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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
UTM NAD83 Zone 17T 555,371 E, 5,172,514 N

FOR
NEW AGE METALS INC.

NI 43-101 & 43-101F1
TECHNICAL REPORT

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P&E Mining Consultants Inc.
Report 355

Effective Date: June 27, 2019
Signing Date: August 7, 2019

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1.0 EXECUTIVE SUMMARY

The following Technical Report was prepared to provide a National Instrument ("NI") 43-101 Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment ("PEA") for the River Valley 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 Deposit is located at UTM NAD83 Zone 17T 555,371 m E, 5,172,514 m N. The River Valley Property ("the Property") mineralization is primarily platinum group elements ("PGE"), with Pd being the dominant metal and lessor amounts of Pt, Au, Cu, Ni and Co. Rh and Ag are also present, however, are not currently considered payable metals.

WSP Canada Inc. ("WSP") completed an Updated Mineral Resource Estimate for the River Valley Deposit with an effective date of October 31, 2018. P&E Mining Consultants Inc. ("P&E") completed this PEA based on the Updated Mineral Resource Estimate. The reporting of the Updated Mineral Resource Estimate complies with all disclosure requirements for Mineral Resources set out in the NI 43-101 Standards of Disclosure for Mineral Projects. The classification of the Updated Mineral Resource is consistent with CIM Definition Standards - For Mineral Resources and Mineral Reserves.

DRA Americas Inc. ("DRA") completed the metallurgical testing and process plant design aspects of the River Valley Project ("the Project") for this PEA.

1.1 PROPERTY DESCRIPTION, LOCATION, ACCESS, AND PHYSIOGRAPHY

The River Valley Property hosts a magmatic contact-hosted platinum-palladium-gold PGE Deposit located in northeastern Ontario, approximately 60 km northeast of Sudbury. 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. The Property claim group consists of 410 single cell mining claims and 40 boundary cell mining claims. The claims are located within Dana, Janes, McWilliams, and Pardo Townships. The claim groups are all contiguous and surround two mining leases that total 5,402.12 ha and are centered at approximately 555,371 m E and 5,172,514 m N (North American Datum ("NAD") 83-Universal Transverse Mercator ("UTM") Zone 17T). The claims are currently 100% owned by NAM, formerly known as Pacific North West Capital ("PFN").

The Property lies at a mean elevation of approximately 325 masl. Relief is moderate and typical of Precambrian Shield topography. The eastern part around Azen Creek is lower and marshy. Forest cover is mainly poplar with about 25 to 33% white pine regrowth.

The Property is accessed from Sudbury by traveling east along Trans-Canada Highway 17 for 50 km to the town of Warren, at this point turn north onto Highway 539. Travel north along Highway 539 for 22 km to the junction of Highway 805. Travel 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 mineralized zones. The Property lies at a mean elevation of approximately 325 masl. 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.

A 230 kV transmission line is located passing through 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.

Water is abundant in region from numerous lakes and rivers to support exploration programs and mining activities.

The City of Greater Sudbury, a major mining and manufacturing city, can provide all of the infrastructure and technical requirements for any exploration and development work.

1.2 HISTORY

The exploration history of the region dates back to the 1960s, with work on the Property starting in earnest in 1999, and exploration drilling starting in 2000 in the Dana Lake area. Surface and airborne exploration programs, along with numerous drill programs were carried out over the years to present day.

1.3 GEOLOGY, MINERALIZATION AND DEPOSIT TYPE

The Deposit is part of the Paleoproterozoic East Bull Lake Intrusive Suite, dated between 2,491 and 2,475 Ma, and mineralization consists of a total of nine distinct bodies of dominantly 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 estimated parental magma compositions for the East Bull Lake Suite Intrusives are thus broadly similar to those postulated for the intrusive suite in the world class Noril'sk-Talnakh nickel-copper-PGE camp in Siberia.

