.2	2.3
	Rougher Tail	3914.7	97.6	0.010	0.02	0.03	0.02	0.06	0.18	0.26	13.0	70.6	14.2	43.5	33.8	30.7	32.1
	Head (Calc.)	4011.9	100.0	0.07	0.03	0.21	0.04	0.17	0.57	0.79	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
DMC F7	3rd Cleaner Conc.	17.0	0.4	13.8	1.19	31.9	5.83	25.1	96.2	127	78.3	14.1	65.6	50.8	54.8	65.4	62.2
	2nd Cleaner Conc.	21.0	0.5	11.7	1.09	27.7	4.97	21.9	82.5	109	82.0	15.9	70.5	53.5	59.2	69.3	66.2
	1st Cleaner Conc.	32.3	0.8	7.73	0.77	18.7	3.32	15.0	54.9	73.3	83.3	17.3	73.2	55.0	62.4	70.9	68.1
	Rougher Conc.	138.8	3.5	1.88	0.25	5.12	0.85	4.21	13.8	18.9	87.1	24.3	85.9	60.2	75.1	76.7	75.4
	1st Cleaner Scav Conc.	14.5	0.4	0.48	0.23	3.13	0.33	2.31	5.04	7.68	2.3	2.3	5.5	2.5	4.3	2.9	3.2
	1st Cleaner Scav. Tails	92.0	2.3	0.05	0.07	0.65	0.06	0.71	0.78	1.55	1.4	4.6	7.2	2.8	8.4	2.9	4.1
	Rougher Tail	3877.8	96.5	0.010	0.03	0.03	0.02	0.05	0.15	0.22	12.9	75.7	14.1	39.8	24.9	23.3	24.6
	Head (Calc.)	4016.6	100.0	0.07	0.04	0.21	0.05	0.19	0.62	0.86	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DMC F8	Ni 2nd Cleaner Conc.	8.5	0.2	0.84	0.35	8.57	0.95	2.79	8.03	11.8	2.3	2.4	7.7	4.1	2.6	2.4	2.6
	Ni 1st Cleaner Conc.	20.2	0.5	0.51	0.21	4.27	0.55	1.71	4.87	7.13	3.4	3.3	9.2	5.6	3.8	3.5	3.7
	Ni Rougher Conc.	170.4	4.3	0.13	0.07	0.79	0.14	0.46	1.26	1.85	7.2	9.2	14.3	11.7	8.5	7.7	8.1
	Cu Cleaner Conc.	18.8	0.5	12.1	1.07	28.1	4.62	23.3	84.9	113	74.5	16.0	56.0	43.9	47.5	57.2	54.3
	Cu Rougher Conc.	51.6	1.3	4.76	0.53	12.0	1.92	10.5	34.5	47.0	80.5	21.7	65.7	50.2	58.8	63.9	62.0
	Ni 1st Cleaner Tails	150.2	3.8	0.08	0.05	0.32	0.08	0.29	0.77	1.14	3.8	5.9	5.1	6.1	4.7	4.1	4.4
	Cu 1st Cleaner Tails	32.8	0.8	0.56	0.22	2.78	0.38	3.17	5.65	9.20	6.0	5.7	9.7	6.3	11.3	6.6	7.7
	Rougher Scav Tail	3778.0	94.5	0.010	0.02	0.05	0.02	0.08	0.21	0.31	12.4	69.1	20.0	38.2	32.8	28.4	30.0
	Head (Calc.)	4000.0	100.0	0.08	0.03	0.24	0.05	0.23	0.70	0.98	100.0	100.0	100.0	100.0	100.0	100.0	100.0
DMC F9	3rd Cleaner Conc.	16.9	0.4	11.9	1.06	30.2	4.80	24.8	89.4	119	67.3	13.6	62.1	40.9	49.5	56.1	53.8
	2nd Cleaner Conc.	20.7	0.5	10.2	0.97	26.4	4.22	21.5	76.8	103	70.4	15.3	66.4	44.0	52.6	59.0	56.8
	1st Cleaner Conc.	34.1	0.8	6.70	0.71	17.9	2.84	14.6	50.9	68.3	76.5	18.4	74.3	48.8	58.7	64.4	62.3
	Rougher Conc.	243.9	6.1	1.05	0.15	3.03	0.50	2.49	8.25	11.2	86.1	28.5	89.8	62.0	71.8	74.7	73.3
	1st Cleaner Scav Conc.	13.5	0.3	1.15	0.29	4.79	0.64	3.28	9.40	13.3	5.2	3.0	7.9	4.4	5.2	4.7	4.8
	1st Cleaner Scav. Tails	196.3	4.9	0.07	0.05	0.32	0.09	0.34	0.76	1.19	4.4	7.2	7.6	8.9	7.9	5.5	6.2
	Mag Conc.	207.6	5.2	0.029	0.08	0.06	0.02	0.12	0.37	0.51	2.0	12.0	1.5	2.1	2.9	2.9	2.8
	Rougher Tail	3563.2	88.8	0.010	0.02	0.02	0.02	0.06	0.17	0.25	11.9	59.5	8.7	35.9	25.3	22.5	23.8
	Head (Calc.)	4014.7	100.0	0.07	0.03	0.20	0.05	0.21	0.67	0.93	100.0	100.0	100.0	100.0	100.0	100.0	100.0

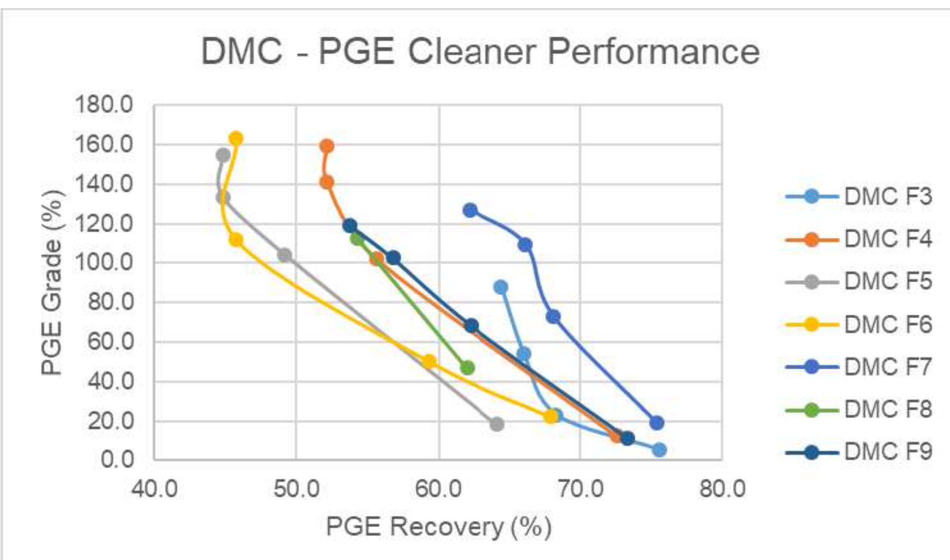
Source: *SGS (2022)*

FIGURE 13.5 DMC – BATCH TEST COPPER CLEANER PERFORMANCE



Source: *SGS (2022)*

FIGURE 13.6 DMC – BATCH TEST PGE CLEANER PERFORMANCE



Source: *SGS (2022)*

Test F3 resulted in a final concentrate grading 10.2% Cu and 88.2 g/t PGE. The copper and PGE recoveries were 79.9% and 64.5%, respectively. A 4 kg flotation test was used in the subsequent tests, instead of 2 kg, to increase the mass in the cleaner circuit to allow for better control and selectivity.

Test F4 resulted in a concentrate grading 18.0% Cu and 160 g/t PGE. The copper and PGE recoveries were 69.5% and 52.1%. Compared to F3, the final concentrate nearly doubled in grade, however, copper and PGE recoveries were lower by ~10% and ~12%, respectively. Final concentrate mass was reduced to 0.3%, from 0.6% in F3 and rougher mass pull was reduced, from

11% to 5%. Test F5 used similar conditions to F4, but with a coarser primary grind. The final concentrate graded 18.6% Cu and 155 g/t PGE with copper and PGE recoveries of 61.9% and 44.8%, respectively.

F6 also followed most of F4 conditions but adjusted the positioning of the regrind mill to process the 1st cleaner concentrate instead of the rougher concentrate. The resulting concentrate grade was 19.6% Cu and 163 g/t PGE, and recoveries were 58.1% and 45.7%, respectively.

F7 focused on increasing copper and PGE recoveries though increased rougher flotation times. The copper and PGE rougher recoveries were 87.1% and 75.4%, respectively. The final cleaner concentrate graded 13.8% Cu and 127 g/t PGE, while the copper and PGE recoveries were 78.3% and 62.2%, respectively.

F8 used a split flowsheet approach to produce a primary copper and a secondary nickel concentrate. The copper concentrate graded 12.1% Cu and 113 g/t PGE, with copper and PGE recoveries of 74.5% and 54.3%. The nickel concentrate graded 0.35% Ni and 11.8 g/t PGE, with nickel and PGE recoveries of 2.4% and 2.6%, respectively. The copper circuit recovered most of the high-quality copper and nickel minerals and upgraded well with one stage of cleaning. However, the remaining copper and nickel minerals that were scavenged in the nickel circuit were of lower quality.

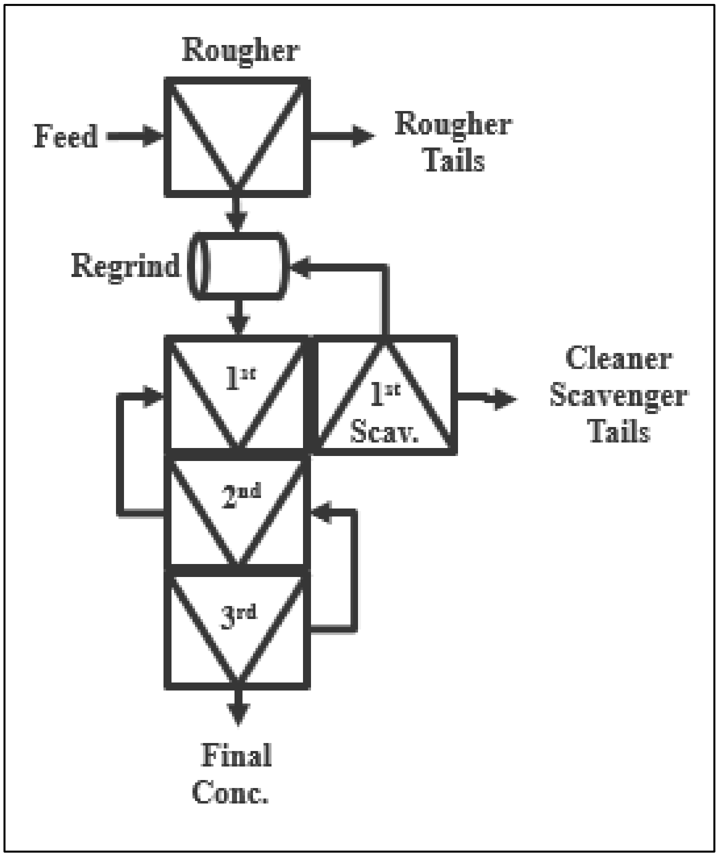
In test F9, a magnetic separation stage was included after rougher flotation. Some additional depressants were also added in the cleaner circuit. The magnetic concentrate had a high mass pull of ~5% and a very low grade of 0.03% Cu and 0.51 g/t PGE, with copper and PGE recoveries of 2.0% and 2.8%, respectively.

Rougher performance throughout these tests was fairly consistent, within analytical uncertainties, as copper and PGE recoveries were mostly between 85 to 88% and 73 to 76%, respectively, using similar conditions.

Cleaner performance had a wide spread of results, with copper grades ranging from 10 to 20% Cu at 58 to 80% recovery and PGE grades ranging from 88 to 164 g/t PGE at recoveries of 44 to 65%. The wide spread in cleaner performance is likely due to the low copper feed grades which affected final concentrate copper grades and recovery.

A locked cycle test was performed on the DMC using F5 conditions from the Lismer testwork and a six-cycle test was performed to simulate a continuous process, with circulating of the cleaner tailings streams back into the process. The flowsheet is illustrated in Figure 13.7 and the metallurgical projection and stability checks are summarized in Table 13.17 and Table 13.18 respectively.

FIGURE 13.7 LOCKED CYCLE TEST FLOWSHEET



Source: *SGS (2022)*

TABLE 13.17
DMC LCT - METALLURGICAL PROJECTION, CYCLE C TO F

Product	Weight		Assays, %, g/t						
	Dry	%	Cu	Ni	S	Au	Pt	Pd	PGE
3rd Cleaner Conc	117.2	0.5	13.1	1.18	30.6	5.91	24.6	96.1	127
1st Cleaner Scav. Tails	1347.8	5.6	0.04	0.06	0.58	0.06	0.53	0.69	1.28
Rougher Tails	22611.0	93.9	0.007	0.022	0.025	0.020	0.063	0.15	0.23
Head (calc.)	24075.9	100.0	0.073	0.030	0.205	0.05	0.21	0.65	0.91

Product	Weight		% Distribution						
	Dry	%	Cu	Ni	S	Au	Pt	Pd	PGE
3rd Cleaner Conc	117.2	0.5	87.5	19.1	72.8	56.7	57.6	72.2	68.0
1st Cleaner Scav. Tails	1347.8	5.6	3.4	11.5	15.7	6.3	14.2	6.0	7.9
Rougher Tails	22611.0	93.9	9.1	69.4	11.5	37.0	28.3	21.8	24.1
Head (calc.)	24075.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: *SGS (2022)*

TABLE 13.18
DMC LCT - STABILITY CHECK

Total Products	Weight		Cu	Ni	S	Au	Pt	Pd	PGE
	g	Wt %							
Cycle A	3995.4	99.5	85.4	78.3	82.0	87.4	82.2	87.8	86.5
Cycle B	4018.4	100.1	97.5	101.1	97.2	95.5	93.6	93.8	93.9
Cycle C	4011.8	99.9	103.1	101.8	98.2	100.6	96.3	100.1	99.3
Cycle D	4015.0	100.0	93.1	115.8	96.9	101.1	98.2	97.6	98.0
Cycle E	4001.1	99.6	102.3	94.9	107.1	100.8	109.3	107.0	107.2
Cycle F	4022.7	100.2	105.8	95.8	97.2	104.4	101.7	99.0	99.9
Average of C-F	-	99.9	101.1	102.1	99.8	101.7	101.4	100.9	101.1

Source: *SGS (2022)*

The locked cycle test projected a final concentrate grading of 13.1% Cu and 127 g/t PGE and projected copper and PGE recoveries were 87.5% and 68.0%, respectively. The stability of this test was excellent as the mass and metals neared 100% accountability.

These results had similar projections as previous testwork with 15.5% Cu and 188 g/t PGE. However, the final copper and PGE concentrate grades were lower likely due to lower feed grade.

13.2.5.2 Lismer Master Composite

Two rougher tests were performed on the LMC to determine the initial metallurgical behaviour at two primary grind sizes. The conditions and results for these tests are summarized in Table 13.19 and Table 13.20, respectively, with copper and PGE performance curves illustrated in Figure 13.8 and Figure 13.9, respectively.

TABLE 13.19
LMC ROUGHER TEST CONDITIONS

Test	Grind P80 (micron)	Reagents* (g/t)		Float Time (mins)	pH
		SIBX	3477		
F1	45	120	60	30	8.8 - 9.4
F2	63	120	60	30	8.7 - 9.2
					*MIBC added as needed

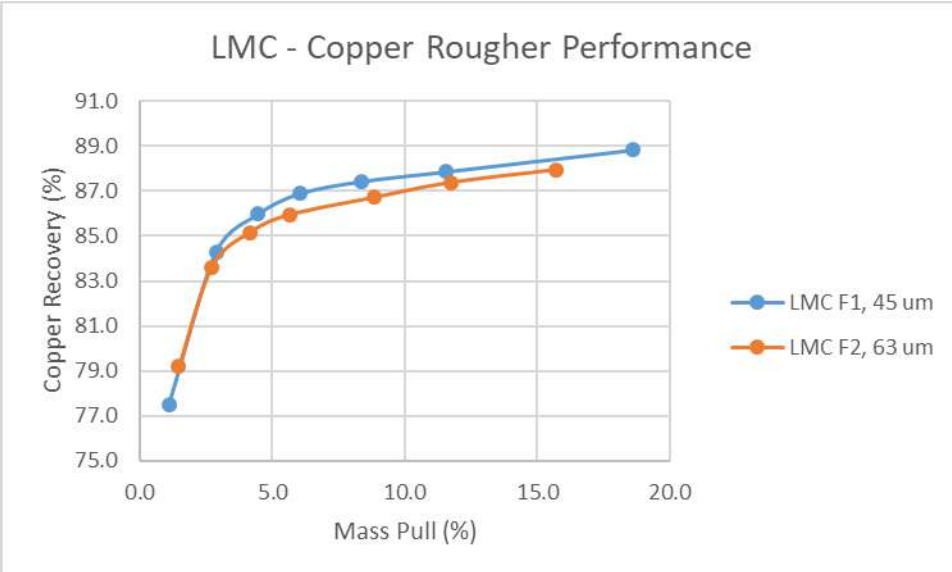
Source: *SGS (2022)*

TABLE 13.20
LMC ROUGHER TEST CONDITIONS

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
LMC F1, 45 um	Rougher Conc 1	22.4	1.1	5.09	0.70	12.6	1.98	13.0	35.0	50.0	77.5	23.1	61.2	45.2	55.8	67.5	62.9
	Rougher Conc 1 - 2	58.1	2.9	2.13	0.36	6.17	0.94	5.94	15.4	22.3	84.3	30.5	77.8	55.4	66.1	77.1	72.7
	Rougher Conc 1 - 3	89.6	4.4	1.41	0.26	4.40	0.64	4.06	10.4	15.1	86.0	34.0	85.5	58.6	69.6	79.9	75.7
	Rougher Conc 1 - 4	121.6	6.0	1.05	0.21	3.44	0.49	3.09	7.8	11.4	86.9	36.8	90.6	60.9	71.9	81.6	77.6
	Rougher Conc 1 - 5	168.2	8.3	0.76	0.16	2.57	0.36	2.29	5.72	8.37	87.4	39.6	93.8	62.3	73.8	82.8	79.0
	Rougher Conc 1 - 6	232.9	11.6	0.56	0.12	1.89	0.27	1.69	4.18	6.14	87.9	42.7	95.5	63.7	75.3	83.9	80.3
	Rougher Conc 1 - 7	375.4	18.6	0.35	0.09	1.19	0.17	1.08	2.66	3.91	88.9	49.2	96.4	66.6	78.0	85.9	82.5
	Rougher Tail	1640.1	81.4	0.010	0.02	0.01	0.02	0.07	0.10	0.19	11.1	50.8	3.6	33.4	22.0	14.1	17.5
	Head (Calc.)	2015.5	100.0	0.07	0.03	0.23	0.05	0.26	0.58	0.88	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LMC F2, 63 um	Rougher Conc 1	29.4	1.5	3.78	0.54	10.0	2.04	12.7	30.1	44.8	79.2	26.7	63.3	53.0	65.7	69.9	67.7
	Rougher Conc 1 - 2	54.3	2.7	2.16	0.36	6.65	1.23	7.56	17.8	26.6	83.6	32.9	77.7	59.2	72.2	76.3	74.1
	Rougher Conc 1 - 3	83.1	4.1	1.44	0.26	4.73	0.85	5.13	12.0	18.0	85.2	36.4	84.6	62.3	75.0	78.8	76.8
	Rougher Conc 1 - 4	113	5.6	1.07	0.21	3.65	0.64	3.87	9.0	13.5	85.9	39.3	88.8	64.4	76.9	80.6	78.6
	Rougher Conc 1 - 5	177.2	8.8	0.69	0.14	2.39	0.43	2.53	5.89	8.84	86.7	42.7	91.2	66.6	78.9	82.4	80.5
	Rougher Conc 1 - 6	235.3	11.7	0.52	0.11	1.82	0.33	1.94	4.51	6.79	87.4	45.4	92.0	68.7	80.5	83.9	82.0
	Rougher Conc 1 - 7	315.3	15.7	0.39	0.09	1.37	0.25	1.48	3.42	5.16	88.0	48.9	92.7	70.1	82.2	85.3	83.5
	Rougher Tail	1689.7	84.3	0.010	0.02	0.02	0.02	0.06	0.11	0.19	12.0	51.1	7.3	29.9	17.8	14.7	16.5
	Head (Calc.)	2005	100.0	0.07	0.03	0.23	0.06	0.28	0.63	0.97	100.0	100.0	100.0	100.0	100.0	100.0	100.0

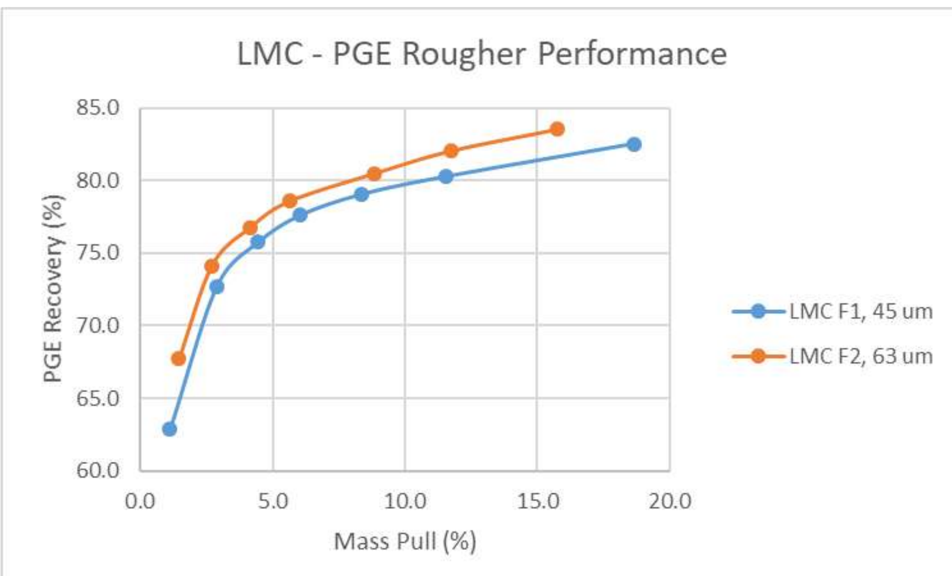
Source: *SGS (2022)*

FIGURE 13.8 LMC COPPER ROUGHER PERFORMANCE



Source: *SGS (2022)*

FIGURE 13.9 LMC PGE ROUGHER PERFORMANCE



Source: *SGS (2022)*

The initial Lismer rougher tests were performed at two primary particle sizes of 45 and 63 microns for F1 and F2, respectively. F1 generated a cumulative rougher concentrate grading 0.35% Cu and 3.9 g/t PGE, with copper and PGE recoveries of 88.9% and 82.5%, respectively. F2 generated a rougher concentrate grading 0.39% Cu and 5.2 g/t PGE, with copper and PGE recoveries of 88.0% and 83.5%, respectively. Test results had similar copper and PGE behaviours indicating no performance differences between these grind sizes. However, the finer primary grind was used for most testing as its copper performance curve showed a better kinetics profile for downstream testing.

Batch cleaner testwork was performed and conditions are summarized in Table 13.21 and Table 13.22 with results summarized in Table 13.23. The copper and PGE cleaner performance curves are illustrated in Figure 13.10 and Figure 13.11, respectively.

TABLE 13.21
LMC BATCH CLEANER TEST CONDITIONS

Test	Grind P80 (micron)		Reagents* (g/t)						Float Time (mins)		pH	
			Rougher		Cleaner							
	Primary	Regrind	SIBX	3477	CMC	$NaSiO_3$	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
F3	~49	37	60.0	30.0	90.0	-	25.0	12.5	20.0	20.0	8.9 - 9.4	7.8 - 9.2
F4	~49	10	60.0	30.0	90.0	10.0	25.0	12.5	20.0	14.0	8.8 - 9.3	8.1 - 9.2
F5	~49	10	60.0	30.0	90.0	10.0	25.0	12.5	30.0	19.0	8.7 - 9.3	8.1 - 9.2
F8	~49	10	60.0	30.0	90.0	10.0	25.0	12.5	30.0	19.0		
*MIBC added as needed												

Source: *SGS (2022)*

TABLE 13.22
LMC F6 AND F7 BATCH CLEANER CONDITIONS

Test	Grind P80 (micron)			Reagents* (g/t)				Float Time (mins)			
				Copper		Nickel					
	Primary	Regrind Cu	PGM	Copper				Copper		PGM	
				SIBX	3477	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
F6	~49	10	N/A	20.0	10.0	40.0	20.0	30	19	N/A	12
Reagents* (g/t)								pH			
Copper				PGM							
Cleaner								Copper		PGM	
CMC	$NaSiO_3$	SIBX	3477	CMC	$NaSiO_3$	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
240.0	10.0	25	12.5	110.0	7.5	15	7.5	?			
Test	Grind P80 (micron)			Reagents* (g/t)				Float Time (mins)			
				Copper		Nickel					
	Primary	Regrind Cu	Ni	Rougher				Copper		Nickel	
				SIBX	3477	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
F7	~49	10	N/A	20.0	10.0	40.0	20.0	6	4	24	12
Reagents* (g/t)								pH			
Copper				Nickel							
Cleaner								Copper		Nickel	
CMC	$NaSiO_3$	SIBX	3477	CMC	$NaSiO_3$	SIBX	3477	Rougher	Cleaner	Rougher	Cleaner
50.0	5.0	5	2.5	80.0	7.5	15	7.5	8.9 - 9.4	8.8	8.7 - 9.1	8.9 - 9.0
*MIBC added as needed											

Source: *SGS (2022)*

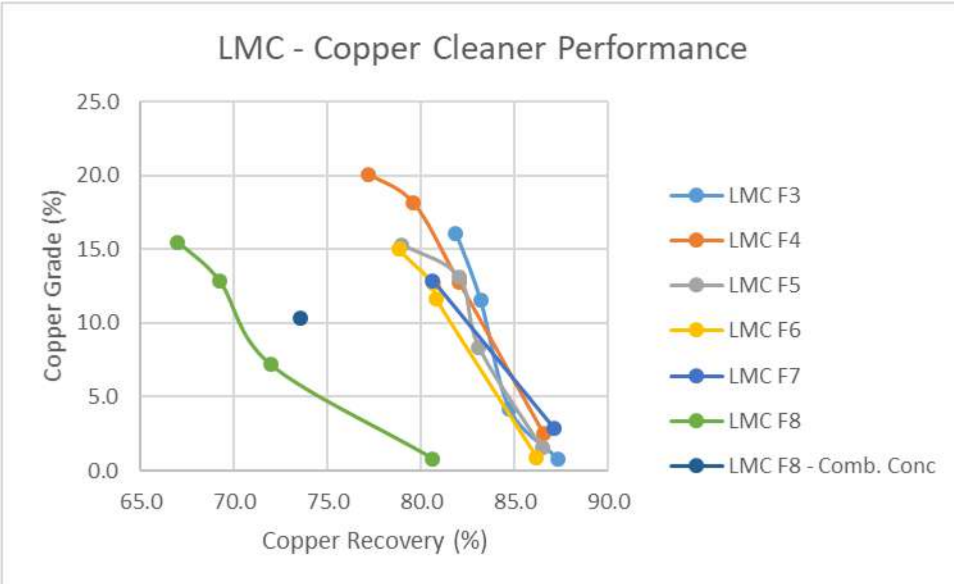
TABLE 13.23
LMC BATCH CLEANER TEST RESULTS

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
LMC F3	3rd Cleaner Conc.	7.4	0.4	16.1	1.61	35.3	7.01	45.2	145	197	81.8	20.3	57.7	51.5	53.7	73.6	66.9
	2nd Cleaner Conc.	10.5	0.5	11.5	1.26	24.9	5.16	34.1	106	145	83.2	22.6	57.7	53.8	57.5	76.2	69.8
	1st Cleaner Conc.	29.3	1.5	4.21	0.54	9.80	1.95	13.7	39.6	55.3	84.7	27.1	63.5	56.7	64.6	79.5	74.2
	Rougher Conc.	154.1	7.7	0.82	0.16	2.58	0.41	3.32	8.14	11.9	87.3	43.3	87.7	63.3	82.2	86.1	83.9
	1st Cleaner Scav Conc.	17.6	0.9	0.11	0.16	1.92	0.13	1.95	2.42	4.50	1.3	4.8	7.5	2.3	5.5	2.9	3.6
	1st Cleaner Scav. Tails	107.2	5.4	0.02	0.06	0.71	0.04	0.70	0.49	1.23	1.3	11.3	16.8	4.3	12.1	3.6	6.0
	Rougher Tail	1848.9	92.3	0.010	0.02	0.03	0.02	0.06	0.11	0.19	12.7	56.7	12.3	36.7	17.8	13.9	16.1
	Head (Calc.)	2003	100.0	0.07	0.03	0.23	0.05	0.31	0.73	1.09	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LMC F4	3rd Cleaner Conc.	11.1	0.3	20.1	1.48	38.0	9.34	38.1	135	182	77.2	12.0	46.4	51.0	43.1	60.9	55.6
	2nd Cleaner Conc.	12.7	0.3	18.1	1.54	35.5	8.16	33.3	118	159	79.6	14.2	49.7	51.0	43.1	60.9	55.6
	1st Cleaner Conc.	18.5	0.5	12.8	1.31	26.9	6.04	26.2	87.0	119	82.0	17.7	54.8	54.9	49.5	65.4	60.6
	Rougher Conc.	99.2	2.5	2.52	0.44	7.59	1.26	6.75	18.5	26.5	86.5	31.8	82.9	61.7	68.2	74.7	72.2
	1st Cleaner Scav Conc.	5.1	0.1	1.44	0.98	11.3	1.21	10.2	20.3	31.7	2.5	3.6	6.3	3.0	5.3	4.2	4.4
	1st Cleaner Scav. Tails	75.6	1.9	0.08	0.19	2.61	0.10	1.74	1.64	3.48	2.0	10.5	21.7	3.7	13.4	5.0	7.2
	Rougher Tail	3892.8	97.5	0.010	0.02	0.04	0.02	0.08	0.16	0.26	13.5	68.2	17.1	38.3	31.8	25.3	27.8
	Head (Calc.)	3992	100.0	0.07	0.03	0.23	0.05	0.25	0.62	0.91	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LMC F5	3rd Cleaner Conc.	14.7	0.4	15.3	1.61	32.4	5.99	36.1	118	160	79.0	17.3	59.0	47.4	52.6	70.4	64.3
	2nd Cleaner Conc.	17.8	0.4	13.1	1.49	28.6	5.22	32.1	103	140	82.0	19.5	63.1	50.0	56.6	74.5	68.3
	1st Cleaner Conc.	28.3	0.7	8.36	1.04	19.0	3.39	21.7	66.6	91.7	83.1	21.5	66.5	51.5	60.8	76.5	70.9
	Rougher Conc.	161.5	4.0	1.52	0.30	4.76	0.67	4.82	12.9	18.4	86.5	35.0	95.2	58.5	77.1	84.3	81.0
	1st Cleaner Scav Conc.	19.0	0.5	0.32	0.38	5.05	0.32	3.32	5.30	8.94	2.1	5.3	11.9	3.3	6.2	4.1	4.6
	1st Cleaner Scav. Tails	114.2	2.8	0.03	0.10	1.19	0.06	0.89	0.80	1.75	1.2	8.2	16.8	3.7	10.1	3.7	5.5
	Rougher Tail	3858.4	96.0	0.010	0.02	0.01	0.02	0.06	0.10	0.18	13.5	65.0	4.8	41.5	22.9	15.7	19.0
	Head (Calc.)	4019.9	100.0	0.07	0.03	0.20	0.05	0.25	0.61	0.91	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
LMC F6	3rd Cleaner Conc.	14.2	0.4	15.0	1.56	34.2	7.45	36.1	111	155	78.8	18.0	59.8	52.1	52.4	68.4	63.0
	2nd Cleaner Conc.	17.2	0.4	12.7	1.44	29.8	6.37	31.7	95.2	133	80.7	20.1	63.2	53.9	55.8	71.1	65.8
	1st Cleaner Conc.	18.8	0.5	11.6	1.34	27.5	5.85	29.3	87.5	123	80.8	20.5	63.7	54.2	56.3	71.4	66.2
	Rougher Conc.	264.1	6.6	0.88	0.18	2.93	0.49	2.85	7.17	10.5	86.2	39.2	95.4	63.2	77.1	82.1	79.6
	1st Cleaner Scav Conc.	18.2	0.5	0.46	0.32	4.33	0.39	3.44	5.83	9.66	3.1	4.7	9.7	3.5	6.4	4.6	5.0
	PGM Scav Con	44.6	1.1	0.10	0.15	2.09	0.13	1.35	1.74	3.22	1.6	5.4	11.5	2.9	6.2	3.4	4.1
	PGM Scav Tails	182.5	4.6	0.01	0.06	0.47	0.03	0.44	0.35	0.82	0.7	8.6	10.6	2.7	8.2	2.8	4.3
	1st Cleaner Scav. Tails	227.1	5.7	0.03	0.08	0.79	0.05	0.62	0.62	1.29	2.2	14.0	22.0	5.5	14.4	6.1	8.4
	Rougher Tail	3739.0	93.4	0.010	0.02	0.01	0.02	0.06	0.11	0.19	13.8	60.8	4.6	36.8	22.9	17.9	20.4
	Head (Calc.)	4003.1	100.0	0.07	0.03	0.20	0.05	0.24	0.58	0.87	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LMC F7	Ni 2nd Cleaner Conc.	5.3	0.1	1.15	0.59	10.8	2.06	6.41	21.1	29.6	2.2	2.5	5.7	4.5	3.4	4.6	4.3
	Ni 1st Cleaner Conc.	19.4	0.5	0.45	0.26	4.19	0.76	2.51	7.46	10.7	3.1	4.0	8.1	6.1	4.9	5.9	5.7
	Ni Rougher Conc.	216.1	5.3	0.10	0.08	0.92	0.14	0.49	1.24	1.87	7.4	13.3	20.0	12.5	10.6	11.0	11.0
	Cu Cleaner Conc.	17.4	0.4	12.9	1.50	29.6	4.58	29.7	89.2	123	80.6	21.2	51.6	32.8	51.8	63.5	58.3
	Cu Rougher Conc.	84.7	2.1	2.86	0.45	7.64	1.16	7.84	21.2	30.2	87.1	31.0	64.8	40.5	66.5	73.4	69.4
	Ni 1st Cleaner Tails	196.7	4.8	0.06	0.06	0.60	0.08	0.29	0.63	1.00	4.3	9.3	11.8	6.5	5.7	5.1	5.3
	Cu 1st Cleaner Tails	67.3	1.6	0.27	0.18	1.96	0.28	2.19	3.59	6.06	6.5	9.8	13.2	7.7	14.8	9.9	11.1
	Rougher Scav Tail	3805.241	92.7	0.004	0.02	0.04	0.03	0.06	0.10	0.19	5.5	55.7	15.2	46.9	22.9	15.6	19.6
	Head (Calc.)	4106.0	100.0	0.068	0.03	0.24	0.06	0.24	0.59	0.90	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LMC F8	Gravity Conc.	8.0	0.2	2.37	0.89	19.8	3.90	26.4	62.7	93.0	6.6	5.0	18.0	12.2	22.9	22.1	21.5
	Grav. + 3rd Cleaner Conc.	20.5	0.5	10.4	1.19	26.9	7.40	25.8	71.5	105	73.6	16.9	62.5	59.1	57.3	64.5	62.2
	3rd Cleaner Conc.	12.5	0.3	15.5	1.38	31.4	9.64	25.4	77.2	112	67.0	12.0	44.5	46.9	34.4	42.4	40.6
	2nd Cleaner Conc.	15.6	0.4	12.8	1.27	27.0	7.72	20.4	61.9	89.9	69.2	13.7	47.7	46.9	34.4	42.4	40.6
	1st Cleaner Conc.	29.0	0.7	7.18	0.82	16.0	4.35	12.2	36.3	52.9	72.0	16.6	52.7	49.2	38.4	46.3	44.4
	Rougher Conc.	284.7	10.0	0.82	0.16	2.35	0.53	1.72	4.78	7.03	80.6	32.5	76.0	59.1	53.0	59.9	58.0
	1st Cleaner Scav Conc.	25.2	0.6	0.70	0.33	4.30	0.64	2.88	7.29	10.8	6.1	5.8	12.3	6.3	7.9	8.1	7.9
	Mag Conc.	114.3	2.9	0.01	0.16	0.15	0.02	0.07	0.15	0.24	0.4	12.7	1.9	0.9	0.9	0.8	0.8
	1st Cleaner Scav. Tails	230.5	2.9	0.032	0.06	0.42	0.04	0.27	0.54	0.85	2.6	10.1	11.0	3.6	6.7	5.5	5.7
	Rougher Tail	3581	90.0	0.01	0.02	0.01	0.02	0.06	0.11	0.19	12.4	49.8	4.1	27.9	23.3	17.3	19.7
	Head (Calc.)	3980.0	100.0	0.073	0.04	0.22	0.06	0.23	0.57	0.87	100.0	100.0	100.0	100.0	100.0	100.0	100.0

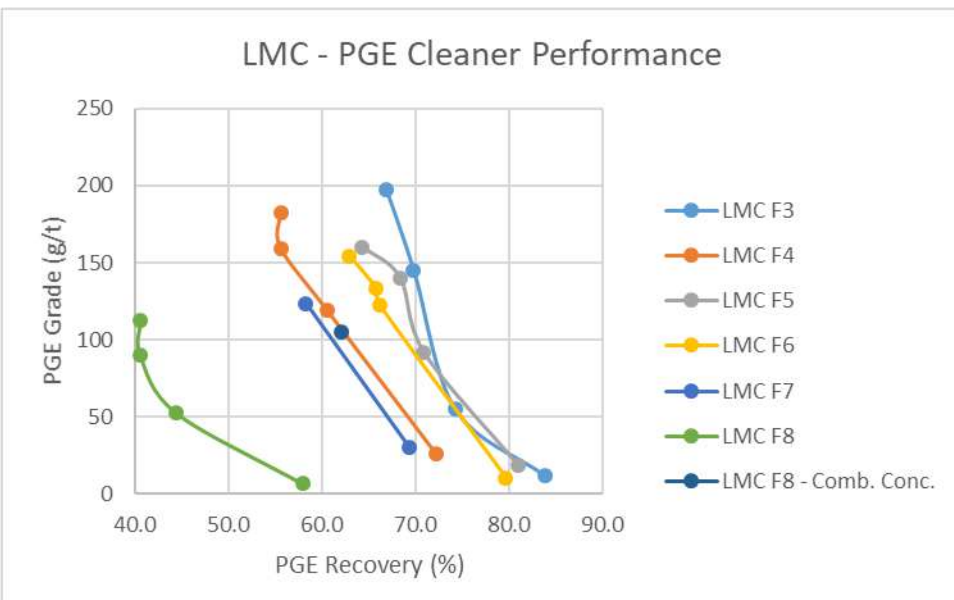
Source: *SGS (2022)*

FIGURE 13.10 LMC BATCH TEST COPPER CLEANER PERFORMANCE



Source: *SGS (2022)*

FIGURE 13.11 LMC BATCH TEST PGE CLEANER PERFORMANCE



Source: *SGS (2022)*

LMC cleaner test F3 resulted in a concentrate grading 16.1% Cu and 197 g/t PGE, with copper and PGE recoveries of 81.8% and 66.9%, respectively. Compared to the DMC material, the LMC composite was more responsive to upgrading. As with the DMC cleaner test, a 4 kg flotation test was used in the subsequent tests to allow more copper units into the cleaner circuit to improve selectivity and final concentrate copper grade.

F4 used F3 conditions, however, reduced the 1st cleaner float time to limit collection of gangue. The test generated a concentrate grading 20.1% Cu and 182 g/t PGE, with copper and PGE recoveries of 77.2% and 55.6%, respectively. Target final concentrate copper grade was achieved but copper recovery was lower. PGE rougher recovery was noticeably lower likely due to the 4 kg feed and bench cell. The PGE lower recovery also lowered the available PGE units and likely affected the final grade.

F5 used F4 conditions, however, increased the rougher float times to increase PGE recovery. The resulting concentrate graded 15.3% Cu and 160 g/t PGE, with copper and PGE recoveries of 79.0% and 64.3%, respectively. While copper and PGE recovery increased, the final concentrate grades decreased due to the increased mass pull.

F6 used F5 conditions, however, increased the dosage of CMC to increase final concentrate grades. The resulting concentrate graded 15.0% Cu and 155 g/t of PGE, with copper and PGE recoveries of 78.8% and 63.0%, respectively demonstrating the additional CMC did not help improve metallurgical performance.

F7 used a split flotation sheet approach to produce a primary copper/PGE concentrate and a secondary nickel/PGE concentrate. The copper concentrate graded 12.9% Cu and 123 g/t PGE, with copper and PGE recoveries of 80.6% and 58.3%, respectively. The nickel concentrate graded 0.59% Ni and 29.6 g/t PGE, with nickel and PGE recoveries of 2.5% and 4.3%, respectively. As seen with the DMC test, the majority of valuable minerals were recovered in the copper circuit with minimal concentration of minerals in the nickel circuit.

F8 explored gravity separation prior flotation to access any potential benefits to the overall process. The gravity separation involved processing 4 kg of feed through a laboratory Knelson Concentrator and reprocessing the Knelson concentrate by a Mozley Table to further upgrade the precious metals. If successful, the gravity concentrate would then be combined with the flotation concentrate to improve overall recovery.

F8 resulted in a combined concentrate of 10.4% Cu and 105 g/t PGE, with copper and PGE recoveries of 73.6% and 62.2%, respectively. Overall, test results had lower copper and PGE metallurgical performances indicating minimal benefit to gravity separation.

A LCT was performed using the conditions of cleaner test F5. A six-cycle test was performed to simulate a continuous process which circulates the cleaner tailings streams back into the process. The metallurgical projection and stability checks are summarized in Table 13.24 and Table 13.25, respectively.

TABLE 13.24
LMC LCT METALLURGICAL PROJECTION

Product	Weight		Assays, %, g/t						
	Dry	%	Cu	Ni	S	Au	Pt	Pd	PGE
3rd Cleaner Conc	110.0	0.5	13.0	1.55	31.3	5.74	31.9	95.2	132.8
1st Cleaner Scav. Tails	1187.1	4.9	0.04	0.10	1.26	0.08	0.96	1.00	2.04
Rougher Tails	22746.9	94.6	0.010	0.019	0.010	0.020	0.07	0.14	0.23
Head (calc.)	24044.0	100.0	0.071	0.030	0.215	0.049	0.26	0.61	0.92

Product	Weight		% Distribution						
	Dry	%	Cu	Ni	S	Au	Pt	Pd	PGE
3rd Cleaner Conc	110.0	0.5	83.8	23.8	66.6	53.3	56.7	70.8	65.9
1st Cleaner Scav. Tails	1187.1	4.9	2.9	15.9	29.0	8.3	18.4	8.0	10.9
Rougher Tails	22746.9	94.6	13.4	60.3	4.4	38.4	24.9	21.2	23.1
Head (calc.)	24044.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: *SGS (2022)*

TABLE 13.25
LMC STABILITY CHECK

Total Products	Weight		Cu	Ni	S	Au	Pt	Pd	PGE
	g	Wt %							
Cycle A	3980.7	99.4	86.4	84.5	74.0	91.4	82.5	81.2	82.1
Cycle B	4001.1	99.9	100.7	102.8	92.2	95.7	95.6	96.6	96.3
Cycle C	3999.2	99.8	96.9	100.4	95.9	94.7	98.0	99.6	98.9
Cycle D	4004.6	100.0	101.1	99.5	104.9	110.3	96.2	101.0	100.2
Cycle E	4009.9	100.1	99.0	92.2	99.3	95.8	103.1	100.0	100.7
Cycle F	4015.6	100.2	108.0	105.6	109.3	102.5	106.4	106.7	106.4
Average of C-F	-	100.0	101.2	99.4	102.3	100.8	100.9	101.8	101.5

Source: *SGS (2022)*

The LCT projected a final concentrate grading 13.0% Cu and 133 g/t PGE, and projected copper and PGE recovery were 83.8% and 65.9%, respectively. The stability of this test was excellent as the mass and metals neared 100% accounted.

These results had similar projections to those experienced in the previous testwork, 15.5% Cu and 188 g/t PGE. However, the final copper and PGE concentrate grades from this test was lower likely owing to the lower feed grades.

13.2.6 Variability Testwork

Cleaner flotation tests were performed on all the individual samples using LMC F5 test conditions with an extra rougher scavenger stage to improve overall recovery.

13.2.6.1 Variability – Dana North

Cleaner flotation tests were performed on three composite samples from the Dana North Zone including Medium (Dana N-M), High (Dana N-H), and Very High (Dana N-VH) along with the

Dana Low (Dana-L) composite sample. The results of these tests are summarized in Table 13.26 while the copper and PGE performance curves are illustrated in Figure 13.12 and Figure 13.13, respectively.

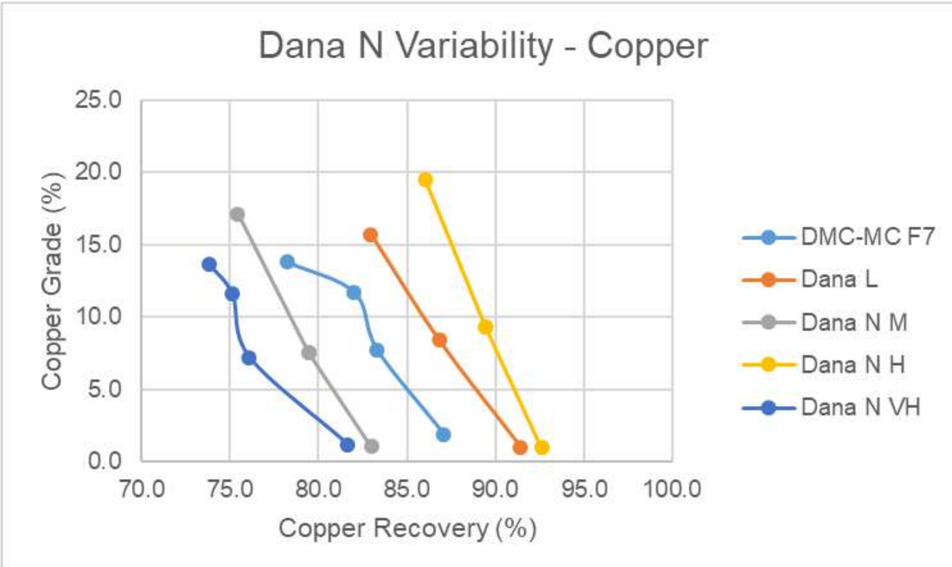
TABLE 13.26
DANA NORTH VARIABILITY BATCH TEST RESULTS

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
DMC-MC F7	3rd Cleaner Conc.	17.0	0.4	13.8	1.19	31.9	5.83	25.1	96.2	127	78.3	14.1	65.6	50.8	54.8	65.4	62.2
	2nd Cleaner Conc.	21	0.5	11.7	1.09	27.7	4.97	21.9	82.5	109	82.0	15.9	70.5	53.5	59.2	69.3	66.2
	1st Cleaner Conc.	32.3	0.8	7.73	0.77	18.7	3.32	15.0	54.9	73.3	83.3	17.3	73.2	55.0	62.4	70.9	68.1
	Rougher Conc.	138.8	3.5	1.88	0.25	5.12	0.85	4.21	13.8	18.9	87.1	24.3	85.9	60.2	75.1	76.7	75.4
	1st Cleaner Scav Conc.	14.5	0.4	0.48	0.23	3.13	0.33	2.31	5.04	7.68	2.3	2.3	5.5	2.5	4.3	2.9	3.2
	1st Cleaner Scav. Tails	92.0	2.3	0.05	0.07	0.65	0.06	0.71	0.78	1.55	1.4	4.6	7.2	2.8	8.4	2.9	4.1
	Rougher Tail	3877.8	96.5	0.010	0.03	0.03	<0.02	0.05	0.15	0.22	12.9	75.7	14.1	39.8	24.9	23.3	24.6
	Head (Calc.)	4016.6	100.0	0.07	0.04	0.21	0.05	0.19	0.62	0.86	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dana L	3rd Cleaner Conc.	13.1	0.3	15.7	1.16	33.4	5.36	18.4	74.5	98.3	82.9	13.8	57.7	41.3	41.9	58.0	53.0
	1st Cleaner Conc.	25.7	0.6	8.38	0.75	19.0	3.05	11.3	41.3	55.7	86.8	17.6	64.6	46.1	50.6	63.1	59.0
	Rougher Conc.	224.4	5.6	1.01	0.15	2.99	0.41	1.68	5.39	7.48	91.4	30.7	88.4	54.4	65.4	71.9	69.1
	1st Cleaner Scav Conc.	5.8	0.1	0.58	0.46	6.83	0.46	2.65	7.42	10.5	1.4	2.4	5.2	1.6	2.7	2.6	2.5
	1st Cleaner Scav. Tails	192.9	4.8	0.04	0.06	0.73	0.06	0.36	0.54	0.96	3.3	10.7	18.6	6.8	12.1	6.2	7.6
	Rougher Scav.	82.0	2.0	0.03	0.03	0.17	0.04	0.17	0.35	0.56	1.1	2.0	1.8	1.9	2.4	1.7	1.9
	Rougher Tail	3707.2	92.4	0.005	0.02	0.02	<0.02	0.05	0.12	0.19	7.5	67.3	9.8	43.6	32.2	26.4	29.0
	Head (Calc.)	4013.6	100.0	0.06	0.03	0.19	0.04	0.14	0.42	0.60	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dana N M	3rd Cleaner Conc.	12.2	0.3	17.1	1.05	31.2	7.81	33.1	128	169	75.4	13.7	56.2	48.7	51.8	67.8	62.8
	2nd Cleaner Conc.	29.3	0.7	7.50	0.60	15.2	3.57	16.2	57.4	77.2	79.4	18.9	65.6	53.4	60.7	73.0	68.9
	1st Cleaner Conc.	29.3	0.7	7.50	0.60	15.2	3.57	16.2	57.4	77.2	79.4	18.9	65.6	53.4	60.7	73.0	68.9
	Rougher Conc.	225.9	5.6	1.02	0.14	2.61	0.52	2.58	8.07	11.2	83.0	33.2	87.1	60.1	74.6	79.2	76.9
	1st Cleaner Scav Conc.	9.0	0.2	0.55	0.25	3.92	0.41	3.08	5.91	9.40	1.8	2.4	5.2	1.9	3.6	2.3	2.6
	1st Cleaner Scav. Tails	187.6	4.7	0.03	0.06	0.59	0.05	0.43	0.47	0.95	1.8	11.9	16.4	4.8	10.3	3.8	5.4
	Rougher Scav.	126.7	3.2	0.03	0.03	0.11	0.04	0.12	0.33	0.49	1.1	4.1	2.1	2.6	1.9	1.8	1.9
	Rougher Tail	3654.4	91.2	0.012	0.02	0.02	<0.02	0.05	0.12	0.19	15.9	62.7	10.8	37.3	23.4	19.0	21.2
	Head (Calc.)	4007	100.0	0.07	0.02	0.17	0.05	0.19	0.58	0.82	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
Dana N H	3rd Cleaner Conc.	12.7	0.3	19.5	1.21	31.4	7.35	28.1	95.9	131	86.0	11.9	55.7	48.1	49.7	62.5	58.3
	2nd Cleaner Conc.	27.6	0.7	9.33	0.76	16.6	3.67	14.5	47.5	65.7	89.4	16.3	63.8	52.1	55.8	67.3	63.4
	1st Cleaner Conc.	27.6	0.7	9.33	0.76	16.6	3.67	14.5	47.5	65.7	89.4	16.3	63.8	52.1	55.8	67.3	63.4
	Rougher Conc.	278.5	7.0	0.96	0.14	2.27	0.42	1.74	5.21	7.37	92.6	30.3	88.1	60.1	67.4	74.5	71.7
	1st Cleaner Scav Conc.	6.0	0.1	0.46	0.41	4.55	0.54	2.43	6.25	9.22	1.0	1.9	3.8	1.7	2.0	1.9	1.9
	1st Cleaner Scav. Tails	244.9	6.1	0.03	0.06	0.60	0.05	0.28	0.42	0.75	2.2	12.1	20.5	6.3	9.6	5.3	6.4
	Rougher Scav.	149.2	3.7	0.02	0.03	0.09	0.04	0.13	0.22	0.39	1.2	3.1	1.9	3.1	2.7	1.7	2.0
	Rougher Tail	3577.7	89.3	0.005	0.02	0.02	<0.02	0.06	0.13	0.21	6.2	66.5	10.0	36.8	29.9	23.8	26.2
	Head (Calc.)	4005.4	100.0	0.07	0.03	0.18	0.05	0.18	0.49	0.71	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dana N VH	3rd Cleaner Conc.	20.8	0.5	13.6	1.19	29.8	5.66	27.3	110	143	73.8	16.3	67.3	52.9	53.2	63.2	60.6
	2nd Cleaner Conc.	24.9	0.6	11.6	1.09	26.0	4.87	23.7	94.4	123	75.1	17.9	70.3	54.4	55.2	64.9	62.3
	1st Cleaner Conc.	40.5	1.0	7.20	0.75	16.7	3.08	15.2	59.3	77.6	76.1	19.9	73.4	56.0	57.5	66.4	64.0
	Rougher Conc.	267.1	6.6	1.17	0.19	3.14	0.54	2.83	10.1	13.4	81.7	32.7	91.0	65.0	70.8	74.2	73.1
	1st Cleaner Scav Conc.	14.9	0.4	0.71	0.34	4.17	0.49	3.00	8.84	12.3	2.8	3.3	6.8	3.3	4.2	3.6	3.7
	1st Cleaner Scav. Tails	211.7	5.3	0.05	0.07	0.47	0.06	0.46	0.72	1.24	2.8	9.5	10.8	5.7	9.1	4.2	5.3
	Rougher Scav.	97.3	2.4	0.05	0.04	0.10	0.05	0.20	0.57	0.82	1.2	2.4	1.1	2.2	1.8	1.5	1.6
	Rougher Tail	3654.4	90.9	0.018	0.03	0.02	<0.02	0.08	0.24	0.34	17.2	64.9	7.9	32.8	27.4	24.2	25.3
	Head (Calc.)	4018.8	100.0	0.10	0.04	0.23	0.06	0.27	0.90	1.22	100.0	100.0	100.0	100.0	100.0	100.0	100.0

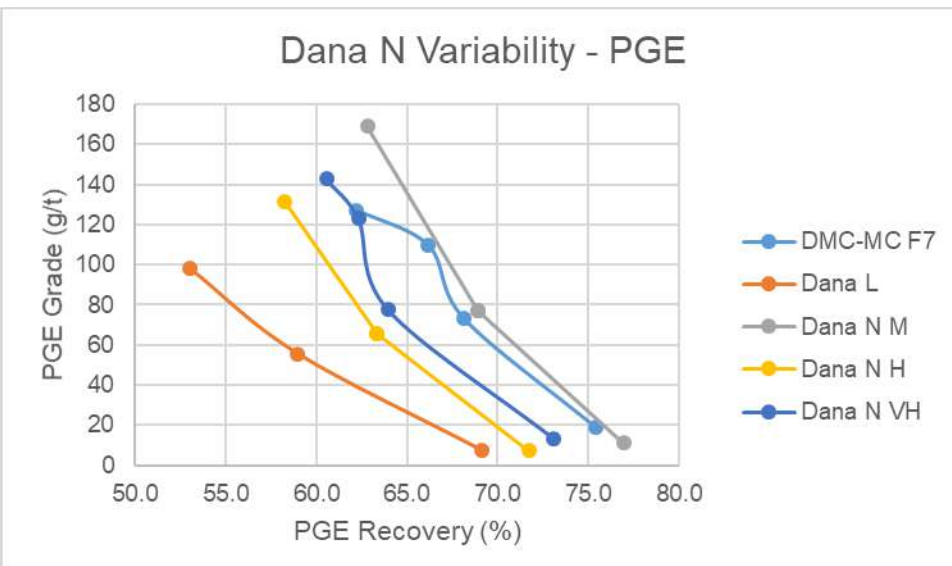
Source: *SGS (2022)*

FIGURE 13.12 DANA NORTH VARIABILITY COPPER PERFORMANCE



Source: *SGS (2022)*

FIGURE 13.13 DANA NORTH VARIABILITY PGE PERFORMANCE



Source: *SGS (2022)*

The concentrates generated from these tests graded between 13.6 to 19.5% Cu and 98 to 169 g/t PGE while the copper and PGE recoveries ranged from 73 to 86% and 53 to 63%, respectively. All four variability tests were similar to the corresponding DMC test with the same grade-recovery curves shape in the middle range.

The copper head grades were also similar, except for Dana N-VH which was higher. However, copper performance varied between all samples suggesting weak relationships between copper feed grade and metallurgy. This is also true with the PGEs as there were no clear trends with tailings grades despite varied feed grades.

The rougher scavenger stage generated concentrates ranging from 2 to 4% mass pull and graded between 0.02 to 0.05% Cu and 0.3 to 0.9 g/t PGE, with copper and PGE recoveries around ~1.2% and 2%, respectively. The concentrate quality at this scavenger stage was poor and likely quite difficult to further process into a saleable product.

13.2.6.2 Variability – Dana South

Cleaner flotation tests were performed on three composite samples from the Dana South Zone including Medium (Dana S-M), High (Dana S-H), and Very High (Dana S-VH) along with the Dana Low (Dana-L) composite sample. The results are summarized in Table 13.27 while copper and PGE performance curves are illustrated in Figure 13.14 and Figure 13.15, respectively.

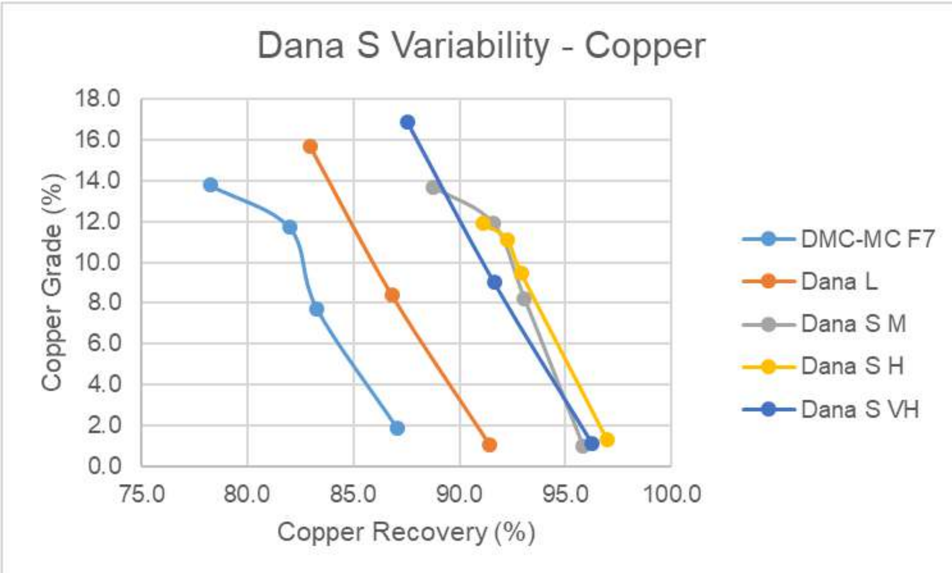
TABLE 13.27
DANA S VARIABILITY BATCH TEST RESULTS

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
DMC-MC F7	3rd Cleaner Conc.	17.0	0.4	13.8	1.19	31.9	5.83	25.1	96.2	127	78.3	14.1	65.6	50.8	54.8	65.4	62.2
	2nd Cleaner Conc.	21	0.5	11.7	1.09	27.7	4.97	21.9	82.5	109	82.0	15.9	70.5	53.5	59.2	69.3	66.2
	1st Cleaner Conc.	32.3	0.8	7.73	0.77	18.7	3.32	15.0	54.9	73.3	83.3	17.3	73.2	55.0	62.4	70.9	68.1
	Rougher Conc.	138.8	3.5	1.88	0.25	5.12	0.85	4.21	13.8	18.9	87.1	24.3	85.9	60.2	75.1	76.7	75.4
	1st Cleaner Scav Conc.	14.5	0.4	0.48	0.23	3.13	0.33	2.31	5.04	7.68	2.3	2.3	5.5	2.5	4.3	2.9	3.2
	1st Cleaner Scav. Tails	92.0	2.3	0.05	0.07	0.65	0.06	0.71	0.78	1.55	1.4	4.6	7.2	2.8	8.4	2.9	4.1
	Rougher Tail	3877.8	96.5	0.010	0.03	0.03	<0.02	0.05	0.15	0.22	12.9	75.7	14.1	39.8	24.9	23.3	24.6
	Head (Calc.)	4016.6	100.0	0.07	0.04	0.21	0.05	0.19	0.62	0.86	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dana L	3rd Cleaner Conc.	13.1	0.3	15.7	1.16	33.4	5.36	18.4	74.5	98.3	82.9	13.8	57.7	41.3	41.9	58.0	53.0
	1st Cleaner Conc.	25.7	0.6	8.38	0.75	19.0	3.05	11.3	41.3	55.7	86.8	17.6	64.6	46.1	50.6	63.1	59.0
	Rougher Conc.	224.4	5.6	1.01	0.15	2.99	0.41	1.68	5.39	7.48	91.4	30.7	88.4	54.4	65.4	71.9	69.1
	1st Cleaner Scav Conc.	5.8	0.1	0.58	0.46	6.83	0.46	2.65	7.42	10.5	1.4	2.4	5.2	1.6	2.7	2.6	2.5
	1st Cleaner Scav. Tails	192.9	4.8	0.04	0.06	0.73	0.06	0.36	0.54	0.96	3.3	10.7	18.6	6.8	12.1	6.2	7.6
	Rougher Scav.	82.0	2.0	0.03	0.03	0.17	0.04	0.17	0.35	0.56	1.1	2.0	1.8	1.9	2.4	1.7	1.9
	Rougher Tail	3707.2	92.4	0.005	0.02	0.02	<0.02	0.05	0.12	0.19	7.5	67.3	9.8	43.6	32.2	26.4	29.0
	Head (Calc.)	4013.6	100.0	0.06	0.03	0.19	0.04	0.14	0.42	0.60	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dana S M	3rd Cleaner Conc.	16.4	0.4	13.7	1.08	28.7	5.19	21.8	82.3	109	88.7	13.1	71.8	49.0	51.7	64.9	60.9
	2nd Cleaner Conc.	19.5	0.5	11.9	0.97	25.1	4.55	19.3	72.0	95.9	91.6	14.0	74.6	51.1	54.6	67.5	63.5
	1st Cleaner Conc.	28.7	0.7	8.21	0.70	17.6	3.18	13.7	50.1	67.0	93.1	14.9	76.8	52.5	56.9	69.1	65.3
	Rougher Conc.	255.5	6.4	0.95	0.12	2.25	0.39	1.80	6.02	8.21	95.8	22.1	87.7	57.0	66.7	74.0	71.3
	1st Cleaner Scav Conc.	6.0	0.2	0.47	0.16	2.68	0.18	2.02	4.05	6.25	1.1	0.7	2.5	0.6	1.8	1.2	1.3
	1st Cleaner Scav. Tails	220.8	5.5	0.02	0.04	0.25	0.03	0.25	0.35	0.63	1.7	6.5	8.4	3.8	8.0	3.7	4.7
	Rougher Scav.	118.9	3.0	0.03	0.03	0.07	0.02	0.11	0.29	0.42	1.3	2.7	1.3	1.4	1.9	1.7	1.7
	Rougher Tail	3621.6	90.6	0.002	0.03	0.02	<0.02	0.06	0.14	0.22	2.9	75.1	11.0	41.7	31.4	24.4	27.1
	Head (Calc.)	3996	100.0	0.06	0.03	0.16	0.04	0.17	0.52	0.74	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
Dana S H	3rd Cleaner Conc.	27.6	0.7	11.9	1.24	33.9	5.91	27.3	96.3	130	91.1	22.4	73.4	63.2	63.2	73.2	70.3
	2nd Cleaner Conc.	29.9	0.7	11.1	1.18	31.9	5.46	25.2	88.9	120	92.3	23.2	74.8	63.2	63.2	73.2	70.3
	1st Cleaner Conc.	35.4	0.9	9.46	1.04	27.5	4.66	21.8	75.9	102	92.9	24.1	76.4	63.9	64.6	74.1	71.3
	Rougher Conc.	269.5	6.7	1.30	0.20	4.41	0.67	3.42	10.9	15.0	97.0	35.8	93.2	70.3	77.2	80.7	79.3
	1st Cleaner Scav Conc.	5.9	0.1	0.69	0.40	7.45	0.48	3.76	8.70	12.9	1.1	1.5	3.4	1.1	1.9	1.4	1.5
	1st Cleaner Scav. Tails	228.2	5.7	0.05	0.07	0.75	0.06	0.56	0.83	1.45	2.9	10.2	13.4	5.3	10.7	5.2	6.5
	Rougher Scav.	94.5	2.4	0.04	0.03	0.14	0.04	0.18	0.48	0.70	1.0	2.1	1.0	1.5	1.4	1.2	1.3
	Rougher Tail	3642.7	90.9	0.002	0.03	0.02	<0.02	0.07	0.18	0.27	2.0	62.1	5.7	28.2	21.4	18.1	19.4
	Head (Calc.)	4006.7	100.0	0.09	0.04	0.32	0.06	0.30	0.91	1.27	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dana S VH	3rd Cleaner Conc.	14.0	0.3	16.9	1.40	34.9	10.1	44.6	176	231	87.5	17.7	64.7	57.8	50.1	65.5	61.5
	1st Cleaner Conc.	27.5	0.7	9.01	0.87	19.6	5.46	26.4	96.5	128	91.6	21.8	71.2	61.4	58.2	70.5	67.2
	Rougher Conc.	236.2	5.9	1.10	0.16	2.85	0.71	3.97	12.4	17.1	96.3	34.0	89.1	68.6	75.1	78.1	77.0
	1st Cleaner Scav Conc.	7.0	0.2	0.52	0.34	4.61	0.50	4.88	10.6	16.0	1.3	2.2	4.3	1.4	2.7	2.0	2.1
	1st Cleaner Scav. Tails	201.7	5.0	0.04	0.06	0.51	0.07	0.88	1.05	2.00	3.3	10.0	13.6	5.8	14.2	5.6	7.7
	Rougher Scav.	132.7	3.3	0.02	0.03	0.07	0.03	0.14	0.43	0.60	1.0	3.4	1.2	1.6	1.5	1.5	1.5
	Rougher Tail	3645.4	90.8	0.002	0.02	0.02	<0.02	0.08	0.21	0.31	2.7	62.7	9.6	29.8	23.4	20.3	21.5
	Head (Calc.)	4014.3	100.0	0.07	0.03	0.19	0.06	0.31	0.94	1.31	100.0	100.0	100.0	100.0	100.0	100.0	100.0

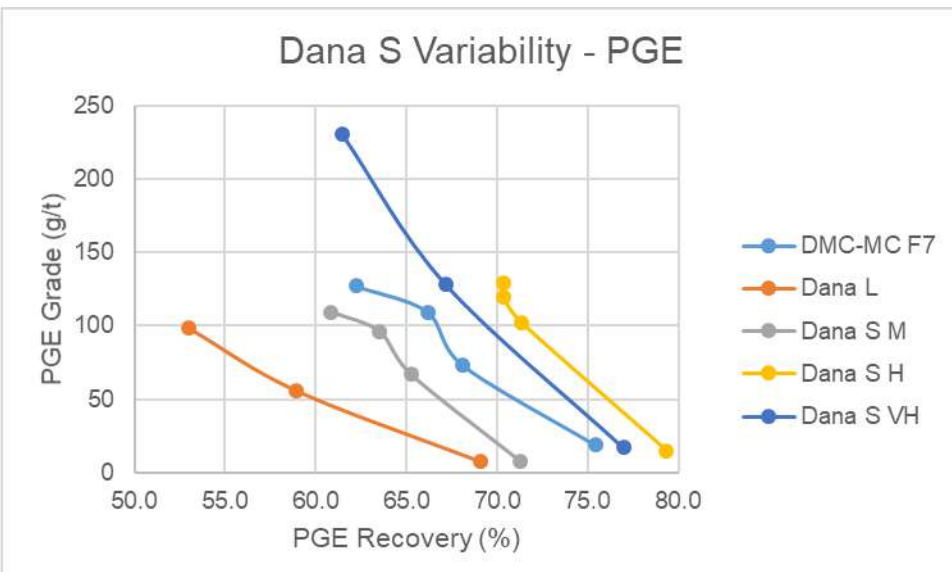
Source: *SGS (2022)*

FIGURE 13.14 DANA S VARIABILITY COPPER PERFORMANCE



Source: *SGS (2022)*

FIGURE 13.15 DANA S VARIABILITY PGE PERFORMANCE



Source: *SGS (2022)*

The concentrates graded from 11.9 to 16.9% Cu and 98 to 230 g/t PGE while the copper and PGE recoveries ranged from 82 to 92% and 53 to 71%, respectively. The Dana South samples had higher copper recoveries than the DMC F7 results perhaps due to the higher final mass pulls. Dana S-VH had the highest PGE feed grade resulting in the highest PGE grade, likely influenced by the mass pull.

Similar observations are made for the Dana South samples as with the Dana North samples as all samples responded consistently with no confirmed relationship between feed grade and metallurgy.

The rougher scavenger stage recovered concentrates ranging from 2 to 4% mass pull and graded between 0.02 to 0.04% Cu and 0.4 to 0.7 g/t PGE, with copper and PGE recoveries around ~1% and ~2%, respectively. As with the Dana North variability samples, the concentrate quality at this scavenger stage was poor and likely quite difficult to further process into a saleable product.

13.2.6.3 Variability – Lismer

Cleaner flotation tests were performed on three variability composite samples from the Lismer Zone including Low (Lismer–L), Medium (Lismer–M), High (Lismer–H), and Very High (Lismer–VH). The results are summarized in Table 13.28 while copper and PGE performance curves are illustrated in Figure 13.16 and Figure 13.17, respectively.

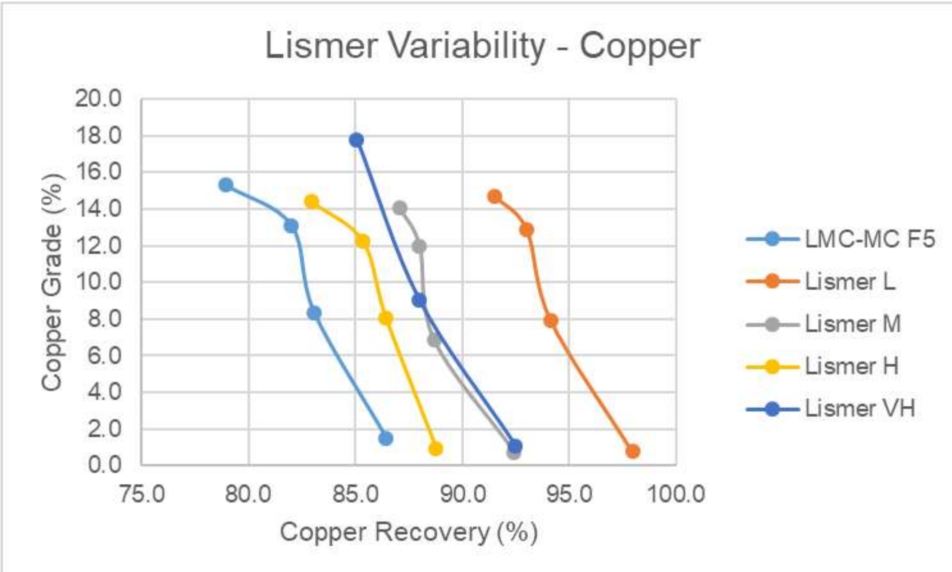
TABLE 13.28
LISMER VARIABILITY BATCH TEST RESULTS

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
LMC-MC F5	3rd Cleaner Conc.	14.7	0.4	15.3	1.61	32.4	5.99	36.1	118	160	79.0	17.3	59.0	47.4	52.6	70.4	64.3
	2nd Cleaner Conc.	17.8	0.4	13.1	1.49	28.6	5.22	32.1	103	140	82.0	19.5	63.1	50.0	56.6	74.5	68.3
	1st Cleaner Conc.	28.3	0.7	8.36	1.04	19.0	3.39	21.7	66.6	91.7	83.1	21.5	66.5	51.5	60.8	76.5	70.9
	Rougher Conc.	161.5	4.0	1.52	0.30	4.76	0.67	4.82	12.9	18.4	86.5	35.0	95.2	58.5	77.1	84.3	81.0
	1st Cleaner Scav Conc.	19.0	0.5	0.32	0.38	5.05	0.32	3.32	5.30	8.94	2.1	5.3	11.9	3.3	6.2	4.1	4.6
	1st Cleaner Scav. Tails	114.2	2.8	0.03	0.10	1.19	0.06	0.89	0.80	1.75	1.2	8.2	16.8	3.7	10.1	3.7	5.5
	Rougher Tail	3858.4	96.0	0.010	0.02	0.01	<0.02	0.06	0.10	0.18	13.5	65.0	4.8	41.5	22.9	15.7	19.0
	Head (Calc.)	4019.9	100.0	0.07	0.03	0.20	0.05	0.25	0.61	0.91	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Lismer L	3rd Cleaner Conc.	14.2	0.4	14.7	1.13	32.9	6.69	25.5	61.7	93.9	91.5	13.7	64.4	51.3	46.2	59.8	54.7
	2nd Cleaner Conc.	16.5	0.4	12.9	1.05	29.2	5.76	21.9	53.1	80.8	93.0	14.8	66.5	51.3	46.2	59.8	54.7
	1st Cleaner Conc.	27.1	0.7	7.92	0.70	18.4	3.60	14.1	33.3	51.0	94.1	16.1	68.8	52.7	48.7	61.6	56.8
	Rougher Conc.	292.4	7.3	0.76	0.12	2.21	0.38	1.67	3.50	5.56	98.0	29.6	89.2	59.7	62.4	69.9	66.7
	1st Cleaner Scav Conc.	10.0	0.2	0.31	0.22	2.86	0.29	2.12	3.52	5.93	1.4	1.9	3.9	1.6	2.7	2.4	2.4
	1st Cleaner Scav. Tails	255.3	6.3	0.02	0.05	0.47	0.04	0.34	0.34	0.72	2.5	11.6	16.5	5.5	11.1	5.9	7.5
	Rougher Scav.	116.0	2.9	0.01	0.02	0.05	0.02	0.05	0.06	0.13	0.5	2.4	0.8	1.3	0.7	0.5	0.6
	Rougher Tail	3613.4	89.8	0.001	0.02	0.02	<0.02	0.08	0.12	0.22	1.6	68.0	10.0	39.0	36.8	29.6	32.6
	Head (Calc.)	4021.8	100.0	0.06	0.03	0.18	0.05	0.20	0.36	0.61	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Lismer M	3rd Cleaner Conc.	14.8	0.4	14.1	2.50	34.6	5.17	36.3	110	151	87.1	25.3	61.3	47.4	45.8	54.6	51.9
	2nd Cleaner Conc.	17.6	0.4	12.0	2.21	29.9	4.35	30.5	92.5	127	88.0	26.6	63.1	47.4	45.8	54.6	51.9
	1st Cleaner Conc.	30.9	0.8	6.88	1.36	17.7	2.52	18.2	53.7	74.4	88.7	28.6	65.5	48.3	47.9	55.6	53.2
	Rougher Conc.	294.1	7.3	0.75	0.22	2.55	0.30	2.38	6.18	8.86	92.4	43.3	89.7	53.9	59.6	61.0	60.3
	1st Cleaner Scav Conc.	22.3	0.6	0.23	0.29	3.03	0.19	2.18	3.83	6.20	2.1	4.4	8.1	2.6	4.1	2.9	3.2
	1st Cleaner Scav. Tails	240.9	6.0	0.02	0.06	0.56	0.02	0.37	0.31	0.70	1.6	10.2	16.1	3.0	7.6	2.5	3.9
	Rougher Scav.	126.3	3.1	0.03	0.03	0.11	0.02	0.05	0.11	0.18	1.6	2.7	1.7	1.6	0.5	0.5	0.5
	Rougher Tail	3594.1	89.5	0.004	0.02	0.02	<0.02	0.13	0.32	0.47	6.0	54.1	8.6	44.6	39.8	38.6	39.1
	Head (Calc.)	4014.5	100.0	0.06	0.04	0.21	0.04	0.29	0.74	1.08	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Test	Product	Weight		Assays, %, g/t							Distribution, %						
		g	%	Cu	Ni	S	Au	Pt	Pd	PGE	Cu	Ni	S	Au	Pt	Pd	PGE
Lismer H	3rd Cleaner Conc.	14.9	0.5	14.4	1.92	35.7	6.15	50.6	159	216	83.0	25.8	35.0	54.5	62.0	76.3	71.6
	2nd Cleaner Conc.	18.0	0.6	12.3	1.80	32.0	5.36	44.3	138	188	85.3	29.2	37.9	57.3	65.6	79.9	75.2
	1st Cleaner Conc.	27.7	0.9	8.07	1.30	22.3	3.58	30.1	92.0	126	86.4	32.4	40.7	58.9	68.6	82.0	77.5
	Rougher Conc.	237.8	7.6	0.97	0.25	4.12	0.46	4.24	11.7	16.4	88.8	54.3	64.5	65.5	82.8	89.4	86.7
	1st Cleaner Scav Conc.	10.4	0.3	0.24	0.44	5.81	0.30	3.54	7.46	11.3	1.0	4.1	4.0	1.9	3.0	2.5	2.6
	1st Cleaner Scav. Tails	199.7	6.4	0.02	0.10	1.51	0.04	0.68	0.75	1.47	1.4	17.8	19.9	4.7	11.2	4.8	6.5
	Rougher Scav.	71.3	2.3	0.01	0.04	0.01	0.02	0.15	0.27	0.44	0.3	2.3	0.0	0.8	0.9	0.6	0.7
	Rougher Tail	2831.0	90.2	0.010	0.02	0.19	<0.02	0.07	0.11	0.20	10.9	43.4	35.4	33.7	16.3	10.0	12.6
	Head (Calc.)	3140.1	100.0	0.08	0.04	0.48	0.05	0.39	0.99	1.43	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Lismer VH	3rd Cleaner Conc.	17.0	0.4	17.8	1.24	34.2	8.46	41.2	166	216	85.1	16.6	59.8	54.7	51.1	72.5	66.4
	1st Cleaner Conc.	34.6	0.9	9.05	0.78	18.8	4.55	23.9	86.6	115	88.0	21.3	66.9	59.9	60.3	77.0	72.0
	Rougher Conc.	301.6	7.6	1.09	0.16	3.05	0.62	3.65	11.0	15.3	92.5	38.6	94.8	70.8	80.4	85.2	83.3
	1st Cleaner Scav Conc.	12.2	0.3	0.52	0.37	5.50	0.69	5.31	9.01	15.0	1.8	3.5	6.9	3.2	4.7	2.8	3.3
	1st Cleaner Scav. Tails	254.8	6.4	0.04	0.07	0.80	0.08	0.83	0.82	1.73	2.7	13.8	21.0	7.8	15.4	5.4	8.0
	Rougher Scav.	103.9	2.6	0.02	0.03	0.14	0.05	0.17	0.38	0.60	0.5	2.4	1.5	2.0	1.3	1.0	1.1
	Rougher Tail	3573.5	89.8	0.007	0.02	0.01	<0.02	0.07	0.15	0.24	7.0	59.0	3.7	27.2	18.3	13.8	15.5
	Head (Calc.)	3979	100.0	0.09	0.03	0.24	0.07	0.34	0.98	1.39	100.0	100.0	100.0	100.0	100.0	100.0	100.0

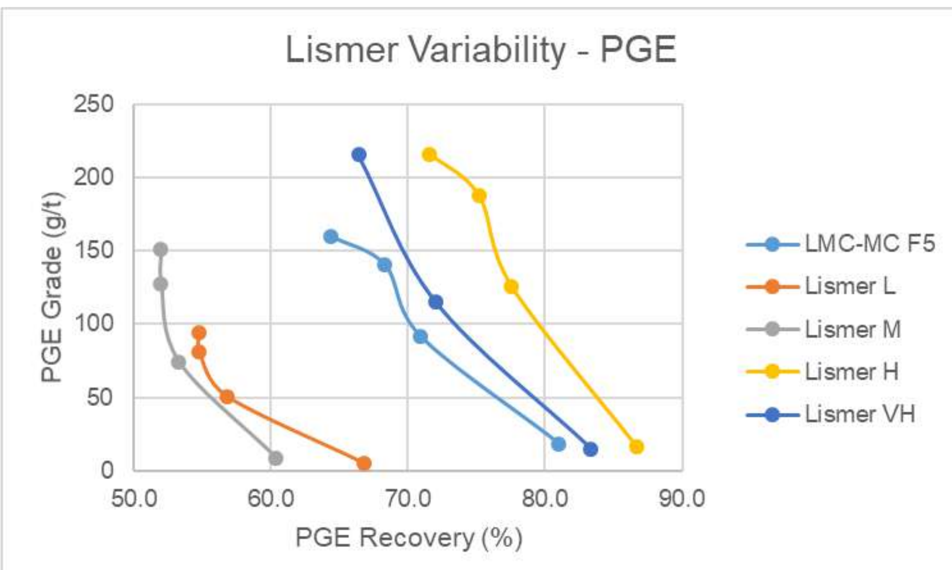
Source: *SGS (2022)*

FIGURE 13.16 LISMER VARIABILITY COPPER PERFORMANCE



Source: *SGS (2022)*

FIGURE 13.17 LISMER VARIABILITY PGE PERFORMANCE



Source: *SGS (2022)*

The concentrates graded from 14 to 18% Cu and 93 to 216 g/t PGE with copper and PGE recoveries from these tests ranged from 82 to 91% and 51 to 72%, respectively. As with the Dana samples, no confirmed relationship between head grade and concentrate grades or recoveries on copper performance.

The rougher scavenger stage generated concentrates ranging from 2 to 4% mass pull and graded between 0.01 to 0.03% Cu and 0.1 to 0.6 g/t PGE, with copper and PGE recoveries of <1.6% and

<1.2%, respectively. As with the Dana variability samples, concentrate quality in this scavenger stage was poor and likely quite difficult to further process into a saleable product.

13.2.6.4 Detailed Concentrate Analysis

Assays were performed on a final concentrate from each Dana and Lismer locked cycle tests for a detailed composition of each concentrate. Results are summarized in Table 13.29.

TABLE 13.29
DETAILED CONCENTRATE ANALYSIS

Element	Lismer MC-LCT 3rd Cl Conc F	Dana MC-LCT 3rd Cl Conc F	Element	Lismer MC-LCT 3rd Cl Conc F	Dana MC-LCT 3rd Cl Conc F
Ag g/t	46.6	50.4	Na g/t	270	427
Al g/t	10600	22100	Ni g/t	15300	11800
As g/t	70	206	P g/t	< 80	< 80
Ba g/t	54.6	128	Pb g/t	334	264
Be g/t	0.05	0.07	Sb g/t	< 40	< 40
Bi g/t	< 30	< 30	Se g/t	130	129
Ca g/t	9200	14300	Sn g/t	24	30
Cd g/t	< 20	< 20	Sr g/t	37.2	121
Co g/t	2730	2480	Ti g/t	196	514
Cr g/t	1200	951	Tl g/t	< 30	< 30
Cu g/t	127000	132000	V g/t	29	36
Fe g/t	315000	301000	Y g/t	1.4	1.5
K g/t	695	340	Zn g/t	3160	2290
Li g/t	< 20	< 20	Si g/t	61200	63600
Mg g/t	15200	8160	U g/t	2.0	2.1
Mn g/t	455	265	Hg g/t	< 3	< 3
Mo g/t	73	56	F %	< 0.005	0.006

Source: *SGS (2022)*

Rhodium analysis graded 1.51 g/t Rh for the Dana final concentrate and 1.88 g/t Rh for the Lismer final concentrate. Using the locked cycle test's projected mass and rhodium feed/concentrate assays, estimated rhodium recovery is ~41% and ~39% for the Dana and Lismer master composites, respectively.

The combined Lismer final concentrate from the locked cycle test, cycles A to E, was studied by QEMSCAN for mineral composition and properties. The estimated particle size was ~16 µm. The mineral composition and associations are summarized in Table 13.30 and Table 13.31, respectively.

TABLE 13.30
LISMER COMBINED LCT 3RD CLEANER CONCENTRATE - MINERAL COMPOSITION

Lismer MC-LCT 3rd Cl Conc A-E Combined, Mineral Mass (%)			
Chalcopyrite	41.4	Micas	1.30
Other Cu Sulphides	0.49	Amphibole	6.19
Pentlandite	3.75	Pyroxene	4.10
Pyrite	12.9	Epidote	0.27
Pyrrhotite/Troilite	17.2	Other Silicates	0.00
Sphalerite	0.97	Talc	0.06
Other Sulphides	0.12	Other Clays	0.03
Quartz	2.98	Fe-Oxides	1.43
Plagioclase	2.35	Other Oxides	0.35
K-Feldspar	0.57	Carbonates	0.23
Olivine	1.82	Apatite	0.00
Chlorite	1.60	Other	0.02

Source: *SGS (2022)*

TABLE 13.31
LISMER COMBINED LCT 3RD CLEANER CONCENTRATE - MINERAL ASSOCIATION

Lismer MC-LCT 3rd Cl Conc A-E Combined : -300/+3um							
Copper		Iron		Nickel		Silicates	
Mineral Name	Dist.	Mineral Name	Dist.	Mineral Name	Dist.	Mineral Name	Dist.
Free Cu-Sulphides	82.3	Free Fe-Sulphides	85.9	Free Ni-Sulphides	67.5	Free Silicates	70.8
Lib Cu-Sulphides	7.7	Lib Fe-Sulphides	4.7	Lib Ni-Sulphides	9.2	Lib Silicates	19.1
CuS:Fe-Sulphides	1.7	FeS:Cu-Sulphides	3.2	NiS:Cu-Sulphides	5.6	Silicates:Fe-Sulphides	1.3
CuS:Ni-Sulphides	0.6	FeS:Ni-Sulphides	0.6	NiS:Fe-Sulphides	3.0	Silicates:Ni-Sulphides	0.0
CuS:Other Sulphides	0.0	FeS:Other Sulphides	0.1	NiS:Other Sulphides	0.3	Silicates:Cu-Sulphides	2.9
CuS:Talc	0.0	FeS:Talc	0.0	NiS:Talc	0.0	Silicates:Other Sulphides	0.0
CuS:Quartz	0.2	FeS:Quartz	0.1	NiS:Quartz	0.0	Silicates:Oxides	0.0
CuS:Plagioclase	0.0	FeS:Plagioclase	0.1	NiS:Plagioclase	0.0	Silicates:Carbonates	0.0
CuS:Amphiboles/Pyroxenes	0.2	FeS:Amphiboles/Pyroxenes	0.4	NiS:Amphiboles/Pyroxenes	0.2	Silicates:Other	0.0
CuS:Chlorite/Micas/Clays	0.1	FeS:Chlorite/Micas/Clays	0.2	NiS:Chlorite/Micas/Clays	0.0	Silicates:CuS:FeS Tern	3.6
CuS:Other Silicates	0.0	FeS:Other Silicates	0.0	NiS:Other Silicates	0.1	Complex	2.3
CuS:Oxides	0.0	FeS:Oxides	0.1	NiS:Oxides	0.1	Total	100.0
CuS:Carbonates	0.0	FeS:Carbonates	0.0	NiS:Carbonates	0.0	Liberated	89.9
CuS:Silicates	1.2	FeS:Silicates	1.8	NiS:Silicates	0.2	-	-
CuS:Other	0.0	FeS:Other	0.0	NiS:Other	0.0	-	-
CuS:FeS:Sil Tern	2.8	FeS:CuS:Sil Tern	1.7	NiS:FeS:Sil Tern	0.7	-	-
Complex	3.1	Complex	1.1	Complex	12.9	-	-
Total	100.0	Total	100.0	Total	100.0	-	-
Liberated	90.0	Liberated	90.6	Liberated	76.7	-	-

Source: *SGS (2022)*

The combined Lismer 3rd cleaner concentrate was primarily sulphide minerals (76.7%), which were mainly comprised of chalcopyrite (41.4%), pentlandite (3.8%), pyrite (12.9%), and pyrrhotite/troilite (17.2%). The remaining portion (23.3%) was comprised of silicates (21.2%) with amphibole (6.2%) and pyroxene (4.1) as the major contributors.

Liberation of the sulphide and silicate minerals were high, ~90%, except for the nickel at ~77% liberation from other minerals. For the sulphide mineral classes, approximately 50% of the non-liberated sulphide mineral were associated with other sulphide minerals with minimal floatable non-sulphide gangue in the concentrate.

The concentrate was primarily comprised of iron sulphides and silicates lowering final concentrate grades. Inhibiting these minerals from floating will be key to increasing final concentrate copper and PGE grades as well as improving salability.

13.2.7 Solid-Liquid Separation Testwork

To determine dewatering properties, a sample of combined dried rougher tailings from the Dana and Lismer LCTs were tested as "River Valley Tailings." Two cycles of rougher tailings were combined and thoroughly mixed with the first characterized to determine physical properties. Results are summarized in Table 13.32.

TABLE 13.32
RIVER VALLEY TAILINGS SAMPLE CHARACTERIZATION

Sample I.D	Particle Sizing				SG of Dried Solids	Testing pH
	[1]d_{80}, µm	[1]<20 µm % vol	[1]<1 µm % vol	[2]K_{80}, µm		
River Valley Tailings	76	37.1	2.6	62	2.95	8.2

[1]Determined using laser diffraction (Malvern Mastersizer).
[2]Determined using screen (sieve) size analysis.

Source: *SGS (2022)*

The second sample was used for static settling and dynamic thickening testwork. The sample was initially tested using Magnafloc 10 as the flocculant, however, further testing showed better performance with Magnafloc 504 during dynamic settling tests. The results are summarized in Table 13.33 and Table 13.34, respectively.

TABLE 13.33
SUMMARY OF STATIC SETTLING TESTWORK ON FLOTATION TAILINGS

Sample I.D.	Flocculant Dosage, g/t	[1]Feed %w/w	[2]U/F %w/w	Unit Area $m^2/(t/day)$	[3]ISR $m^3/m^2/day$	[4]Supernatant Clarity	[5]TSS mg/L
River Valley Tailings	27	10	66	0.08	668	Cloudy	68

All values were calculated without a safety factor.
Test conditions: 2L cylinder with rotating picket-style raking, room temperature.
Flocculant: Magnafloc 10
[1]Diluted Thickener Feed.
[2]Final Thickened "Underflow" Density.
[3]Initial Settling Rate.
[4]Supernatant Visual Clarity at 10 minutes of elapsed settling time.
[5]Supernatant Total Suspended Solids (TSS) at 10 minutes of elapsed settling time.

Source: *SGS (2022)*

TABLE 13.34
SUMMARY OF DYNAMIC THICKENING TESTWORK ON FLOTATION TAILINGS

Dosage flocc't, g/t	Unit Area, $m^2/(t/d)$	Solids Loading, $t/m^2/h$	Net Rise Rate $m^3/m^2/d$	Underflow, %w/w solids	Overflow TSS, mg/L	Residence Time, h	U/F Yield Stress, Pa
30	0.07	0.60	124.3	56.0	242	0.31	11
30	0.08	0.52	108.8	57.3	248	0.28	14
30	0.09	0.46	96.7	58.0	190	0.32	15
30	0.10	0.42	87.0	57.8	165	0.35	16
30	0.11	0.38	79.1	57.3	144	0.39	14
Underflow extended for 30 minutes:				62.6			43
Bed height was maintained around 150 mm							

Source: *SGS (2022)*

It was also noted that the dried sample may have affected the flocculation and settling behaviour. Additional testing on fresh tailings is recommended to confirm behaviour.

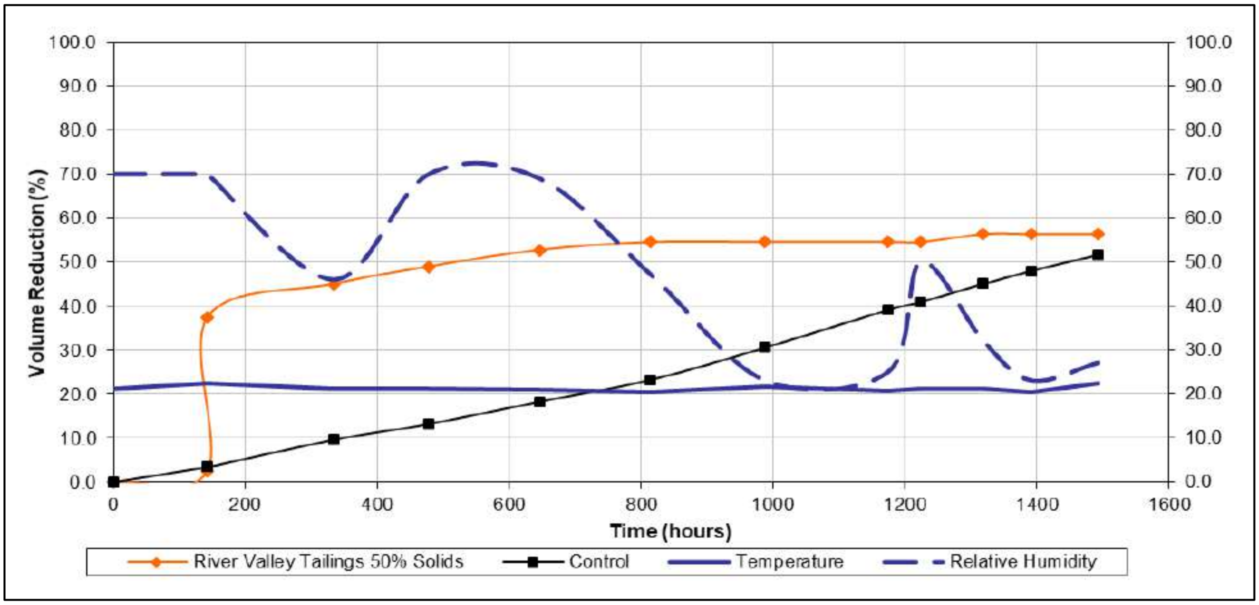
13.2.8 Environmental Testwork

The reconstituted tailings from the solid liquid separation testwork were used to perform tailings deposition testwork. The sample was subjected to air drying, Atterberg limit, and settling density testwork.