The three largest and most economically interesting mineralized bodies of the East Bull Lake Suite Intrusives 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). The River Valley Intrusion, the largest of the East Bull Lake Intrusive Suite by area, covers an area of approximately 200 km^2. An economically important feature commonly shared by the Agnew Lake, East Bull Lake, and River Valley Intrusions is the occurrence of a copper-nickel-PGE bearing breccia unit situated at the base of the intrusions, where the footwall contact is preserved.

The contact between the River Valley Intrusion and the Archean basement trends southeasterly for a distance of approximately 16 km. On the basis of surface mapping and diamond drilling, the idealized sectional stratigraphy of the mineralized environment comprises five major units, from the layered rocks of the River Valley Intrusion in the west to the igneous basal contact of the intrusion to the east.

The mineralized breccia unit occurring at the contact has been identified along most of the 16 km strike length. The contact is divided into several areas based on structural offsetting, alteration grades, and grade distribution. The zones of mineralized breccia starting in the northwest and proceeding to the southeastern extent of the contact on the Property are: Dana North, Dana South, Banshee, Lismer's Extension, Lismer's Ridge, Varley, Azen, Razor, and River Valley Extension.

Two styles of mineralization have been observed at the Project: contact nickel-PGE mineralization and reef PGE mineralization. The presence of several highly-anomalous assays from rocks lying within higher portions of the River Valley Intrusion's stratigraphy suggests that there are opportunities for PGE mineralization such as reef or stratabound-type targets, or narrow, high-grade breccia zones.

1.4 EXPLORATION AND DRILLING

NAM has conducted exploration on the Property since 1999, consisting of surface exploration, induced polarization ("IP") surveys and drilling.

In 2000 a total of 6,779 m of drilling in 40 holes was conducted in the Dana Lake area. 16,027 m in 98 holes were drilled in 2001, and 83 holes were drilled in 2002 at Lismer Ridge, Dana South and Banshee Lake. From late 2002 to May 2004 a total of 44,131 m in 208 holes were drilled, followed by 24,198 m in 123 holes in 2005. During 2011 and 2012 a total of 12,767 m in 46 holes were drilled in Dana North and Dana South.

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

In 2018 the Dana North/Pine Zone area was channel sampled. There was no drilling on the Property in 2018.

1.5 SAMPLE PREPARATION, ANALYSIS, SECURITY, QA/QC AND DATA VERIFICATION

It is WSP's opinion that the sample preparation, analytical procedures, security and QA/QC program meet industry standards and support the Updated Mineral Resource Estimate. It is also WSP's opinion that the data set is of sufficient quality to support the Updated Mineral Resource Estimate.

1.6 MINERAL PROCESSING AND METALLURGICAL TESTING

The earliest records for metallurgical testwork regarding the River Valley Project relate to metallurgical testwork on the Dana Lake Zone with these first tests conducted in 1999.

Since then, other metallurgical testwork and mineralogical studies have been carried out to assist in establishing viable process flowsheet options for obtaining a single sulphide concentrate containing both Platinum Group Metals (“PGEs”) and base metals.

The first of these metallurgical testwork programs was carried out in 1999 at the Michigan Technological University (“MTU”). Initial testwork included mineralogical analysis, bulk density measurements of the mineralization, physical characterization and pilot plant flotation on the Dana Lake mineralization to produce a sulphide concentrate containing PGEs and base metals.

In 2001, a testwork program was conducted on samples taken from 13 separate drill holes from the River Valley Deposit. These tests were carried out by the owner at the time, Anglo American Platinum Limited (“Amplats”), to determine mineralogical composition. Preliminary flotation tests were also carried out on these samples to determine the mineralogy of the concentrates produced and the recovery of palladium.

In 2004, the new owner of River Valley, Pacific North West Capital Corporation, contracted SGS Lakefield Research (“SGS”) to carry out kinetic flotation tests on River Valley Project drill core. The testwork produced a rougher concentrate.