13.2.8.1 Air Drying Testwork

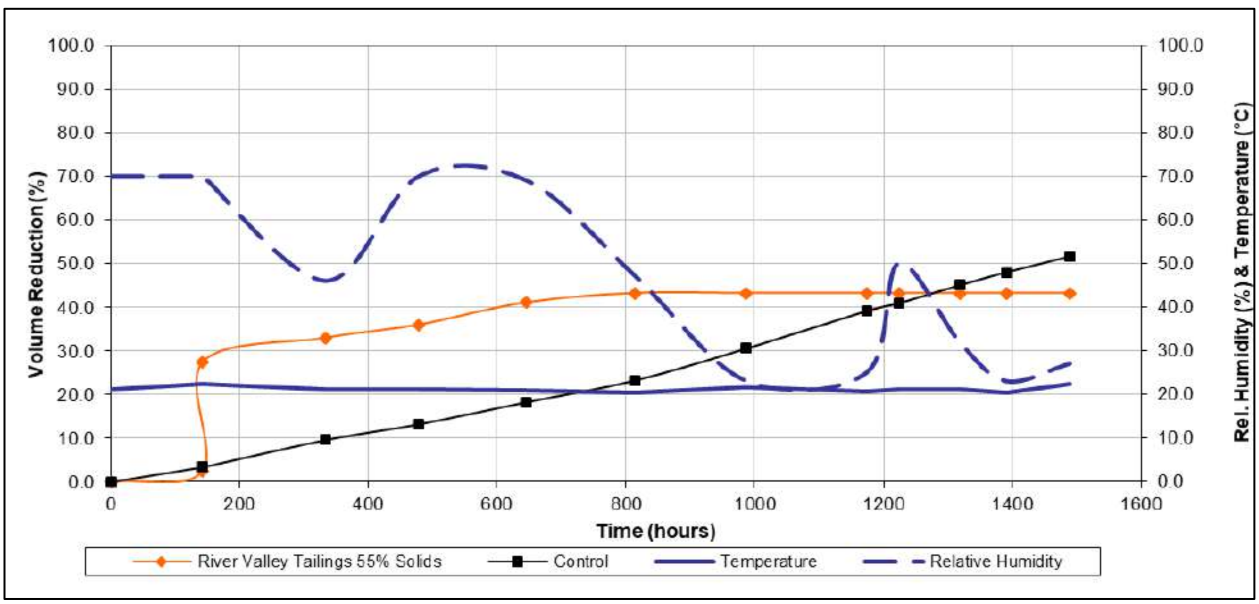
Air drying tests were performed at three percent solids (50%, 55%, and 60%) to determine drying characteristics. The volume reduction varied for each test and was dependent on the percent solids of each test sample. Test performance is illustrated in Figure 13.18, Figure 13.19, and Figure 13.20.

FIGURE 13.18 AIR DRYING PERFORMANCE AT 50% SOLIDS



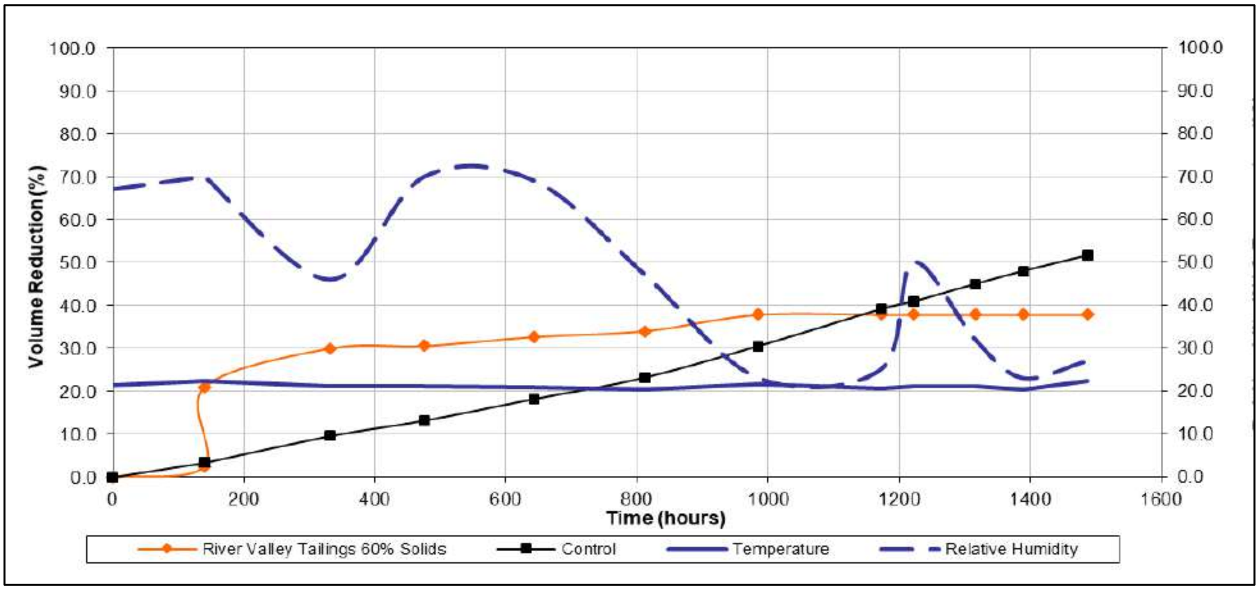
Source: *SGS (2022)*

FIGURE 13.19 AIR DRYING PERFORMANCE AT 55% SOLIDS



Source: *SGS (2022)*

FIGURE 13.20 AIR DRYING PERFORMANCE AT 60% SOLIDS

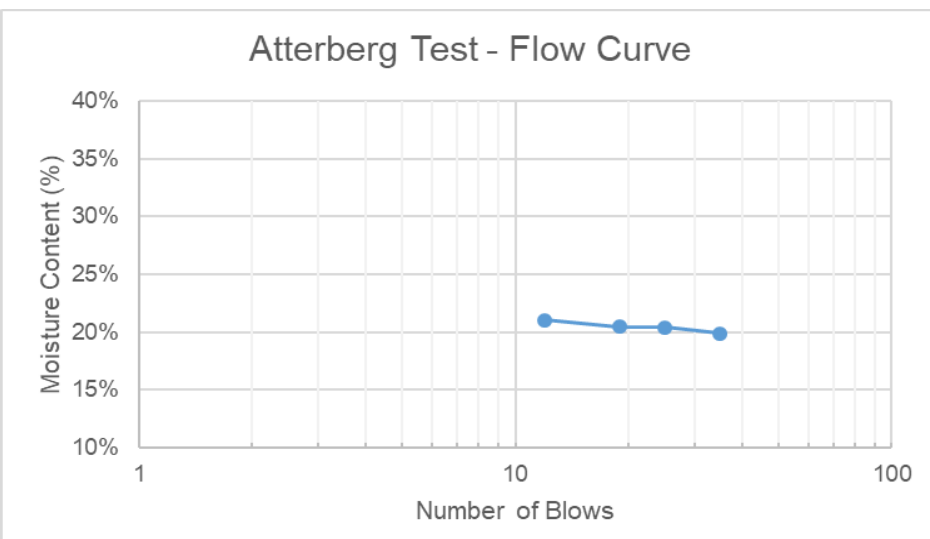


Source: *SGS (2022)*

13.2.8.2 Atterberg Limit Testwork

Four Atterberg limit tests determined the liquid limit to be 20. The flow curve is illustrated in Figure 13.21.

FIGURE 13.21 ATTERBERG TESTWORK FLOW CURVE

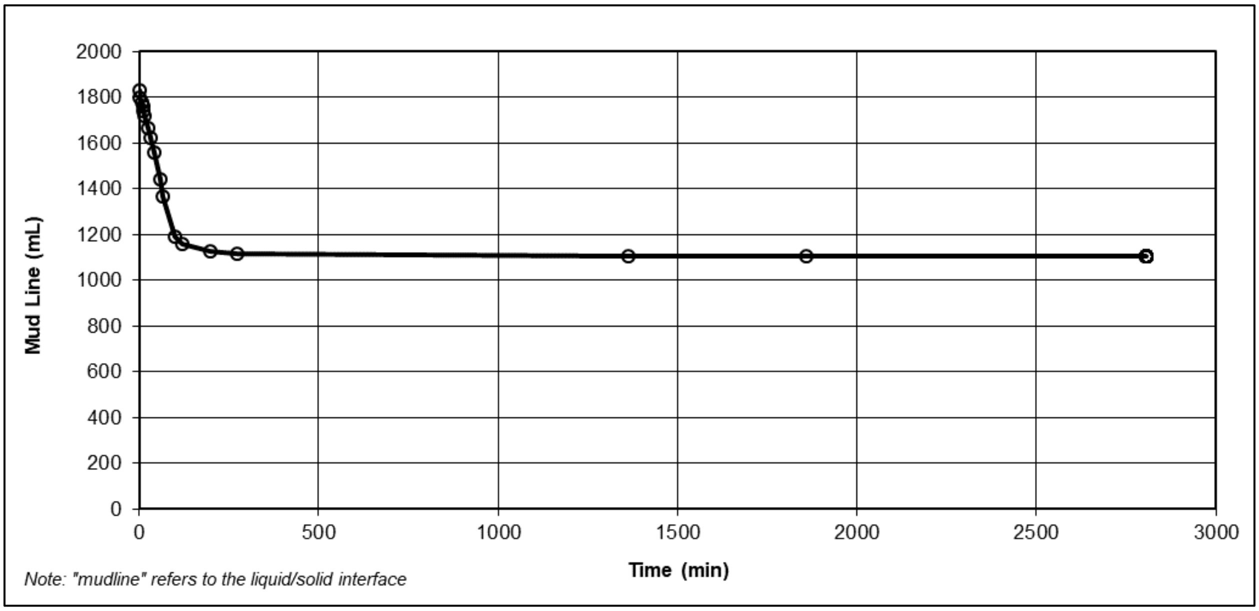


Source: *SGS (2022)*

13.2.8.3 Settling Density Testwork

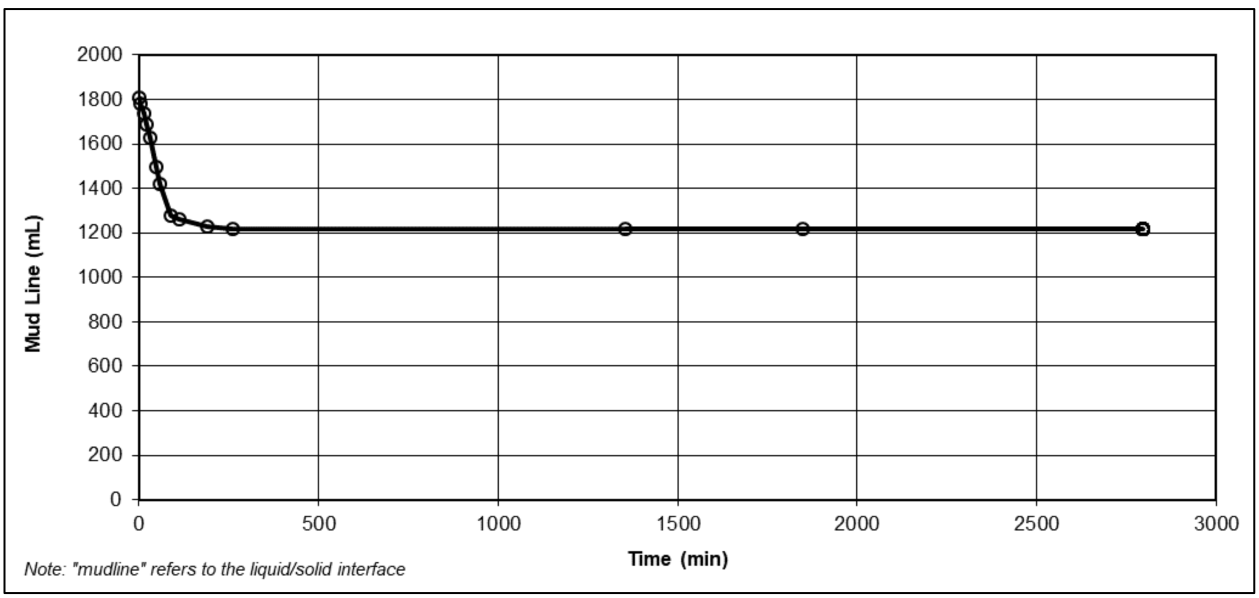
Settling tests were performed using standard and drained methods to determine the settling rate, settled terminal density, and the effect of drainage on the settling of the solid material. The results are illustrated in Figures 13.22 through Figures 13.27.

FIGURE 13.22 STANDARD SETTLING TEST RESULTS, 50% SOLIDS



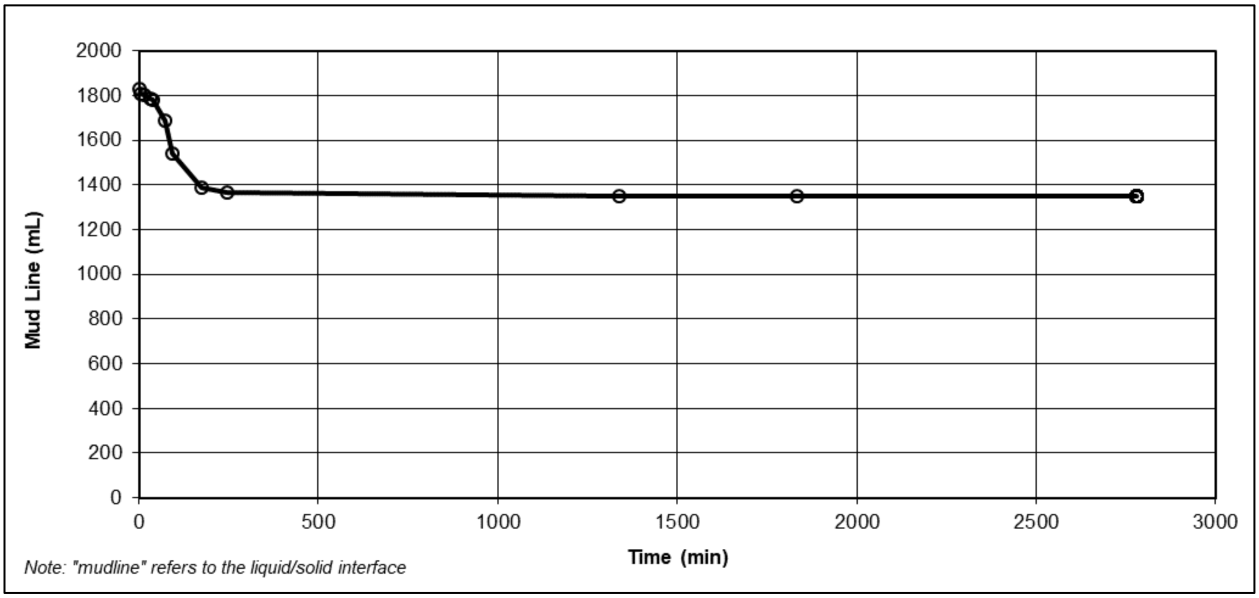
Source: *SGS (2022)*

FIGURE 13.23 STANDARD SETTLING TEST RESULTS, 55% SOLIDS



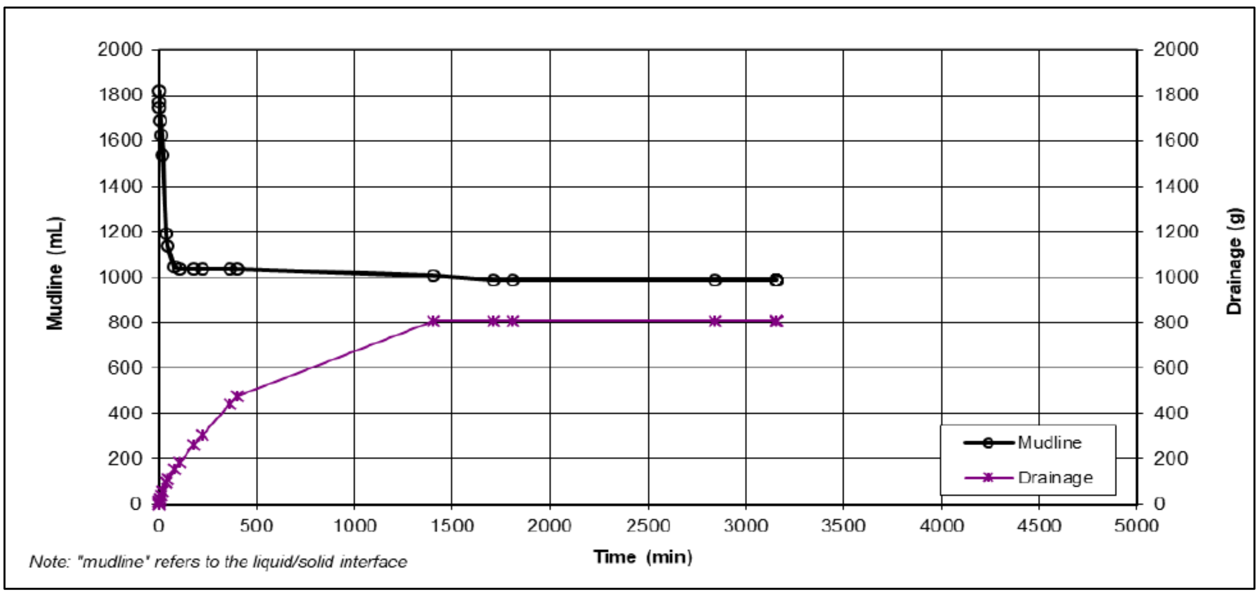
Source: *SGS (2022)*

FIGURE 13.24 STANDARD SETTLING TEST RESULTS, 60% SOLIDS



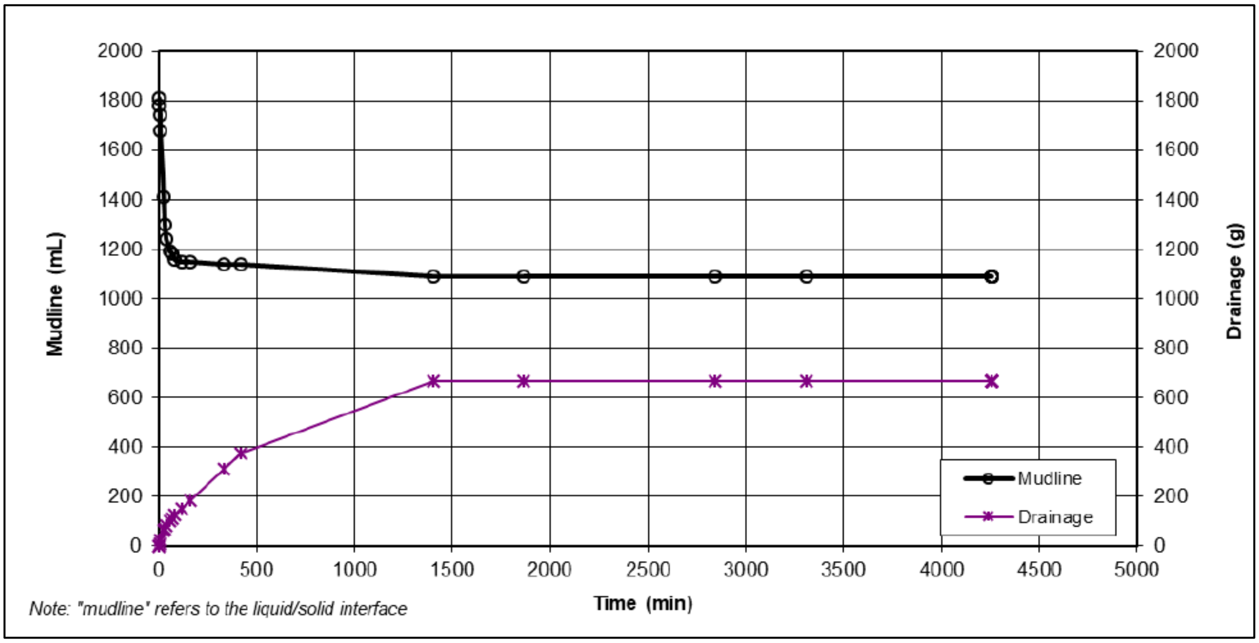
Source: *SGS (2022)*

FIGURE 13.25 DRAINED SETTLING TEST RESULTS, 50% SOLIDS



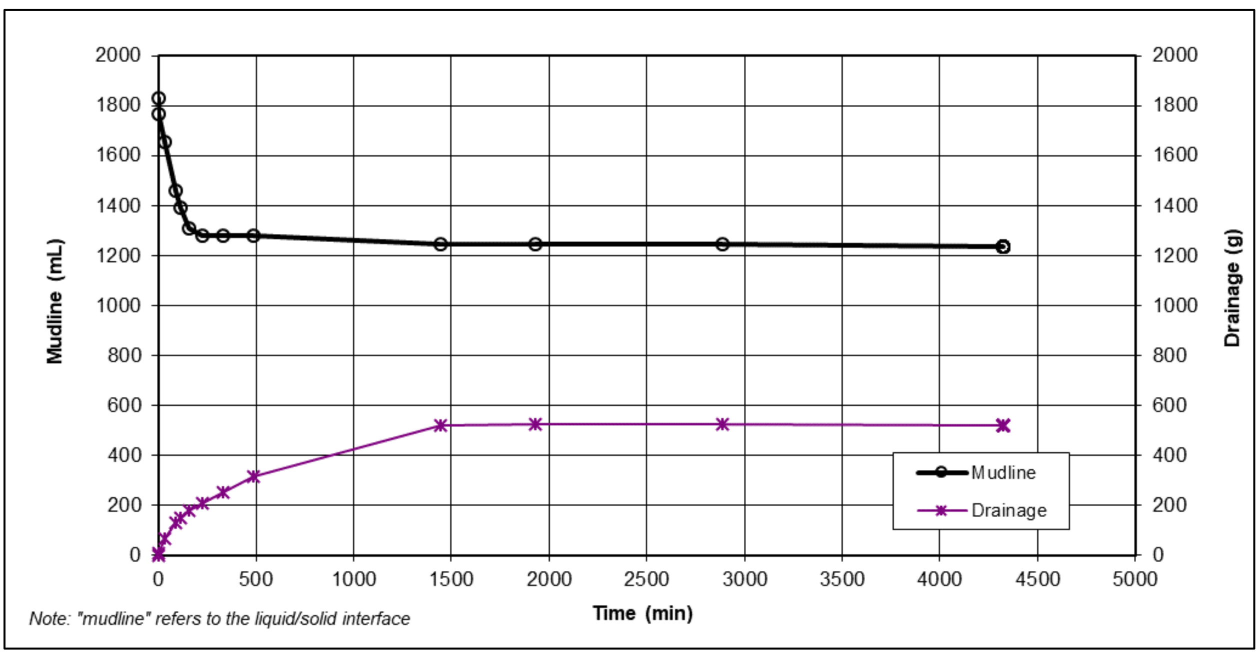
Source: *SGS (2022)*

FIGURE 13.26 DRAINED SETTLING TEST RESULTS, 55% SOLIDS



Source: *SGS (2022)*

FIGURE 13.27 DRAINED SETTLING TEST RESULTS, 60% SOLIDS



Source: *SGS (2022)*

13.3 SGS TESTING 2022 – RESULTANT INDICATIVE RECOVERIES AND GRADES

The indicative recoveries and anticipated final concentrate grades for the River Valley material are shown in Tables 13:35 and 13:36. Results are based on LCT and 0.5% mass pull.

TABLE 13.35
INDICATIVE RECOVERIES
(PEA 2019 VERSUS LCT SGS 2022)

Indicatives Recoveries		
Element	**PEA LOM**	**LCT SGS Testing**
Au	60%	55.4%
Pt	65.9%	56.8%
Pd	80%	71.1%
Cu	85.1%	85.6%
Ni	17.2%	21.1%
Co	25%	25%
Ag	60%	60%
Rh	70%	40%

Source: *D.E.N.M. (2023)*

TABLE 13.36
ANTICIPATED FINAL CONCENTRATE GRADES

Element	Concentrate Assays	Unit
Cu	13.00	%
Ni	1.35	%
Co	0.261	%
S	31.00	%
Au	5.80	gpt
Pt	28.00	gpt
Pd	95.00	gpt
PGM (3E)	128.80	gpt
Rh	1.88	gpt

Source: *D.E.N.M. (2023)*

13.5 RECOMMENDATIONS

The following is recommended to further the understanding of these somewhat complex mineral zones (Lismer, Dana) and improving metal recoveries (Pt, Pd, Cu):

- Perform a trade-off study to determine the optimal placement for a regrind mill. Depending on the placement of the regrind mill, design and operational costs could be reduced to improve project economics (higher grade marketable smelter concentrate).

- Gravity separation could be investigated to determine if this method could be optimized to extract PGE.

- Regrind sizing should be further studied to determine favorable fine particle size for efficient milling and design.

- Further variability testing should be performed on discrete samples typical of blocks that will be mined as opposed to composite samples.

- Further LCT should be performed on various samples to better develop a relationship between batch and LCT metallurgical performance.

13.6 IMPROVED METAL RECOVERY OPTIONS

This metallurgical testing campaign carried out in 2021-2023 was primarily focused on conventional milling and flotation to produce a marketable copper concentrate product. A single concentrate (copper and PGM's) would be shipped to specific smelters as part of revenue stream for the Project and subject to treatment charges, reduced metal payments and associated penalties.

The Hydrometallurgical Option, as an alternative, would treat the Dana and Lismer concentrates under pressure leaching and metal precipitation processes. Recovery of PGM, gold, and base metal could be obtained to increase overall process recoveries.

Flotation alternatives of conventional (tank cells, and air induced cells) flotation as well as alternative reagent schemes were unable to produce a high-grade copper and PGM concentrate. Initial scoping of the River Valley material with two new alternative technologies showed increases in recovery and grade. Further work is recommended in these areas.

River Valley does contain rhodium at both the Dana and Lismer Zones with 18 ppb Rh and 22 ppb Rh, respectively. The resultant locked cycle testing for rhodium recovery produced final concentrate grades of 1.51 g/t Rh and 41.7% recovery at Dana, and 1.88 g/t Rh and 39.1% recovery at Lismer. Increasing production capability for a higher-grade rhodium is recommended.

The present River Valley flowsheet has thickened rougher tailings treatment to produce a 55% solids density that is pumped to the TMF. The basis for the LOM impoundment area was determined from this mass flow rate. Process water recovery will be collected in the dam and returned to the process facility.

As an alternative to a wet tailings design TMF, preliminary testing was completed on thickened tailings to investigate a dewatered tailings / dry stack tailings. The basis for this investigation was to reduce the total volume required of the impounded tailings over the LOM. Two processes were considered in this initial testing: pressure filtration and centrifuge applications. Pressure filtration testing indicated the ability to produce a final tailings water content of 15% producing two products: dewatered tailings and process water for recycle. In the case(s) of the centrifuge testing, resultant water moistures varied between 17% and plus 20%. Three products resulted from the centrifuge testing: dewatered tailings, process water, and centrate (cloudy) water requiring additional processing to remove the fine slimes content.

Additional testing and detailed trade-off studies are recommended in this area to reduce overall volume site requirements for the LOM.

14.0 MINERAL RESOURCE ESTIMATES

14.1 INTRODUCTION

The Mineral Resource Estimate presented herein is reported in accordance with the Canadian Securities Administrators' National Instrument 43-101 and were estimated in conformity with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) "Estimation of Mineral Resource and Mineral Reserves Best Practice Guidelines" (November 2019) and reported using the definitions set out in the 2014 CIM Definition Standards on Mineral Resources and Mineral Reserves. Mineral Resources that are not converted to Mineral Reserves do not have demonstrated economic viability. Confidence in the estimate of Inferred Mineral Resource is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure. Mineral Resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent Mineral Resource Estimates.

This Mineral Resource Estimate was based on information and data supplied by NAM, and was undertaken by Yungang Wu, P.Geo. Antoine Yassa, P.Geo. and Eugene Puritch, P.Eng., FEC, CET of P&E Mining Consultants Inc. of Brampton, Ontario (the "Authors"). All of the Authors are Qualified Persons and are independent of NAM, as defined in NI 43-101. The effective date of this Mineral Resource Estimate is June 29, 2023.

14.2 DATABASE

All drilling and assay data were provided by NAM in the form of Excel data files. The GEOVIA GEMS™ V6.8.4 database compiled by the Authors for this Mineral Resource Estimate consisted of 723 drill holes, totalling 156,421 m as presented in Table 14.1. A drill hole plan is shown in Appendix A.

TABLE 14.1 **DRILL HOLE SUMMARY**		
Zone	**No. of Holes**	**Metres Drilled**
Dana North	169	37,730.8
Pine	15	2,894.8
Dana South	83	20,409.8
Lismer Ridge	104	20,599.0
Lismer North	54	11,529.0
Azen	33	6,929.4
Banshee	22	4,270.8
Varley	70	12,864.8
Razor	10	1,820.9
Mustang	67	16,441.8
Others*	96	20,929.9
Total	**723**	**156,421.0**

** Casson, Drop Zone, Jackson's Flats, MacDonald (Varley), MRS (Mustang), Pardo, RVP, Spade Lake (Azen), T3 (Pine).*

In addition to the 723 drill holes, the database contains 2,641 surface channel samples, all of which are 0.3 m in length. Since the channel samples exhibited some degree of bias and the areas in which they were taken were well drilled, it was decided to exclude them from the grade interpolation process. The channel samples were used for wireframe boundary creation.

The database contains Pd, Pt, Au, Co, Cu, Ni, Rh and Ag. The basic statistics of all raw assays are presented in Table 14.2.

TABLE 14.2 **RAW ASSAY DATABASE SUMMARY**									
Variable	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Co (%)**	**Cu (%)**	**Ni (%)**	**Rh (g/t)**	**Ag (g/t)**	**Length (m)**
Number of Samples	124,822	124,822	124,815	57,267	62,095	62,095	20,727	108,374	124,822
Minimum Value	0	0	0	0	0	0	0	0	0.04
Maximum Value	51.000	22.080	2.430	0.053	1.055	0.457	0.873	50.100	10.00
Mean	0.241	0.102	0.019	0.002	0.033	0.012	0.006	0.271	0.91
Median	0.041	0.033	0.006	0.002	0.011	0.008	0.000	0.000	1.00
Variance	0.476	0.057	0.002	0.000	0.003	0.000	0.000	1.030	0.14
Standard Deviation	0.690	0.238	0.040	0.002	0.057	0.014	0.020	1.015	0.38
Coefficient of Variation	2.863	2.326	2.095	0.993	1.697	1.154	3.549	3.748	0.41

Table 14.2 Raw Assay Database Summary									
Variable	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Co (%)**	**Cu (%)**	**Ni (%)**	**Rh (g/t)**	**Ag (g/t)**	**Length (m)**
Skewness	9.946	14.029	9.063	3.178	4.048	4.582	9.994	38.153	1.47
Kurtosis	314.562	734.941	232.826	45.469	32.651	62.669	242.102	1,834.486	10.94

All drill hole survey and assay values are expressed in metric units, with grid coordinates reported using the NAD 83, Zone 17N UTM system.

14.3 DATA VALIDATION

The Authors validated the Mineral Resource Estimate database in GEMS™ by checking for inconsistencies in analytical units, duplicate entries, interval, length or distance values less than or equal to zero, blank or zero-value assay results, out-of-sequence intervals, intervals or distances greater than the reported drill hole length, inappropriate collar locations, survey and missing interval and coordinate fields. A few minor errors were identified and corrected in the database. The Authors are of the opinion that the supplied database is suitable for Mineral Resource estimation.

14.4 DOMAIN INTERPRETATION

A total of ten mineralized domains were determined from lithology, structure, and grade boundary interpretation from visual inspection of drill hole vertical cross-sections. These domains were created with computer screen digitizing on drill hole vertical cross-sections. The domain outlines were influenced by the selection of mineralized material above CDN$10/t NSR that demonstrated lithological and structural zonal continuity along strike and down dip. In some cases, mineralization below CDN$10/t NSR was included for the purpose of maintaining zonal continuity and minimum width. The NSR was calculated with formula below:

NSR CDN$/t= [(Ni % x 48.15) + (Cu % x 61.59) + (Au g/t x 47.50) + (Ag g/t x 0.40) + (Pt g/t x 28.45) + (Pd g/t x 60.01) + (Rh g/t x 164.39) + (Co % x 49.60)] - 0.40

Minimum constrained drill core length for interpretation was approximately 2.0 m. On each vertical cross-section, polyline interpretations were digitized from drill hole to drill hole, however, not typically extended more than 50 m into untested territory. Interpreted polylines from each cross-section were wireframed (connected) to form 3-D mineralized domains. The mineralized domains were then clipped against an overburden surface constructed from the bottom of casings in drill hole logs. The resulting solids (wireframes or domains) were used for statistical analysis, grade interpolation, rock coding and Mineral Resource estimation. The 3-D domain wireframes are presented in Appendix B. A topographic surface was created using drill hole collars and LIDAR data.

14.5 ROCK CODE DETERMINATION

A unique rock code was assigned to the block model for each mineralized domain as presented in Table 14.3.

TABLE 14.3
ROCK CODES AND VOLUMES OF MINERALIZED DOMAINS FOR THE MINERAL RESOURCE ESTIMATE

Domain	Rock Type	Volume (m^3)
Dana North	100	12,033,874
Pine	200	771,063
Dana South	300	8,721,516
Lismer Ridge	500	13,879,966
Lismer North	600	4,370,790
Varley	700	9,027,648
Azen	800	12,642,099
Banshee	900	2,781,007
Razor	1000	10,020,632
Mustang	1100	20,379,025

14.6 WIREFRAME CONSTRAINED ASSAYS

Wireframe constrained assays were back-coded in the assay database with rock codes that were derived from intersections of the mineralized domains and drill holes. The basic statistics of mineralized wireframe constrained assays are presented in Table 14.4.

TABLE 14.4
BASIC STATISTICS OF ASSAYS CONSTRAINED WITHIN THE WIREFRAMES

Variable	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Co (%)	Ni (%)	Rh (g/t)	Ag (g/t)	Length (m)
Number of Samples	57,980	57,980	57,980	27,663	27,076	27,663	8,951	55,120	57,980
Minimum Value	0	0	0	0	0	0	0	0	0.050
Maximum Value	51.000	22.080	2.430	1.050	0.043	0.457	0.873	50.100	4.000
Mean	0.477	0.188	0.034	0.062	0.002	0.016	0.013	0.309	0.769
Median	0.156	0.090	0.017	0.037	0.002	0.011	0.001	0.000	0.500
Variance	0.906	0.105	0.003	0.005	0.000	0.000	0.001	1.597	0.108
Standard Deviation	0.952	0.323	0.053	0.073	0.002	0.016	0.029	1.264	0.328

Variable	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Co (%)	Ni (%)	Rh (g/t)	Ag (g/t)	Length (m)
Coefficient of Variation	1.995	1.719	1.537	1.171	0.769	0.975	2.273	4.083	0.427
Skewness	7.354	11.119	7.083	2.862	2.638	3.602	6.960	33.649	1.296
Kurtosis	178.628	449.019	147.630	18.925	31.026	48.594	122.263	1,315.274	6.654

14.7 COMPOSITING

In order to regularize the assay sampling intervals for grade interpolation, a 2.0 m compositing length was selected for the drill hole intervals that fell within the constraints of the above-noted Mineral Resource wireframes. The composites were calculated over 2.0 m lengths starting at the first point of intersection between assay data and hanging wall of the 3-D zonal constraint. The compositing process was halted upon exit from the footwall of the 3-D wireframe constraint. Background values, as stated below, were used for un-assayed intervals during compositing. The background values were derived from the average of low-grade constrained assays or by regression. If the last composite interval was less than 0.5 m, the composite length was discarded. This process would not introduce any short sample bias in the grade interpolation process. The constrained composite data were extracted to a point area file for grade capping analysis. The composite statistics are summarized in Table 14.5.

The wireframe constrained background grades used for un-assayed intervals for the Dana North, Pine, Dana South, Lismer North, Lismer Ridge, and Banshee mineralized domain areas are as follows:

- Cu = 0.057%.
- Ni = 0.014%.
- Co = 0.0026%.
- Rh = (Pt – 0.0086844)/10.8009; negative values set to 0.005 g/t.

The wireframe constrained background grades used for un-assayed intervals for the Azen, Razor, Varley, Banshee and Mustang mineralized domains are as follows:

- Cu = 0.014%.
- Ni = 0.010%.
- Co = 0.002%.
- Ag = 1.72 g/t.
- Au = 0.007 g/t.
- Pt = 0.031 g/t.
- Pd = 0.047 g/t.
- Rh = Pt/11.

TABLE 14.5
BASIC COMPOSITE STATISTICS

Variable	Pd (g/t)	Pt (g/t)	Au (g/t)	Co (%)	Cu (%)	Ni (%)	Ag (g/t)	Rh (g/t)	Length (m)
Number of Samples	22,883	22,883	22,883	20,726	22,377	22,377	20,722	22,883	22,883
Minimum Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.500
Maximum Value	15.853	6.673	1.206	0.037	0.665	0.357	50.100	0.499	2.000
Mean	0.443	0.177	0.032	0.003	0.054	0.015	0.362	0.013	1.980
Median	0.178	0.099	0.019	0.003	0.057	0.014	0.100	0.006	2.000
Variance	0.563	0.061	0.002	0.000	0.002	0.000	1.803	0.000	0.020
Standard Deviation	0.751	0.246	0.042	0.001	0.044	0.011	1.343	0.022	0.143
Coefficient of Variation	1.695	1.394	1.288	0.405	0.817	0.745	3.714	1.721	0.072
Skewness	4.749	5.403	4.358	4.117	2.705	5.846	30.783	4.956	-7.523
Kurtosis	44.009	66.436	51.159	87.309	16.833	104.530	1099.458	50.928	60.853

14.8 GRADE CAPPING

Grades capping was performed on the 2.0 m composite values in the database within the constraining domains to control the possible bias resulting from erratic high-grade composite values in the database. Log-normal histograms and log-probability plots for composites were generated for each mineralization domain. Selected histograms and log-probability plots are presented in Appendix C. The grade capping values are detailed in Table 14.6. The capped composite statistics are summarized in Table 14.7. The capped composites were utilized to develop variograms and for block model grade interpolation.

TABLE 14.6
GRADE CAPPING VALUES

Pd Capping								
Domains	**Total No. of Composites**	**Capping Value Pd (g/t)**	**No. of Capped Composites**	**Mean of Composites**	**Mean of Capped Composites**	**CoV of Composites**	**CoV of Capped Composites**	**Capping Percentile**
Dana North	7,002	6.30	4	0.476	0.475	1.557	1.541	99.9
Pine	429	no cap	0	0.725	0.725	1.310	1.310	100.0
Dana South	5,541	8.00	6	0.521	0.519	1.882	1.846	99.9
Lismer Ridge	3,633	6.00	1	0.396	0.393	1.438	1.332	100.0
Lismer North	1,343	7.00	2	0.533	0.523	1.597	1.385	99.9
Varley	1,369	5.50	3	0.415	0.412	1.618	1.576	99.8
Azen	703	no cap	0	0.257	0.257	1.120	1.120	100.0
Banshee	506	3.00	1	0.274	0.266	1.492	1.179	99.8
Razor	702	no cap	0	0.283	0.283	1.061	1.061	100.0
Mustang	1,655	no cap	0	0.216	0.216	1.219	1.219	100.0
Pt Capping								
Domains	**Total No. of Composites**	**Capping Value Pt (g/t)**	**No. of Capped Composites**	**Mean of Composites**	**Mean of Capped Composites**	**CoV of Composites**	**CoV of Capped Composites**	**Capping Percentile**
Dana North	7,002	2.00	7	0.187	0.186	1.271	1.253	99.9
Pine	429	no cap	0	0.254	0.254	1.175	1.175	100.0
Dana South	5,541	3.00	3	0.188	0.187	1.548	1.502	99.9
Lismer Ridge	3,633	2.00	3	0.168	0.167	1.219	1.115	99.9
Lismer North	1,343	2.00	4	0.222	0.216	1.432	1.138	99.7
Varley	1,369	1.70	7	0.161	0.158	1.550	1.422	99.5
Azen	703	no cap	0	0.092	0.092	1.013	1.013	100.0
Banshee	506	1.50	2	0.166	1.590	1.492	1.054	99.6
Razor	702	1.00	1	0.122	0.121	1.064	0.979	99.9
Mustang	1,655	1.50	5	0.137	0.135	1.269	1.100	99.7

TABLE 14.6
GRADE CAPPING VALUES

Au Capping

Domains	Total No. of Composites	Capping Value Au (g/t)	No. of Capped Composites	Mean of Composites	Mean of Capped Composites	CoV of Composites	CoV of Capped Composites	Capping Percentile
Dana North	7,002	no cap	0	0.035	0.035	1.224	1.224	100.0
Pine	429	no cap	0	0.042	0.042	1.157	1.157	100.0
Dana South	5,541	0.60	2	0.034	0.034	1.437	1.380	100.0
Lismer Ridge	3,633	no cap	0	0.030	0.030	1.127	1.127	100.0
Lismer North	1,343	no cap	0	0.036	0.036	1.052	1.052	100.0
Varley	1,369	no cap	0	0.028	0.028	1.450	1.450	100.0
Azen	703	no cap	0	0.019	0.019	1.201	1.201	100.0
Banshee	506	no cap	0	0.029	0.029	1.096	1.096	100.0
Razor	702	no cap	0	0.023	0.023	1.330	1.330	100.0
Mustang	1,655	no cap	0	0.030	0.030	1.279	1.279	100.0

Cu Capping

Domains	Total No. of Composites	Capping Value Cu (%)	No. of Capped Composites	Mean of Composites	Mean of Capped Composites	CoV of Composites	CoV of Capped Composites	Capping Percentile
Dana North	7,002	no cap	0	0.059	0.059	0.807	0.807	100.0
Pine	429	no cap	0	0.066	0.066	0.813	0.813	100.0
Dana South	5,541	0.50	1	0.060	0.060	0.849	0.844	100.0
Lismer Ridge	3,633	no cap	0	0.056	0.056	0.532	0.532	100.0
Lismer North	1,343	no cap	0	0.058	0.058	0.356	0.356	100.0
Varley	1,369	no cap	0	0.029	0.029	1.076	1.076	100.0
Azen	703	no cap	0	0.029	0.029	1.170	1.170	100.0
Razor	702	no cap	0	0.023	0.023	1.011	1.011	100.0
Mustang	1,655	no cap	0	0.046	0.046	0.958	0.958	100.0

TABLE 14.6
GRADE CAPPING VALUES

Ni Capping								
Domains	**Total No. of Composites**	**Capping Value Ni (%)**	**No. of Capped Composites**	**Mean of Composites**	**Mean of Capped Composites**	**CoV of Composites**	**CoV of Capped Composites**	**Capping Percentile**
Dana North	7,002	no cap	0	0.014	0.014	0.601	0.601	100.0
Pine	429	no cap	0	0.021	0.021	1.155	1.155	100.0
Dana South	5,541	no cap	0	0.014	0.014	0.622	0.622	100.0
Lismer Ridge	3,633	no cap	0	0.014	0.014	0.480	0.480	100.0
Lismer North	1,343	no cap	0	0.013	0.013	0.261	0.261	100.0
Varley	1,369	no cap	0	0.011	0.011	0.545	0.545	100.0
Azen	703	no cap	0	0.016	0.016	0.936	0.936	100.0
Razor	702	no cap	0	0.016	0.016	0.937	0.937	100.0
Mustang	1,655	no cap	0	0.024	0.024	0.928	0.928	100.0
Co Capping								
Domains	**Total No. of Composites**	**Capping Value Co (%)**	**No. of Capped Composites**	**Mean of Composites**	**Mean of Capped Composites**	**CoV of Composites**	**CoV of Capped Composites**	**Capping Percentile**
Dana North	7,002	no cap	0	0.003	0.003	0.373	0.373	100.0
Pine	429	no cap	0	0.003	0.003	0.372	0.372	100.0
Dana South	5,541	no cap	0	0.003	0.003	0.384	0.384	100.0
Lismer Ridge	3,633	no cap	0	0.003	0.003	0.298	0.298	100.0
Lismer North	1,343	no cap	0	0.003	0.003	0.208	0.208	100.0
Varley	1,369	no cap	0	0.002	0.002	0.298	0.298	100.0
Azen	703	0.02	5	0.002	0.002	1.061	0.819	99.3
Razor	702	no cap	0	0.002	0.002	0.526	0.526	100.0
Mustang	1,655	no cap	0	0.002	0.002	0.333	0.333	100.0

TABLE 14.6
GRADE CAPPING VALUES

Domains	Total No. of Composites	Capping Value Rh (g/t)	No. of Capped Composites	Mean of Composites	Mean of Capped Composites	CoV of Composites	CoV of Capped Composites	Capping Percentile
Rh Capping								
Dana North	7,002	no cap	0	0.016	0.016	1.406	1.406	100.0
Pine	429	no cap	0	0.023	0.023	1.190	1.190	100.0
Dana South	5,541	0.30	3	0.017	0.017	1.623	1.579	99.9%
Lismer Ridge	3,633	0.25	1	0.015	0.015	1.272	1.182	100.0
Lismer North	1,343	0.20	4	0.020	0.019	1.331	1.189	99.7
Ag Capping								
Domains	**Total No. of Composites**	**Capping Value Ag (g/t)**	**No. of Capped Composites**	**Mean of Composites**	**Mean of Capped Composites**	**CoV of Composites**	**CoV of Capped Composites**	**Capping Percentile**
Dana North	7,002	no cap	0	0.459	0.459	1.159	1.159	100.0
Pine	429	no cap	0	0.684	0.684	0.700	0.700	100.0
Dana South	5,541	no cap	0	0.357	0.357	1.326	1.326	100.0
Lismer Ridge	3,633	no cap	0	0.152	0.152	2.006	2.006	100.0
Lismer North	1,343	no cap	0	0.095	0.095	2.479	2.479	100.0
Varley	1,369	no cap	0	0.125	0.125	2.195	2.195	100.0
Azen	703	30.00	12	1.431	1.093	4.727	4.050	98.3
Razor	702	no cap	0	0.217	0.217	1.627	1.627	100.0

Note: *CoV = coefficient of variation.*

TABLE 14.7 BASIC CAPPED COMPOSITE STATISTICS								
Variable	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Co (%)**	**Ni (%)**	**Rh (g/t)**	**Ag (g/t)**
Number of Samples	22,883	22,883	22,883	22,377	20,726	22,377	22,883	20,722
Minimum Value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum Value	8.000	3.000	0.729	0.577	0.02	0.357	0.309	30
Mean	0.441	0.175	0.032	0.054	0.003	0.015	0.013	0.350
Median	0.178	0.099	0.019	0.057	0.003	0.014	0.006	0.100
Variance	0.526	0.053	0.002	0.002	0.000	0.000	0.000	0.894
Standard Deviation	0.725	0.231	0.041	0.044	0.001	0.011	0.022	0.946
Coefficient of Variation	1.646	1.314	1.271	0.815	0.389	0.745	1.676	2.701
Skewness	3.847	3.630	3.617	2.649	2.184	5.846	4.075	23.054
Kurtosis	23.201	22.317	26.142	15.786	25.631	104.542	29.068	687.159

14.9 VARIOGRAPHY

A variography analysis was attempted using the palladium capped composites within individual domains as a guide to determining a grade interpolation search distance and ellipse orientation strategy. Selected variograms are presented in Appendix D.

Continuity ellipses based on the observed ranges were subsequently generated and utilized as the basis for estimation search ranges, distance weighting calculations and Mineral Resource classification criteria.

14.10 BULK DENSITY

A total of 432 bulk density samples were tested from Dana North, Dana South and Lismer Ridge Zones. The bulk density ranged from 2.61 t/m^3 to 3.26 t/m^3 with average of 2.94 t/m^3. A uniform bulk density 2.94 t/m^3 was applied for all mineralized domains for this Mineral Resource Estimate.

The Authors recommend collection of more bulk density samples from all zones, various rock types and mineralization types in order to create future bulk density models.

14.11 BLOCK MODELLING

The River Valley block model was constructed using GEOVIA GEMS™ V6.8.4 modelling software. The block model origin and block size are presented in Table 14.8. The block model consists of separate model attributes for estimated grades, NSR, rock type (mineralization domains), volume percent, bulk density, and classification.

TABLE 14.8 RIVER VALLEY BLOCK MODEL DEFINITION			
Direction	**Origin***	**No. of Blocks**	**Block Size (m)**
X	554,600	2,330	5
Y	5,163,000	2,100	5
Z	350	102	5
Rotation	0 º		

***** *Origin for a block model in GEMS™ represents the coordinate of the outer edge of the block with minimum X and Y, and maximum Z.*

All blocks in the rock type block model were initially assigned a waste rock code of 99, corresponding to the surrounding country rocks. The mineralization domain was used to code all blocks within the rock type block model that contain 0.01% or greater volume within the wireframe domain. These blocks were assigned individual rock codes as presented in Table 14.3. The overburden and topographic surfaces were subsequently utilized to assign respective rock codes 10 and 0, corresponding to overburden and air for all blocks 50% or greater above the surfaces.

A volume percent block model was set up to accurately represent the volume and subsequent tonnage that was occupied by each block inside the constraining wireframe domain. As a result, the domain boundary was properly represented by the volume percent model ability to measure individual infinitely variable block inclusion percentages within that domain. The minimum percentage of the mineralization block was set to 0.01%.

Palladium, platinum, gold, rhodium and silver grades were interpolated into the blocks using Inverse Distance weighting to the third power (“ID^3”), whereas copper, nickel and cobalt grades were interpolated with Inverse Distance squared (“ID^2”). Nearest Neighbour (“NN”) was run for validation purpose. Multiple passes were executed for the grade interpolation to progressively capture the sample points, to avoid over-smoothing and preserve local grade variability. Grade blocks were interpolated using the parameters in Table 14.9.

TABLE 14.9 BLOCK MODEL GRADE INTERPOLATION PARAMETERS						
Pass	**No. of Composites**			**Search Range (m)**		
	Min	**Max**	**Max per Hole**	**Major**	**Semi-Major**	**Minor**
I	5	15	2	30	30	15
II	3	15	2	50	50	25
III	1	15	2	150	150	75

For rhodium, the grades used for un-assayed intervals were calculated with the following formula, based on a Robust Simple Regression analysis:

- Rh g/t = (Pt g/t - 0.0086844)/10.8009

Robust Regression reduces the influence of outlier assay points on the analysis (Rousseeuw and Leroy, 1987; Rollinson 1993). The Robust Simple Regression analysis for rhodium was completed by NAM in ioGAS version 6.1 modelling software.

Selected vertical cross-sections and plans for Pd and NSR blocks are presented in Appendices E and F, respectively.

14.12 MINERAL RESOURCE CLASSIFICATION

In the opinion of the Authors, all of the drilling, assaying and exploration work on the River Valley Project supports this Mineral Resource Estimate, and is based on spatial continuity of the mineralization within a potentially mineable shape, which is sufficient to indicate a reasonable potential for economic extraction, thus qualifying it as a Mineral Resource under the 2014 CIM Definition Standards. The Mineral Resource was classified as Measured, Indicated, and Inferred based on the geological interpretation, Pd variogram performance and drill hole spacing.

Measured Mineral Resources were classified for the blocks interpolated with the Pass I in Table 14.9, which used at least three drill holes with a 30 m spacing. Indicated Mineral Resources were classified for the blocks interpolated with the Pass II in Table 14.9, which used at least two drill holes with a 50 m spacing. Inferred Mineral Resources were classified for the blocks interpolated with the Pass III in Table 14.9, which used at least one drill hole with a 150 m spacing. The classifications were manually adjusted on a longitudinal projection to reasonably reflect the distribution of each classification. Selected classification block vertical sections and plans are attached in Appendix G.

14.13 NSR CUT-OFF VALUE CALCULATION

The River Valley Mineral Resource Estimate was derived from applying NSR cut-off values to the block model and reporting the resulting tonnes and grades for potentially mineable areas.

The following parameters were used to calculate the NSR values that determine pit constrained and out-of-pit potentially economic portions of the constrained mineralization:

- Metal prices and US$ currency exchange rate based on approximate three-year trailing average as of July 31, 2021:

Pd price:	US$1,850/oz
Pt price:	US$900/oz
Au price:	US$1,600/oz
Ag price:	US$18.50/oz
Rh price:	US$8,000/oz
Ni price:	US$6.50/lb
Cu price:	US$3.0/lb

Co price:	US$16/lb
Currency exchange rate:	CDN$/US$=0.75
Pd process recovery:	80%
Pt process recovery:	80%
Au process recovery:	80%
Ag process recovery:	80%
Rh process recovery:	80%
Ni process recovery:	30%
Cu process recovery:	85%
Co process recovery:	25%
Pd smelter payable:	80%
Pt smelter payable:	80%
Au smelter payable:	85%
Ag smelter payable:	65%
Rh smelter payable:	80%
Ni smelter payable:	90%
Cu smelter payable:	85%
Co smelter payable:	50%

- Open pit marginal processing and G&A cost of CDN$15/t; and
- Underground mining, processing and G&A cost of CDN$50/t.

The NSR cut-off value of the pit constrained Mineral Resource is CDN$15/t. The NSR cut-off value of the out-of-pit Mineral Resource is CDN$50/t.

14.13.1 Pit Optimization Parameters

The block model was further investigated with a pit optimization to ensure that a reasonable assumption of potential economic extraction could be made (see pit shell in Appendix H). The following parameters were utilized in the pit optimization:

- Metal Values: From parameters above
- All Materials Mining Cost: CDN$2.25/t mined
- Process Cost: CDN$12.50/t processed
- General & Administration Cost: CDN$2.50/t processed
- Process Capacity: 15,000 tpd
- Pit Slopes: 50°

14.14 MINERAL RESOURCE ESTIMATE

The Mineral Resource Estimate is reported with an effective date of June 29, 2023, and is tabulated in Table 14.10. The Authors consider the mineralization of the River Valley Project to be potentially amenable to open pit and underground mining methods.

TABLE 14.10
MINERAL RESOURCE ESTIMATE (1-4)

Pit Constrained Mineral Resources @ CDN$15/t NSR Cut-off

Zone	Class	Tonnes (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
Dana North	Measured	8,418	0.63	170.0	0.23	63.4	0.04	12.0	0.07	13.0	0.003	0.5	0.02	3	0.020	5.5	0.57	153.7	54.84
	Indicated	16,733	0.53	283.5	0.21	111.0	0.04	20.0	0.06	22.4	0.003	1.0	0.01	5	0.018	9.7	0.33	178.0	46.53
	Inferred	1,884	0.48	29.1	0.20	12.0	0.04	2.2	0.06	2.5	0.003	0.1	0.02	1	0.017	1.0	0.17	10.4	43.26
Pine	Measured	559	0.91	16.4	0.31	5.6	0.05	0.9	0.07	0.8	0.003	0.0	0.02	0.2	0.029	0.5	0.49	8.8	75.55
	Indicated	1,019	0.62	20.4	0.22	7.3	0.04	1.2	0.06	1.3	0.003	0.1	0.02	0.4	0.020	0.7	0.80	26.1	53.36
	Inferred	2	0.16	0.0	0.14	0.0	0.03	0.0	0.05	0.0	0.003	0.0	0.01	0.0	0.012	0.0	0.95	0.1	20.89
Dana South	Measured	6,508	0.77	160.7	0.26	53.4	0.05	9.8	0.07	9.9	0.003	0.4	0.02	2	0.023	4.8	0.38	79.8	64.23
	Indicated	8,866	0.62	176.9	0.23	65.0	0.04	10.8	0.06	12.3	0.003	0.5	0.01	3	0.020	5.8	0.35	99.1	53.34
	Inferred	1,165	0.42	15.6	0.16	5.8	0.03	1.0	0.06	1.4	0.003	0.1	0.01	0.4	0.014	0.5	0.23	8.7	37.02
Banshee	Indicated	2,438	0.29	22.5	0.17	13.5	0.03	2.6	0.06	3.1	0.003	0.1	0.01	1	0.015	1.2	-	-	30.11
	Inferred	3,514	0.29	32.8	0.16	17.6	0.03	3.1	0.06	4.4	0.003	0.2	0.01	1	0.014	1.5	-	-	29.28
Azen	Inferred	23,417	0.37	282.2	0.12	93.1	0.03	18.9	0.03	16.1	0.003	1.3	0.02	9	0.011	8.5	0.75	564.1	31.85
Lismer Ridge	Indicated	24,473	0.46	364.2	0.19	149.1	0.03	26.5	0.06	32.1	0.003	1.4	0.02	8	0.017	13.1	0.17	133.4	41.70
	Inferred	6,280	0.39	79.7	0.16	31.8	0.03	5.7	0.05	7.1	0.002	0.3	0.01	2	0.015	3.0	0.09	19.1	35.51
Lismer North	Indicated	8,140	0.54	142.5	0.23	59.3	0.04	9.7	0.06	10.6	0.003	0.4	0.01	2	0.020	5.3	0.11	28.6	48.27
	Inferred	2,754	0.61	54.0	0.24	21.5	0.04	3.6	0.06	3.5	0.003	0.2	0.01	1	0.022	1.9	0.02	1.7	52.95
Razor	Inferred	16,677	0.36	191.3	0.15	82.6	0.03	15.7	0.03	9.7	0.002	0.7	0.02	7	0.014	7.5	0.22	118.0	29.46
Mustang	Inferred	30,889	0.27	266.3	0.17	166.0	0.04	36.2	0.06	37.6	-	-	0.03	18	0.015	15.1	-	-	26.82
Varley	Indicated	11,844	0.50	188.9	0.19	71.5	0.03	11.9	0.03	8.1	0.002	0.5	0.01	3	0.017	6.5	0.12	47.5	41.64
	Inferred	6,097	0.42	82.3	0.16	31.4	0.03	5.4	0.03	3.8	0.002	0.3	0.01	2	0.015	2.9	0.10	18.6	35.50
Total Pit Con-strained	Measured	15,485	0.70	347.1	0.25	122.4	0.05	22.7	0.07	23.7	0.003	0.9	0.02	5.2	0.02	10.8	0.49	242.3	59.53
	Indicated	73,513	0.51	1,198.9	0.20	476.7	0.03	82.7	0.06	89.9	0.002	4.0	0.01	22.4	0.02	42.3	0.22	512.7	44.70
	M+I	**88,998**	**0.54**	**1,546.0**	**0.21**	**599.1**	**0.04**	**105.4**	**0.06**	**113.6**	**0.002**	**4.9**	**0.01**	**27.6**	**0.02**	**53.1**	**0.26**	**755.0**	**47.28**
	Inferred	92,679	0.35	1,033.3	0.15	461.8	0.03	91.8	0.04	86.1	0.002	3.2	0.02	41.4	0.01	41.9	0.25	740.7	31.06

TABLE 14.10
MINERAL RESOURCE ESTIMATE [1-4]

Out-of-Pit Mineral Resources @ CDN$50/t NSR Cut-off

Zone	**Class**	**Tonnes (k)**	**Pd (g/t)**	**Pd (koz)**	**Pt (g/t)**	**Pt (koz)**	**Au (g/t)**	**Au (koz)**	**Cu (%)**	**Cu (Mlb)**	**Co (%)**	**Co (Mlb)**	**Ni (%)**	**Ni (Mlb)**	**Rh (g/t)**	**Rh (koz)**	**Ag (g/t)**	**Ag (koz)**	**NSR (CDN$/t)**
Dana North	Measured	0.1	1.01	0.00	0.43	0.00	0.06	0.00	0.05	0.00	0.003	0.00	0.01	0.00	0.038	0.00	0.05	0.00	85.44
	Indicated	130.3	1.19	4.99	0.41	1.73	0.08	0.32	0.07	0.19	0.003	0.01	0.02	0.04	0.038	0.16	0.08	0.35	97.58
	Inferred	94.4	0.88	2.67	0.34	1.03	0.07	0.21	0.09	0.19	0.003	0.01	0.02	0.04	0.030	0.09	0.53	1.61	77.14
Pine	Measured	2.8	1.06	0.09	0.36	0.03	0.07	0.01	0.10	0.01	0.003	0.00	0.03	0.00	0.033	0.00	0.53	0.05	89.92
	Indicated	26.4	0.77	0.66	0.25	0.22	0.05	0.04	0.09	0.05	0.004	0.00	0.08	0.04	0.023	0.02	1.00	0.85	69.34
Dana South	Indicated	354.2	1.15	13.05	0.35	3.96	0.06	0.67	0.09	0.67	0.003	0.02	0.02	0.15	0.031	0.36	0.29	3.36	92.64
	Inferred	210.3	0.98	6.63	0.30	2.05	0.06	0.39	0.08	0.38	0.003	0.02	0.02	0.09	0.027	0.18	0.52	3.49	80.71
Banshee	Indicated	1.3	0.65	0.03	0.23	0.01	0.03	0.00	0.06	0.00	0.003	0.00	0.01	0.00	0.020	0.00	-	-	54.20
	Inferred	91.2	0.68	1.99	0.35	1.04	0.02	0.06	0.06	0.11	0.003	0.01	0.01	0.03	0.032	0.09	-	-	60.96
Azen	Inferred	40.5	0.77	1.00	0.23	0.30	0.04	0.06	0.07	0.06	0.003	0.00	0.04	0.03	0.021	0.03	0.86	1.12	64.43
Lismer Ridge	Indicated	31.0	0.94	0.94	0.36	0.36	0.06	0.06	0.06	0.04	0.003	0.00	0.01	0.01	0.033	0.03	0.00	0.00	78.98
	Inferred	499.1	0.78	12.46	0.32	5.14	0.04	0.64	0.05	0.58	0.002	0.02	0.01	0.13	0.035	0.56	0.53	8.58	67.06
Lismer North	Indicated	54.4	0.83	1.46	0.32	0.56	0.05	0.08	0.06	0.07	0.003	0.00	0.01	0.02	0.029	0.05	0.00	0.00	69.95
	Inferred	164.6	0.75	3.95	0.36	1.89	0.06	0.32	0.06	0.21	0.003	0.01	0.01	0.05	0.032	0.17	0.00	0.02	66.99
Razor	Inferred	96.9	0.91	2.82	0.40	1.24	0.04	0.12	0.02	0.04	0.002	0.00	0.01	0.02	0.036	0.11	0.08	0.26	68.98
Mustang	Inferred	325.6	0.69	7.19	0.53	5.54	0.05	0.54	0.06	0.42	-	-	0.02	0.15	0.048	0.50	-	-	62.91
Varley	Indicated	41.6	0.81	1.08	0.32	0.43	0.06	0.08	0.05	0.05	0.002	0.00	0.02	0.01	0.029	0.04	0.17	0.23	68.81
	Inferred	66.7	0.78	1.66	0.27	0.58	0.05	0.10	0.04	0.05	0.002	0.00	0.01	0.02	0.025	0.05	0.09	0.20	63.14
Total Out-of-Pit	Measured	2.9	1.05	0.10	0.37	0.03	0.07	0.01	0.10	0.01	0.003	0.00	0.03	0.00	0.033	0.00	0.51	0.05	89.72
	Indicated	639.3	1.08	22.21	0.35	7.26	0.06	1.25	0.08	1.06	0.003	0.04	0.02	0.28	0.032	0.66	0.23	4.79	88.46
	M+I	**642.1**	**1.08**	**22.31**	**0.35**	**7.29**	**0.06**	**1.25**	**0.08**	**1.07**	**0.003**	**0.04**	**0.02**	**0.28**	**0.032**	**0.66**	**0.23**	**4.84**	**88.47**
	Inferred	1,589.2	0.79	40.38	0.37	18.82	0.05	2.44	0.06	2.04	0.002	0.07	0.02	0.56	0.035	1.79	0.30	15.29	68.14

Table 14.10
Mineral Resource Estimate (1-4)

Total Mineral Resources @ CDN$15 & CDN$50/t NSR Cut-off																			
Zone	**Class**	**Tonnes (k)**	**Pd (g/t)**	**Pd (koz)**	**Pt (g/t)**	**Pt (koz)**	**Au (g/t)**	**Au (koz)**	**Cu (%)**	**Cu (Mlb)**	**Co (%)**	**Co (Mlb)**	**Ni (%)**	**Ni (Mlb)**	**Rh (g/t)**	**Rh (koz)**	**Ag (g/t)**	**Ag (koz)**	**NSR (CDN$/t)**
Total Resource	Measured	15,488	0.70	347.2	0.25	122.4	0.05	22.7	0.07	23.7	0.003	0.9	0.02	5.2	0.022	10.8	0.49	242.4	59.54
	Indicated	74,152	0.51	1,221.1	0.20	484.0	0.04	84.0	0.06	91.0	0.002	4.0	0.01	22.7	0.018	43.0	0.22	517.5	45.08
	M+I	**89,640**	**0.54**	**1,568.3**	**0.21**	**606.4**	**0.04**	**106.7**	**0.06**	**114.7**	**0.002**	**4.9**	**0.01**	**27.9**	**0.019**	**53.8**	**0.26**	**759.8**	**47.58**
	Inferred	94,268	0.35	1,073.7	0.16	480.6	0.03	94.2	0.04	88.1	0.002	3.3	0.02	42.0	0.014	43.7	0.25	756.0	31.69

Notes: *Class = classification, M+I = Measured and Indicated.*

1. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
2. *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.*
3. *The Inferred Mineral Resource in this estimate has a lower level of confidence than that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could potentially be upgraded to an Indicated Mineral Resource with continued exploration.*
4. *The Mineral Resources were estimated in accordance with the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions (2014) and Best Practices Guidelines (2019) prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council.*

14.15 MINERAL RESOURCE SENSITIVITIES

Mineral Resources are sensitive to the selection of a reporting NSR cut-off value and are demonstrated in Tables 14.11 and Table 14.12 for pit constrained, and in Table 14.13 for out-of-pit Mineral Resources, respectively.

Table 14.11
Pit Constrained Mineral Resources Sensitivity @ CDN$25/t NSR Cut-off

Zone	Class	Tonnes (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
Dana North	Measured	6,143	0.79	156.2	0.28	55.9	0.05	10.7	0.08	10.8	0.003	0.4	0.02	2.4	0.025	4.9	0.60	119.1	67.86
	Indicated	11,159	0.70	251.5	0.26	93.6	0.05	16.9	0.07	16.2	0.003	0.7	0.02	3.7	0.023	8.3	0.36	130.2	60.23
	Inferred	1,305	0.61	25.8	0.24	10.2	0.04	1.8	0.06	1.8	0.003	0.1	0.02	0.5	0.022	0.9	0.19	7.8	53.98
Pine	Measured	479	1.03	15.9	0.35	5.4	0.06	0.8	0.07	0.8	0.003	0.0	0.02	0.2	0.032	0.5	0.48	7.3	84.91
	Indicated	756	0.77	18.7	0.27	6.5	0.04	1.0	0.07	1.1	0.003	0.0	0.02	0.3	0.024	0.6	0.79	19.2	65.17
	Inferred	0	0.20	0.0	0.18	0.0	0.05	0.0	0.08	0.0	0.004	0.0	0.02	0.0	0.016	0.0	0.96	0.0	28.47
Dana South	Measured	4,650	1.00	150.1	0.32	47.4	0.06	8.5	0.08	7.9	0.003	0.3	0.02	1.7	0.029	4.3	0.43	64.7	82.22
	Indicated	5,823	0.85	159.7	0.29	54.9	0.05	9.0	0.07	9.0	0.003	0.4	0.02	2.1	0.027	5.1	0.36	66.8	71.12
	Inferred	751	0.54	13.0	0.19	4.7	0.03	0.7	0.06	1.0	0.003	0.0	0.02	0.2	0.017	0.4	0.22	5.3	46.37
Banshee	Indicated	1,374	0.38	16.6	0.22	9.8	0.04	1.6	0.06	1.7	0.003	0.1	0.01	0.4	0.02	0.9	0.00	0.0	37.85
	Inferred	2,000	0.37	23.7	0.19	12.3	0.03	1.8	0.06	2.5	0.003	0.1	0.01	0.6	0.017	1.1	0.00	0.0	35.64
Azen	Inferred	14,685	0.47	221.4	0.15	71.3	0.03	14.2	0.03	11.0	0.002	0.6	0.02	6.2	0.014	6.6	0.73	345.6	39.17
Lismer Ridge	Indicated	16,100	0.61	315.2	0.24	122.2	0.04	21.7	0.06	22.7	0.003	1.1	0.02	5.7	0.021	10.9	0.20	102.5	53.16
	Inferred	3,501	0.55	62.0	0.22	24.2	0.04	4.2	0.05	4.1	0.003	0.2	0.01	1.0	0.021	2.4	0.10	11.5	48.03
Lismer North	Indicated	6,238	0.66	132.6	0.27	53.1	0.04	8.6	0.06	8.3	0.003	0.4	0.01	1.9	0.024	4.8	0.12	24.3	57.33
	Inferred	2,210	0.72	50.9	0.28	19.5	0.05	3.3	0.06	2.8	0.003	0.1	0.01	0.7	0.025	1.8	0.02	1.4	61.07
Razor	Inferred	8,043	0.50	129.8	0.21	54.6	0.04	9.6	0.03	5.1	0.002	0.4	0.02	3.2	0.000	0.0	0.21	53.8	40.35
Mustang	Inferred	12,719	0.40	164.0	0.22	90.8	0.04	18.0	0.06	16.8	0.000	0.0	0.03	8.7	0.000	0.0	0.00	0.0	37.25
Varley	Indicated	7,345	0.65	153.5	0.24	56.9	0.04	9.4	0.04	5.7	0.002	0.3	0.01	1.9	0.022	5.2	0.15	35.2	53.86
	Inferred	3,212	0.59	60.4	0.22	22.3	0.04	3.7	0.03	2.3	0.002	0.1	0.01	0.8	0.020	2.1	0.12	12.1	48.45
Total	Measured	11,272	0.89	322.2	0.30	108.7	0.06	20.0	0.05	19.5	0.002	0.7	0.01	4.4	0.027	9.8	0.53	191.1	74.51
	Indicated	48,795	0.67	1,047.8	0.25	397.1	0.04	68.3	0.04	64.7	0.002	3.1	0.01	16.0	0.023	35.7	0.24	378.2	57.31
	M+I	**60,066**	**0.71**	**1,370.0**	**0.26**	**505.7**	**0.05**	**88.4**	**0.04**	**84.2**	**0.002**	**3.8**	**0.01**	**20.4**	**0.024**	**45.4**	**0.29**	**569.3**	**60.54**
	Inferred	48,426	0.48	751.0	0.20	309.9	0.04	57.3	0.03	47.4	0.001	1.8	0.01	21.8	0.010	15.2	0.28	437.5	41.48

Notes: *Class = classification, M+I = Measured and Indicated.*

TABLE 14.12
SENSITIVITIES OF PIT CONSTRAINED MINERAL RESOURCE ESTIMATE

Zone	Class	Cut-off NSR (CDN$/t)	Tonnage (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
Dana North	Measured	30	5,296	0.87	148.4	0.31	52.1	0.06	9.9	0.08	9.9	0.003	0.3	0.02	2	0.027	4.6	0.62	105.6	74.28
		25	6,143	0.79	156.2	0.28	55.9	0.05	10.7	0.08	10.8	0.003	0.4	0.02	2.4	0.025	4.9	0.60	119.1	67.86
		20	7,229	0.70	163.7	0.26	59.8	0.05	11.4	0.07	11.9	0.003	0.4	0.02	3	0.022	5.2	0.59	136.1	60.99
		15	8,418	0.63	170.0	0.23	63.4	0.04	12.0	0.07	13.0	0.003	0.5	0.02	3	0.020	5.5	0.57	153.7	54.84
		10	9,680	0.56	174.3	0.21	66.1	0.04	12.6	0.07	14.0	0.003	0.6	0.02	3	0.018	5.7	0.55	171.1	49.32
	Indicated	30	9,232	0.78	233.0	0.29	85.0	0.05	15.2	0.07	14.0	0.003	0.6	0.02	3	0.025	7.6	0.38	111.7	66.76
		25	11,159	0.70	251.5	0.26	93.6	0.05	16.9	0.07	16.2	0.003	0.7	0.02	3.7	0.023	8.3	0.36	130.2	60.23
		20	13,683	0.61	268.0	0.23	102.2	0.04	18.4	0.06	19.2	0.003	0.8	0.02	5	0.020	9.0	0.34	151.7	53.01
		15	16,733	0.53	283.5	0.21	111.0	0.04	20.0	0.06	22.4	0.003	1.0	0.01	5	0.018	9.7	0.33	178.0	46.53
		10	19,701	0.46	293.2	0.19	117.3	0.03	21.1	0.06	25.3	0.003	1.1	0.01	6	0.016	10.2	0.32	200.9	41.41
	Inferred	30	1,100	0.68	23.9	0.27	9.4	0.05	1.7	0.07	1.6	0.003	0.1	0.02	0.4	0.024	0.8	0.20	7.0	58.88
		25	1,305	0.61	25.8	0.24	10.2	0.04	1.8	0.06	1.8	0.003	0.1	0.02	0.5	0.022	0.9	0.19	7.8	53.98
		20	1,524	0.56	27.3	0.22	11.0	0.04	2.0	0.06	2.1	0.003	0.1	0.02	1	0.020	1.0	0.18	8.9	49.38
		15	1,884	0.48	29.1	0.20	12.0	0.04	2.2	0.06	2.5	0.003	0.1	0.02	1	0.017	1.0	0.17	10.4	43.26
		10	2,234	0.42	30.2	0.18	12.7	0.03	2.3	0.06	2.9	0.003	0.1	0.02	1	0.015	1.1	0.16	11.7	38.47
Pine	Measured	30	445	1.09	15.5	0.37	5.3	0.06	0.8	0.07	0.7	0.003	0.0	0.02	0.2	0.034	0.5	0.46	6.6	89.22
		25	479	1.03	15.9	0.35	5.4	0.06	0.8	0.07	0.8	0.003	0.0	0.02	0.2	0.032	0.5	0.48	7.3	84.91
		20	518	0.97	16.1	0.33	5.5	0.05	0.9	0.07	0.8	0.003	0.0	0.02	0.2	0.030	0.5	0.48	8.0	80.14
		15	559	0.91	16.4	0.31	5.6	0.05	0.9	0.07	0.8	0.003	0.0	0.02	0.2	0.029	0.5	0.49	8.8	75.55
		10	609	0.85	16.6	0.29	5.7	0.05	0.9	0.06	0.9	0.003	0.0	0.02	0.2	0.027	0.5	0.50	9.8	70.37
	Indicated	30	655	0.84	17.8	0.29	6.1	0.05	1.0	0.07	1.0	0.003	0.0	0.02	0.3	0.026	0.6	0.78	16.3	71.03
		25	756	0.77	18.7	0.27	6.5	0.04	1.0	0.07	1.1	0.003	0.0	0.02	0.3	0.024	0.6	0.79	19.2	65.17
		20	869	0.70	19.6	0.25	6.9	0.04	1.1	0.06	1.2	0.003	0.1	0.02	0.4	0.022	0.6	0.79	22.2	59.60
		15	1,019	0.62	20.4	0.22	7.3	0.04	1.2	0.06	1.3	0.003	0.1	0.02	0.4	0.020	0.7	0.80	26.1	53.36

TABLE 14.12
SENSITIVITIES OF PIT CONSTRAINED MINERAL RESOURCE ESTIMATE

Zone	Class	Cut-off NSR (CDN$/t)	Tonnage (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
		10	1,270	0.52	21.2	0.19	7.9	0.03	1.3	0.05	1.5	0.003	0.1	0.02	1	0.017	0.7	0.79	32.3	45.22
	Inferred	20	1	0.19	0.0	0.17	0.0	0.04	0.0	0.06	0.0	0.004	0.0	0.01	0.0	0.015	0.0	0.94	0.0	25.06
		15	2	0.16	0.0	0.14	0.0	0.03	0.0	0.05	0.0	0.003	0.0	0.01	0.0	0.012	0.0	0.95	0.1	20.89
		10	7	0.13	0.0	0.10	0.0	0.01	0.0	0.03	0.0	0.003	0.0	0.01	0.0	0.008	0.0	0.94	0.2	14.71
Dana South	Measured	30	4,129	1.09	145.2	0.34	45.4	0.06	8.2	0.08	7.3	0.003	0.3	0.02	2	0.031	4.1	0.45	59.9	89.10
		25	4,650	1.00	150.1	0.32	47.4	0.06	8.5	0.08	7.9	0.003	0.3	0.02	1.7	0.029	4.3	0.43	64.7	82.22
		20	5,386	0.90	155.2	0.29	50.0	0.05	9.1	0.07	8.7	0.003	0.3	0.02	2	0.026	4.5	0.41	71.1	74.01
		15	6,508	0.77	160.7	0.26	53.4	0.05	9.8	0.07	9.9	0.003	0.4	0.02	2	0.023	4.8	0.38	79.8	64.23
		10	8,247	0.63	166.1	0.22	57.1	0.04	10.7	0.06	11.5	0.003	0.5	0.01	3	0.019	5.1	0.35	91.6	53.31
	Indicated	30	4,921	0.96	151.6	0.32	50.9	0.05	8.4	0.07	7.8	0.003	0.3	0.02	2	0.029	4.6	0.36	57.1	79.10
		25	5,823	0.85	159.7	0.29	54.9	0.05	9.0	0.07	9.0	0.003	0.4	0.02	2.1	0.027	5.1	0.36	66.8	71.12
		20	7,077	0.74	168.1	0.26	59.5	0.04	9.9	0.07	10.4	0.003	0.4	0.02	2	0.024	5.3	0.35	79.9	62.43
		15	8,866	0.62	176.9	0.23	65.0	0.04	10.8	0.06	12.3	0.003	0.5	0.01	3	0.020	5.8	0.35	99.1	53.34
		10	10,757	0.53	183.0	0.20	69.4	0.03	11.7	0.06	14.1	0.003	0.6	0.01	3	0.018	6.1	0.34	116.9	46.17
	Inferred	30	555	0.63	11.2	0.22	3.9	0.03	0.6	0.06	0.7	0.003	0.0	0.02	0.2	0.020	0.4	0.22	4.0	53.09
		25	751	0.54	13.0	0.19	4.7	0.03	0.7	0.06	1.0	0.003	0.0	0.02	0.2	0.017	0.4	0.22	5.3	46.37
		20	955	0.47	14.5	0.17	5.3	0.03	0.9	0.06	1.2	0.003	0.1	0.02	0.3	0.015	0.5	0.22	6.8	41.31
		15	1,165	0.42	15.6	0.16	5.8	0.03	1.0	0.06	1.4	0.003	0.1	0.01	0.4	0.014	0.5	0.23	8.7	37.02
		10	1,380	0.37	16.4	0.14	6.2	0.02	1.1	0.05	1.6	0.003	0.1	0.01	0.4	0.012	0.5	0.24	10.8	33.22
Banshee	Indicated	30	941	0.43	13.0	0.26	7.7	0.04	1.2	0.06	1.2	0.003	0.1	0.01	0.3	0.023	0.7	0.00	0.0	42.72
		25	1,374	0.38	16.6	0.22	9.8	0.04	1.6	0.06	1.7	0.003	0.1	0.01	0.4	0.02	0.9	0.00	0.0	37.85
		20	1,922	0.33	20.1	0.19	12.0	0.04	2.2	0.06	2.4	0.003	0.1	0.01	1	0.017	1.1	0.00	0.0	33.45
		15	2,438	0.29	22.5	0.17	13.5	0.03	2.6	0.06	3.1	0.003	0.1	0.01	1	0.015	1.2	0.00	0.0	30.11
		10	2,649	0.27	23.1	0.16	13.9	0.03	2.7	0.06	3.3	0.003	0.2	0.01	1	0.014	1.2	0.00	0.0	28.73
	Inferred	30	1,129	0.45	16.5	0.23	8.3	0.03	1.0	0.06	1.4	0.003	0.1	0.01	0.3	0.020	0.7	0.00	0.0	42.37

TABLE 14.12
SENSITIVITIES OF PIT CONSTRAINED MINERAL RESOURCE ESTIMATE

Zone	Class	Cut-off NSR (CDN$/t)	Tonnage (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
		25	2,000	0.37	23.7	0.19	12.3	0.03	1.8	0.06	2.5	0.003	0.1	0.01	0.6	0.017	1.1	0.00	0.0	35.64
		20	2,883	0.32	29.7	0.17	15.9	0.03	2.6	0.06	3.6	0.003	0.2	0.01	1	0.015	1.4	0.00	0.0	31.82
		15	3,514	0.29	32.8	0.16	17.6	0.03	3.1	0.06	4.4	0.003	0.2	0.01	1	0.014	1.5	0.00	0.0	29.28
		10	3,781	0.28	33.6	0.15	18.0	0.03	3.3	0.06	4.8	0.003	0.2	0.01	1	0.013	1.6	0.00	0.0	28.11
Azen	Inferred	30	11,367	0.51	187.9	0.16	59.5	0.03	11.7	0.03	8.7	0.002	0.6	0.02	5	0.015	5.4	0.68	246.9	42.53
		25	14,685	0.47	221.4	0.15	71.3	0.03	14.2	0.03	11.0	0.002	0.6	0.02	6.2	0.014	6.6	0.73	345.6	39.17
		20	18,589	0.42	252.7	0.14	82.1	0.03	16.5	0.03	13.4	0.003	1.0	0.02	8	0.012	7.5	0.75	445.6	35.58
		15	23,417	0.37	282.2	0.12	93.1	0.03	18.9	0.03	16.1	0.003	1.3	0.02	9	0.011	8.5	0.75	564.1	31.85
		10	28,523	0.33	302.5	0.11	101.6	0.02	20.7	0.03	18.8	0.003	1.6	0.02	11	0.010	9.2	0.75	689.5	28.38
Lismer Ridge	Indicated	30	13,060	0.68	287.1	0.26	109.5	0.05	19.3	0.07	18.9	0.003	0.8	0.02	5	0.023	9.7	0.20	85.6	59.05
		25	16,100	0.61	315.2	0.24	122.2	0.04	21.7	0.06	22.7	0.003	1.1	0.02	5.7	0.021	10.9	0.20	102.5	53.16
		20	20,102	0.53	342.1	0.21	136.4	0.04	24.2	0.06	27.3	0.003	1.2	0.02	7	0.019	12.0	0.18	118.6	46.95
		15	24,473	0.46	364.2	0.19	149.1	0.03	26.5	0.06	32.1	0.003	1.4	0.02	8	0.017	13.1	0.17	133.4	41.70
		10	27,507	0.42	374.1	0.18	155.5	0.03	27.7	0.06	35.3	0.003	1.6	0.01	9	0.015	13.6	0.16	142.6	38.51
	Inferred	30	2,819	0.61	55.5	0.24	21.7	0.04	3.7	0.05	3.3	0.002	0.2	0.01	1	0.023	2.1	0.10	9.3	53.04
		25	3,501	0.55	62.0	0.22	24.2	0.04	4.2	0.05	4.1	0.003	0.2	0.01	1.0	0.021	2.4	0.10	11.5	48.03
		20	4,602	0.47	70.1	0.19	27.7	0.03	4.8	0.05	5.4	0.002	0.2	0.01	1	0.018	2.7	0.10	14.1	41.92
		15	6,280	0.39	79.7	0.16	31.8	0.03	5.7	0.05	7.1	0.002	0.3	0.01	2	0.015	3.0	0.09	19.1	35.51
		10	7,265	0.35	82.8	0.14	33.4	0.03	6.0	0.05	8.3	0.002	0.4	0.01	2	0.013	3.1	0.10	22.4	32.37
Lismer North	Indicated	30	5,264	0.73	122.8	0.29	48.5	0.05	7.9	0.06	7.1	0.003	0.3	0.01	2	0.026	4.4	0.12	20.8	62.36
		25	6,238	0.66	132.6	0.27	53.1	0.04	8.6	0.06	8.3	0.003	0.4	0.01	1.9	0.024	4.8	0.12	24.3	57.33
		20	7,229	0.59	138.0	0.24	56.5	0.04	9.3	0.06	9.5	0.003	0.4	0.01	2	0.022	5.1	0.12	26.9	52.12
		15	8,140	0.54	142.5	0.23	59.3	0.04	9.7	0.06	10.6	0.003	0.4	0.01	2	0.020	5.3	0.11	28.6	48.27
		10	8,585	0.52	143.9	0.22	60.2	0.04	9.9	0.06	11.1	0.003	0.5	0.01	3	0.020	5.4	0.11	29.2	46.43
	Inferred	30	1,928	0.78	48.4	0.30	18.3	0.05	3.1	0.06	2.4	0.003	0.1	0.01	1	0.027	1.7	0.02	1.2	65.92

TABLE 14.12
SENSITIVITIES OF PIT CONSTRAINED MINERAL RESOURCE ESTIMATE

Zone	Class	Cut-off NSR (CDN$/t)	Tonnage (k)	Pd (g/t)	Pd (koz)	Pt (g/t)	Pt (koz)	Au (g/t)	Au (koz)	Cu (%)	Cu (Mlb)	Co (%)	Co (Mlb)	Ni (%)	Ni (Mlb)	Rh (g/t)	Rh (koz)	Ag (g/t)	Ag (koz)	NSR (CDN$/t)
		25	2,210	0.72	50.9	0.28	19.5	0.05	3.3	0.06	2.8	0.003	0.1	0.01	0.7	0.025	1.8	0.02	1.4	61.07
		20	2,489	0.66	52.7	0.26	20.6	0.04	3.5	0.06	3.1	0.003	0.1	0.01	1	0.023	1.9	0.02	1.6	56.69
		15	2,754	0.61	54.0	0.24	21.5	0.04	3.6	0.06	3.5	0.003	0.2	0.01	1	0.022	1.9	0.02	1.7	52.95
		10	2,903	0.58	54.5	0.23	21.8	0.04	3.6	0.06	3.7	0.003	0.2	0.01	1	0.021	2.0	0.02	1.7	50.89
Razor	Inferred	30	5,536	0.58	103.7	0.24	43.1	0.04	7.0	0.03	3.6	0.002	0.2	0.02	2	0.022	3.9	0.19	33.9	46.19
		25	8,043	0.50	129.8	0.21	54.6	0.04	9.6	0.03	5.1	0.002	0.4	0.02	3.2	0.000	0.0	0.21	53.8	40.35
		20	11,438	0.43	158.1	0.18	67.0	0.03	12.1	0.03	7.2	0.002	0.5	0.02	5	0.017	6.1	0.22	81.3	34.96
		15	16,677	0.36	191.3	0.15	82.6	0.03	15.7	0.03	9.7	0.002	0.7	0.02	7	0.014	7.5	0.22	118.0	29.46
		10	20,795	0.31	209.5	0.14	91.8	0.03	18.0	0.02	11.4	0.002	0.9	0.02	8	0.012	8.3	0.22	145.9	26.14
Mustang	Inferred	30	8,651	0.46	129.2	0.25	68.5	0.05	13.1	0.06	11.6	0.000	0.0	0.03	6	0.022	6.2	0.00	0.0	42.04
		25	12,719	0.40	164.0	0.22	90.8	0.04	18.0	0.06	16.8	0.000	0.0	0.03	8.7	0.000	0.0	0.00	0.0	37.25
		20	20,265	0.33	213.9	0.19	126.7	0.04	26.4	0.06	26.3	0.000	0.0	0.03	13	0.018	11.5	0.00	0.0	31.74
		15	30,889	0.27	266.3	0.17	166.0	0.04	36.2	0.06	37.6	0.000	0.0	0.03	18	0.015	15.1	0.00	0.0	26.82
		10	40,102	0.23	299.6	0.15	189.7	0.03	42.1	0.05	45.1	0.000	0.0	0.02	21	0.013	17.2	0.00	0.0	23.59
Varley	Indicated	30	6,024	0.74	142.9	0.27	52.5	0.04	8.6	0.04	4.8	0.002	0.3	0.01	2	0.025	4.8	0.16	30.4	60.78
		25	7,345	0.65	153.5	0.24	56.9	0.04	9.4	0.04	5.7	0.002	0.3	0.01	1.9	0.022	5.2	0.15	35.2	53.86
		20	9,583	0.57	175.0	0.21	65.5	0.04	10.9	0.03	6.9	0.002	0.4	0.01	3	0.019	6.0	0.13	41.6	47.36
		15	11,844	0.50	188.9	0.19	71.5	0.03	11.9	0.03	8.1	0.002	0.5	0.01	3	0.017	6.5	0.12	47.5	41.64
		10	13,742	0.45	196.9	0.17	75.2	0.03	12.6	0.03	9.1	0.002	0.6	0.01	4	0.015	6.8	0.12	52.0	37.64
	Inferred	30	2,296	0.70	51.9	0.25	18.8	0.04	3.2	0.03	1.7	0.002	0.1	0.01	1	0.023	1.7	0.13	9.4	57.70
		25	3,212	0.59	60.4	0.22	22.3	0.04	3.7	0.03	2.3	0.002	0.1	0.01	0.8	0.020	2.1	0.12	12.1	48.45
		20	4,892	0.48	74.8	0.18	28.3	0.03	4.8	0.03	3.2	0.002	0.2	0.01	1	0.016	2.6	0.10	16.4	39.92
		15	6,097	0.42	82.3	0.16	31.4	0.03	5.4	0.03	3.8	0.002	0.3	0.01	2	0.015	2.9	0.10	18.6	35.50
		10	6,803	0.39	85.4	0.15	32.8	0.03	5.7	0.03	4.2	0.002	0.3	0.01	2	0.014	3.0	0.09	19.7	33.17

Note: *Class = classification.*

Table 14.13 Sensitivities of Out-of-pit Mineral Resource Estimate																				
Zone	**Class**	**Cut-off NSR (CDN$/t)**	**Tonnage (k)**	**Pd (g/t)**	**Pd (koz)**	**Pt (g/t)**	**Pt (koz)**	**Au (g/t)**	**Au (koz)**	**Ag (g/t)**	**Ag (koz)**	**Cu (%)**	**Cu (Mlb)**	**Co (%)**	**Co (Mlb)**	**Ni (%)**	**Ni (Mlb)**	**Rh (g/t)**	**Rh (koz)**	**NSR (CDN$/t)**
All Zones	Measured	90	1.2	1.21	0.05	0.41	0.02	0.08	0.00	0.57	0.02	0.11	0.00	0.004	0.00	0.04	0.00	0.037	0.00	102.02
		70	2.8	1.07	0.10	0.37	0.03	0.07	0.01	0.50	0.04	0.10	0.01	0.003	0.00	0.03	0.00	0.033	0.00	90.84
		50	2.9	1.05	0.10	0.37	0.03	0.07	0.01	0.51	0.05	0.10	0.01	0.003	0.00	0.03	0.00	0.033	0.00	89.72
		30	3.7	0.91	0.11	0.32	0.04	0.06	0.01	0.52	0.06	0.09	0.01	0.003	0.00	0.03	0.00	0.029	0.00	78.36
	Indicated	90	218.4	1.66	11.68	0.52	3.64	0.08	0.60	0.32	2.27	0.10	0.47	0.003	0.02	0.02	0.10	0.047	0.33	133.25
		70	344.3	1.41	15.56	0.45	4.95	0.07	0.83	0.27	2.98	0.09	0.66	0.003	0.02	0.02	0.15	0.041	0.45	113.42
		50	639.3	1.08	22.21	0.35	7.26	0.06	1.25	0.23	4.79	0.08	1.06	0.003	0.04	0.02	0.28	0.032	0.66	88.46
		30	1,257.7	0.76	30.62	0.26	10.57	0.05	1.84	0.23	9.20	0.07	1.91	0.003	0.08	0.02	0.49	0.023	0.95	63.83
	Inferred	90	144.3	1.36	6.32	0.51	2.37	0.08	0.35	0.29	1.35	0.07	0.21	0.003	0.01	0.02	0.06	0.047	0.22	110.77
		70	566.9	1.03	18.72	0.45	8.28	0.05	0.85	0.40	7.27	0.05	0.62	0.002	0.03	0.01	0.16	0.048	0.87	86.23
		50	1,589.2	0.79	40.38	0.37	18.82	0.05	2.44	0.30	15.29	0.06	2.04	0.002	0.07	0.02	0.56	0.035	1.79	68.14
		30	6,119.8	0.51	99.50	0.25	48.43	0.04	8.02	0.29	57.13	0.05	7.33	0.002	0.24	0.02	2.31	0.022	4.42	45.27

Note: *Class = classification.*

14.16 MODEL VALIDATION

The block model was validated using a number of industry standard methods including visual and statistical methods. Visual examination of composites and block grades on successive plans and vertical cross-sections were performed on-screen to confirm that the block models correctly reflect the distribution of composite grades (see Appendix E for Pd and F for NSR block models and grades). The review of estimation parameters included:

- Number of composites used for grade estimation;
- Number of drill holes used for grade estimation;
- Mean distance to sample used;
- Number of passes used to estimate grade;
- Actual distance to closest point;
- Grade of true closest point; and,
- Mean value of the composites used.

The ID^3 estimate was compared to a NN estimate along with composites. A comparison of Pd mean composite grades with the block model at a 0.001 g/t Pd cut-off grade are presented in Table 14.14.

TABLE 14.14
PD AVERAGE GRADE COMPARISON OF COMPOSITES WITH BLOCK MODEL

Zone	Data Type	Pd (g/t)
Dana North, Pine, Dana South	Composites	0.50
	Capped composites	0.50
	Block model interpolated with ID^3	0.47
	Block model interpolated with NN	0.47
Lismer Ridge, Lismer North	Composites	0.43
	Capped composites	0.43
	Block model interpolated with ID^3	0.41
	Block model interpolated with NN	0.41
Varley	Composites	0.41
	Capped composites	0.42
	Block model interpolated with ID^3	0.38
	Block model interpolated with NN	0.39
Azen	Composites	0.26
	Capped composites	0.26
	Block model interpolated with ID^3	0.29
	Block model interpolated with NN	0.30
Banshee	Composites	0.27
	Capped composites	0.27

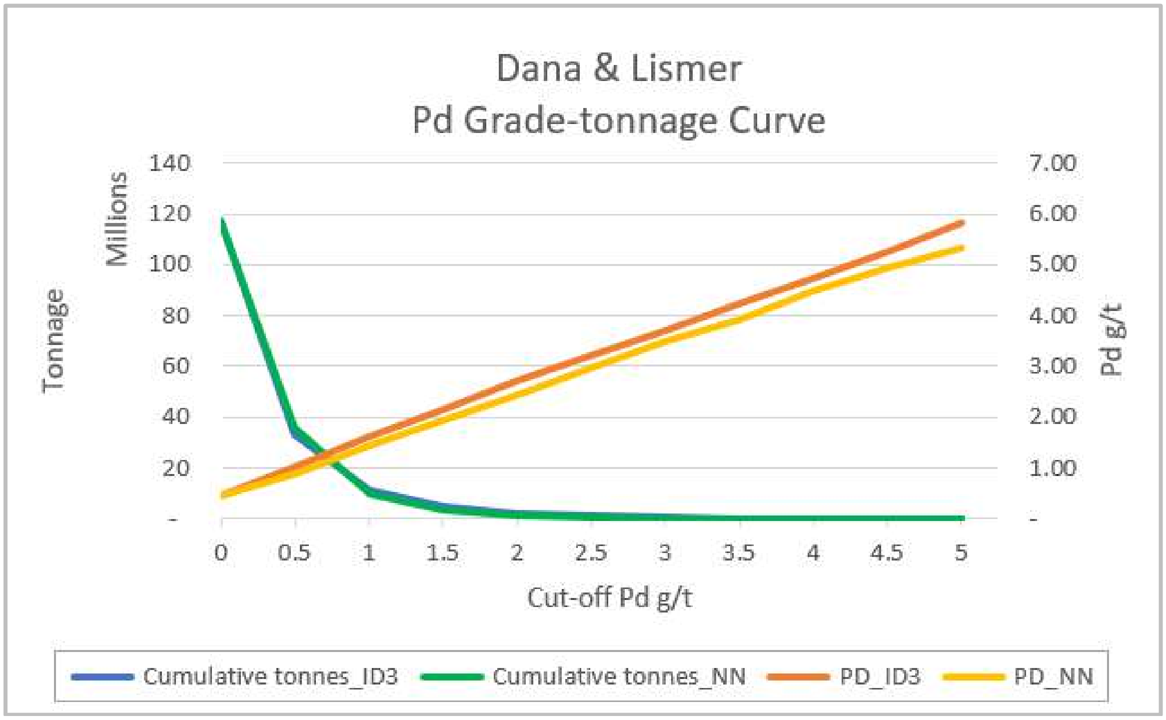
TABLE 14.14 **PD AVERAGE GRADE COMPARISON OF COMPOSITES WITH BLOCK MODEL**		
Zone	**Data Type**	**Pd (g/t)**
	Block model interpolated with ID^3	0.27
	Block model interpolated with NN	0.28
Razor	Composites	0.28
	Capped composites	0.28
	Block model interpolated with ID^3	0.27
	Block model interpolated with NN	0.27
Mustang	Composites	0.22
	Capped composites	0.22
	Block model interpolated with ID^3	0.21
	Block model interpolated with NN	0.21

Notes: *ID^3 - interpolated with Inverse Distance Cubed, NN - interpolated using Nearest Neighbour.*

The comparison above shows the average grade of block model was slightly different from that of the capped composites used for grade estimation. These were most likely due to grade de-clustering and interpolation process. The block model values will be more representative than the composites, due to 3-D spatial distribution characteristics of the block model.

A comparison of the Pd grade-tonnage curves interpolated with ID^3 and NN on a global mineralization basis is shown in Figure 14.1.

FIGURE 14.1 PD DANA AND LISMER GRADE–TONNAGE CURVE



Local trends of Pd and Pt were evaluated by comparing the ID^3 and NN estimate against the composites. Swath plots for Dana and Lismer are shown in Figures 14.2 to 14.4.

FIGURE 14.2 DANA AND LISMER PD AND PT GRADE EASTING SWATH PLOTS

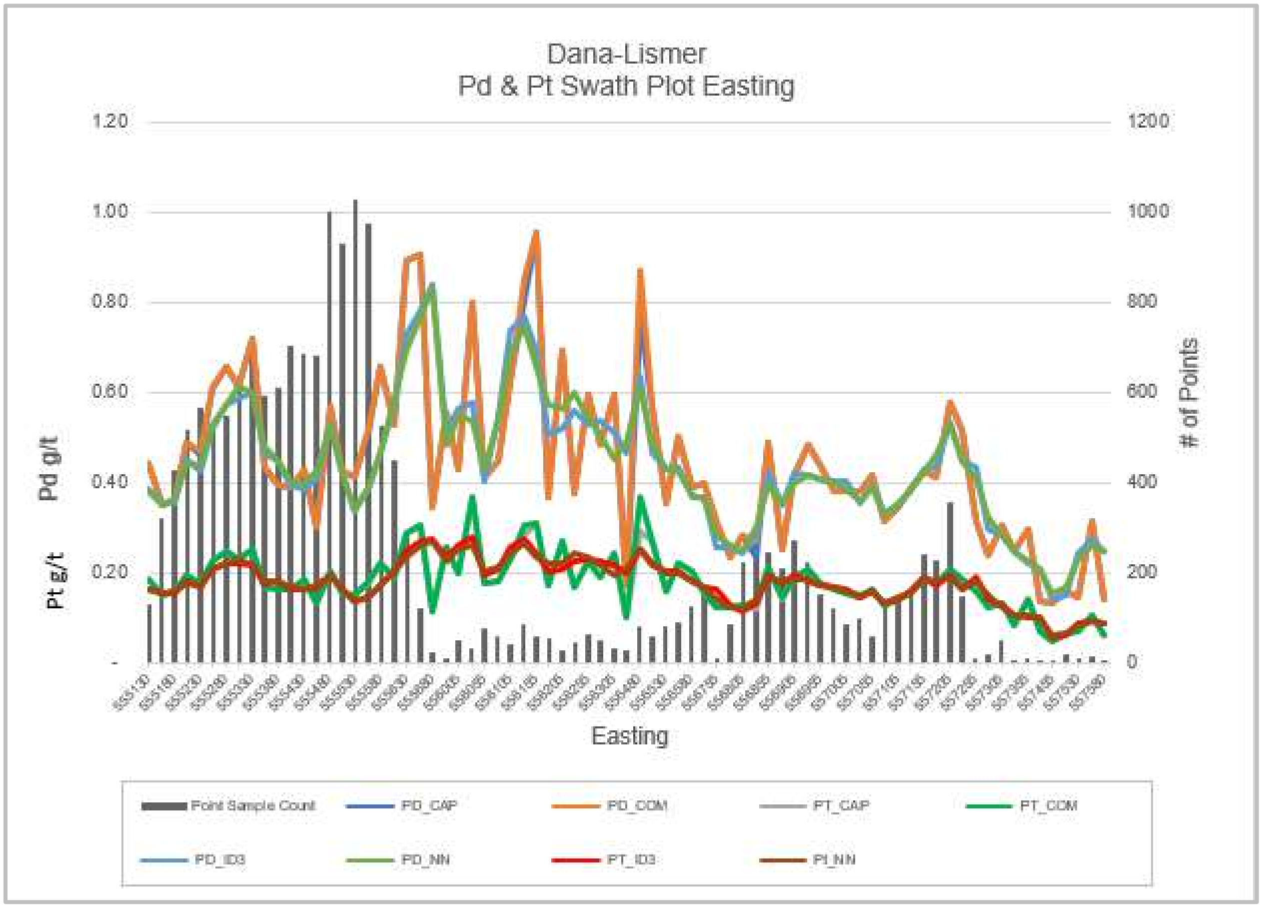


FIGURE 14.3 DANA AND LISMER PD AND PT GRADE NORTHING SWATH

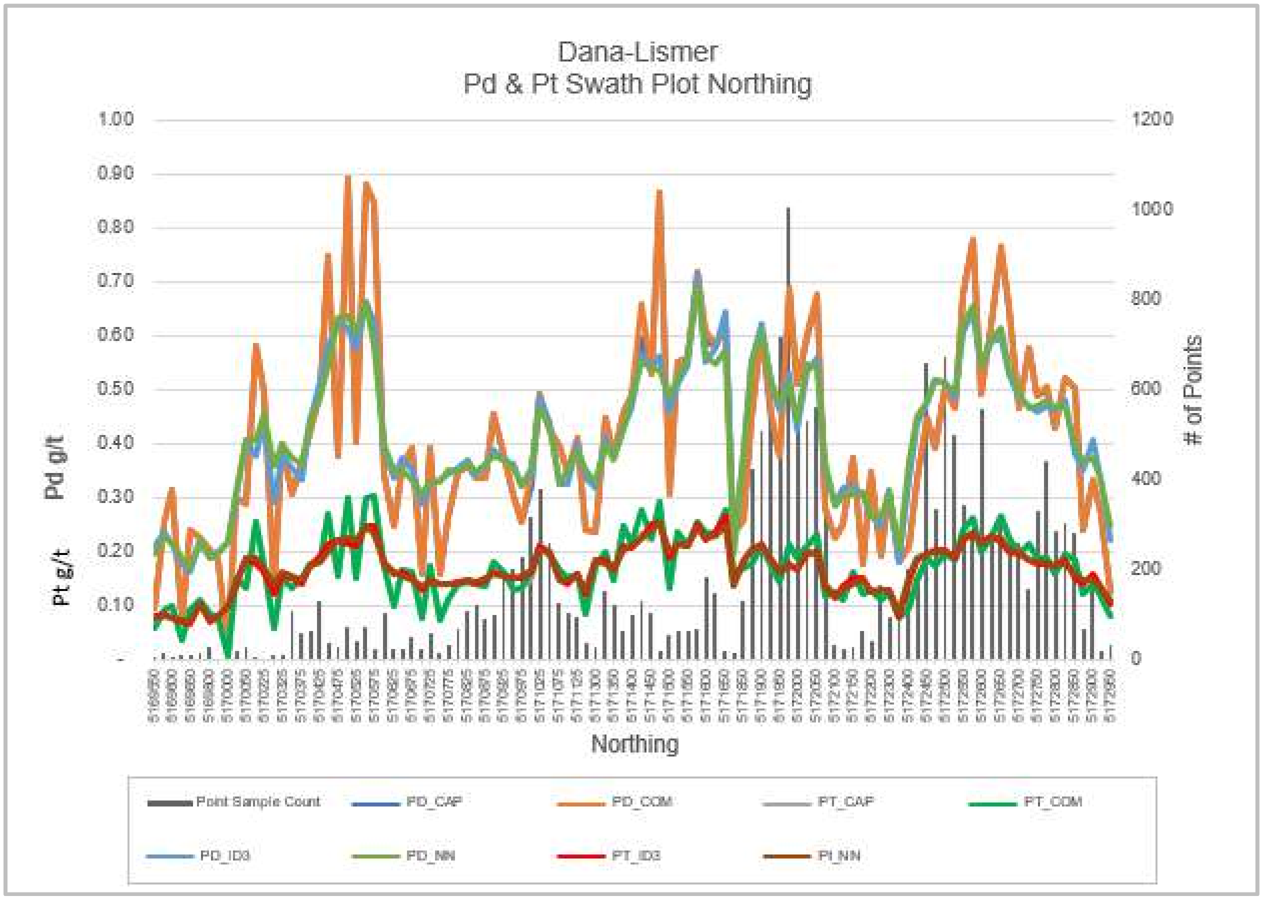
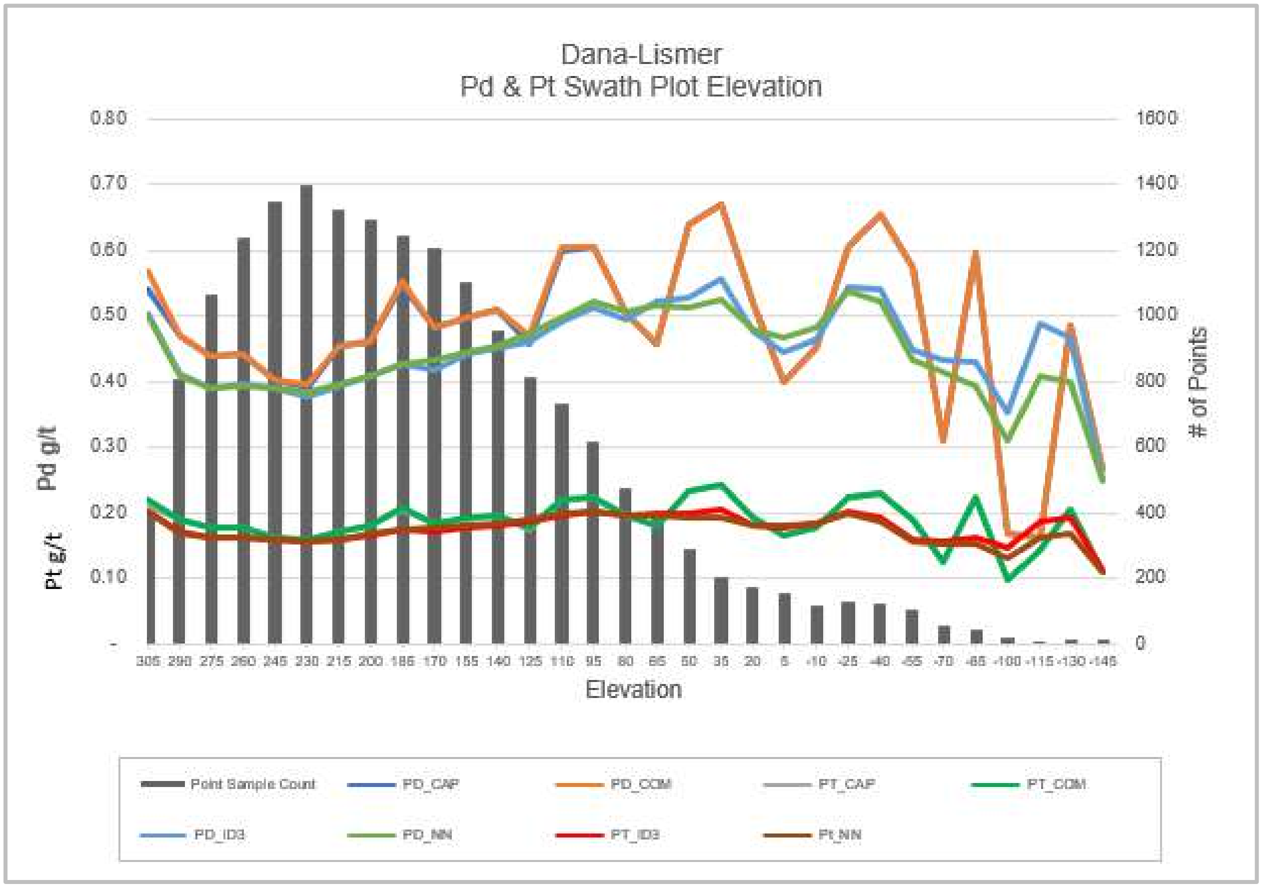


FIGURE 14.4 DANA AND LISMER PD AND PT GRADE ELEVATION SWATH PLOTS



Comparison to the previous updated 2019 Mineral Resource Estimate is shown in Table 14.15.

TABLE 14.15
CURRENT MINERAL RESOURCE
COMPARISON TO JANUARY 9, 2019

Date	Class	Cut-off PdEq (g/t)	Tonnes (k)	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Co (%)	Ni (%)	Rh (g/t)
Jan 2019 Mineral Resource Estimate	Measured	0.35 Pit Constrained+ 2.0 Out-of-Pit	56,097	0.54	0.20	0.03	0.06	0.006	0.02	0.013
	Indicated		43,159	0.49	0.19	0.03	0.05	0.006	0.02	0.003
	M+I		**99,255**	**0.52**	**0.20**	**0.03**	**0.06**	**0.006**	**0.02**	**0.009**
	Inferred		52,306	0.31	0.15	0.04	0.04	0.001	0.02	0.012
Date	**Class**	**Cut-off NSR (CDN$/t)**	**Tonnes (k)**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Co (%)**	**Ni (%)**	**Rh (g/t)**
Current Mineral Resource Estimate	Measured	$15 Pit Constrained+ $50 Out-of-Pit	15,488	0.70	0.25	0.05	0.07	0.003	0.02	0.022
	Indicated		74,152	0.51	0.20	0.04	0.06	0.002	0.01	0.018
	M+I		**89,640**	**0.54**	**0.21**	**0.04**	**0.06**	**0.002**	**0.01**	**0.019**
	Inferred		94,268	0.35	0.16	0.03	0.04	0.002	0.02	0.014

Notes: *Class = classification, M+I = Measured and Indicated.*

The current Mineral Resource Estimate is based on all historical and 2020 diamond drilling, more conservative mineralized domain wireframing strategy and revised mineralized domain modelling, inverse distance grade interpretation methodology, and higher overall metal prices, particularly for palladium. As a result, metal grades and Measured and Indicated Mineral Resources increased in comparison to the previous 2019 Mineral Resource Estimate. Moreover, at the CDN$15/t NSR cut-off, the pit constrained Measured and Indicated Mineral Resources total of 89 Mt grading 0.79 g/t Pd+Pt+Au (2.3 Moz) significantly exceeds the 78 Mt of potentially mineable resources grading 0.79 g/t Pd+Pt+Au (2.0 Moz) in the 2019 Preliminary Economic Assessment of River Valley (P&E, DRA, WSP, 2019).

15.0 MINERAL RESERVE ESTIMATES

There is no Mineral Reserve Estimate stated for the River Valley Deposit. This section does not apply to this Technical Report.

16.0 MINING METHODS

Compared to the 2019 PEA on the River Valley Project, this 2023 PEA is based on a smaller, higher-grade operation with lower initial CAPEX, reduced open pit mining (both tonnage and number of open pits), inclusion of underground mining, and a much smaller environmental footprint, to provide feed to an on-site 2.5 Mtpa process plant (6,850 tpd).

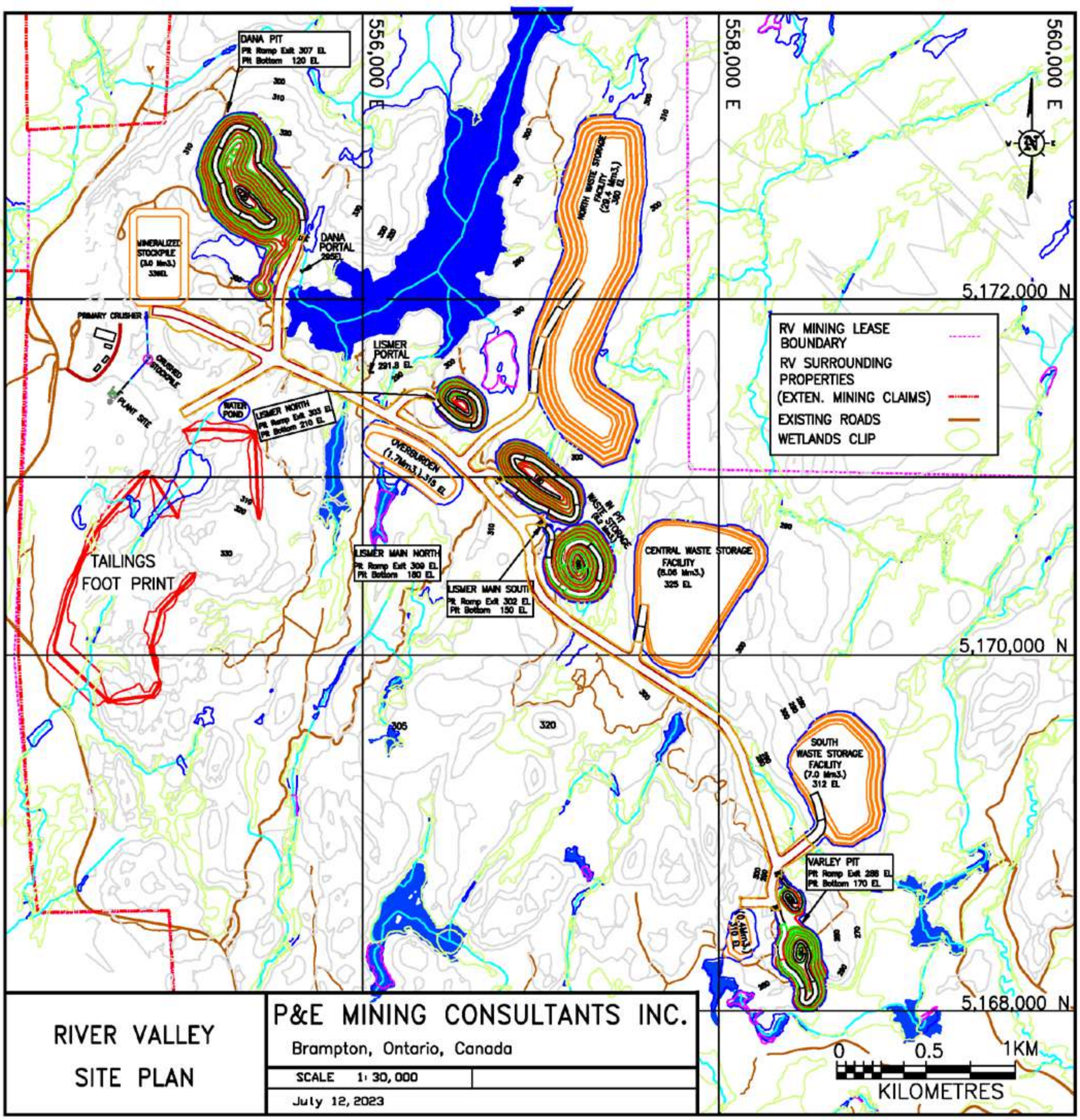
Initial mining is by open pit at the northwest end of the Deposit, close to the proposed process plant site location (Figure 16.1). A series of five open pits will be mined, starting at the Dana Zones and progressing in a southeasterly direction to the Lismer Zones and finally the Varley Zone. The Dana Pit contains approximately half of the life-of-mine ("LOM") mineralized process plant feed. The open pits will produce a total of 35.7 Mt of process plant feed. The average open pit strip ratio is planned to be 3.4:1 over the LOM. It is anticipated that a fleet of 90 t haul trucks, 10 m^3 excavators and 254 mm hole diameter rotary drills will be utilized, following industry standard conventional open pit mining techniques.

The Tailings Management Facility ("TMF") is planned to be operated for the first seven years of mine production. The Dana Pit is planned to be mined out by the end of production Year 7. Tailings will be pumped to the pit starting in Year 8 and will continue to the end of mine life.

Higher grade underground mineralization is planned to be mined during production years two to seven, and will total approximately 3 Mt of process plant feed. The underground mining method is planned to be sublevel longhole stoping with cemented rock backfill, at a mining rate of 1,500 tpd. The lower extents of the Dana South Zone and the Lismer North Zone are planned to be ramp-accessed from portals at surface outside pit limits.

Separate open pit mining, underground mining and processing schedules have been developed for the Project. The production plan utilizes Measured, Indicated and Inferred Mineral Resources. Inferred Mineral Resources are considered too speculative geologically to have the economic considerations applied to them to be categorized as Mineral Reserves, and there is no certainty that the Inferred Mineral Resources will be upgraded to a higher Mineral Resource classification. There is no certainty that this Preliminary Economic Assessment will be realized.

FIGURE 16.1 PROJECT SITE PLAN VIEW



16.1 OPEN PIT MINING

The River Valley Deposit is relatively shallow and is suitable for conventional open pit mining methods. Five open pits will be developed over the LOM. The open pit mining operation will excavate three different materials:

- Overburden (spotty, thin and minimal in quantity);
- Waste Rock; and
- Process Plant Feed (to be processed or placed in a stockpile for future processing).

The design of the PEA mine plan and production schedule entailed several sequential steps. They are as follows:

- Complete pit optimizations to select the optimal pit shells;
- Design operational pit designs (with ramps and benches) based on the optimal shells;
- Develop internal pit phases, where necessary, to transition the annual production tonnages;
- Develop a life-of-mine ("LOM") open pit mining production schedule, including stockpiling lower-grade material; and
- Develop a LOM processing schedule.

16.1.1 Pit Optimization

A series of pit optimizations were completed using the NPV Scheduler™ software package. This optimization process produces a series of nested pit shells containing mineralized material that is economically mineable according to a set of physical and economic design parameters. The pit shell that produces the optimal undiscounted cash flow is selected as the optimum shell to be used for mine design.

A Net Smelter Return ("NSR") field was added to the Mineral Resource Estimate block model based on the formula in red font at the bottom of Table 16.1. Feed grades in the table were set to 1 g/t or 1% in order that payable metal per unit grade could be calculated. A series of pit optimizations were conducted for all pits simultaneously using an NSR cut-off value of $13.50/t (processing cost plus G&A cost), with a mining cost of $2.75/t, and a pit slope angle of 47° (flattened from the recommended pit slope angles of 49 to 54° to account for haulage ramps). The analysis examined a wide range of revenue factors, from 6% to 100%.

TABLE 16.1
NSR VALUE CALCULATION

	RIVER VALLEY PROJECT				
	NSR Calculation				
Feb6/23					
Element	**Metal Price $US/lb or oz**	**Concentrate Recovery**	**Smelter Payable**	**Refining Charge $US/lb or oz**	**Average Feed Grade % or g/t**
Ni	$10.00	21%	0%	$0.00	1.000%
Cu	$4.10	86%	91%	$0.085	1.000%
Au	$1,800	54%	82%	$5.00	1.000
Ag	$23.50	60%	45%	$0.50	1.000
Pt	$1,025	57%	91%	$28.00	1.000
Pd	$2,250	71%	96%	$28.00	1.000
Rh	$13,000	40%	0%	$0.00	1.000
Co	$26.70	25%	0%	$0.00	1.000%
$C/$US		$0.77			
Mass Pull	0.41%				
Concentrate Moisture	8.0%				
Concentrate Freight US$/t	$166				
Smelter Treatment US$/t	$85				
Penalties US$/t	$4				
Element	**Payable Metal $C/tonne**	**PdEq Ratio**			
Ni	$0.00	0.00			
Cu	$89.54	1.41			
Au	$33.43	0.53			
Ag	$0.26	0.00			
Pt	$21.52	0.34			
Pd	$63.33	1.00			
Rh	$0.00	0.00			
Co	$0.00	0.00			
Subtotal	**$208.08**				
Conc Freight, Smelter Treatment, Penalties C$/t	**$1.43**				
NSR C$/t	**$206.65**				
NSR=[(Ni % x 0)+(Cu % x 89.54)+(Au g/t x 33.43)+(Ag g/t x 0.26)+(Pt g/t x 21.52)+(Pd g/t x 63.33)+(Rh g/t x 0)+(Co % x 0)]-1.43					

The pit optimization results are shown graphically in Figure 16.2 and 16.3. Figure 16.2 presents the NPV and Profit versus Revenue Factor. NPV and Profit increase in a substantial step at 60% Revenue Factor and level off after approximately 64% Revenue Factor. Figure 16.3 presents an estimate for the potentially mineable portion of the Mineral Resource for each Revenue Factor. The 64% Revenue Factor results in a tonnage of approximately 37 Mt, which would give a mine life of 15 years at a processing rate of 2.5 Mtpa. The 64% Revenue Factor was therefore selected as the optimized pit shell and forms the basis for the open pit design.

The process plant feed quantities reported by the optimization represent the potentially mineable tonnage contained in the optimized pit shell; however, the quantity used in the mine production schedule will be derived from operational pit designs once mining dilution and mining recovery are applied.

FIGURE 16.2 PIT OPTIMIZATION NPV AND PROFIT VERSUS REVENUE FACTOR

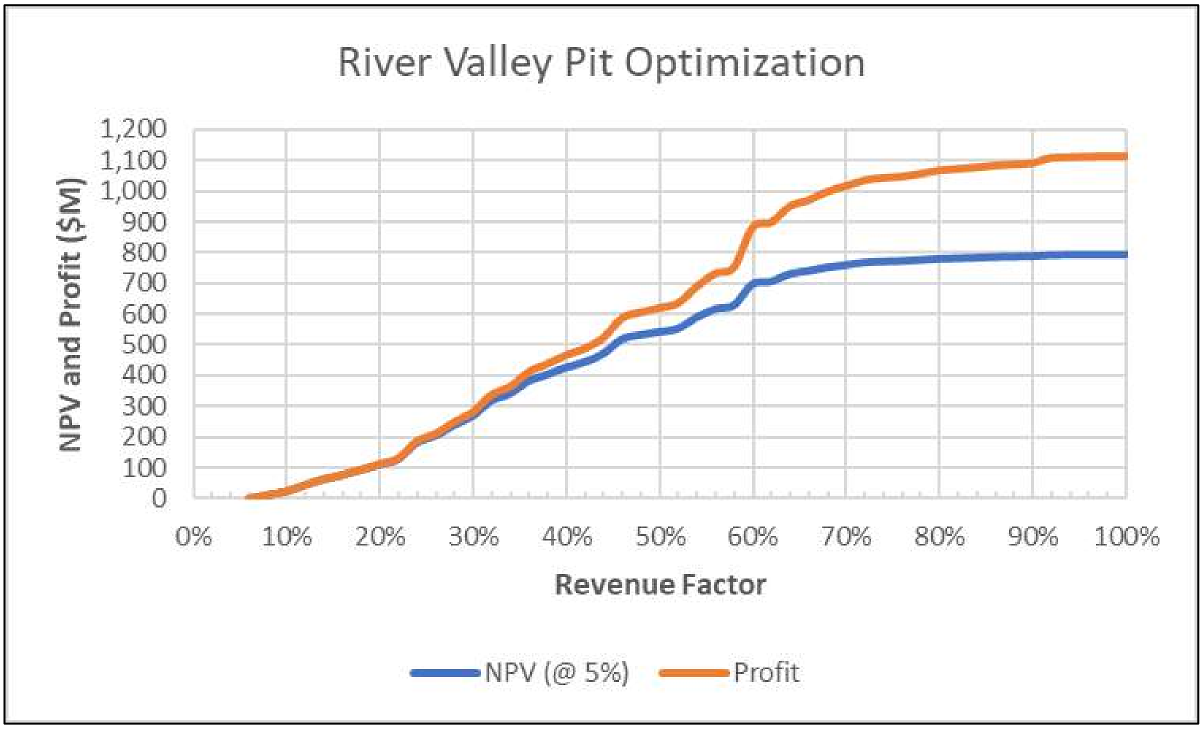
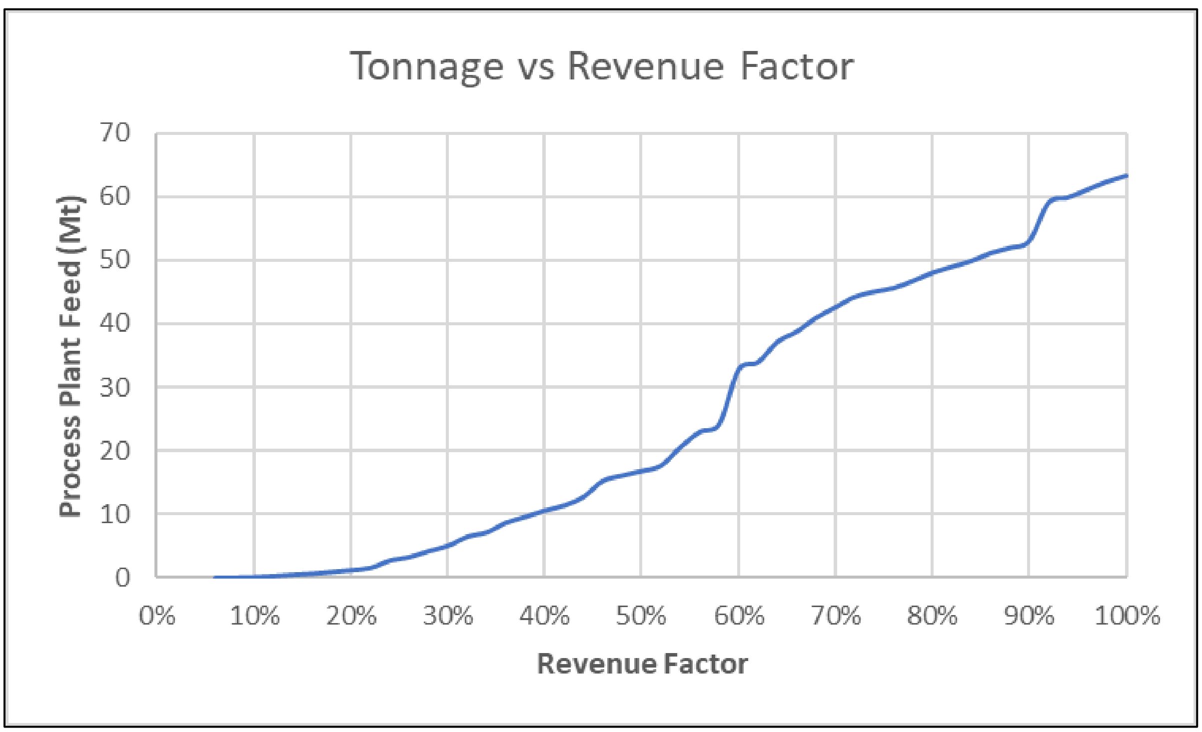


FIGURE 16.3 OPTIMIZATION PROCESS PLANT FEED TONNAGE



16.1.2 Open Pit Designs

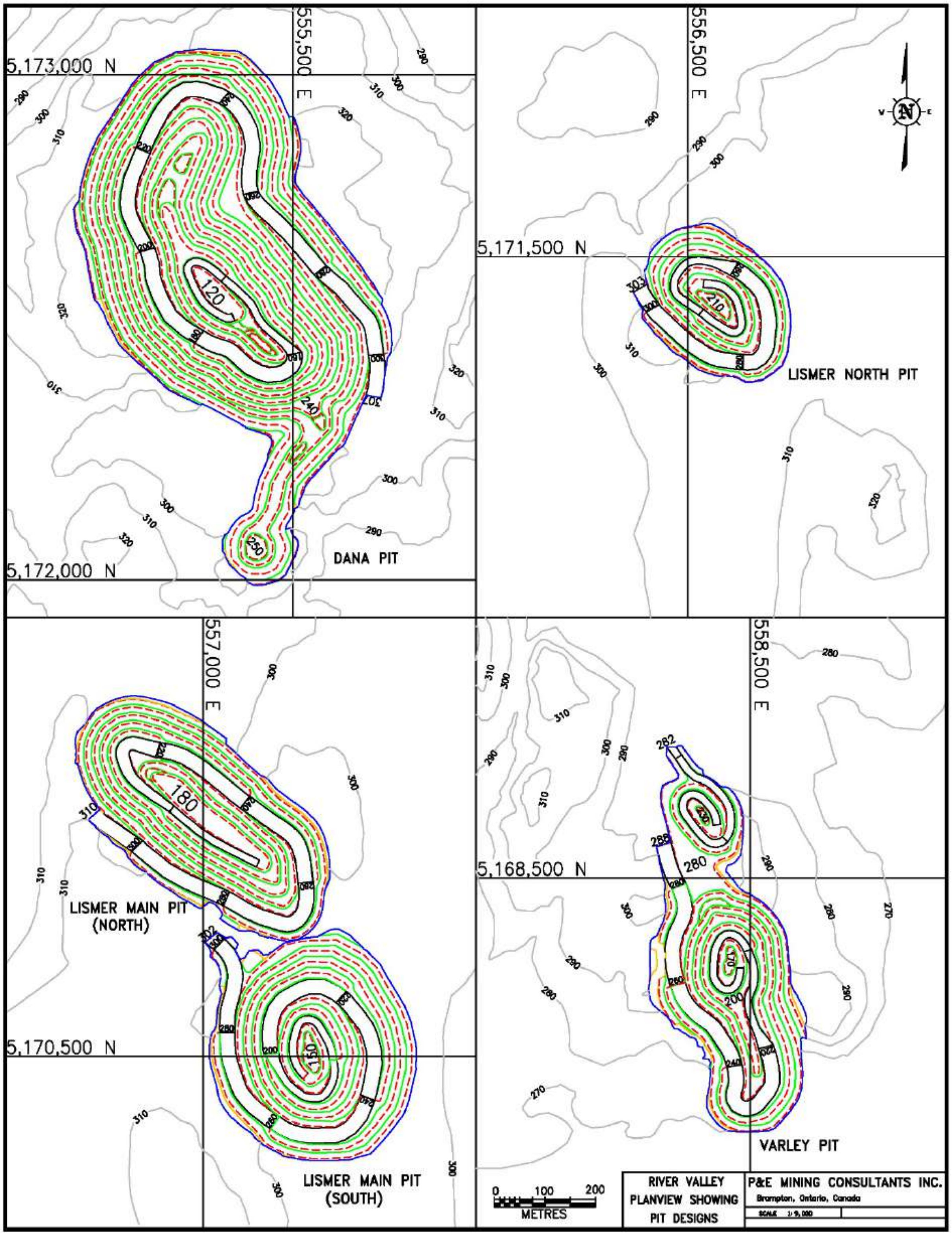
Five open pit designs were created using the selected optimized shells as the basis. Benches and haul roads were added, according to the design parameters in Table 16.2. The pit designs are shown in Figure 16.4 and the relative positions of the pits are shown in Figure 16.1 above.

TABLE 16.2
PIT DESIGN PARAMETERS

Item	Unit	Measurement
Ramp Design		
Haul Ramp Width (double)	m	30
Haul Ramp Width (single)	m	15
Ramp Grade	%	10
Pit Slopes[1]		
Inter-ramp Angle	deg	52
Bench Face Angle	deg	75
Bench Height	m	10
Benching (single or double)	No.	double
Bench Width	m	10.5

Notes 1: *Typical slopes are noted. See Section 16.1.2.1 for details.*

FIGURE 16.4 OPEN PIT DESIGNS



16.1.2.1 Geotechnical and Hydrogeological Study

Knight Piésold Ltd. ("KP") was engaged by NAM to provide Pre-Feasibility Study ("PFS") level open pit slope recommendations for the Dana North, Dana South, Lismer North, and Lismer Ridge Zones. Although the River Valley Deposit consists of numerous mineralized zones, KP focussed on the Dana North, Dana South, Lismer North (formerly known as Lismer Extension), and Lismer Ridge Zones. These four mineralized zones are planned to be the first zones mined, include the largest open pits, and are fundamental to the Project economics. The completed work included:

- Reviewing all available and relevant geological, structural, and hydrogeological information;
- Completing a geomechanical and hydrogeological site investigation program;
- Characterizing the rock mass quality and discontinuity orientations in the vicinity of the mineralized zones;
- Defining geomechanical domains;
- Completing slope stability analyses;
- Developing open pit slope geometry recommendations for the final open pit walls; and
- Reviewing the final open pit designs from a rock mechanics perspective.

Site Investigation Program

The site investigation program activities included:

- Five triple-tubed diamond drill holes with a total meterage of 1,213 m. All of the drill holes were angled and oriented with Reflex ACT III orientation tools;
- Detailed geomechanical logging of the recovered drill core, for a total of 1,213 m of logging. The logging was supplemented by a high-level review of 367 m of available drill core from seven exploration drill holes;
- Televiewer surveys were completed by DGI Geoscience Inc. in six historical exploration drill holes;
- Laboratory strength testing of drill core samples from the geomechanical drill holes;
- Packer testing was completed in all of the geomechanical drill holes (see Section 20.5.3 for hydrogeological results); and
- Vibrating wire piezometers were installed in three of the geomechanical drill holes.

The encountered rock masses were classified using the RMR89 and NGI-Q classification systems.

Rock Mass Domain Definition

The encountered rock masses were grouped into geomechanical domains. Each domain contains rock masses with similar engineering characteristics that are expected to perform similarly within the final open pit slopes. Several possible domain definitions were considered based on lithology, structural geology and spatial position. The domain definition that most effectively met these criteria was considered to be the best of the available alternatives. Due to the complexity of the rock masses at the River Valley Deposit, factors influencing the rock mass quality and the rock mass structure were considered separately. Structural domains were defined on the basis of lithology and spatial position as follows:

- Dana (North and South);
- Lismer North;
- Lismer Ridge North Domain; and
- Lismer Ridge South Domain.

Rock mass quality domains were defined by lithology as follows:

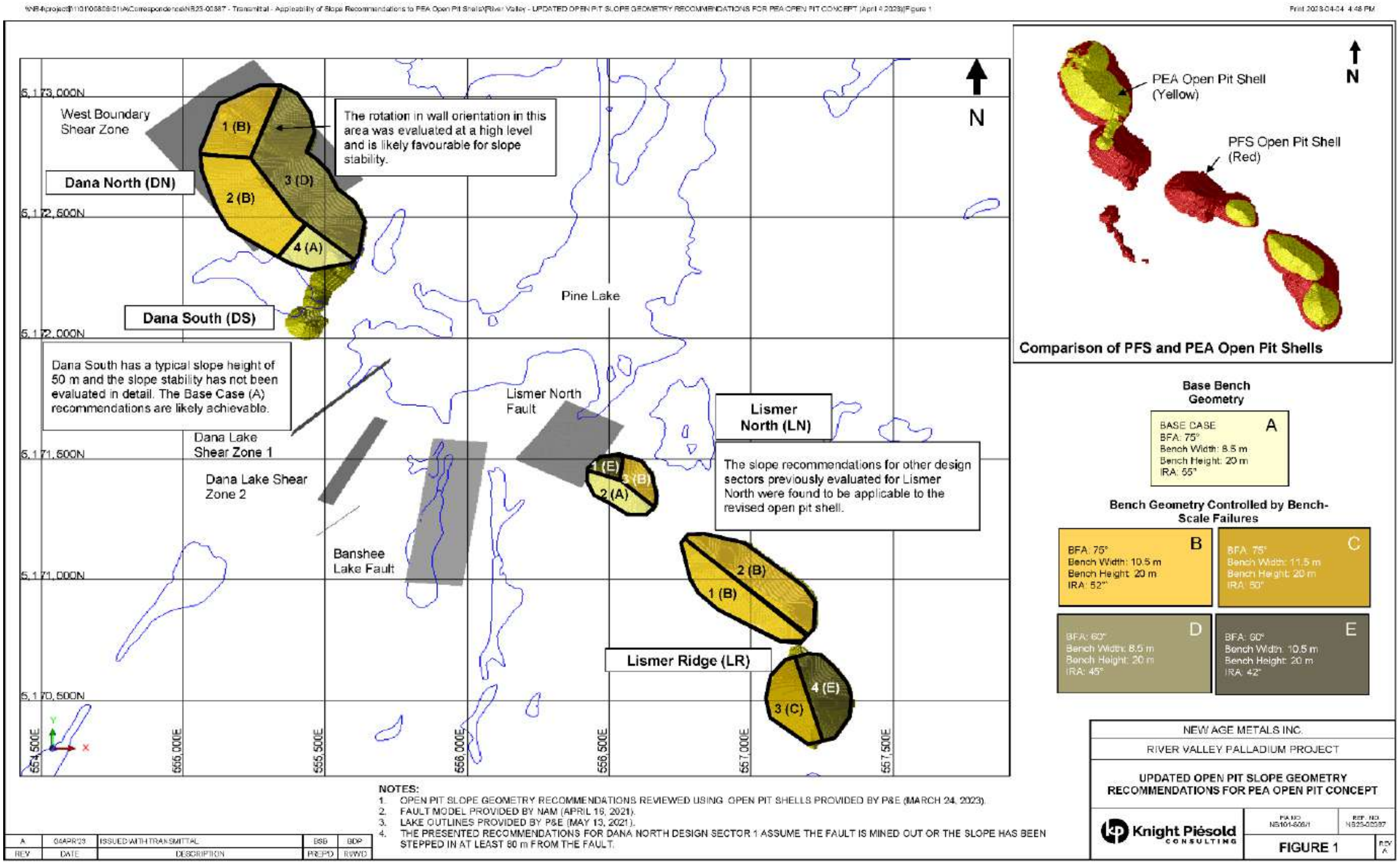
- Layered Unit (LU);
- Footwall (FW);
- Breccia (BX);
- Inclusion-Bearing Zone (IBZ);
- Huronian Metasediment (HUR);
- Mafic Dykes (MD); and
- Boundary Zone (BZ).

Stability Analyses and Open Pit Slope Design Input

Slope stability analyses were undertaken to evaluate the achievable slope configuration for individual design sectors. The analyses were based on the geomechanical domain definition and proposed open pit geometry, and included kinematic and limit-equilibrium analyses. The resulting slope geometry recommendations for the PEA open pit designs are presented in Figure 16.5 and ranged as follows:

- Design Bench Face Angle (“BFA”) - 60 to 75°;
- Design Bench Width - 8.5 to 11.5 m;
- Bench Height - 20 m; and
- Inter-Ramp Angle (“IRA”) - 42 to 55°.

FIGURE 16.5 OPEN PIT SLOPE GEOMETRY RECOMMENDATIONS



Source: *Knight Piésold (2023)*

The achievable slope geometry varies from sector to sector. Key considerations include:

- The achievable slope geometry of Dana North Sector 1 is sensitive to the position of the West Boundary Shear Zone relative to the open pit slope. There is the potential for inter-ramp scale and overall slope scale failures on this fault. Several possible slope configurations were provided;

- Planar failures on Joint Sets A' and B'' are expected to limit the achievable BFA in Dana North Sector 3, Dana South Sector 3, and Lismer North Sectors 1 and 5. The design BFA has been reduced to 60° to manage these failures. In the case of Lismer North, where the BFA is expected to break back to 55°, the catch bench width has been increased accordingly;

- Toppling failures, primarily along Joint Set A and A' or B and B', may control the achievable bench geometry in numerous sectors (Dana North Sectors 1 and 2; Lismer North Sectors 3, 4, 6, and 7; and Lismer Ridge Sectors 1, 2, and 3.). The potential for toppling is sensitive to the spacing and persistence of the discontinuities as well as the rock mass stiffness. As a precaution, the catch bench width has been increased to 10.5 m in order to manage the potential for toppling failures;

- Wedge failures on numerous joint sets are expected to limit the achievable bench geometry in Lismer Ridge Sector 4. The design BFA has been reduced and the catch bench width increased to manage these failures; and

- The maximum recommended inter-ramp height is 180 m, after which a ramp or geotechnical step-out should be included to limit the slope height and provide greater operational flexibility.

Recommendations

Additional work will be required to support the next level of design and construction. This work is expected to include additional analyses based on additional or updated data for the open pits. Additional data requirements are expected to include:

- Developing a 3D lithological model;

- Updating the existing 3D structural model to incorporate the results of the geomechanical drilling, additional exploration drilling, and the improved understanding of the deposit geology;

- Improving the characterization of the deposit rock masses, with a particular focus on:
    - The potential influence of varying metamorphic grade on the intact rock properties.
    - The rock mass quality of the FW and HUR units given the limited data available for these units.
    - The position, orientation, and shear strength of the West Boundary Shear Zone given the influence of this fault on the achievable slope geometry for Dana North Sector 1.

- The discontinuity orientations in the Dana South zone as relatively few data are available for this zone.
- The prominence of Joint Set B at the Lismer Ridge zone as this set may have been under-sampled at the zone.

- Characterizing the overburden within the vicinity of the open pit crests. As the overburden is expected to be relatively thin, geotechnical drill holes and/or test pits could be used to target areas where the overburden is expected to be thicker.

Any further infill or definition drilling at the project should be reviewed for opportunities to provide additional information on the deposit rock masses and large-scale structures. The domain definition, stability analyses, and slope recommendations should be updated to account for the results of any additional data and any changes to the geological models, large-scale structural interpretations, rock mass characterization, and/or open pit wall geometry. Specific additional analyses to support design and construction are expected to include:

- Evaluating the stability of the overburden and providing recommendations on the overburden slope geometry;
- Evaluating the potential for toppling failure using 2D numerical models (e.g., RS2);
- Reviewing the stability and configuration of the interim pit designs; and
- Completing a detailed risk assessment on expected slope performance and its sensitivity to the key design inputs and assumptions.

16.1.2.2 Open Pit Mining Dilution and Mining Losses

In order to estimate the tonnes and grade of potentially mineable process plant feed, mining dilution and mining loss factors need to be applied to the in-situ tonnages and grades.

The amount of open pit dilution that occurs during mining will be dependent on the width of the mineralized zones and the blast hole spacing that is used to define the mining dig limits.

In order to estimate dilution, several different representative bench plans from the open pit designs were used for analysis. For the selected benches a 1.5 m wide envelope of diluting material was assumed around the mineralized domains. An average dilution of approximately 9% was applied to the in-situ tonnes and grades, including diluting grades within the diluting skin, to determine the diluted tonnes and grades. The dilution parameters are summarized in Table 16.3. Mining losses were assumed at 3% based on experience. The same dilution parameters were applied to all open pits.

TABLE 16.3
OPEN PIT DILUTION AND DILUTING GRADES

Dilution	Mining Loss	PdEq (g/t)	Au (g/t)	Pt (g/t)	Pd (g/t)	Cu (%)	N (%)	Co (%)
8.6%	3%	0.22	0.01	0.05	0.07	0.04	0.02	0.01

16.1.3 Potentially Mineable Portion of the Mineral Resource

After the pit designs were finalized, the potentially mineable portion of the Mineral Resource and waste tonnages were reported inside the open pits, as summarized in Table 16.4. The tonnages were used to create the PEA production schedule, and incorporate the mining dilution and mining losses described previously.

TABLE 16.4
OPEN PIT PROCESS PLANT FEED (DILUTED)

Open Pit	Process Plant Feed (Mt)	NSR (CDN$/t)	Waste Rock (Mt)	Total Material (Mt)	Strip Ratio (W:O)[1]
Dana Phase 1	7.2	49.9	14.3	21.5	2.0
Dana Phase 2	12.1	43.1	49.4	61.5	4.2
SubTotal Dana	**19.3**	**45.6**	**63.7**	**83.0**	**3.3**
Lismer Main South	3.9	49.6	19.3	23.2	4.9
Lismer North	1.9	40.5	6.0	7.9	3.3
Lismer Main North	7.4	33.9	16.6	24.0	2.3
Varley	3.1	57.0	13.2	16.3	4.4
Total[2]	**35.7**	**44.4**	**118.9**	**154.6**	**3.4**

1. *w:o = waste:process plant feed ratio.*
2. *Totals may not sum due to rounding.*
Note: *The potentially mineable portion of the Mineral Resource utilized in the PEA contains Measured, Indicated and Inferred Mineral Resources. The reader is cautioned that Inferred Resources are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that value from such Inferred Mineral Resources will be realized either in whole or in part.*

In order to distribute the annual waste tonnages and to accelerate access to process plant feed, the Dana Pit was sub-divided into two phases. All other pits were mined as single phase pits due to their smaller size.

Table 16.5 presents the PEA open pit process plant feed portion of the Mineral Resource by classification. Approximately 97% of the 35.7 Mt LOM process plant feed is in the Measured + Indicated classifications.

TABLE 16.5
OPEN PIT MINE PLAN PORTION OF MINERAL RESOURCE BY CLASSIFICATION

Classification	Tonnes (k)	NSR (CDN $/t)	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Co (%)	Ni (%)	Rh (g/t)	Ag (g/t)
Measured	8,961	49.99	0.613	0.227	0.043	0.067	0.003	0.016	0.020	0.60
Indicated	25,563	41.75	0.510	0.202	0.036	0.058	0.003	0.015	0.018	0.33
Meas + Ind	**34,524**	**43.89**	**0.537**	**0.208**	**0.038**	**0.060**	**0.003**	**0.015**	**0.018**	**0.40**
Inferred	1,150	61.58	0.810	0.288	0.049	0.042	0.002	0.012	0.026	0.22

16.1.4 Production Schedule

The open pit production schedule consists of one year of pre-production for pre-stripping followed by 16 years of mining. The target peak annual mining rate is 16 Mt tonnes of material per year in the early production years and averages 9 Mtpa thereafter. Table 16.6 provides the open pit total material schedule by year.

TABLE 16.6
ANNUAL OPEN PIT MINE PRODUCTION SCHEDULE

Zone	Material Type	Units	Total	Year																
				-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Total Mining	Total Material	Mt	**154.6**	4.0	16.0	16.0	12.0	10.0	10.0	10.0	9.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	10.0	1.6
	Total Waste	Mt	**118.9**	3.1	13.1	13.6	9.9	7.9	8.0	6.4	5.4	7.0	6.6	6.2	5.9	5.7	5.6	6.0	7.8	0.7
	Strip Ratio	w:o	**3.4**	4.1	4.8	5.6	4.7	3.7	4.0	1.9	1.5	6.9	4.8	3.5	3.0	2.6	2.6	3.0	3.5	0.8
	Total Plant Feed	**Mt**	**35.7**	**0.9**	**2.9**	**2.4**	**2.1**	**2.1**	**2.0**	**3.5**	**3.6**	**1.0**	**1.4**	**1.8**	**2.1**	**2.3**	**2.4**	**2.0**	**2.2**	**0.9**
	NSR	$/t	**44.4**	55.4	51.6	41.9	39.7	42.8	39.5	44.4	50.1	43.2	50.3	51.6	37.1	29.5	32.1	40.8	59.6	54.8
Dana Phase-1	Total Material	Mt	**21.5**	4.0	10.	3.8	1.6	1.9	0.3											
	Total Waste	Mt	**14.3**	3.1	7.1	2.3	0.8	0.8	0.1											
	Strip Ratio	w:o	**2.0**	4.1	2.5	1.6	1.0	0.7	0.4											
	Total Plant Feed	**Mt**	**7.3**	**0.9**	**2.9**	**1.4**	**0.8**	**1.1**	**0.2**											
	NSR	$/t	**49.9**	55.4	51.4	46.7	45.5	48.3	53.3											
Dana Phase-2	Total Material	Mt	**61.5**		6.0	12.2	10.4	8.1	9.7	10.0	5.0									
	Total Waste	Mt	**49.5**		6.0	11.2	9.0	7.1	7.9	6.5	1.8									
	Strip Ratio	w:o	**4.2**		143.5	11.1	6.9	6.7	4.4	1.9	0.5									
	Total Plant Feed	**Mt**	**12.1**		**0.1**	**1.0**	**1.3**	**1.0**	**1.8**	**3.5**	**3.3**									
	NSR	$/t	**43.1**		59.5	35.1	36.3	37.1	37.8	44.4	51.3									
Lismer Main South	Total Material	Mt	**23.2**								4.0	7.9	8.0	3.3						
	Total Waste	Mt	**19.3**								3.6	7.0	6.6	2.0						
	Strip Ratio	w:o	**4.9**								9.9	7.5	4.8	1.6						
	Total Plant Feed	**Mt**	**4.0**								**0.4**	**0.9**	**1.4**	**1.3**						
	NSR	$/t	**49.6**								39.5	41.7	50.3	57.6						
	Total Material	Mt	**7.9**											4.7	3.0	0.2				

TABLE 16.6
ANNUAL OPEN PIT MINE PRODUCTION SCHEDULE

Zone	Material Type	Units	Total	Year																
				-1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
Lismer North	Total Waste	Mt	**6.0**											4.1	1.9	0.1				
	Strip Ratio	w:o	**3.3**											7.6	1.7	0.1				
	Total Plant Feed	**Mt**	**1.9**											**0.6**	**1.1**	**0.2**				
	NSR	$/t	**40.5**											38.1	41.9	39.6				
Lismer Main North	Total Material	Mt	**24.0**												5.0	7.8	6.5	3.7	1.0	
	Total Waste	Mt	**16.6**												4.0	5.7	4.3	2.1	0.5	
	Strip Ratio	w:o	**2.3**												4.4	2.8	2.0	1.4	0.8	
	Total Plant Feed	**Mt**	**7.4**												**1.0**	**2.1**	**2.2**	**1.6**	**0.6**	
	NSR	$/t	**33.9**												31.9	28.9	30.6	39.0	54.4	
Varley	Total Material	Mt	**16.3**														1.5	4.3	9.0	1.6
	Total Waste	Mt	**13.2**														1.3	3.8	7.3	0.7
	Strip Ratio	w:o	**4.4**														10.0	8.6	4.5	0.8
	Total Plant Feed	**Mt**	**3.2**														**0.2**	**0.5**	**1.6**	**0.9**
	NSR	$/t	**57.0**														51.3	47.2	61.4	54.8

Note: *NSR is in CDN$.*
The potential process feed tonnages utilized in the PEA contain Measured, Indicated and Inferred Mineral Resources. The reader is cautioned that Inferred Mineral Resources are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that value from such Mineral Resources will be realized either in whole or in part.

16.1.5 Open Pit Mining Practices

For the PEA it is assumed that the open pit operations will be performed by the Company except for explosives services. Hiring a mining contractor is an option that could be reviewed in future studies.

The following sections describe the anticipated open pit mine operations and equipment.

16.1.5.1 Drilling and Blasting

The waste rock and process plant feed materials will require blasting.

Blasthole drilling will be carried out using rotary drills with hole diameters of 254 mm at an operating bench height of 10 m.

The blasthole spacing will be approximately 7 m and will be carried out using an ammonium nitrate fuel oil mixture ("ANFO") emulsion. A bulk explosives truck will pump directly into the drill holes. Blast initiation will be carried out using non-electric detonators and booster charges.

The assumed powder factors for waste rock and process plant feed are estimated at 0.30 kg/t and 0.35 kg/t, respectively.

Blasting operations will be contracted as a supply and deliver down-the-hole service. The explosives contractor will supply personnel for all phases of blasting including stemming, mobile equipment for mixing and pumping emulsion explosives, and infrastructure for storing the explosives.

16.1.5.2 Loading and Hauling

Two diesel-powered hydraulic excavators with 10 m^3 heavy rock buckets will be used to excavate the blasted rock. The excavators will load 90 t off-highway haul trucks with a four-pass loading match. The truck fleet will peak at 10 units.

Excavator loading operations will be supported by a wheel loader with an 11 m^3 rock bucket.

16.1.5.3 Pit Dewatering

The open pits will experience groundwater seepage in addition to regular precipitation events and snowmelt. Staged skid or trailer-mounted diesel-powered centrifugal pumps will be used to remove water from each pit sump location during pit development.

16.1.5.4 Auxiliary Pit Services Equipment

The primary mining operations will be supported by a fleet of support equipment consisting of bulldozers with ripper attachments, graders, water truck, maintenance vehicles, and service vehicles. A list of major and support equipment is provided in Table 16.7.

16.1.5.5 Waste Rock Storage Facilities

The open pit operation will require the development of three waste rock storage facilities ("WRF") located near the mining areas, as shown in Figure 16.1 above. The WRFs are referred to as North, Central and South.

Where overburden is encountered, it will be excavated and hauled to separate storage locations, as shown in Figure 16.1 above. There will be two locations, one near the Lismer North open pit, and the other near the Varley open pit. The location near Lismer North will be for storage of overburden excavated from the TMF and from the nearby open pits.

It will be possible to backfill at least the mined-out Lismer Main South open pit with waste rock, and it is planned to backfill the Dana open pit with tailings beginning in Year 8 of production. More detailed planning of these activities will be required at the next study stage.

16.1.6 Open Pit Mining Equipment

The open pit mine operations at River Valley will employ mining methods and technologies used at other locations across Canada where similar rock and climatic conditions are found. Table 16.7 lists the anticipated peak mine equipment fleet requirements.

TABLE 16.7
OPEN PIT MINING EQUIPMENT FLEET

Equipment (model example)	Number of Units
Rotary Drill 254 mm Bit (Sandvik DR410i)	2
Hydraulic Excavator 10 m^3 (CAT 6018)	2
Wheel Loader 11 m^3 (CAT 992)	1
Haul Truck 90 t (CAT 777)	10
Stemming Truck 15 t	1
Personnel Van	2
Crane 40 t (Grove)	1
Dozer (CAT D8)	2
Mechanic & Welding Truck	2
Excavator 4 m^3 (PC390)	1
Fuel & Lube Truck	1
Grader 16H-class 16' blade	2
Flat Deck w Hiab	1
Lighting Plant	5
Tire Manipulator	1
Truck and Trailer	1
Pickup Truck	6

TABLE 16.7 OPEN PIT MINING EQUIPMENT FLEET	
Equipment (model example)	**Number of Units**
Pit Water Pumps	2
Forklift	1
Wheel Loader 4 m^3	1
Tractor Massey Ferguson 375/4WD	1
Water Truck (HM400)	1
Drill 50 mm Bit, Crawler	1

16.1.7 Open Pit Support Facilities

The River Valley Project will require mine offices, change house facilities, maintenance facilities, warehousing and cold storage areas. Mine offices will be provided for mine management, engineering, geology and mine maintenance services.

A maintenance shop which will provide open pit and underground support services will be located near the process plant. The maintenance facility will consist of a truck shop which will include a wash facility, welding equipment and a dedicated preventive maintenance bay. The facility will have adjoining indoor parts storage and tool crib. A fuel and lube station will be conveniently located near the maintenance facility and main haul road for equipment access. A mobile truck-mounted fuel and lube system will be available to service less mobile equipment in the field.

16.1.8 Open Pit Mining Manpower

The River Valley open pit mining operation will require a peak workforce of approximately 125 personnel, as summarized in Table 16.8. Manpower numbers will fluctuate as mining volumes and operating equipment requirements change.

The open pit mining operations manning list includes all aspects involved with the open pit operations, including:

- Senior mine and maintenance supervision;
- Office technical staff, engineering, geology, surveying, etc.;
- Clerical, maintenance planning, safety, training;
- Mine operations crews;
- Mine support crews; and
- Mine maintenance crews.

TABLE 16.8 OPEN PIT MANPOWER	
Category	**Number**
Driller	5
Truck Drivers	30
Excavator Operators	6
Loader Operators	1
Heavy Duty Mechanic	19
Pit Services (Dewatering)	3
Grader Operator	6
Dozer Operator	6
Water/Sand Truck Operator	3
Utility Operators	6
Mine General Foremen	1
Mine Foremen	3
Drill and Blast Foremen	1
Mine Clerk	1
Equipment Trainer	1
Maintenance General Foreman	1
Maintenance Foreman	3
Shop Foreman	3
Maintenance Clerk	1
Planner	1
Welder	3
Gas Mechanic	2
Fuel and Lube Person	3
Tireman	2
Partsman	1
Labourer	2
Chief Mine Engineer	1
Senior Pit Engineer	1
Drill & Blast Engineer	1
Geologist	2
Surveyor	1
Survey Technician	1
Mine Technician	1
Grade Control Technician	2
Geotechnical Engineer	1
Total	**125**

16.2 UNDERGROUND MINING

Underground mineralization is planned to be mined during Project production years two to seven and will total approximately 2.94 Mt of process plant feed. The underground mining methods are planned to be sublevel longitudinal and transverse longhole stoping, with cemented rock backfill. Underground production will be from both development and stope mineralization.

The Dana Zone stopes and development are accessed by a ramp from a surface portal elevation of 292 m elevation (“EL”) to a depth of -120EL, a vertical distance 412 m. There are three mining zones: South, Central and North. There are 16 stopes in the South Zone, extending from 175El to -125EL, 23 stopes in the Central Zone, extending from 275El to 25EL and 18 stopes in the North Zone, extending from 275El to -95EL. The Lismer North stopes and development are accessed by a ramp from a surface portal elevation of 292EL to a depth of 45EL, a vertical distance 337 m. There are 17 stopes in the Lismer North Zone, extending from 275El to 45EL. A break-down of the potentially mineable portion of the Mineral Resource by Zone is presented in Table 16.9.

TABLE 16.9
UNDERGROUND MINE PLAN PORTION OF MINERAL RESOURCE BY CLASSIFICATION

Zone	Classification	Tonnes (kt)	NSR (CDN$/t)	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Co (%)	Ni (%)	Rh (g/t)	Ag (g/t)
Dana	Measured (M)	1,061	110.58	1.63	0.5	0.09	0.09	0.003	0.02	0.05	0.57
	Indicated (I)	1,245	105.89	1.57	0.49	0.08	0.09	0.003	0.02	0.05	0.44
	Total M&I	**2,307**	**108.05**	**1.6**	**0.49**	**0.08**	**0.09**	**0.003**	**0.02**	**0.05**	**0.5**
	Inferred	95	90.71	1.34	0.42	0.07	0.08	0.003	0.02	0.04	0.23
Lismer	Measured (M)										
	Indicated (I)	287	96.55	1.43	0.51	0.07	0.06	0.003	0.01	0.05	0.14
	Total M&I	**287**	**96.55**	**1.43**	**0.51**	**0.07**	**0.06**	**0.003**	**0.01**	**0.05**	**0.14**
	Inferred	252	123.66	1.88	0.6	0.1	0.06	0.003	0.01	0.05	0.01
Combined	Measured (M)	1,061	110.58	1.63	0.5	0.09	0.09	0.003	0.02	0.05	0.57
	Indicated (I)	1,532	104.14	1.54	0.49	0.08	0.08	0.003	0.02	0.05	0.39
	Total M&I	**2,593**	**106.77**	**1.58**	**0.49**	**0.08**	**0.09**	**0.003**	**0.02**	**0.05**	**0.46**
	Inferred	347	114.65	1.73	0.55	0.09	0.06	0.003	0.02	0.05	0.07

Note: *The Authors targeted NSR blocks >85 $/t to define the stopes.*
The potentially mineable portion of the Mineral Resource utilized in the PEA contains Measured, Indicated and Inferred Mineral Resources. The reader is cautioned that Inferred Resources are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves, and there is no certainty that value from such Inferred Mineral Resources will be realized either in whole or in part.

A summary of mineralized tonnes mined by mining method and Zone is presented in Table 16.10.

TABLE 16.10
TOTAL TONNES BY MINING METHOD AND MINING ZONE

Item / Zone	Dana Stopes and Development			Lismer Zone	Total	
	South Zone (kt)	Central Zone (kt)	North Zone (kt)	Lismer Stopes & Dev (kt)	Tonnes (kt)	Percentage (%)
Longitudinal Longhole (t)	525	198	379	342	**1,444**	**49.1**
Transverse Longhole (t)	459	602	239	197	**1,497**	**50.9**
Total (t)	**984**	**799**	**618**	**539**	**2,941**	**100**
Percentage of Total (%)	**33.5**	**27.2**	**21**	**18.3**	**100**	

The Transverse Longhole mining method will be implemented where the mineralized zone is at least 15 m wide. Primary and secondary stopes will be mined from cross-cuts driven in mineralization on 15 m footwall drift centers. An estimated 51% of all mineralized tonnes mined will be by the Transverse Longhole mining method. Approximately 49% of all mineralized tonnes mined will be by the Longitudinal Longhole mining method, on a retreat basis.

3-D schematic views of the underground mine layouts, for both the Dana and Lismer Zones, are shown in Figures 16.6 and 16.7.

FIGURE 16.6 3-D SCHEMATIC OF DANA ZONE OPEN PIT AND UNDERGROUND LAYOUT, LOOKING NORTHEASTERLY

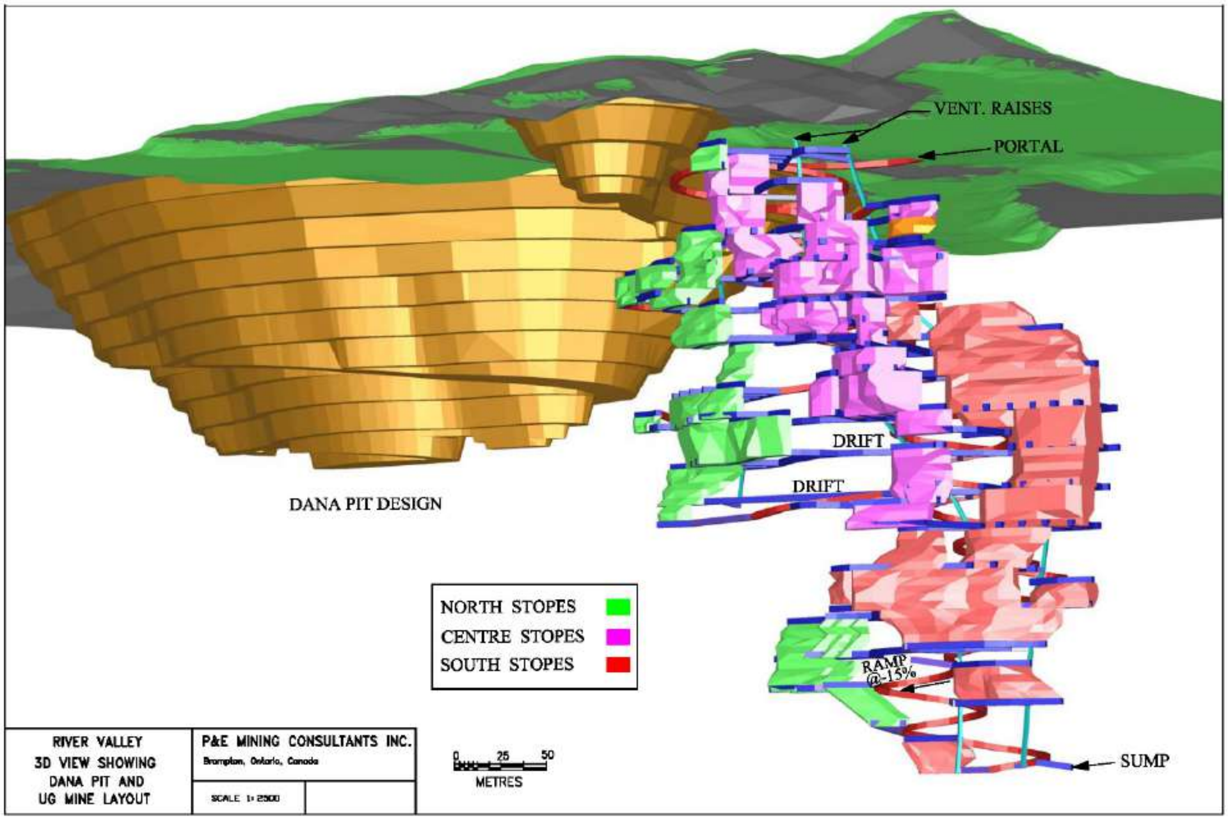
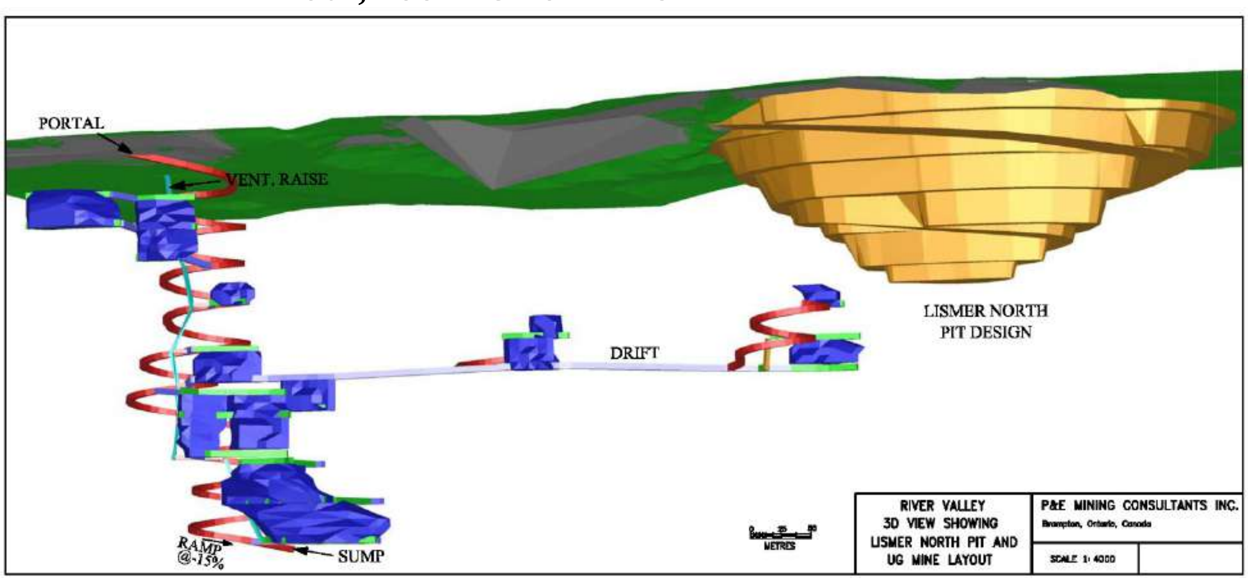


FIGURE 16.7 3-D SCHEMATIC OF LISMER ZONE OPEN PIT AND UNDERGROUND LAYOUT, LOOKING NORTHEASTERLY



All mine and stope development will be carried out by a mining contractor. Company personnel will carry out all other mining activities including: stope drilling and blasting; haulage of mineralization; backfilling; administration; technical support and personnel, and operation of underground and surface support equipment.

All nine underground Mining Zones will be serviced by ventilation, electrical and compressed air supplies, and dewatering systems. Fresh air will be provided through a fresh air raise ("FAR") and the main ramp, while the return air will exhaust upwards in a return air raise ("RAR"). The FAR and main ramp will be equipped with direct-fired propane mine air heaters during the winter months. Pump stations will use both electric submersible and centrifugal pumps to move ground and process water to surface through pump lines. High-voltage electrical power will be provided to the ramp portal and FAR then fed, at lower voltages, down the ramp, FAR and/or boreholes to the underground workings.

Underground mining is planned to produce at a nominal production rate of 1,500 tpd, combined stope and development mineralization: 45,660 tonnes per month, 547,900 tonnes per year for approximately 5.4 years. Mineralized production will consist of 2.94 Mt. The proposed production schedule, from all sources, is presented in Table 16.11.

TABLE 16.11
PROPOSED UNDERGROUND PRODUCTION SCHEDULE

Item / Year	**Units**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**LOM**
Project Year		**2**	**3**	**4**	**5**	**6**	**7**	
Development	(kt)	61	48	26	19	21		**175**
Slots	(kt)	9	5	4	8	6		**33**
LH Stoping	(kt)	476	492	514	521	521	209	**2,733**
Total	**(kt)**	**547**	**545**	**544**	**548**	**548**	**209**	**2,941**
Au	(g/t)	0.090	0.090	0.083	0.074	0.077	0.089	**0.083**
Ag	(g/t)	0.631	0.487	0.390	0.397	0.231	0.274	**0.416**
Pt	(g/t)	0.502	0.525	0.500	0.466	0.497	0.527	**0.500**
Pd	(g/t)	1.704	1.678	1.595	1.463	1.528	1.636	**1.597**
Rh	(g/t)	0.046	0.049	0.046	0.044	0.046	0.049	**0.046**
Cu	(%)	0.104	0.089	0.083	0.077	0.070	0.075	**0.084**
Ni	(%)	0.021	0.018	0.017	0.017	0.016	0.016	**0.018**
Co	(%)	0.003	0.003	0.003	0.003	0.003	0.003	**0.003**

Note: *Yr = year; Slots = slot raises; LH = Longhole.*
Project Year refers to the combined Open Pit and Underground Project Schedule.

A total of 527,800 tonnes of waste rock will be extracted from the mine workings. A summary of waste tonnes extracted from the mine workings is presented in Table 16.12.

TABLE 16.12 SUMMARY OF WASTE PRODUCTION								
Description / Year	**Yr -1**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Total**
Project Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Development Waste (kt)	**100**	**185**	**168**	**23**	**36**	**17**	**0**	**528**
Cumulative Devel. Waste	100	285	452	475	511	528		

Note: *Yr = year*

Access to the underground mining zones will be via 4.5 m high by 4.0 m wide -15% ramps from two surface 292EL portals, accessing all sublevels from the 275EL to the -125EL level for the Dana Zone, a vertical depth of 400 m, and the 45EL level for the Lismer Zone, a vertical depth of 230 m. Conceptual mining plans have been developed, for both the Dana and Lismer Zones, based on using underground mechanized trackless mining equipment. The underground mining methods will be conventional longitudinal longhole stoping (49.1%), on a retreat basis and transverse longhole stoping (50.9%), from footwall and hanging wall drifts. Stopes will be backfilled with cemented rockfill backfill, and waste rock when available. Stopes will generally be 20 m to 25 m high, floor to back, with both floor and back level access. A few stopes will be less than 20 m high. Longitudinal longhole stopes are planned to be 25 m long. Each longhole stope will have a 2 m by 2 m slot raise. Drifts/cross-cuts in mineralization will provide access for the successive operations of slot raise development, blasthole drilling, blasting and extraction, and backfill placement. Remotely operated underground load/haul/dump ("LHD") units will remove broken mineralization from the stopes.

A steady state production rate of 1,500 tpd of stope and development mineralization will begin to be mined starting in the 14th month from the start of underground mine development, on a schedule of 365 working days per year.

A summary of daily average production rates by year and source is presented in Table 16.13.

TABLE 16.13 SUMMARY OF AVERAGE DAILY PRODUCTION RATES						
Item / Year	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**
Project Year	**2**	**3**	**4**	**5**	**6**	**7**
Development in Mineralization (tpd)	168	131	71	53	56	
Slots (tpd)	24	15	12	22	17	
LH Stoping (tpd)	1,304	1,346	1,406	1,425	1,427	1,500
Total (tpd)	**1,497**	**1,492**	**1,489**	**1,500**	**1,500**	**1,500**

Note: *Yr = year; Slots = slot raises; LH = Longhole*

16.2.1 NSR Cut-off Value

An NSR cut-off value of $85/t was applied to the Mineral Resource block model to define stope outlines.

16.2.2 Longitudinal Longhole Stoping Method

The longitudinal longhole retreat mining method was implemented for veins between 3 m and 15 m in width. The longitudinal longhole retreat mining method is initially developed with sublevel drifts developed the full length of the mineralization every 25 m vertical ("undercuts" and "overcuts"), from the main ramp access drifts/cross-cuts. A 2.0 m by 2.0 m slot / ventilation / backfill raise is then driven every 25 m on strike, to result in a 25 m long longitudinal longhole stope.

Blastholes measuring 92 mm ($3^{5/8}$ inches) in diameter will be drilled from the sublevel either up or down to break through to the sublevel above or below. These blastholes would typically be drilled on a 2.1 m by 2.1 m pattern, in order to break the rock into the open slot and stope. The blasting powder factor necessary to produce adequate fragmentation of the rock, using emulsion explosives, is estimated to be 0.60 kg/t. A summary of typical longhole stope drilling and blasting parameters, for both longitudinal and transverse longhole stopes, is presented in Table 16.14.

TABLE 16.14
TYPICAL LONGHOLE STOPING DRILLING AND BLASTING PARAMETERS

Parameter	Amount
Total Tonnes Process Plant Feed per Day	1,500
Mineralization Dry Bulk Density	2.94
Stope Height (m)	16
Nominal Stope Width (m)	15
Nominal Stope Length (m)	27
Total Nominal Stope Tonnage	20,563
Slot Raise Tonnage	228
Nominal Sublevel Drift Tonnage	1,223
Nominal Longhole Tonnage	19,112
Longhole Drilling Parameters @ 92 mm Dia Holes	
Total Drilling Per Stope (m)	1,463
Drill Holes Per Stope	90
Drilling Time Per Shift (Hrs)	10
Metres Drilled per Shift	76
Total Metres Drilled Per Day	152
Required Metres per Day for Production Schedule	107
Blasting Parameters	
Loading Time Per Shift (Hrs)	10
Stemming Length Per Blasted Hole Length (m)	0.3
Load Length Per Hole (m)	16.0
Length of Blastholes Loaded Per Stope (m)	1,435

Cemented rock fill backfill, and development waste rock when available, will be placed in the mined-out stopes, from the sublevel above once stope extraction is complete. The cement content is planned at 5.4% by mass.

The stope mining cycle will include longhole drilling, blasting, loading and backfilling. The overall average stope mining productivity is estimated to be 325 tpd per stope. At any given time, a minimum of five stopes will be available for stope mining. The maximum daily longitudinal longhole production rate of 1,500 tpd is anticipated to be achieved in the 28th month from the start of underground mine development.

A summary of typical longhole stope productivities is presented in Table 16.15.

TABLE 16.15
TYPICAL LONGHOLE STOPE PRODUCTIVITIES

Operation	Productivity
Drilling (tpd)	1,991
Blasting (tpd)	1,991
LHD Loading (tpd)	1,500
Truck Haulage (tpd)	1,500
Backfill (tpd)	1,355
Average Stope Productivity (tpd)	325
Minimum tpd / level	349
Minimum Number of Working Sublevels	4.0
Average Stoping TPD	1,394

Longitudinal longhole stope mining will start during the 17th month, from the start of the underground project, on the 200 to 225EL sublevels in the Dana Central Zone. Initially stopes at the far ends of the drifts in mineralization will be mined, followed by stopes being mined successively towards the sublevel access cross-cut, on a retreat basis. It is estimated that there will be a total 86 longitudinal longhole stopes, LOM.

The envisaged underground longitudinal longhole mining method is estimated to result in external dilution of 15%, at the dilution grades noted in Table 16.16.

TABLE 16.16
DILUTION GRADES

Item	NSR	Au	Ag	Pt	Pd	Rh	Cu	Ni	Co
Units	CDN$/t	g/t	g/t	g/t	g/t	g/t	%	%	%
Grade	12.84	0.02	0.4	0.08	0.12	0.008	0.03	0.01	0.003

Mining recovery (extraction) is estimated at 90%.

16.2.3 Tranverse Longhole Stoping Method

The transverse longhole mining method was planned for veins greater than 15 m in width. The transverse longhole mining method is normally developed from footwall sublevel drifts. Primary and secondary stopes will be mined from cross-cuts driven from these footwall sublevel drifts, on 15 m centres. These cross-cuts will be driven the full width of the zone in mineralization normally every 25 m vertical ("undercuts" and "overcuts"). A 2.0 m by 2.0 m slot / ventilation / backfill raise will be driven near the hanging wall contact from the undercut cross-cut to the overcut cross-cut. Stopes will be at least 15 m long. Primary stopes will be mined and backfilled first, followed by secondary stopes.

Blastholes measuring 92 mm ($3^{5/8}$ inches) in diameter will be drilled from the sublevel either up or down to break through to the sublevel above or below. These blastholes would typically be drilled on a 2.1 m by 2.1 m pattern, in order to break the rock into the open slot and stope. The blasting powder factor necessary to produce adequate fragmentation of the rock, using emulsion explosives, is estimated to be 0.60 kg/t. A typical transverse longhole stope will contain 18,079 tonnes of stope mineralization and 210 tonnes of slot mineralization. Transverse longhole stope drilling and blasting parameters are the same as the longitudinal longhole stope drilling and blasting parameters, Table 16.14 above.

Cemented rock fill backfill, and development waste rock when available, will be placed in the mined-out stopes, from the sublevel above once stope extraction is complete. The cement content in the primary stopes is planned at 5.4%. Secondary stopes are not planned to require cement and this will be reviewed in future studies.

The stope mining cycle will include longhole drilling, blasting, loading and backfilling. The overall average stope mining productivity is estimated to be 325 tpd per stope. At any given time, a minimum of five stopes will be available for stope mining. The maximum daily transverse longhole production rate of 1,500 tpd is planned to be achieved in the 28th month from the start of underground mine development. A summary of typical longhole stoping productivities is presented in Table 16.15 above.

Transverse longhole stope mining will start during the 12th month, from the start of the underground project, on the 140 to 165EL sublevels in the Dana Central Zone. Transverse longhole stopes will all be 15 m wide, and vary in length up to 37 m long. It is estimated that there will be a total of 74 transverse longhole stopes, LOM.

The envisaged underground transverse longhole mining method is estimated to result in external dilution of 15%, at the dilution grades noted in Table 16.16 above. Mining recovery (extraction) is estimated at 90%.

16.2.4 Mine and Stope Development

All excavations in waste rock are classified as mine development. All development in mineralization that produces process plant feed is classified as stope development. The life of mine ("LOM") schedule includes a total of 14,804 m of mine development. A summary of LOM mine development is presented in Table 16.17.

TABLE 16.17 **LOM SUMMARY OF UNDERGROUND MINE DEVELOPMENT**			
Zone	**Description**	**Size (W x H) (m)**	**Metres**
Dana	Main Ramp	4.0 x 4.5	**3,318**
	Access X-cut	4.0 x 4.5	**749**
	Vent Exhaust X-cut N	3.0 x 3.0	**215**
	Vent Fresh Air X-cut N	3.0 x 3.0	**198**
	Vent Exhaust X-cut S	3.0 x 3.0	**278**
	Vent Exhaust Raise N	2.4 x 2.4	**234**
	Vent Fresh Air Raise	2.4 x 2.4	**414**
	Vent Exhaust Raise S	2.4 x 2.4	**397**
	Int Ramp /FW Drift/FW X-cut	3.0 x 3.0	**5,382**
	Dana Subtotal (m)		**11,185**
Lismer	Main Ramp	4.0 x 4.5	**1,558**
	Access Drift	4.0 x 4.5	**303**
	Vent Fresh Air X-cut N	3.0 x 3.0	**121**
	Vent Fresh Air Raise	2.4 x 2.4	**223**
	Internal ramp/Acs-X-cut	3.0 x 3.0	**1,396**
	Pass	3.0 x 3.0	**18**
	Lismer Subtotal (m)		**3,619**
Total			**14,804**

Note: *X-cut = crosscut; Acs-X = access cross-cut; N = north; S = south; Int. = internal; FW = footwall.*

There is a total of 7,679 m of stope development required over the LOM. This includes 3,752 m of drifts and cross-cuts in the Dana Zone, and 1,130 m of drifts and 27 m of cross-cuts in the Lismer Zone, and 2,770 m of slot raises. All stope development is in mineralization. A summary of stope development is presented in Table 16.18.

TABLE 16.18 **LOM SUMMARY OF UNDERGROUND STOPE DEVELOPMENT**			
Zone	**Description**	**Size (W x H) (m)**	**Metres**
Dana	Drift & X-cut	3.0 x 4.0	**3,752**
	Slot Raises	2.0 x 2.0	**2,128**
	Dana Subtotal (m)		**5,880**
Lismer	Drift	3.0 x 4.0	**1,130**
	X-cut	3.0 x 4.0	**27**
	Slot Raises	2.0 x 2.0	**642**
	Lismer Subtotal (m)		**1,799**
Total			**7,679**

Note: *X-cut = cross-cut.*

In summary there is a total 22,483 m of mine and stope development excavated over the LOM. A longitudinal projection of the Dana and Lismer planned underground workings is presented in Figure 16.8.

16.2.5 Dana Access Ramp and Level Development

Access to the Dana Zone is via a 4.5 m high by 4.0 m wide -15% ramp from surface for a vertical depth of 417 m from 292EL to -125EL. Portal construction is estimated to take place during the 4th month from the time the ramp contractor arrives on site. This development is part of and classified as mine development.

Excavation of the ramp and access cross-cuts will be completed by a contractor at an average rate of 6 metres per day (mpd). The 3,318 m length ramp and 749 m of sublevel access cross-cuts are scheduled to be completed during the 27th month, life-of-underground mine. The ramp and access development quantities includes a 15% allowance for miscellaneous development including remuck bays, safety bays, etc. The main ramp will allow all men, construction materials, equipment and excavated material to travel between levels and sublevels, as well as to and from surface.

Additional Dana Zone level development (in waste) consists of: 493 m of ventilation cross-cuts, 612 m of ventilation fresh air raises, 631 m of ventilation exhaust raises and 5,382 m of internal ramps / footwall drifts and cross-cuts.

16.2.6 Lismer Access Ramp and Level Development

Access to the Lismer Zone is via a 4.5 m high by 4.0 m wide -15% ramp from surface for a vertical depth of 247 m from 292EL to 45EL. Portal construction is estimated to take place during the 27th month from the time the Dana ramp contractor arrives on site.

Excavation of the ramp and access cross-cuts will be completed by a contractor at an average rate of 6 mpd. The 1,558 m length ramp and 303 m of sublevel access drifts and 121 m fresh air cross-cuts are scheduled to be completed during the 38th month, life-of-underground mine.

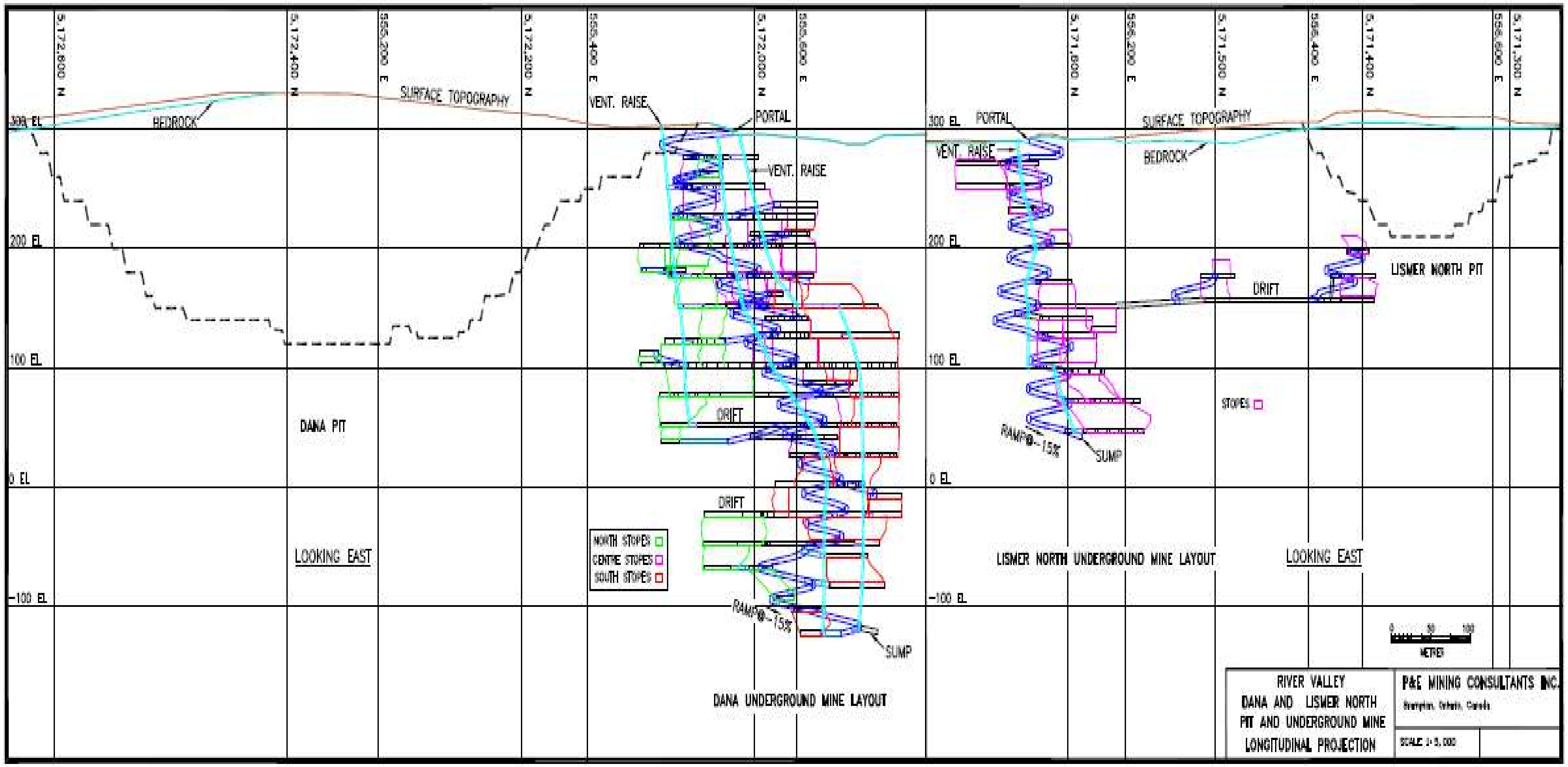
Additional Lismer Zone level development (in waste) consists of 223 m of ventilation fresh air raises, 18 m of passes for mineralization and 1,396 m of internal ramps / access cross-cuts.

16.2.7 Development in Mineralization

All development in mineralization that produces process plant feed is classified as stope development. Stope development includes drifts, cross-cuts and slot raises in mineralized rock.

Dana Zone stope development will start in the Central Zone on the 200EL sublevel during the 11th month in the transverse longhole stoping area. There is a total of 3,752 m of drifts and cross-cuts, and 2,128 m of slot raise stope development, for a total of 5,880 m LOM.

FIGURE 16.8 LONGITUDINAL PROJECTION OF UNDERGROUND MINE LAYOUT



Lismer Zone stope development will start on the 250EL sublevel during the 53rd month in the longitudinal longhole stoping area. There is a total of 1,130 m of drifts, 27 m of cross-cuts and 642 m of slot raise stope development, for a total of 1,799 m LOM.

16.2.8 Stope Production Schedule

Dana Zone transverse longhole stoping starts during the 12th month in the Central Zone on the 225EL to 200EL sublevels. Longitudinal longhole stoping starts in the 13th month in the North Zone on the 225EL to 200EL sublevels. Dana stope production is scheduled to end in the South Zone on the -45EL to -25EL sublevels during the 78th month.

Lismer Zone transverse longhole stoping starts during the 66th month on the 70EL sublevel. Longitudinal longhole stoping starts in the 55th month on the 200EL sublevel. Lismer stope production is scheduled to end on the 250EL sublevel during the 78th month.

16.2.9 Company Underground Mine Manpower

An estimated 20 Company underground mine personnel will be required on a daily basis, including 9 mine staff and 11 mine labourer positions. A summary of manpower requirements is presented in Table 16.19. The mining contractor's manpower requirements have not been included in Table 16.19.

TABLE 16.19 **COMPANY UNDERGROUND MANPOWER REQUIREMENTS**	
Description	**Manshifts/Day**
Mine Staff	
Mine Superintendent	1
Shift Foreman	2
Chief Engineer	1
Mine Engineer/Rock Mechanics/Mine Planner	1
Ventilation/Surveyor Technician	1
Surveyor Helper	1
Chief Geologist	1
Geological Technician	1
Subtotal Mine Staff	**9**
Mine Labour Positions	
U/G Mechanics	3
Electricians	2
Services Leader	1
Grader Operator	1
Pump / Construction Man	1
Mine Labourer	2
Service Truck Operator	1
Subtotal Mine Labour	**11**
Total Labour	**20**

Note: *Does not include contractor's manpower.*

16.2.10 Geotechnical Considerations

For development headings swellex bolts (2.4 m) will be installed on the walls and back on a 1.2 m by 1.2 m pattern, with welded wire mesh screen.

KP provided geomechanical input on achievable stope and pillar dimensions for the underground mine design as follows:

- The rock mass characteristics developed for the open pits are considered applicable to the underground mine for the purposes of this PEA;

- The proposed stope dimensions of 29 m high (25 m sublevel spacing and 4 m overcut), 15 m long, and 20 m from hanging wall to footwall, are expected to be achievable based on the empirical Stability Graph Method (Nickson, 1992). The results suggest that cable bolts will be required in the back of the overcut to break the span. Hanging wall overbreak was estimated to be 0.5 m or less based on the empirical method developed by Clark (1998);

- The crown pillars between the stopes and surface or the Dana and Lismer North open pits were evaluated using the Critical Scaled Span method (Carter, 2014). A target

Probability of Failure ("PoF") of 5 to 10% was selected on the understanding that neither water nor tailings will be stored in the open pits until underground mining is complete. This results in a recommended crown pillar thickness of 25 m. The uppermost stope to be mined at the Dana Zone is less than 25 m to the Dana Pit. This stope will be the last stope to be mined, and is planned to be mined once mining has been completed in the nearby open pit area. The uppermost stope at the Lismer Zone is less 25 m from surface. Drilling and surface mapping have indicated that the mineralization continues up to surface. Further drilling of this stope is required to determine if it is economic to mine it up to surface. Another stope at the Lismer Zone is within 20 m of the Lismer North Pit, however, it will be mined well before the pit is mined;

- The crown pillars between the stopes and Pine Lake were also evaluated using a similar approach, with a target PoF of 1%. Based on the results, a crown pillar thickness of 75 m is recommended. There are two stopes in the mine design that are less than the 75 m pillar distance. The top of the uppermost stope is at 50 m below Pine Lake. These two stopes will require careful monitoring when being mined. The feasibility of this will be sensitive to the actual thickness of the overburden; and

- The proposed underground mine plan was reviewed from a geomechanical perspective. Comments were provided on factors that could influence operations or subsequent design studies.