In 2006, flotation testwork was carried out by Anglo-American Metallurgical Services on a sample of River Valley mineralization. The objective of the study was to investigate possible treatment routes to improve Platinum (“Pt”), Palladium (“Pd”) and Nickel (“Ni”) recoveries and the concentrate grades of these minerals. The effect of feed grind size, collector type and dosage, as well as the impact of dispersants, complexing agents and a higher energy input during flotation on grade-recovery relationship, was evaluated.

In 2013**,** scoping level metallurgical testing was conducted at SGS on a sample from the River Valley Deposit for Pacific North West Capital Corporation. The testwork program produced head grades and mineralogical compositions of the sample and concentrate for both the Dana South Zone (“DSZ”) and Dana North Zone (“DNZ”). A composite sample of both zones was generated with the following analysis conducted:

- 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”).

In February 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.

A significant amount of testwork was conducted and reviewed to develop a preliminary flowsheet for the development of the River Valley process plant design. The merits of a crushing, grinding and sequential flotation flowsheet were evaluated during the program and analyzed. Adequate testwork has been conducted to support the basis of this Technical Report.

The metallurgical programs concluded that a sequential flotation flowsheet for the recovery of PGE-bearing concentrate may be the preferred processing route. Improvements and optimization with further testwork will be required to confirm an increase in PGE recovery.

1.7 UPDATED MINERAL RESOURCE ESTIMATE

The Updated Mineral Resource Estimate was completed on the Dana North, Dana South, Pine, Banshee, Lismer, Lismer Extension, Varley, Azen, Razor, and River Valley Extension Zones, using the ordinary kriging ("OK") grade interpolation methodology on a composited borehole dataset consistent with industry standards. The database contains 710 drillholes with 106,554 assays records in the database, and 2,642 surface channel samplings. It was determined that grade capping was not required on any element in the dataset. The potential of smearing high-grade samples will be controlled by the kriging process. A block size of 2.5 m x 5 m x 2.5 m was selected in order to accommodate the nature of the mineralization and to be amenable for potential open pit extraction. Validation of the results was conducted through the use of visual inspection, swath plots, and global statistical comparison of the model against inverse distance squared ("ID2") and nearest neighbour ("NN") grade models.

The effective date of the Updated Mineral Resource Estimate is June 27, 2019. The Updated Mineral Resource is amenable to open pit mining. Table 1.1 summarizes the results of the Updated Mineral Resource Estimate using a 0.35 g/t PdEq cut-off grade for a pit constrained Mineral Resource Estimate and 2.00 g/t PdEq cut-off grade for potential underground Mineral Resource remnants. Table 1.2 summarizes the contained metal within the Updated Mineral Resource Estimate.

TABLE 1.1
RIVER VALLEY UPDATED MINERAL RESOURCE ESTIMATE
(USING 0.35 G/T PDEQ AND 2.00 G/T PDEQ CUT-OFF GRADES)

Classification	PdEq Cut-off (g/t)	Tonnes	Pd (g/t)	Pt (g/t)	Rh (g/t)	Au (g/t)	Cu (%)	Ni (%)	Co (%)	PdEq (g/t)
Measured	0.35	56,025,400	0.54	0.20	0.013	0.03	0.06	0.02	0.006	0.94
	2.00	71,300	2.33	0.75	0.036	0.09	0.12	0.02	0.002	3.38
	0.35+2.00	**56,096,700**	**0.54**	**0.20**	**0.013**	**0.03**	**0.06**	**0.02**	**0.006**	**0.94**
Indicated	0.35	43,153,300	0.49	0.19	0.003	0.03	0.05	0.02	0.006	0.84
	2.00	5,200	2.23	0.60	0.003	0.11	0.03	0.04	0.000	3.20
	0.35+2.00	**43,158,500**	**0.49**	**0.19**	**0.003**	**0.03**	**0.05**	**0.02**	**0.006**	**0.84**
Meas +Ind	0.35	99,178,700	0.52	0.20	0.009	0.03	0.06	0.02	0.006	0.90
	2.00	76,500	2.32	0.74	0.034	0.09	0.11	0.02	0.002	3.37
	0.35+2.00	**99,255,200**	**0.52**	**0.20**	**0.009**	**0.03**	**0.06**	**0.02**	**0.006**	**0.90**
Inferred	0.35	52,306,000	0.31	0.15	0.012	0.04	0.04	0.02	0.001	0.63
	2.00	-	-	-	-	-	-	-	-	-
	0.35+2.00	**52,306,000**	**0.31**	**0.15**	**0.012**	**0.04**	**0.04**	**0.02**	**0.001**	**0.63**

Note: *Total Meas +Ind = Total Measured + Indicated.*

TABLE 1.2
RIVER VALLEY UPDATED MINERAL RESOURCE ESTIMATE INSITU METALS (000S)
(USING 0.35 G/T PDEQ AND 2.00 G/T PDEQ CUT-OFF GRADES)

Classification	PGE + Au (oz)	Pd (oz)	Pt (oz)	Au (oz)	Rh (oz)	PdEq (oz)	Cu (lbs)	Ni (lbs)	Co (lbs)
Measured	1,394	983	362	49	23	1,701	74,209	24,705	7,405
Indicated	983	678	264	42	4	1,166	47,515	19,009	5,701
Meas +Ind	2,377	1,661	626	91	28	2,867	121,724	43,714	13,107
Inferred	841	521	252	67	20	1,059	46,071	23,036	1,152

Note: *Total Meas +Ind = Total Measured + Indicated.*
Metal units are in thousands.

1.8 MINERAL RESERVE ESTIMATE

There is no Mineral Reserve Estimate stated for the River Valley Deposit.

1.9 MINING METHODS

The River Valley Deposit is relatively shallow and lends itself to conventional open pit mining methods. Accordingly, the PEA mine plan entails developing 14 open pits aligned across approximately 16 km on the Property. An open pit mining and processing schedule has been developed for the Project. The mine 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.

Open pit optimizations were run based on an NSR cut-off value of $11.45/t and a pit slope angle of 48°, with a mining cost for all materials of $2.00/t. A slope angle of 50° for PEA level pit optimization was recommended by Mine Design Engineering Inc. (“MDEng”), and it was subsequently flattened by 2° in the pit optimizations to allow for haulage ramps. Benches and haul roads were added during the creation of each pit design.

Mining dilution of 9.5% and 3% mining losses at diluting grades that averaged 0.22 g/t PdEq were incorporated to estimate the diluted potentially mineable portion of the Updated Mineral Resource Estimate (process plant feed). Total process plant feed was estimated at 78.1 Mt at a LOM average grade of 0.88 g/t PdEq. Total waste material within the open pits was estimated at 278 Mt, giving a LOM strip ratio of 3.6:1. A production schedule was generated at 6.0 Mtpy process plant feed. The open pit production schedule consists of one year of pre-production for pre-stripping followed by 13 years of mining and a partial final year of stockpile reclaim. The target peak annual mining rate is 40 Mt tonnes of material per year, or 110,000 tpd.

It is assumed that the open pits will be operated as a contract mining operation using conventional open pit mining diesel equipment consisting of 254 mm rotary drills, 29 m^3 hydraulic excavators, 221 t off-highway haul trucks and auxiliary equipment. The open pit operation will require the development of several waste rock storage facilities (“WRF”) located immediately adjacent to the mining areas. A management and supervision team of NAM employees will direct the mining contractor. The River Valley mining operation will require a steady-state open pit workforce of approximately 189 personnel.

1.10 RECOVERY METHODS

The preliminary process plant design is derived from the results obtained from historical testwork with emphasis given to the pilot plant testwork program conducted by MTU in 1999 and the bench scale Locked Cycle Testwork (“LCT”) program conducted by SGS in 2013. The data and results were used to develop the process design criteria develop a mass and water balance, size the major equipment and develop an operating cost (“OPEX”) and capital cost estimate (“CAPEX”). The reason why these two particular tests were used as a basis for design is that they were based on the most optimized results obtained from all previous mineralogical, elemental deportment and kinetics tests, and because LCTs simulate how the actual process plant will be running, therefore, valuable predictions about the process can be made.