16.2.11 Backfill

No backfill studies have been completed for this PEA. Cemented rock backfill will be placed in the mined-out stoping areas. In addition, development waste rock will be used as backfill, when available. A summary of backfill requirements is presented in Table 16.20.

TABLE 16.20
SUMMARY OF ANNUAL CEMENTED ROCK FILL BACKFILL REQUIREMENTS

Item / Year	Yr -1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total
In-situ Mineralized (kt)	0	547	545	544	548	548	209	2,941
Volume (k m^3)	0	186	185	185	186	186	71	1,000
CRF Backfill (kt)	**0**	**372**	**371**	**370**	**373**	**373**	**142**	**2,000**

16.2.12 Ventilation

A summary of the estimated underground ventilation requirements for the underground mobile equipment is presented in Table 16.21.

TABLE 16.21 SUMMARY OF UNDERGROUND VENTILATION REQUIREMENTS						
Equipment	**Qty**	**Engine Power (HP)**	**Installed Power (HP)**	**Overall Utilization (%)**	**HP for Ventilation (HP)**	**Ventilation Required (CFM)**
Sandvik LH307 3.2 m^3 LHD	6	201	1,110	65%	721	68,404
Sandvik TH420 20t Haul Truck	7	322	2,358	65%	1,533	145,345
Top Hammer Drill (DL311-7)	3	173	519	10%	52	4,922
MCU 2700 Blasting Tractor	1	75	75	20%	15	1,423
Sandvik DD421 Devel Jumbo - 2 Boom	2	241	483	10%	48	4,577
Getman Scissor Lift / Boom Truck	3	173	519	25%	130	12,306
Toromont Cat Grader M135H	1	135	135	25%	34	3,201
Getman Personnel Carrier	1	173	173	25%	43	4,102
Mechanics / Electrician Vehicle	2	128	256	25%	64	6,070
Staff Toyota	4	128	512	25%	128	12,140
Subtotal	**30**	**1,749**	**6,139**		**2,768**	**262,489**
Minimum air required (Allow 20% for leakage and short-circuiting) (CFM)						314,986
Total (CFM)						**315,000**

Note: *Includes Contractor Equipment.*

The input parameters used for mine air heating are presented in Table 16.22.

TABLE 16.22 INPUT PARAMETERS FOR MINE AIR HEATING		
Parameter	**Amount**	**Unit**
Assume air is heated to	-1	degrees Celcius
from	-40	degrees Celcius (for sizing the heater)
Air Pressure, P	14.16	psi (absolute)
Specific Heat of Air, c	0.24	BTU/lb°R (BTU/lb°F)
Assumed Airflowf	315,000	cfm (airflow of heated air)
Heater Efficiency	95	%
Heating Value of Propane	110,000	BTU/ imperial gallon
Total Degree Days	2,295	Degree Days
1 BTU raises the temperature of 1 cu. ft. of air by	53.94	degrees Rankine (Fahrenheit)
Air Density	0.0772	lb/ft^3 (Density of fan intake air)

16.2.13 Mine Underground and Associated Surface Support Equipment

An estimated 27 pieces of underground mobile equipment will be required over the LOM, used mainly for stope drilling, blasting, loading, backfilling and haulage. An additional four pieces of surface mobile equipment will be required to support the underground operations. A list of mobile, miscellaneous underground and surface equipment, and infrastructure is presented in Table 16.23. Note that Table 16.23 does not include contractor's equipment.

TABLE 16.23
MINE UNDERGROUND AND SURFACE SUPPORT EQUIPMENT

Type	Item	Qty
U/G Mobile Equipment	Top Hammer Drill (Dl311-7)	3
	Getman Scissor Lift / Boom Truck	2
	Sandvik LH307 3.2 M^3 LHD - Haulage	5
	Sandvik TH320 20t Haul Truck C/W Ejector Box	8
	MCU 2700 UG Blasting Tractor	1
	Mechanics / Electrician Vehicle	1
	Grader	1
	Toyotas	4
	Getman Personnel Carrier	1
	Alimak	1
	Subtotal	**27**
Misc. U/G Equipment	Stopers	4
	Jacklegs	4
	Construction Hand Tools & Equipment	1
	U/G Ventilation Fans	18
	Heading Pumps	3
	Main Dewatering Pumps	3
	Drill Equipment Starters	3
	Main Substations	2
	Pump Station Electrical	1
	Portable Substations	2
	Subtotal	**41**
Misc. Surface Equipment	Cap Lamps	75
	Safety Gear	75
	Other Safety Gear	1
	Mine ERT	1
	Recondition Surface Ventilation Fans	2
	Compressors	2
	FAR VFD 450kw Starters	2
	Grounding & Cable Miscellaneous	1
	Subtotal	**159**
	Fel - Cat 980g	1

Table 16.23 **Mine Underground and Surface Support Equipment**		
Type	**Item**	**Qty**
Surface Mobile Equipment	Bus - 30 Person	1
	Pickup Truck - Ford F150	2
	Subtotal	**4**
Surf. Support/ Infrastructure	CRF Backfill with Truck Loadout Facilities and Crusher	Lot
	Waste Rock Co-Disposal Basin and Dam	Lot
	Ventilation Raise Infrastructure	3
	Office Building (36x18x6 m)	1
	Office Furniture, Equipment, Computers, Eng Equipment, etc.	1
	Dry	1
	Dry Equipping	1

Note: *Does not include contractor's equipment.*

16.2.14 Underground Infrastructure

A summary of underground infrastructure requirements is presented in Table 16.24.

Table 16.24 **Underground Infrastructure Requirements**								
Description	**Yr -1**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Total**
Pump Station	1				1			2
Sump		1		2	1			4
Mine Air Heaters		1		1	1			3
Refuge Station	1	1	1	1	1			5
Latrine	1	1	1	1	1	1		6
Powder Magazine	1	1	1	1	1			5
Detonator Magazine	1	1	1	1	1			5
Ventilation Bulkheads and Regulators		5	5	5	5	5		25
Total	**5**	**11**	**9**	**12**	**12**	**6**		**55**

16.4 LOM PRODUCTION SCHEDULE

Open pit mining is planned from Year -1 to Year 16. Underground development will start in Year 1 and production mining is planned from Year 2 to Year 7. Remaining lower grade mineralization that has been stockpiled over the mine life will be processed in Year 16. The combined mining schedule is presented in Table 16.25. Figure 16.9 presents the average PdEq g/t head grade and NSR CDN$/t value per annum. Note that due to lower grade stockpiled mineralization being fed to the process plant in the last two years of mine life, at low copper grades, the amount of concentrate decreases and hence the NSR $/t decreases in relation to the PdEq grade.

Figure 16.10 shows the Project site layout at the end of mine life, with tailings deposited into the Dana Pit, waste rock deposited into the Lismer Main South Pit, and the TMF filled with tailings.

TABLE 16.25
LOM FEED TO PROCESS PLANT

Feed	Unit	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16
Open Pit Mining	kt	**35,700**	**2,281**	**1,953**	**1,955**	**1,956**	**1,952**	**1,952**	**2,290**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**1,359**
Cu	%	**0.060**	0.073	0.063	0.058	0.063	0.060	0.068	0.069	0.060	0.067	0.064	0.055	0.052	0.052	0.054	0.049	0.046
Ni	%	**0.015**	0.016	0.015	0.015	0.015	0.015	0.016	0.017	0.016	0.017	0.016	0.013	0.014	0.014	0.014	0.013	0.012
Co	%	**0.003**	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002
Ag	g/t	**0.396**	0.599	0.504	0.414	0.542	0.430	0.477	0.463	0.441	0.480	0.378	0.304	0.228	0.250	0.292	0.292	0.305
Pt	g/t	**0.211**	0.273	0.217	0.196	0.205	0.192	0.259	0.271	0.173	0.194	0.217	0.187	0.155	0.164	0.197	0.268	0.234
Pd	g/t	**0.546**	0.741	0.566	0.505	0.545	0.489	0.714	0.748	0.441	0.510	0.569	0.437	0.352	0.387	0.480	0.730	0.591
Rh	g/t	**0.019**	0.024	0.018	0.017	0.017	0.017	0.024	0.024	0.015	0.017	0.019	0.017	0.014	0.014	0.017	0.024	0.021
Au	g/t	**0.038**	0.050	0.039	0.035	0.038	0.036	0.047	0.049	0.032	0.035	0.038	0.033	0.027	0.028	0.035	0.050	0.039
Underground Mining	kt	**2,941**		**547**	**545**	**544**	**548**	**548**	**209**									
Cu	%	**0.084**		0.104	0.089	0.083	0.077	0.070	0.075									
Ni	%	**0.018**		0.021	0.018	0.017	0.017	0.016	0.016									
Co	%	**0.003**		0.003	0.003	0.003	0.003	0.003	0.003									
Ag	g/t	**0.416**		0.631	0.487	0.390	0.397	0.231	0.274									
Pt	g/t	**0.500**		0.502	0.525	0.500	0.466	0.497	0.527									
Pd	g/t	**1.597**		1.704	1.678	1.595	1.463	1.528	1.636									
Rh	g/t	**0.046**		0.046	0.049	0.046	0.044	0.046	0.049									
Au	g/t	**0.083**		0.090	0.090	0.083	0.074	0.077	0.089									
Process Plant Feed	kt	**38,641**	**2,281**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**2,500**	**1,359**
PdEq	g/t	**1.19**	1.37	1.40	1.37	1.35	1.30	1.64	1.51	0.86	0.97	1.10	0.96	0.78	0.82	1.00	1.38	1.21
NSR	CDN$/t	**58.57**	71.98	74.27	66.28	68.83	64.24	72.67	71.37	51.27	58.11	59.72	48.56	42.33	44.31	45.48	48.05	44.26
Cu	%	**0.062**	0.073	0.072	0.065	0.067	0.064	0.068	0.070	0.060	0.067	0.064	0.055	0.052	0.052	0.054	0.049	0.046
Ni	%	**0.015**	0.016	0.016	0.016	0.016	0.015	0.016	0.017	0.016	0.017	0.016	0.013	0.014	0.014	0.014	0.013	0.012
Co	%	**0.003**	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.002
Ag	g/t	**0.397**	0.599	0.532	0.430	0.509	0.422	0.423	0.447	0.441	0.480	0.378	0.304	0.228	0.250	0.292	0.292	0.305

TABLE 16.25
LOM FEED TO PROCESS PLANT

Feed	Unit	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16
Pt	g/t	**0.233**	0.273	0.279	0.268	0.269	0.252	0.311	0.292	0.173	0.194	0.217	0.187	0.155	0.164	0.197	0.268	0.234
Pd	g/t	**0.626**	0.741	0.814	0.760	0.774	0.703	0.892	0.822	0.441	0.510	0.569	0.437	0.352	0.387	0.480	0.730	0.591
Rh	g/t	**0.021**	0.024	0.024	0.024	0.024	0.023	0.029	0.026	0.015	0.017	0.019	0.017	0.014	0.014	0.017	0.024	0.021
Au	g/t	**0.041**	0.050	0.050	0.047	0.047	0.044	0.054	0.052	0.032	0.035	0.038	0.033	0.027	0.028	0.035	0.050	0.039

Note: *Y = year.*

FIGURE 16.9 PROCESS PLANT HEAD GRADE AND NSR PER ANNUM

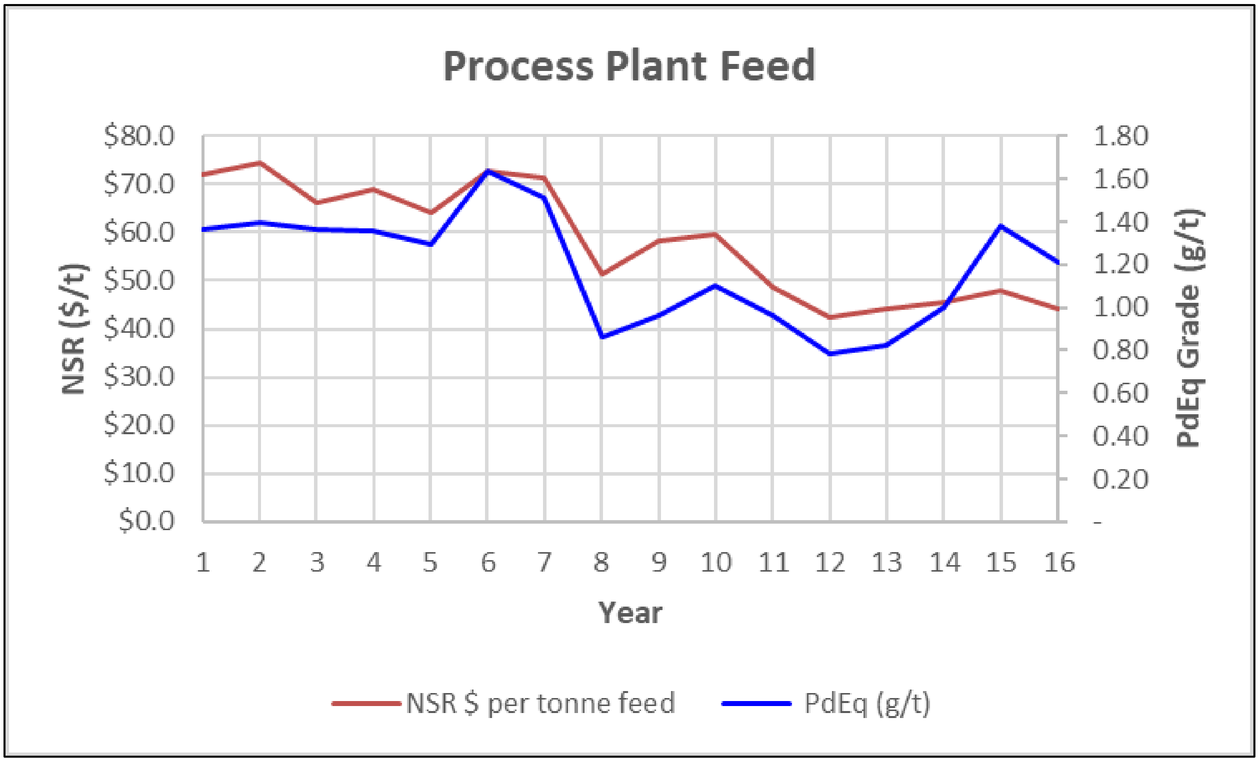
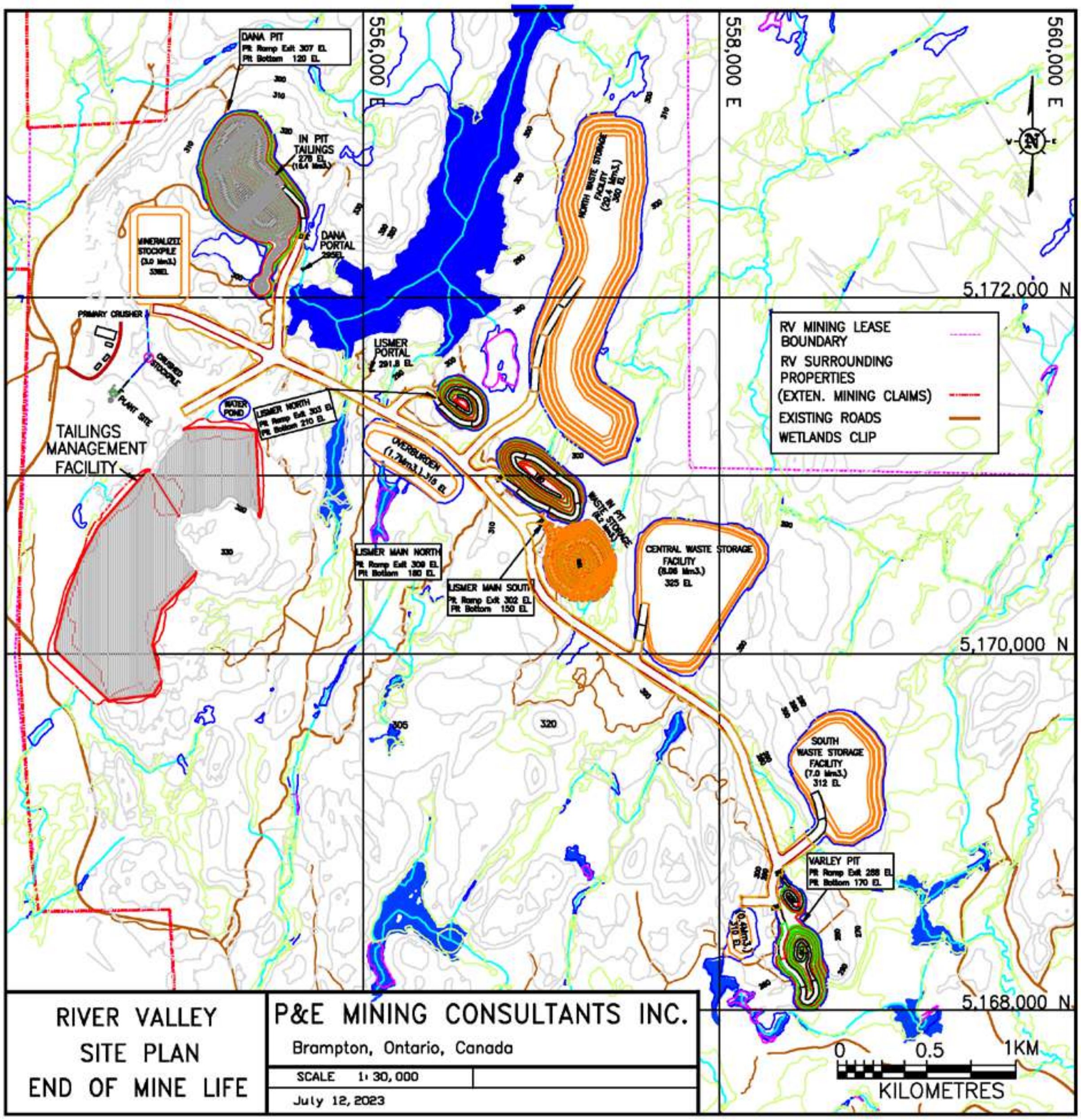


FIGURE 16.10 SITE PLAN AT END OF MINE LIFE



17.0 RECOVERY METHODS

17.1 SUMMARY

This Technical Report section describes the recovery methods for the River Valley Project crushing and process facilities. Testwork detailed in Section 13 were utilized in the flowsheet development and design criteria for the Project's two main zones, Dana and Lismer. The process plant design is based on nominal 6,850 mtpd throughput crushing, grinding, flotation, and dewatering circuits. The proposed mining and processing schedule is presented in Section 16 for the proposed 16-year mine life. As discussed, the process plant will treat sulphide material from the Dana and Lismer Zones via conventional flotation operations with process water recovery completed via a tailings thickener and TMF water recapture and return.

Average feed grades to the process plant over the LOM are as follows:

- 1.19 g/t PdEq
- 0.041 g/t Au
- 0.397 g/t Ag
- 0.233 g/t Pt
- 0.626 g/t Pd
- 0.021 g/t Rh
- 0.062% Cu
- 0.015% Ni
- 0.003% Co

The process plant flowsheet design consists of conventional crushing, a semi-autogenous ("SAG") mill with a pebble crusher, and a closed-circuit ball mill circuit with cyclones to ensure product (P_{80}) size feed to the flotation circuit. The cyclone overflow is conditioned prior to rougher flotation with reagents, including collectors, frother, and suited depressants, to produce a bulk rougher concentrate. The rougher concentrate is re-ground in a closed circuit regrind ball mill and further upgraded in a series of cleaner flotation cells to produce the final cleaner concentrate. The final concentrate is thickened, filtered, and dried prior to shipping to a smelter.

The cleaner circuit consists of 1st, 2nd, and 3rd cleaning circuits as well as cleaner scavenger. Associated recycling is completed between the stages. The rougher flotation circuit tailings feeds the tailings thickener to reduce impounded TMF density and return process water internally. Process water is recycled from the concentrate and tailings thickener as well as the settled water in the TMF pond. These three water streams are pumped to the main process water tank for reuse in the process plant.

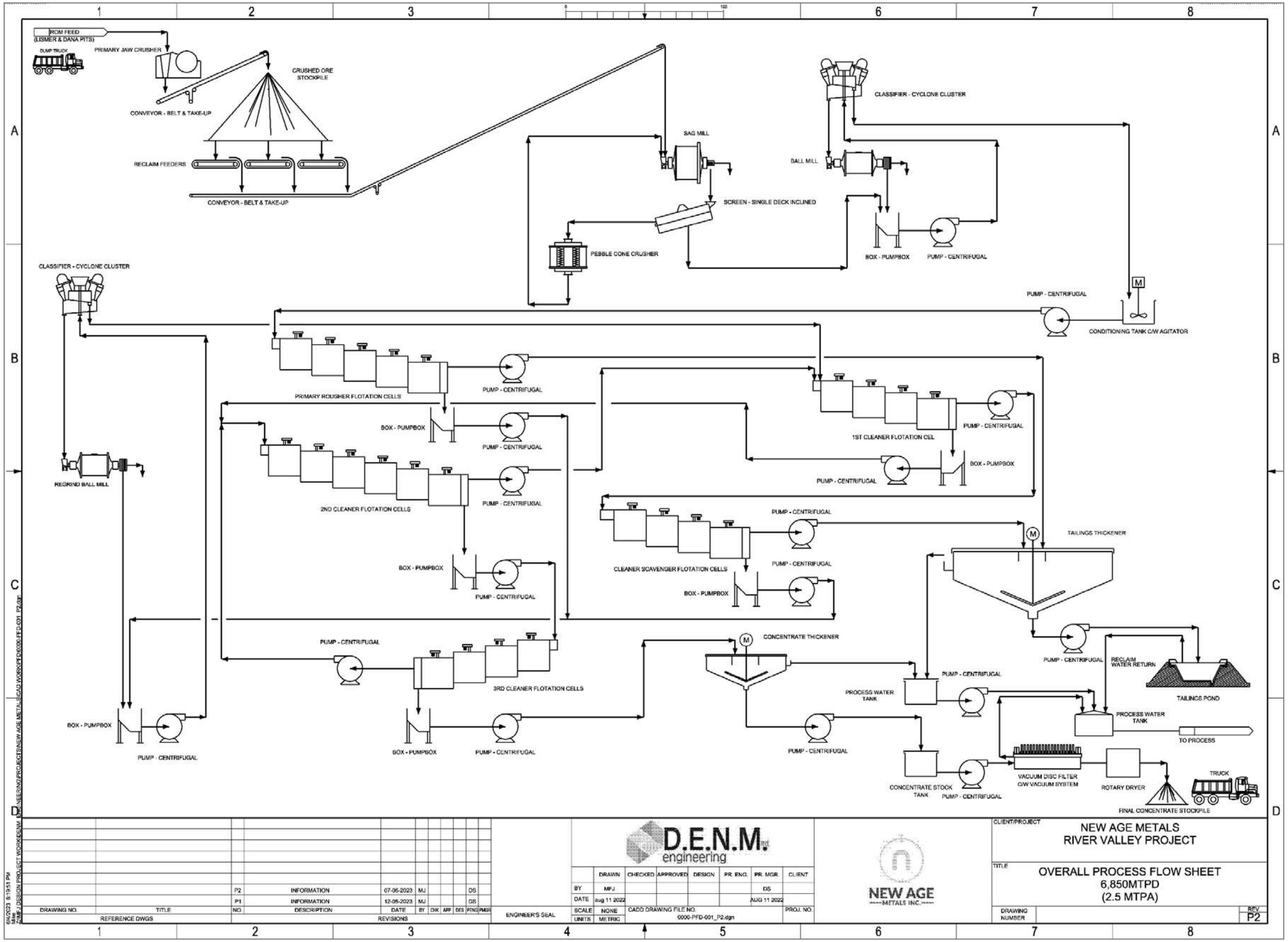
The process plant includes the following unit operations and support facilities:

- ROM Material Receiving and Primary Jaw Crushing;
- Transfer Conveyors;
- Crushed Feed Stockpile and Reclaim;
- SAG Mill, Pebble Crusher, Closed Circuit Ball with Associated Cyclones;
- Rougher Flotation Circuit c/w with Concentrate Regrinding;

- Cleaner Flotation Circuits;
- Concentrate Thickener and Vacuum Filter and Diesel Fired Rotary Dryer;
- Concentrate Dewatering;
- Process Water Recovery and Recirculation;
- Reagent Preparation Facilities; and
- Utilities.

The simplified process plant flowsheet for the River Valley Project is shown in Figure 17.1.

FIGURE 17.1 SIMPLIFIED OVERALL PROCESS FLOWSHEET FOR 6,850 TPD



Source: *D.E.N.M. (2023)*

17.2 PROCESS PLANT DESIGN

17.2.1 Key Process Design Criteria

The River Valley process plant is designed to treat copper and PGM metal bearing sulphide feed at a nominal rate of 6,850 tpd (2,500,000 tpa). The preliminary key process criteria are shown in Table 17.1.

TABLE 17.1
PROCESS DESIGN CRITERIA

Criteria	Units	Value
Feed Characteristics		
Specific Gravity	g/cm^3	2.95
Bulk Density	t/m^3	1.60
Moisture Content	%	3.0
Milling Circuit Feed Size – F_{80}	mm	150
Milling Circuit Product Size – P_{80}	µm	74
Plant Availability/Utilization		
Overall Process Plant Feed - Nominal	tpa	2,500,000
Process Plant Feed - Nominal	tpd	6,850
Crushing Plant Feed	tpd	8,000
Crusher Plant Utilization	%	75.0
Grinding, Leach and Refinery Utilization	%	92.0
Primary Crushing Circuit Throughout Rate	tph	381
Grinding and Flotation Process Rate	tph	310
LOM Feed Grade to Process Plant (as per Mining Schedule)		
Au	g/t	0.041
Pt	g/t	0.233
Pd	g/t	0.626
PdEq	g/t	1.190
Cu	%	0.062
Ni	%	0.015
Co	%	0.003
Ag	g/t	0.397
Rh	g/t	0.021
Indicative Recoveries		
Au	%	55.4
Pt	%	56.8
Pd	%	71.1
Cu	%	85.6
Ni	%	21.1

Table 17.1 Process Design Criteria		
Criteria	**Units**	**Value**
Co	%	25.0
Ag	%	60.0
Rh	%	40.0
Mineralization Hardness		
Abrasion Index (“Ai”)	g	0.210-0.546
A x b (Average Lismer/Dana)	g	24.5
Bond Ball Mill Work Index (“BWI”)	kWh/t	17.4
Primary Crushing		
Type		Jaw Crusher
Installed Power	kW	250
Feed Size F80	mm	500
Closed Side Setting	mm	150
SAG Mill		
Dimensions (Dia. x EGL) (Metso)	m	7.5 x 4.7
Installed Power	kW	4,600
Feed Size F_{80}	mm	150
Product Size	mm	2.5
Pebble Crushing		
Installed Power	kW	125
Feed Rate	tph	51
% H_2O (screen undersize)	%	10
Feed Size F_{80}	mm	76
Crusher Product	mm	15
Ball Mill		
Dimensions (Dia. x EGL) (Metso)	m	6,3 x 7.5
Quantity		1
Installed Power	kW	5,100
Circulating Load	%	250
Primary Grinding Product P_{80}	µm	75
Flotation Circuit and Regrind		
Conditioning Residence Time	min	5
Agitated Tank Volume	m^3	60
No. of Conditioners		1
Rougher Residence Time	min	30
Rougher Cell Volume	m^3/cell	100
No. of Rougher Cells		5
Mass Pull on Roughers	%	6
Rougher Concentrate F_{80}	µm	74

Table 17.1 Process Design Criteria		
Criteria	**Units**	**Value**
Regrind Mill Power	kW	700
Rougher Concentrate Regrind P_{80}	µm	10
No. 1st Cleaner		
1st Cleaner Residence Time	min	15
1st Cleaner cell Volume	m^3/cell	6
1st Cleaner Scavenger Residence Time	min	15
1st Cleaner Scavenger cell volume	m^3/cell	6
No. of 1st Cleaner and Scavenger Cells		4
No. 2nd Cleaner		
2nd Cleaner Residence Time	min	10
2nd Cleaner Cell Volume	m^3/cell	1.42
2nd Cleaner Cells		6
No. 3rd Cleaner		
3rd Cleaner Residence Time	min	10
3rd Cleaner Cell Volume	m^3/cell	1.42
3rd Cleaner Cells		4
Concentrate and Tailings Thickening and Filtration		
Concentrate Thickener Solids Loading (assumed)	t/h/m^2	0.25
Final Concentrate Feed Density	%	25
% Solids in Thickener Underflow	%	55
% Solids in Filter Feed	%	55
Filter Type		Vacuum Disc
Filter Rate of Final Concentrate	mtph	1.55
Concentrate LCT Mass Pull Design	%	0.5
Concentrate Produced	tpd	34.2
Final Cu Concentrate Produced	tpa	12,469
Filter cake moisture content	%	20
Filtrate H2O	m^3/hr	4.3
Tailings Thickener Solids Loading (SGS testing)	t/h/m^2	0.36-0.47
% solids in underflow	%	55
Tailings Thickener Dia.	m	35
Underflow flowrate (TMF feed)	m^3/hr	356
Overflow flowrate (recycle)	m^3/hr	376

Source: *D.E.N.M. (2023) and Section 13- SGS River Valley Testing*

17.2.2 Operating Schedule and Availability

The River Valley process plant is designed to operate for two 12-hour shifts per day, 365 days per year. Utilization expected for the specific circuits is 75% for the primary crusher and 92% for the milling, flotation, regrinding, dewatering, and drying. The factors applied allow for sufficient downtime for both scheduled and unscheduled maintenance within the crushing and processing areas.

17.3 PROCESS PLANT DESCRIPTION

17.3.1 Primary Crushing

The proposed crushing circuit will reduce the run-of-mine ("ROM") mineralized feed from a nominal top size of 600 mm to a product of 80% passing (P_{80}) 150 mm for the SAG mill feed material.

The front-end crushing circuit includes, however, is not limited to, the following equipment:

- ROM feed hopper;
- Rock breaker for oversize feed;
- Vibrating grizzly apron feeder;
- Jaw crusher;
- Associated conveyor transfer belts to new plant location; and
- Belt scale and belt magnet.

Feed material is hauled from the open pits and underground mine and dumped at the ROM delivery area, located adjacent to the crusher. The 100 t capacity ROM surge bin with a vibrating grizzly feeder feeds the primary jaw crusher.

The 250 kW jaw crusher at 762 mm x 1,219 mm (30 in x 48 in.) processes a nominal 444 tph of material based on a 75% utilization factor. The jaw crusher discharge is conveyed to the crushed feed stockpile.

17.3.2 Crushed Feed Stockpile and Reclaim

The stockpile provides production surge capacity to ensure a steady rate to the SAG mill and process facility.

Area Equipment includes:

- Crushed Feed Stockpile: 4,500 t live capacity;
- Reclaim Apron Feeders (3): variable speed; and
- Associated Conveyor Belt Feed System with Belt Scale, Self-Cleaning Magnet.

The apron feeders discharge onto the SAG mill feed conveyor to feed crushed material to the primary grinding SAG mill unit. The apron feeders reclaim the material from the 3,500 t stockpile and ensures a controlled feed rate to the SAG mill of 310 tph. Feed control to the feeders is ensured by the inline belt scale.

17.3.3 Grinding Circuit

The feed rate to the primary SAG mill is a nominal 310 tph. The grinding circuit is a two stage process with the SAG mill, screen and pebble crusher and the ball mill in closed circuit with classifying cyclones.

Area Equipment includes:

- SAG Mill VFD: installed power of 4.6 MW;
- Pebble Crusher: installed power 125 kW;
- Ball Mill: installed power 5.1 MW;
- Mill Discharge Pumpbox with associated Cyclone Feed Pumps;
- Cyclone Classification: Four Operating 6gMAX20 Units;
- Grinding Circuit Control: flow meters, density meters, variable speed pumps;
- Grinding Area Sump Pumps; and
- Sampling System: raw feed and leach feed.

Recycled water from the process is added to the SAG mill feed to ensure a slurry density with the mill of 74%. Oversize material from the classifying screen is sent to the pebble crusher via conveyors and recirculated to the SAG mill feed belt. The screen undersize feeds the ball mill pump box to allow pumped and classified feed at the cyclone cluster. The cyclone overflow, P_{80} = 74 µm flows to the pre-leach thickener.

Grinding media is added to the mills to maintain required power draw and grinding of the material to the desired size.

17.3.4 Flotation Circuit

Area equipment includes:

- Conditioning Tank: 3.5 m (dia) x 5 m;
- Five Rougher Flotation Cells: 100 m^3/ cell;
- EGL: 700 kW Regrind Mill c/w Closed Circuit Cyclones 3.2 m (dia) x 5.6 m;
- Four First Cleaner Flotation Cells: 6 m^3/ cell;
- Six Second Cleaner Flotation Cells: 1.42 m^3/ cell;
- Four Cleaner Scavenger Flotation Cells: 6 m^3/ cell;
- Four Third Cleaner Flotation Cells: 1.42 m^3/ cell;
- Concentrate Thickener: 4 m (dia);
- Dewatering Vacuum Disc Filter System;
- Diesel Fired Rotary Concentrate Dryer;
- Tailings Thickener: 35 m (dia); and
- All Associated Concentrate Pumps, Slurry Cyclone Feed Pumps, Dewatering Filter Feed Pumps.

17.3.5 Reagent Handling and Storage

Fresh water for the River Valley Project is provided by nearby lake sources located in the proposed process facility area. This water supply is to be utilized for all reagent mixing within the main plant and the flotation circuit. The main reagent mixing area in the process plant includes mixing area containment. An intricate distribution system of reagent feeders and pumping will ensure proper dosage and addition points with the overall flotation circuit.

Required flotation reagents:

- MIBC (frother);
- SIBX (primary collector);
- A3418A (collector);
- Carboxymethyl Cellulose ("CMC");
- Sodium Silicate (Na2SiO2): Non-Sulphide Depressant Reagent; and
- Magnafloc 10: Flocculant Bagged and Dry Concentrate and Tailings Thickener.

17.3.6 Assay and Metallurgical Laboratory

A fully equipped laboratory, located close the main process facility, will be an integral part of the River Valley Project. The laboratory has the necessary analytics to provide all required data for the mining operation, main process facility including the flotation circuit, and environmental monitoring.

The laboratory is also instrumental in providing on-time process monitoring of said processes, daily production reporting, blast hole sampling, and exploration samples.

17.3.7 Water Supply

Once the process plant is commissioned it is estimated that little make-up water will be required. There will be sufficient water available from the combined tailings management facility and water pond operations to use as reclaim water. Any make-up water for the River Valley Project will be supplied by nearby lake sources located in the proposed process facility area. This water supply is to be utilized for all reagent mixing within the main plant and process water make-up for grinding and flotation.

Other possible sources are rain and snowpack run-off collected within the water management area. The surface water will supply water to all facets of the Project and process water collected from the filters and thickeners is collected and stored within the main plant water distribution system, such as tanks, high pressure pumps, filters, and associated control.

17.3.9 Air Supply

An air distribution system will supply required high-pressure air to the main plant for grinding mills, maintenance tools, and other process requirements. High volume flotation blowers are used for all the process flotation units to aid and ensure of the recovery of the Cu-PGM bearing concentrates. Instrument air is utilized for required instrumentation and process control hierarchy throughout the process plant.

18.0 PROJECT INFRASTRUCTURE

Infrastructure at the River Valley Project consists of a nearby powerline and well-maintained access roads. The site is currently accessible via an 81 km highway road from Sudbury, ON (Highway 17 E and 539 N) or via a 77 km highway road from North Bay, ON (Highway 17 W and 539 N). Site access is more than sufficient for the transportation of major equipment including mills, crusher, process equipment and tankage, piping and electrical as well as all consumables and mine manpower. The River Valley Project site also has telephone, cell phone coverage and access to high-speed internet.

A 44 kV transmission line is located approximately 45 km from the proposed River Valley processing facility site. The line is controlled and maintained by Hydro One and is considered the optimum power source for the Project.

18.1 PLANNED INFRASTRUCTURE

Major infrastructure for the River Valley Project includes:

- Five individual open pit mines;
- Two underground mines;
- Process plant and laboratory with main substation and electrical power distribution;
- Tailings management facility ("TMF"); and
- Waste rock storage facilities.

Infrastructure to be installed by the Company:

- Main access road and gatehouse;
- Administration building for senior management, general and administration staff, technical staff, safety and training staff;
- Mechanical parts warehouse;
- Process plant supplies warehouse;
- Maintenance building with overhead crane for Company mining equipment;
- Personnel change room facility with showers;
- Water and sewage treatment plants; and
- Diesel fuel tank farm and fueling station.

Buildings will be supplied by well water for showers, toilets, etc. whereas drinking water will be bottled. The Company will not be supplying on-site housing and employees and contractors will commute from nearby towns.

Items to be installed by the contractors:

- Maintenance building with overhead crane for contract mining equipment;
- Bulk explosives storage and magazines;
- Contractor offices; and
- Contractor supplies warehouse.

The overall site layout is shown in Figure 18.1 with associated mining and waste rock storage locations, process plant location and TMF.

18.2 ELECTRICAL POWER DISTRIBUTION

A dedicated 44 kV feeder line from the Crystal Falls Transformer Station is located approximately 45 km from the proposed River Valley processing facility site. The line is controlled and maintained by Hydro One and is considered the optimum power source for the Project. The total connected electrical power for the process plant is estimated at 10.2 MW. A diesel generator at the process plant will be used for emergency power generation.

18.3 TAILINGS AND WATER MANAGEMENT

18.3.1 Introduction

The Project will include open pits, underground mines, waste rock storage facilities ("WSFs"), mineralized material stockpiles, process plant site, tailings management facility ("TMF"), and a water management pond ("WMP"). Knight Piésold Ltd. ("KP") provided tailings and water management layouts, as well as waste rock management and infrastructure design support for this PEA.

The tailings throughput is currently envisioned to average 2,500 tpd over a planned 16 year mine life (38.6 Mt in total mineralized tonnage). During Years 1 through 7 of operations, approximately 17.2 Mt of tailings will be stored in the TMF. Tailings will be conveyed and deposited via a thickened tailings slurry pipeline with discharge spigots located around the perimeter of the TMF basin during this period. The remaining tailings after Year 7 (21.4 Mt) will be stored in the mined-out Dana Pit. Tailings will be pipeline end discharged into the Dana Pit during this period.

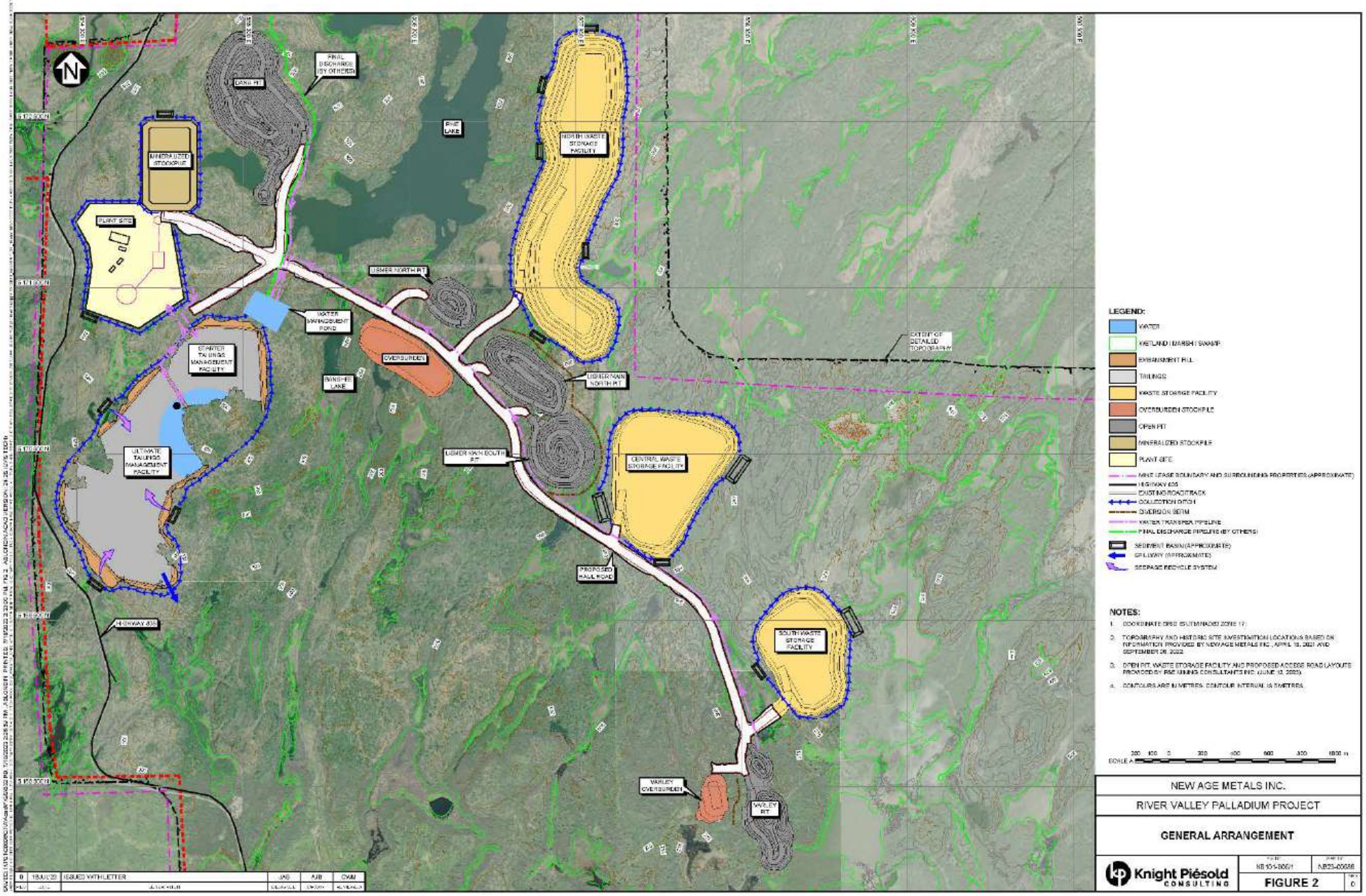
18.3.2 Site Conditions

18.3.2.1 Topography and Vegetation

The Project is in moderate and undulating topography ranging from El. 280 m to El. 345 m. There are several ridges in the area flanked by lower elevation valleys with swampy conditions and streams. The TMF is in a low-lying area ranging from El. 330 m at the north end to El. 280 m at the south end.

The forest cover mainly consists of poplar with some white pine regrowth. Most of the Dana Lake, Lismer Ridge, Casson, Varley, and Azen Creek areas have been logged within the past 15 years (P&E, 2019).

FIGURE 18.1 PROJECT SITE LAYOUT PLAN VIEW



Source: *KP (2023)*

18.3.2.2 Climate

Regional climate data, including temperature, precipitation, wind, and evaporation were assessed and reported in the Desktop Atmospheric Assessment Report (Story, 2022). The report is based on data collected from the Sudbury weather and air quality stations and from the North Bay weather station. The Sudbury station is located approximately 47 km west of the Project and the North Bay station is located approximately 65 km southeast of the Project.

The total annual precipitation is estimated to be 903 mm for Sudbury and 1,045 mm for North Bay. The months with the most precipitation are September and October. Approximately 76% of the precipitation falls as snow. The annual potential evapotranspiration rate ("PET") is 505 mm for North Bay and 541 mm for Sudbury. A 24-hour equivalent rainfall conversion factor of 1.13 was used to convert the daily values to 24-hour duration events (U.S. Department of Commerce - Weather Bureau, 1961).

18.3.2.3 Geotechnical Conditions

The surficial geology in the region of the TMF is based on the results of recent site investigations (KP, 2022) at other potential TMF locations. The results from the site investigations indicate that the overburden across the site typically consists of a thin layer of organics underlain by silty sand units, glacial till, and bedrock (KP, 2022). The completed investigations indicate that the surficial geology is generally consistent over the Project site, and bedrock outcrops are common throughout the Project area. The soil conditions encountered at an alternate TMF site were used to assess the selected TMF location for this PEA. The geotechnical conditions at the alternate TMF site generally consist of the following:

Organics: A thin surficial layer of moist organics ranging in thickness from 0.2 to 1.1 m. The organics were observed to consist of organic silt and clay, with varying amounts of sand throughout.

Silty Sand: A relatively thin layer of wet to saturated silty sand, ranging in thickness from 0.6 to 4.6 m. The sand was noted to be loose to compact based on the results from Standard Penetration Tests ("SPTs"). The laboratory testwork completed identified particle size distributions consisting of sand, silty sand, or sandy silt. Trace to some gravel and trace clay were identified in all samples. The moisture content was measured to range from approximately 7 to 56%. Atterberg limits on select samples indicate the materials are non-plastic.

Bedrock: The bedrock generally consists of Gabbro and was encountered at depths ranging from 0.6 to 9.3 m during the site investigations. The bedrock was also observed to be at surface in many areas. In general, the Gabbro is FAIR to GOOD quality rock based on RMR estimates (Bieniawski, 1989).

Hydraulic conductivity packer tests were completed at six drill holes at an alternative TMF location. The testing intervals and hydraulic conductivity results are summarized in KP (2022). One test yielded a hydraulic conductivity value of 2.8 x 10^{-6} m/s, and the other five tests had no take. No faults or other isolated bedrock zones of high permeability were encountered during the site investigations.

It has been assumed that the geotechnical and hydrogeological conditions at the TMF site selected for this PEA will be similar to the observed conditions at the alternate TMF site. Site specific geotechnical investigations will be required during future, more detailed, levels of study to confirm the assumptions at this TMF location.

18.3.3 Design Basis

The design basis for the TMF and site water management measures was developed based on input from the Authors, past studies for the Project, industry accepted best practices, previous experience on similar projects, and the anticipated site conditions. Key criteria used to develop the TMF and water management arrangements are summarized below:

- The TMF embankment concepts were developed to meet national standards and guidelines for the design of mining facilities (CDA, 2019; Mining Association of Canada; MAC, 2019). The embankments include provision for adequate operational freeboard to provide ongoing tailings storage, operational water management, temporary storage of the Environmental Design Storm ("EDS"), and conveyance up to and including the Inflow Design Flood ("IDF"), plus an allowance for dry freeboard for potential wave run-up;

- The TMF is sized for the storage of 17.2 Mt of tailings. Thickened slurry tailings (typically 50% to 60% solids content by weight) will be deposited into the TMF from an overland pipeline and discharged into the basin from spigots installed around the perimeter of the facility. The average settled dry density of the tailings is assumed to be 1.4 t/m^3 for the duration of the TMF operating life;

- The EDS corresponds to a 1 in 100-year, 24-hour duration, rainfall event plus 30-day snowmelt;

- The IDF for the TMF was selected as ⅓ between the 1 in 1,000-year, 24-hour duration storm event (133 mm) and the Probable Maximum Flood ("PMF") (calculated to be 353 mm), resulting in 206 mm of precipitation. This criterion corresponds to a dam classification of HIGH (CDA, 2019) during operations;

- Supernatant water from the TMF will be pumped back to the process plant site for use in the process. The WMP will receive water from the rest of the site facilities, which will be used to supplement the make-up water for the process plant. Any excess water remaining at that point will be treated and discharged to the environment;

- Surface water management systems (ditches and ponds) will be constructed to collect and temporarily contain surface runoff. Following settling/clarification, collected runoff will either be transferred to the WMP for use as process water, or released to the environment if water quality is acceptable. Runoff from storms greater than the design storm will report directly to the environment via spillways; and

- Based on preliminary geochemical characterization results, the bulk of the mine waste rock is assumed to be Non-Acid Generating ("N-PAG"). Some of the waste rock will be used for TMF embankment construction and the remainder will be stored in the WSFs.

18.3.4 TMF Concept Summary

18.3.4.1 General

The TMF concept is summarized in the sections below. The proposed filling schedule is illustrated in Figure 18.2 and the ultimate TMF general arrangement is shown in Figure 18.3.

18.3.4.2 Embankment Staging

The TMF will be constructed in three stages to reduce initial capital expenditure. Stage 1 will consist of a starter cell at the north end of the valley and is sized to provide two years of storage. The Stage 1 impoundment will be formed through the construction of two dams (North and Divider Embankments), with the remaining containment provided by the natural topography. Stage 2 includes the North, Divider, and South Embankments, and all embankments will be raised using the downstream construction method as required to reach the approximate 7-year facility life.

18.3.4.3 Embankment Section

The TMF perimeter embankments will consist of zoned rockfill, including the following materials, from upstream to downstream:

- 100 mm HDPE geomembrane (textured one side) will be installed to provide an impervious barrier, contain the process water, runoff, and tailings, and reduce seepage from the facility;

- 12 oz/yd^2 non-woven geotextile will be installed immediately below the geomembrane to act as a cushion layer and protect the geomembrane from damage;

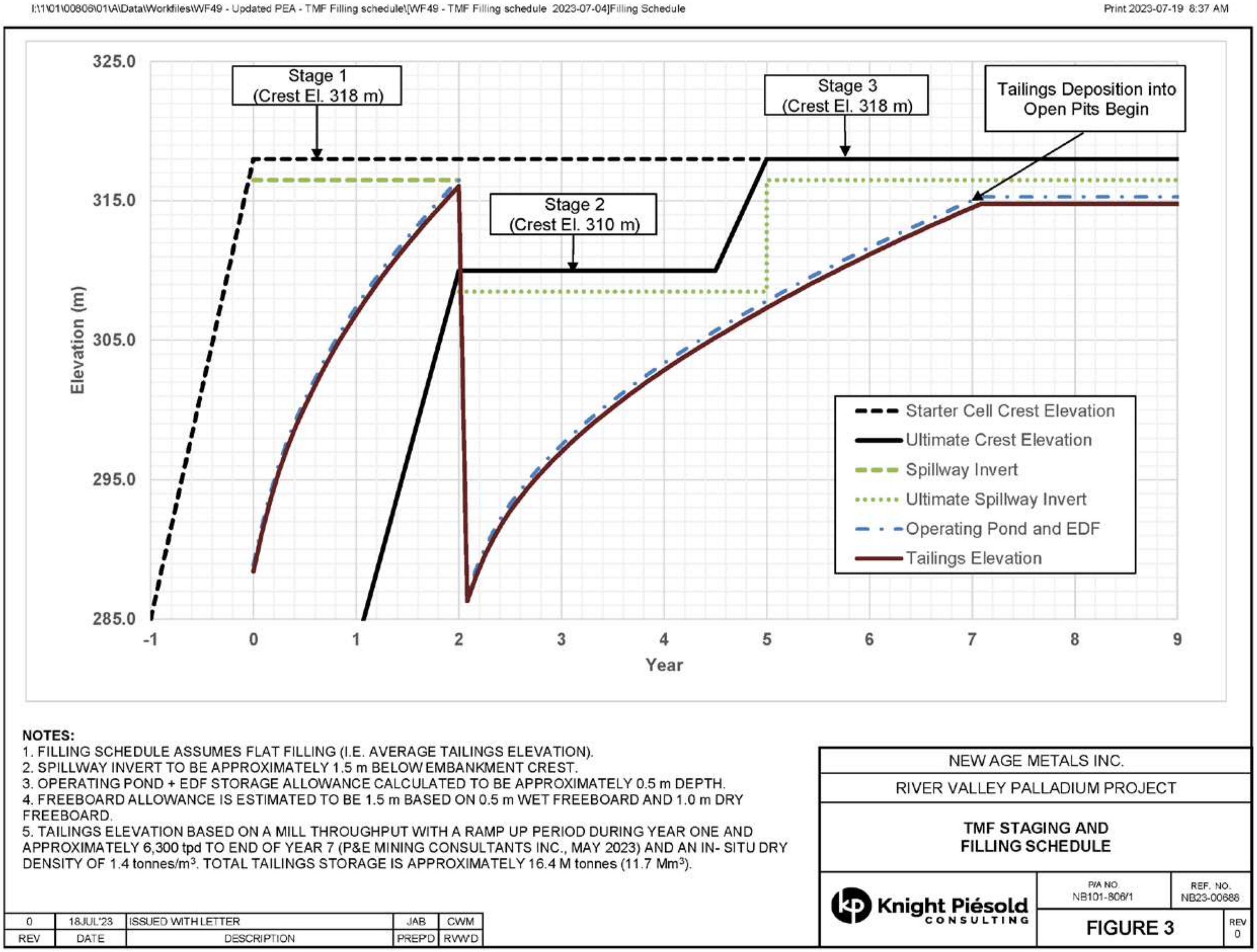
- Zone F (filter zone) will be placed and compacted to provide a bedding layer for the geomembrane/non-woven geotextile, maintain filter relationships with the tailings, and provide drainage within the embankment fill. The Zone F will have a true thickness of 0.3 m. Processing may be required to meet the material specifications;

- Zone T (transition zone) will be placed and compacted to maintain filter relationships with the upstream Zone F and provide drainage within the embankment fill. Zone T will have a true thickness of 3.4 m and will consist of a sand and gravel. Processing will be required to meet the material specifications; and

- Zone R (rockfill) will be placed and compacted to form the downstream shell zone.

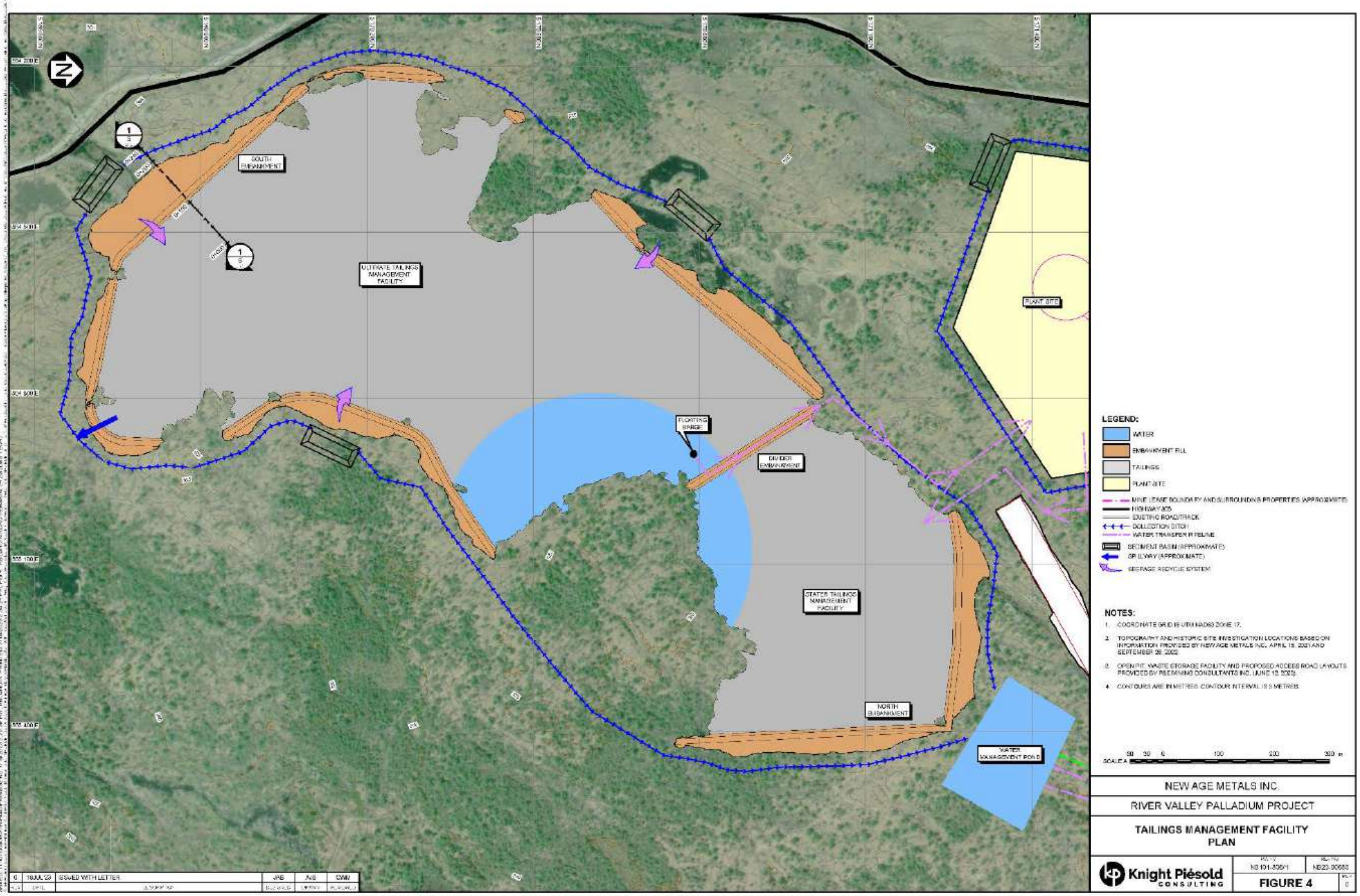
The upstream slope of each embankment will be 2.5H:1V. The downstream slope will be 2H:1V during all stages of construction. Slope benches (typically 3 m wide) will be included on the upstream slopes between the embankment stages to facilitate the geomembrane installation. The crest width will be 10 m at all stages of construction. The typical section for the perimeter TMF embankments is shown in Figure 18.4.

FIGURE 18.2 TMF STAGING AND FILLING SCHEDULE



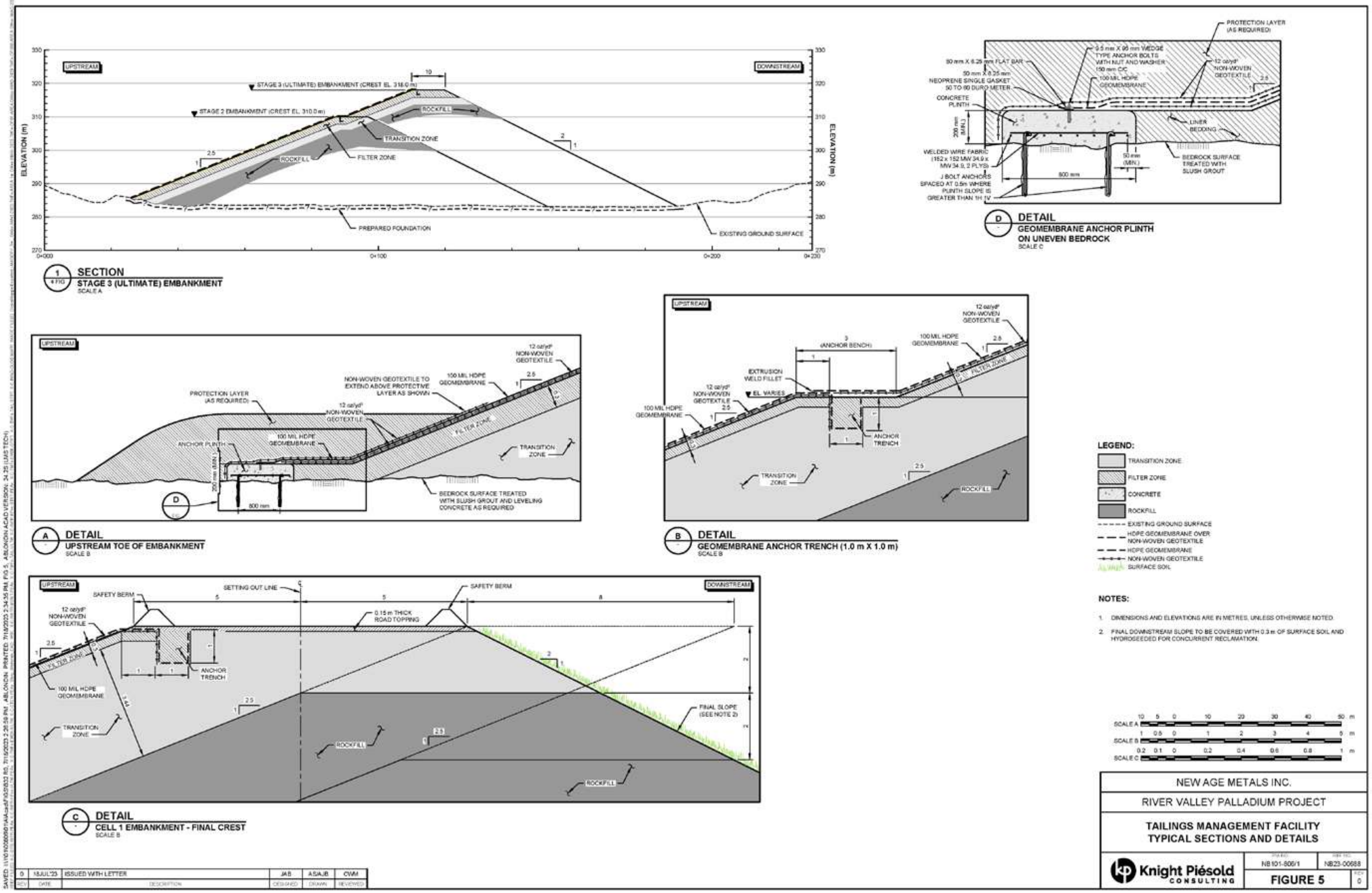
Source: *KP (2023)*

FIGURE 18.3 TMF PLAN VIEW



Source: *KP (2023)*

FIGURE 18.4 TMF TYPICAL VERTICAL CROSS-SECTIONS AND DETAILS



Source: *KP (2023)*

18.3.4.4 Geosynthetic Lining System

A geosynthetic lining system consisting of 100 mm HDPE geomembrane underlain by 12 oz/yd^2 non-woven geotextile will be installed along the upstream face of the perimeter embankments. The geomembrane will be tied into anchor trenches along the embankment crest and along the upstream embankment toe, where possible. Areas along the upstream toe with exposed or near surface bedrock or steep topography will require the installation of a concrete plinth to anchor the lining system. Typical details for the embankment liner system are included in Figure 18.4 above.

18.3.4.5 Instrumentation

Instrumentation, consisting of vibrating wire piezometers, survey monuments, and slope inclinometers will be installed within the foundation and embankment fill materials as required. The instrumentation will be monitored to verify embankment performance during construction and throughout operations. The installation of monitoring wells downstream of the TMF is assumed to be completed by others.

18.3.4.6 Tailings Delivery and Deposition

Tailings will be pumped as a thickened slurry (typically 50% to 60% solids content by weight) from the process plant to the TMF via above ground pipelines. Tailings will be deposited from multiple spigot locations around the perimeter of the TMF basin and upstream faces of the TMF embankments to establish tailings beaches and maintain the supernatant pond against the eastern side of the valley, where natural topography exists. The tailings deposition strategy will allow for even filling of the basin to provide time for drying/partial consolidation to maximize tailings storage capacity within the impoundment.

18.3.4.7 Water Management

Meteoric and supernatant inflows to the TMF will be temporarily stored within the basin prior to reclaim to the process plant via a floating pump barge located at the east side of the basin.

A wet freeboard allowance for temporary storage of the EDS runoff is included within the proposed staging plan. The TMF will be equipped with an overflow spillway to accommodate flows above the EDS and up to and including the IDF.

Pump and pipeline systems for tailings delivery/deposition, and water reclaim have been designed by other firms.

18.3.5 Site Water Management

18.3.5.1 General

Surface water management measures are required to collect runoff from the various site infrastructure areas and route the collected water to sediment basins for sediment control. The collected runoff will be transferred to the WMP (with the exception of the TMF runoff) and eventually released to the environment provided that acceptable water quality has been achieved. Minimal treatment is anticipated in order to achieve the acceptable water quality requirements.

The water management measures consist of diversion and collection ditches, sediment basins, and sumps. All water retaining structures will be constructed with N-PAG materials (mine rock) and will include geosynthetic lining systems as required in order to minimize seepage. Appropriate bedding and transition layers will be included as part of the designs.

The sediment basins around the site were sized to temporarily contain runoff from the 1 in 10 year, 24-hour duration summer/fall rainfall event with an additional freeboard allowance of 1 m. A spillway will be incorporated into each sediment basin to manage larger events up to and including the 1 in 200 year, 24-hour duration summer/fall rainfall event. The collection ditches were sized to convey runoff resulting from the 1 in 50 year, 24-hour duration summer/fall rainfall event. The conceptual site water management measures are shown on the general arrangement plan, Figure 18.1. The following summarizes the water management details for each of the key areas around the Project site:

Open Pits: Sumps will be established within each pit. It is assumed that runoff and groundwater inflows reporting to the pits will be pumped to their respective sump using a pump and pipeline system.

WSFs: A series of collection ditches around the perimeter of each WSF will drain into sediment basins. The sediment basins will be constructed as cut-fill balances, by excavating into the existing ground to provide adequate storage.

Process Plant Site: A collection ditch around the perimeter of the Process Plant Site will collect runoff from that area and convey it to a sediment basin.

TMF Perimeter: A series of ditches and sediment basins will manage runoff from the downstream slopes of the TMF embankments. The collected runoff will be temporarily stored in the basins to allow for some sediment removal, prior to pumping the runoff back into the TMF basin. Seepage collection drains, ditches, sumps, and pump back systems will also be installed to collect potential embankment seepage below the embankments. Pump back systems, if required, will be installed.

WMP: The WMP will be constructed immediately northeast of the TMF. The WMP will provide temporary storage of contact water from the WSFs and open pits during normal operations and temporarily store precipitation falling on the WMP surface following storm events up to a 1 in 100 year, 24-hour storm. A floating pump and pipeline will be installed at the WMP to draw down the pond in a controlled manner following each storm event. The collected water will be pumped to the process plant for re-use in the process. Any excess water will be treated (if required) in a water treatment plant and discharged to the environment. A spillway will be installed on the WMP embankment to safely pass flows from the IDF.

18.3.5.2 Site Wide Water Balance

An annual site wide water balance, using a spreadsheet approach, was completed to support the water management strategy for the River Valley site and to verify that sufficient water will be available for reclaim from the WMP. The water balance was developed for two scenarios: one when tailings are deposited into the TMF (Year 7) and one when tailings are deposited into the Dana Pit (Year 13). The timing of each structure is illustrated in Figure 18.5.

The water balance indicates that the site is expected to operate in a water surplus and periodic discharge to the environment will occur. The results of the water balance are summarized below:

- There will be sufficient water available from the combined TMF and WMP operations to use as reclaim water, with no make-up water being required from a water availability perspective; and

- Under average conditions, water from the WMP will be periodically pumped to the treatment plant for treatment and discharge at an annualized average rate of approximately 66 m^3/hr.

18.3.6 Waste Rock Storage Facilities

Three WSFs were sized by the Authors to store 93.4 Mt of waste rock (44.5 Mm^3 at an assumed placed density of 2.1 t/m^3). An additional 17.2 Mt (8.2 Mm^3) is expected to be stored in the Lismer Main South Pit once it has been mined out. Planning of the WSFs consider the following:

- Minimal surficial and environmental impacts;

- Minimal visual impacts;

- Close proximity to the mining areas to minimize haul distances;

- Selective placement of any potentially acid generating material to impede oxidation;

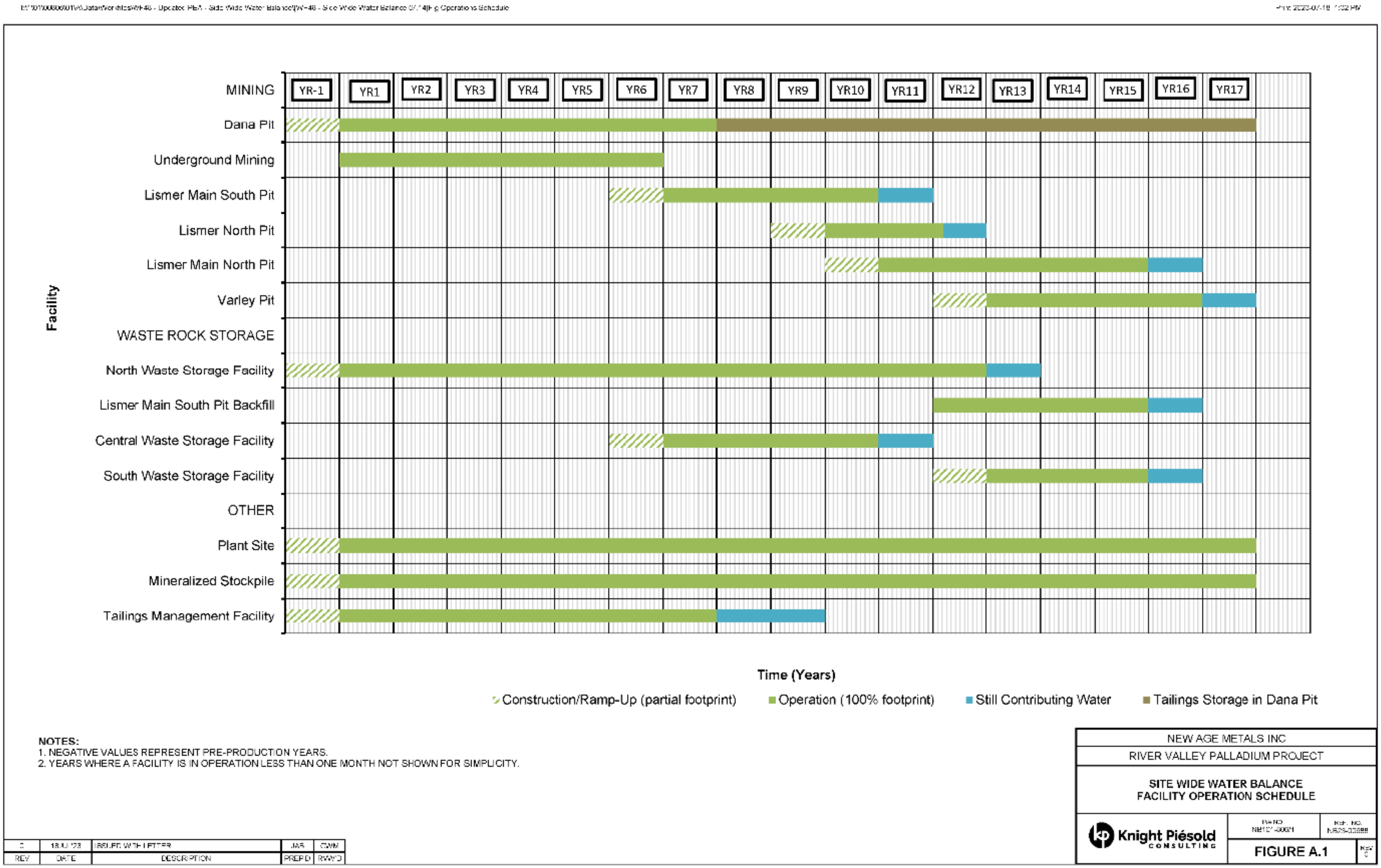
- Ensuring that the facilities can be safely and securely rehabilitated in accordance with best available practices at the end of the mine life; and

- Any WSF placed adjacent to an open pit shall have a minimum setback of 100 m from the ultimate edge of the pit. Smaller offsets could be possible with detailed analysis of the exact configuration. The slope stability of all WSFs should be reviewed with additional site investigation data at future levels of design.

The waste rock storage development strategy proposed by the Authors considers a section geometry with 8 m wide benches, 15 m high inter-bench heights, 1.5H:1V inter-bench slopes, and maximum 60 m in total height. Prior to construction of the WSFs, the footprint will be cleared, and surficial organic materials removed prior to waste rock placement.

A high-level stability review of the proposed waste rock storage geometry was completed by KP using Slope/W© software (GEO-SLOPE International Ltd., 2021). The material parameters used in the model were based on typical values (Leps, 1970 and Carter and Bentley, 2016). A 1 in 2,475 earthquake event was adopted to estimate the peak ground acceleration ("PGA") of 0.13 g based on a Seismic Site Class of C (NRCC, 2020).

FIGURE 18.5 SITE WIDE WATER BALANCE FACILITY OPERATION SCHEDULE



Source: *KP (2023)*

The proposed rockfill storage geometry will be stable under both static and pseudo-static loading conditions based on the analyses completed. The evaluated configurations should be reviewed if the WSFs need to be higher than 60 m. The inter-bench slopes could be reduced to 2H:1V during operations to complete progressive reclamation activities and prepare the WSFs for final closure during operations.

18.3.7 Materials, Quantities and Costs

Material and quantity estimates were developed for the starter and ultimate TMF arrangements, as well as the ultimate arrangement for the site wide water management measures. The quantities include foundation preparation requirements, embankment construction materials, geosynthetics and liner tie-in items, embankment instrumentation, the runoff/seepage collection ditches, and excavation and embankment construction for the settling ponds. Unit rates were used to estimate the capital costs of the facilities. The material and quantity estimates were generally determined based on neat lines from the design figures.

The following key assumptions were used in developing this PEA level cost estimate:

- The waste and water management strategy was developed based on the current understanding of the site conditions. Limited specific geotechnical information was available for concept development and quantity estimates;
- Suitable embankment fill for the TMF and WMP will be sourced from open pit development;
- The cost estimates are at a conceptual level of detail (±50%); and
- A contingency of 15% is included as a separate line item on the summary tables.

The cost to construct the TMF is approximately $50.7M and the cost to construct the water management structures is approximately $13.5M over one pre-production year and seven years of operations.

18.3.8 Recommendations for Future Work

Key recommendations for advancement and optimization of the TMF and site water management measures during the next level of design are summarized as follows:

- Completion of geotechnical/hydrogeological site investigations at the selected TMF footprint to characterize the foundations of the TMF embankments;
- Collection of site specific meteorological and hydrological data. This data will be used to refine seasonal runoff values and design storms to be used in future work;
- Development of a detailed annual site wide water balance for the TMF and site water management infrastructure; and

- Development of a predictive water quality model, in conjunction with the water balance, to review the requirements for water treatment and/or discharge.

19.0 MARKET STUDIES AND CONTRACTS

19.1 METAL PRICES AND FOREIGN EXCHANGE

The Author followed the approximate May 31, 2023 three-year monthly trailing average metal prices and CDN$:US$ exchange rate. The metal prices and FX are listed in Table 19.1. It should be noted that only Au, Pd, Pt, and Cu are considered as payable in potential smelter/refinery agreements.

TABLE 19.1
METAL PRICE ASSUMPTIONS AND FX (US$)

Commodity	Au ($/oz)	Pd ($/oz)	Pt ($/oz)	Rh ($/oz)	Ag ($/oz)	Ni ($/lb)	Cu ($/lb)	Co ($/lb)	CDN$:US$
Price	1,830	2,150	1,010	5,450	23.50	9.60	4.00	26.00	1.35

19.2 CONTRACTS

There are no existing contracts in place related to the River Valley Project.

19.3 SMELTING AND REFINING

An independent marketing and logistics study was commissioned for the concentrate to be produced from the River Valley Project. The conclusions are summarized below.

Based on metallurgical testwork performed by SGS-Lakefield, the expected analysis of the concentrate is set out in Table 19.2.

Copper smelters/refineries recover PGMs which report to refinery anode slimes along with gold, silver and other byproduct metals such as selenium and tellurium. However, PGM production at most copper refineries will typically be very low due to the contained metal characteristics of the inputs. As such, only a small number of copper smelters measure and track their PGM recoveries and few are thus prepared to pay for platinum and palladium in concentrates.

Although PGMs are relatively common in nickel concentrates, copper is typically an ‘undesirable’ at most nickel smelters. The River Valley concentrate is likely unsuitable as a feed for either of the Sudbury nickel smelters, however, this requires further investigation.

Metallurgical testwork indicates that the copper grade in the River Valley concentrate will range from 11% to 20% with a weighted average grade of 14% to 15%. While unlikely to cause significant marketing issues based on the annual output and likely destinations, these copper grades are well below what most western copper smelters consider desirable and may either limit the volumes to which any single smelter might be prepared to commit or, more probably, lead to the imposition of penalties via a lower (net) copper payable. With most smelters targeting higher average feed blends, the River Valley concentrate will have to be blended with diminishing volumes of higher grade concentrates to ensure an optimal smelter feed mix.

TABLE 19.2
CONCENTRATE QUALITY

Element	Unit	Range				Element	Unit	Range		
Cu	%	11.7%	to	19.5%		Cd	%	< 0.01%		
Ag	gms/dmt	31.3	to	78.4		Co	%	0.14%	to	0.42%
Au	gms/dmt	4.2	to	6.3		Cr	%	0.10%	to	0.12%
Pt	gms/dmt	22.4	to	36.2		K	%	0.03%	to	0.07%
Pd	gms/dmt	47.8	to	130.7		Li	ppm	< 20		
Rh	gms/dmt	1.4	to	2.3		MgO	%	1.35%	to	2.52%
S	%	30.6%	to	31.3%		Mn	%	0.03%	to	0.05%
Fe	%	30.1%	to	31.5%		Mo	%	0.006%	to	0.007%
Pb	%	0.026%	to	0.033%		Na	%	0.03%	to	0.04%
Zn	%	0.23%	to	0.32%		Ni	%	0.65%	to	1.41%
As	%	0.01%	to	0.02%		P	ppm	< 80		
Sb	%	< 0.01%				Se	ppm	129	to	130
Bi	%	< 0.01%				SiO2	%	13.09%	to	13.61%
F	ppm	< 60				Sn	%	0.002%	to	0.003%
Hg	ppm	< 3				Sr	%	0.004%	to	0.012%
Al2O3	%	2.00%	to	4.18%		Ti	%	0.02%	to	0.05%
Ba	%	0.005%	to	0.013%		Tl	ppm	< 30		
Be	ppm	0.05	to	0.07		V	ppm	29	to	36
Ca	%	0.92%	to	1.43%		Y	ppm	1.4	to	1.5

The projected levels of PGMs in the River Valley concentrate is considerably higher than those found in most copper concentrates, and particularly those traded in the global custom concentrate market.

19.3.1 Concentrate Offtake Terms

It was assumed that the River Valley concentrate will be evenly split between two buyers (one domestic, one offshore). Based on feedback received from two of the most likely buyers of the River Valley concentrate and the Author's knowledge of the market, the following assumptions have been used for offtake terms:

19.3.1.1 Payable Metals

The net payable amounts for each of the payable metals is expected to be as presented in Table 19.3. Silver and rhodium are not expected to be at high enough concentrations to be payable. Nickel and cobalt are not expected to be payable as part of a copper concentrate.

TABLE 19.3 **CONCENTRATE PAYABLE METAL**			
Element	**Unit**	**Concentrate Grade**	**Net Payable (%)**
Cu	%	13.0	91
Pd	g/t	143.3	96
Pt	g/t	35.1	91
Au	g/t	5.9	82
Ag	g/t	57.1	0
Ni	%	0.8	0
Co	%	0.2	0
Rh	g/t	2.2	0

19.3.1.2 Treatment Charge and Refining Charges

Benchmark treatment and copper refining charges have been used. Other charges, such as freight capture and container handling charges, are incorporated into the logistics costs.

Treatment Charge: US$85.00/dry metric tonne ("dmt")

Copper Refining Charge: US$0.085/lb payable copper

Other Refining Charges:
- Platinum US$28.00/payable oz
- Palladium US$28.00/payable oz
- Gold US$5.00/payable oz
- Silver US$0.50/payable oz.

19.3.1.3 Penalties

The concentrate to be produced will be very low in deleterious elements commonly seen in copper concentrates (e.g., lead, zinc, arsenic, antimony, bismuth). Based on expected concentrate specifications it is assumed that a penalty will apply to the combined $MgO + Al_2O_3$ content and such penalty will apply to all buyers. It is assumed that total penalties will be in the order of US$4.00/dmt.

19.3.2 Logistics Costs

For concentrate sales to a domestic buyer, the concentrate will be delivered overland direct by truck from the mine to the smelter.

For deliveries to an offshore smelter, there are two possible shipment modes:

1. rail to a port for stockpiling until a 5,500-tonne bulk parcel is accumulated; load parcel into vessel's hold for shipment to disport; or

2. load concentrate into containers either at site or at an intermediate point for shipment 'direct' to the receiving smelter.

Costs are expected to be lower for shipments via container and handling losses will be reduced. With the ability to ship in smaller parcel sizes, additional benefits associated with container shipments include expedited cashflow and lower financing costs.

For this PEA, it is recommended that an 'all-in' average logistics cost of US$166.00/dmt be used. This figure includes a domestic sale freight capture component and all other logistics related costs.

20.0 ENVIRONMENTAL STUDIES, PERMITS, AND SOCIAL OR COMMUNITY IMPACTS

20.1 2023 REVISED APPROACH TO MINING AND REDUCED ENVIRONMENTAL IMPACTS

NAM has been working to refine several aspects of this Project since issuing a press release on the status of the Project in the fall 2022. These have included significantly decreasing the environmental impact of the Project by eliminating open pit mining within Pine Lake, which is a recognized lake trout habitat, as well as significantly reducing the size of the Dana South and Lismer North open pits. NAM has focussed on maximizing the extraction of high-grade mineralization via underground mining as opposed to open pit mining in these areas. Therefore, the Project no longer requires the construction of a large dam across the south-end of Pine Lake and eliminates the associated impact on fish and fish habitat. Impacts to Pine Lake have been virtually eliminated due to this refinement to the Project. By focussing on maximizing the extraction of high-grade mineralization, NAM has also been able to reduce the rate of extraction and processing for the Project. This modification has reduced the footprint of the process plant area and the size of the equipment in this area which in turn has reduced the carbon footprint associated with processing.

The Project will be required to obtain numerous provincial and federal approvals and permits and it is anticipated that it will be subject to both provincial environmental assessments and a federal Impact Assessment, as discussed below. However, the permitting for the Project will be less onerous now, than the Project presented in the fall 2022, since, as indicated above, the large dam across the south-end of Pine Lake and the associated impact on fish and fish habitat have been eliminated.

20.2 PROJECT SUMMARY

The Property, owned by NAM, is located in the Townships of Dana and Pardo, approximately 15 km northeast of River Valley, Ontario, and 60 km east-northeast of Sudbury, Ontario. The Property has not been developed previously and consequently is considered a green field site; however, the Property has supported forestry in the past, therefore, much of the Property is accessible via the existing forestry roads.

Open pit and underground mining techniques will be utilized to extract the mineralized material. The mineralized material will be mined and processed at a rate of approximately 6,850 tpd. The concentrate will be transported off-site for smelting and refining.

NAM has developed an Environmental and Social Governance (“ESG”) Strategy and will prepare an ESG Sustainability Report annually to disclose and communicate ESG-related information to NAM’s stakeholders. The first ESG Sustainability Report is posted on NAM’s website. As outlined in its ESG Strategy, NAM is committed to managing and operating their assets in a manner that is protective of human health and safety and the environment. It is NAM’s policy to comply, in all material respects, with applicable health, safety and environmental laws and regulations.

20.3 REGULATORY FRAMEWORK

The construction, operation, and closure of the Project will require both federal and provincial regulatory approvals/authorizations. The preliminary federal and provincial permitting processes and regulatory requirements are outlined in the following sections.

20.3.1 Federal Impact/Environmental Assessment

Most major mining Projects in Ontario proceed through one or more environmental assessments ("EA") or impact assessments ("IA"). Provincially, the process is referred to as EA whereas federally this process is referred to as IA. Where a Project is required to proceed through both provincial and federal processes, the assessments are coordinated to reduce duplication of effort and consultation fatigue with the Project stakeholders.

An agreement exists between the Province of Ontario and the Government of Canada referred to as the *Canada-Ontario Agreement on Environmental Assessment Cooperation (2004).* Under the new *Impact Assessment Act*, 2019 ("IAA"), the Government of Canada is still committed to meeting the objective of "one project, one assessment". This commitment was made to ensure better coordination and alignment of these assessment timelines and procedures.

20.3.1.1 Federal IA Requirements

The Project, as currently defined, meets two of the conditions set forth within the Physical Activities Regulations (SOR/2019-285) of the *Impact Assessment Act*, 2019, which include:

Section 18(c): "The construction, operation, decommissioning and abandonment of a new metal mine, other than a rare earth element mine, placer mine or uranium mine, with an ore production capacity of 5,000 tpd or more"; and

Section 18(d): "The construction, operation, decommissioning and abandonment of a new metal mill, other than a uranium mill, with an ore input capacity of 5,000 tpd or more".

However, at this point in this Project, documentation in the form of a Project Description has not yet been provided to the Impact Assessment Agency to assess whether a federal Impact Assessment under the IAA will be required.

20.3.1.2 Provincial EA Requirements

Although there are no specific provincial EA requirements for mining projects in Ontario, some of the activities related to the development of the Project, including some ancillary infrastructure components, may require approval under one or more provincial Class EAs including the following:

- Ministry of Natural Resources and Forestry ("MNRF") Class Environmental Assessment for Resource Stewardship and Facility Development Projects. This process needs to be followed to obtain surface rights/easement for the construction of Project related infrastructure on Crown Land (e.g., shoreline or bed of lakes/streams for infrastructure development and any offsite infrastructure); and

- Electricity Projects for power supply or transmission to support construction or operations as per the Electricity Projects Regulation (Ontario Regulation 116/01) made under the Environmental Assessment Act.

Class EAs are screened out to an appropriate category (i.e., A, B, C, or D) based on the potential for significant adverse effects to occur and level of expected concern from stakeholders. If there is a high level of uncertainty and high potential for concern, the EA gets elevated to an Individual Provincial EA (e.g., Category D under the Class Environmental Assessment for Resource Stewardship and Facility Development Projects or Category C under the Electricity Projects Regulation).

20.3.2 Federal Permitting Process

The potential federal regulatory requirements for the Project are summarized in Table 20.1.

TABLE 20.1
POTENTIAL FEDERAL ENVIRONMENTAL REGULATIONS, PERMITS, AND APPROVALS

Item	Applicable Act/Regulation	Responsible Agency	Description
Species at Risk Agreement or Permit	Species at Risk Act ("SARA")	Environment and Climate Change Canada	Required if the Project will harm or disturb a Species ("SAR") at Risk or a SAR critical habitat.
Migratory Birds	Migratory Birds Convention Act	Environment and Climate Change Canada	Protection and conservation of migratory birds and their nests.
Work in Navigable Waters	Canadian Navigable Waters Act	Transport Canada	Alteration of navigable waters
Manufacturing, Storage and Transportation of Explosives	Explosives Act	Natural Resources Canada	The explosives contractor will be required to hold any required permits.
Metal and Diamond Mining Effluent Regulations	Fisheries Act	Environment and Climate Change Canada	Operational Compliance – Environmental monitoring and reporting if discharges during operation exceed a flow rate of 50 m^3 per day.

TABLE 20.1 POTENTIAL FEDERAL ENVIRONMENTAL REGULATIONS, PERMITS, AND APPROVALS			
Item	**Applicable Act/Regulation**	**Responsible Agency**	**Description**
Authorization under section 35(2) - Harmful Alteration, Disruption or Destruction of Fish Habitat	Fisheries Act	Fisheries and Oceans Canada	Will be required for the development of site infrastructure that will impact fish habitat including construction of the tailings storage facility and open pit mines.
Authorization under Section 36(5) and Schedule 2 Listing under Metal and Diamond Mining Effluent Regulations	Fisheries Act	Environment and Climate Change Canada	Overprinting of water frequented by fish by the construction of the tailings storage facility.

20.3.3 Provincial Permitting Process

The anticipated provincial permits and approvals are summarized in Table 20.2.

TABLE 20.2 POTENTIAL PROVINCIAL ENVIRONMENTAL PERMITS AND APPROVALS			
Item	**Applicable Act/Regulation**	**Responsible Agency**	**Description**
Industrial Sewage Works – Environmental Compliance Approval	Ontario Water Resources Act	Ministry of the Environment, Conservation and Parks	Approval to construct sewage works for the treatment and discharge of water (effluent) to the environment.
Permit to Take Water	Ontario Water Resources Act	Ministry of the Environment, Conservation and Parks	Required for mine dewatering and/or the taking of surface water for domestic and/or industrial purposes (i.e., drilling) at rates greater than 50,000 litres per day.
Work Permits	Public Lands Act	Ministry of Natural Resources and Forestry	Approval for certain work activities on Crown land and shorelines of lakes and rivers (i.e., construction of an effluent outfall, pumphouse and intake pipe). Installation of culverts or bridges.
Closure Plan	Mining Act	Ministry of Mines	To allow for mine development, operation, and ultimately closure.

Table 20.2 **Potential Provincial Environmental Permits and Approvals**			
Item	**Applicable Act/Regulation**	**Responsible Agency**	**Description**
Work Permit/Approval	Lakes and Rivers Improvement Act/Mining Act	Ministry of Natural Resources and Forestry/Ministry of Mines	Construction of dams and dykes for settling ponds and tailings storage facility. Further engineering design and consultation with the Ministries is required to determine if approval under the Lakes and Rivers Improvement Act will be required.
Forest Resource License or Permit	Crown Forest Sustainability Act	Ministry of Natural Resources and Forestry	Harvesting of merchantable timber as necessary for the construction of the Project.
Endangered Species Act Permit	Endangered Species Act	Ministry of the Environment, Conservation and Parks	Permit to authorize activities that are otherwise not allowed under the Endangered Species Act (e.g., harm or harassment of a species at risk or damage or destroy its habitat). Additional terrestrial studies are required to determine permitting requirements in this regard.
Class Environmental Assessment – Disposition of Crown Resources	Public Lands Act	Ministry of Natural Resources and Forestry	Approval to obtain surface rights/easement for the construction of Project related infrastructure on Crown Land (e.g., shoreline or bed of lakes/streams and any offsite infrastructure).
Class Environmental Assessment – Electricity Projects (**not anticipated**)	Ontario Environmental Assessment Act	Ministry of the Environment, Conservation and Parks	Construction of Category B or C[1] transmission lines or transformer stations

Notes: *[1]. Refer to Guide to Environmental Assessment Requirements for Electricity Projects (Ontario, 2011)*

20.4 SOCIAL OR COMMUNITY IMPACT

20.4.1 Land and Resource Use

The Property is located in the Townships of Dana and Pardo, approximately 15 km northeast of River Valley, Ontario, and 60 km east-northeast of Sudbury, Ontario. The Property is accessible via historical forestry trails that connect to tertiary Highway 805.

The Project is located approximately 3 km east from the Sturgeon River Provincial Park and 9 km east of the Temagami River Provincial Park. The Dana Township Jack Pine Forest Conservation Reserve is located immediately to the east of the Project. There is one hunt camp located near the north end of Pine Lake. The closest cottagers/residents to the Project are located approximately 5 km to the north on Silver Lake and 2 km south in Glen Afton.

The Project property is situated on Crown Land within the Emerald Lake Area (Policy ID G1938), which is designated as a general use area. Timber production is an important use of this area. Mineral potential is recognized as being high and mining opportunities are supported, therefore, the policy indicates that mining activities should not be obscured by other development. Wildlife management, recreation, and tourism are also important land uses in this area.

20.4.2 Archaeological Resources

A Stage 1 Archaeological Assessment was completed for the Property and a scoped Stage 2 Archaeological Assessments was completed in the areas of Platadium Pond and Pine Lake. These areas were cleared from the need of further assessment. Additional Stage 2 Assessment will be required in areas where the Project footprint is within 150 m of any unassessed waterbodies (i.e., streams or lakes).

20.4.3 Indigenous Engagement and Consultation

The Project is situated on the traditional territory of Temagami First Nation and Nipissing First Nation. A Memorandum of Understanding was signed by Temagami First Nation in 2014 and amended in 2017. Temagami First Nation has assisted with the completion of baseline archaeological, surface water quality, groundwater, and hydrology studies and members of the community also participated in a site visit in September 2022. A Memorandum of Understanding was signed with Nipissing First Nation in late-January 2022. In 2023, NAM anticipates that Nipissing First Nation will also participate in the Project’s ongoing baseline environmental data collection. Regular Project updates are provided to each of these communities.

20.4.4 Public and Agency Consultation

As the Project progresses towards the permitting phase, consultation with the public through public information sessions, in the surrounding communities, as well as inter-agency meetings with the various ministries of the Provincial and Federal governments will be required to provide information about the Project.

20.5 ENVIRONMENTAL STUDIES

20.5.1 Climate

Climate data relevant to the Project were obtained from two regional weather stations: North Bay A (ID 6085680) and Sudbury A (ID 6068150). The climate data was extracted from the Climate Normal Data generated for a 30-year period from 1981 to 2010 (Environment and Climate Change

Canada ("ECCC"), 2021a (North Bay A) and 2021b (Sudbury A)). The Climate Normal Data is updated every 10 years by ECCC. The Sudbury A station is located approximately 47 km west of the Project while the North Bay A station is located approximately 65 km southeast of the Project.

The Climate Normal Data, based on the 30-year period of 1981 to 2010, are summarized in Table 20.3. The mean temperature data are similar for the two stations. The total annual precipitation for the Project would be expected to fall within the range recorded by the two stations: 903 millimeters ("mm") at the closer Sudbury station and 1,045 mm at the North Bay station.

Ambient air quality data from the two stations in Sudbury and North Bay were compared to the Canadian Ambient Air Quality Standards for the parameters of fine particulate matter, nitrogen dioxide, and ozone as well as for sulphur dioxide at the Sudbury station. There are no apparent issues of air quality for the Project based upon the Author's review of the available data. In addition, based upon the remoteness of the Project, its ambient air quality is expected to be better than recorded at either of the Sudbury and North Bay stations.

TABLE 20.3
CLIMATE NORMAL DATA FOR SUDBURY A AND NORTH BAY A WEATHER STATIONS

Station	Sudbury	North Bay
Mean Annual Air Temperature (℃)	4.1	4.2
Mean January Air Temperature (℃)	-13	-12.5
Mean July Air Temperature (℃)	19.1	18.9
Average Length of Frost-Free Period (days)	136	135
Average Day of Last Spring Frost	17 May	16 May
Average Day of First Fall Frost	1 October	29 September
Total Annual Precipitation (mm)	903	1,045

20.5.2 Surface Water Hydrology and Quality

At the regional scale, the Project flows to the Sturgeon River, which is a south-flowing river that flows to Lake Nipissing and ultimately contributes flow to the French River. Long-term flow data are available from several Water Survey of Canada ("WSC") stations in the Sturgeon River watershed and from several other regional watersheds including the Little Sturgeon River and the Veuve River.

At a local scale, it is currently anticipated that most of the Project activities will take place in the Pine Lake watershed. A hydrology station has been set up on the outlet of Pine Lake (PLOUT) and flows and water levels have been measured between 2020-2022 at this site. Instantaneous streamflow in the PLOUT channel was measured twice in 2020, four times in 2021, and five times in 2022. On 10 November 2021, a water level logger was installed at the PLOUT site. The flow and level data collected to date have been utilized to create a well-defined open water rating curve at PLOUT.

Stream flows measured at PLOUT, on a unit-area watershed basis, compare well to unit-area flows reported at regional WSC stations. Given the small size of the PLOUT watershed, its low flows have been estimated to be very low (e.g., 7Q20<~0.005 m^3/s), therefore, the much larger Sturgeon River is likely to be a better candidate for assimilation of any discharges from the Project.

To characterize the baseline water quality across the Property, surface water quality sampling has been conducted since 2020 at 10 sites. Samples have been collected at a frequency of between two to four times per year. Samples have been sent to an accredited lab for analysis and the results compared to the Provincial Water Quality Objectives ("PWQOs").

The following parameters did not meet PWQOs in at least one sample:

- pH;
- dissolved aluminum (0.2 µm);
- total copper;
- total iron;
- dissolved oxygen;
- total cobalt; and
- total phosphorous.

The surface water in this area is characterized as containing low dissolved solids concentrations from close to non-detectable concentrations to 30 milligrams per litre ("mg/L"). The pHs were often less than the lower PWQO pH limit of 6.5. The acidic and low alkalinity surface water conditions (i.e., low pH values) are typical in this region due to historical acid rain production from the Sudbury mining activities. The site is close enough (~50 to 60 km) to Sudbury that the surface water chemistry may also reflect lingering effects of historically-elevated atmospheric deposition from the Sudbury area metal smelters.

Regarding metal concentrations, iron (total) and aluminum (dissolved 0.2 µm) were also greater than their respective PWQOs in several samples, however, elevated levels of iron and aluminum are frequently encountered in northern Ontario surface waters.

An Assimilative Capacity study will be required to support the Industrial Sewage Works Environmental Compliance Approval application. As such, surface water quality sampling, as well as ongoing characterization of the hydrology, throughout all hydrologic conditions, should be continued until production commences (to support permitting activities), at which time the permits and approvals will dictate the operational and post-closure monitoring requirements.

20.5.3 Hydrogeology and Groundwater Quality

Five groundwater monitoring wells were installed in fall of 2021 to obtain baseline groundwater quality and hydrogeological data for the Project. Level loggers were deployed in two of the wells to record daily water level data. The groundwater monitoring wells were monitored three times in 2022 for groundwater quality and levels and monitoring has continued in 2023.

The groundwaters in this area are characterized as being soft to moderately hard and as having a neutral to slightly acid pH with low alkalinity.

Metal concentrations were not compared to any objectives/standards at this time since there are no applicable objectives/standards for the Project. The data collected will be utilized to establish site specific background concentrations.

The groundwater quality program should continue to be conducted on a thrice yearly basis to capture any temporal variations in groundwater quality and levels. This information will be required to support future permitting processes.

20.5.3.1 Hydrogeological Considerations

Baseline hydrogeological data was collected to evaluate the hydrogeological conditions for the River Valley Project. Data collection included 33 packer tests completed within five angled drill holes, four response tests completed within monitoring wells, and the instrumentation of three nested vibrating wire piezometers installed within three drill holes located within the Deposit. The hydrogeological properties of the various lithological units were summarized into a series of hydrostratigraphic units to conceptualize the hydrogeological conditions of the River Valley Project. A summary of the hydraulic testing results summarized by lithology is presented in Table 20.4.

The hydraulic conductivity testing results were calculated to span several orders of magnitude from 5 x 10^{-9} metres per second ("m/s") to 5 x 10^{-6} m/s, with a geometric average of 3 x 10^{-8} m/s. A decreasing hydraulic conductivity with depth relationship was noted within the collected data, which is commonly observed for Canadian Shield bedrock. Higher hydraulic conductivity features were noted in both the shallow bedrock, which is influenced by near surface meteoric weathering and fracturing, and in packer tests completed in fault zones.

A total of five packer tests were completed within intervals containing observed faults or shears. The results completed within observed structures ranged from 2 x 10^{-8} m/s to 2 x 10^{-6} m/s. The highest hydraulic conductivity result was noted within the West Boundary Shear Zone fault at a depth of approximately 204 m. The testing results completed in observed faults suggest that, when encountered as an open feature (not infilled with rock gouge) or as a zone of poor rock quality, these features could have a hydraulic conductivity on the order of 10^{-6} m/s (upper end of test results). Only a single test was completed in the overburden as it is relatively thin.

TABLE 20.4 SUMMARY OF HYDRAULIC CONDUCTIVITY TESTING RESULTS				
Lithology	**Hydraulic Conductivity**			
	Number of Tests	**Range of Test Results**		**Geometric Average**
		Min	**Max**	
		(m/s)		**(m/s)**
Overburden (OB)	1	-	9E-04	-
Bedrock (BR)	30	5E-09	5E-06	3E-08
Breccia (BX)	8	1E-08	3E-07	6E-08
Boundary Zone (BZ)	2	5E-09	9E-09	7E-09
Huronian (HUR)	1	9E-09	9E-09	9E-09
Inclusion Bearing Zone (IBZ)	2	2E-08	2E-08	2E-08
Layered Unit (LU)	17	5E-09	5E-06	8E-08
Faults/Shears (FZ)	6	2E-08	2E-06	2E-07

Groundwater inflow estimates were calculated for each of the planned open pit and underground mining zones.

The inflow estimates utilized the open pit and underground PEA designs provided by P&E (received May 9, 2023) and the following analytical methods:

- Marinelli and Niccoli (2000) – Radial Inflow to a Mine Pit – Utilized for estimating the groundwater inflow to the open pits;

- Goodman et. al. (1965) - Groundwater Inflow During Tunnel Driving – Utilized for calculating groundwater inflow to the Dana South and Lismer North underground declines; and

- Darcy Flux – Flux of water into open stopes for the underground workings and for approximating the contribution of a fault to the north end of the Dana North Pit.

A base case groundwater inflow estimate was completed using the average hydraulic properties of the materials tested. A lower-case and upper-case groundwater inflow limit were also calculated based on the lower and upper range of the hydraulic testing results. Recharge rates for the Project area were estimated using published values for the Upper Ottawa River Basin (Singer and Cheng, 2002).

The estimated rates of groundwater inflow to the proposed ultimate configurations of the mine workings (open pits and underground) are presented in Table 20.5. The base case groundwater inflow rates are predicted to range from 2 litres per second ("L/s") within the Varley Pit to 11 L/s for the Dana South underground, with an upper range estimated to range from 5 to 22 L/s, respectively. The groundwater inflow estimates are steady-state and do not account for temporary increases in inflow rates due to the release of groundwater storage (within faults and fractures).

Pit dewatering, if required, can likely be achieved through a combination of in-pit methods (e.g., sumps and advanced benching), prior to the mining of the active bench. If an additional dewatering effort is required for water management purposes, a combination of vertical and horizontal wells can be utilized to lower the water table.

TABLE 20.5
OPEN PIT AND UNDERGROUND INFLOW ESTIMATE SUMMARY

Development Name	Groundwater Inflow Estimate (Base Case)	Groundwater Inflow Range
	(L/s)	(L/s)
Dana North Pit	10	7 to 15
Dana South Underground	11	7 to 22
Lismer North Pit	3	2 to 5
Lismer North Underground	8	4 to 19
Lismer Main North Pit	3	2 to 6
Lismer Main South Pit	5	3 to 8
Varley Pit	2	1 to 5

20.5.4 Aquatic Environment

The Property is located within Fisheries Management Zone 11 (“FMZ 11”). Coldwater, coolwater, and warmwater fish communities are found within FMZ 11. Walleye and trout fisheries (lake trout and brook trout) are predominantly targeted by anglers. The northern lakes in FMZ 11 are typical boreal shield lakes that are characterized as being deep, cold, clear, nutrient poor water, and have limited littoral areas due to the presence of steep banks which are predominantly bedrock.

Baseline aquatic assessments were completed in 2020 and 2021 within the creeks and lakes surrounding the Project. Pine Lake is a deep and cold lake that is known to support a native population of lake trout. Pine Lake is approximately 3 km long, with a maximum width of approximately 500 m, and a maximum measured depth of 26 m. The only other large-bodied fish species captured in Pine Lake was common white sucker. Other species present include rock bass, pumpkinseed, common shiner, and golden shiner.

The other lakes and streams assessed had small-bodied fish communities typical of smaller lakes and streams in northern Ontario and consisted of species such as brook stickleback, common shiner, creek chub, finescale dace, and spottail shiner.

Additional baseline aquatic studies will be required to further characterize the existing fish communities and fish habitat within streams and/or lakes that may be overprinted by Project infrastructure, such as the tailings storage facility, or if they are to be impacted by the Project.

Multiple seasons of data collection will be required to support future permitting processes associated with these activities.

20.5.5 Terrestrial Environment

Desktop and field terrestrial baseline studies, including breeding bird, Eastern Whip-poor-will, bat, and vegetation surveys were completed in 2021. The results of these surveys were updated in 2023. Based on information obtained from the Natural Heritage Information Centre ("NHIC"), three species at risk ("SAR") have been confirmed to be present within 10 km of the Project: Canada warbler (Special Concern), snapping turtle (Special Concern), and black ash (Endangered).

At total of 49 bird species were detected during the breeding bird surveys. Two SAR were confirmed during the breeding bird surveys which included eastern whip-poor-will (Threatened) and Canada warbler (Special Concern).

Six species of bats were detected by the automatic recording units deployed onsite. Three of the species recorded are classified as Endangered: the little brown myotis, northern myotis, and tri-coloured bat. The other bat species that were detected include the following: eastern red bat, hoary bat, and big brown/silver-haired bat.

Two monarch (Special Concern) butterflies were observed onsite while conducting breeding bird surveys in June 2021.

There were no rare vascular plant SAR observed during field investigation; however, most of Ontario's rare vascular plant species are confined to southern Ontario. Black ash is the only plant species, designated as a SAR, that has the potential to occur in the Project area. Black ash is predominantly located in swamps, floodplains, and fens. This species has been recorded, via NHIC reporting, within 5 km of the Project area.

Additional terrestrial baseline studies will be required to inform and support future permitting activities.

20.5.6 Geochemical Considerations

A preliminary geochemical characterization program was completed in 2022 to evaluate the baseline geochemical conditions of the mine waste materials from the River Valley Project. These geochemical data were generated for samples from the Lismer and Dana Zones. Waste rock and tailings materials from the Varley area were not evaluated during the 2022 program. These preliminary baseline data are summarized below by waste type.

20.5.6.1 Waste Rock

Geochemical samples were collected from diamond drill core to assess the waste rock. A total of 25 drill core samples were collected and screened based on drill hole (or deposit) and stratigraphic unit. The geomechanical drill holes were collared throughout four of the proposed mining areas, as summarized in Table 20.6.

TABLE 20.6 SAMPLED DRILL HOLES AND ASSOCIATED MINING AREA		
Drill Hole ID	**Mining Area**	**Number of Samples**
KP21-01	Lismer North Area	2
KP21-02	Lismer Main Pit	5
KP21-03	Dana North Pit	5
KP21-04	Saddle Area South of Dana North	2
KP21-05	Dana South Area	11

The main lithologies encountered at the zones are summarized in Table 20.7 in approximate stratigraphic order from youngest (to the west/southwest) to oldest (to the east/northeast).

TABLE 20.7 MAIN LITHOLOGIES AND GEOCHEMICAL SAMPLING			
Stratigraphic Unit	**Short Form**	**Definition**	**Number of Samples**
Layered Unit	LU	The LU is part of the main body of the River Valley Intrusion and is comprised of layered massive melagabbro to leucogabbro.	8
Inclusion-Bearing Zone	IBZ	This unit is comprised of larger gabbro to leucogabbro fragments either within a fine-grained mafic matric or medium-grained felsic matrix.	5
Breccia	BX	The BX unit is the main unit and is comprised of smaller gabbro to melagabbro fragments.	6
Boundary Zone	BZ	The BZ, also known as the footwall breccia, consists of a hybrid of LU and FW rocks and underlies the BX.	3
Footwall	FW	The footwall (or hanging wall depending on the dip of the subvertical zone) host rock consists primarily of Archean migmatite, gneiss, syenite, and gabbro.	3

The collected waste rock samples were sent to SGS Lakefield Inc. for static geochemical testing. The following suite of static testing was completed on each sample:

- Modified Acid Base Accounting (“ABA”);
- Net Acid Generation (“NAG”) pH;
- Total Metals Inductively Coupled Plasma Mass Spectrometry (“ICP-MS”); and
- Shake Flask Extraction (“SFE”).

Following an initial review of the Modified ABA testing results, five samples with higher sulphide concentrations were selected and underwent Rietveld Quantitative Analysis X-Ray Diffraction ("XRD") testing.

Detailed static testing results from these 25 samples are described in the Preliminary Geochemical Characterization Summary - Waste Rock Memorandum (KP, 2022a).

In summary, the static testing results from the waste rock samples demonstrate that there is a low potential for the waste rock to generate acid with minor metal leaching ("ML") potential. These data suggest that:

- Waste rock that was tested from the Lismer mining areas were Non-Potentially Acid Generating ("NPAG");
- Waste rock that was tested from both of the Dana mining areas were predominantly NPAG, however, there was some uncertainty with the acid generating potential of some samples, mainly within the footwall due to sulphide content;
- Visible sulphides were noted in 14 of the 25 samples, which did not coincide directly with the uncertain samples;
- The predominant sulphide-bearing mineral is pyrite, which is the most aggressive acid producing sulphide species; and
- There was an indication of minor ML of Al and V from the tested samples, which was more predominant in the Dana mining areas.

20.5.6.2 Tailings

Three tailings solids samples from the 2022 bench scale processing of mineralized samples and three tailings process water (supernatant) samples were collected for geochemical testing in 2022. These samples comprised: one solids and one supernatant sample of Lismer tailings, one solids and one supernatant sample of Dana tailings, and solids and one supernatant sample of combined tailings. No Varley tailings solids or supernatant were available to be tested.

These samples were produced at the SGS Lakefield Inc. metallurgical department and were sent internally to its environmental testing laboratory for static geochemical testing. The following suite of static testing was completed on each sample:

- ABA;
- NAG pH;
- Whole Rock Analysis ("WRA");
- ICP-MS;
- SFE; and
- Tailings Process Water Chemistry.

In addition, the combined tailings solids sample underwent Rietveld Quantitative Analysis X-Ray Diffraction ("XRD") testing.

Detailed static testing results tables from these tailings were provided in a transmittal in 2022 (KP, 2022b). This transmittal was exclusive of the XRD testing results.

In summary, the static testing results from the tailings samples suggest that:

- All tested tailings streams are considered NPAG;
- The tailings are relatively inert with limited buffering capacity and sulphide concentrations below the minimum detection limit ("MDL");
- There was an indication of ML from the tested samples based on the process water chemistry and SFE testing; and
- The contaminants of potential concern ("COPC") that exceeded the PWQOs were Al, Cu, Cr, Pb and V.

20.5.6.3 Recommendations for Future Study

As the Project advances, it is recommended that:

- Additional static testing of waste rock should be completed to increase the number of samples within the dataset. Sampling should cover all of the proposed mining areas both laterally and vertically.
    - Sampling should include additional sampling of the footwall within the Dana mining areas, as those samples should have the most potential for acidification. Understanding this unit will be crucial for future mine planning.
- Any zones that have not been tested to date which will be mined as part of this Project (such as the Varley Zone) will require geochemical testing at the next level of design.
    - Static testing of the waste rock
    - Static testing of tailings (solids and supernatant)
    - If any mineralization has the potential to be processed with the Lismer and Dana mineralization, a representative combination tailings sample should be tested.
- Kinetic testing (via laboratory humidity cell testing) should be conducted on the major lithologies and tailings streams from the Project.
    - Kinetic testing should include the sulphide-rich waste rock to assess the reaction rates over time. Static testing suggests that the samples are NPAG to uncertain, however, kinetic testing will help to determine if the buffering capacity within these samples will deplete over time and allow for the sulphide oxidation to produce acid.
    - Exceedance from short-term leach testing is only an indication of which parameters may have the potential to leach into the environment under ideal conditions. Overall

leaching potential should be assessed further via laboratory or on-site kinetic testing.

- The COPCs are being monitored as part of the baseline water quality program. This baseline water quality data will help to inform the geochemistry conclusions of the Project.

20.6 MINE CLOSURE PLAN

The Project involves the development of several open pit mines, underground mine workings, a process plant, tailings and water management infrastructure including collection ditches, settling ponds, water treatment system, and ancillary infrastructure.

A production phase Closure Plan, and associated financial assurance, will be filed with the Ministry of Mines before development. The production phase Closure Plan will be prepared for submission to the Ministry of Mines in accordance with O. Reg. 240/00: Advanced Exploration, Mine Development and Closure Under Part VII of the Act. Closure of the Project will be completed in accordance with the O. Reg. 240/00 (as amended) and will meet the requirements of the Mine Rehabilitation Code of Ontario (Schedule 1 of O. Reg. 240/00 (as amended)); (the "Code")) with the fundamental considerations being to ensure physical and chemical stability of the Property to protect human health and the environment.

The five main closure activities include:

- Decontamination/decommissioning;
- Asset removal;
- Demolition and disposal;
- Rehabilitation; and
- Monitoring and reporting.

Progressive rehabilitation will be completed throughout the life of the Project whenever feasible. Progressive rehabilitation activities will focus on the demolition and disposal of unused buildings and infrastructure, as well as the removal of unused equipment and machinery. Also, progressive rehabilitation of tailings areas, waste rock storage piles, and other inactive areas will take place when these areas are no longer required for the Project. Progressive rehabilitation reports will be filed with the Ministry of Mines in accordance with O. Reg. 240/00.

20.6.1 Decontamination/Decommissioning

Surface facilities and the underground workings will be decontaminated and decommissioned as necessary. Surplus chemicals and hazardous materials will be disposed of at approved offsite facilities licensed to receive these types of materials. Sumps will be cleaned.

Empty tanks and equipment will be removed from the Property, sold as scrap or reuse by others, or transported to an approved waste management facility. Any remaining fuel will be removed from the tanks by the contractor (if applicable) or Company and then the tanks will be removed from the Property.

No waste management sites will be present upon completion of the Project. All waste generated during the Project (e.g., domestic and industrial hazardous and non-hazardous) will be hauled offsite and disposed of as mandated by the applicable regulations.

20.6.2 Asset Removal

Salvageable machinery, equipment, and other materials will be dismantled and taken offsite for resale or recycling. Remaining items will be transported to an offsite waste management facility.

20.6.3 Rehabilitation Activities

An overview of the rehabilitation activities that will be completed for main project components is provided below. The main project components that will require rehabilitation at closure include:

- Underground workings and openings to surface from the underground workings;
- Open pits;
- Tailings storage facility;
- Transportation corridors and laydown areas;
- Buildings and foundations;
- Ancillary infrastructure, including electricity infrastructure and pipelines;
- Contaminated soils;
- Waste rock and overburden piles; and
- Water impoundments.

Detailed descriptions of the rehabilitation requirements for the above components are provided below.

20.6.3.1 Underground Workings and Openings to Surface

The closure of the underground mine will require the following activities:

- Removing pumps, rolling equipment, oils, fuels, solvents, and all hazardous materials from the underground workings;

- Allowing the underground workings to naturally flood;

- Demolishing the aboveground associated infrastructure (i.e., fans, heaters, collars, etc.);

- Backfilling or construction of a barricade in the portal, to prevent inadvertent access while the workings are flooding, in accordance with the Code;

- Capping or backfilling raises and other openings to the surface, to prevent inadvertent access, in accordance with the Code; and

- Assessing the stability of any remaining crown pillars, and if required, rehabilitating them in accordance with the Code.

20.6.3.2 Open Pits

The closure of the open pits will require the following activities:

- Removing pumps, rolling equipment, oils, fuels, solvents, and all hazardous materials;

- Allowing the open pits to naturally flood, backfilling the pits with tailings and waste rock material, or a combination of these measures; and

- For pits that are not flooded or backfilled to grade or above, based on the results of the pit wall stability assessment, construct a boulder fence, or berm, around the permitter of pit in accordance with the Code.

Where possible, and if environmentally acceptable, some of the pits may be connected to Pine Lake to provide additional fish habitat, however, this will have to be studied to determine feasibility.

20.6.3.3 Tailings Storage Facility

The tailings storage facilities will be designed and/or modified at closure to ensure long-term physical stability. Decant structures will be decommissioned and replaced with engineered spillways. The dams will be inspected on a defined monitoring schedule during all closure phases in accordance with the filed Closure Plan.

The closure of the tailings storage facilities may involve the following:

- Placement of waste rock on the tailings surface to increase trafficability;
- Recontouring of the tailings surface to promote drainage;
- Construction of drainage features to prevent erosion; and
- Placement of topsoil and revegetation.

20.6.3.4 Transportation Corridors and Laydown Areas

Transportation corridors will be graded to promote drainage, scarified, and revegetated. Access roads required for post-closure monitoring will be left “as is” and maintained to facilitate access.

Laydown areas will be scarified, covered with 50 to 100 mm of stockpiled overburden or topsoil, as necessary, and vegetated with native self-sustaining species.

20.6.3.5 Buildings and Foundations

All permanent structures that cannot be removed from the Property as a saleable asset, will require demolition.

Concrete basements and foundations will be left in place. Any portions of concrete foundations remaining above grade will be levelled and rebar will be cut-off at grade. Basements will be backfilled. Large slabs will be perforated on a 2 m grid to permit drainage. Concrete slabs will be covered with 0.15 m of development rock or locally stockpiled overburden.

The demolition process will produce:

- Saleable recyclable materials (steel, stainless steel, copper, steel sections, and sheet metal);
- Hazardous materials;
- Roofing materials and insulation;
- Wood; and
- Concrete.

Recyclable materials will be separated and processed for transport and sale concurrent with demolition. Excavators equipped with grapples will sort the recyclable products from the non-recyclables. Shears will be used to size recyclables for shipping and sale. Cleaning procedures of recyclables will be integrated into demolition, as necessary.

Hazardous materials will be handled and disposed of in accordance with the appropriate regulations and industry standard practice. Where possible, chemicals will be mixed to produce a neutral solution and disposed of in the tailings storage facility. Remaining hazardous materials such as spent chemicals (that cannot be managed onsite), waste oil, and sludges will be disposed offsite at licensed facilities.

Non-hazardous waste materials such as roofing materials, insulation, wood, co-mingled concrete and all recyclables will be disposed offsite in a licenced landfill.

20.6.3.6 Ancillary Infrastructure

Rehabilitation of ancillary infrastructure components involves the following:

- Decommissioning and removal of power transmission lines and electrical infrastructure, once they are no longer required to support closure activities;

- Decommissioning and removal of pipelines;

- Scarifying corridors and allowing them to naturally revegetate; however, portions of the corridor located near sensitive environments, or that may easily erode, will be seeded to enhance the physical stability; and

- Decommissioning and removing the water treatment plant and appurtenances once water quality meets discharge requirements without treatment.

20.6.3.7 Contaminated Soils

Soil testing will be conducted in any areas of known or suspected contamination and/or potential spills, including areas around chemical, fuel, and explosive storage areas. Testing will be conducted according to industry standard procedures and the analytical results compared to the soil standards for use under Part XV.1 of the Environmental Protection Act. Table 3, Full Depth Generic Site Condition Standards in a Non-Potable Groundwater situation. This assessment will determine whether any soils require remediation/management. Contaminated soils will be excavated and hauled offsite by licenced contractors to licensed facilities.

20.6.3.8 Waste Rock and Overburden Piles

Any remaining waste rock will be rehabilitated, based on the geochemistry, according to the filed Closure Plan. This rehabilitation may involve contouring to ensure long-term stability, application of some growth media, such as stockpiled overburden, and vegetating with self-sustaining native species.

Remaining portions of the overburden stockpile will be re-contoured and vegetated with native self-sustaining species. The footprint of the overburden stockpile will be scarified to reduce compaction and vegetated with native self-sustaining species.

20.6.4 Water Impoundments

Water impoundment structures will be decommissioned once they are no longer required for water management. Berms and/or dams will be breached and re-contoured to restore natural contours, to the extent possible, and drainage. Any liners will be removed and hauled to an offsite landfill. The footprints of impoundment areas will be vegetated with native self-sustaining species.

20.6.5 Monitoring and Reporting

Following closure, physical, chemical, and biological monitoring of the Property will be conducted to ensure that the Property is chemically and physically stable. The monitoring programs will be designed and conducted in accordance with the Code.

The following is a summary of the anticipated monitoring programs:

- Surface Water Quality Monitoring;
- Groundwater Quality and Level Monitoring;
- Physical Stability Monitoring; and
- Biological Monitoring.

The monitoring programs will be conducted according to the filed Closure Plan until the objectives of the Closure Plan are met. Reports will be submitted to the Ministry of Mines in accordance with the Closure Plan.

20.6.6 Closure Plan Cost Estimate

A Closure Plan cost estimate has been completed based on the details listed above. The Author estimates the closure cost to be $16.3M.

21.0 CAPITAL AND OPERATING COSTS

The estimated capital and operating costs related to the construction and operation of the mining and processing facilities are provided in this section.

The total initial capital cost of the River Valley Project is estimated at $269M. Sustaining capital costs incurred during the 16 production years are estimated to total $163M. Total operating costs over the life-of-mine ("LOM") are estimated at $1,197M which average $30.98/t processed. All costs are presented in Q2 2023 Canadian dollars. No provision has been included in the cost estimates to offset future escalation.

21.1 CAPITAL COST ESTIMATES

Initial capital costs are for construction of a 2.5 Mtpa flotation process plant and conventional tailings facility, and set up an open pit mining site with the necessary infrastructure and pre-production activities. The capital cost estimates are summarized in Table 21.1.

TABLE 21.1
CAPITAL COST ESTIMATE

Item	Initial ($M)	Sustaining ($M)	Total ($M)
Site development	9.7	11.6	21.3
Open pit mining equipment and pre-stripping	27.3	47.8	75.1
Process plant directs	74.6		74.6
Process plant indirects	24.6		24.6
Site infrastructure	17.4		17.4
Electrical powerline connection	30.0		30.0
Tailings and water management facilities	25.3	32.0	57.3
EPCM	19.9		19.9
Owner's costs	10.0		10.0
Underground mine development and equipment[1]		37.1	37.1
Reclamation and closure		16.3	16.3
Contingency (13%)	29.9	18.1	48.0
Total[2]	**268.7**	**163.0**	**431.7**

[1] Underground mine development and equipment includes underground closure and salvage. [2] Totals may not sum due to rounding.

21.1.1 Site Development

Site development is estimated to cost $9.7M and includes items such as:

- Construction of the main access road to the Property and to the process plant site;
- Process plant area clearing, grubbing, topsoil removal and site preparation;

- Construction contractor lay-down pad preparation; and
- Construction of initial haul roads and preparation of the North waste rock storage facility.

21.1.2 Open Pit Mining Equipment and Pre-Stripping

Major pieces of open pit mining equipment are planned to be leased over a five year period at a 9% interest rate, and minor equipment will be purchased. Major equipment is comprised of excavators, haul trucks, rotary drills, wheel loaders, track dozers, graders and water trucks. A 10% downpayment cost is planned for all leased equipment, and equipment that is leased at the beginning of the two-year pre-production period will be subject to a lease payment in the second year of pre-production. The rest of the open pit mining equipment is support equipment. The cost for leases and purchases of open pit mining equipment during the pre-production period is estimated at $15.9M.

A total of 4.4 Mt of waste rock, overburden and process plant stockpile feed are planned to be mined at the Dana Pit during the second year of pre-production. At a unit cost of $2.53/t for open pit pre-stripping costs are estimated at $11.1M.

A further $0.3M is estimated for equipping the open pit technical offices and purchasing radios, computers and survey equipment.

The total initial capital cost for open pit mining equipment and pre-stripping is estimated at $27.3M.

21.1.3 Process Plant Directs and Indirects

Capital costs for the River Valley Project process plant are an accumulation of the items described in the following subsections.

21.1.3.1 Process Plant Direct Equipment Costs

Major mechanical equipment costs are based on previous budget quotations provided by major vendors and factored accordingly for the design throughput of 6,850 mtpd. Details of specific process design criteria are provided in Sections 13 and 17 of this Technical Report. As discussed in Section 13, testing of the River Valley material was detailed in nature with assumptions made in the process capital generated costs. This included primary crushing, SAG and ball mill circuit, rougher and cleaner flotation cells, regrind mill, tailings, and final concentrate thickeners, concentrate dewatering and drying, reagent mixing systems.

In addition, minor mechanical equipment costs are based on a database and familiarity with costs of the equipment. Bulk materials costs such as bins, tanks, structures are based on some built-up rates and factored costs and allowances.

21.1.3.3 Process Plant Direct Construction Costs

Direct construction costs are based on factoring and direct input of costs where applicable. This includes process area, site development, concrete and steel work, mechanical, piping, Motor Control Centre ("MCC") electrical and instrumentation.

21.1.3.4 Process Plant Indirect Costs

For this Technical Report, factored costs are used for the process indirects. These include, however, are not limited to the line items shown in Table 21.2.

TABLE 21.2
PROCESS PLANT INDIRECT CAPITAL FACTORS

Commodity	Factor (%)	Factored Basis
Freight	5.6	% of Direct Process Equipment Capital
Start-up and Commissioning	1.3	% of Direct Process Equipment Capital
First Fills and Commissioning Spares	2.2	% of Direct Process Equipment Capital
EP Section (Engineering and Procurement)	4.9	% of Total Capital Costs – Equipment and Construction
CM & PM Section (Construction and Project Management)	7.6	% of Total Capital Costs – Equipment and Construction

Source: *D.E.N.M. (2023)*

21.1.3.5 Process Plant Cost Estimate

For the process plant described in Section 17 of this Technical Report, a summary of the preliminary estimated capital costs are shown in Table 21:3.

TABLE 21.3
PROCESS PLANT CAPITAL COST ESTIMATE

Section	Description	Cost ($M)[1]
Directs		
10	Primary Crushing and Coarse Feed Stockpile	9.0
20	Grinding and Classification	22.4
20	Process Plant Flotation	18.4
20	Reagent Circuit	0.9
20	Process Plant Utilities	8.8
20	Process Buildings	13.6
30	Tailings Discharge and Reclaim Water	1.6
Sub-total	**Total Equipment and Construction Directs**	**74.6**

TABLE 21.3 **PROCESS PLANT CAPITAL COST ESTIMATE**		
Section	**Description**	**Cost ($M)[1]**
Indirects		
90	Freight	4.4
90	Start-up and Commissioning	1.7
90	Commissioning Spares and First Fills	2.1
90	Construction Power, Other Indirects, Crew, Equipment	16.4
Sub-total	**Factored Indirects (less EPCM)**	**24.6**
Total		**99.2**

Source: *D.E.N.M. (2023)*
Note: *[1] Totals may not sum due to rounding.*

21.1.4 Site Infrastructure

Site infrastructure includes items such as a gatehouse to the mine site, administration offices with first aid and safety offices, a warehouse, the process plant laboratory, diesel fuel storage with a distribution station, a change house, a mine equipment maintenance shop, mobile equipment for the process plant, fresh water/fire water/potable water systems, and electrical distribution systems at the process plant/admin site. The initial capital cost for site infrastructure is estimated at $17.4M.

21.1.5 Electrical Powerline Connection

Power for the process plant and site infrastructure will be provided by a dedicated 44 kV feeder line from the Crystal Falls Transformer Station. Initial discussions with Hydro One (supplier and builder) have been completed regarding options and cost estimates. Approximately 45 km of new powerline is required. The cost to supply adequate power to the River Valley mine site is estimated at $30.0M.

21.1.6 Tailings and Water Management Facilities

Material and quantity estimates were developed for the starter and ultimate TMF arrangements, as well as the ultimate arrangement for the site wide water management measures. The quantities include foundation preparation requirements, embankment construction materials, geosynthetics and liner tie-in items, embankment instrumentation, the runoff/seepage collection ditches, and excavation and embankment construction for the settling ponds. The unit rates to estimate the capital costs of the facilities have been based on the Author's experience at similar sites, adjusted for inflation and including a 30% increase to account for observed price volatility under current market conditions. The material and quantity estimates were generally determined based on neat lines from the set of figures drafted for the TMF design.

The following key assumptions were used in developing the PEA level cost estimates:

- The waste and water management strategy was developed based on the current understanding of the site conditions. Limited specific geotechnical information was available for concept development and quantity estimates;

- Suitable embankment fill for the TMF and WMP will be sourced from open pit development; and

- The cost estimates are at a conceptual level of detail (+/-50%).

The estimated capital costs are $17.0M for initial TMF construction to provide adequate storage capacity for the first two years of production, and $6.7M for initial site water management. A water treatment plant is estimated at $1.6M. Total capital costs for tailings and water management are estimated at $25.3M.

21.1.7 EPCM and Owner's Costs

Engineering, procurement, and construction management ("EPCM") has been estimated as 15.3% of the total process plant costs, equivalent to $19.9M.

Owner's costs include 19 administrative personnel in the first year of pre-production and a staff of 25 in the second year of pre-production. Also included are general offices expenses, environmental and community expenses, insurance, generator costs until grid electrical power is connected, transportation to site, lodging, and maintenance costs. The initial capital cost for Owner's costs is estimated at $10.0M.

21.1.8 Contingency

A contingency of 13% has been applied to all capital costs. On initial CAPEX the contingency is estimated at $29.9M.

21.1.9 Sustaining Capital Costs

21.1.9.1 Site Development

Sustaining site development is estimated to cost $11.6M and is comprised of construction of haul roads to the Lismer and Varley Pits and preparation of the Central and South waste rock storage facilities.

21.1.9.2 Open Pit Mining Equipment

Lease payments over the mine life are estimated at $38.8M. Replacement of support equipment is estimated at $2.0M over the LOM. A further $6.0M is estimated for haul truck overhauls and

$1.0M is estimated for miscellaneous items. Total sustaining costs for open pit mine equipment are estimated at $47.8M.

21.1.9.3 Tailings and Water Management Facilities

Construction of the final TMF is scheduled in production years two and three and is estimated at $27.0M. The final TMF provides adequate tailings storage for the first seven years of open pit production. Expansion of the water management facilities over the LOM is estimated at $5.0M. Total sustaining capital costs for the TMF and water management facilities are estimated at $32.0M

21.1.9.4 Underground Mining

The LOM total capital cost of the Underground Project is estimated at $37.1M. Since capital costs are incurred during the open pit production years the costs are classified as sustaining. Capital cost estimates include pre-production mine and stope development, pre-production underground support services, Company purchased underground mining equipment; underground infrastructure; surface infrastructure, and a salvage credit. A breakdown of these estimates is provided in Table 21.4.

TABLE 21.4
UNDERGROUND LOM CAPITAL COSTS

Description / Underground Year	Yr -1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total ($M)
Project Year	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
Underground Mine Equipment	6.7	7.9	3.1	0.2	1.8	0.9	1.0	**21.6**
Development / Infrastructure	13.9	0.9	0.4	1.1	1.0	0.2	0.0	**17.4**
Surface Infrastructure	1.5	0.7						**2.2**
Salvage Value							-4.0	**-4.0**
Total CAPEX ($M)[1]	**22.1**	**9.4**	**3.5**	**1.3**	**2.7**	**1.1**	**-3.0**	**37.1**

Notes: *[1] Totals may not sum due to rounding. Yr = year.*

Details of these estimates are provided in the following subsections.

Underground Mine Equipment

The Company will spend an estimated $21.6M on the purchase of underground mine equipment, LOM, used mainly for stope drilling, blasting, loading, backfilling and haulage. These costs include all underground mobile and stationary equipment. A schedule of sustaining capital expenditure estimates for Company-supplied mine underground equipment is presented in Table 21.5.

TABLE 21.5 UNDERGROUND MINE EQUIPMENT CAPITAL COST ESTIMATE									
Description	**Units**	**Yr -1**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Total ($M)**
Top Hammer Drill (DL311-7)	3		0.9	0.9		0.9			**2.8**
Getman Scissor Lift / Boom Truck	2	0.4	0.4						**0.7**
Sandvik LH307 3.2 m3 LHD - Haulage	5	1.0	2.1	1.0				1.0	**5.2**
Sandvik TH320 20t Haul Truck	8	1.8	3.6	0.9			0.9		**7.2**
MCU 2700 UG Blasting Tractor	1	0.6							**0.6**
Mechanics / Electrician Vehicle	1	0.1							**0.1**
Grader	1	0.4							**0.4**
Toyotas	4	0.2	0.1						**0.2**
Getman Personnel Carrier	1	0.3							**0.3**
Alimak	1	0.3							**0.3**
Stopers, Jacklegs, Hand Tools	4	0.1							**0.1**
Underground Fans	18		0.1	0.1	0.1				**0.3**
Heading Pumps	3	0.1							**0.1**
Main Dewatering Pumps	3		0.1	0.1	0.1				**0.2**
Drill Equipment Starters	3		0.0	0.0	0.0				**0.1**
Main Substations	2	0.3	0.3						**0.5**
Pump Station Electrical	1		0.1						**0.1**
Portable Substations	2	0.3	0.3						**0.5**
Misc. Underground equipment	41	0.6	0.8	0.2	0.2				**1.8**
Cap Lamps	75	0.1							**0.1**
Safety Gear	75	0.1							**0.1**
Mine ERT	1	0.3							**0.3**
Surface Ventilation Fans	2	0.8				0.8			**1.5**
Compressors	2	0.1				0.1			**0.1**
FAR VFD 450kW Starters	2	0.1				0.1			**0.1**
Misc. Surface Equipment	159	1.2				0.9			**2.1**
Total ($M)[1]	**227**	**6.7**	**7.9**	**3.1**	**0.2**	**1.8**	**0.9**	**1.0**	**21.6**

Notes: *[1] Totals may not sum due to rounding. Yr = year.*

Underground Mine Pre-production Development and Associated Infrastructure Capital Costs

An estimated $17.4M will be spent on underground mine pre-production development and associated infrastructure capital costs over the LOM. This includes expenditures for: 2,910 m of mine and stope development; pre-production support services; two pump stations; four sumps; three mine air heating systems; five lunchrooms / refuge stations; six latrines; five powder /

detonator magazines; and 25 ventilation bulkhead / regulators. A summary of underground mine pre-production development and associated infrastructure sustaining capital cost estimates is presented in Table 21.6.

TABLE 21.6
PRE-PRODUCTION DEVELOPMENT AND INFRASTRUCTURE CAPITAL COSTS

Description / Year	Yr -1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total ($M)
Pre-production Mine and Stope Development	12.0							**12.0**
Pre-production Mine Services	1.5							**1.5**
Pump Station	0.1				0.1			**0.2**
Sump		0.2		0.4	0.2			**0.8**
Mine Air Heaters		0.3		0.3	0.3			**0.8**
Refuge Station and Latrines	0.2	0.2	0.2	0.2	0.2			**1.0**
Powder and Detonator Magazines	0.1	0.1	0.1	0.1	0.1			**0.4**
Ventilation Bulkheads and Regulators		0.2	0.2	0.2	0.2	0.2		**0.8**
Total ($M)[1]	**13.9**	**0.9**	**0.4**	**1.1**	**1.0**	**0.2**		**17.4**

Notes: *[1] Totals may not sum due to rounding. Yr = year.*

Underground Mine Associated Surface Infrastructure Capital Costs

An estimated $2.2 M of capital will be spent on underground mine associated surface infrastructure over the LOM. This includes site facilities, buildings, building furnishings and surface mobile equipment.

The capital cost of site facilities includes the cost of a CRF backfill facility, ventilation raise infrastructure, and waste rock and mineralized stockpile infrastructure. Buildings capital costs include an office building and a dry. The building furnishings include office furniture, computers, engineering equipment and dry equipment. Surface mobile equipment capital costs include a front-end loader, a bus and pickup trucks.

Underground Mine Salvage Value

A salvage estimate is based on a 20% value of the underground equipment, surface building and surface mobile equipment used by the underground mining operation and equates to $4.0M.

21.1.10 Reclamation and Closure Costs

The Project involves the development of several open pit mines, underground mine workings, a process plant, tailings and water management infrastructure including collection ditches, settling ponds, water treatment system, and ancillary infrastructure. The five main closure activities include decontamination/decommissioning; asset removal; demolition and disposal; rehabilitation; and monitoring and reporting. Progressive reclamation will be carried out when possible over the

LOM. Progressive underground closure cost estimates are included in sustaining underground mine development and equipment capital. A reclamation and closure bond estimated at $13.5M will be put in place in the first year of production. Two subsequent bond payments for a total of $2.8M will be made over the LOM, giving a total estimate for reclamation and closure of $16.3M.

21.1.11 Sustaining Cost Contingency

A contingency of 13% has been applied to all sustaining capital costs and is estimated at $18.1M.

21.2 OPERATING COST ESTIMATES

Operating costs are estimated to average $30.98/t processed over the LOM as presented in Table 21.7. Open pit mining costs are applicable to 16 years of production whereas underground mining costs are only for six years of production. The operating costs have been estimated from first principles and consumable quotes, with factoring and estimates from the Author's experience at other mines.

TABLE 21.7
OPERATING COST ESTIMATE

Item	Unit	Unit Cost ($/t)	LOM Total ($M)
Open pit mining	$/t mined	2.95	
Open pit mining	$/t processed	12.63	450.8
Underground mining	$/t processed	60.61	178.2
Process plant	$/t processed	12.69	490.4
General and administration	$/t processed	2.01	77.5
Total[1]	**$/t processed**	**30.98**	**1,196.9**

[1] Totals may not sum due to rounding.

21.2.1 Open Pit Mining

A breakdown of LOM average open pit mining unit operating costs by activity and by element is presented in Table 21.8. LOM total costs are also shown.

Mine operating costs are derived from a combination of first principle calculations with an in-house equipment database for all major and supporting equipment operating parameters, and include fuel, consumables, labour ratios, and general parts costs. The average open pit mine operating cost is estimated at $2.95/t mined over the 16 production years.

Annual mineralized material tonnes, waste tonnes and loading and hauling hours are calculated based on the capacities of the loading and hauling fleet. These tonnes and hours provide the basis for drilling, blasting, and support fleet inputs. Based on the tonnes scheduled, a requirement for production drilling hours is calculated based on blast hole size and pattern, bench height, material density and drill penetration rate.

An estimate for blasting supplies, initiation systems and blasting accessories is provided on a per hole basis. Drilling and blasting inputs (pattern area, powder factor, etc.) have been included.

Fleet requirements for loading, hauling and support are derived from the loading and hauling operating hours. Operating hours for a support fleet of dozers, front-end loaders, graders, service and welding trucks, etc., are estimated to derive the support fleet requirements.

The diesel fuel price assumed is $1.00/L.

All equipment costs are based on estimated fuel consumption rates, consumables costs, ground-engaging tools (“GET”) estimate, and general parts and preventative maintenance costs on a per-hour or per-metre interval basis.

Operating labour man-hours are categorized for the different labour categories such as operators, mechanics, electricians, etc. The mining cost also includes all mine salaried staff, technical consumables and software.

TABLE 21.8
OPEN PIT MINING OPERATING COST ESTIMATE

Item	Unit Cost ($/t material)	LOM Total ($M)
By Activity		
Drilling	0.22	33.3
Blasting	0.58	88.9
Loading	0.32	49.5
Hauling	0.86	131.0
Services/Roads/Waste Storage	0.62	94.0
General/Supervision/Technical	0.35	53.9
Total[1]	**2.95**	**450.8**
By Element		
Operating Labour	0.54	83.0
Maintenance Labour	0.34	51.6
Supervision and Technical	0.33	51.0
Non-Energy Consumables and Parts	0.94	144.3
Fuel	0.48	72.8
Electric Power	0.04	5.6
Leases and Outside Services	0.28	42.5
Total [1]	**2.95**	**450.8**

[1] Totals may not sum due to rounding.

The average open pit mining operating cost equates to $12.63/t processed over the LOM.

21.2.2 Underground Mining

The underground operating cost estimates ("OPEX") include the cost of supervisory, operating and maintenance labour; operating equipment, consumables, materials and supplies. No contingency has been added to OPEX costs. The yearly operating cost varies from a high of $72.79/t, in underground Year 2, to a low of $46.82/t, in Year 5, averaging $60.61/t over the LOM. A summary of the average operating cost estimates for the Underground Project is provided in Table 21.9.

TABLE 21.9
AVERAGE UNDERGROUND OPERATING COST PER TONNE MINED

Description	Operating Cost ($/t mined)
Mine and Stope Development (Contractor)	24.97
Longhole Stoping	5.73
Underground Support Services	6.52
CRF Backfill	13.67
Underground Mineralization Haulage	9.72
Total OPEX[1]	**60.61**

[1] Totals may not sum due to rounding.

Details of these estimates are provided in the following subsections.

21.2.2.1 Mine and Stope Development

An estimated $73.4M ($24.97/t) will be spent on mine and stope development. All stope development will be completed by a contractor(s). This includes: the cost of the ramps, drifts, cross-cuts, raises, mineralized passes and slot raises. The cost of mine and stope development in underground Year -1 has been capitalized. A summary of mine and stope development OPEX cost estimates is presented in Table 21.10.

TABLE 21.10
MINE AND STOPE DEVELOPMENT OPERATING COSTS

Deposit	Item	Yr -1	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Total ($M)
Dana	Main Ramp		8.0	1.4					9.4
	Access X-cut		1.9	0.4					2.3
	Vent Exhaust X-cut N		0.1	0.1					0.3
	Vent Fresh Air X-cut N		0.2	0.2	0.0				0.4
	Vent Exhaust X-cut S		0.4	0.4	0.0				0.8

Table 21.10 Mine and Stope Development Operating Costs									
Deposit	**Item**	**Yr -1**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Total ($M)**
	Vent Exhaust Raise N		0.2	0.2					0.4
	Vent Fresh Air Raise		0.5	0.5	0.2				1.2
	Vent Exhaust Raise S		0.5	0.5	0.2				1.1
	Int Ramp /FW Drift/ FW X-cut		3.8	3.8	3.8	5.5			17.0
	Drift and X-cuts		2.9	2.9	2.7	5.6			14.1
	Slots		0.9	0.9	0.6	1.5	1.5		5.3
Lismer	Main Ramp			6.2	0.8				7.0
	Access Drift			1.3	0.0				1.4
	Vent Fresh Air X-cut N			0.4	0.0				0.4
	Vent Fresh Air Raise			0.7	0.2				0.9
	Internal ramp/AcsX-cut					3.2	1.7		4.9
	Mineralized Pass						0.1		0.1
	Drifts					2.2	2.3		4.5
	X-cuts						0.1		0.1
	Slots					0.5	1.1		1.7
	Contractor Demobilization						0.1		0.1
Total ($M)[1]			**19.4**	**19.9**	**8.7**	**18.5**	**6.9**		**73.4**
Total ($/t)			**35.41**	**36.60**	**16.02**	**33.85**	**12.50**		**24.97**

[1] Totals may not sum due to rounding.
Notes: X-cut = cross-cut; N = north; S = south; Int = internal; FW = footwall; Acs = access; black text is mine development; red text is stope development

21.2.2.2 Longhole Stope Mining

There is an estimated 2.73 Mt of longhole stoping mineralization over the LOM. Longhole stope production reaches a maximum 0.52 Mt in Year 5. Longhole stope mining operating costs include the cost of material, consumables and direct labour for stope drilling, blasting, ground support, pipe, accessories and services. The estimated LOM operating cost of longhole mining is summarized in Table 21.11.

TABLE 21.11 LONGHOLE STOPE MINING OPERATING COSTS	
Item	**$/t**
Drilling and Blasting	3.86
Ground Support	0.03
Pipe and Accessories	0.04
Services	0.44
Direct Mine Labour	1.80
Total - $/t Stope Mineralization	**6.17**
Total - $/t Stope and Development Mineralization	**5.73**
Total LOM ($M)[1]	**16.9**

[1] Totals may not sum due to rounding.

21.2.2.3 Underground Support Services

Mine G&A include the cost of underground supervision and technical staff, support labour including: U/G mechanics, U/G electricians, service leaders, grader operators, pump/construction operators, service truck operators and mine labourers. It also includes the cost of mine air heating, support vehicle operation and maintenance and the cost of all electric power to service the underground. A summary of these operating costs per tonne processed on a yearly basis is presented in Table 21.12.

TABLE 21.12 UNDERGROUND MINE G&A OPERATING COSTS								
Item	**Yr -1**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Total ($/t)**
Mine Staff		2.04	2.06	2.07	2.05	2.05	2.05	2.05
Mine Labour		1.84	1.99	2.00	1.98	1.98	1.98	1.96
Mine Air Heating		0.48	0.77	0.77	0.77	0.77	1.49	0.77
Surface Equipment and Vehicles		0.38	0.46	0.46	0.45	0.45	0.45	0.44
Underground Vehicles		0.53	0.71	0.71	0.70	0.70	0.70	0.67
Electric Power		0.53	0.64	0.64	0.64	0.64	0.70	0.63
Total ($/t)[1]		**5.80**	**6.63**	**6.65**	**6.60**	**6.60**	**7.38**	**6.52**
Total ($M)		**3.2**	**3.6**	**3.6**	**3.6**	**3.6**	**1.5**	**19.2**

[1] Totals may not sum due to rounding.

21.2.2.4 Cemented Rock Fill Backfill

All underground stopes, and development in mineralization, will be backfilled with either Cemented Rock Fill ("CRF") backfill or development waste rock. For costing it has been assumed that only CRF backfill will be placed. A summary schedule of backfill placement and mineralization mined is presented in Table 21.13.

Table 21.13 Tonnes Mined and Backfill Tonnes Placed									
Item	**Yr -1**	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**$M**	**$/t**
CRF Haulage		3.7	4.2	4.6	4.3	3.7	1.2	21.7	7.39
Binder (5% cement)		2.4	2.4	2.4	2.4	2.4	0.9	12.8	4.36
Misc Construction Material		0.4	0.4	0.4	0.4	0.4	0.1	2.0	0.68
Operators		0.7	0.7	0.7	0.7	0.7	0.3	3.7	1.25
OPEX ($M)[1]		**7.1**	**7.6**	**8.0**	**7.8**	**7.1**	**2.6**	**40.2**	
OPEX ($/t)		**13.00**	**13.98**	**14.80**	**14.20**	**12.95**	**12.23**		**13.67**

[1] Totals may not sum due to rounding.

21.2.2.5 Underground Haulage

All underground development and stope mineralized rock will be loaded and hauled up the ramps to the surface process plant stockpile, approximately 1 km from the ramp portals. A summary of the estimated cost for underground haulage is presented in Table 21.14. The average haulage cost is $9.72/t hauled for a total LOM underground haulage cost estimated at $28.6M.

Table 21.14 Underground Haulage Operating Costs							
Item	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Avg./ Total**
Truck OPEX ($/t)	6.26	7.50	8.24	7.97	7.03	6.68	**7.35**
LHD OPEX ($/t)	2.31	2.52	2.99	2.41	1.87	1.72	**2.37**
Total Haulage Cost ($/t)[1]	**8.58**	**10.02**	**11.22**	**10.38**	**8.90**	**8.40**	**9.72**
Total Haulage Cost ($M)	**4.7**	**5.5**	**6.1**	**5.7**	**4.9**	**1.8**	**28.6**

[1] Totals may not sum due to rounding.

21.2.3 Process Plant

Process plant operating costs are based on preliminary process design criteria including manpower requirements, estimated connected horsepower, maintenance and operating consumables including reagents. Operating labour rates, wear components, reagent costing, power and diesel rates were obtained from suppliers and local vendors. Power costs are estimated at $0.08/ kWh with diesel costs estimated at $1.00 /L. Total process connected power is estimated at 10.2 MW with operating costs estimated at an average of $12.69/t processed. The process plant operating cost estimates are summarized in Table 21.15 and presented in detail in Table 21.16.

TABLE 21.15 PROCESS PLANT OPERATING COSTS			
Item	**Annual Cost ($M)**	**Unit Cost ($/t Processed)**	**% of Total**
Labour	8.4	3.36	26%
Power and Fuel	7.1	2..85	22%
Maintenance and Operating Consumables	16.2	6.49	51%
Total[1]	**31.7**	**12.69**	**100 %**

Source: *D.E.N.M. (2023)*
[1] Totals may not sum due to rounding.

21.2.3.1 Labour

The process plant labour positions and rates for the River Valley Project are based on local manpower rates for similar operations within the area. Rates address senior process management, operating personal, and specific support personal including, however, not limited to, maintenance (mechanical, electrical, instrumentation) and assay laboratory. A wage burden rate of 38% for each position was applied accordingly.

To accommodate a 24-hour operation, the number of process-related hourly employees and staff totals 82. The preliminary schedule of positions, rotation, and quantities are provided in Table 21.16.

TABLE 21.16
PROCESS PLANT OPERATING COST BREAKDOWN

LABOUR

Position	Number of Personnel	Rotation	Staff/ Hourly	Tier	Base Pay $CDN	Burden (% of Base Pay)	Scheduled Hours	Annual Cost per Position	Annual Cost $CDN	$CDN/ dmt
Operations										
Mill Manager	1	5&2	Staff		$200,000	38%	2,184	$276,000	$276,000	
Mill Superintendent	1	5&2	Staff		$160,000	38%	2,184	$220,800	$220,800	
Mill Clerk	1	5&2	Staff		$60,000	38%	2,184	$82,800	$82,800	
General Foreman	1	7&7	Staff		$130,000	38%	2,184	$179,400	$179,400	
Shift Supervisors	4	7&7	Hourly		$100,000	38%	2,184	$138,000	$552,000	
Control Room Operators	4	7&7	Hourly		$85,000	38%	2,184	$117,300	$469,200	
Plant Senior Operators	4	7&7	Hourly		$75,000	38%	2,184	$103,500	$414,000	
Mill Junior Operators	8	7&7	Hourly		$70,000	38%	2,184	$96,600	$772,800	
Mill Labourers	14	7&7	Hourly		$65,000	38%	2,184	$89,700	$1,255,800	
Mill Total	38									
Mill Maintenance										
Maintenance Superintendent	1	5&2	Staff		$120,000	38%	2,184	$165,600	$165,600	
Mill Maintenance Foreman	1	5&2	Staff		$95,000	38%	2,184	$131,100	$131,100	
Maintenance Planner	2	5&2	Staff		$80,000	38%	2,184	$110,400	$220,800	
Electrical Supervisor	1	5&2	Staff		$95,000	38%	2,184	$131,100	$131,100	
Electrician Apprentice	2	7&7	Hourly		$55,000	38%	2,184	$75,900	$151,800	
Electrician	4	7&7	Hourly		$75,000	38%	2,184	$103,500	$414,000	
Instrumentation Technician	4	7&7	Hourly		$75,000	38%	2,184	$103,500	$414,000	
Instrumentation Apprentice	2	7&7	Hourly		$55,000	38%	2,184	$75,900	$151,800	
Millwright	4	7&7	Hourly		$75,000	38%	2,184	$103,500	$414,000	
Millwright Apprentice	2	7&7	Hourly		$55,000	38%	2,184	$75,900	$151,800	
MM Total	23									
Technical Services										
Sr. Metallurgical Engineer	1	5&2	Staff		$120,000	38%	2,184	$165,600	$165,600	
Metallurgical Engineer (Process Control)	2	5&2	Staff		$80,000	38%	2,184	$110,400	$220,800	
Metallurgist	2	7&7	Hourly		$70,000	38%	2,184	$96,600	$193,200	
Metallurgical Technician	4	7&7	Hourly		$60,000	38%	2,184	$82,800	$331,200	
Chief Assayer	1	5&2	Staff		$85,000	38%	2,184	$117,300	$117,300	
Senior Assayers	2	5&2	Staff		$60,000	38%	2,184	$82,800	$165,600	
QC Manager	1	5&2	Staff		$60,000	38%	2,184	$82,800	$82,800	
Assay Technicians	4	7&7	Hourly		$55,000	38%	2,184	$75,900	$303,600	
Laboratory Technician	4	7&7	Hourly		$45,000	38%	2,184	$62,100	$248,400	
Technical Total	21									
Subtotal Labour	**82**								**$8,397,300**	**3.36**

Table 21.16 Process Plant Operating Cost Breakdown										
POWER & FUEL										
Item					**Consumption per Year**	**Unit Cost**			**Annual Cost $CDN**	**$/t**
Power					kWh/Yr	$/kWh				
Power					84,089,305	$0.08			$6,861,687	$2.74
Fuel & Propane				L/Day	L/Yr	$/L				
Fuel for Support Equipment				225	82,125	$1.27			$104,299	
Concentrate Drying	20 % - 8 %			320	116,800	$1.27			$148,336	
Subtotal - Power & Fuel									**$7,114,322**	**$2.85**
MAINTENANCE & OPERATING CONSUMABLES										
Item	**Notes**			**Consumption per tonne**	**Consumption per Year**	**Material Cost $/t**	**Freight Cost $/t**	**Total Cost $/t**	**Annual Cost $CDN**	**$/t**
Grinding Media				g/t	t/yr					
SAG Mill	Abrasive		Magottteaux	442	1,105	$2,175	included	$2,175	$2,403,375	
Balls - Ball Mill	Abrasive		Magottteaux	940	2,350	$2,225	included	$2,225	$5,228,750	
Balls - Fine Milling	Abrasive		Magottteaux	940	338	$2,225	included	$2,225	$752,940	
Subtotal									**$8,385,065**	**$3.35**
Liners and Wear										
SAG Mill	MoGroup	2 per year			2	$735,000		$735,000	$1,470,000	
Ball Mill	MoGroup	1 per year			1	$636,000		$636,000	$636,000	
Regrind Mill	Off Shore	2 per year			2	$50,000		$50,000	$100,000	
Crusher (Primary)	MoGroup	2 per year			2	$75,000		$75,000	$150,000	
Crusher (Pebble)	MoGroup	2 per year			2	$35,000		$35,000	$70,000	
Subtotal									**$2,426,000**	**$0.97**
Reagents			Source	kg/t	t/yr	$/tonne CDN	Freight (Minesite)			
MIBC Frother			Quadra Chemicals	0.037	92	$4,020	$690	$4,710	$434,498	
Aerophine 3477 - Collector	Polyfloat 3430		Quadra Chemicals	0.038	96	$7,647	$690	$8,337	$797,226	
SIBX - primary collector			Quadra Chemicals	0.077	191	$4,256	$690	$4,946	$945,923	
CMC - CP Kelco Celect HPD			Quadra Chemicals	0.081	203	$3,980	$690	$4,670	$945,675	
Sodium Silicate (Na2SiO2) - non-sulphide depressant			Quadra Chemicals	0.009	23	$1,330	$690	$2,020	$45,450	
BASF Magnafloc 10 - tailings thickener			Quadra Chemicals	0.024	61	$6,060	$690	$6,750	$410,063	
Subtotal									**$3,578,833**	**$1.43**

TABLE 21.16
PROCESS PLANT OPERATING COST BREAKDOWN

Maintenance										
Plant Maintenance (4% of equipment cost)										
Equipment Directs	$30,000,000								$1,200,000	
Subtotal									**$1,200,000**	**$0.48**
Supplies						$/Man-Hour	Man Hours			
Plant Consumables, Tools and Safety Supplies						$3.50	179,088		$626,808	
									$626,808	$0.25
Subtotal - Maintenance & Operating Consumables									**$16,216,706**	**$6.49**
SUPPORT EQUIPMENT										
Item	**Notes**								**Annual Cost $CDN**	**$/t**
				Quantity	Capex Allowed for WBS Section	Fuel L/Day				
Light Vehicles				6		60				
Crane - 60t (18 hrs / day)	It includes operator, maintenance and diesel			1		30				
Bob Cat (10 hrs / day)				1		20				
Deck Truck/Boom Truck (10 hrs / day)				1		30				
All Terrain Fork Lift (10 hrs / day)				1		35				
Front end loader (18 hrs / day)				1		50				
				Diesel	Total Daily	225				
Total Processing Costs									**$31,728,328**	**$12.69**

Source: *D.E.N.M. (2023)*

21.2.3.2 Reagent and Grinding Media

Reagent costs are based on quotations from local flotation suppliers in Canada (sulphide) and include the following:

- MIBC Frother;
- Aerophine 3418A;
- SIBX – Primary collector;
- CMC - CP Kelco Celect HPD;
- Sodium Silicate (Na2SiO2) - non-sulphide depressant; and
- BASF Magnafloc 10 - tailings and concentrate thickeners.

Grinding media and wear components costs including mills and crushers, are supplied by local Canadian vendors and reagent consumption is based on project testwork from the recent SGS testing campaign. Consumptions are calculated on an annual basis and unit costs are based on 2.5 Mtpa process plant feed rate.

21.2.3.3 Process Plant Electrical Power

Power to the River Valley Project site is supplied by a dedicated 44 kV high voltage line located 45 km from the proposed process plant site. Electricity consumption for the process plant is estimated at 84,089 MWh per year (10.2 MW connected).

An electrical rate cost based on consumption rates supplied by Hydro One is $0.08/kWh.

21.2.4 General and Administration

General and Administration ("G&A") costs are estimated at $5.0M annually, as summarized in Table 21.17. This equated to an average G&A unit operating cost of $2.01/t process plant feed over the LOM.

TABLE 21.17
GENERAL AND ADMINISTRATION COSTS

Item	Number	Annual Cost ($)
General Manager	1	270,000
Public Relation / Sustainability	1	108,000
Administration Manager	1	202,500
Human Resources	1	135,000
Community Relations	1	108,000
Safety & Security Officer	1	135,000
Warehouse Supervisor	1	108,000
Purchasing	2	189,000
Logistics and Concentrate Sales	2	189,000

TABLE 21.17 GENERAL AND ADMINISTRATION COSTS		
Item	**Number**	**Annual Cost ($)**
Security	8	648,000
Nurse	2	189,000
Receptionist	1	67,500
Environmental Officer	1	108,000
Accountants	2	189,000
IT	1	80,000
Clerks/Staff	4	324,000
General Office Expenses	Lump sum	300,000
Insurance	Lump sum	500,000
Software, Computers, Safety Supplies	Lump sum	200,000
Community Service Programs	Lump sum	200,000
Environmental and Permit Expenses	Lump sum	300,000
Allowance	10%	450,000
Total[1]		**5,000,000**

[1] Totals may not sum due to rounding.

21.3 ROYALTIES

The Project is subject to a 1.0% NSR royalty after a $2.0M payment that is planned at the start of production. Total costs associated with this NSR royalty over the LOM are estimated at $24.6M including the $2.0M lump sum payment.

21.4 CASH COSTS AND ALL-IN SUSTAINING COSTS

Cash costs over the LOM, including royalties, are estimated to average US$1,231/oz PdEq. All-In Sustaining Costs ("AISC") over the LOM are estimated to average US$1,518/oz PdEq and include closure costs.

21.5 SITE MANPOWER

Peak year site manpower is estimated at 257 Company personnel, consisting of 125 open pit mining, 20 underground mining plus contractors, 82 process plant and 30 G&A. Maintenance personnel are included in the mining and process plant numbers.

22.0 ECONOMIC ANALYSIS

Cautionary Statement - The reader is advised that this PEA Technical Report is intended to provide only an initial, high-level review of the Project potential and design options. The PEA mine plan and economic model include numerous assumptions and the use of Inferred Mineral Resources. Inferred Mineral Resources are considered to be too speculative to be used in an economic analysis except as allowed by NI 43-101 in PEA studies. There is no guarantee the Project economics described herein will be achieved.

Economic analysis for the River Valley Project has been undertaken for the purposes of evaluating potential financial viability of the Project. NPV and IRR estimates are calculated based on a series of inputs: costs (described in Section 21) and revenues (detailed in this section). Revenues are derived from estimated process recoveries and smelter/refinery payables.

Sensitivity analysis has been completed for after-tax NPV and IRR on a ±30% range of values for metal prices, and OPEX and CAPEX costs. Finally, sensitivity to discount rate has been performed on the assumed value of 5%. All costs and revenues in the financial analysis are in Q2 2023 Canadian dollars, with no provision for escalation or inflation. Metal prices are quoted in US dollars.

Under baseline scenarios (5% discount rate, payable metals using prices of US$2,150/oz Pd, US$1,010/oz Pt, US$1,830/oz Au and US$4.00/lb Cu, OPEX and CAPEX as set out in Section 21), the overall after-tax NPV of the Project is estimated at $140M ($296M pre-tax), with an after-tax IRR of 11% (16% pre-tax). This results in an after-tax payback period of approximately 6.9 years.

22.1 PARAMETERS

The revenue, and therefore profit and NPV, of the Project are influenced by the parameters detailed in Sections 22.1.1 to 22.1.5. Cost estimates are detailed in Section 21.

22.1.1 Metal Prices

The metal prices are based on the three-year monthly trailing averages as of May 31, 2023, with minor adjustment, and the payable metals are projected at US$2,150/oz Pd, US$1,010/oz Pt, US$1,830/oz Au and US$4.00/lb Cu.

22.1.2 Discount Rate

A 5% discount rate was selected for the Project. Mining legislation in the stable jurisdiction of Ontario, Canada, is well understood. Existing infrastructure includes nearby electrical power lines and water sources. A skilled labour pool, mining equipment sales and parts distribution, and well-established mining contractors are available in Sudbury. There is a large history of producing operations within 100 km of the Project.

22.1.3 Costing

Mining is based on conventional open pit and underground methods with predictable costs for consumables, equipment, and labour. Process plant costing has been performed from first principles in combination with factors derived from the Author's experience in similar settings, and the current Canadian labour market.

22.1.4 Other Inputs

The economic analysis is valid for the LOM production schedule presented in Section 16. The schedule includes a reasonable ramp-up of the process plant in Year 1 with Q1 at 75%, Q2 at 90%, Q3 and Q4 at 100% for an average of 91% for the year.

Mineralized material is to be treated in an on-site conventional sulphide flotation plant to produce a saleable PGM-enriched Cu concentrate to be transported off-site for smelting and refining. The process plant production rate is set at 2.5 Mtpa, which is an average 6,850 tpd throughput rate for 365 days per year of processing. Open pit production of mineralized material is higher than process plant throughput, and therefore a stockpiling strategy is used to limit low-grade material sent to the process plant and provide a buffer for potential short-term impacts on production. A mineralized stockpile of 1.1 Mt is built up during open pit mining which is drawn down in the last year of the mine life.

There is no provision for salvage value of the process plant or open pit mining equipment at the end of production.

22.1.5 Royalty and Taxes

The Project is subject to a 1.0% NSR royalty.

Applicable taxes on taxable income are Canadian Federal at 15%, Ontario Provincial at 11.5% and Ontario Mining Tax at 10%. A non-capital loss carry-forward amount has been applied to taxation calculations.

22.2 SIMPLIFIED FINANCIAL MODEL

Table 22.1 summarizes the NPV, IRR and payback period of the Project under baseline inputs.

TABLE 22.1
PAYBACK PERIOD, NPV AND IRR FOR BASELINE FINANCIAL MODEL

Item	Payback Period (years)	NPV ($M) (5% discount rate)	IRR [1] (%)
Pre-Tax	6.1	296	16
After-Tax	6.9	140	11

Note: *1. IRR value was calculated using Microsoft Excel's IRR function.*

A summary of the key economic parameters and results is presented in Table 22.2.

TABLE 22.2
PEA SUMMARY PARAMETERS AND RESULTS

Parameter	Amount
Palladium Price (Base case) US$/oz	2,150
Exchange Rate US$:CDN$	1.35
Production Profile	
Open Pit Feed Mined (t)	35,700,000
Underground Feed Mined (t)	2,941,000
LOM Tonnes Processed (t)	38,641,000
Average Process Plant Head Grade (PdEq g/t)	1.19
Mine Life (years)	16
Daily Process Plant Throughput (tpd)	6,850
Palladium Process Plant Recovery (%)	71.5
LOM Payable Palladium Equivalent (ozs)	735,000
Average Annual Palladium Production (ozs)	47,400
Revenue ($ M)	2,263.1
Operating Costs	
Unit Average LOM Operating Costs ($ per tonne processed)	30.98
Open Pit Mining Costs ($ per tonne processed)	12.63
Underground Mining Costs ($ per tonne processed)	60.61
Processing Costs ($ per tonne processed)	12.69
G&A ($ per tonne processed)	2.01
Total LOM Operating Cost ($ M)	1,196.9
LOM Average Cash Cost (US$/oz PdEq)	1,231
LOM Average AISC (US$/oz PdEq)	1,518
Capital Requirements	
Pre-Production Capital Cost ($ M)	268.7
LOM Sustaining Capital Cost ($ M)	163.0
Project Economics	
Royalties After $2M Buy Down (%)	1.0
Royalty Payable Including $2M Buy Down to 1% ($ M)	24.6
Taxes ($ M)	258.2
Pre-Tax	
NPV (5% Discount Rate) ($ M)	296.3
IRR (%)	16.1
Payback (years)	6.1
Cumulative Undiscounted Cash Flow ($ M)	609.9

TABLE 22.2 PEA SUMMARY PARAMETERS AND RESULTS	
Parameter	**Amount**
After-Tax	
NPV (5% Discount Rate) ($ M)	139.7
IRR (%)	11.3
Payback (years)	6.9
Cumulative Discounted Cash Flow ($ M)	351.6

A simplified financial model for the Project, using baseline inputs, is presented in Table 22.3.

TABLE 22.3
CASHFLOW MODEL SUMMARY (CDN$M)

Item	Total	Year																	
		-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Revenue	**2,263.11**	-	-	164.22	185.67	165.71	172.08	160.59	181.70	178.42	128.17	145.28	149.30	121.40	105.83	110.76	113.70	120.12	60.16
(-) Operating Cost	**(1,196.90)**	-	-	(73.36)	(113.39)	(109.40)	(97.92)	(106.52)	(93.90)	(73.17)	(63.16)	(64.09)	(63.59)	(61.41)	(60.92)	(62.54)	(62.24)	(65.19)	(26.10)
(-) Royalties	**(24.63)**	-	-	(3.64)	(1.86)	(1.66)	(1.72)	(1.61)	(1.82)	(1.78)	(1.28)	(1.45)	(1.49)	(1.21)	(1.06)	(1.11)	(1.14)	(1.20)	(0.60)
(-) Capital Spending	**(431.72)**	(35.63)	(233.11)	(49.23)	(39.70)	(25.19)	(20.17)	(7.41)	(12.17)	1.14	(0.76)	(4.14)	(0.11)	(0.11)	(3.78)	(1.23)	(0.11)	-	-
Pre-Tax Cash Flow	**609.86**	(35.63)	(233.11)	25.76	30.72	29.46	52.28	45.04	73.81	104.61	62.97	75.61	84.10	58.66	40.07	45.89	50.21	53.73	45.68
(-) Income Tax	**(258.25)**	-	-	-	(4.43)	(8.07)	(14.13)	(11.23)	(19.06)	(26.71)	(16.01)	(27.44)	(29.84)	(20.76)	(14.12)	(16.72)	(18.02)	(19.56)	(12.16)
After-Tax Cash Flow	**351.61**	**(35.63)**	**(233.11)**	**25.76**	**26.29**	**21.39**	**38.15**	**33.82**	**54.75**	**77.90**	**46.96**	**48.17**	**54.26**	**37.91**	**25.95**	**29.17**	**32.19**	**34.17**	**33.52**
Cumulative After-Tax Cash Flow	**-**	(35.63)	(268.74)	(242.98)	(216.69)	(195.30)	(157.15)	(123.33)	(68.58)	9.32	56.28	104.45	158.71	196.62	222.57	251.73	283.92	318.09	351.61
Discounted After-Tax Cash Flow (5%)	**139.73**	(35.63)	(222.01)	23.37	22.71	17.60	29.89	25.24	38.91	52.73	30.27	29.57	31.73	21.11	13.76	14.73	15.48	15.65	14.63
Discounted Cumulative After-Tax Cash Flow	**-**	(35.63)	(257.64)	(234.27)	(211.56)	(193.96)	(164.07)	(138.84)	(99.93)	(47.20)	(16.93)	12.64	44.37	65.47	79.23	93.97	109.45	125.10	139.73

22.3 SENSITIVITY

After-tax Project sensitivity has been analyzed on both an NPV and IRR basis for the impact of changes to metal prices, OPEX and CAPEX for a variance of ±20% from the baseline costs stated in Section 21. The Project NPV sensitivity to discount rate was also analyzed for 0, 5, 7 and 10% discount rates. IRR is insensitive to discount rate and has not been analyzed as a result.

Variance in OPEX and CAPEX can be the result of changes in the Canadian labour market, increase in raw materials costs, changes in mining or processing parameters, changes in scale or design, changes in technology, general inflation, and other sources. Metal price variance can be the result of changes in banking policies, market trends, general supply and demand pressures, and other sources. Variance in discount rate can be the result of market trends, changes in perceived risk, banking policies, corporate financing structure, and other sources.

The Project IRR is most sensitive to changes in metal prices, then CAPEX and OPEX. When comparing the impacts of the same factors the Project NPV remains most sensitive to changes in metal prices, followed by OPEX, then CAPEX. Figures 22.1 and 22.2 show the Project NPV and IRR sensitivity graphs, respectively. Table 22.4 presents the Project NPV sensitivity to discount rate.

TABLE 22.4
PROJECT SENSITIVITY TO DISCOUNT RATE

Discount Rate (%)	After-Tax NPV ($M)
0	352
5	140
7	85
10	22

FIGURE 22.1 PROJECT AFTER-TAX NPV SENSITIVITY

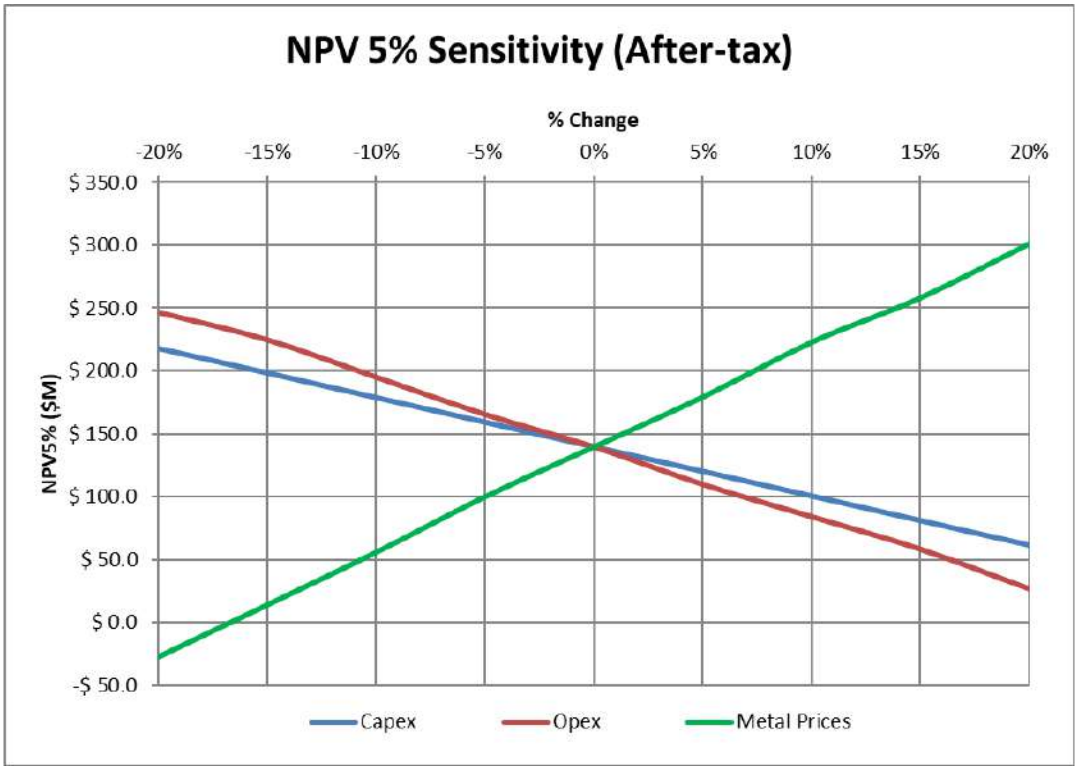
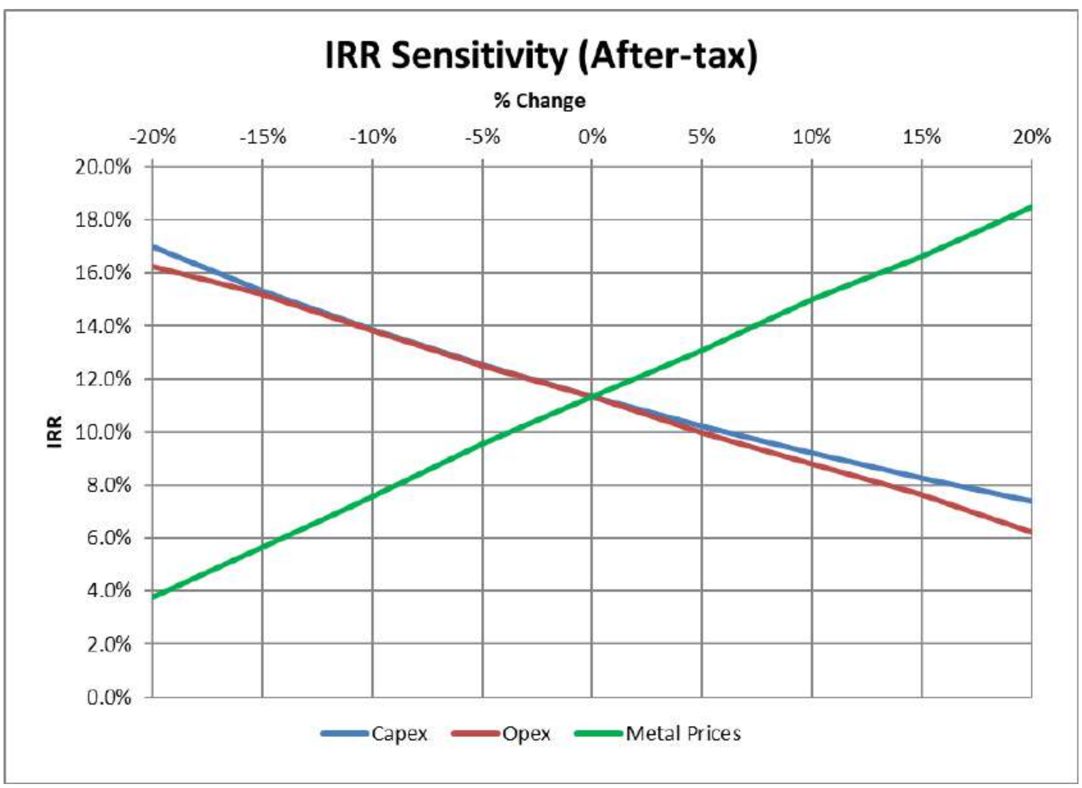


FIGURE 22.2 PROJECT AFTER-TAX IRR SENSITIVITY



22.4 SUMMARY

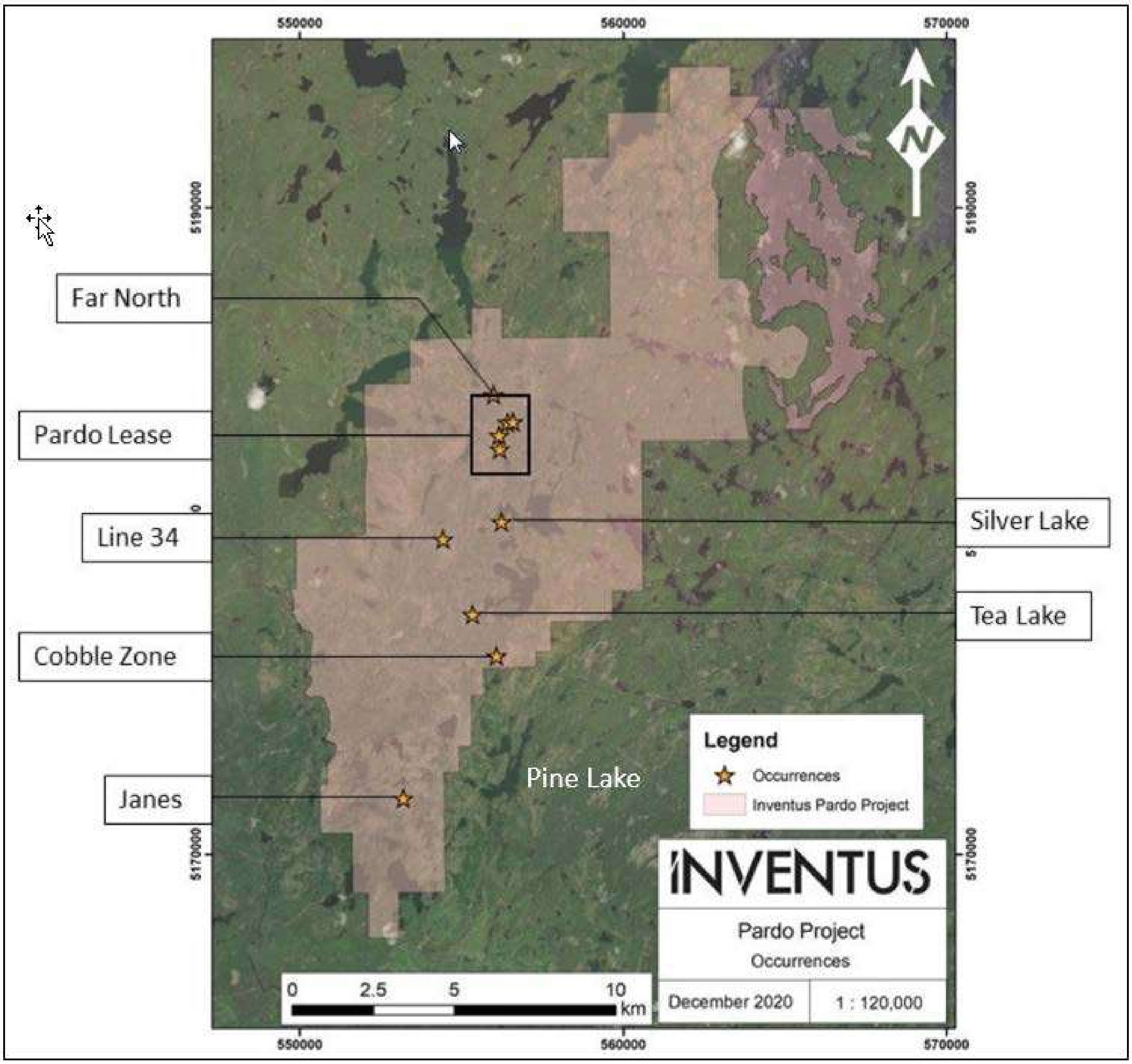
The Project is most sensitive to items directly affecting the metal prices, followed by OPEX. CAPEX has the least overall impact.

It is the opinion of the Authors that the River Valley Project has potential to be financially viable. Therefore, it is recommended to advance the Project to the next phase of study.

23.0 ADJACENT PROPERTIES

The only property of significance adjacent to River Valley is the Pardo Gold Property owned by Inventus Mining Inc. ("Inventus"). The Pardo Gold Property is located west and north adjacent to the River Valley Palladium Property (Figure 23.1). Pardo consists of 3.8 sq. km of mining leases and 180 sq. km of mining claims. According to Inventus, Pardo is the largest and most advanced paleoplacer gold occurrence in North America. The style of gold mineralization is similar to paleoplacer gold deposits found in the Witswatersrand gold fields of South Africa (Whymark and Frimmel, 2018).

FIGURE 23.1 PARDO GOLD PROPERTY, INVENTUS MINING CORP.



Source: *Inventus Mining Corp website (2021)*

Gold mineralization occurs in conglomerate layers or "reefs" that are horizontal and typically 1 m to 4 m in thickness. The reefs are laterally extensive and occur on or near surface. Gold grades

>10 g/t Au occur concentrated in fluvial channels or "pay streaks", and embayments in the footwall on which the mineralized conglomerate was deposited. The gold-bearing conglomerates, if economically feasible, would be subject to low-cost surface strip mining methods.

Inventus' 2018 Technical Report (Nordmin, 2018) outlined three exploration target ranges for the gold-bearing conglomerate; P10, P50, and P90 (Table 23.1).

TABLE 23.1
EXPLORATION TARGET RANGES FOR THE PARDO GOLD PROPERTY

Parameter	P10	P50	P90
Tonnage (t)	450,000	8,600,000	12,500,000
Gold Grade (g/t)	4.20	3.50	3.50
Gold Content (oz)	60,000	950,000	1,400,000

Source: *Inventus website (2021)*

The potential tonnages and grades are conceptual in nature and based on surface mapping, drilling and channel sampling results that define the approximate thickness, extent and grade of the mineralized conglomerate unit. Currently, there has been insufficient exploration to define a Mineral Resource.

Inventus is currently pursuing a 50,000 t advanced exploration bulk sample program at Pardo to build confidence in the gold grade. In late 2017 Inventus conducted its first bulk sample at Pardo from the Trench 1 Occurrence. The 1,000 t sample was processed the material at the McEwen Mining's Black Fox Process Plant near Timmins and calculated to contain 133.8 ounces of gold, at a grade of 4.2 g/t Au. Diamond drilling prior to extraction of the bulk sample returned an average grade of 1.3 g/t Au representing a >200% increase in grade from the bulk sample.

The highest-grade occurrences to date have been the 007, Eastern Reef and Godzilla Zones. Surface channel sampling highlights from these Zones include:

- 36.5 g/t gold over 31 m at the 007 Zone.
- 4.2 g/t gold over 92.5 m at Eastern Reef Zone.
- 5.2 g/t gold over 140 m at the Godzilla Zone.

The reader is cautioned by the Author that the grades and lengths of gold mineralization at the Pardo Property are not necessarily indicative of mineralization on the River Valley Palladium Property.

24.0 OTHER RELEVANT DATA AND INFORMATION

24.1.1 Project Risks and Opportunities

Risks and opportunities have been identified for the Project. The anticipated impact on the Project is listed in brackets after each item, using low-medium-high categories.

24.1.1.1 Risks

Lower metal prices would decrease the Project economics. Financial viability of the Project is very dependent on the palladium price. (high)

Since this study is at a PEA level of engineering and costing, and relies in part on factored costs, it is possible that operating and capital costs could increase at more detailed levels of study. Mining contractors should be asked to provide bids for inclusion in future engineering studies. (medium)

The contingency on capital costs is low at 13%. (medium)

A 5% discount rate may be low given the recent increase in interest rates. (medium)

Approximately 51% of the total tonnage in the current Mineral Resource Estimate is in the Inferred Mineral Resource classification. The Inferred Resource is based on limited information and although it is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated or Measured Mineral Resources with infill drilling, that upgrade is not guaranteed. However, 96% of the tonnage in the mine plan is in the Measured and Indicated Mineral Resource classifications. (medium)

More detailed open pit slope geotechnical studies could impact favorably or negatively on the pit designs. Flattening of slopes could have a significant impact on the mined open pit waste quantity. (low)

There is currently limited geotechnical information in the proposed underground mining areas. Mining costs could increase if poor ground conditions are encountered or if dilution is higher than expected. (low)

24.1.1.2 Opportunities

There is an opportunity to extend known mineralization at depth and elsewhere on the Property. The Property covers an approximate 16 km strike length that contains mineralization in various Zones, and not all areas have been explored. (high)

The applicability of new innovative technologies including hydrometallurgical techniques to improve PGE recoveries can be investigated. (high)

Since the majority of production is planned from the four northwesterly pits, exploration should be concentrated in this region to expand the mine life at potentially reduced mining costs. (medium)

Rhodium ("Rh") and silver ("Ag") grades are included in the Mineral Resource Estimate, however, are not included as payable metals in the NSR estimates. Metallurgical testing may potentially indicate a methodology to recover sufficient quantities in order that those metals become payable. (low)

With well-developed open pit and underground grade control programs and blast optimization studies, it may be possible to reduce mining dilution and improve process plant feed grades. (low)

There is an opportunity to expand the tonnage mined by open pit methods. Analysis indicates that additional tonnage is potentially economic, however, at lower grade. This may lead to an increase in the process plant throughput. (low)

Expanded use of underground electric mining equipment, particularly LHDs, would reduce ventilation requirements. (low)

25.0 INTERPRETATION AND CONCLUSIONS

NAM's 100% owned River Valley Property is a dominantly palladium property composed of two mining leases, 310 single cell mining claims, and 18 boundary claims covering an area of approximately 10,700 ha in the Sudbury Mining Division of Ontario. Contact-type palladium mineralization associated with disseminated copper-nickel sulphides is currently defined in ten zones of various sizes over a strike length of approximately 16 km. Three additional mineralized zones are known, and with further exploration drilling are opportunities to delineate additional Mineral Resources.

The Property benefits significantly from excellent access and close proximity to Sudbury. Mineral exploration, mining, along with processing and smelting are major components of the local economy. Access and weather conditions allow for exploration and development work to be conducted year-round.

NAM has carried out exploration programs on the Property since 1999. The programs consisted of surface exploration, numerous airborne and ground geophysical surveys, a LiDAR topographical survey, and extensive diamond drilling programs. Geological mapping, mineral prospecting, IP geophysical surveys and diamond drilling are the most effective exploration tools employed. At least 742 diamond drill holes totalling 161,256 m have been completed on 13 mineralized zones along the 16 km strike length of the River Valley Deposit. Ten of the 13 mineralized zones are included in the current Mineral Resource Estimate. In 2021, four drill holes were completed for metallurgical testing. In 2022, five geomechanical drill holes were completed for open pit wall slope purposes.

In the opinion of the Authors of this Technical Report, the sample preparation, analytical procedures, security and QA/QC program meet industry standards, and that the data are of good quality and satisfactory for use in the Mineral Resource Estimate reported in this Technical Report. It is recommended that the Company continue with the current QC protocol, which includes the insertion of appropriate in-house reference materials (at a rate of between 3-5%), blanks and duplicates, and to further support this protocol with umpire assaying (on at least 5% of samples) at a reputable secondary laboratory. Due diligence sampling by the Authors shows acceptable correlation with the original NAM assays and it is the Author's opinion that NAM's assay results are suitable for use in the current Mineral Resource Estimate.

In 2012 and 2013**,** scoping level metallurgical testing was conducted at SGS on samples from the River Valley Deposit for Pacific North West Capital Corporation (now NAM). The testwork program produced head grades and mineralogical compositions of the samples and concentrate for both the Dana South Zone ("DSZ") and Dana North Zone ("DNZ"). In 2018, Expert Process Solutions ("XPS") released a report on the "Mineralogical Analysis of Dana and Pine Zone Samples". A mineralogical analysis was completed on four composites from the River Valley Property. The composites generated were created from assay reject material and included "typical" grade Pine Zone, "high-grade" Pine Zone, "typical" grade Dana Zone, and "high-grade" Dana Zone. Copper and nickel sulphides and Co-bearing sulphides were identified, as were palladium and platinum minerals and a rhodium-bearing mineral. Indicative metallurgical recoveries from LCT testwork at SGS in 2022 are 55.4% Au, 56.8% Pt, 71.1% Pd, 85.6% Cu, 21.1% Ni, 25% Co, 60% Ag, and 40% Rh. Anticipated concentrate grades are 13.0% Cu, 1.35% Ni, 0.261% Co, 31.0% S, 5.80 g/t Au, 28.0 g/t Pt, 95.0 g/t Pd and 1.88 g/t Rh.

At cut-offs of CDN$15/t NSR (pit constrained) and CDN$50/t NSR (out-of-pit), the Mineral Resource Estimate consists of: 89.6 Mt grading 0.54 g/t Pd, 0.21 g/t Pt, 0.04 g/t Au and 0.06% Cu, or CDN$47.58/t NSR in the Measured and Indicated classifications; and 94.3 Mt grading 0.35 g/t Pd, 0.16 g/t Pt, 0.03 g/t Au and 0.04% Cu, or CDN$31.69/t NSR in the Inferred classification. Contained metal contents are 2.3 Moz Pd+Pt+Au in the Measured and Indicated classifications and 1.6 Moz Pd+Pt+Au in the Inferred classification.

The Mineral Resource Estimates are sensitive to the selection of a reporting NSR cut-off value. At a cut-off of $CDN25/t NSR, the pit constrained Mineral Resources consist of: 60.1 Mt grading 0.71 g/t Pd, 0.26 g/t Pt, 0.05 g/t Au and 0.04% Cu, or CDN$60.54/t NSR in the Measured and Indicated classifications; and 48.4 Mt grading 0.48 g/t Pd, 0.20 g/t Pt, 0.04 g/t Au and 0.03% Cu, or CDN$41.48/t NSR in the Inferred classification. Contained metal contents are 2.0 Moz Pd+Pt+Au in the Measured and Indicated classifications and 1.1 Moz Pd+Pt+Au in the Inferred classification.

The predominance of Pd + Pt (88%) in a breakdown of relative metal contribution to the NSR is particularly noteworthy, given the sparsity of such primary PGM deposits in secure and established global mining jurisdictions.

Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues. The Inferred Mineral Resource in this estimate has a lower level of confidence that that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.

In terms of significant risks and uncertainties on the Project's continued or potential economic viability, Inferred Mineral Resources have a low level of confidence applied to them, due to the wide drill hole spacing, inconclusive assumption of potentially extractable mineralization continuity, and uncertain metallurgical and economic parameters.

Compared to previous studies on the River Valley Project, this 2023 PEA is based on a smaller, higher-grade operation with lower initial capital costs, reduced open pit mining (both tonnage and number of open pits), inclusion of underground mining, and a much smaller environmental footprint, to provide mineralized feed to an on-site 2.5 Mtpa process plant (6,850 tpd).

The River Valley Project includes a conventional open pit mining operation. Initial mining is by open pit at the northwest end of the Deposit, close to the proposed process plant site location. A series of five open pits will be mined, starting at the Dana Zones and progressing in a southeasterly direction to the Lismer Zones and finally the Varley Zone. The mine equipment fleet, with 90 t haul trucks, 10 m^3 excavators and 254 mm hole diameter rotary drills, will be owned and operated by the Company. A contractor will be responsible for drill and blast activities. The Company will provide overall mine management and technical services. One year of pre-production mining is planned, followed by 16 years of production. The open pits will produce a total of 35.7 Mt of process plant feed. The average open pit strip ratio is planned to be 3.4:1 over the LOM.