The run-of-mine ("ROM") mineralized material is crushed in a single primary crushing stage prior to the milling circuit. The grinding circuit consists of a SAG mill in closed circuit with a pebble crusher and two ball mills in parallel. These are followed by rougher-scavenger flotation, then by three stages of cleaner flotation, and are designed to process 21,920 tpd (6.0 Mtpy) of run-of-mine ("ROM") mineralized material.

The process plant will produce a single concentrate for sale using conventional sulphide flotation techniques. The flotation circuit configuration and design are based on the LCT conducted by SGS in 2013. Concentrate and tailings products will be dewatered using high-rate thickeners and the concentrate will be further dewatered by conventional plate and frame pressure filtration.

Process water will be recovered from the concentrate and tailings thickener overflow. Raw water is assumed to be sourced from the local environment and will be used as make-up water. It is assumed that 10% of the fresh water make-up will come from fresh water sources in case there is not enough recovered water from the tailings storage facility ("TSF") during winter or very dry conditions.

1.11 PROJECT INFRASTRUCTURE

There is currently no mining infrastructure at the River Valley Project site. The process plant, TSF, low grade stockpile, offices, and initial open pits to be mined will all be located in the northwest corner 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.

The process plant facilities will consist of the following:

- Primary crusher building;
- Grinding, flotation, thickening and filtration building that will also house areas for:
    - Laboratory,
    - Offices,
    - Lunchroom,
    - Medical services,
    - Control room,
    - Water treatment plant;
- Reagents storage and mixing building;
- Spare parts warehouse building;
- Main electrical substation.

Contracted mining operations are planned for open pit extraction. Infrastructure required includes access roads to each open pit and to overburden and waste rock storage areas. The contractor will install its own equipment maintenance facilities with the main location near the process plant. A portable office for supporting technical services is required for the owner's supervisory personnel. An explosives magazine and bulk explosives plant will be established by the mining contractor at required safe distances from the process plant/office/maintenance facility area.

There will be no camp facilities at site. Personnel and contractors will be responsible for their own housing and will travel from local communities.

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. It is assumed that electrical power will be provided by the local utility via either of these overland power lines. The total utilized electrical power estimate for the process plant, during steady state operation, is estimated at 26.7 MW. A diesel generator at the process plant will be used for emergency power generation.

Raw (fresh) water for the process plant will be withdrawn from local fresh water sources. A combined raw and fire 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. Effluent water from the process plant will be directed to a treatment plant.

Tailings management at River Valley will occur in two phases. For the first 5 to 6 years, tailings will be stored in a surface TSF constructed with an engineered single perimeter embankment. The embankment will be a downstream design constructed mainly with sized mine waste rock. The upstream embankment face will be composed of a protected, impervious layer which will be keyed into a solid rock base below the embankment. The impervious layer will be backed by a filter zone. Approximately 30 Mt of tailings will be stored on surface. To minimize size segregation of tailings solids, the tailings will be thickened in the process plant to 55% solids or higher before being pumped to the TSF for deposition.

At the end of 5 or 6 years of operation, the surface TSF will cease to operate. Thickened tailings will then be deposited under a water/ice cover in the mined-out open pits. A water cover will be maintained with the excess water clarified in dedicated surface ponds for either treatment and release or sent to the process plant as make up water.

1.12 MARKET STUDIES AND CONTRACTS

P&E followed the approximate long term price consensus forecasts by various banks and brokerage firms for Au, Pt, Ni and Cu. For Pd, Co and the CDN$:US$ exchange rate, these were adjusted to more closely follow recent trends. The metal prices and FX are listed in Table 1.3.

TABLE 1.3
METAL PRICE ASSUMPTIONS AND FX (US$)

Commodity	Au/oz	Pd/oz	Pt/oz	Ni/lb	Cu/lb	Co/lb	CDN$:US$
Price	1,350	1,200	1,050	8.00	3.25	35.00	1.37

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

1.13 ENVIRONMENTAL STUDIES, PERMITS, AND SOCIAL OR COMMUNITY IMPACTS

The River Valley Property is located equally distant from Sudbury and North Bay (100 km by road each) and 20 km north of the Trans-Canada Highway #17. The Property area is uninhabited with the closest full-time habitation 7 km south at Glen Afton, and at the village of River Valley a further 10 km southeast along the Sturgeon River. Previous exploration activities on the Property have included trenching, surface drilling, geophysical surveys, geological mapping and exploration trail development. No significant environmental liabilities related to previous exploration activities are known to exist at the Property. The trails and cleared zones to the east of the Deposit are the result of provincially-permitted forestry.

The River Valley Project, while a proposed large-scale mining project, is expected to have no discernable off-site impacts during development, operations and closure. No hazardous chemicals will be used to process mineralized feed material and the waste rock is not expected to be acid generating or metal leaching. Elements of potential concern often found with Mineral Resources (e.g. arsenic) are present at background concentrations. The Project will be designed for closure with mined-out pits to be used for tailings disposal 5-6 years after Project initiation and the initial TSF will be cease operation in the early years of mine life.

A major environmental aspect of the Project that will be outlined in a Project Description and in the expected Environmental Assessments is the intrusion of mine pits into the footprint of small and one larger surface water body (Pine Lake) on the Project site.

Baseline environmental studies for the Project have been limited to a 2011 study of surface water quality, sediment analyses and benthic identifications. More extensive baseline environmental studies will be required in the earliest stage of the Project development and for an Environmental Impact Assessment.

The federal and provincial Environmental Assessment (“EA”) processes and permitting framework for metal mining in Canada are well established. A requirement of an EA under federal legislation is anticipated for the River Valley Project. It is reasonably possible that a joint Federal-Provincial EA would be agreed upon by the respective agencies. Following the EA approval, the Project will enter a permitting phase which will regulate the Project through all phases - construction, operation, closure, and possibly post-closure. Throughout all of these processes, consultation with, and advice from, local First Nations and local communities is considered essential. The two First Nations are the Temagami First Nation which has an interest in the northern section of the Property, and the Nipissing First Nation which has an interest in the southern section. NAM has initiated these consultations.

Other than marginal timber resources, no Crown resources are affected by the Project. The construction of a power line allowance and a 115 KV transmission line will require Provincial approval. Upgrading of the 6 km trail to the Project from Glen Afton will be required to handle industrial transport and provide safe access for workers.

NAM will develop a reclamation and Closure Plan that will satisfy all regulatory requirements and will be consistent with best Canadian industrial practice. The Closure Plan will be submitted to the Ontario Ministry of Northern Development, Mines and Energy. The closed-out Project site should essentially be a "walk-away" situation, that is, no post operation active treatment should be required. Surface water quality should return to pre-mining conditions and pits will either be flooded, allowing aquatic biology to self-establish, or will be filled with tailings. A vegetative cover will be established on the in-pit tailings once self-consolidation of the tailings mass is completed.

1.14 CAPITAL AND OPERATING COSTS

Capital and operating costs are listed in Q2 2019 Canadian dollars ("$") unless otherwise stated as United States dollars ("US$").

1.14.1 Project Capital Costs

1.14.1.1 Mining Capital Costs

Mining capital costs are for pre-stripping Open Pit 1. A total of 7.7 Mt of material, mostly waste rock, will be mined during the pre-production period at a cost of $2.25/t for a total estimated cost of $17.3 M. A 1.5 Mt stockpile of process plant feed will also be established during pre-production.

1.14.1.2 Process Plant Capital Costs

The process plant capital cost estimate was compiled by DRA and is summarized in Table 1.4. DRA developed the process plant, plant infrastructure and plant indirect capital cost estimates for the Project scope described in this Technical Report. The process plant Total Installed Cost ("TIC") is estimated at $441 M (US$322 M).