Higher grade underground mineralization is planned to be mined during production years two to seven, and will total approximately 3 Mt of process plant feed. The underground mining method is planned to be sublevel longitudinal and transverse longhole stoping with cemented rock backfill, at a rate of 1,500 tpd. The lower extents of the Dana South Zone and the Lismer North Zone are planned to be ramp-accessed from portals at surface. All underground mine and stope development will be carried out by a mining contractor. Company personnel and equipment will carry out all other underground mining activities.

Mining operations are planned to deliver 6,850 tpd to the process plant, equivalent to 2.5 Mtpa. The TMF is planned to be operated for the first seven years of mine production. The Dana Pit is planned to be mined out by the end of production Year 7. Tailings will be pumped to the pit starting in Year 8 and will continue to the end of mine life.

The process plant will consist of conventional crushing, a semi-autogenous ("SAG") mill with a pebble crusher, and a closed-circuit ball mill circuit with cyclones to ensure product (P_{80}) size feed to the flotation circuit. The cyclone overflow is conditioned prior to rougher flotation with reagents, including collectors, frother, and suited depressants, to produce a bulk rougher concentrate. The rougher concentrate is re-ground in a closed circuit regrind ball mill and further upgraded in a series of cleaner flotation cells to produce the final cleaner concentrate. The final concentrate is thickened, filtered, and dried prior to shipping to a smelter.

The cleaner circuit consists of 1st, 2nd, and 3rd cleaning circuits as well as cleaner scavenger. Associated recycling is completed between the stages. The rougher flotation circuit tailings feeds the tailings thickener to reduce impounded TMF density and return process water internally. Process water is recycled from the concentrate and tailings thickener as well as the settled water in the TMF pond. These three water streams are pumped to the main process water tank for reuse in the process plant.

The initial mine infrastructure will be located within a compact site in the northwest area of the Property, and NAM will strive to contain this small footprint during future operations. Major infrastructure for the Project includes five open pit mines, two underground mines, the process plant with laboratory and main electrical substation and power distribution, the TMF, and three waste rock storage facilities. Infrastructure to be installed by the Company includes the main access road and gatehouse, administration building, warehouse, maintenance building, change room, water and sewage treatment plants, and a diesel fuel tank farm with a fueling station.

There will be no camp facilities at site. Personnel and contractors will be responsible for their own housing and will travel from local communities. Infrastructure to be installed by contractors includes a maintenance building, bulk explosives storage and magazines, offices and a warehouse.

After discussions with Hydro One, it is planned that electrical power will be provided by a dedicated 44 kV feeder line from the Crystal Falls Transformer Station and will require 45 km of new powerline. The total connected electrical power for the process plant is estimated at 10.2 MW. A diesel generator at the process plant will be used for emergency power generation.

Based on preliminary geochemical characterization results, the bulk of the mine waste rock is assumed to be NPAG. Some of the waste rock will be used for TMF embankment construction and the remainder will be stored in the waste rock storage facilities.

The TMF will be constructed in three stages to reduce initial capital expenditure. Stage 1 will consist of a starter cell at the north end of the valley and is sized to provide two years of storage. The Stage 1 impoundment will be formed through the construction of two dams (North and Divider Embankments), with the remaining containment provided by the natural topography. Stage 2 includes the North, Divider, and South Embankments, and all embankments will be raised using the downstream construction method as required to reach the approximate 7-year facility life.

Metallurgical testwork indicates that the copper grade in the River Valley concentrate will range from 11% to 20% with a weighted average grade of 14% to 15%. It is assumed that the River Valley concentrate will be evenly split between two buyers (one domestic, one offshore). Feedback was received from two of the most likely buyers of the River Valley concentrate. The net payable amounts for each of the payable metals is expected to be 91% copper, 96% palladium, 91% platinum and 82% gold. Silver and rhodium are not expected to be at high enough concentrations to be payable. Nickel and cobalt are not expected to be payable as part of a copper concentrate.

A benchmark treatment charge of US$85.00/dry metric tonne ("dmt") and copper refining charge of US$0.085/lb payable copper have been used. Refining charges of US$28.00/payable oz platinum and palladium, US$5.00/payable oz gold and US$0.50/payable oz silver have been assumed. It is assumed that total penalties will be in the order of US$4.00/dmt. Other charges, such as freight capture and container handling charges, are incorporated into the US$166.00/dmt logistics costs.

By focussing on maximizing the extraction of high-grade mineralization, impacts to Pine Lake have been eliminated and the rate of mineralization extraction and processing for the Project have been reduced. This modification has reduced the footprint of the processing area and the size of the equipment in this area which in turn has reduced the carbon footprint associated with processing.

NAM has developed an Environmental and Social Governance ("ESG") Strategy and will prepare an ESG Sustainability Report annually to disclose and communicate ESG related information to NAM's stakeholders. The Project will have to obtain numerous provincial and federal approvals and permits and it is anticipated that it will be subject to provincial environmental assessments and a federal Impact Assessment. The environmental baseline studies are well advanced and consist of: Stage 1 and 2 Archaeological Assessments, aquatics (fish and fish habitat), atmospheric, terrestrial (species at risk and habitat assessments), surface water quality, groundwater, aquifer permeability, and hydrology. KP completed geochemical characterization of the tailings and waste rock material and hydrogeological modelling of the dewatering of the proposed open pits and underground workings. A production phase Closure Plan, and associated financial assurance, will be filed with the Ministry of Mines before development of the Project.

The Project is situated on the traditional territory of Temagami First Nation and Nipissing First Nation. A Memorandum of Understanding was signed by Temagami First Nation in 2014 and amended in 2017. Temagami First Nation has assisted with the completion of baseline archaeological, surface water quality, groundwater, and hydrology studies and members of the community also participated in a site visit in September 2022. A Memorandum of Understanding was signed with Nipissing First Nation in late-January 2022. In 2023, NAM is hoping that Nipissing First Nation will also participate in the Project's ongoing baseline data collection. Regular Project updates are provided to each of these communities.

Open pit mining costs (all in Canadian dollars) have been estimated to average $2.95/t of material mined or $12.63/t processed over the production years. Underground mining costs have been estimated to average $60.61/t processed. Processing costs ($12.69/t processed, including tailings) and site G&A ($2.01/t processed) contribute to a total LOM average cost estimated at $30.98/t processed. The average operating cash cost over the production years including royalties is estimated at US$1,231/oz PdEq, and the average all-in sustaining cost is estimated at US$1,518/oz PdEq and includes closure costs.

The Project is subject to a 1.0% NSR royalty after a $2.0M payment that is planned at the start of production. Total costs associated with this NSR royalty over the LOM are estimated at $24.6M including the $2.0M lump sum payment.

Company peak year site manpower is estimated at 325 people, consisting of 193 mining, 109 process plant and 23 G&A. Maintenance personnel are included in the mining and process plant numbers. Underground development contractors are additional.

Initial capital costs are estimated at $269M and include a 13% contingency. Initial capital costs are for construction of a 2.5 Mtpa flotation process plant and conventional tailings storage facility, provide electrical grid power, and to set up an open pit mining site with the necessary infrastructure and carry out pre-production activities. Sustaining capital costs to increase the capacity of the tailings storage facility, develop two underground mines, lease open pit mining equipment, and provide for closure costs are estimated at $163M.

Using three-year monthly trailing average metal prices as of May 31, 2023 of US$1,830/oz Au, US$2,150/oz Pd, US$1,010/oz Pt and US$4.00/lb Cu, the Project has an estimated pre-tax NPV at a 5% discount rate of $296M and an IRR of 16%. After-tax NPV and IRR are estimated at $140M and 11%, respectively. Simple after-tax payback is 6.9 years. Project economics are most sensitive to metal prices. The Project NPV is more sensitive to overall operating costs than capital costs.

The most significant potential risks for impact on the Project are that lower metal prices, particularly palladium, would decrease the Project economics, and that the operating and capital cost estimates could increase with more detailed study. Opportunities consist of a Mineral Resource that is open along strike and down dip, and that new innovative mineral process technologies including hydrometallurgical techniques to improve PGE recoveries can be investigated.

It is the opinion of the Authors that the River Valley Project has potential to be financially viable. Therefore, it is recommended to advance the Project to the next phase of study.

26.0 RECOMMENDATIONS

Additional exploration and study expenditures are warranted to advance the Project. The Authors recommendations include: current mineralized zone in-fill, expansion and step-out drilling to increase the size of the Mineral Resource; geological, geophysical, geochemical and mineralogical studies; metallurgical testwork; and an updated Mineral Resource Estimate, such that a Pre-Feasibility Study can eventually be completed.

The Authors recommend additional drilling on the Property to convert Inferred to Indicated Mineral Resources, expand the current Mineral Resources, and add new Mineral Resources. Higher-grade Inferred classification Mineral Resources at the Lismer North and Varley Zones, in particular, should be drilled to upgrade them to Indicated classification Mineral Resources. The current Mineral Resources are locally open to expansion by drilling along strike, particularly at the Dana South Zone, and are more generally open to expansion by drilling down-dip. Mineralized zones at Pardo, Drop and Jackson Flats remain to be drilled at sufficient density for Mineral Resource estimation.

IP geophysical surveys and limited drilling programs east of the footwall contact of the River Valley Intrusion previously discovered the Pine Zone. This discovery opens up the potential for new exploration opportunities on the Property. Completion of 3-D geological modelling of the mineralized host units and cross-cutting faults could aid in prioritizing ground and borehole IP chargeability features of interest for drill testing. Additionally, historical targets with characteristics of reef-style mineralization internally within the River Valley Intrusion warrant further investigation.

Additional recommendations by the Authors include:

- Collect more bulk density samples from all zones, various rock types and mineralization types, in order to create future bulk density models;
- Additional metallurgical testwork to improve concentrate grades for metallurgical processing of all metals, including rhodium;
- Hydrometallurgical techniques should be investigated as part of a strategy to improve metal recoveries;
- Dewatered tailings process applications and trade-off studies versus proposed wet tailings;
- Continued Rh assay studies and mineralogical investigations of fresh mineralized drill core, particularly from the Lismer Zones and the Varley Zone; and
- Geomechanical drilling should be used to advance the viability of an expanded underground mining component at River Valley, in parallel to open pit mining.

The Company re-commenced permitting and baseline studies in 2020 and it is recommended that this work continue on these initiatives, including:

- Continued and expanded aquatic, terrestrial and atmospheric field studies to support permitting activities;
- Ongoing groundwater, surface water and hydrology monitoring; and
- Community and government engagement and consultation.

The recommended exploration and development work program and budget for the River Valley Project is presented in Table 26.1. The program should be completed in two phases. Phase 1 is estimated to cost $2.0M and should be completed in the next 12 to 18 months. The Phase 2 program is estimated at $24.7M and would be contingent on the results of Phase 1. The objective of the work program is to complete a Pre-Feasibility Study.

TABLE 26.1 **RECOMMENDED WORK PROGRAM AND BUDGET**					
PHASE 1					
Activity	**Purpose**	**Zone**	**Units/ Samples/ Metres**	**Cost**	**Budget Estimate (CDN$)**
Drilling - Expansion	Expand Mineral Resources	DSZ	4,500	300	1,350,000
Lithostructural 3-D Modelling	Improve drill targeting using IP	Pine-DNZ-DSZ-LNZ			100,000
Geophysics - BHIP Surveys	Better zone definition	DSZ	2	35,000	70,000
Hydrometallurgy - PLATSOL	Increase metal recoveries	Dana & Lismer	2	35,000	70,000
Environment & Permitting	Local FN & Govt engagement	general			150,000
Sub-Total					**1,740,000**
Contingency (15%)					260,000
Total					**2,000,000**
PHASE 2					
Activity	**Purpose**	**Zone**	**Units/ Samples**	**Cost**	**Budget Estimate (CDN$)**
Drilling - Infill	Convert HG INF to IND	LNZ-DSZ-LRZ-VZ-AZ	25,000	300	7,500,000
Drilling - Expansion	Expand Mineral Resources	PZ, DNZ-DSZ, LNZ, LRZ, VZ, AZ	25,000	300	7,500,000
Drilling - Discovery	Define new mineralized zones	new mineralized zones	10,000	300	3,000,000
Geophysics: Ground & BHIP	Discovery of new HG mineralization	new mineralized zones			500,000
Lithostructural 3-D Modelling	Improve drill targeting using IP	LRZ-VZ-AZ			100,000
Sulphide Flotation	Improve conc grades for metallurgy	Dana, Lismer, Varley			210,000

Table 26.1 Recommended Work Program and Budget					
PHASE 2					
Activity	**Purpose**	**Zone**	**Units/ Samples**	**Cost**	**Budget Estimate (CDN$)**
Hydrometallurgy	PLATSOL process optimization	general	2	150,000	300,000
Geomechanical Drilling	Advance viability of UG mining	DSZ-LNZ			600,000
Environment & Permitting	Local FN & Govt engagement	general			125,000
Updated MRE	Increase HG IND MRE	general			150,000
Pre-Feasibility Study	Next stage of engineering study	general			1,500,000
Sub-Total					**21,485,000**
Contingency (15%)					3,223,000
Total					**24,708,000**

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28.0 CERTIFICATES

CERTIFICATE OF QUALIFIED PERSON

ANDREW BRADFIELD, P. ENG.

I, Andrew Bradfield, P. Eng., residing at 5 Patrick Drive, Erin, Ontario, Canada, N0B 1T0, do hereby certify that:

1. I am an independent mining engineer contracted by P&E Mining Consultants.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of Queen's University, with an honours B.Sc. degree in Mining Engineering in 1982. I have practiced my profession continuously since 1982. I am a Professional Engineer of Ontario (License No.4894507). I am also a member of the National CIM.

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   I have practiced my profession continuously since 1982. My summarized career experience is as follows:
   - Various Engineering Positions – Palabora Mining Company, 1982-1986
   - Mines Project Engineer – Falconbridge Limited, 1986-1987
   - Senior Mining Engineer – William Hill Mining Consultants Limited, 1987-1990
   - Independent Mining Engineer, 1990-1991
   - GM Toronto – Bharti Engineering Associates Inc, 1991-1996
   - VP Technical Services, GM of Australian Operations – William Resources Inc, 1996-1999
   - Independent Mining Engineer, 1999-2001
   - Principal Mining Engineer – SRK Consulting, 2001-2003
   - COO – China Diamond Corp, 2003-2006
   - VP Operations – TVI Pacific Inc, 2006-2008
   - COO – Avion Gold Corporation, 2008-2012
   - Independent Mining Engineer, 2012-Present
4. I have visited the Property that is the subject of this Technical Report on September 10, 2018.
5. I am responsible for authoring Sections 2, 3, 15, 19, 22, 24 and co-authoring 1, 16, 21, 25, 26, and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had no prior involvement with the Property that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signing Date: August 11, 2023

{SIGNED AND SEALED}
[Andrew Bradfield]

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Andrew Bradfield, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

JARITA BARRY, P.GEO.

I, Jarita Barry, P.Geo., residing at 9052 Mortlake-Ararat Road, Ararat, Victoria, Australia, 3377, do hereby certify that:

1. I am an independent geological consultant contracted by P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of RMIT University of Melbourne, Victoria, Australia, with a B.Sc. in Applied Geology. I have worked as a geologist for over 17 years since obtaining my B.Sc. degree. I am a geological consultant currently licensed by Engineers and Geoscientists British Columbia (License No. 40875) and Professional Engineers and Geoscientists Newfoundland & Labrador (License No. 08399). I am also a member of the Australasian Institute of Mining and Metallurgy of Australia (Member No. 305397);

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:

   - Geologist, Foran Mining Corp. 2004
   - Geologist, Aurelian Resources Inc. 2004
   - Geologist, Linear Gold Corp. 2005-2006
   - Geologist, Búscore Consulting 2006-2007
   - Consulting Geologist (AusIMM) 2008-2014
   - Consulting Geologist, P.Geo. (EGBC/AusIMM) 2014-Present
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Section 11 and co-authoring Sections 1, 12, 25, 26 and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a Qualified Person for a Technical Report titled "Technical Report and Updated Mineral Resource Estimate of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", with an effective date of September 14, 2021.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Jarita Barry]

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Jarita Barry, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

JAMES L. PEARSON, P. ENG.

I, James Pearson, P.Eng., residing at 105 Stornwood Court, Brampton, Ontario. Canada, L6W 4H6, do hereby certify that:

1. I am a Mining Engineering Consultant, contracted by P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of Queen's University, Kingston, Ontario, Canada, in 1973 with an honours Bachelor of Science degree in Mining Engineering. I am registered as a Professional Engineer in the Province of Ontario (Reg. No. 36043016). I have practiced my profession continuously since 1973.

   I have read the definition of "Qualified Person" set out in National Instrument ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101. My relevant experience for the purpose of the Technical Report has been acquired by the following activities:

   - Review and report as a consultant on numerous exploration and mining projects around the world for due diligence and regulatory requirements;
   - Project Manager and Superintendent of Engineering and Projects at several underground operations in South America;
   - Senior Mining Engineer with a large Canadian mining company responsible for development of engineering concepts, mine design and maintenance;
   - Mining analyst at several Canadian brokerage firms.
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for co-authoring Sections 1, 16, 21, 25, 26 and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had no prior involvement with the Property that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[James L. Pearson]

James L. Pearson, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

EUGENE PURITCH, P. ENG., FEC, CET

I, Eugene J. Puritch, P. Eng., FEC, CET, residing at 44 Turtlecreek Blvd., Brampton, Ontario, Canada, L6W 3X7, do hereby certify that:

1. I am an independent mining consultant and President of P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of The Haileybury School of Mines, with a Technologist Diploma in Mining, as well as obtaining an additional year of undergraduate education in Mine Engineering at Queen's University. In addition, I have also met the Professional Engineers of Ontario Academic Requirement Committee's Examination requirement for a Bachelor's degree in Engineering Equivalency. I am a mining consultant currently licensed by the: Professional Engineers and Geoscientists New Brunswick (License No. 4778); Professional Engineers, Geoscientists Newfoundland and Labrador (License No. 5998); Association of Professional Engineers and Geoscientists Saskatchewan (License No. 16216); Ontario Association of Certified Engineering Technicians and Technologists (License No. 45252); Professional Engineers of Ontario (License No. 100014010); Association of Professional Engineers and Geoscientists of British Columbia (License No. 42912); and Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (No. L3877). I am also a member of the National Canadian Institute of Mining and Metallurgy.

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   I have practiced my profession continuously since 1978. My summarized career experience is as follows:
   - Mining Technologist - H.B.M.& S. and Inco Ltd., 1978-1980
   - Open Pit Mine Engineer – Cassiar Asbestos/Brinco Ltd., 1981-1983
   - Pit Engineer/Drill & Blast Supervisor – Detour Lake Mine, 1984-1986
   - Self-Employed Mining Consultant – Timmins Area, 1987-1988
   - Mine Designer/Resource Estimator – Dynatec/CMD/Bharti, 1989-1995
   - Self-Employed Mining Consultant/Resource-Reserve Estimator, 1995-2004
   - President – P&E Mining Consultants Inc, 2004-Present
4. I have visited the Property that is the subject of this Technical Report on September 10, 2018.
5. I am responsible for authoring Section 23 and co-authoring Sections 1, 14, 25, 26 and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the River Valley Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", with an effective date of June 27, 2019, and for a Technical Report titled "Technical Report and Updated Mineral Resource Estimate of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", with an effective date of September 14, 2021.
8. I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023

Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Eugene Puritch]

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Eugene Puritch, P.Eng., FEC, CET

CERTIFICATE OF QUALIFIED PERSON

RICHARD SUTCLIFFE, PH.D., P. GEO.

I, Richard Sutcliffe, Ph.D., P. Geo., residing at 130 Foxridge Drive, Ancaster, Ontario, Canada, do hereby certify that:

1. I am an independent geological consultant and Senior Geological Advisor, P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of the University of Toronto with a Bachelor of Science degree in Geology (1977). In addition, I have a Master of Science in Geology (1980) from University of Toronto and a Ph.D. in Geology (1986) from the University of Western Ontario. I have worked as a geologist for over 35 years since obtaining my M.Sc. degree. I am a geological consultant currently licensed by the Association of Professional Geoscientists of Ontario (License No 852).

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:

• Precambrian Geologist, Ontario Geological Survey	1980-1989
• Senior Research Geologist, Ontario Geological Survey	1989-1991
• Associate Professor of Geology, University of Western Ontario.	1990-1992
• President and CEO, URSA Major Minerals Inc.	1992-2012
• President and CEO, Patricia Mining Corp.	1998-2008
• President and CEO, Auriga Gold Corp.	2010-2012
• Founder and President, Pavey Ark Minerals Inc.	2012-present
• Consulting Geologist	1992-Present

4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Sections 4 to 10 and co-authoring Sections 1, 25, 26 and 27 of this Technical Report.
6. I am independent of the issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report and Updated Mineral Resource Estimate of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario" with an effective date of September 14, 2021.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Richard Sutcliffe]

____
Dr. Richard H. Sutcliffe, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

YUNGANG WU, P.GEO.

I, Yungang Wu, P. Geo., residing at 3246 Preserve Drive, Oakville, Ontario, Canada L6M 0X3, do hereby certify that:

1. I am an independent consulting geologist contracted by P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of Jilin University, China, with a Master's degree in Mineral Deposits (1992). I have worked as a geologist for 30 plus years since graduating. I am a geological consultant and a registered practising member of the Professional Geoscientists Ontario (Registration No. 1681).

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is as follows:

   - Geologist –Geology and Mineral Bureau, Liaoning Province, China 1992-1993
   - Senior Geologist – Committee of Mineral Resources and Reserves of Liaoning, China 1993-1998
   - VP – Institute of Mineral Resources and Land Planning, Liaoning, China 1998-2001
   - Project Geologist–Exploration Division, De Beers Canada 2003-2009
   - Mine Geologist – Victor Diamond Mine, De Beers Canada 2009-2011
   - Resource Geologist– Coffey Mining Canada 2011-2012
   - Consulting Geologist 2012-Present
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for co-authoring Sections 1, 14, 25, 26 and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report and Updated Mineral Resource Estimate of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario" with an effective date of September 14, 2021.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Yungang Wu]

____

Yungang Wu, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

ANTOINE R. YASSA, P.GEO.

I, Antoine R. Yassa, P.Geo. residing at 3602 Rang des Cavaliers, Rouyn-Noranda, Quebec, Canada, J0Z 1Y2, do hereby certify that:

1. I am an independent geological consultant contracted by P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of Ottawa University at Ottawa, Ontario with a B. Sc (HONS) in Geological Sciences (1977) with continuous experience as a geologist since 1979. I am a geological consultant currently licensed by the Order of Geologists of Québec (License No 224) and by the Association of Professional Geoscientist of Ontario (License No 1890);

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:

   - Minex Geologist (Val d'Or), 3-D Modeling (Timmins), Placer Dome — 1993-1995
   - Database Manager, Senior Geologist, West Africa, PDX, — 1996-1998
   - Senior Geologist, Database Manager, McWatters Mine — 1998-2000
   - Database Manager, Gemcom modeling and Resources Evaluation (Kiena Mine) — 2001-2003
   - Database Manager and Resources Evaluation at Julietta Mine, Bema Gold Corp. — 2003-2006
   - Consulting Geologist — 2006-present

4. I have visited the Property that is the subject of this Technical Report on June 6 to June 8, 2021.
5. I am responsible for co-authoring Sections 1, 12, 14, 25, 26 and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report and Updated Mineral Resource Estimate of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario" with an effective date of September 14, 2021.
8. I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Antoine R. Yassa]

____

Antoine R. Yassa, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

JESSICA BREAULT, P.ENG.

I, Jessica Breault, P.Eng., do hereby certify that:

1) This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario" (the "Technical Report") with an effective date of June 29, 2023.
2) I am employed as a Geological Engineer of Knight Piésold Ltd. with a business address at 200 - 1164 Devonshire Avenue, North Bay, Ontario, P1B 6X7, Canada.
3) I am a graduate of Queen's University, with a B.Sc. degree in Geological Engineering in 2012. I have practiced my profession continuously since 2012. My experience includes tailings and water management in Canda, the United States and worldwide.
4) I am a registered Professional Engineer in good standing with Professional Engineers Ontario (License No. 100186209) and in the province of Quebec (License No. 6048199).
5) I have read the definition of "Qualified Person" set out in National Instrument 43-101 (NI 43-101) and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
6) I have visited the Property that is the subject of this Technical Report on October 4, 2021 and August 17, 2022.
7) I am responsible for co-authoring Sections 1, 18, 21, 25, 26 and 27 of this Technical Report.
8) I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
9) I have had no prior involvement with the Property that is the subject of this Technical Report.
10) As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11) I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Jessica Breault]

____

Jessica Breault, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

BENJAMIN PEACOCK, P.ENG.

I, Benjamin Peacock, P.Eng., do hereby certify that:

1) This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario" (the "Technical Report") with an effective date of June 29, 2023.
2) I am employed as a Specialist Engineer of Knight Piésold Ltd. with business address at 200 - 1164 Devonshire Avenue, North Bay, Ontario, P1B 6X7, Canada.
3) I am a graduate of the University of Waterloo with an honours B.ASc. degree in Civil Engineering in 2008. I have practiced my profession continuously since 2008. My experience includes open pit and rock mechanics in Canada, the United States, and worldwide.
4) I am a registered Professional Engineer in good standing with Professional Engineers Ontario (License No. 100141409), Newfoundland & Labrador (License No. 09001) and NWT & Nunavut (License No. L3788).
5) I have read the definition of "Qualified Person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
6) I have not visited the Property that is the subject of this Technical Report.
7) I am responsible for co-authoring Sections 1, 16, 20, 25, 26 and 27 of this Technical Report.
8) I am independent of the Issuer and related companies applying all of the tests in Section 1.5 of the NI 43-101.
9) I have had no prior involvement with the Property that is the subject of this Technical Report.
10) As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11) I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Benjamin Peacock]

____
Benjamin Peacock, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

DAVID SALARI, P.ENG.

I, David Salari, P.Eng., of 125 Bronte Road, Unit 503, Oakville, Canada, L6L 0H1, do hereby certify that:

1. I am an independent metallurgical engineer with an office at Suite 300-10, 1100 Burloak Drive, Burlington, Ontario, Canada, L6L 2Y8.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate University of Toronto with a Bachelor's of Applied Science (BASc) – Metallurgy and Material Science. I have been actively involved in mining and mineral processing since 1980 with extensive experience in metallurgical and mill testing and design, mill capital and operating costs, construction, commissioning, and mill operations.

   I am a member in good standing of the Professional Engineers Ontario - #40416505 and I am the designated P.Eng. for D.E.N.M. Engineering Ltd. – Certificate of Authorization – Professional Engineers Ontario - #100102038 and Designation as a Consulting Engineer – Professional Engineers Ontario - # 4012.

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
4. I visited the Property that is the subject of this Technical Report on August 20, 2021.
5. I am responsible for authoring Sections 13 and 17 and co-authoring Sections 1, 18, 21, 25, 26 and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had no prior involvement with the Property that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signing Date: August 11, 2023

{SIGNED AND SEALED}
[David Salari]

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David Salari, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

MARIA STORY, P.ENG.

I, Maria Story, B.A.Sc., P.Eng., residing at 770 Lakeshore Rd., Haileybury, Ontario, Canada, do hereby certify that:

1. I am an independent Environmental/Chemical Engineer, and President of Story Environmental Inc.
2. This certificate applies to the Technical Report titled "Preliminary Economic Assessment of the River Valley Palladium Project, Dana, Janes, McWilliams, and Pardo Townships, Sudbury Mining Division, Ontario", (The "Technical Report") with an effective date of June 29, 2023.
3. I am a graduate of the University of Toronto with a Bachelor of Applied Science degree (BASc) in Chemical Engineering (1990). I have worked as an Environmental Engineer for a total of 33 years since graduating in 1990. I am a chemical engineer currently licensed by the Professional Engineers of Ontario (License No. 90341611).

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:
   - President, Story Environmental Inc. 1996-present
   - Environmental Engineer, ICI Canada Inc. 1990-1996
4. I visited the Property that is the subject of this Technical Report on July 21, 2022.
5. I am responsible for co-authoring Sections 1, 20, 25, 26 and 27 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had no prior involvement with the Property that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: June 29, 2023
Signed Date: August 11, 2023

{SIGNED AND SEALED}
[Maria Story]

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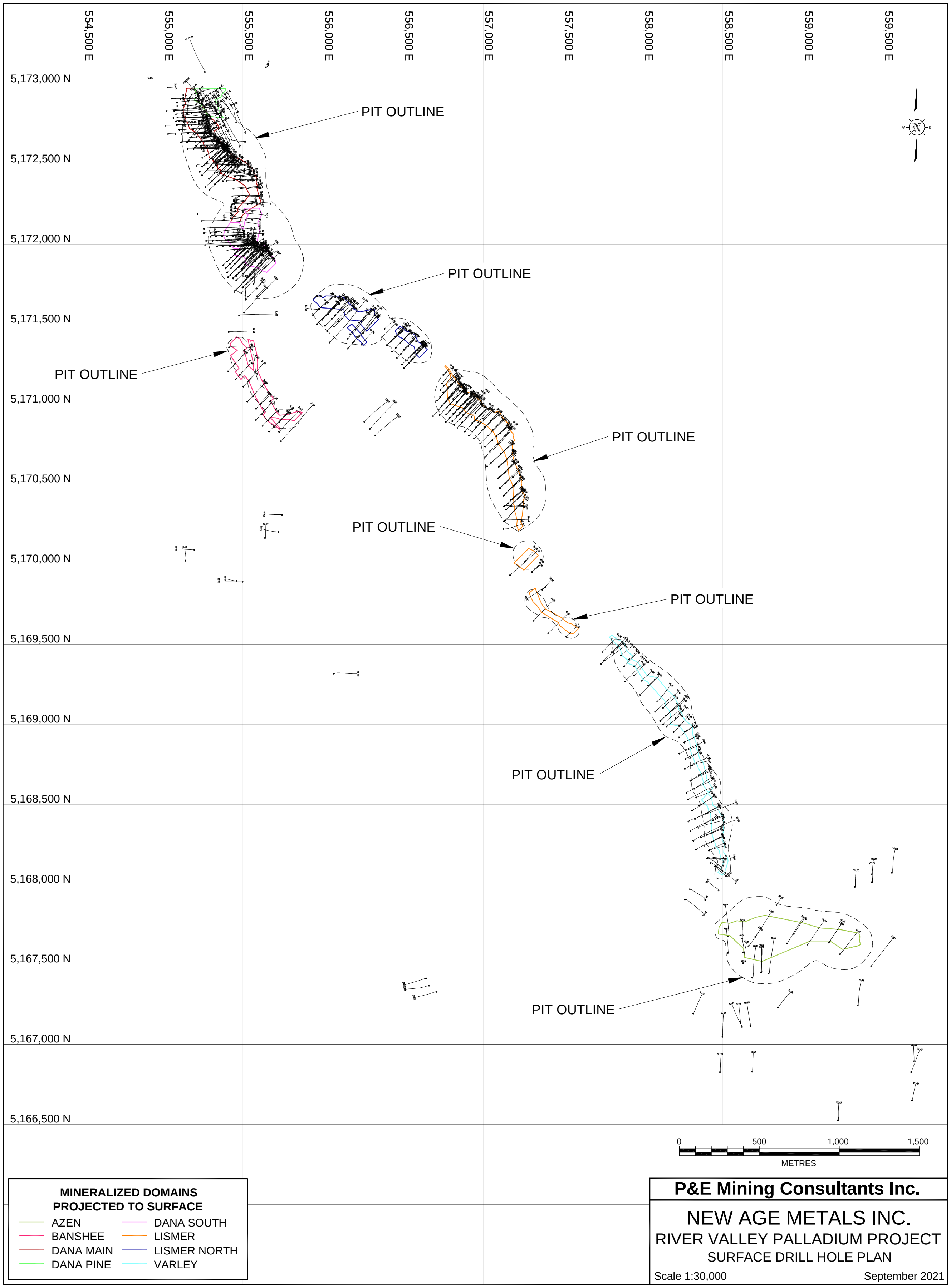
Maria Story, P.Eng.

APPENDIX A SURFACE DRILL HOLE PLAN


554,500 E
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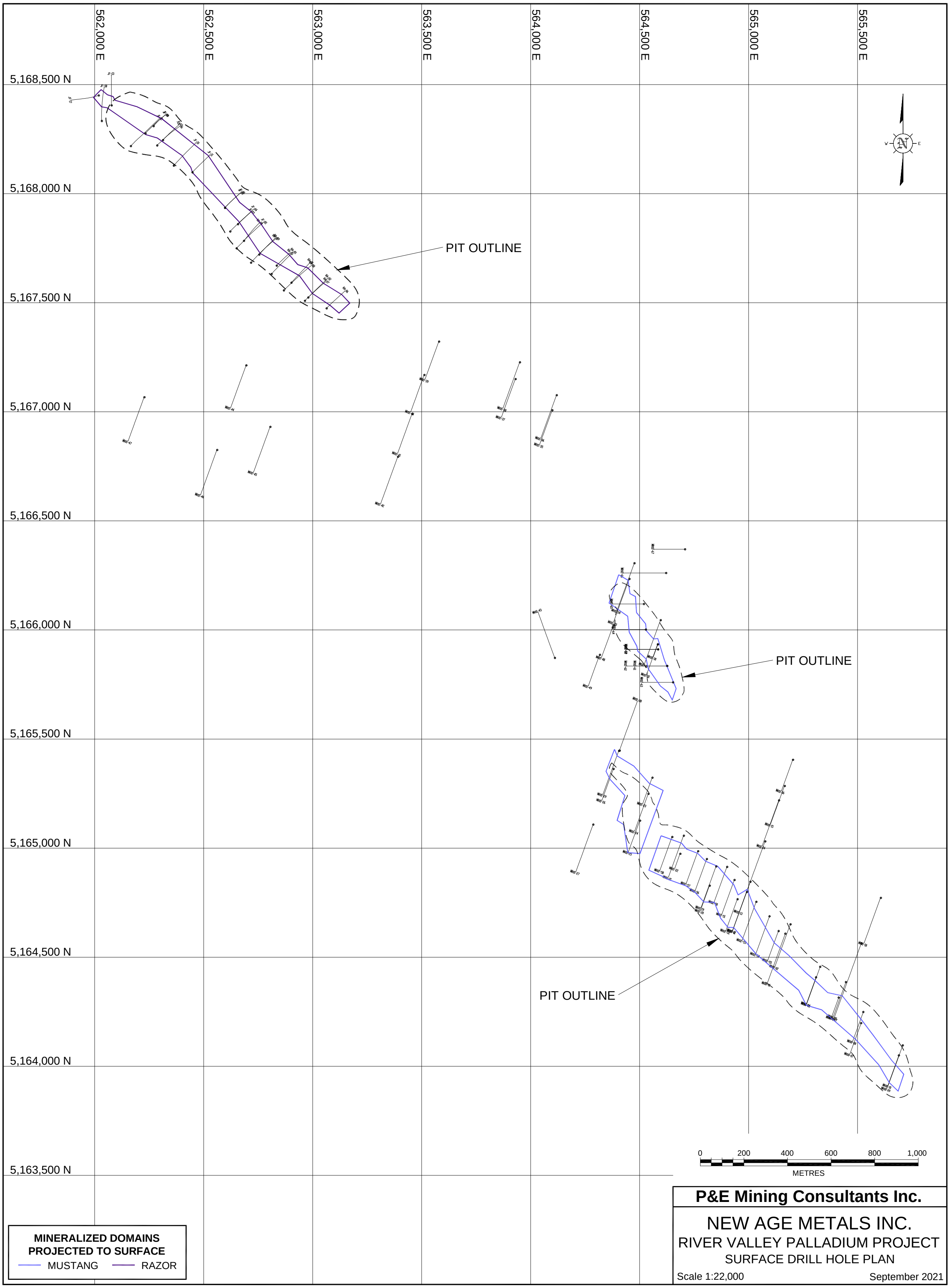
5,166,500 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
0
500
1,000
1,500
METRES
MINERALIZED DOMAINS
PROJECTED TO SURFACE
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
SURFACE DRILL HOLE PLAN
Scale 1:30,000
September 2021



562,000 E
562,500 E
563,000 E
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565,000 E
565,500 E
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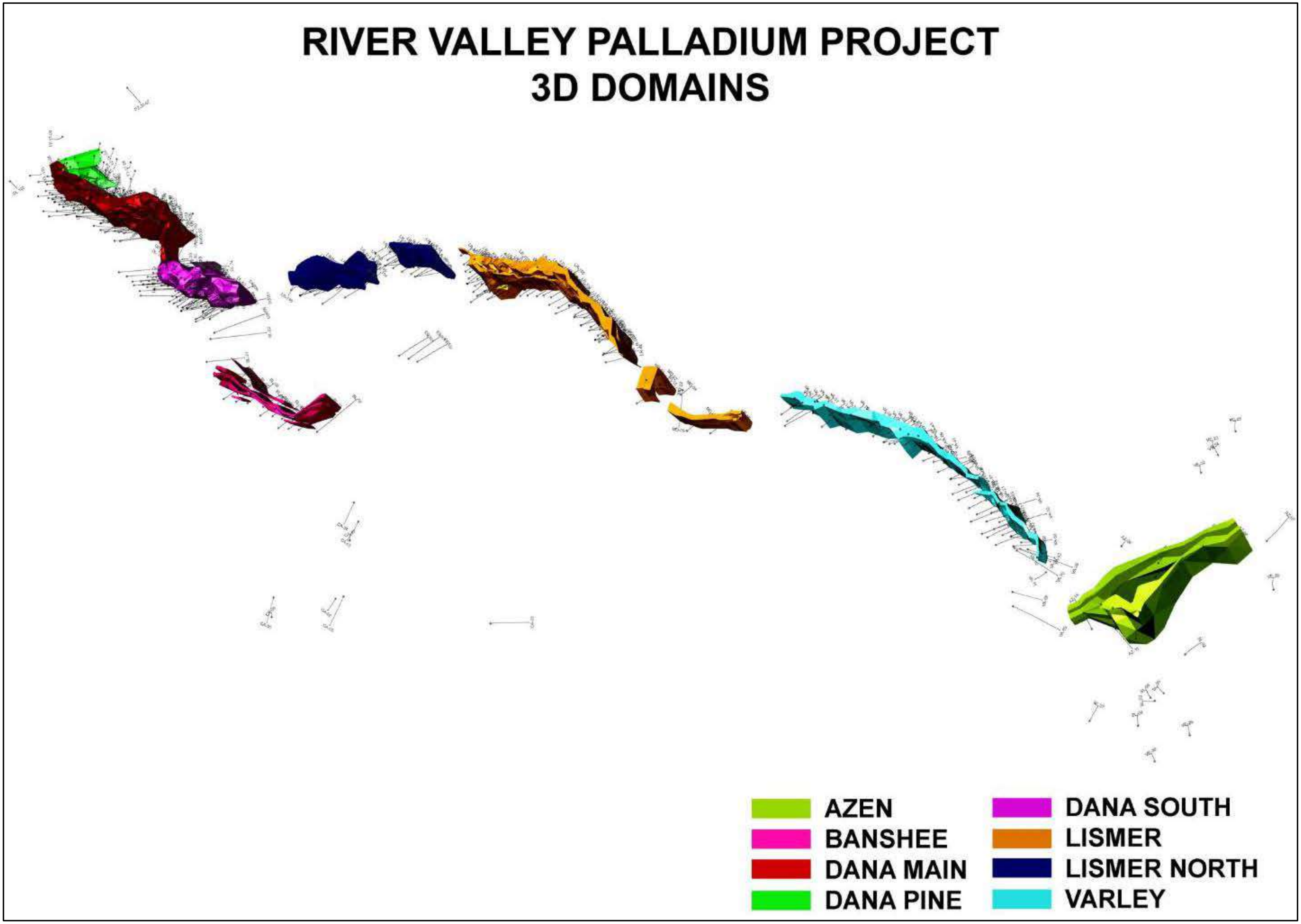
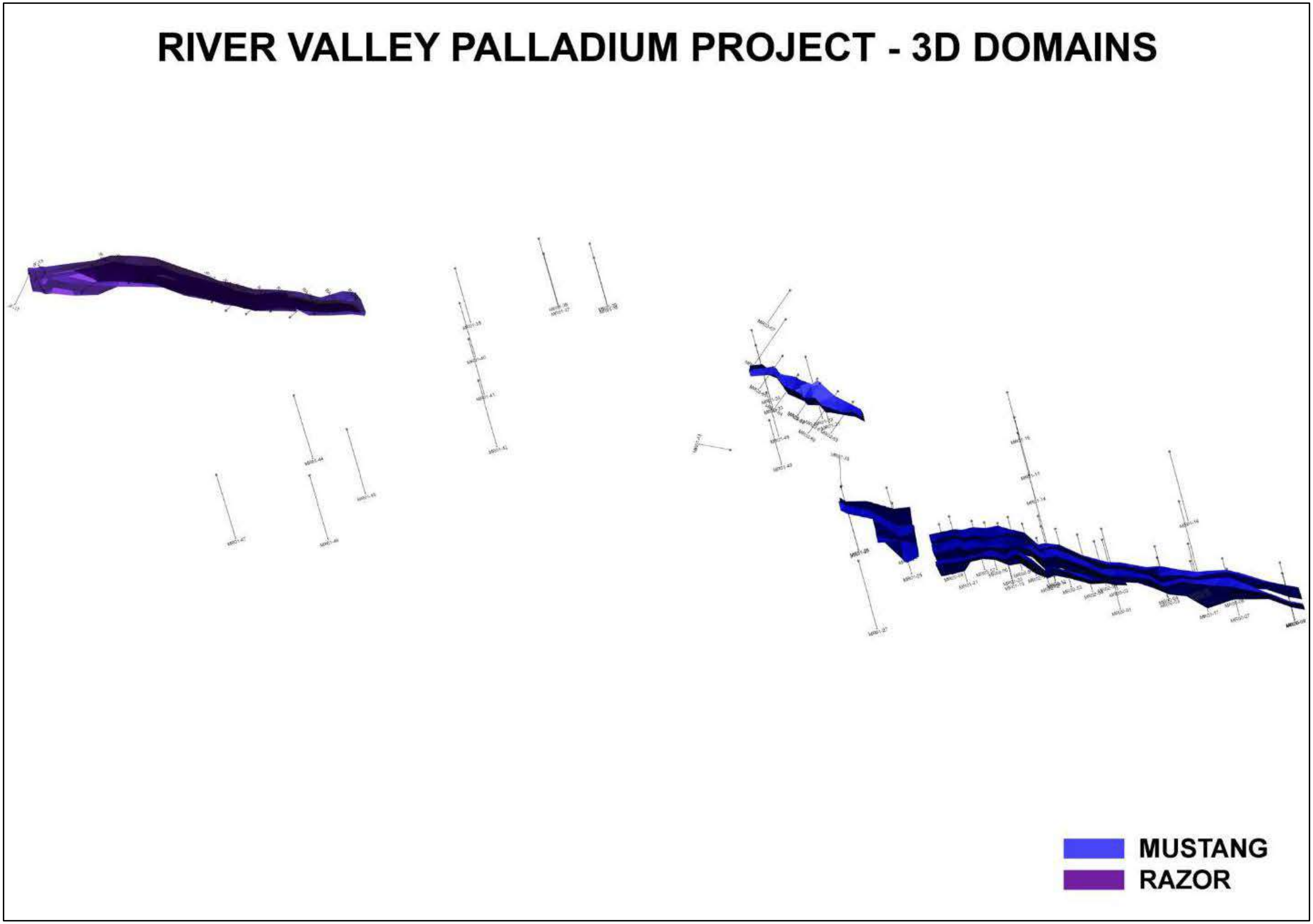
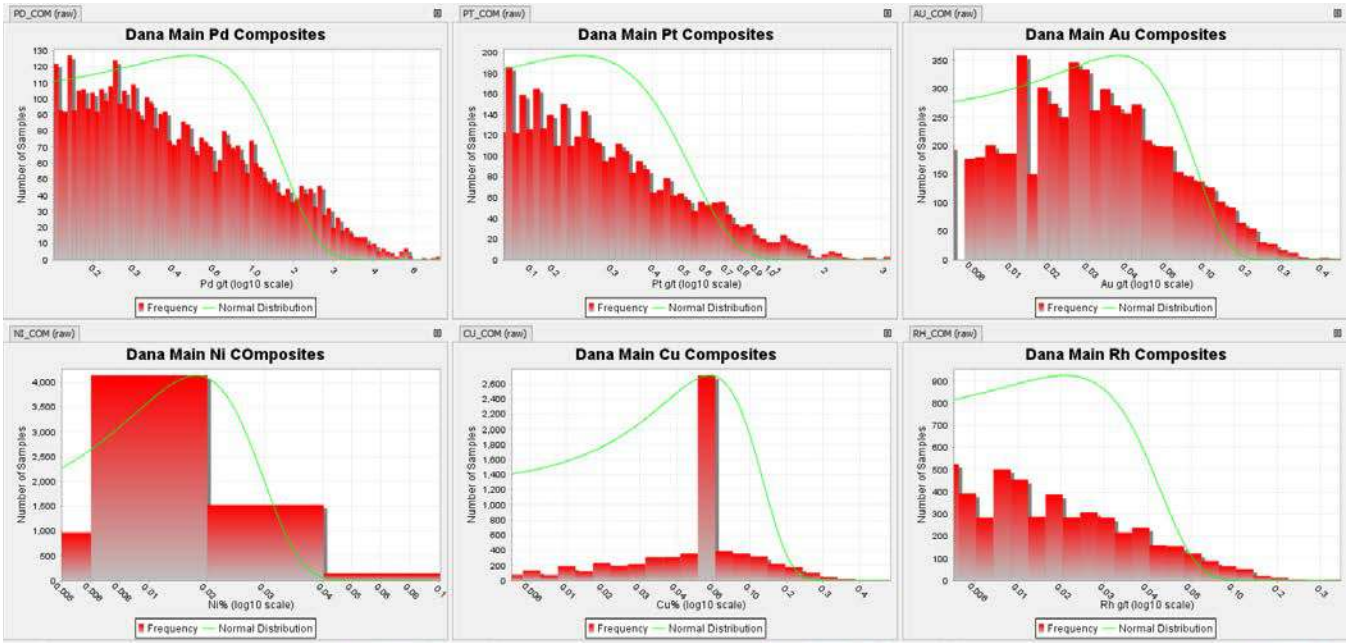
5,167,500 N
5,167,000 N
5,166,500 N
5,166,000 N
5,165,500 N
5,165,000 N
5,164,500 N
5,164,000 N
5,163,500 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
0 200 400 600 800 1,000
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
SURFACE DRILL HOLE PLAN
Scale 1:22,000
September 2021
MINERALIZED DOMAINS
PROJECTED TO SURFACE
MUSTANG
RAZOR

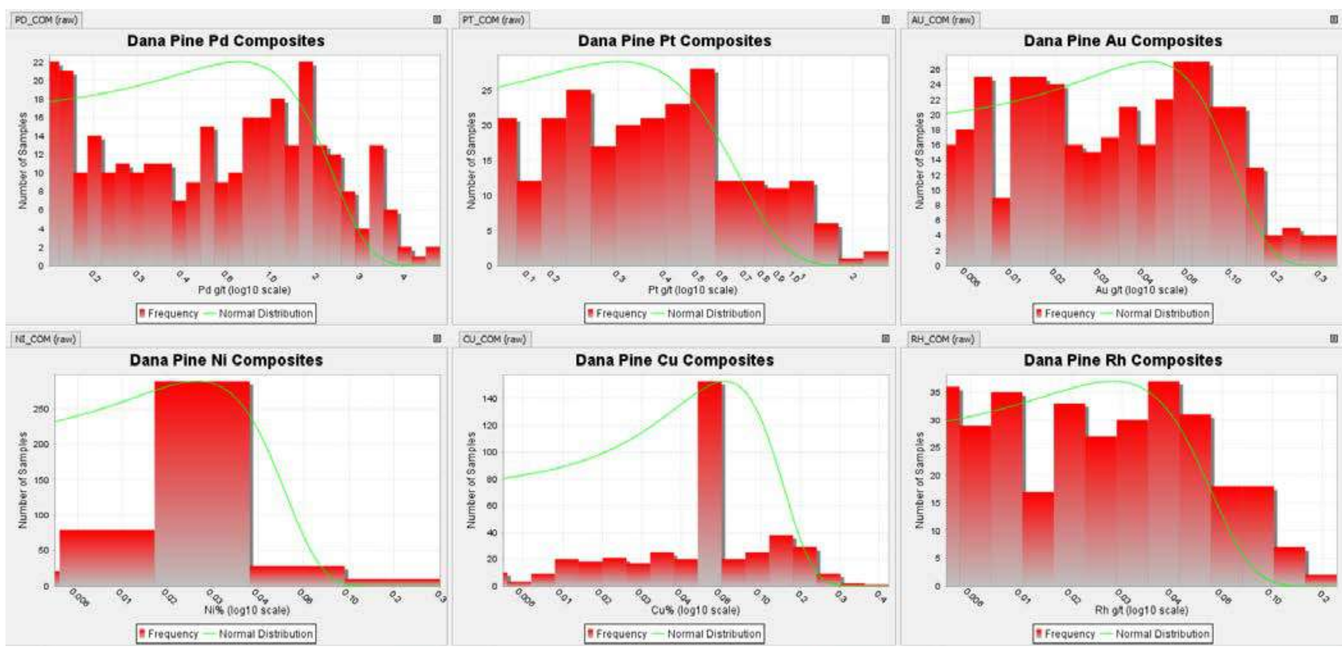
APPENDIX B 3-D DOMAINS

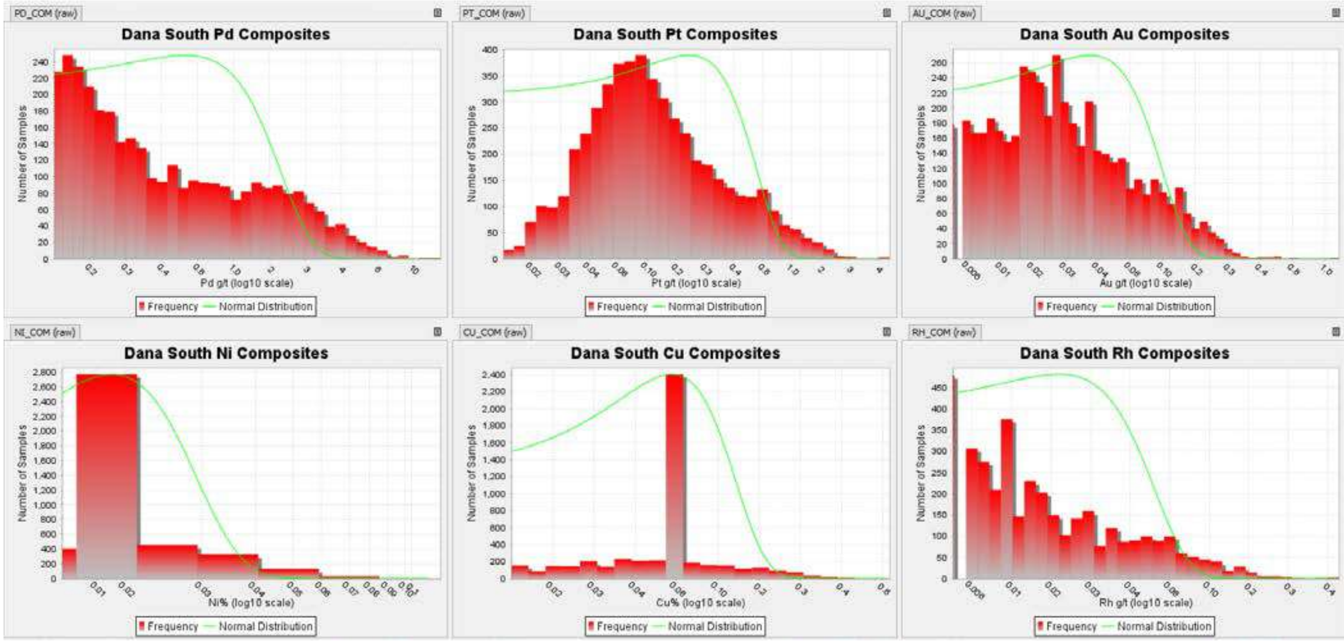

RIVER VALLEY PALLADIUM PROJECT
3D DOMAINS
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY

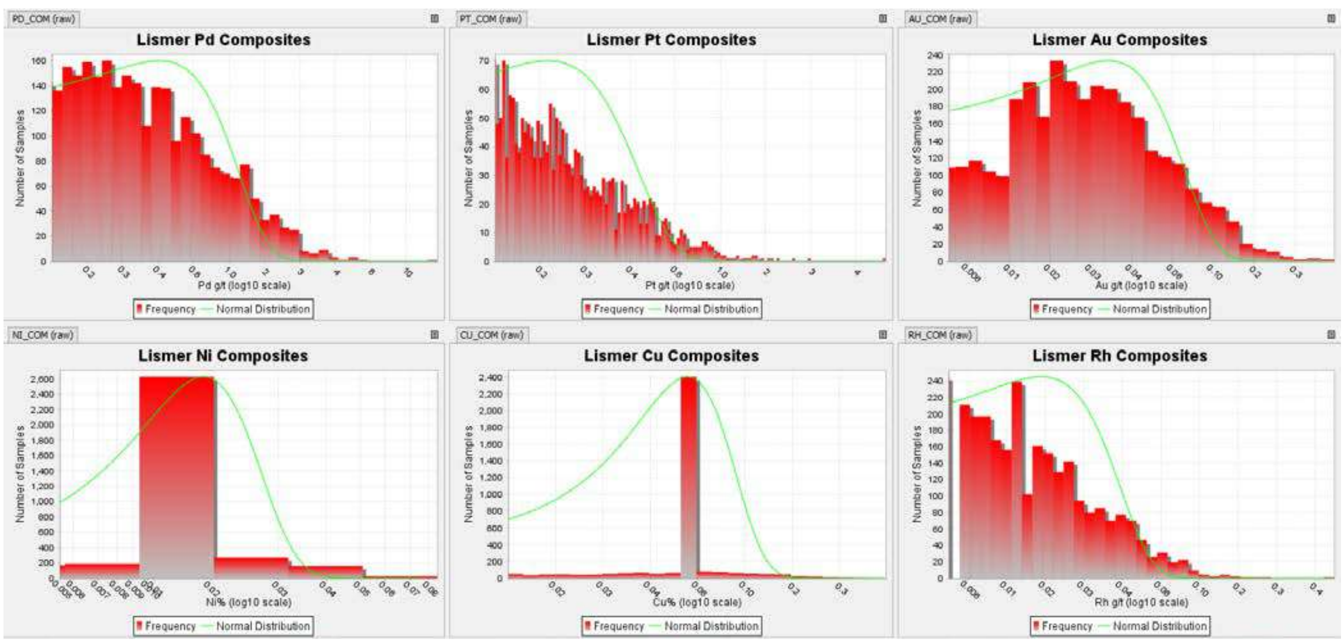

RIVER VALLEY PALLADIUM PROJECT - 3D DOMAINS
MUSTANG
RAZOR

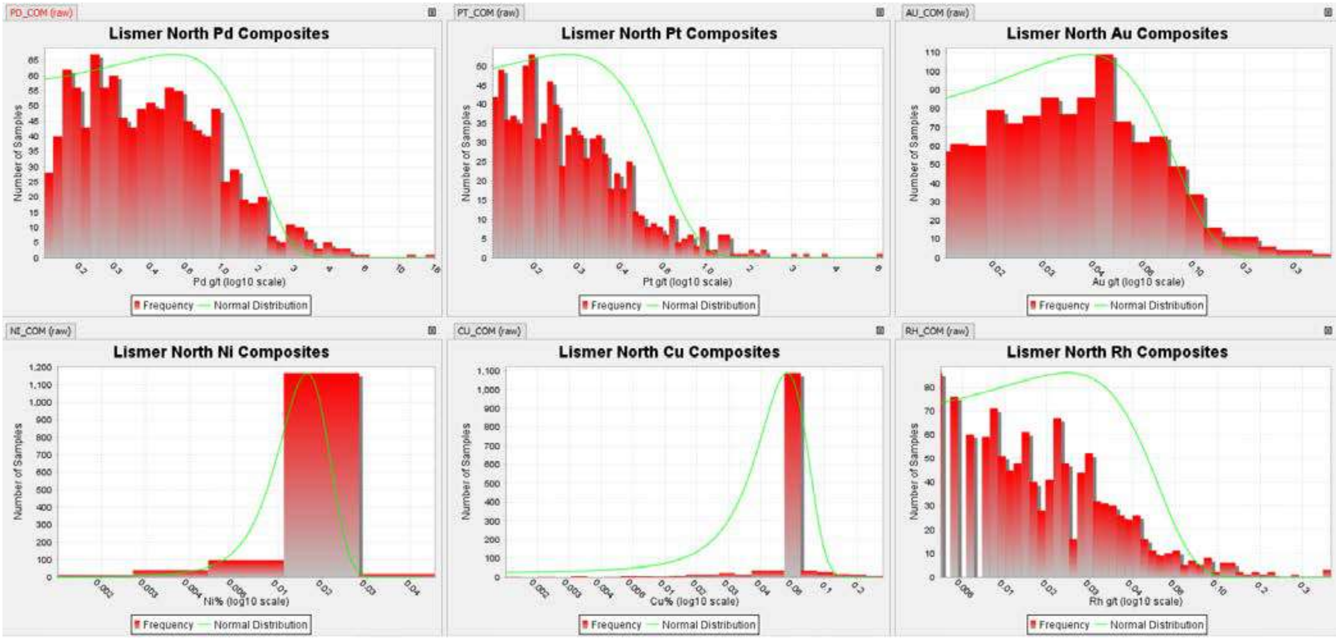
APPENDIX C LOG NORMAL HISTOGRAMS

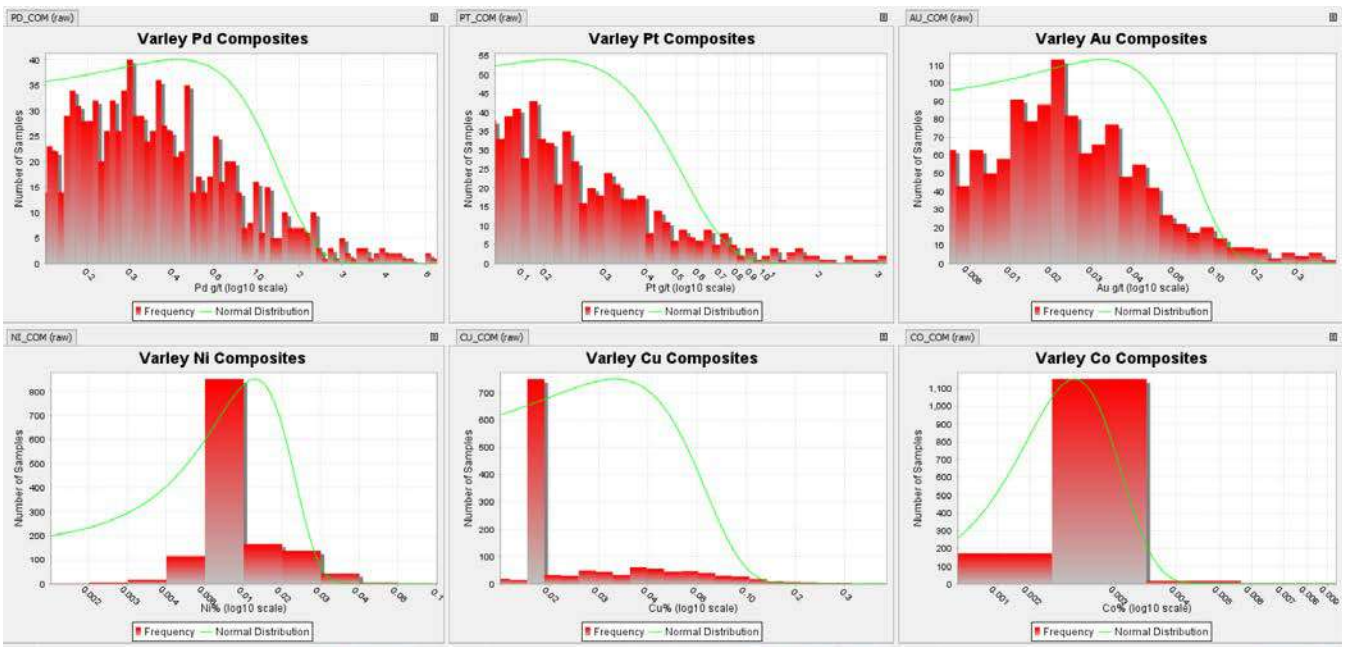


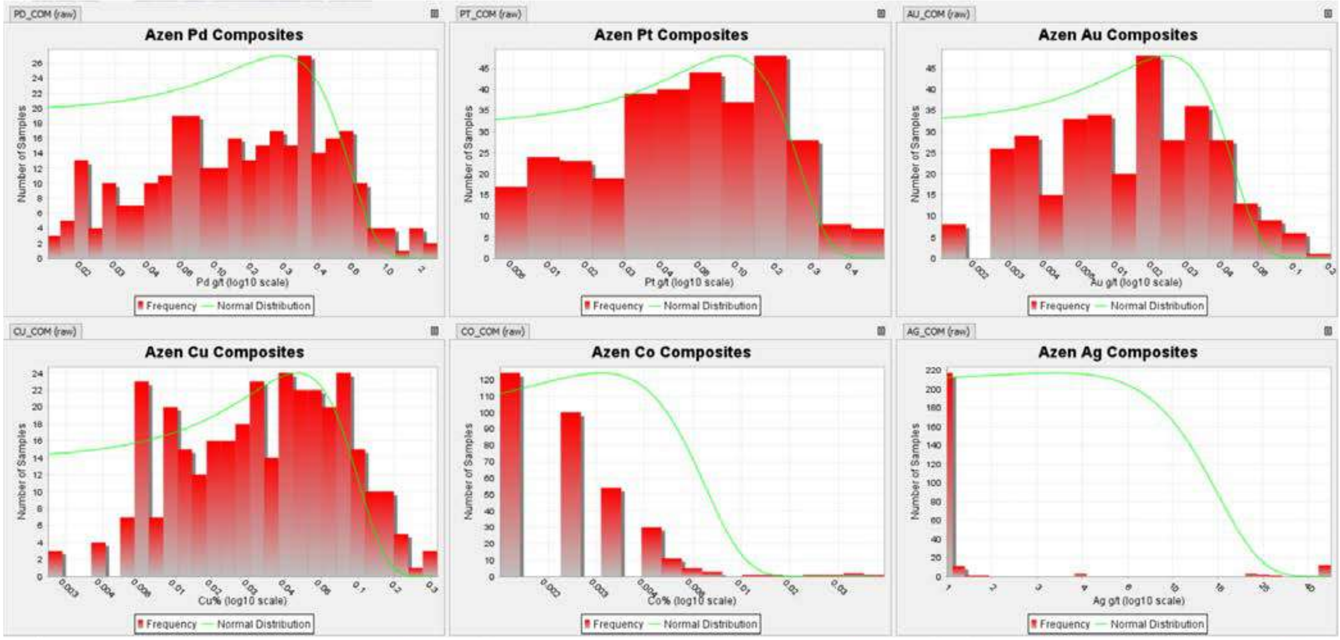



Dana South Pd Composites
Number of Samples
Pd g/t (log10 scale)
Frequency
Normal Distribution
Dana South Pt Composites
Number of Samples
Pt g/t (log10 scale)
Frequency
Normal Distribution
Dana South Au Composites
Number of Samples
Au g/t (log10 scale)
Frequency
Normal Distribution
Dana South Ni Composites
Number of Samples
Ni% (log10 scale)
Frequency
Normal Distribution
Dana South Cu Composites
Number of Samples
Cu% (log10 scale)
Frequency
Normal Distribution
Dana South Rh Composites
Number of Samples
Rh g/t (log10 scale)
Frequency
Normal Distribution


Lismer Pd Composites
Number of Samples
Pd g/t (log10 scale)
Frequency
Normal Distribution
Lismer Pt Composites
Number of Samples
Pt g/t (log10 scale)
Frequency
Normal Distribution
Lismer Au Composites
Number of Samples
Au g/t (log10 scale)
Frequency
Normal Distribution
Lismer Ni Composites
Number of Samples
Ni% (log10 scale)
Frequency
Normal Distribution
Lismer Cu Composites
Number of Samples
Cu% (log10 scale)
Frequency
Normal Distribution
Lismer Rh Composites
Number of Samples
Rh g/t (log10 scale)
Frequency
Normal Distribution


PD_COM (raw)
Lismer North Pd Composites
Number of Samples
Pd g/t (log10 scale)
PT_COM (raw)
Lismer North Pt Composites
Pt g/t (log10 scale)
AU_COM (raw)
Lismer North Au Composites
Au g/t (log10 scale)
NI_COM (raw)
Lismer North Ni Composites
Ni% (log10 scale)
CU_COM (raw)
Lismer North Cu Composites
Cu% (log10 scale)
RH_COM (raw)
Lismer North Rh Composites
Rh g/t (log10 scale)
Frequency
Normal Distribution


PD_COM (raw)
Varley Pd Composites
Number of Samples
Pd g/t (log10 scale)
PT_COM (raw)
Varley Pt Composites
Pt g/t (log10 scale)
AU_COM (raw)
Varley Au Composites
Au g/t (log10 scale)
NI_COM (raw)
Varley Ni Composites
Ni% (log10 scale)
CU_COM (raw)
Varley Cu Composites
Cu% (log10 scale)
CO_COM (raw)
Varley Co Composites
Co% (log10 scale)
Frequency
Normal Distribution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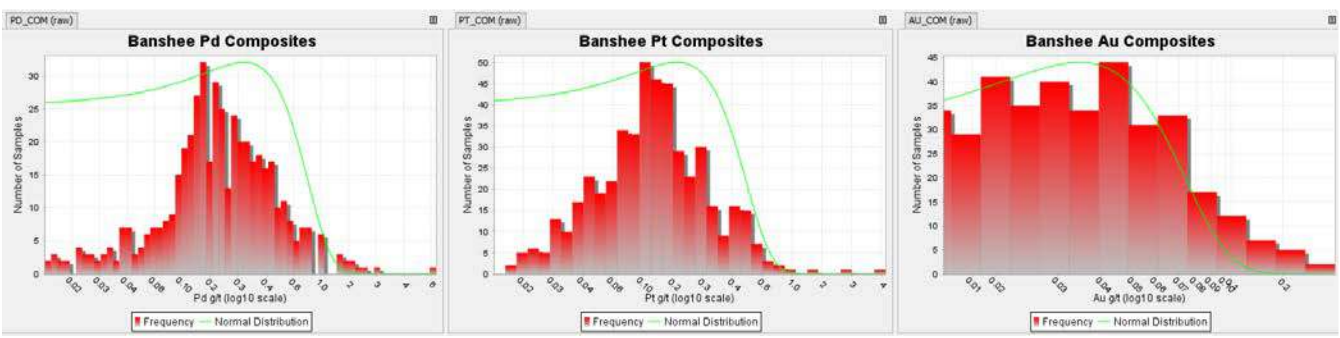
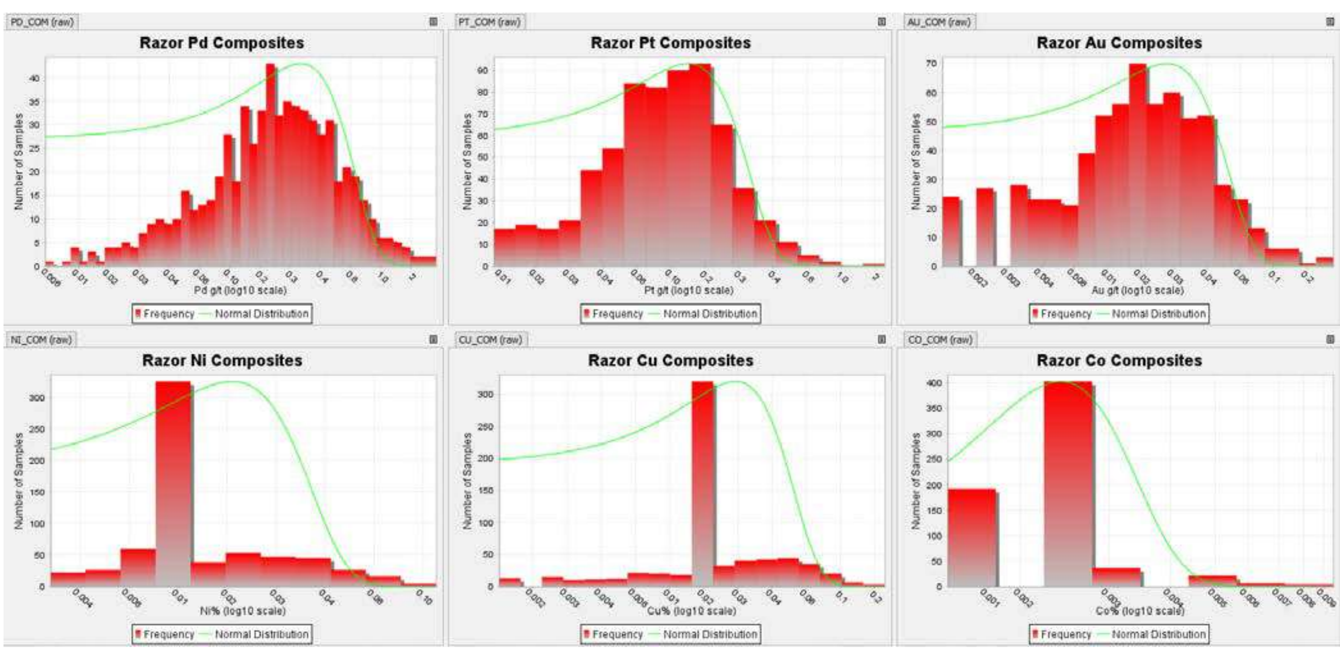
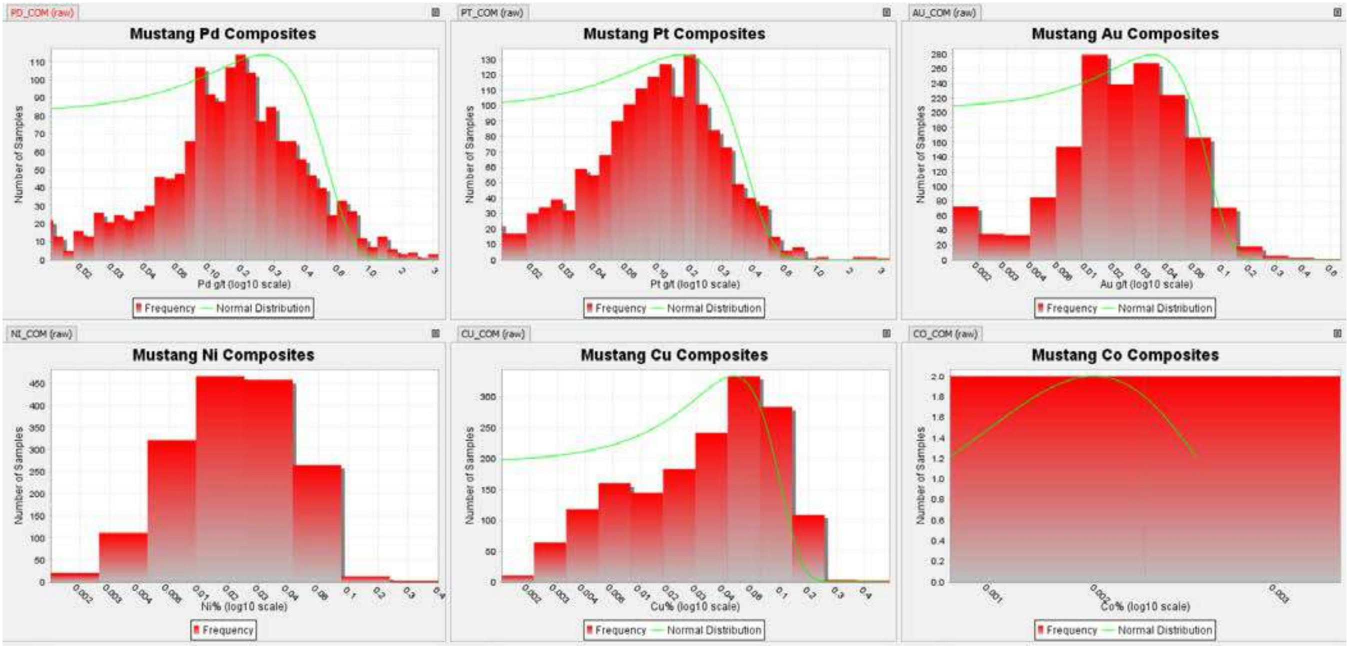
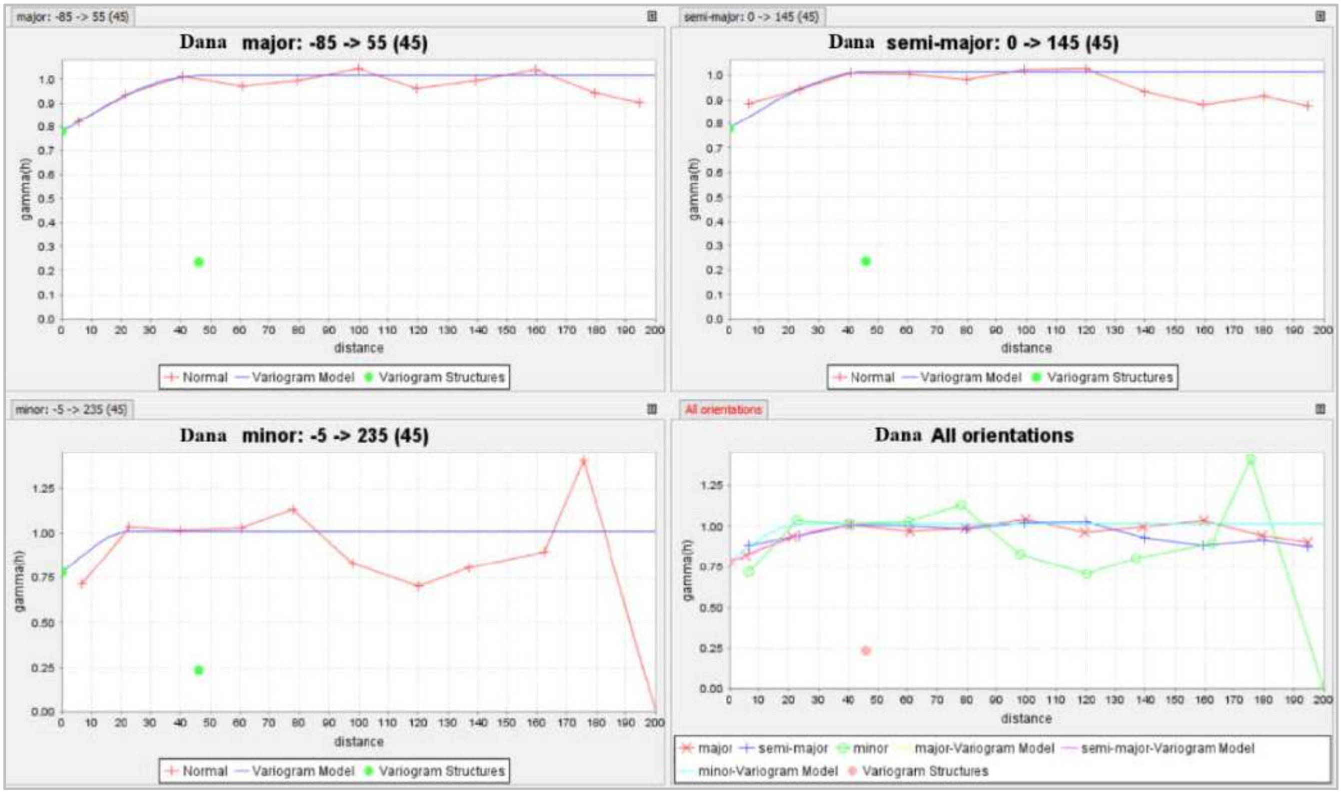
Pd g/t (log10 scale)
Azen Pt Composites
Pt g/t (log10 scale)
Azen Au Composites
Au g/t (log10 scale)
Azen Cu Composites
Cu% (log10 scale)
Azen Co Composites
Co% (log10 scale)
Azen Ag Composites
Ag g/t (log10 scale)
Number of Samples
Frequency
Normal Distribution

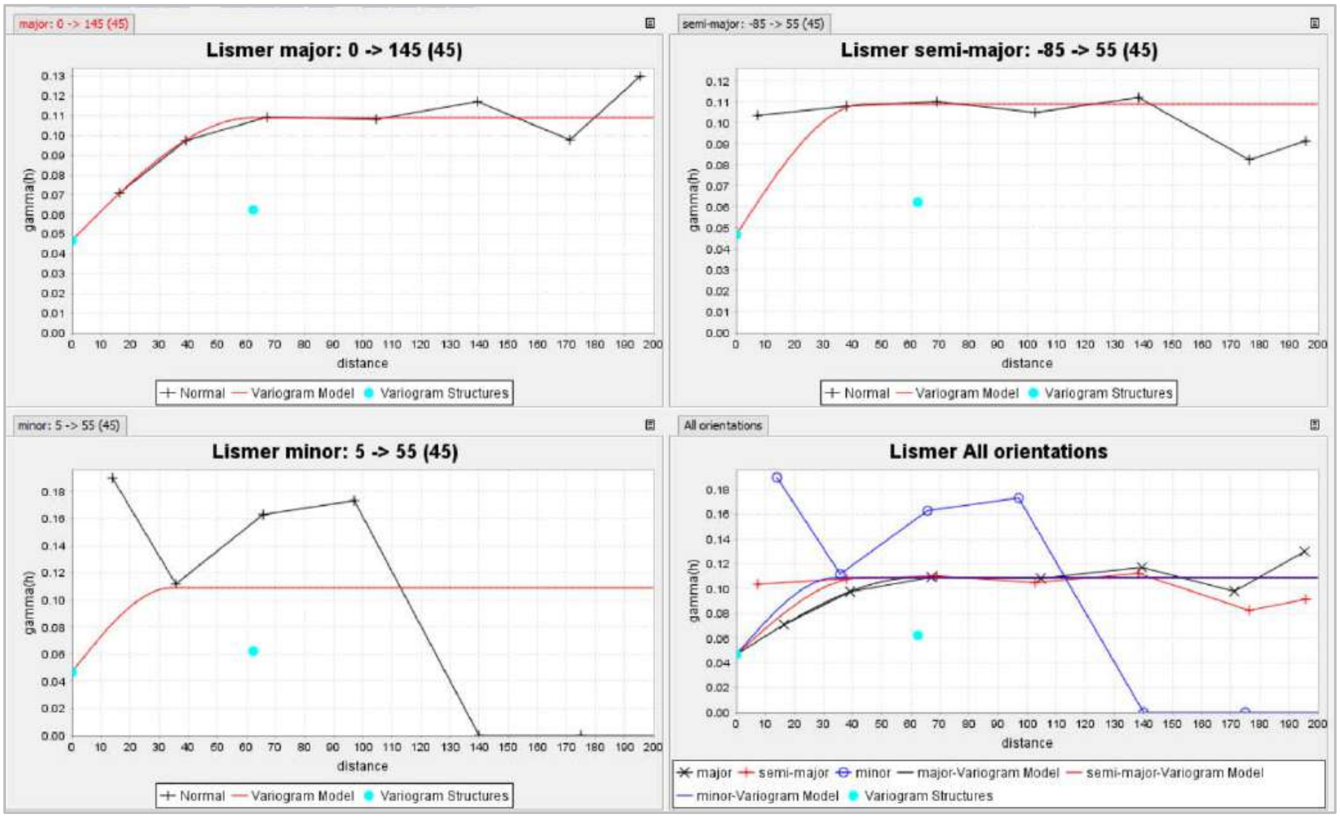

Banshee Pd Composites
Pd g/t (log10 scale)
Banshee Pt Composites
Pt g/t (log10 scale)
Banshee Au Composites
Au g/t (log10 scale)
Number of Samples
Frequency
Normal Distribution

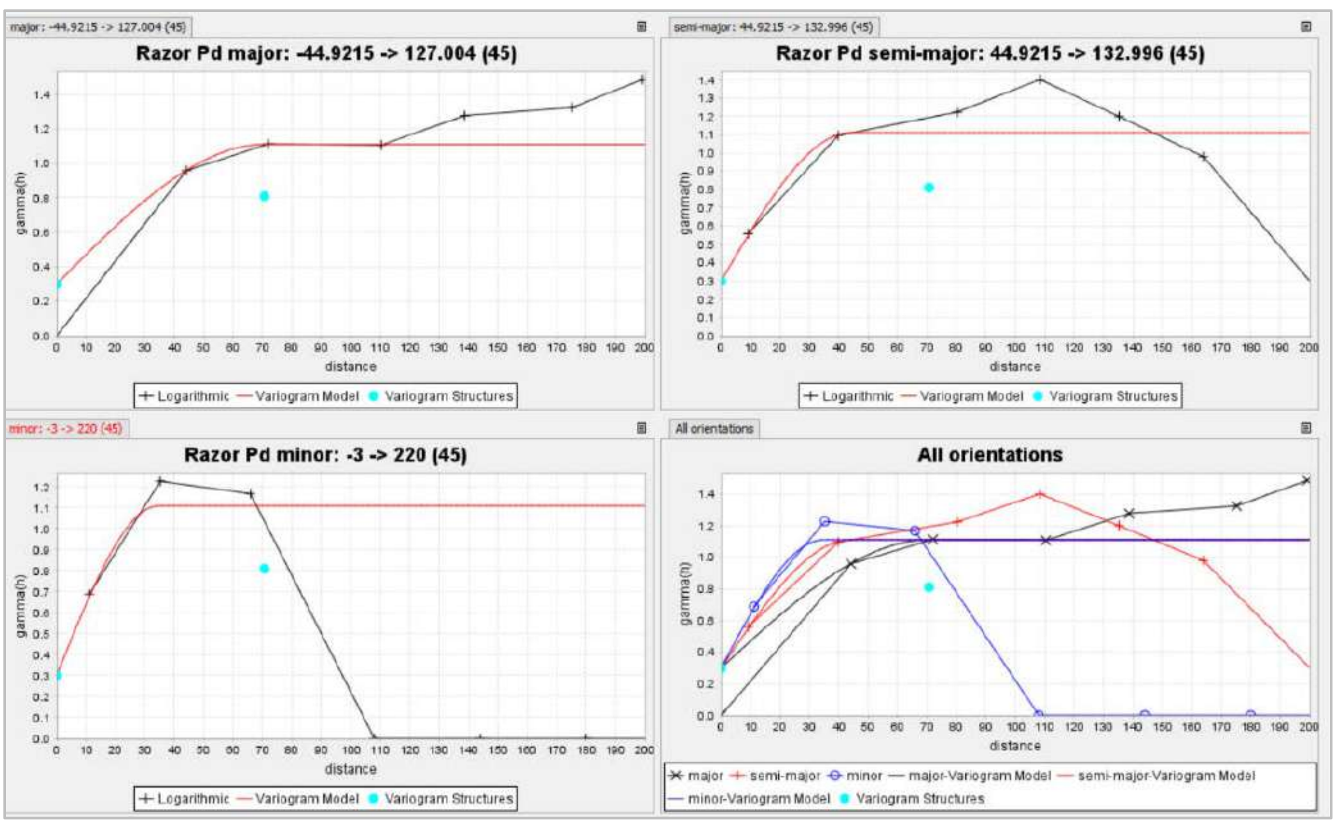

Razor Pd Composites
Pd g/t (log10 scale)
Razor Pt Composites
Pt g/t (log10 scale)
Razor Au Composites
Au g/t (log10 scale)
Razor Ni Composites
Ni% (log10 scale)
Razor Cu Composites
Cu% (log10 scale)
Razor Co Composites
Co% (log10 scale)
Number of Samples
Frequency
Normal Distribution


Mustang Pd Composites
Mustang Pt Composites
Mustang Au Composites
Mustang Ni Composites
Mustang Cu Composites
Mustang Co Composites
Number of Samples
Pd g/t (log10 scale)
Pt g/t (log10 scale)
Au g/t (log10 scale)
Ni% (log10 scale)
Cu% (log10 scale)
Co% (log10 scale)
Frequency
Normal Distribution

APPENDIX D VARIOGRAMS




major: 0 -> 145 (45)
Lismer major: 0 -> 145 (45)
gamma(h)
distance
Normal
Variogram Model
Variogram Structures
semi-major: -85 -> 55 (45)
Lismer semi-major: -85 -> 55 (45)
gamma(h)
distance
Normal
Variogram Model
Variogram Structures
minor: 5 -> 55 (45)
Lismer minor: 5 -> 55 (45)
gamma(h)
distance
Normal
Variogram Model
Variogram Structures
All orientations
Lismer All orientations
gamma(h)
distance
major
semi-major
minor
major-Variogram Model
semi-major-Variogram Model
minor-Variogram Model
Variogram Structures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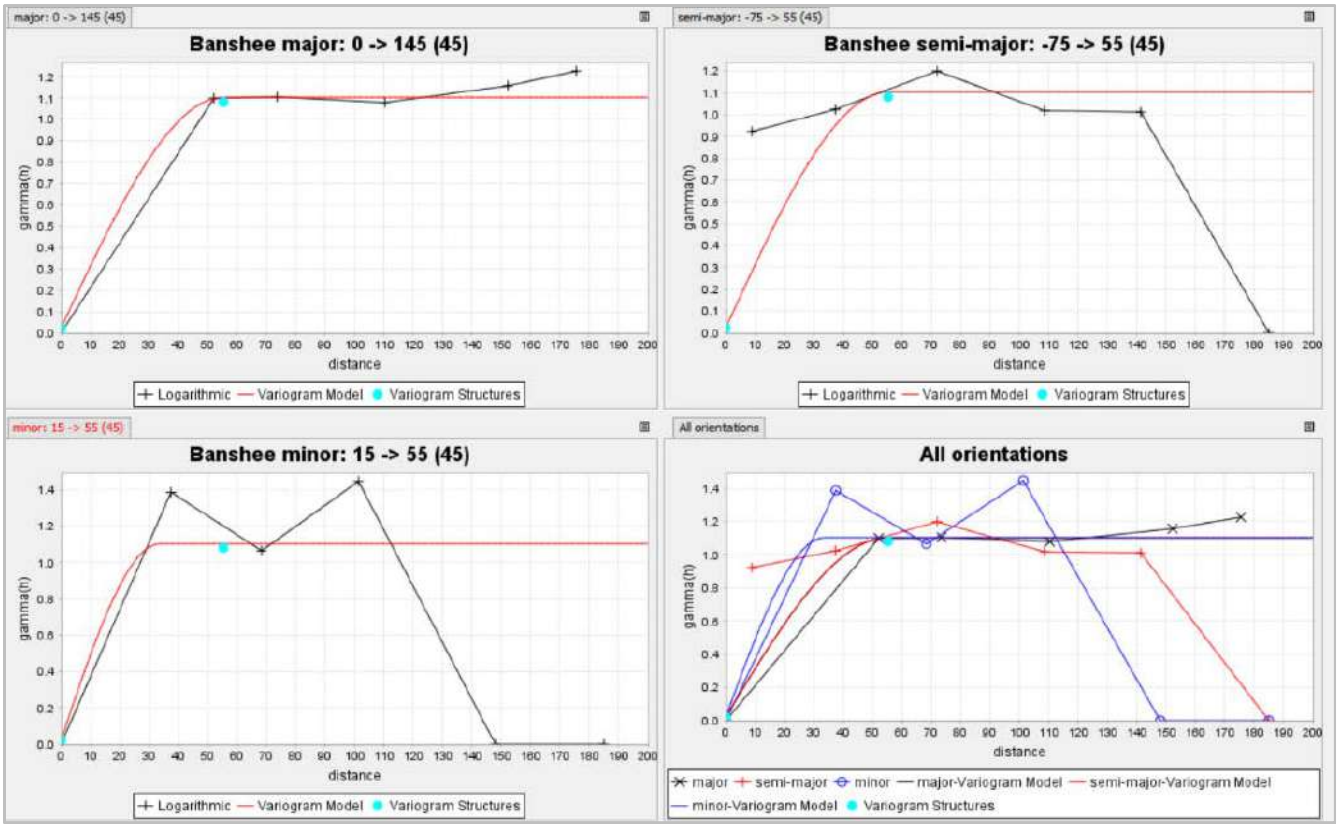
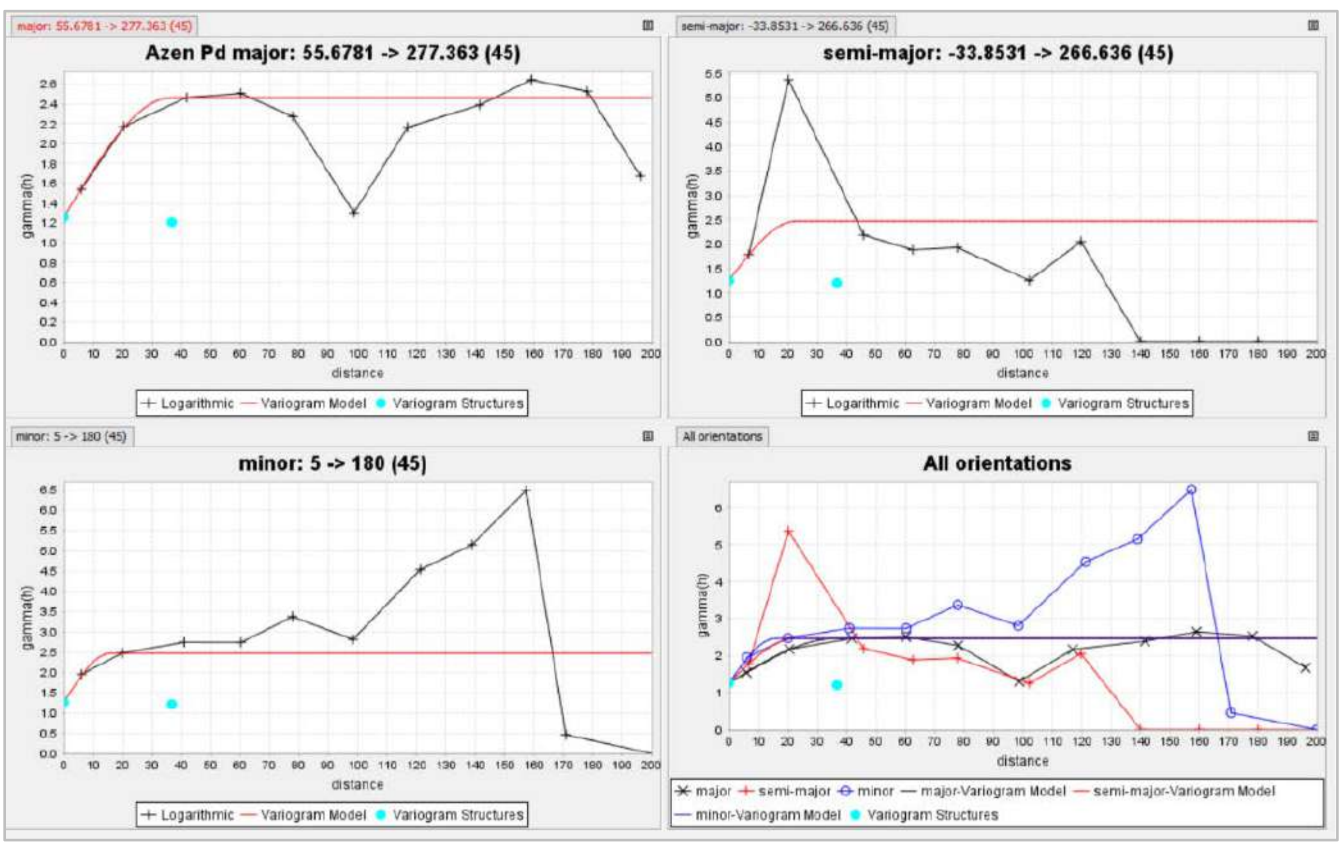
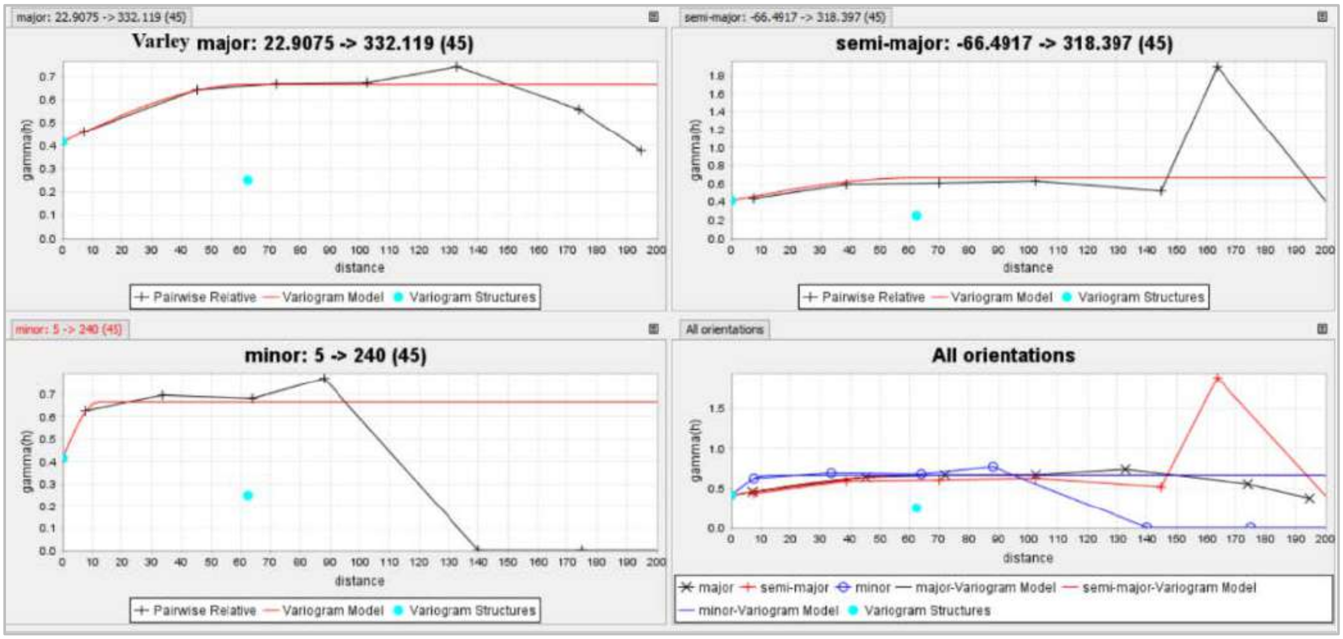
Razor Pd major: -44.9215 -> 127.004 (45)
gamma(h)
distance
Logarithmic
Variogram Model
Variogram Structures
semi-major: 44.9215 -> 132.996 (45)
Razor Pd semi-major: 44.9215 -> 132.996 (45)
gamma(h)
distance
Logarithmic
Variogram Model
Variogram Structures
minor: -3 -> 220 (45)
Razor Pd minor: -3 -> 220 (45)
gamma(h)
distance
Logarithmic
Variogram Model
Variogram Structures
All orientations
All orientations
gamma(h)
distance
major
semi-major
minor
major-Variogram Model
semi-major-Variogram Model
minor-Variogram Model
Variogram Structures

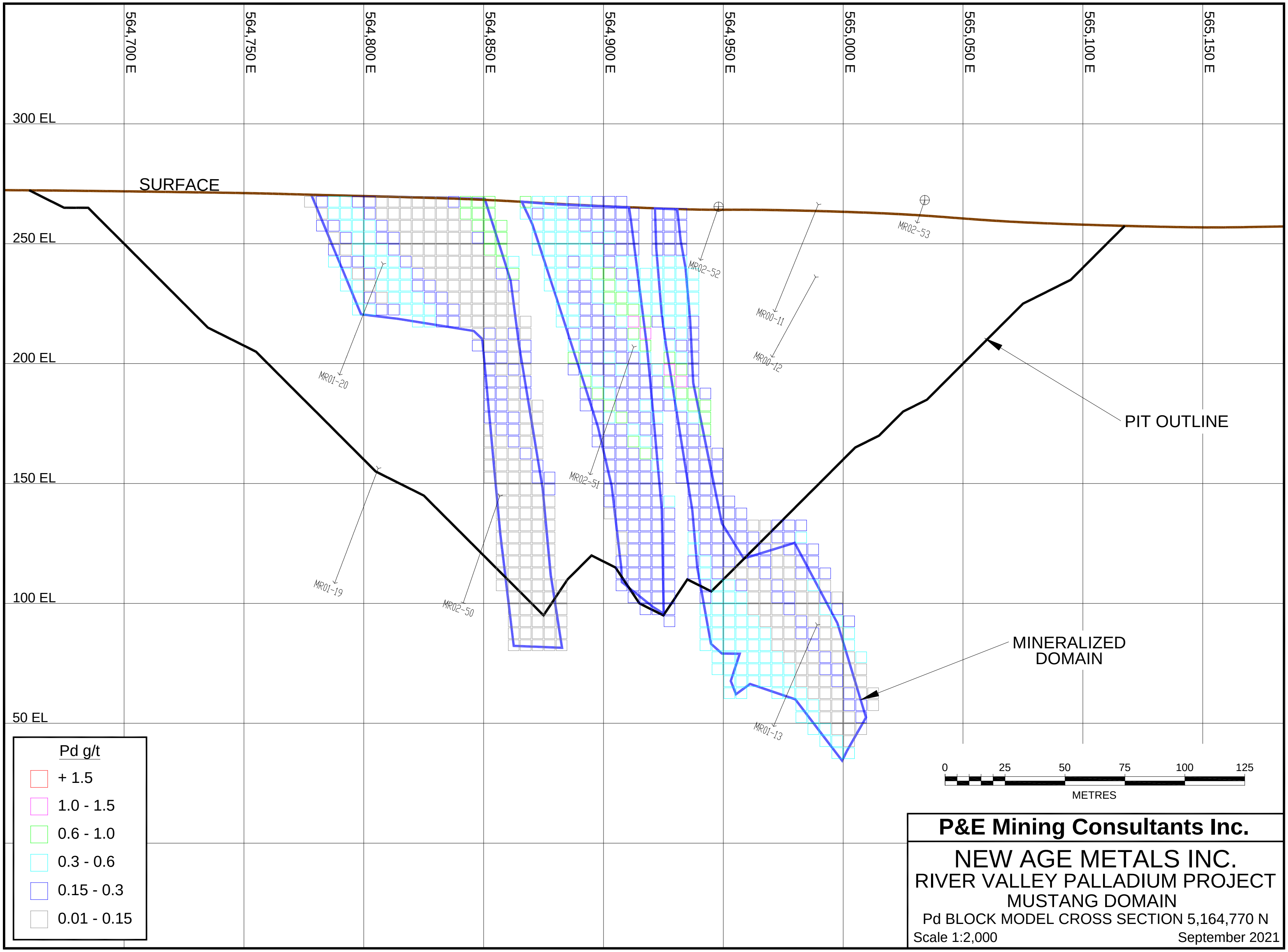

major: 0 -> 145 (45)
Banshee major: 0 -> 145 (45)
semi-major: -75 -> 55 (45)
Banshee semi-major: -75 -> 55 (45)
minor: 15 -> 55 (45)
Banshee minor: 15 -> 55 (45)
All orientations
All orientations
gamma(h)
distance
Logarithmic
Variogram Model
Variogram Structures
major
semi-major
minor
major-Variogram Model
semi-major-Variogram Model
minor-Variogram Model

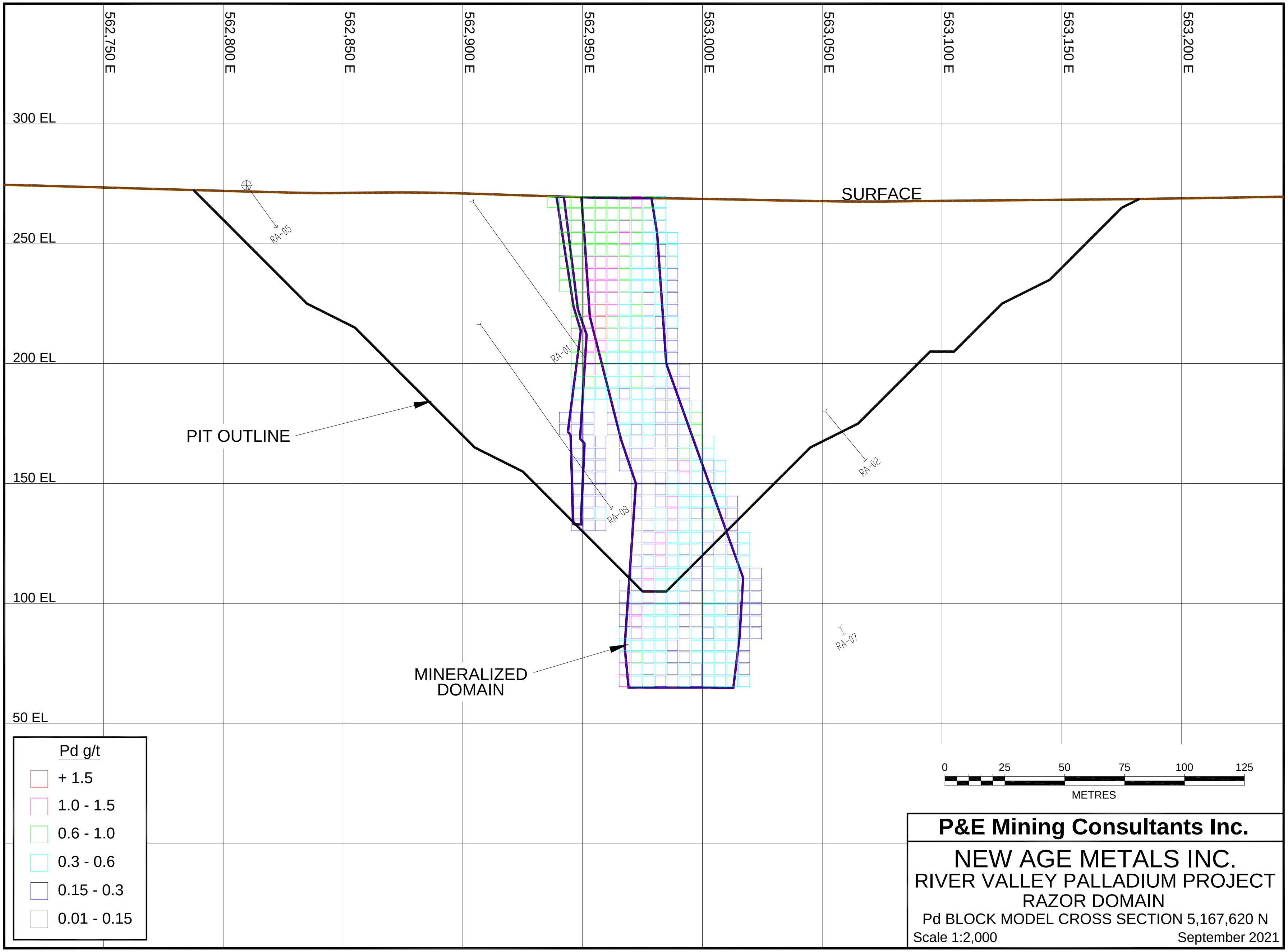

major: 55.6781 -> 277.363 (45)
Azen Pd major: 55.6781 -> 277.363 (45)
semi-major: -33.8531 -> 266.636 (45)
semi-major: -33.8531 -> 266.636 (45)
minor: 5 -> 180 (45)
minor: 5 -> 180 (45)
All orientations
All orientations
gamma(h)
distance
Logarithmic
Variogram Model
Variogram Structures
major
semi-major
minor
major-Variogram Model
semi-major-Variogram Model
minor-Variogram Model

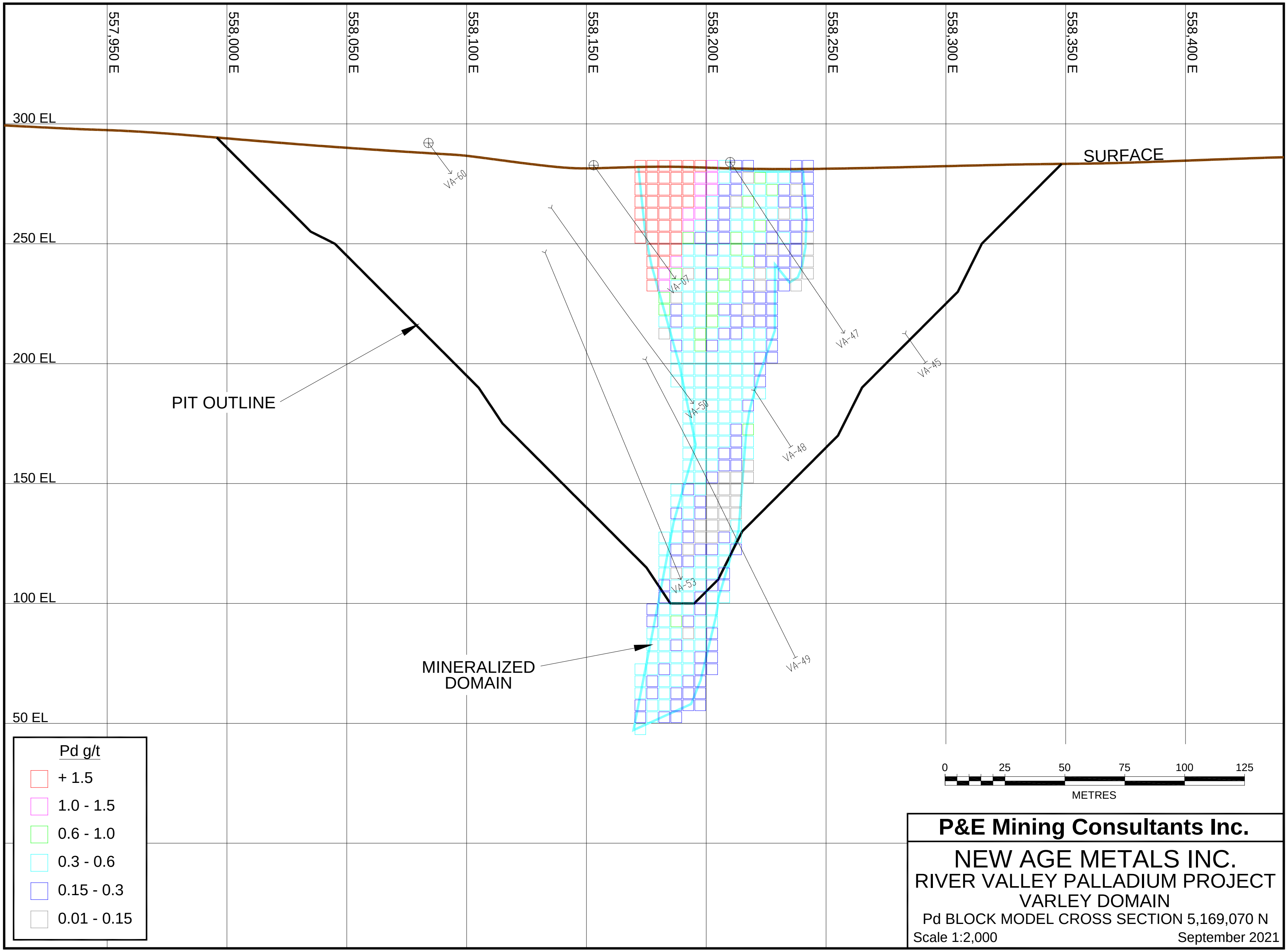


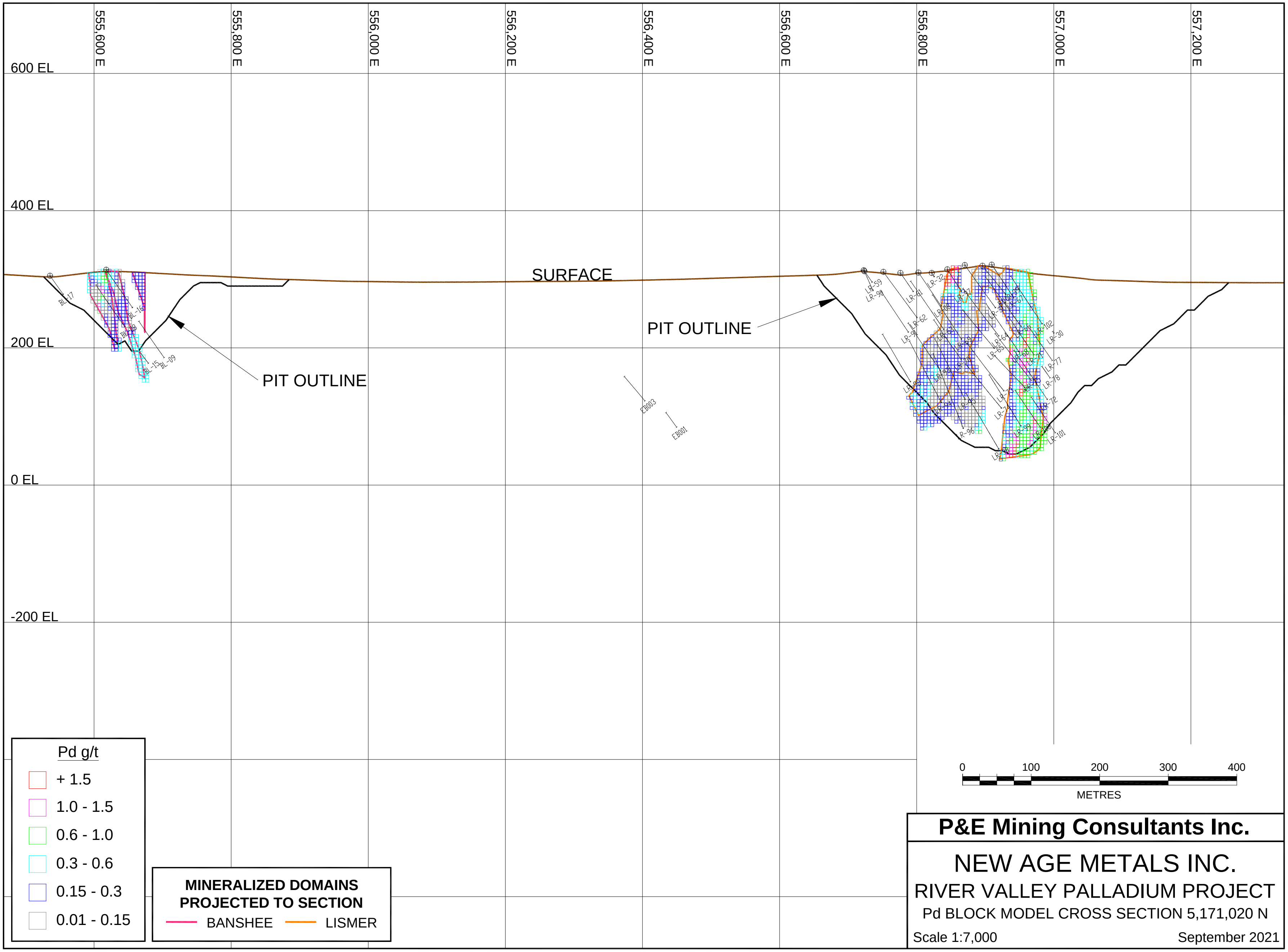
major: 22.9075 -> 332.119 (45)
Varley major: 22.9075 -> 332.119 (45)
gamma(h)
distance
Pairwise Relative
Variogram Model
Variogram Structures
semi-major: -66.4917 -> 318.397 (45)
semi-major: -66.4917 -> 318.397 (45)
gamma(h)
distance
Pairwise Relative
Variogram Model
Variogram Structures
minor: 5 -> 240 (45)
minor: 5 -> 240 (45)
gamma(h)
distance
Pairwise Relative
Variogram Model
Variogram Structures
All orientations
All orientations
gamma(h)
distance
major
semi-major
minor
major-Variogram Model
semi-major-Variogram Model
minor-Variogram Model
Variogram Structures

APPENDIX E PD BLOCK MODEL CROSS-SECTIONS AND PLANS

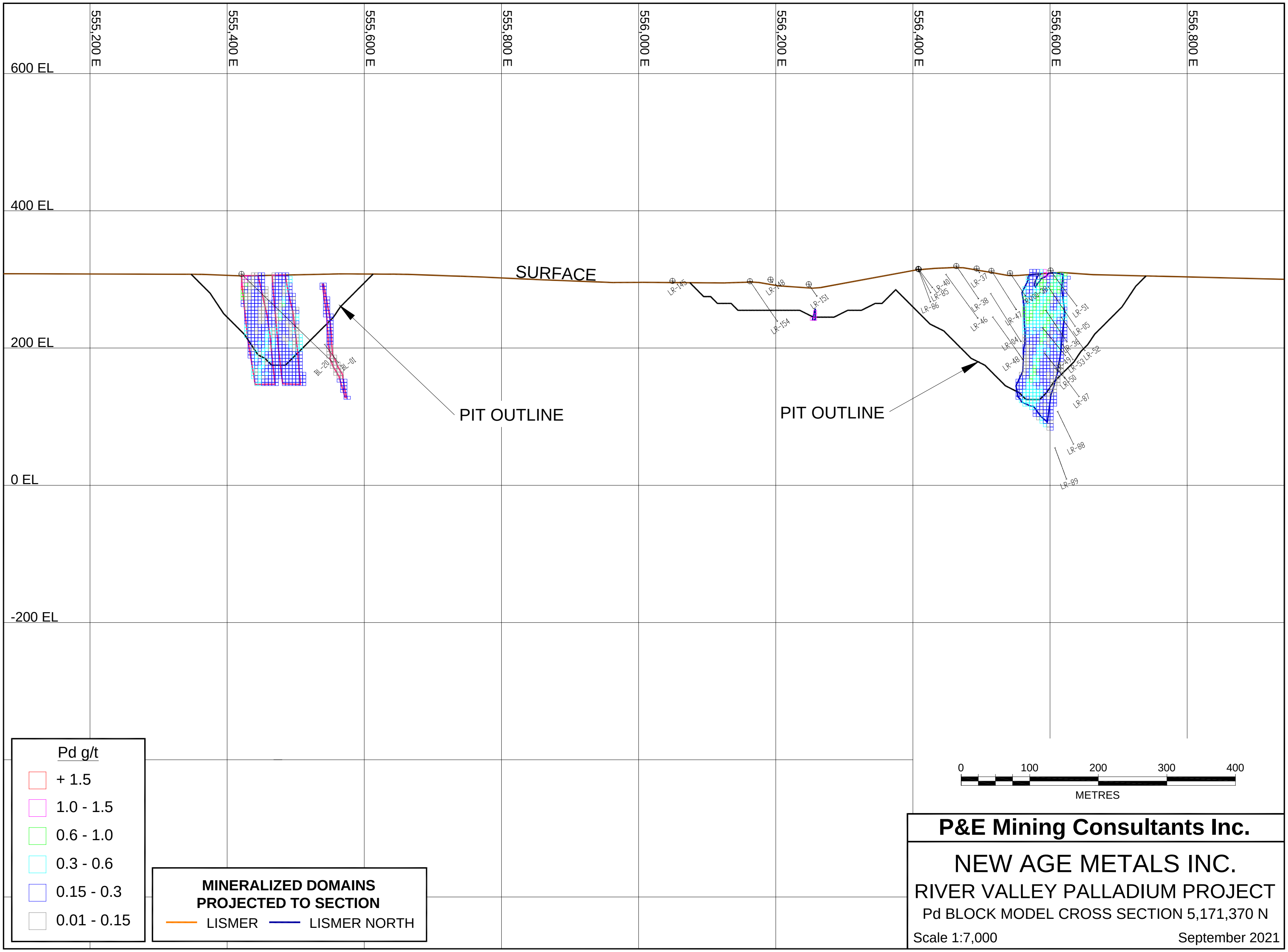

564,700 E
564,750 E
564,800 E
564,850 E
564,900 E
564,950 E
565,000 E
565,050 E
565,100 E
565,150 E
300 EL
250 EL
200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
MR01-20
MR01-19
MR02-50
MR02-51
MR02-52
MR00-11
MR00-12
MR02-53
MR01-13
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
0 25 50 75 100 125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
MUSTANG DOMAIN
Pd BLOCK MODEL CROSS SECTION 5,164,770 N
Scale 1:2,000
September 2021


562,750 E
562,800 E
562,850 E
562,900 E
562,950 E
563,000 E
563,050 E
563,100 E
563,150 E
563,200 E
300 EL
250 EL
200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
RA-05
RA-01
RA-08
RA-02
RA-07
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
0
25
50
75
100
125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
RAZOR DOMAIN
Pd BLOCK MODEL CROSS SECTION 5,167,620 N
Scale 1:2,000
September 2021

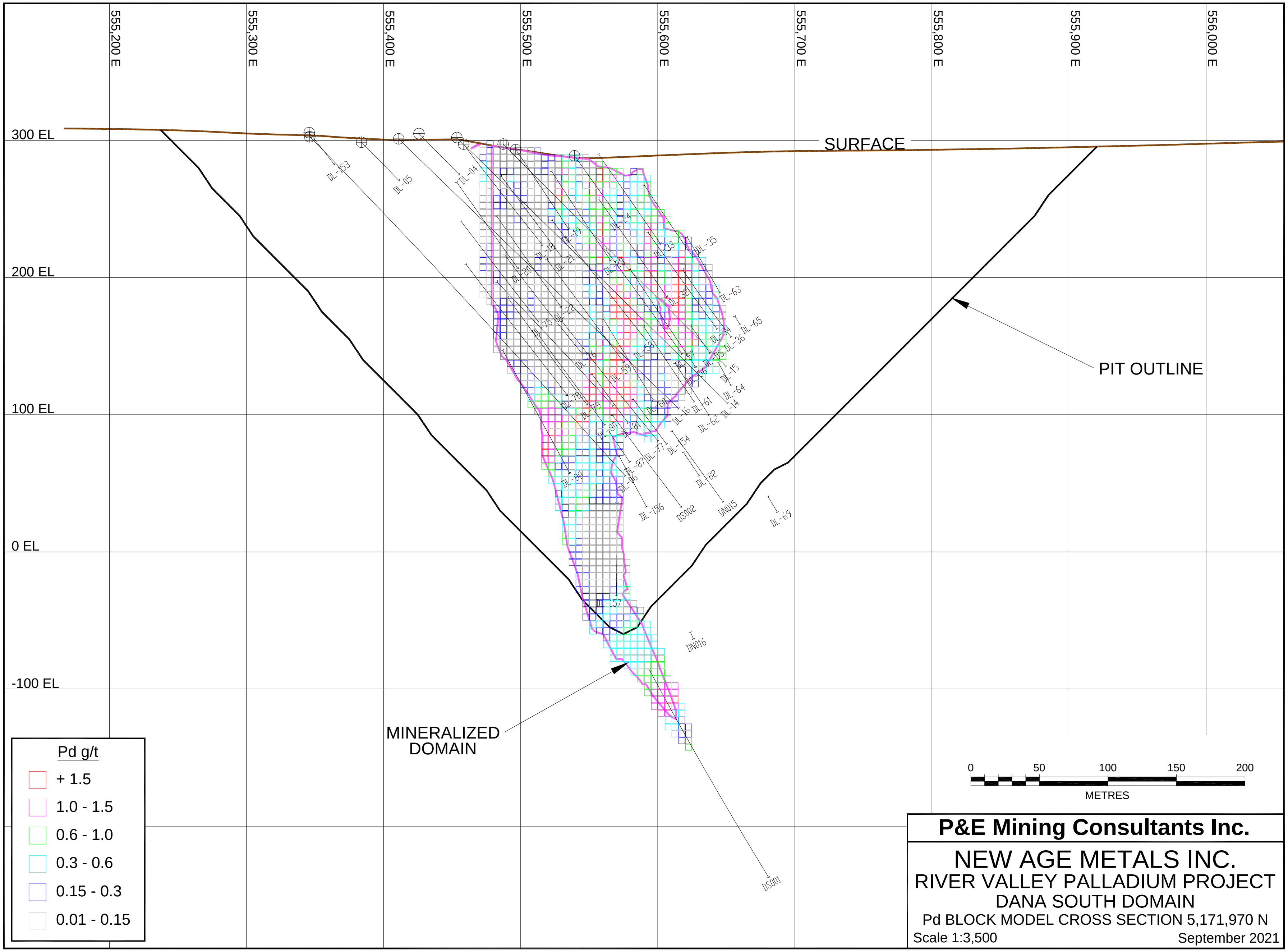

557,950 E
558,000 E
558,050 E
558,100 E
558,150 E
558,200 E
558,250 E
558,300 E
558,350 E
558,400 E
300 EL
250 EL
200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
VA-60
VA-07
VA-47
VA-45
VA-50
VA-48
VA-53
VA-49
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
0
25
50
75
100
125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
VARLEY DOMAIN
Pd BLOCK MODEL CROSS SECTION 5,169,070 N
Scale 1:2,000
September 2021

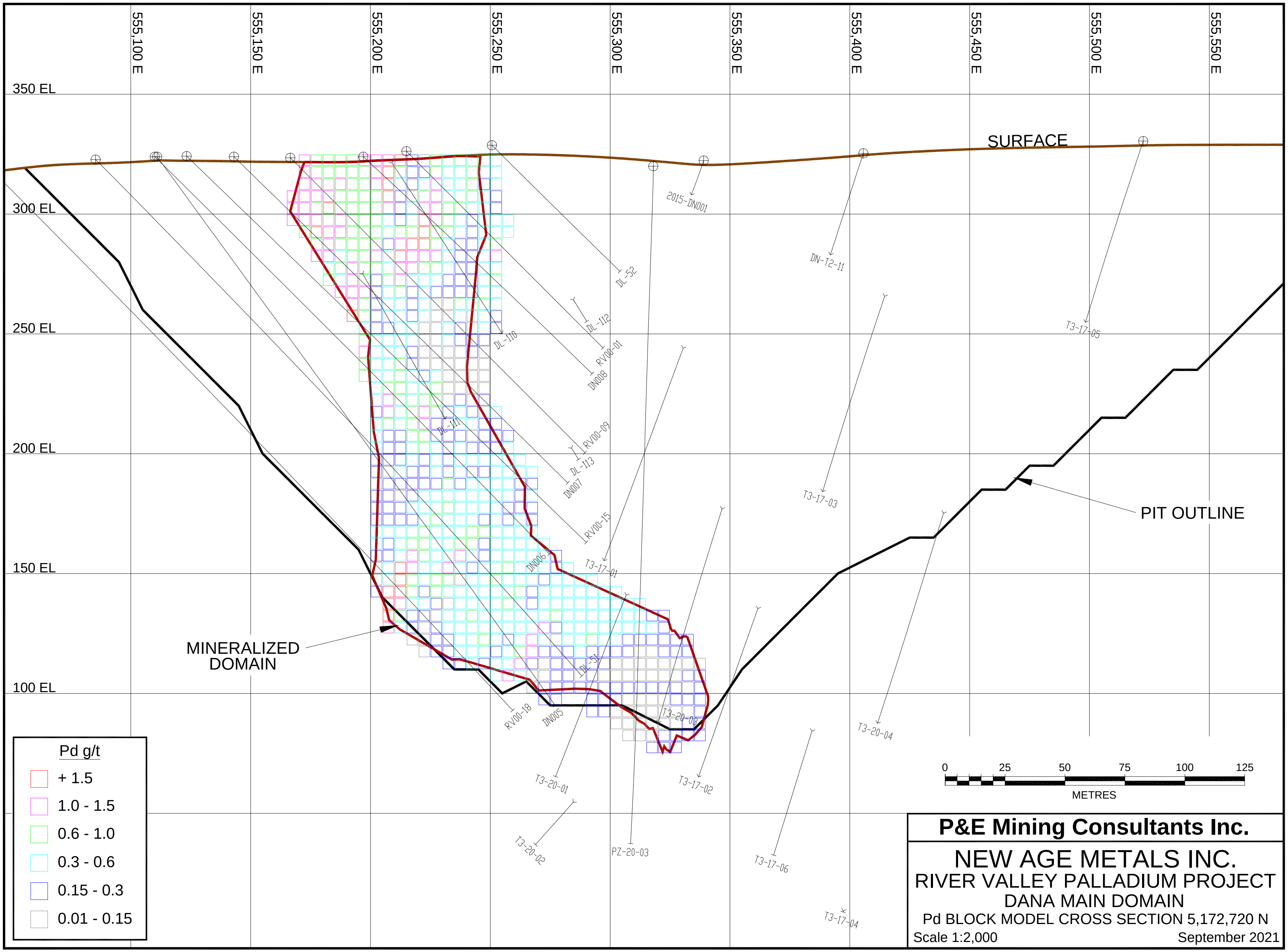


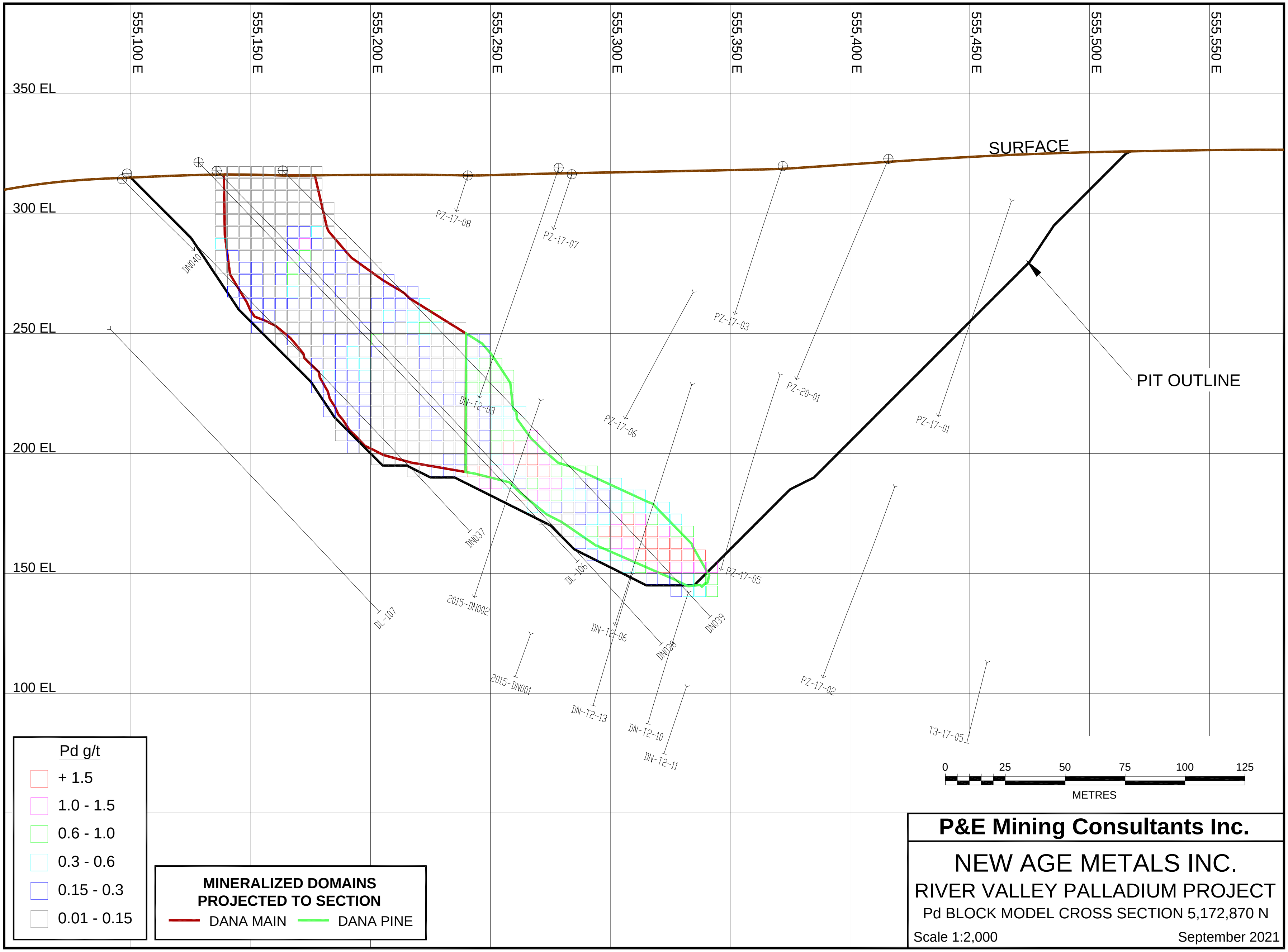
555,600 E
555,800 E
556,000 E
556,200 E
556,400 E
556,600 E
556,800 E
557,000 E
557,200 E
600 EL
400 EL
200 EL
0 EL
-200 EL
SURFACE
PIT OUTLINE
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS
PROJECTED TO SECTION
BANSHEE
LISMER
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL CROSS SECTION 5,171,020 N
Scale 1:7,000
September 2021



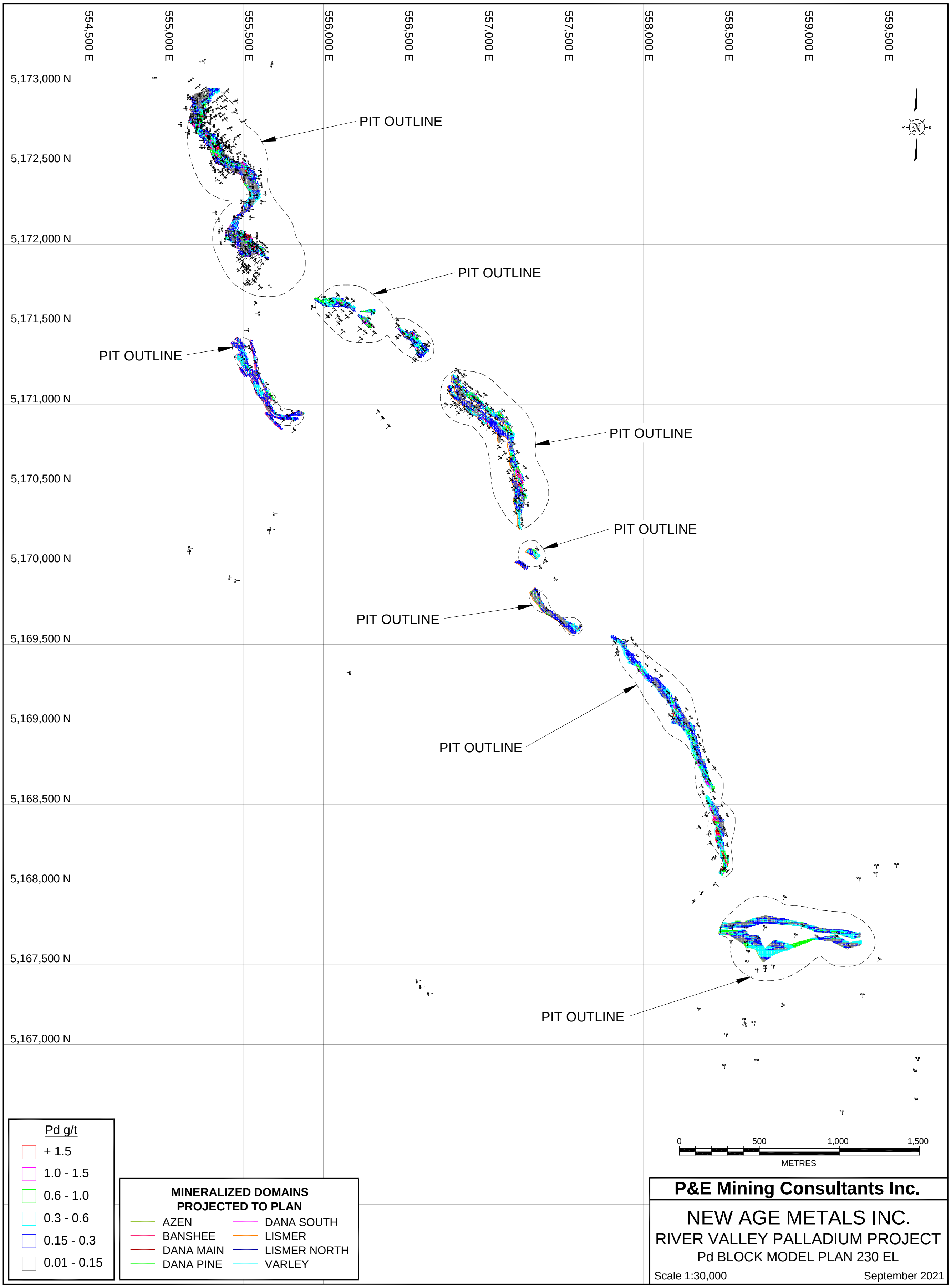
555,200 E
555,400 E
555,600 E
555,800 E
556,000 E
556,200 E
556,400 E
556,600 E
556,800 E
600 EL
400 EL
200 EL
0 EL
-200 EL
SURFACE
PIT OUTLINE
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS
PROJECTED TO SECTION
LISMER
LISMER NORTH
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL CROSS SECTION 5,171,370 N
Scale 1:7,000
September 2021


555,200 E
555,300 E
555,400 E
555,500 E
555,600 E
555,700 E
555,800 E
555,900 E
556,000 E
300 EL
200 EL
100 EL
0 EL
-100 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
DANA SOUTH DOMAIN
Pd BLOCK MODEL CROSS SECTION 5,171,970 N
Scale 1:3,500
September 2021

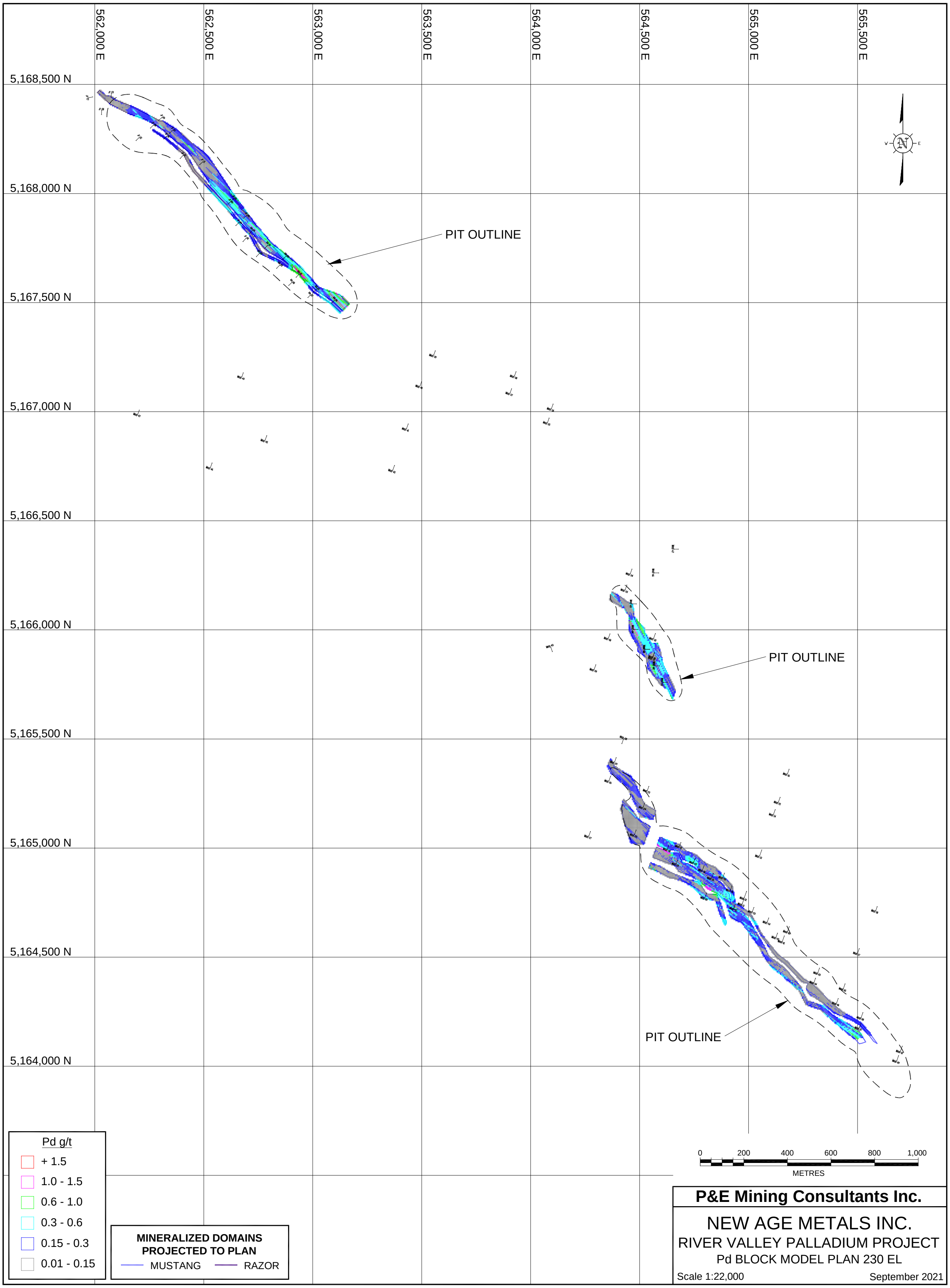

555,100 E
555,150 E
555,200 E
555,250 E
555,300 E
555,350 E
555,400 E
555,450 E
555,500 E
555,550 E
350 EL
300 EL
250 EL
200 EL
150 EL
100 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
0 25 50 75 100 125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
DANA MAIN DOMAIN
Pd BLOCK MODEL CROSS SECTION 5,172,720 N
Scale 1:2,000
September 2021



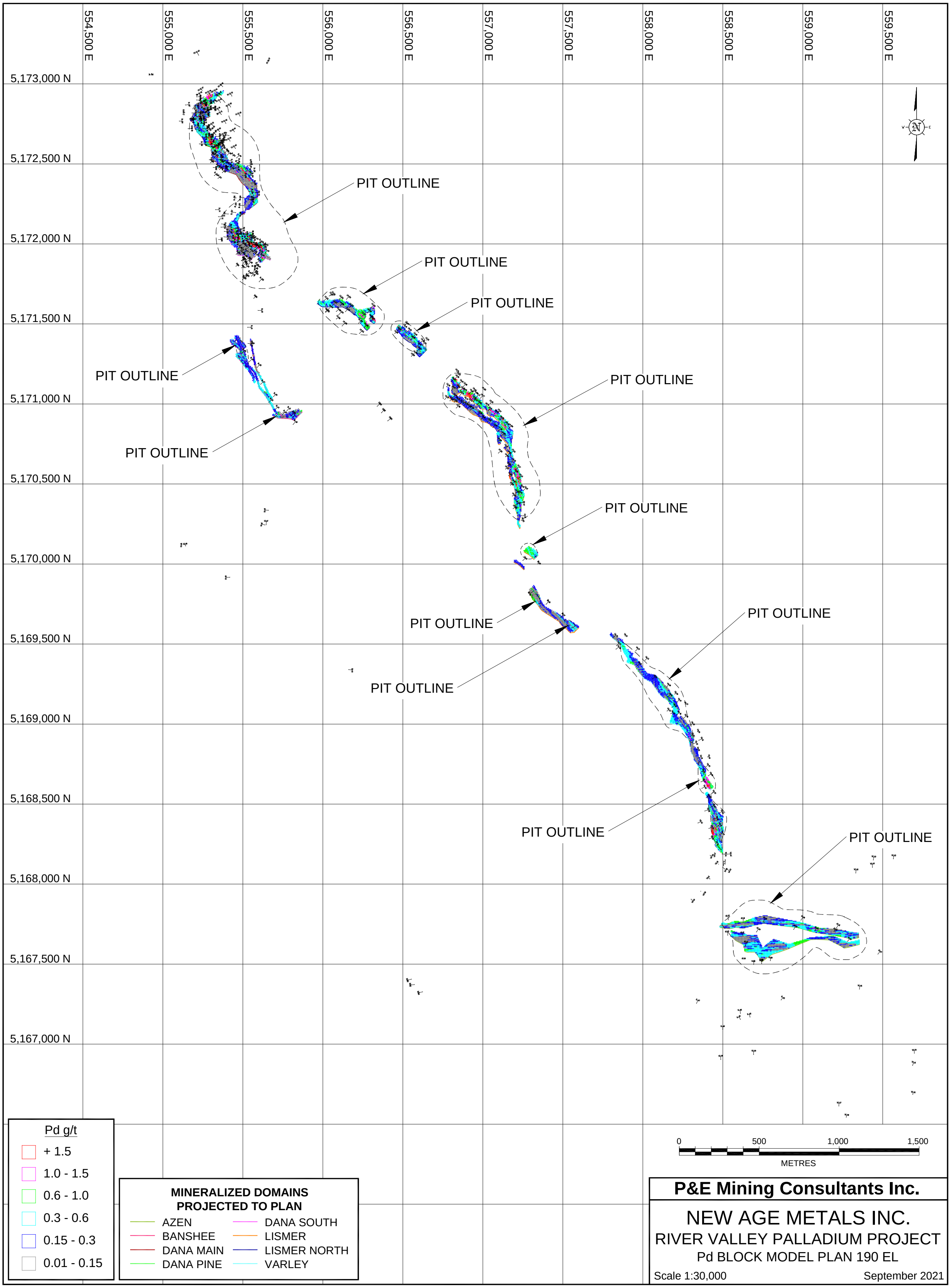
555,100 E
555,150 E
555,200 E
555,250 E
555,300 E
555,350 E
555,400 E
555,450 E
555,500 E
555,550 E
350 EL
300 EL
250 EL
200 EL
150 EL
100 EL
SURFACE
PIT OUTLINE
PZ-17-08
PZ-17-07
PZ-17-03
PZ-20-01
PZ-17-01
PZ-17-06
PZ-17-05
PZ-17-02
DN040
DN037
DN039
DN038
DL-106
DL-107
DN-T2-03
DN-T2-06
DN-T2-13
DN-T2-10
DN-T2-11
2015-DN002
2015-DN001
T3-17-05
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS
PROJECTED TO SECTION
DANA MAIN
DANA PINE
0
25
50
75
100
125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL CROSS SECTION 5,172,870 N
Scale 1:2,000
September 2021

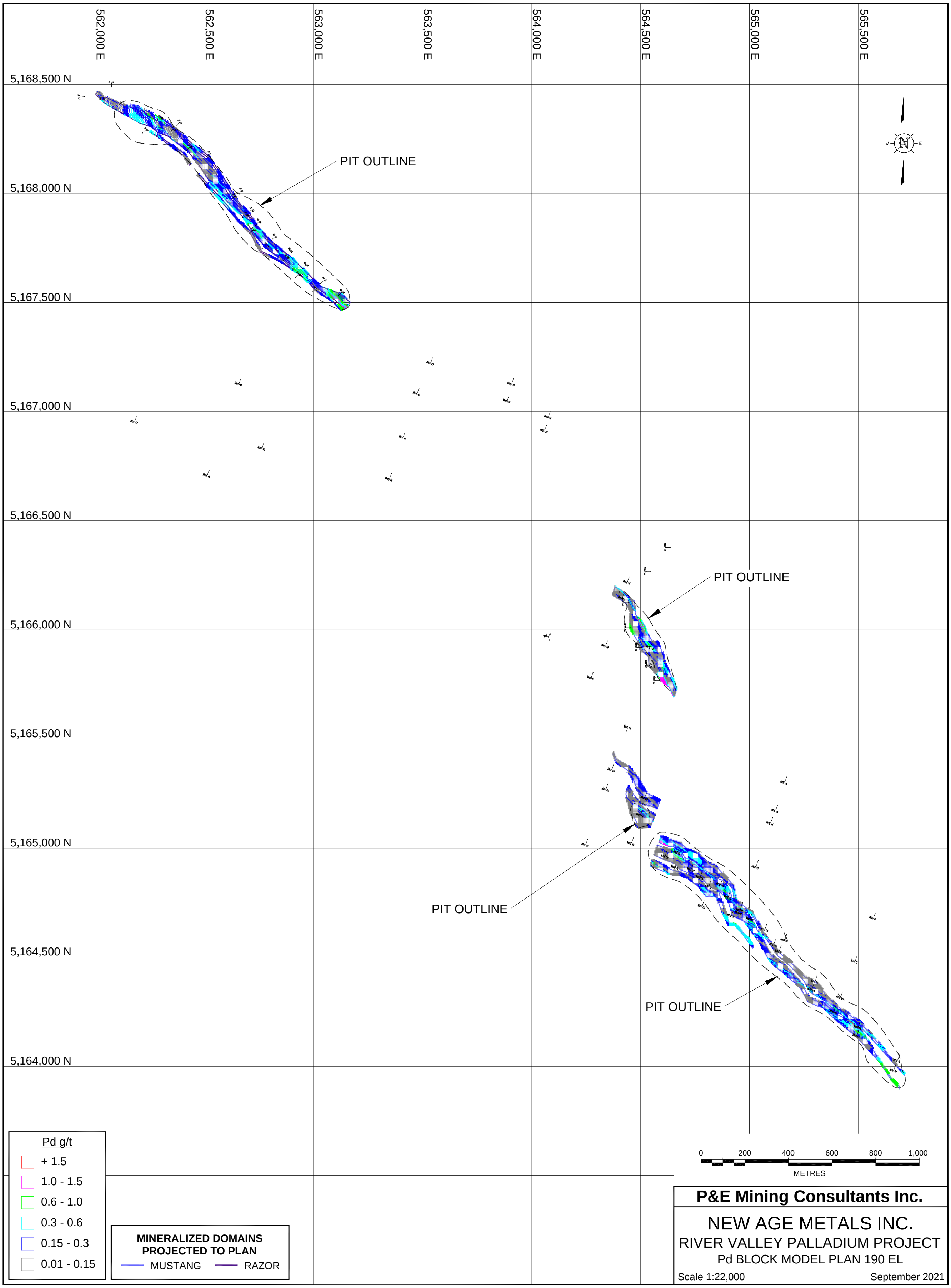


554,500 E
555,000 E
555,500 E
556,000 E
556,500 E
557,000 E
557,500 E
558,000 E
558,500 E
559,000 E
559,500 E
5,173,000 N
5,172,500 N
5,172,000 N
5,171,500 N
5,171,000 N
5,170,500 N
5,170,000 N
5,169,500 N
5,169,000 N
5,168,500 N
5,168,000 N
5,167,500 N
5,167,000 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
0
500
1,000
1,500
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL PLAN 230 EL
Scale 1:30,000
September 2021



562,000 E
562,500 E
563,000 E
563,500 E
564,000 E
564,500 E
565,000 E
565,500 E
5,168,500 N
5,168,000 N
5,167,500 N
5,167,000 N
5,166,500 N
5,166,000 N
5,165,500 N
5,165,000 N
5,164,500 N
5,164,000 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS
PROJECTED TO PLAN
MUSTANG
RAZOR
0
200
400
600
800
1,000
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL PLAN 230 EL
Scale 1:22,000
September 2021


554,500 E
555,000 E
555,500 E
556,000 E
556,500 E
557,000 E
557,500 E
558,000 E
558,500 E
559,000 E
559,500 E
5,173,000 N
5,172,500 N
5,172,000 N
5,171,500 N
5,171,000 N
5,170,500 N
5,170,000 N
5,169,500 N
5,169,000 N
5,168,500 N
5,168,000 N
5,167,500 N
5,167,000 N
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
0
500
1,000
1,500
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL PLAN 190 EL
Scale 1:30,000
September 2021


562,000 E
562,500 E
563,000 E
563,500 E
564,000 E
564,500 E
565,000 E
565,500 E
5,168,500 N
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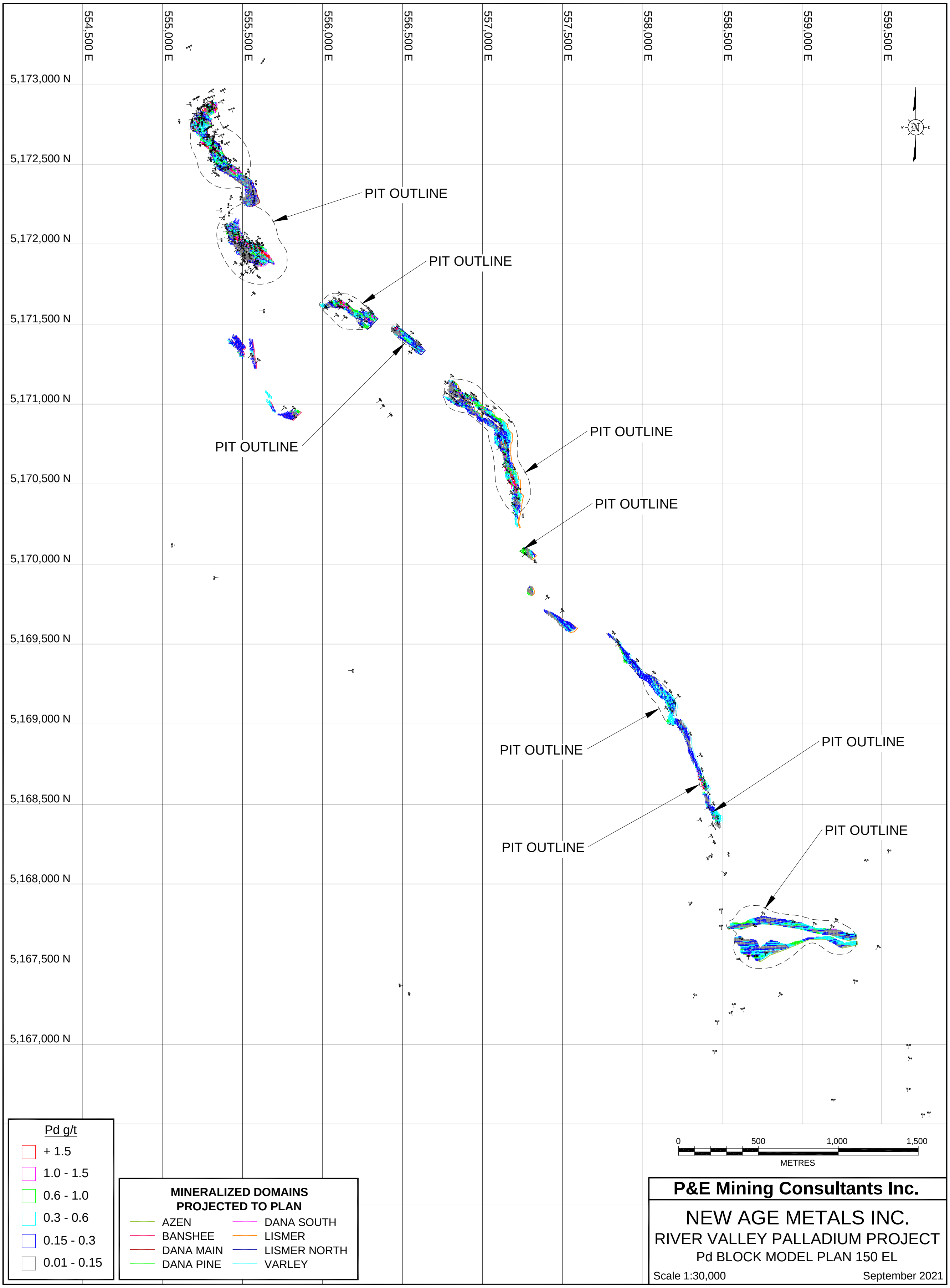
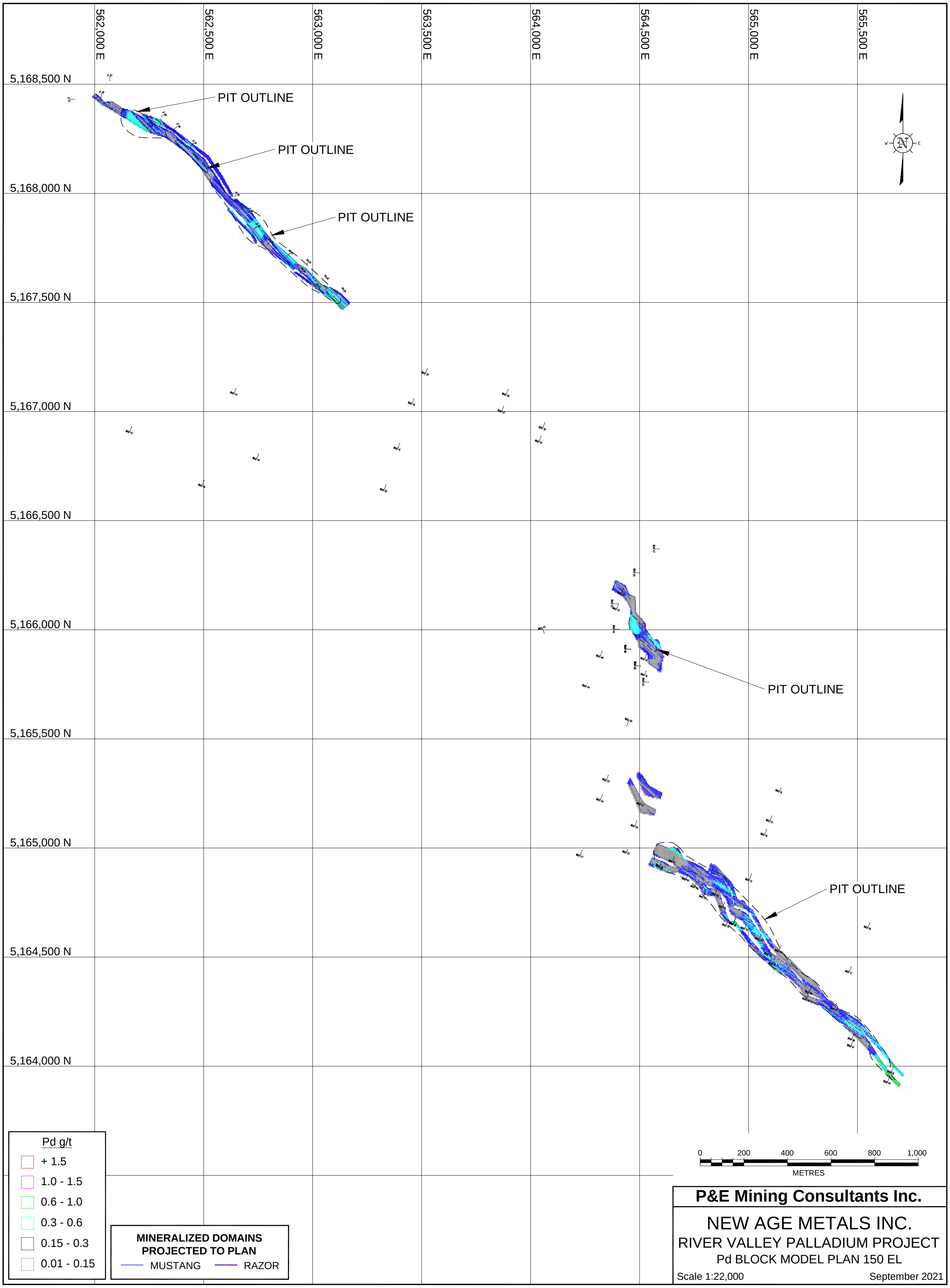
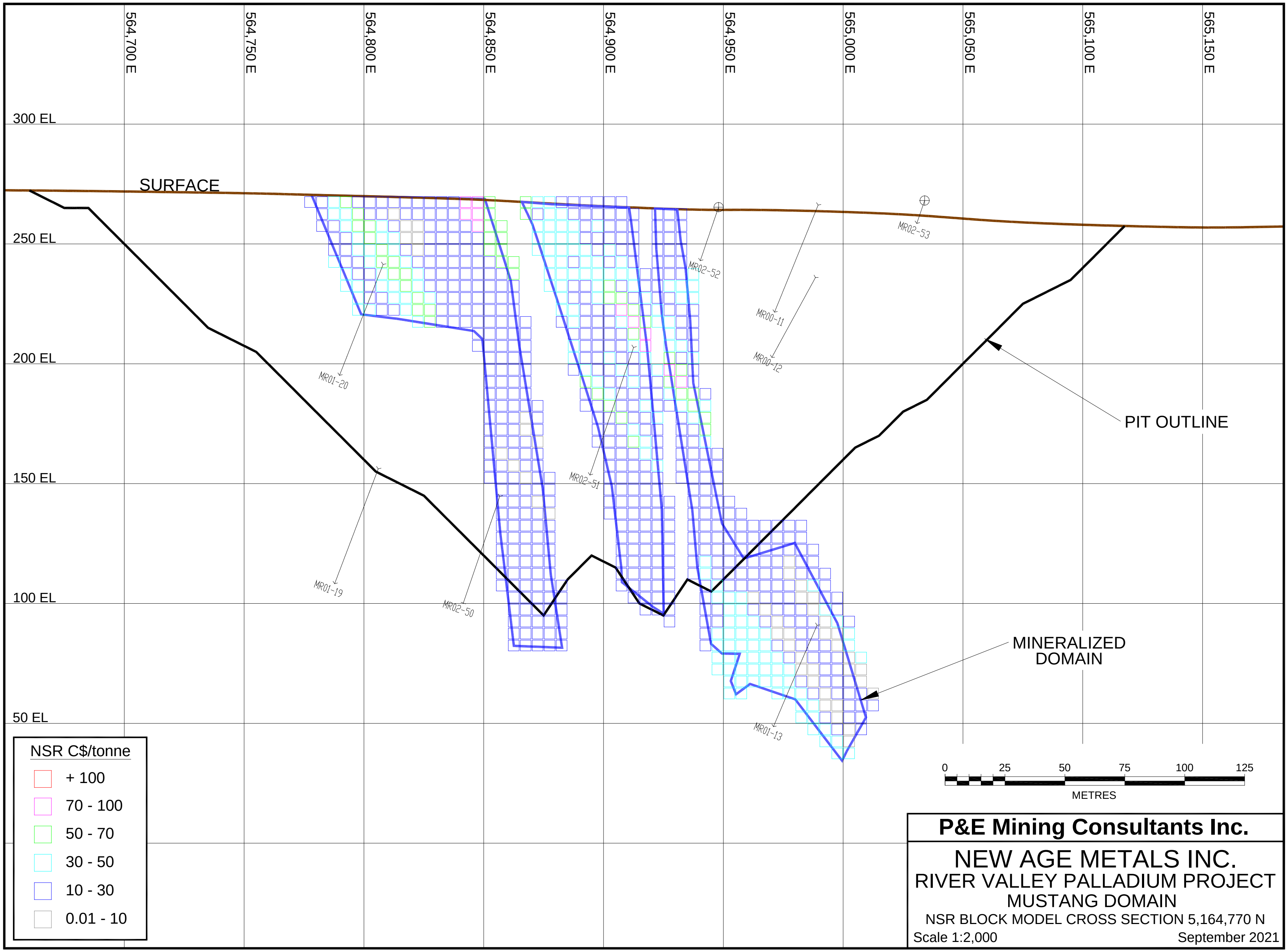
5,167,500 N
5,167,000 N
5,166,500 N
5,166,000 N
5,165,500 N
5,165,000 N
5,164,500 N
5,164,000 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS PROJECTED TO PLAN
MUSTANG
RAZOR
0
200
400
600
800
1,000
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL PLAN 190 EL
Scale 1:22,000
September 2021

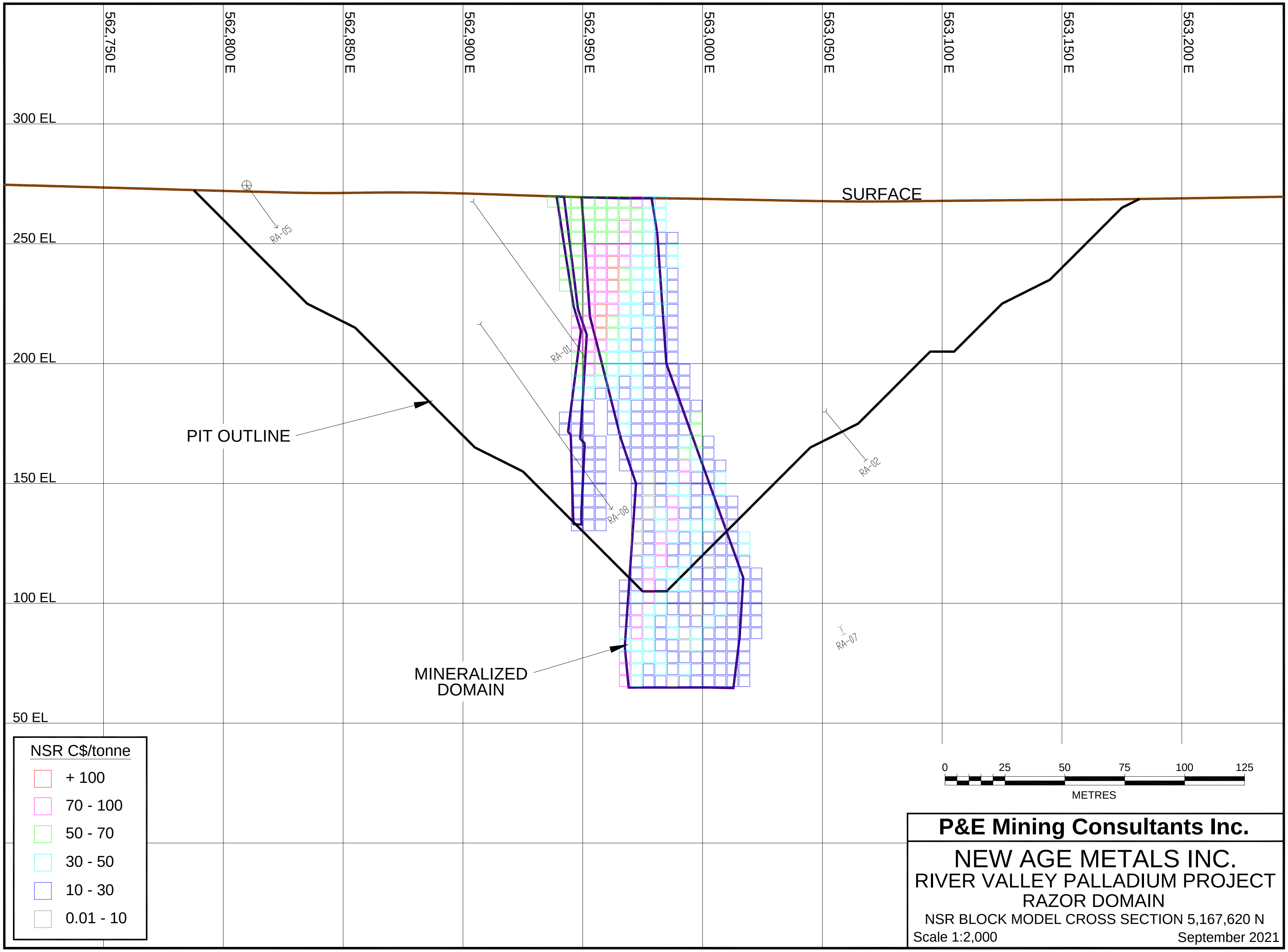

554,500 E
555,000 E
555,500 E
556,000 E
556,500 E
557,000 E
557,500 E
558,000 E
558,500 E
559,000 E
559,500 E
5,173,000 N
5,172,500 N
5,172,000 N
5,171,500 N
5,171,000 N
5,170,500 N
5,170,000 N
5,169,500 N
5,169,000 N
5,168,500 N
5,168,000 N
5,167,500 N
5,167,000 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
0
500
1,000
1,500
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL PLAN 150 EL
Scale 1:30,000
September 2021

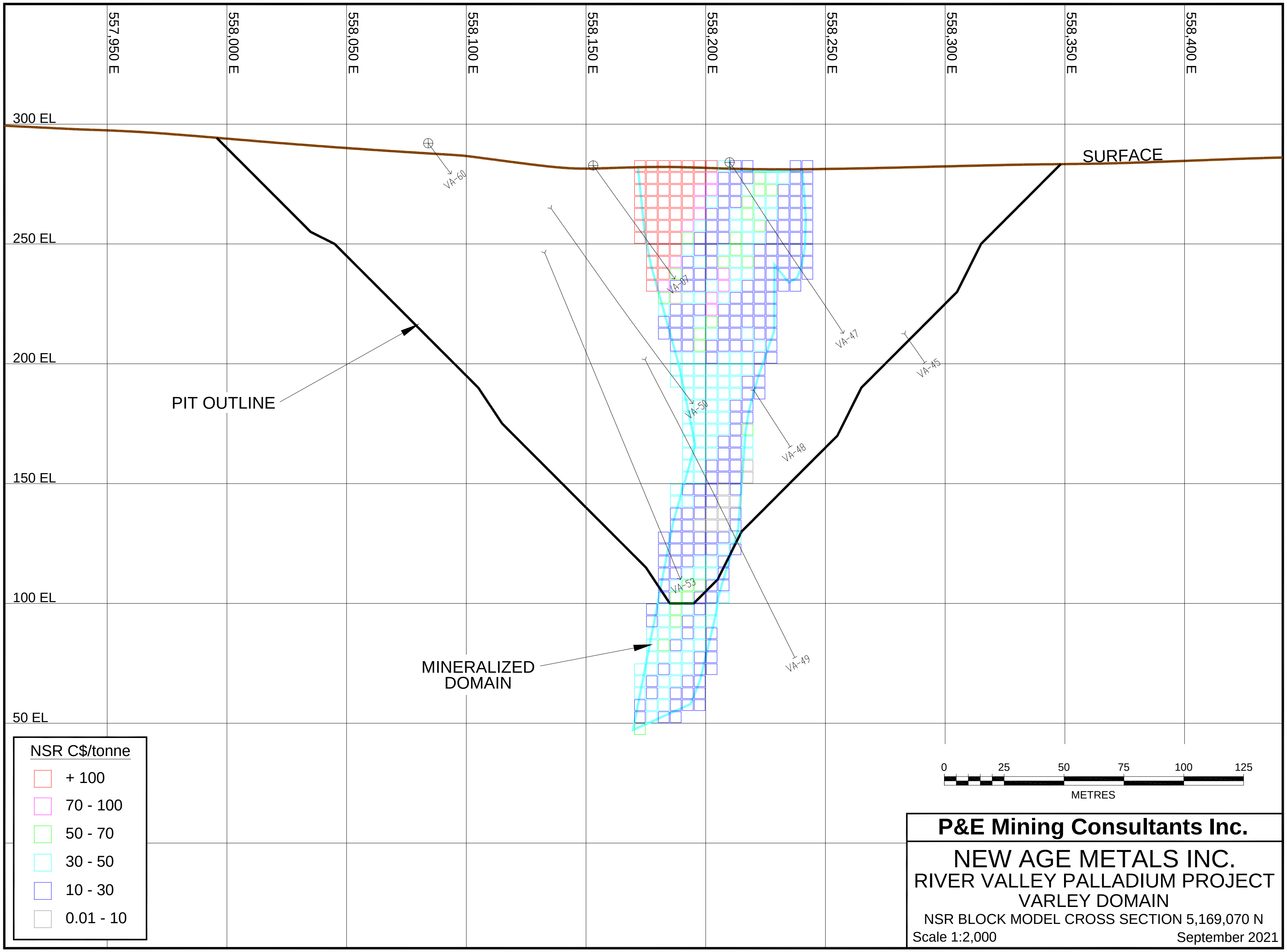


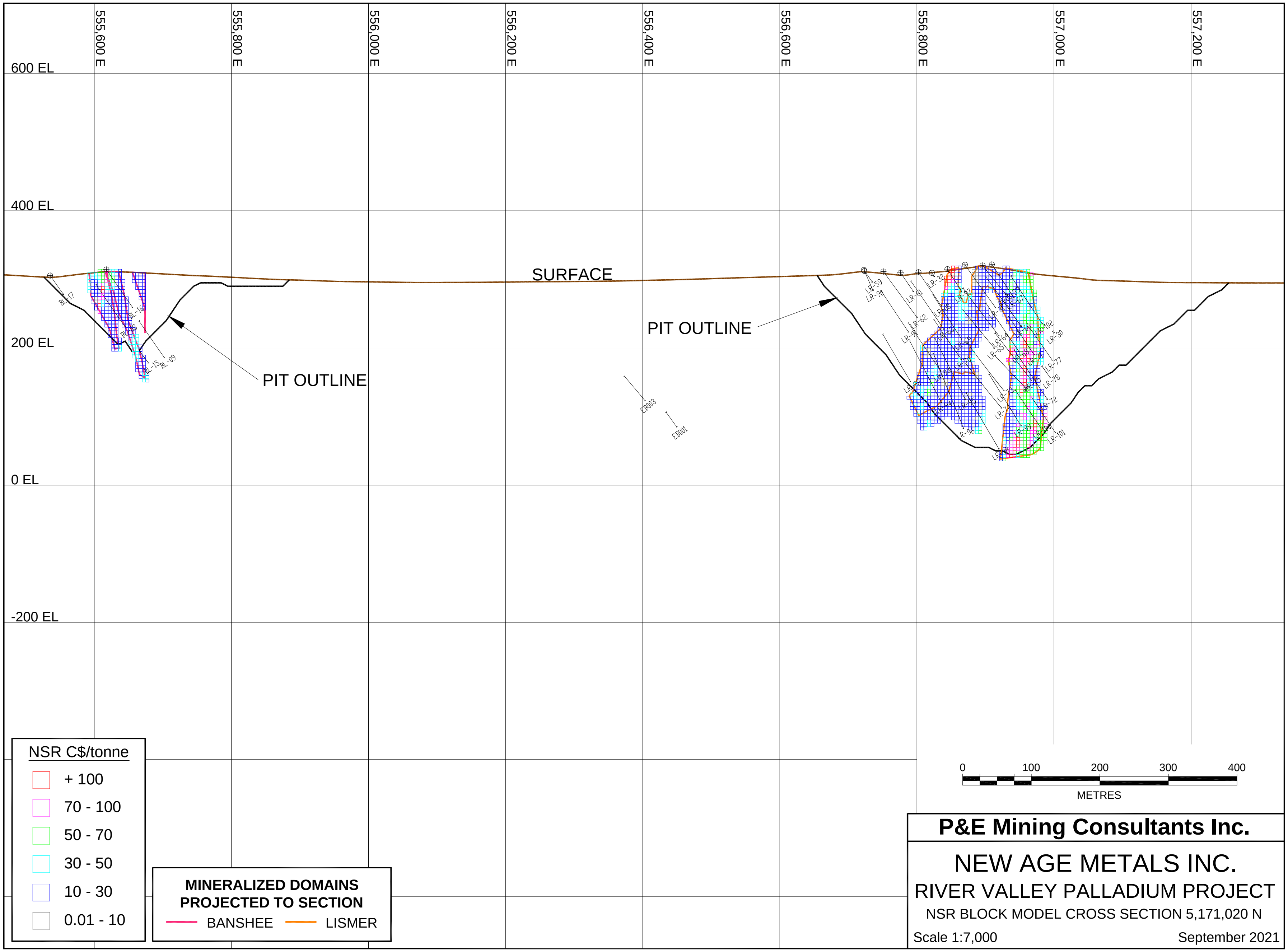
562,000 E
562,500 E
563,000 E
563,500 E
564,000 E
564,500 E
565,000 E
565,500 E
5,168,500 N
5,168,000 N
5,167,500 N
5,167,000 N
5,166,500 N
5,166,000 N
5,165,500 N
5,165,000 N
5,164,500 N
5,164,000 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
Pd g/t
+ 1.5
1.0 - 1.5
0.6 - 1.0
0.3 - 0.6
0.15 - 0.3
0.01 - 0.15
MINERALIZED DOMAINS PROJECTED TO PLAN
MUSTANG
RAZOR
0
200
400
600
800
1,000
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
Pd BLOCK MODEL PLAN 150 EL
Scale 1:22,000
September 2021

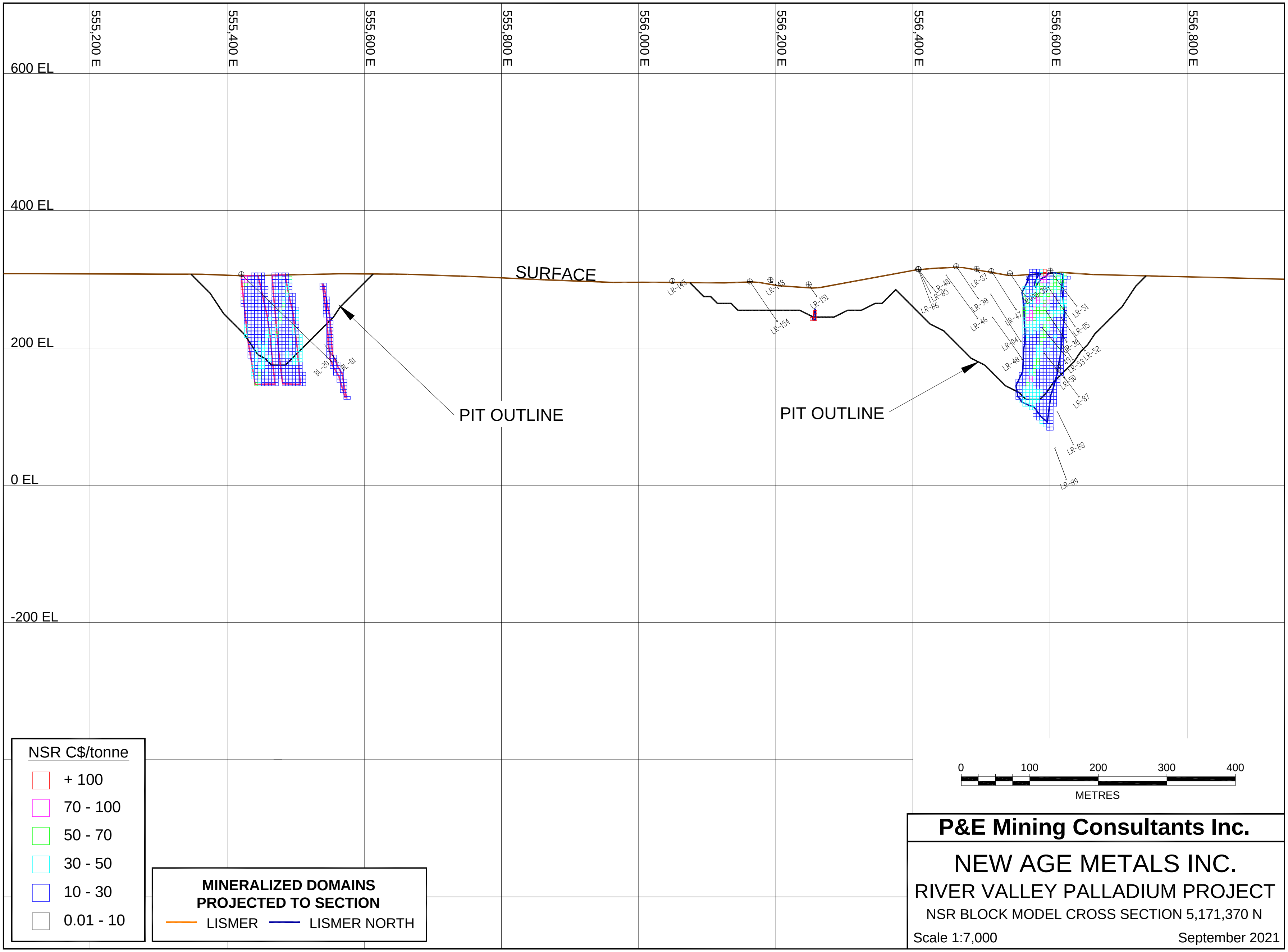
APPENDIX F NSR BLOCK MODEL CROSS-SECTIONS AND PLANS

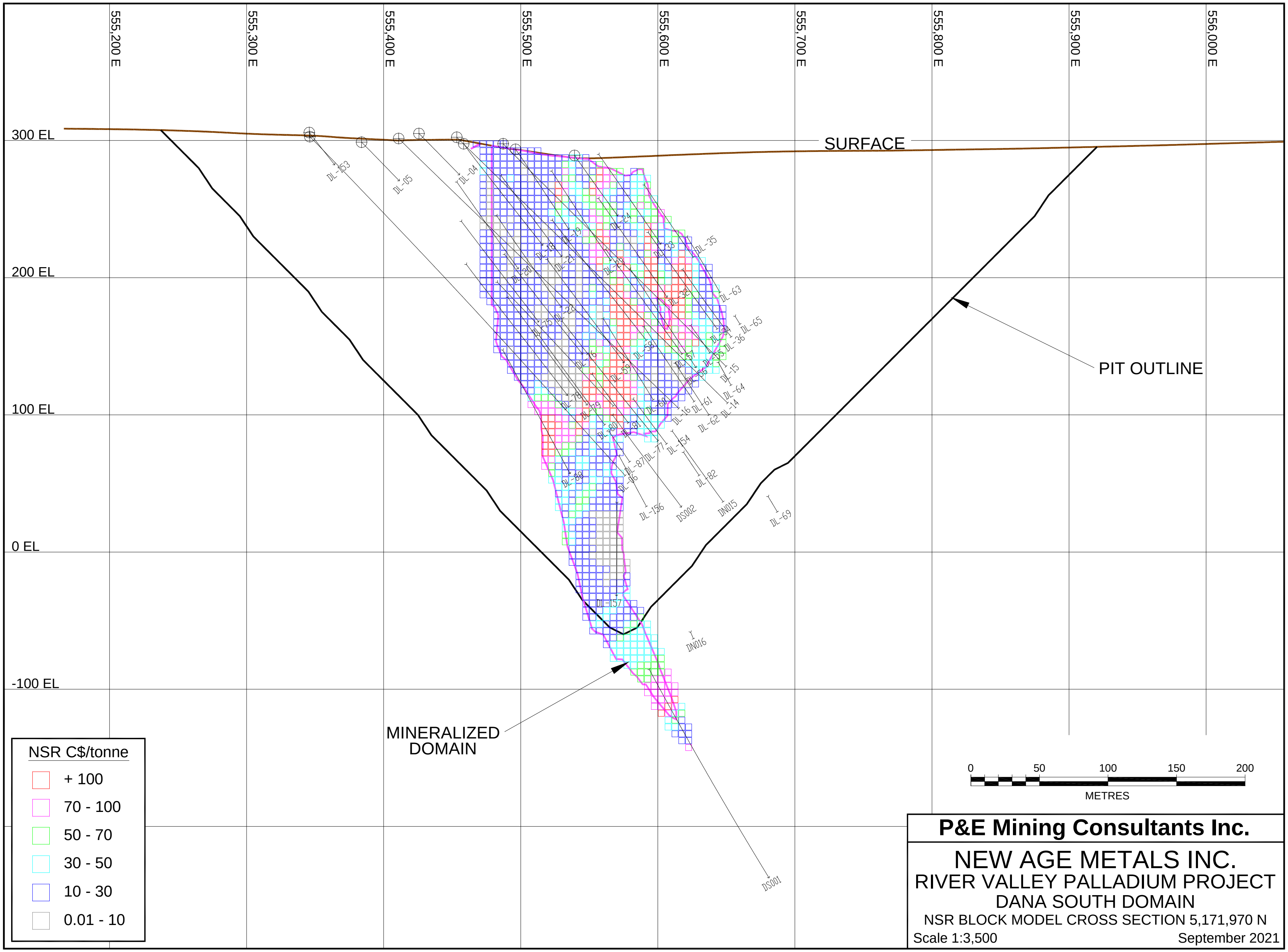

564,700 E
564,750 E
564,800 E
564,850 E
564,900 E
564,950 E
565,000 E
565,050 E
565,100 E
565,150 E
300 EL
250 EL
200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
MR02-52
MR02-53
MR00-11
MR00-12
MR01-20
MR02-51
MR01-19
MR02-50
MR01-13
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
0
25
50
75
100
125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
MUSTANG DOMAIN
NSR BLOCK MODEL CROSS SECTION 5,164,770 N
Scale 1:2,000
September 2021


562,750 E
562,800 E
562,850 E
562,900 E
562,950 E
563,000 E
563,050 E
563,100 E
563,150 E
563,200 E
300 EL
250 EL
200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
RA-05
RA-01
RA-08
RA-02
RA-07
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
0
25
50
75
100
125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
RAZOR DOMAIN
NSR BLOCK MODEL CROSS SECTION 5,167,620 N
Scale 1:2,000
September 2021


557,950 E
558,000 E
558,050 E
558,100 E
558,150 E
558,200 E
558,250 E
558,300 E
558,350 E
558,400 E
300 EL
250 EL
200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
VA-60
VA-67
VA-47
VA-45
VA-50
VA-48
VA-53
VA-49
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
0
25
50
75
100
125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
VARLEY DOMAIN
NSR BLOCK MODEL CROSS SECTION 5,169,070 N
Scale 1:2,000
September 2021


555,600 E
555,800 E
556,000 E
556,200 E
556,400 E
556,600 E
556,800 E
557,000 E
557,200 E
600 EL
400 EL
200 EL
0 EL
-200 EL
SURFACE
PIT OUTLINE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS
PROJECTED TO SECTION
BANSHEE
LISMER
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL CROSS SECTION 5,171,020 N
Scale 1:7,000
September 2021


555,200 E
555,400 E
555,600 E
555,800 E
556,000 E
556,200 E
556,400 E
556,600 E
556,800 E
600 EL
400 EL
200 EL
0 EL
-200 EL
SURFACE
PIT OUTLINE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS
PROJECTED TO SECTION
LISMER
LISMER NORTH
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL CROSS SECTION 5,171,370 N
Scale 1:7,000
September 2021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0 EL
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SURFACE
PIT OUTLINE
MINERALIZED
DOMAIN
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
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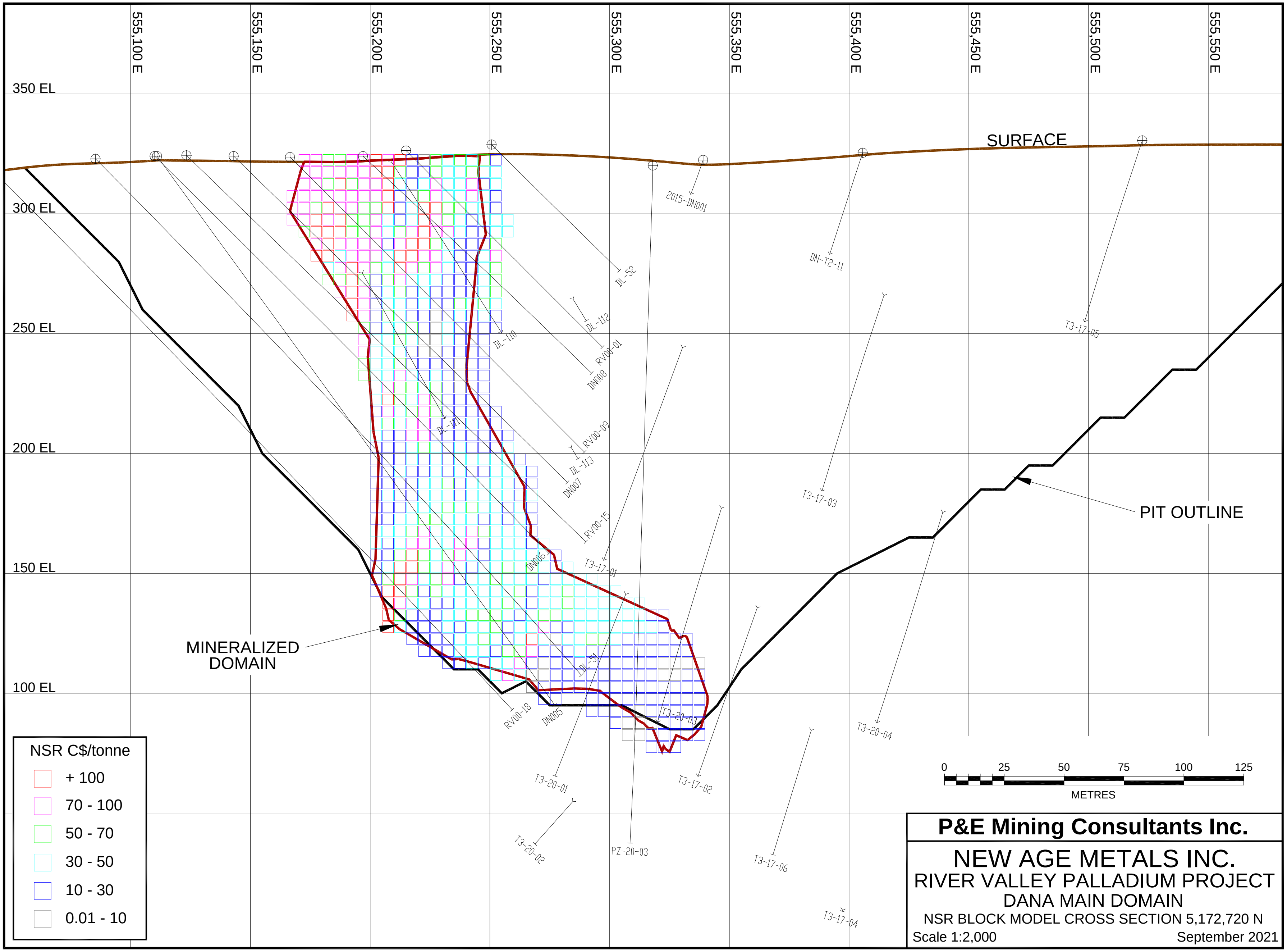
September 2021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SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
0 25 50 75 100 125
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
DANA MAIN DOMAIN
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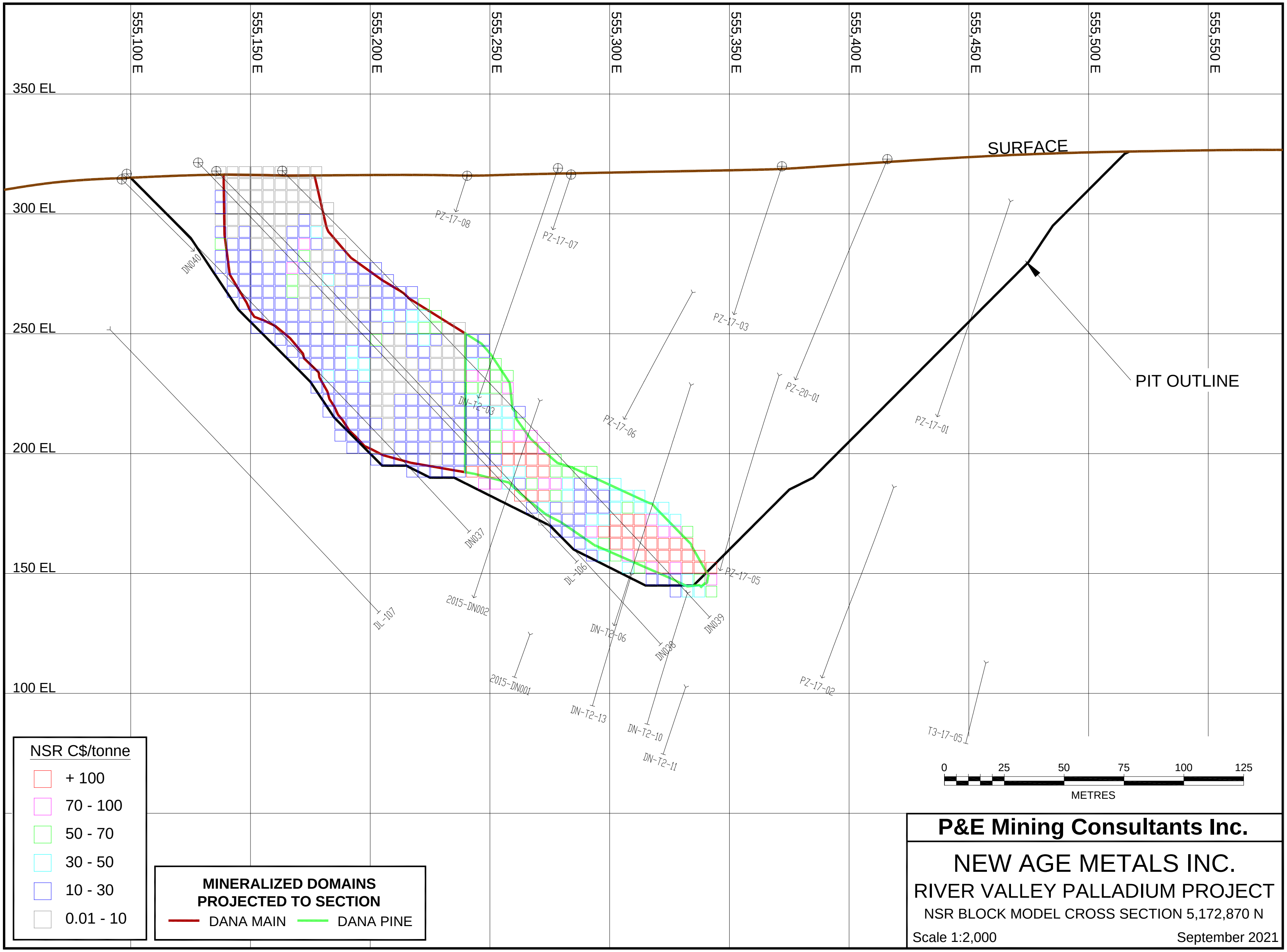
September 2021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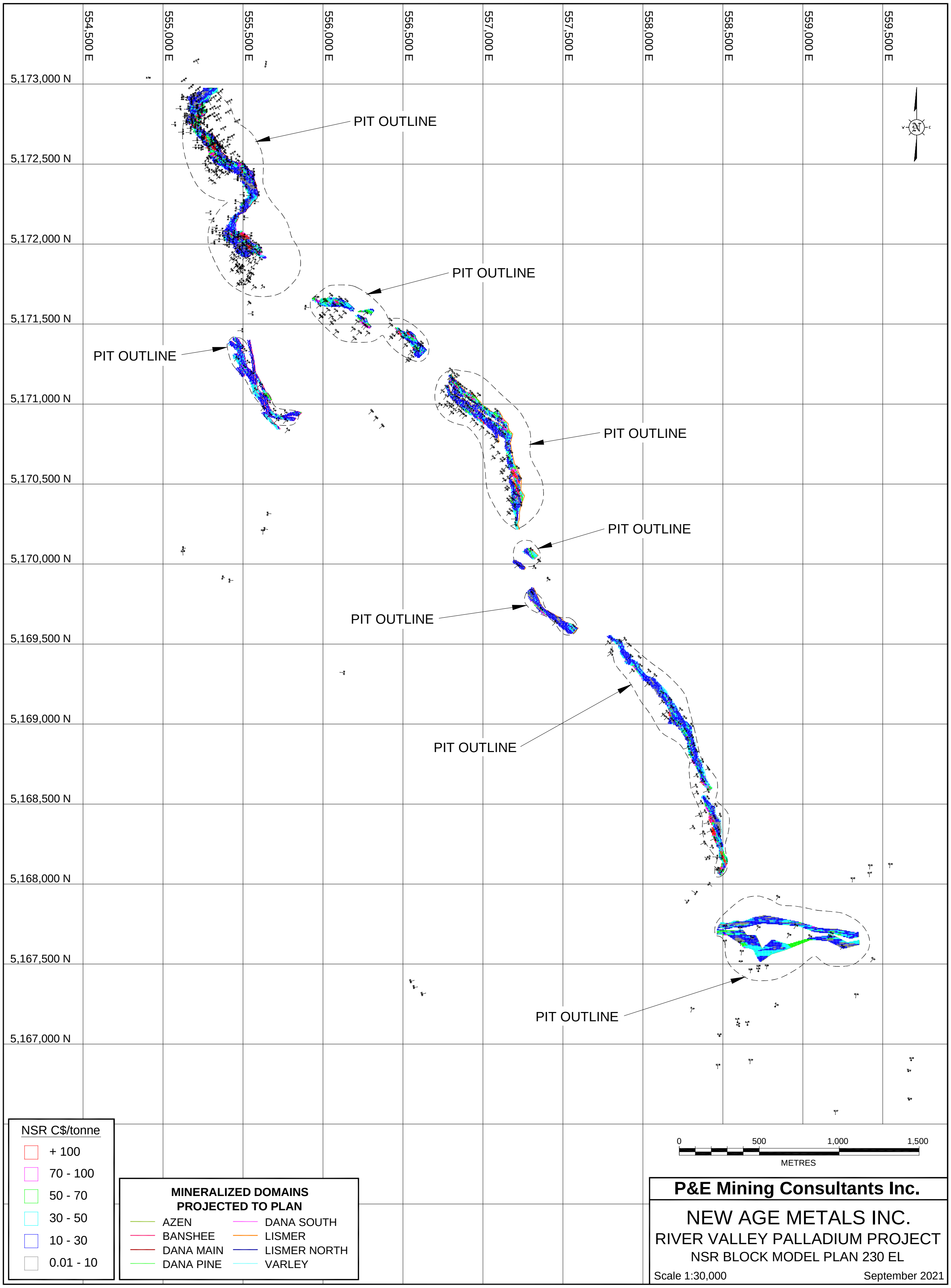
SURFACE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS PROJECTED TO SECTION
DANA MAIN
DANA PINE
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL CROSS SECTION 5,172,870 N
Scale 1:2,000
September 2021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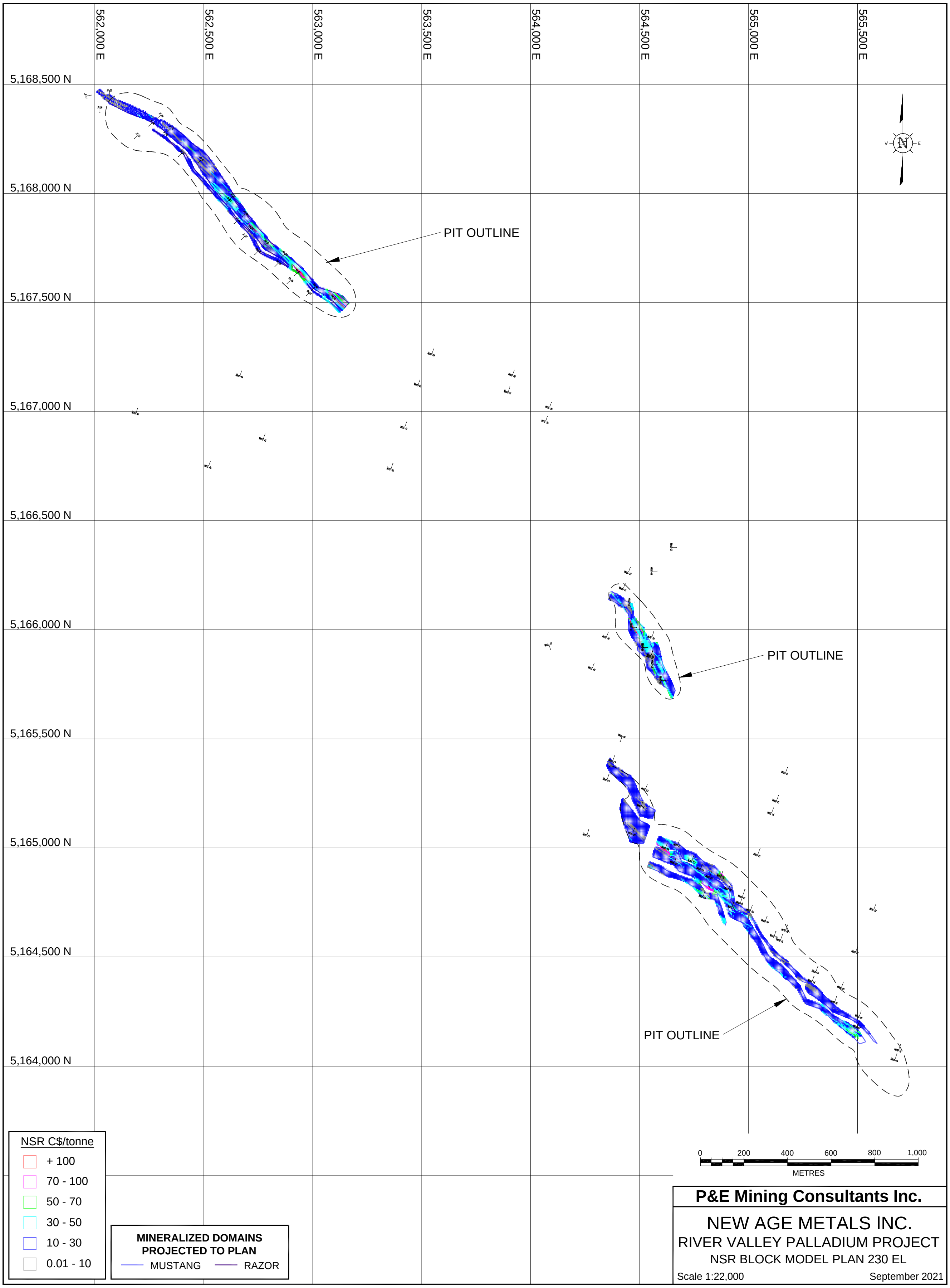
5,167,500 N
5,167,000 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
0
500
1,000
1,500
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL PLAN 230 EL
Scale 1:30,000
September 2021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PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS
PROJECTED TO PLAN
MUSTANG
RAZOR
0
200
400
600
800
1,000
METRES
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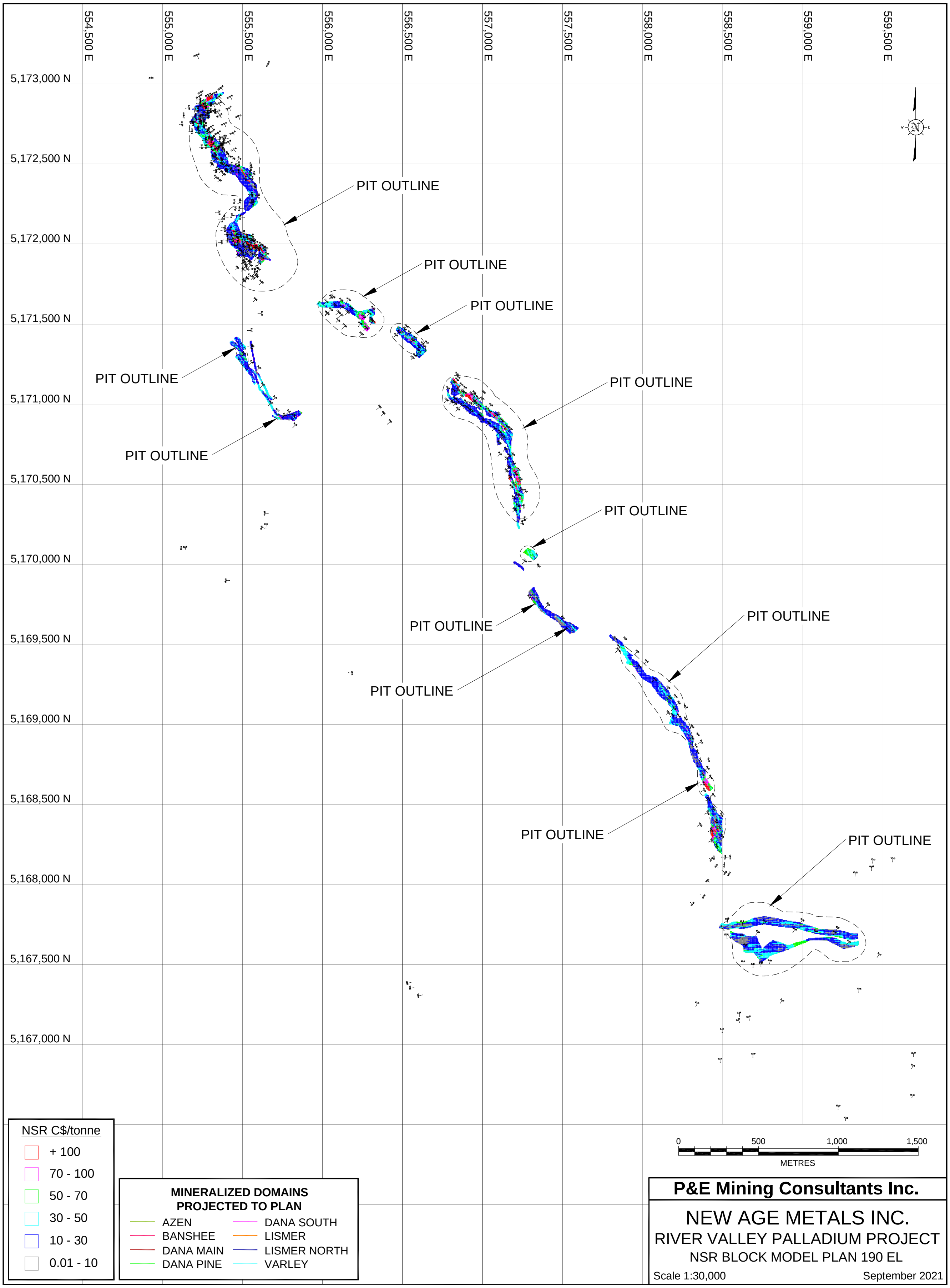
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL PLAN 230 EL
Scale 1:22,000
September 2021



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5,168,000 N
5,167,500 N
5,167,000 N
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
0
500
1,000
1,500
METRES
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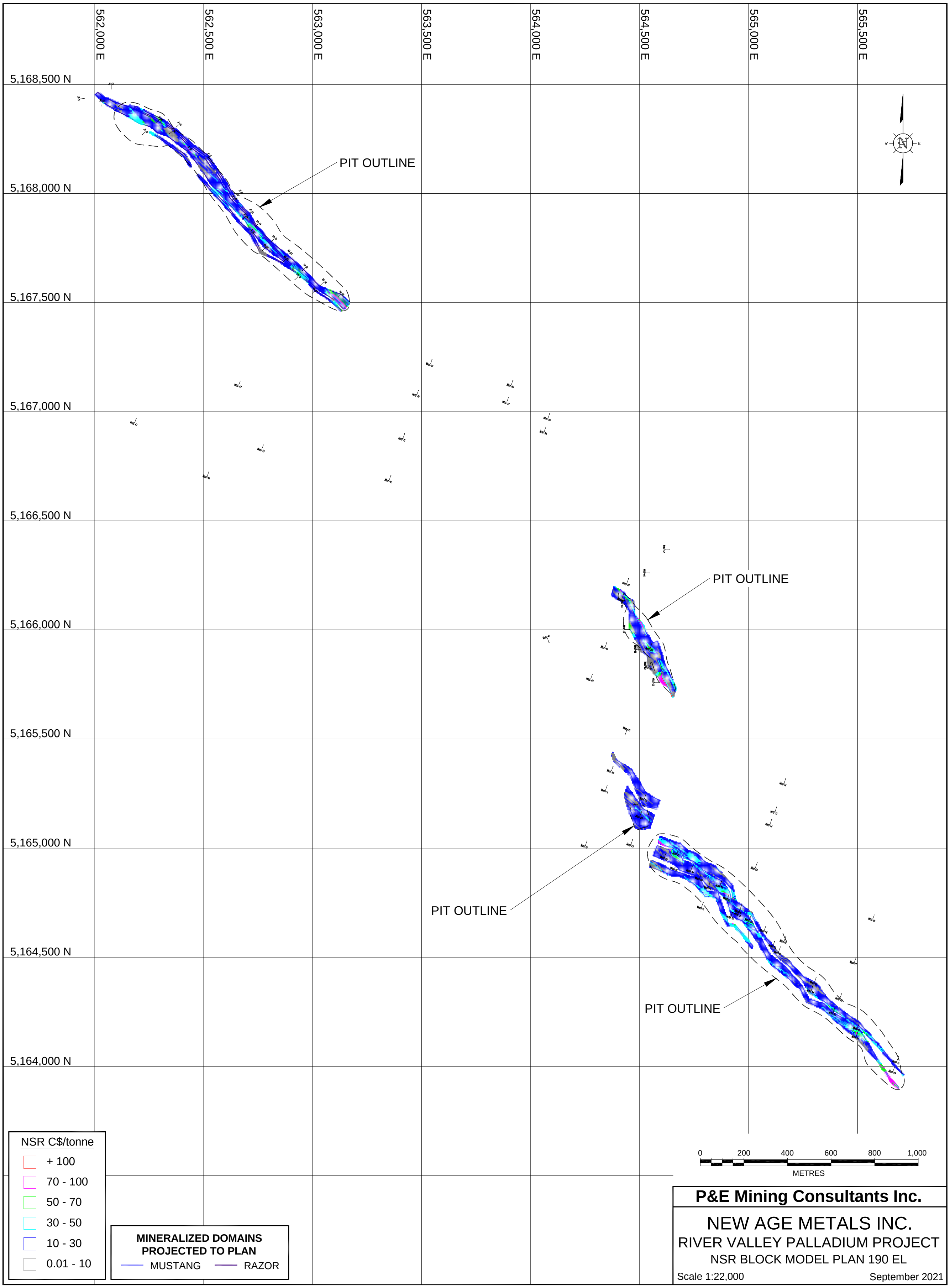
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL PLAN 190 EL
Scale 1:30,000
September 2021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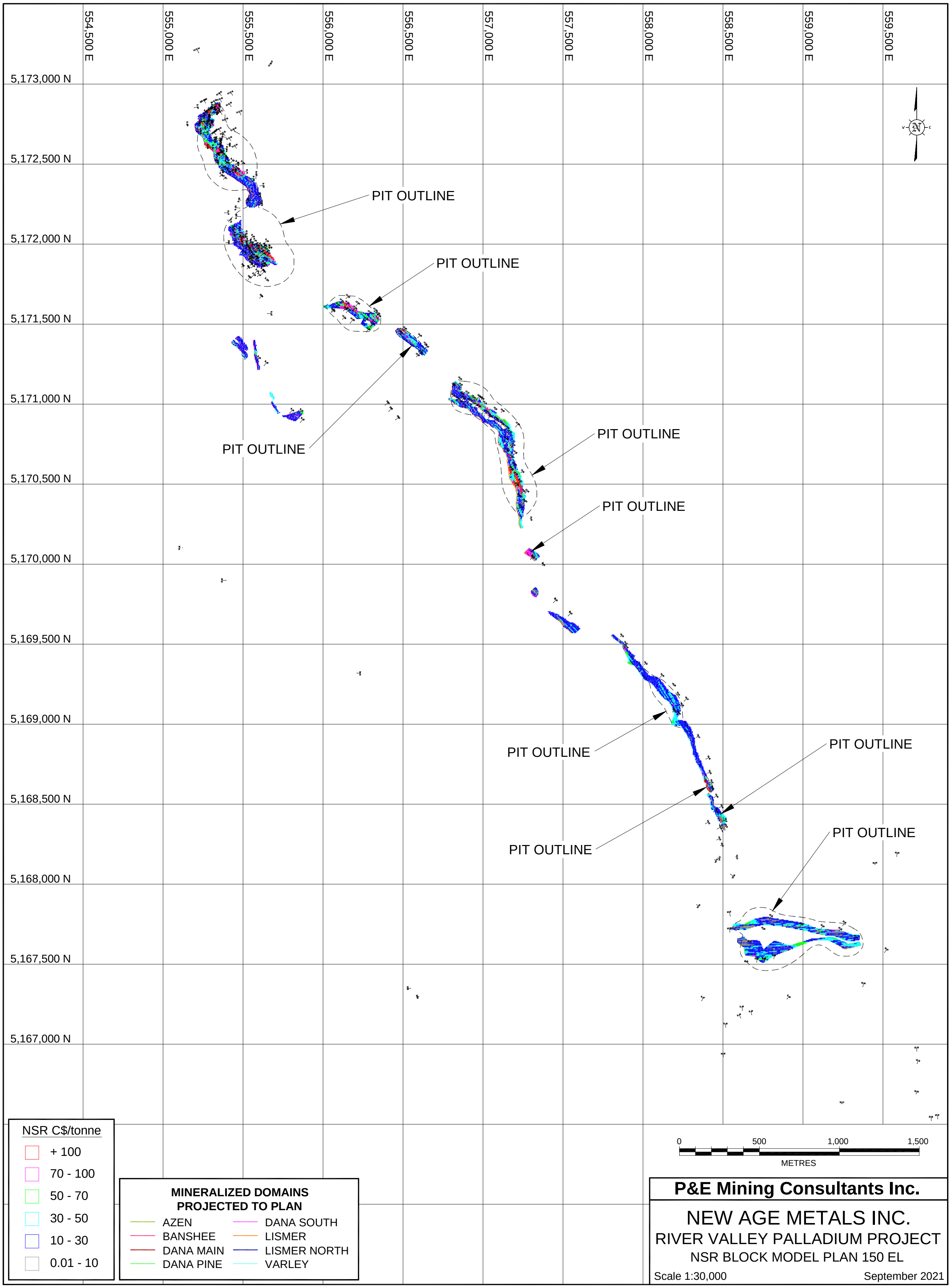
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS PROJECTED TO PLAN
MUSTANG
RAZOR
0
200
400
600
800
1,000
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL PLAN 190 EL
Scale 1:22,000
September 2021



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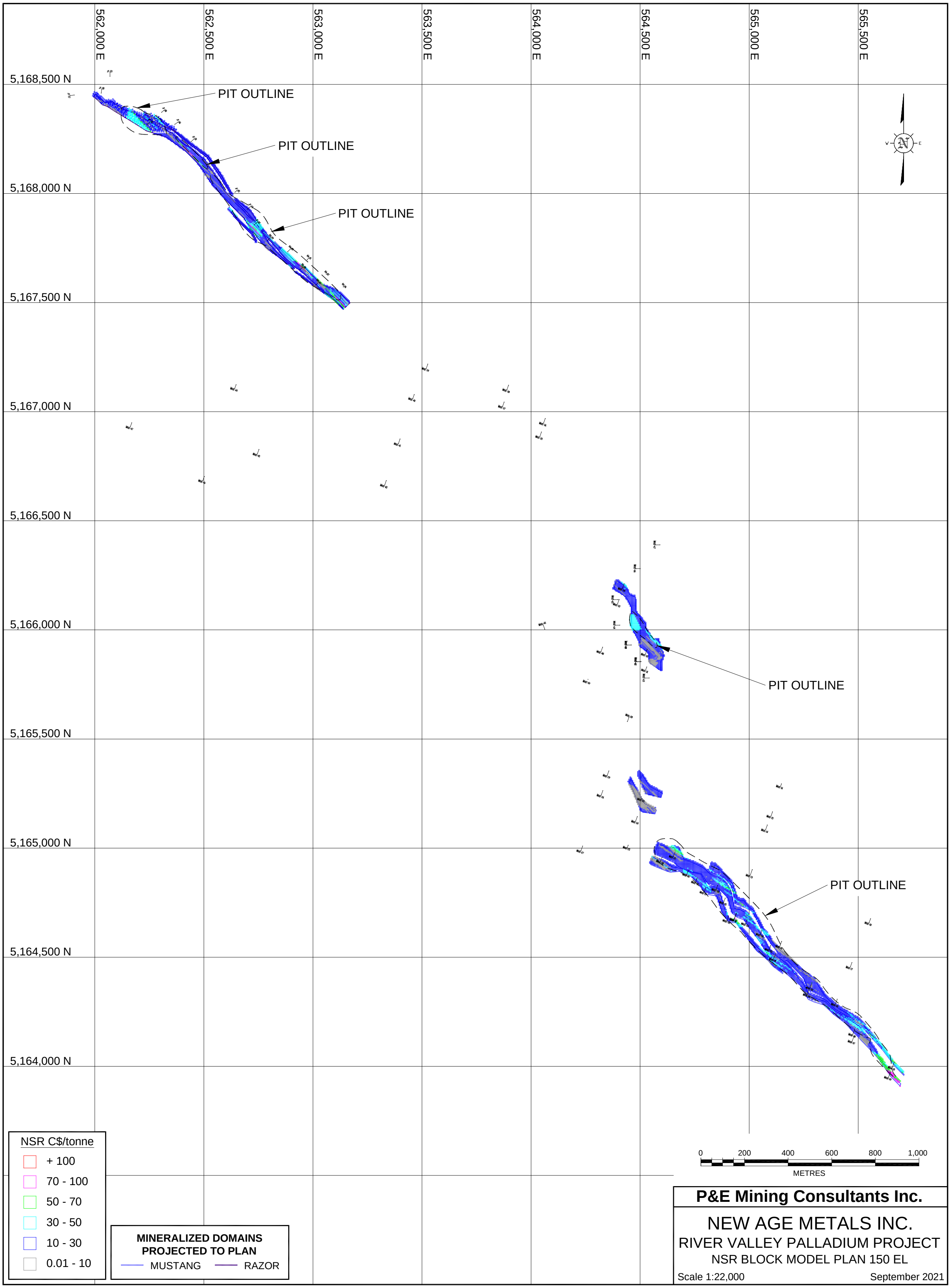
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
0
500
1,000
1,500
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL PLAN 150 EL
Scale 1:30,000
September 2021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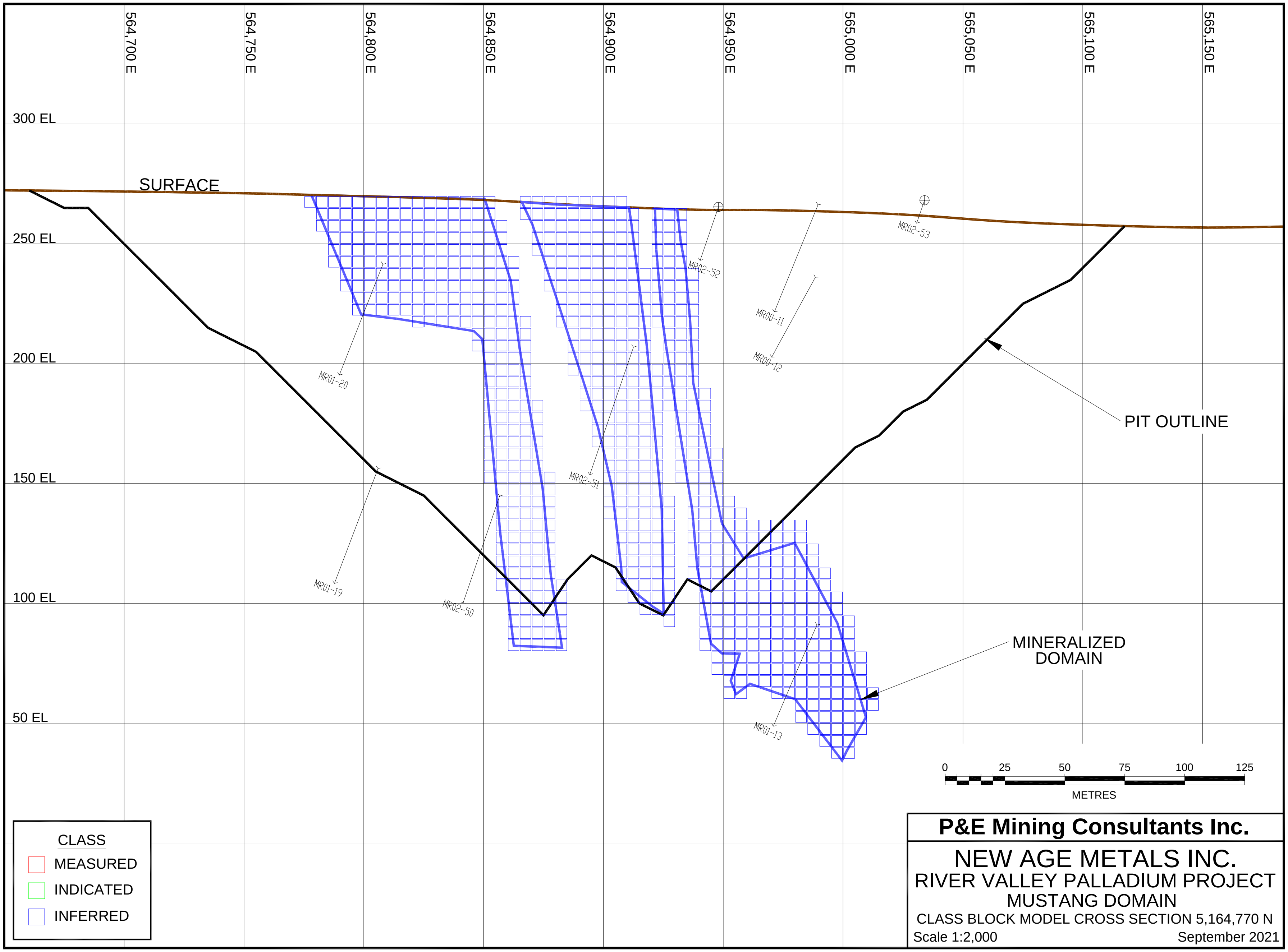
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
NSR C$/tonne
+ 100
70 - 100
50 - 70
30 - 50
10 - 30
0.01 - 10
MINERALIZED DOMAINS
PROJECTED TO PLAN
MUSTANG
RAZOR
0
200
400
600
800
1,000
METRES
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
NSR BLOCK MODEL PLAN 150 EL
Scale 1:22,000
September 2021

APPENDIX G CLASSIFICATION BLOCK MODEL CROSS-SECTIONS AND PLANS



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300 EL
250 EL
200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
MR01-20
MR01-19
MR02-50
MR02-51
MR02-52
MR00-11
MR00-12
MR02-53
MR01-13
0 25 50 75 100 125
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
MUSTANG DOMAIN
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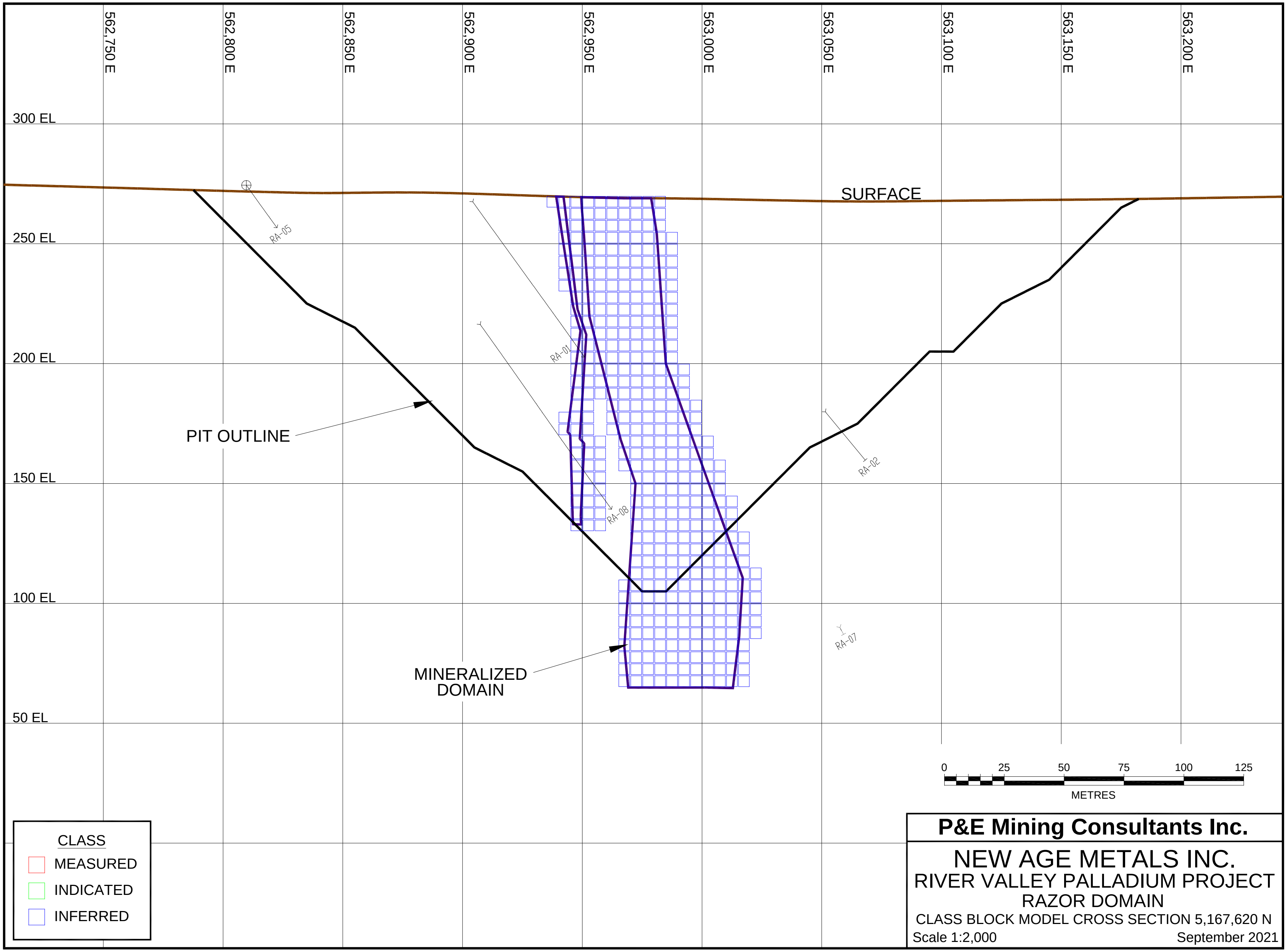
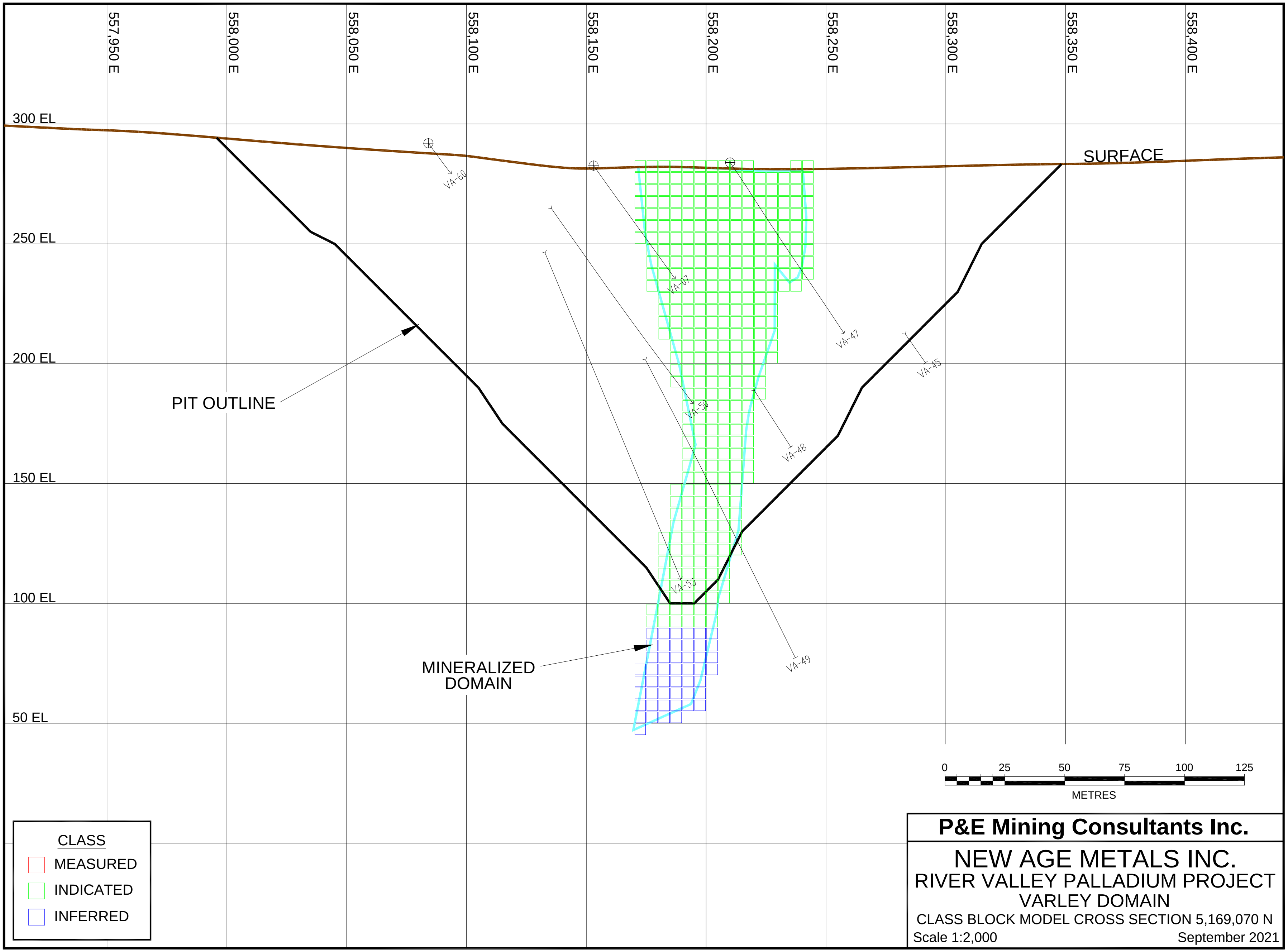
Scale 1:2,000
September 2021



P&E Mining Consultants Inc.

NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
RAZOR DOMAIN
CLASS BLOCK MODEL CROSS SECTION 5,167,620 N

Scale 1:2,000 September 2021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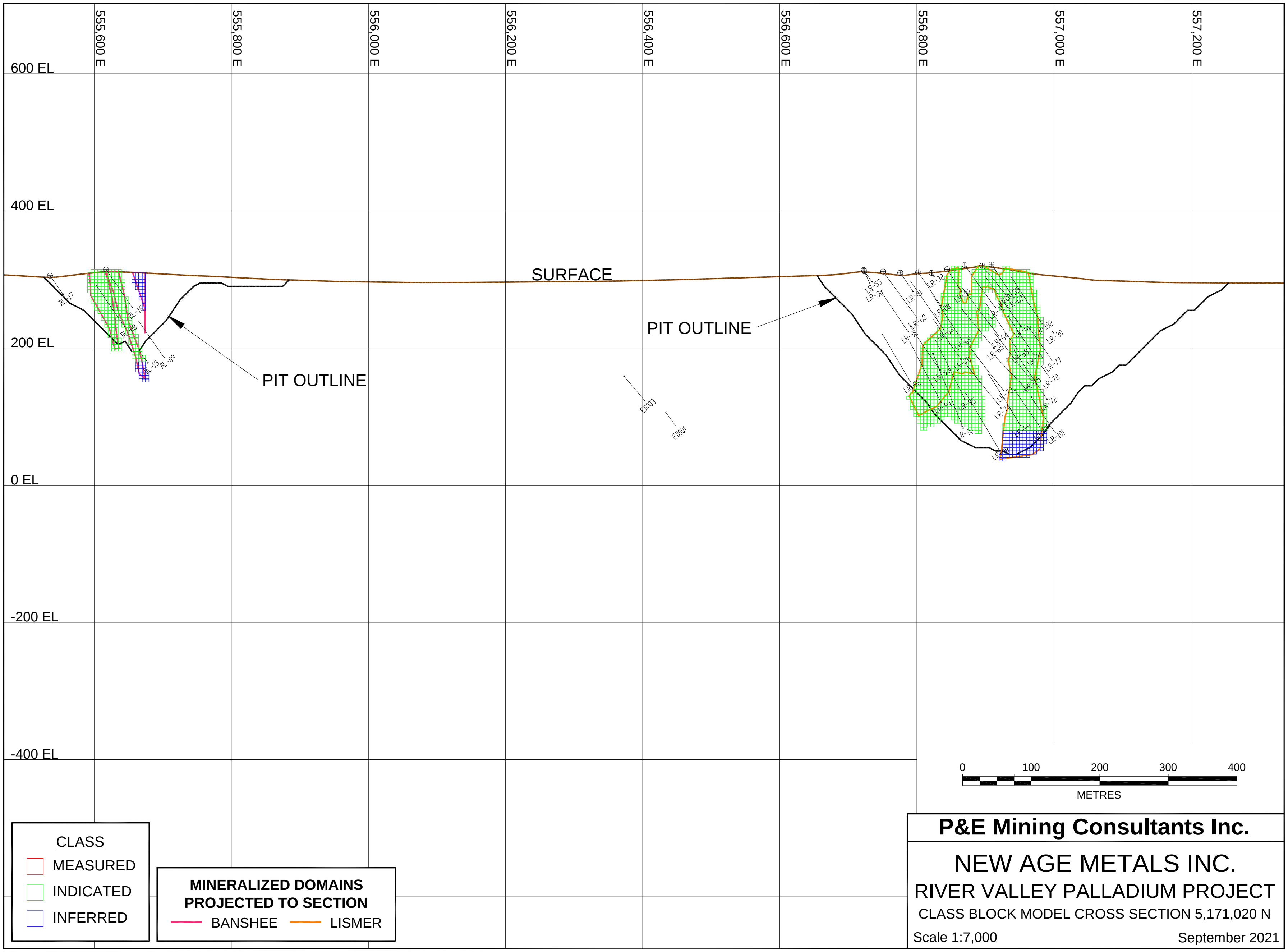
50 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
VA-60
VA-07
VA-47
VA-45
VA-50
VA-48
VA-53
VA-49
0
25
50
75
100
125
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
VARLEY DOMAIN
CLASS BLOCK MODEL CROSS SECTION 5,169,070 N
Scale 1:2,000
September 2021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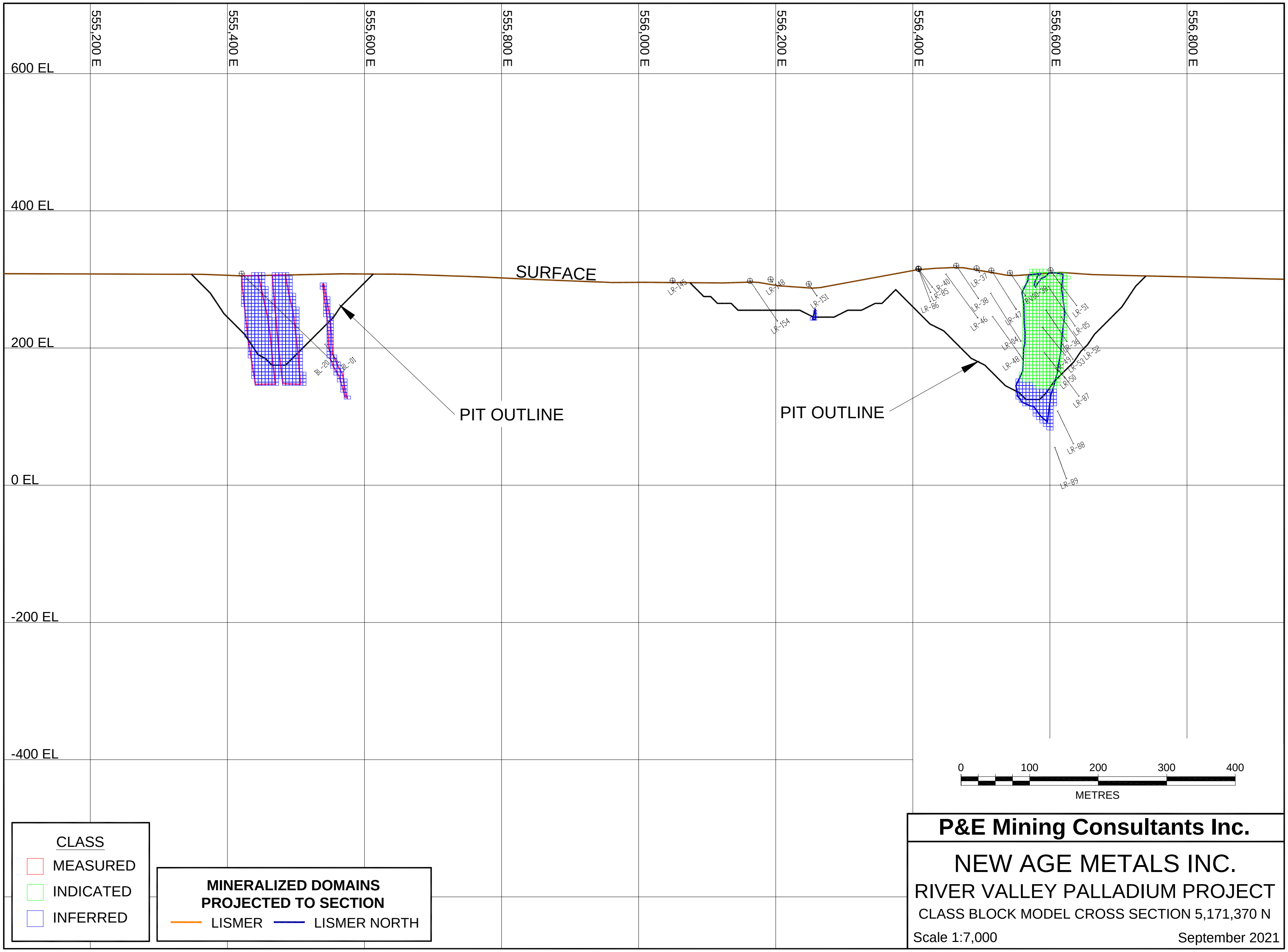
200 EL
0 EL
-200 EL
-400 EL
SURFACE
PIT OUTLINE
PIT OUTLINE
0
100
200
300
400
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO SECTION
BANSHEE
LISMER
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL CROSS SECTION 5,171,020 N
Scale 1:7,000
September 2021



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0 EL
-200 EL
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SURFACE
PIT OUTLINE
PIT OUTLINE
0
100
200
300
400
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO SECTION
LISMER
LISMER NORTH
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL CROSS SECTION 5,171,370 N
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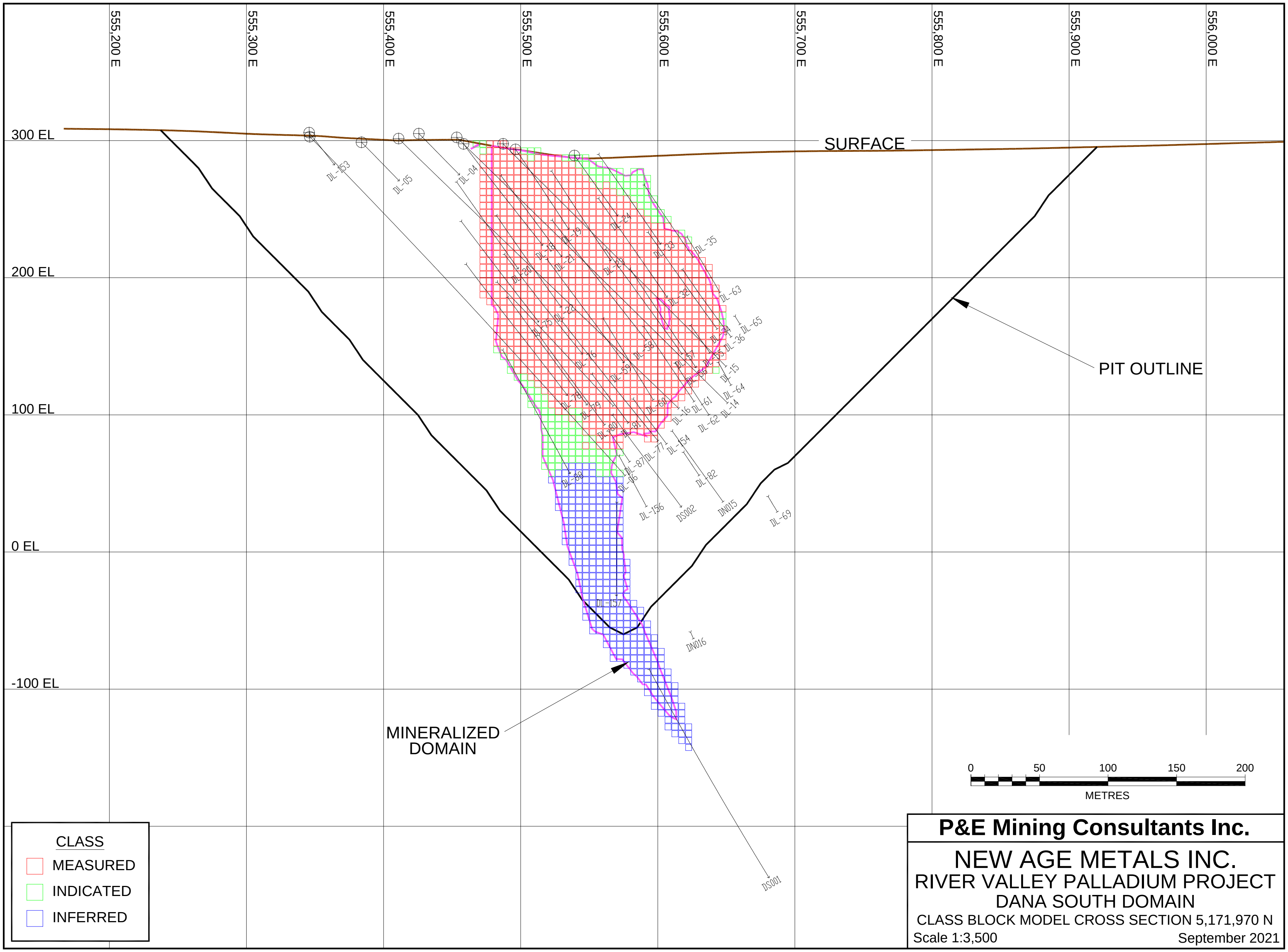
September 2021



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0 EL
-100 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
0
50
100
150
200
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
DANA SOUTH DOMAIN
CLASS BLOCK MODEL CROSS SECTION 5,171,970 N
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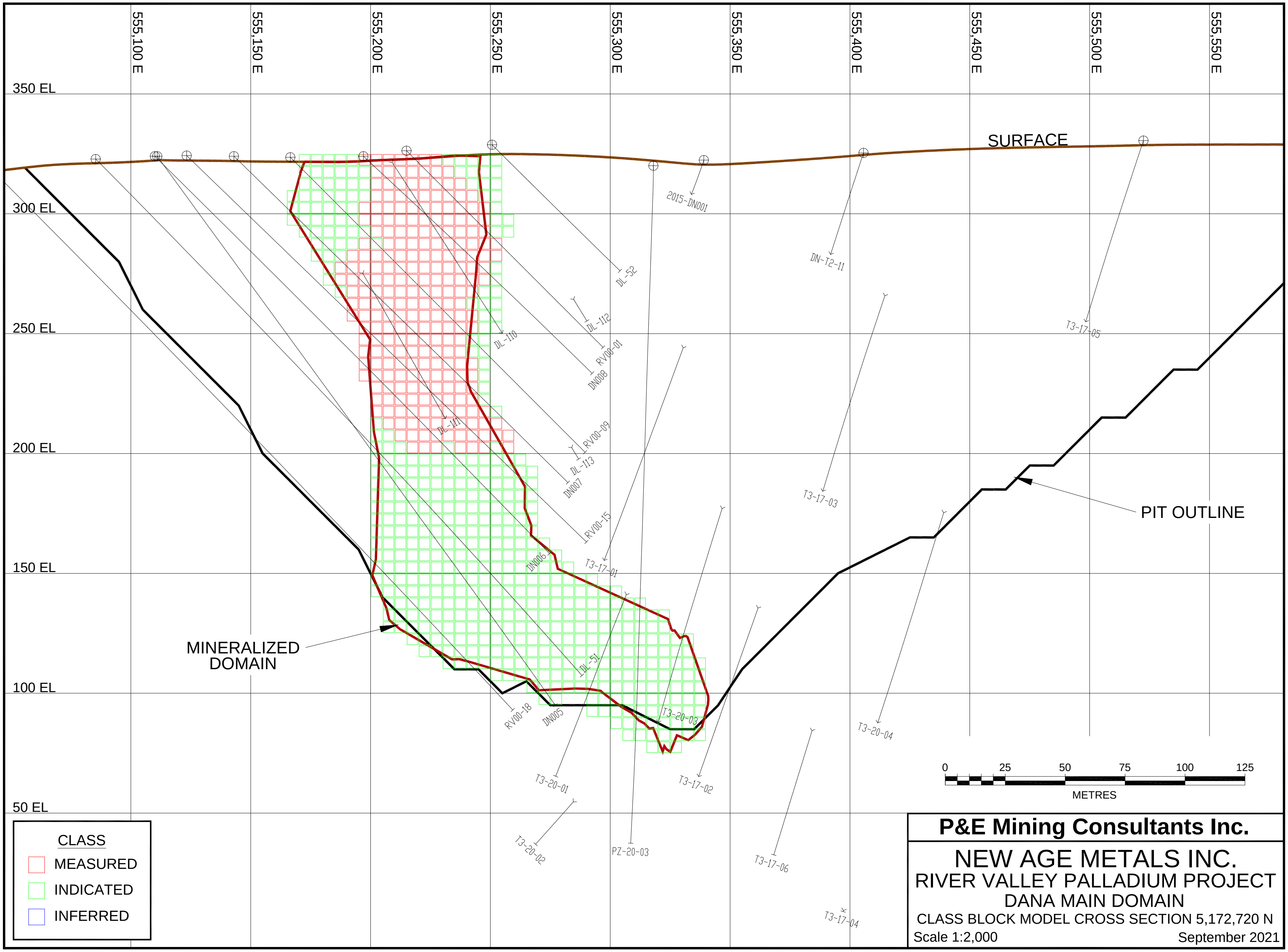
September 2021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SURFACE
PIT OUTLINE
MINERALIZED DOMAIN
2015-DN001
DN-T2-11
DL-52
DL-112
DL-110
RV00-01
DN008
DL-111
RV00-09
DL-113
DN007
RV00-15
DN006
T3-17-01
T3-17-05
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DL-51
RV00-18
DN005
T3-20-03
T3-20-04
T3-20-01
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T3-20-02
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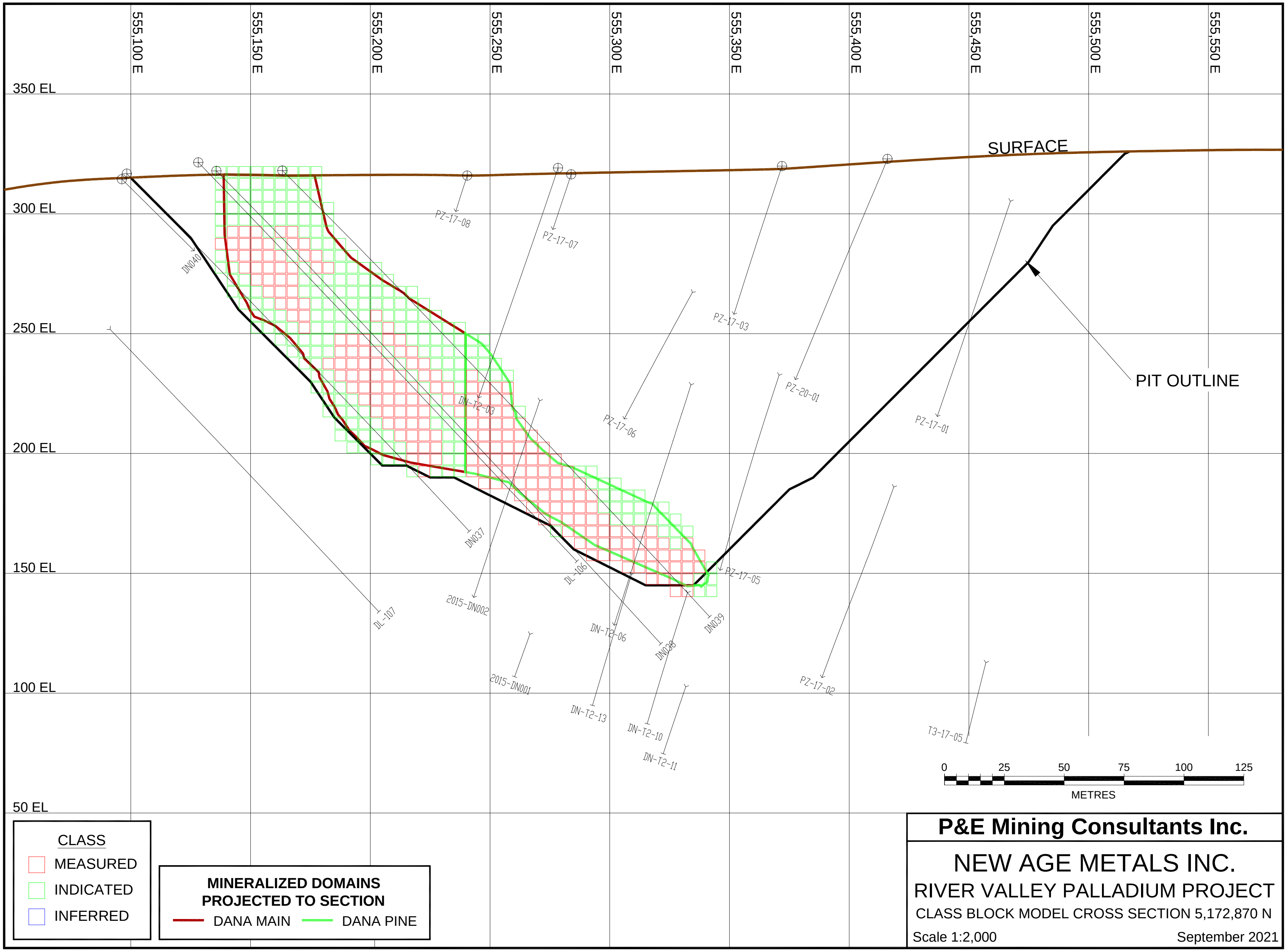
T3-17-04
0
25
50
75
100
125
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
DANA MAIN DOMAIN
CLASS BLOCK MODEL CROSS SECTION 5,172,720 N
Scale 1:2,000
September 2021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200 EL
150 EL
100 EL
50 EL
SURFACE
PIT OUTLINE
PZ-17-08
PZ-17-07
PZ-17-03
PZ-20-01
PZ-17-06
PZ-17-01
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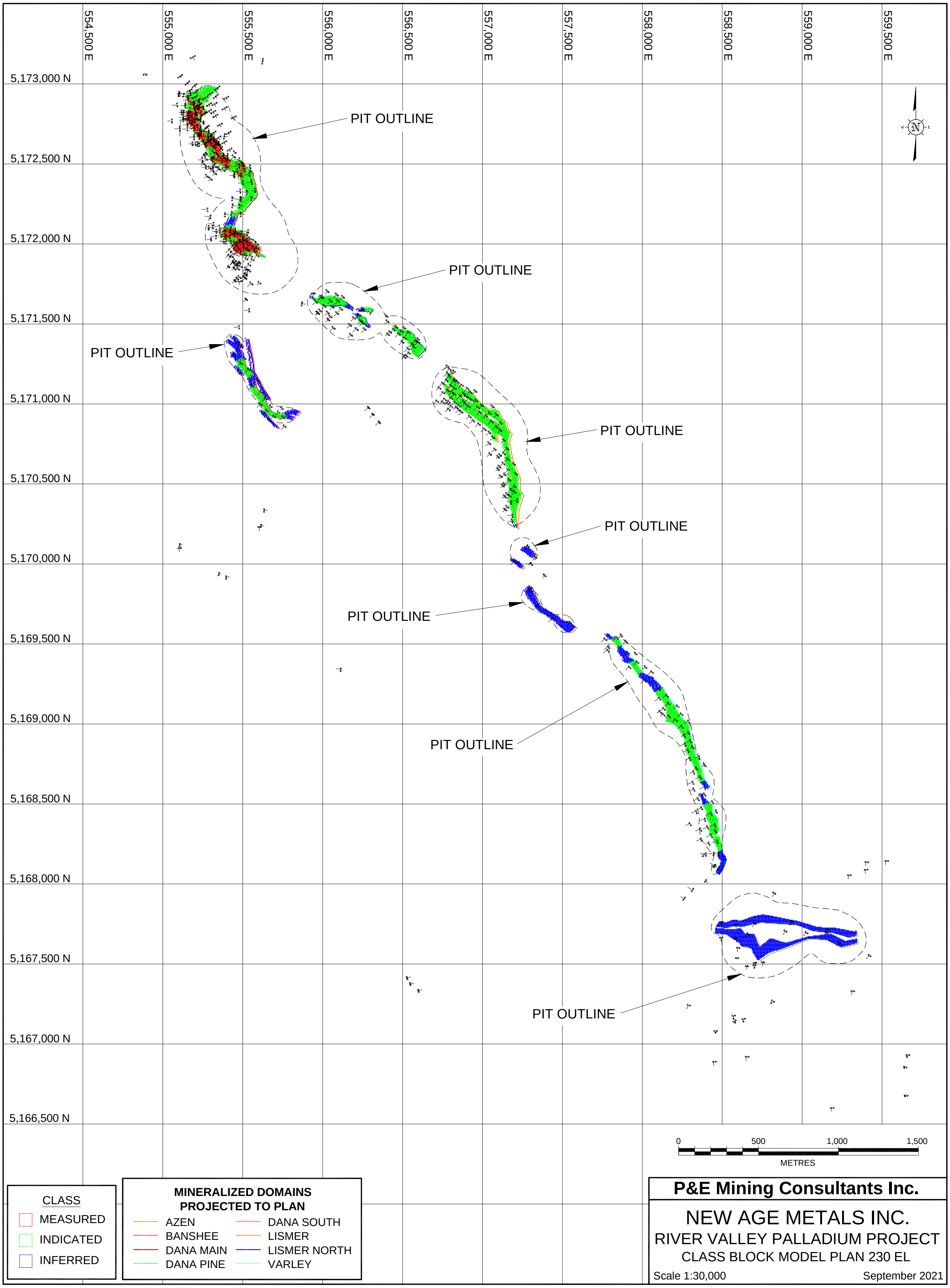
DN-T2-03
DN037
DL-106
DL-107
2015-DN002
2015-DN001
DN-T2-06
DN038
DN039
DN-T2-13
DN-T2-10
DN-T2-11
T3-17-05
0 25 50 75 100 125
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO SECTION
DANA MAIN
DANA PINE
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL CROSS SECTION 5,172,870 N
Scale 1:2,000
September 2021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PIT OUTLINE
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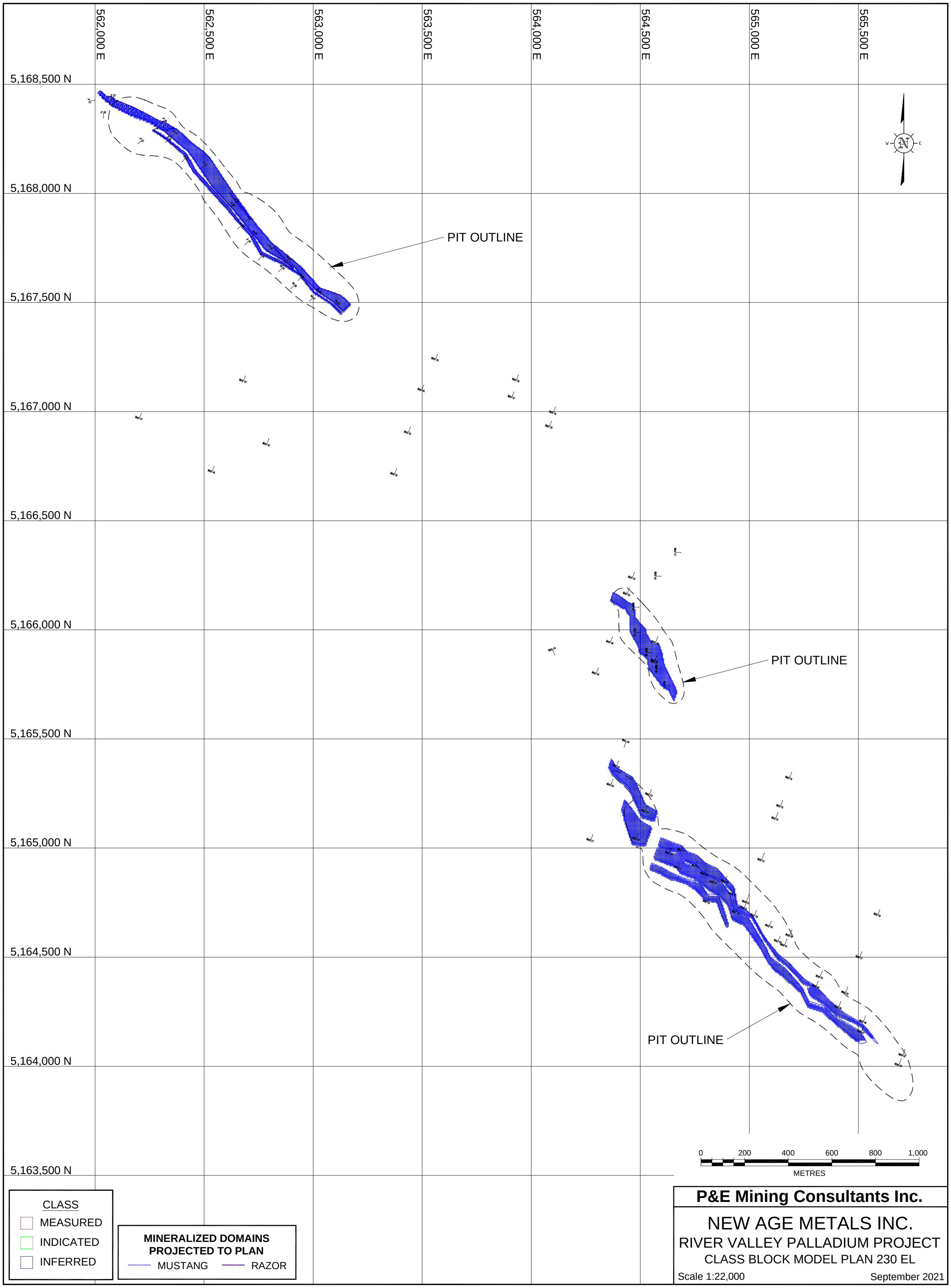
500
1,000
1,500
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL PLAN 230 EL
Scale 1:30,000
September 2021



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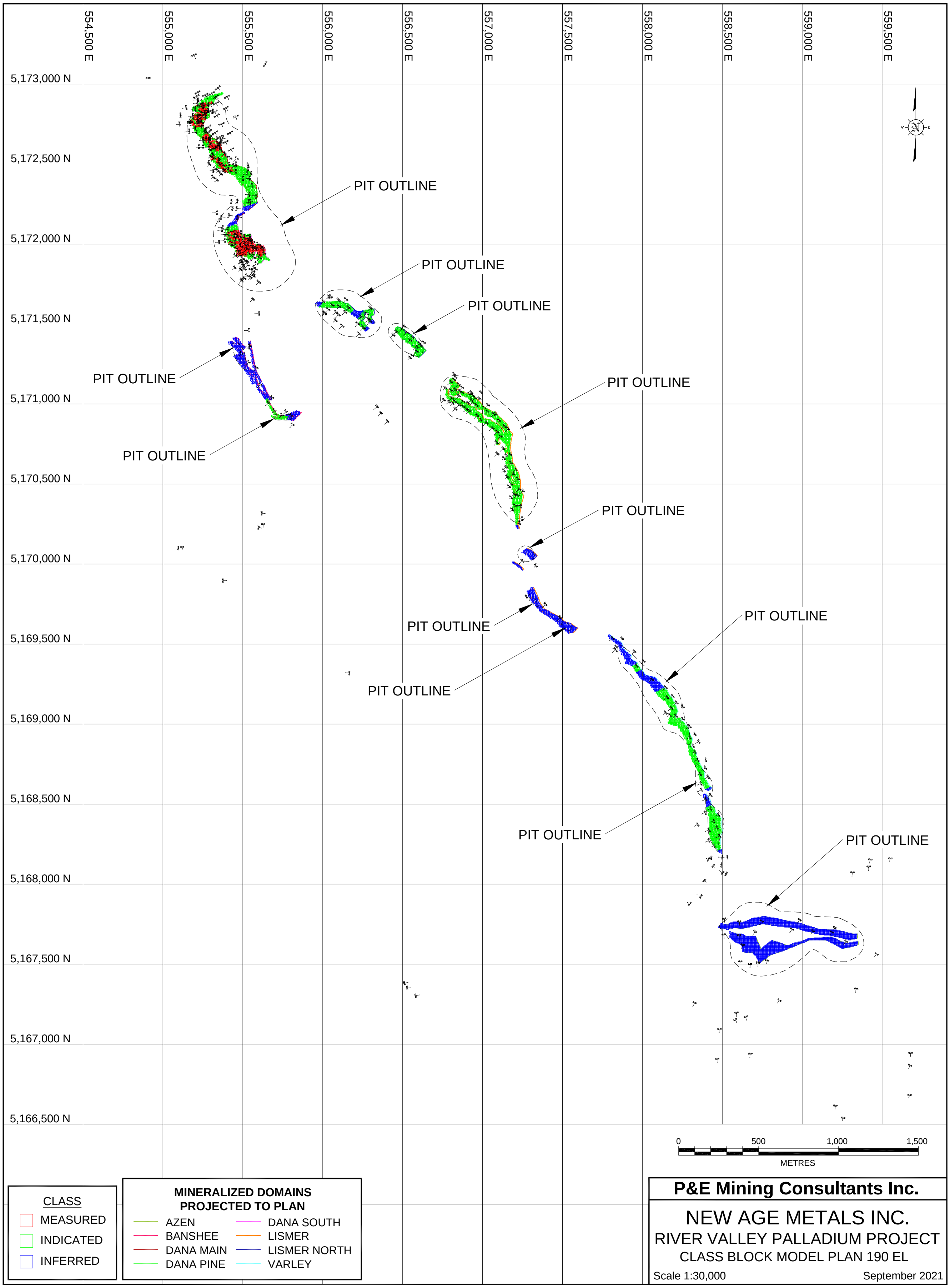
PIT OUTLINE
PIT OUTLINE
0 200 400 600 800 1,000
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS PROJECTED TO PLAN
MUSTANG
RAZOR
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL PLAN 230 EL
Scale 1:22,000
September 2021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PIT OUTLINE
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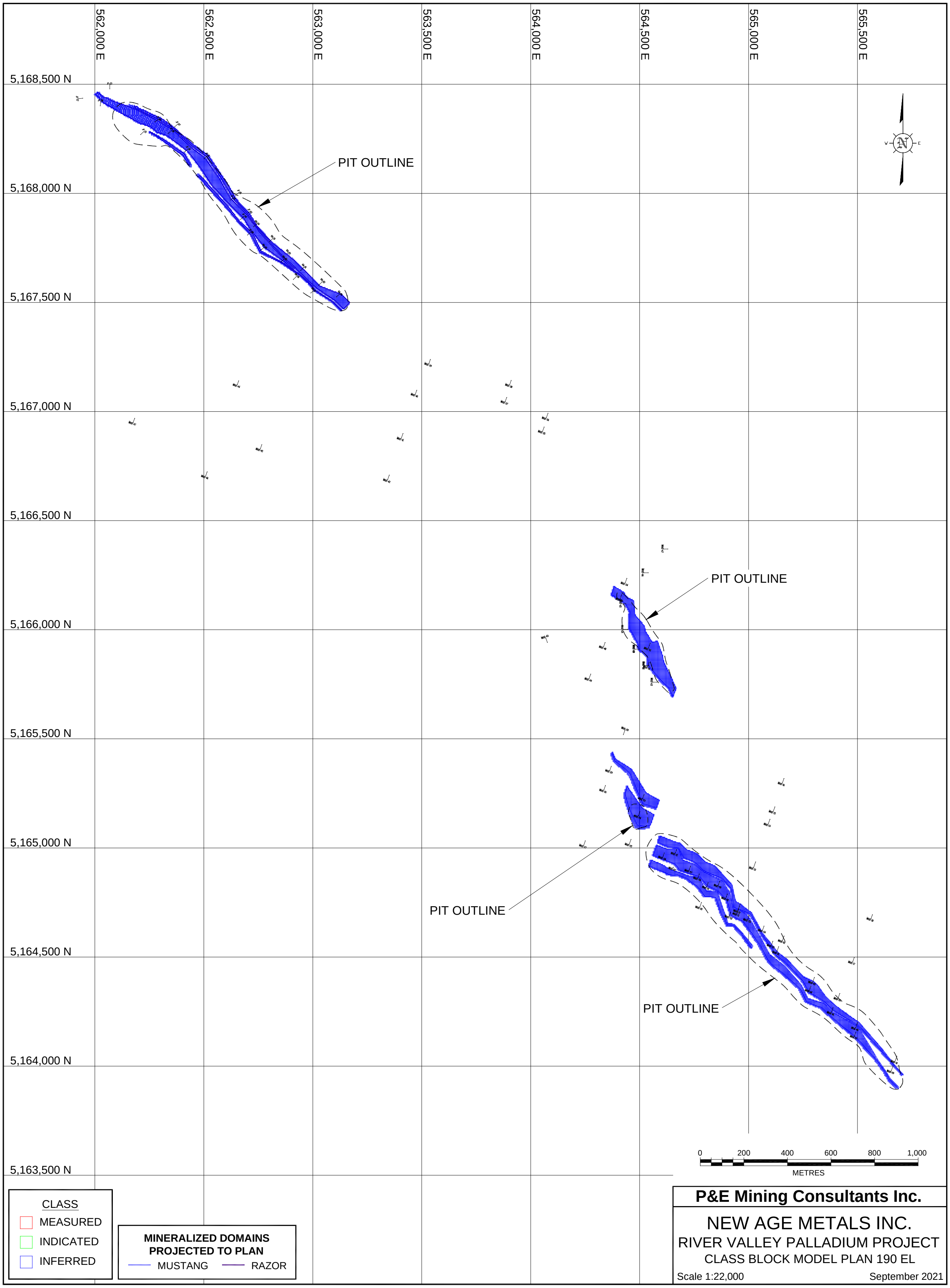
1,500
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL PLAN 190 EL
Scale 1:30,000
September 2021



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PIT OUTLINE
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200
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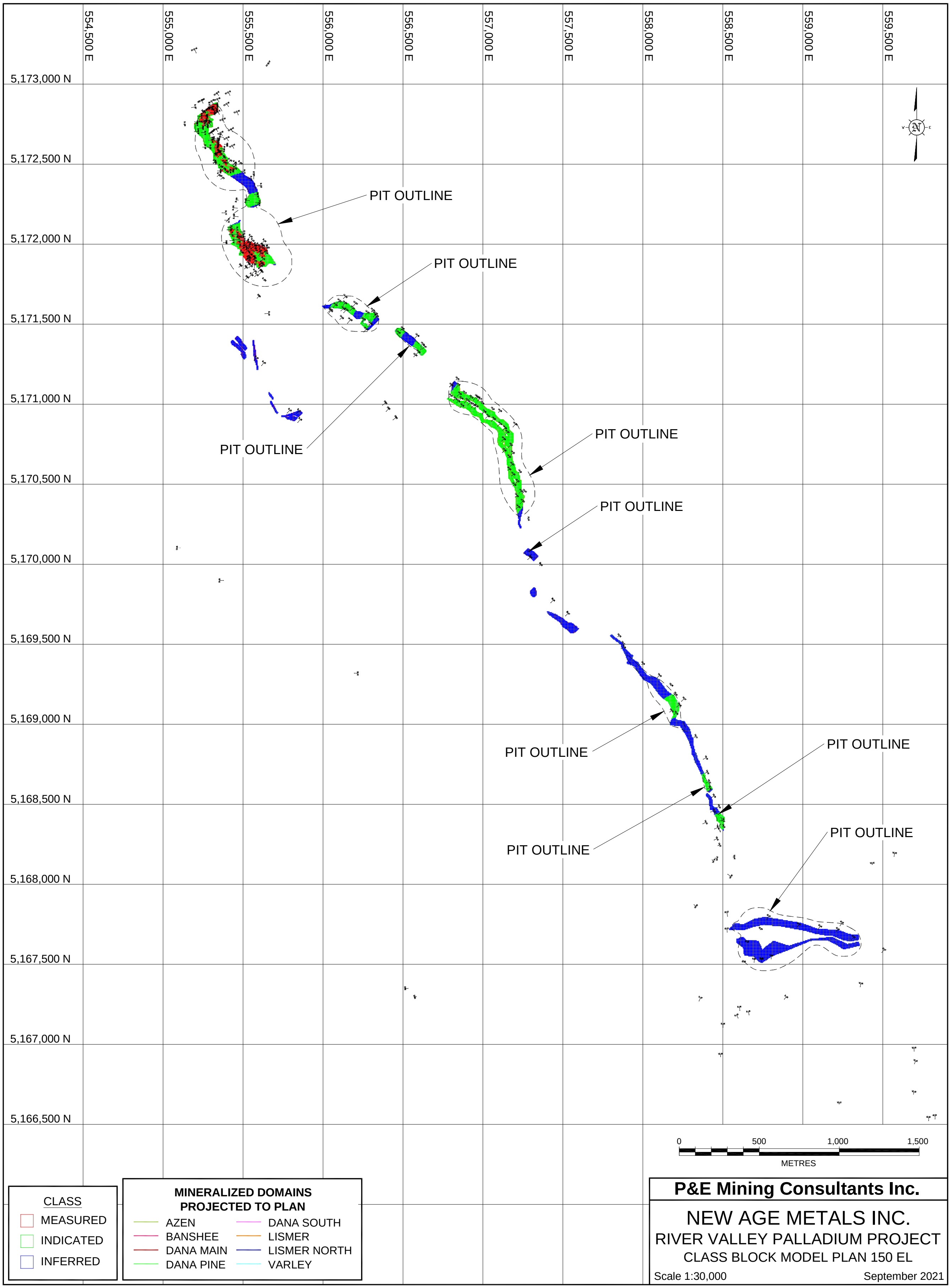
800
1,000
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO PLAN
MUSTANG
RAZOR
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL PLAN 190 EL
Scale 1:22,000
September 2021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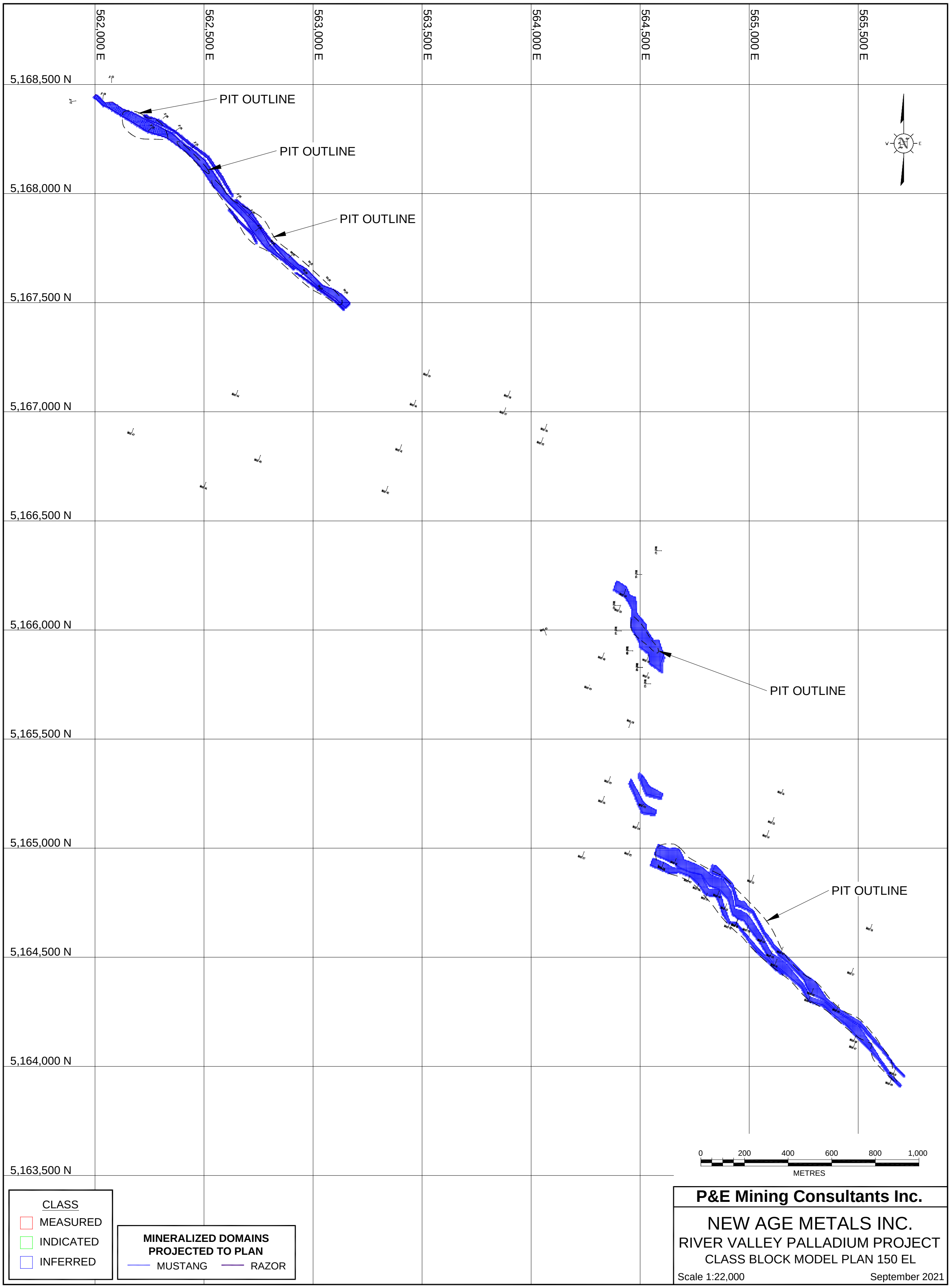
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO PLAN
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL PLAN 150 EL
Scale 1:30,000
September 2021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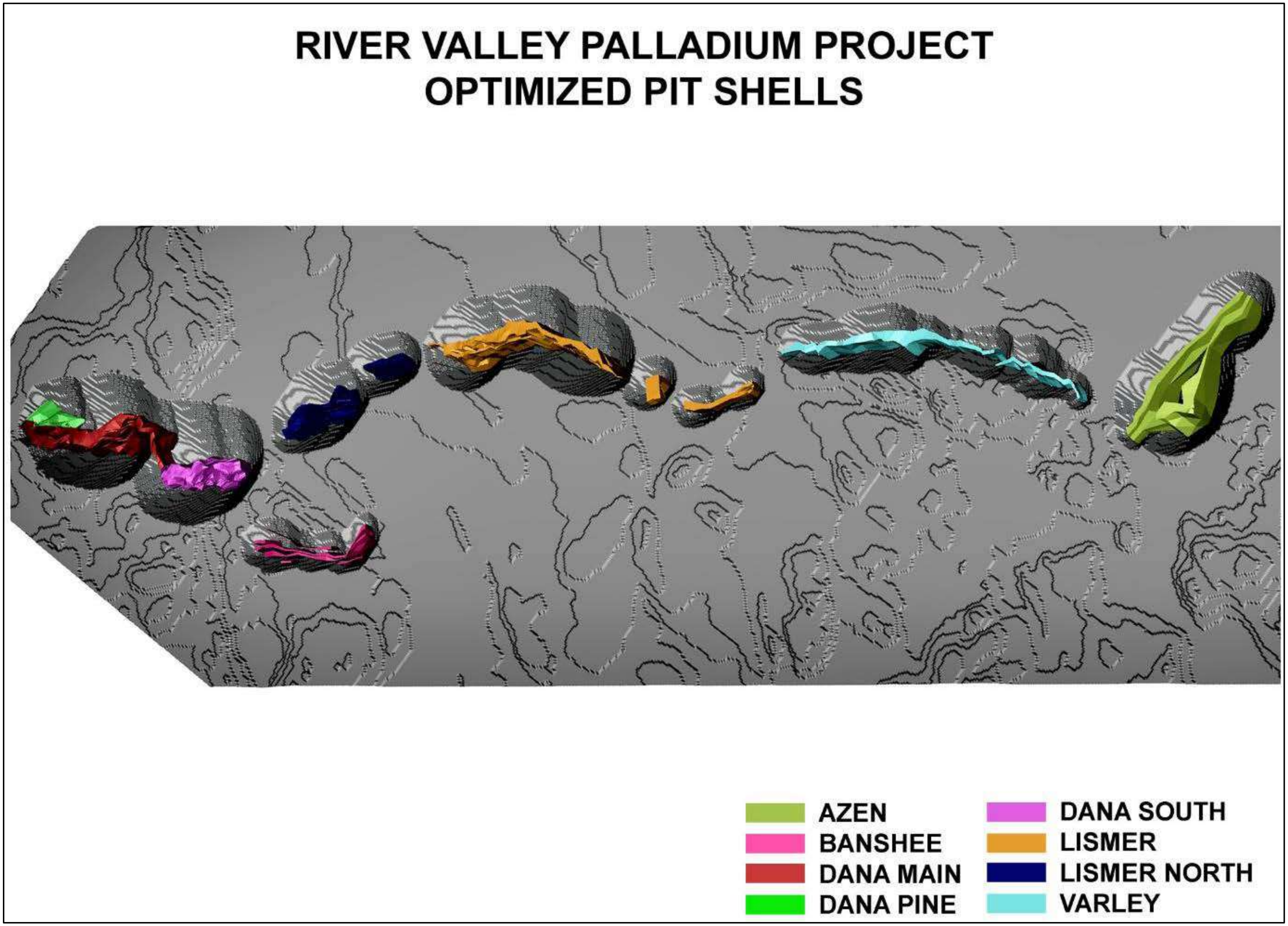
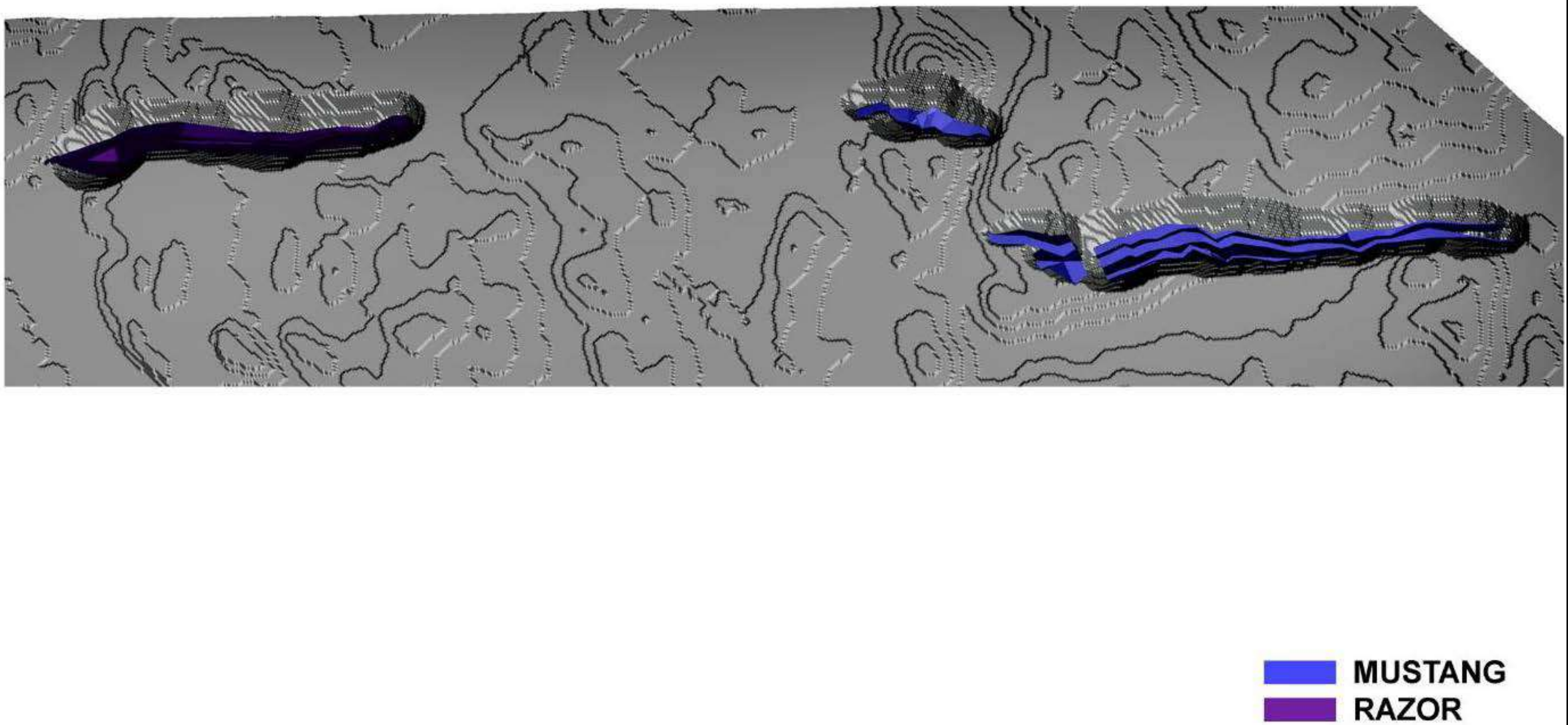
METRES
CLASS
MEASURED
INDICATED
INFERRED
MINERALIZED DOMAINS
PROJECTED TO PLAN
MUSTANG
RAZOR
P&E Mining Consultants Inc.
NEW AGE METALS INC.
RIVER VALLEY PALLADIUM PROJECT
CLASS BLOCK MODEL PLAN 150 EL
Scale 1:22,000
September 2021

APPENDIX H OPTIMIZED PIT SHELL


RIVER VALLEY PALLADIUM PROJECT
OPTIMIZED PIT SHELLS
AZEN
BANSHEE
DANA MAIN
DANA PINE
DANA SOUTH
LISMER
LISMER NORTH
VARLEY

RIVER VALLEY PALLADIUM PROJECT
OPTIMIZED PIT SHELLS



APPENDIX I LAND TENURE RECORDS

TABLE APPENDIX I.1
RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
102741	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
104765	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
104766	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
105097	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
105098	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
105591	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
105919	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
105921	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
105944	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
106519	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
106571	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
106572	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
107066	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-05-25	Active
109529	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
118059	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
120739	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
120770	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
120782	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
123988	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
123996	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
124148	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
125447	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
125448	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
127874	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active

Table Appendix I.1 **River Valley Property Mining Claims**					
Claim Number	**Mining Claim Type**	**Ownership (100%)**	**Registration Date**	**Due Date**	**Tenure Status**
127898	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
127899	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
128818	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
129263	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
130026	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
130032	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
130733	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-05-25	Active
131410	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
131411	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
131450	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
132079	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
132218	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
132754	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
132766	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
135986	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
135988	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
135991	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
136150	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
139358	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
140846	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
140848	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
140897	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
140898	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
140899	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
142943	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
147429	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
147430	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active

TABLE APPENDIX I.1
RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
147447	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
148207	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
148728	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
151890	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
151893	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
153888	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
155875	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
161091	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
163968	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
163974	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
165173	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
165270	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
165929	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
167144	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
168509	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
168510	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
168511	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
168514	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
168515	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
170243	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
170546	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
171854	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
171855	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
172386	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
172661	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
174020	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
174048	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active

TABLE APPENDIX I.1
RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
174874	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
177436	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
177437	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
177995	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
181353	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
182007	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
183413	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
183414	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
183415	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
183444	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
183473	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
184051	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
184071	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
184756	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
186618	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
187988	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
187992	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
188468	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
188469	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
188795	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
189442	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
190005	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-03	Active
190006	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-03	Active
191338	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
191366	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
192852	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
192853	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active

Table Appendix I.1 River Valley Property Mining Claims					
Claim Number	**Mining Claim Type**	**Ownership (100%)**	**Registration Date**	**Due Date**	**Tenure Status**
192891	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
192914	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
193344	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-05-25	Active
200331	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
200968	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
211603	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
215899	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
217301	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
218417	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
218418	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
218419	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
218680	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
218808	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
219331	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
219332	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-03	Active
220638	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
223261	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
223281	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
223852	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
224001	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
224002	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
224527	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
224550	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
226127	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
226371	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
226372	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
228145	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active

TABLE APPENDIX I.1
RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
228180	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
228181	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
228628	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
228629	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
228630	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
231272	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
231312	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
231313	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
231885	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
232529	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
232579	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
234446	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
234447	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
234448	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
234449	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
235834	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
235842	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
235923	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
237384	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
237385	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
237441	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
237559	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
237560	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
239407	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-03	Active
239408	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
239409	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-03	Active
239410	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active

TABLE APPENDIX I.1
RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
240756	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
240757	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
240778	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
240779	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
242130	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
243401	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
243402	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
244692	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
244724	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
244742	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
244743	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
248044	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
248077	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
249013	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
249014	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
249552	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
249568	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
251570	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
252094	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
254642	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
254643	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
254646	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
254647	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
254896	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
254897	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
254898	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
256217	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active

TABLE APPENDIX I.1 **RIVER VALLEY PROPERTY MINING CLAIMS**					
Claim Number	**Mining Claim Type**	**Ownership (100%)**	**Registration Date**	**Due Date**	**Tenure Status**
265649	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
271820	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
272511	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
272512	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
273590	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
273591	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
279263	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
279310	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
279910	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
280039	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
280040	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
280041	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
280577	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
280591	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
280593	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
282412	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
283790	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
283796	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
283797	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
284081	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
284082	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
284738	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
285671	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
285672	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
285673	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
285826	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
287175	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active

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RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
287176	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
287177	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
287204	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
287205	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
287281	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
288618	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
288663	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
290485	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
291984	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
291985	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
292141	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
292759	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
296139	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
296702	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
299235	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
299283	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
299284	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
300047	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
300048	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
300049	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
300050	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
300051	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
300141	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
300813	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
304121	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
304771	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
306029	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-03	Active

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RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
306030	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
307405	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
307406	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
310897	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
311563	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
312174	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
312175	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
315379	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
316152	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
316153	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
316157	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
316772	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
316773	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
317409	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
317442	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
317461	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
321720	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2025-06-02	Active
322541	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-03	Active
325179	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
331069	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
331070	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
331076	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
331077	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
336442	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
336936	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
337525	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-05-25	Active
338225	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active

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RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
338253	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-11-16	Active
338342	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
338889	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
338998	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
338999	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
339000	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
339001	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
339540	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
339560	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
342062	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
343662	Single Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
521421	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521422	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521423	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521424	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521425	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521426	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521427	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521428	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521429	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521430	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521431	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521432	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521433	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521434	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521435	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521436	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active

TABLE APPENDIX I.1 RIVER VALLEY PROPERTY MINING CLAIMS					
Claim Number	**Mining Claim Type**	**Ownership (100%)**	**Registration Date**	**Due Date**	**Tenure Status**
521437	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521438	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521439	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521440	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521441	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521442	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521443	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521444	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521445	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
521446	Single Cell Mining Claim	NEW AGE METALS INC.	2018-05-17	2024-05-17	Active
551042	Single Cell Mining Claim	NEW AGE METALS INC.	2019-06-04	2024-06-04	Active
551043	Single Cell Mining Claim	NEW AGE METALS INC.	2019-06-04	2024-06-04	Active
551044	Single Cell Mining Claim	NEW AGE METALS INC.	2019-06-04	2024-06-04	Active
551045	Single Cell Mining Claim	NEW AGE METALS INC.	2019-06-04	2024-06-04	Active
551046	Single Cell Mining Claim	NEW AGE METALS INC.	2019-06-04	2024-06-04	Active
551047	Single Cell Mining Claim	NEW AGE METALS INC.	2019-06-04	2024-06-04	Active
106193	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
106520	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
125099	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
132217	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
135987	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
140847	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
146312	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
148177	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
150739	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
168512	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-09-13	Active
194387	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active

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RIVER VALLEY PROPERTY MINING CLAIMS

Claim Number	Mining Claim Type	Ownership (100%)	Registration Date	Due Date	Tenure Status
241500	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
246712	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
288617	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
296138	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-02	Active
299234	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2024-06-10	Active
319441	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active
319442	Boundary Cell Mining Claim	NEW AGE METALS INC.	2018-04-10	2023-08-05	Active

Note: *Land tenure information effective June 29, 2023.*