TABLE 1.4
PROCESS PLANT CAPITAL COSTS IN US$

Description	Installation Cost	Material Cost	Equipment Supply Cost	Subcontractor	Total Installed
Factored Commodities					
Earthworks and Civil	$ 4,607,925	$ 511,992	$ -		$ 5,119,916
Concrete	$ 4,319,929	$ 5,279,914	$ -		$ 9,599,843
Structural Steel	$ 4,607,925	$ 6,911,887	$ -		$ 11,519,811
Platework	$ 2,303,962	$ 2,815,954	$ -		$ 5,119,916
Buildings, Architectural	$ -	$ -	$ -		$ -
Building Services	$ -	$ -	$ -		$ -
Electrical	$ 3,455,943	$ 2,419,160	$ 5,644,708		$ 11,519,811
Instrumentation	$ 2,687,956	$ 1,996,767	$ 2,995,151		$ 7,679,874
Piping	$ 6,399,895	$ 5,759,906	$ 639,990		$ 12,799,790
Insulation and Protection	$ 959,984	$ 959,984	$ -		$ 1,919,969
Subtotal Process Plant Factored Commo	**$ 29,343,519**	**$ 26,655,563**	**$ 9,279,848**	**$ -**	**$ 65,278,931**
Subtotal Process Plant	**38,468,560**	**31,249,563**	**59,559,759**	**$ -**	**$ 129,277,882**
Utilities					
Flocculant Plant	$ 157,281	$ 71,218	$ 237,412		$ 465,910
Air Reticulation	$ 235,774	$ 80,015	$ 471,618		$ 787,407
Process Water	$ 59,171	$ 54,897	$ 29,739		$ 143,806
Gland Water	$ 48,478	$ 44,949	$ 24,429		$ 117,856
Fire Water	$ 157,510	$ 169,207	$ 56,983		$ 383,700
Reagent mixing Plant	$ 300,850	$ 174,326	$ 394,117		$ 869,294
Subtotal Plant Utilities	**959,064.6**	**594,611.8**	**1,214,297.0**	**-**	**2,767,973.5**
Infrastructure					
Plant Terracing-General Site Clearing & Grub	$ 1,170,000				$ 1,170,000
Primary Crusher Building	$ 1,500,000	$ 2,025,000	$ 225,000		$ 3,750,000
Process Building	$ 15,400,000	$ 20,790,000	$ 2,310,000		$ 38,500,000
Reagent Storage	$ 480,000	$ 720,000	$ -		$ 1,200,000
Flocculant area	$ 300,000	$ 450,000	$ -		$ 750,000
Main Electrical Substation	$ 900,000	$ -	$ 3,600,000		$ 4,500,000
Overland Tailings piping	$ 506,250	$ 556,875	$ 61,875		$ 1,125,000
Water Treatment Plant	$ 415,938	$ 210,788	$ 583,275		$ 1,210,000
Satelite Communications System	$ 168,000	$ 93,600	$ 218,400		$ 480,000
Plant Mobile Equipment	$ 418,922		$ 3,770,302		$ 4,189,224
Subtotal Plant Infrastructure	**21,259,110**	**24,846,263**	**10,768,852**	**-**	**56,874,224**
Total Direct Cost	**60686734.92**	**$ 56,690,438**	**$ 71,542,907**	**$ -**	**$ 188,920,080**
Indirect Costs					
Contractor Field Indirects				$ 51,724,639.61	$ 51,724,640
Spare Parts				$ 2,382,390.34	$ 2,382,390
Initial Fills				$ 2,400,000	$ 2,400,000
Vendor Supervision				$ 2,382,390.34	$ 2,382,390
Freight, Transport and Insurance for Process Equipment				$ 5,723,432.57	$ 5,723,433
Freight, Transport and Insurance for Steel, EC&I & Piping				$ 2,544,926.63	$ 2,544,927
Third Party Engineering				$ 550,000.00	$ 550,000
Start-up/Commissioning Support				$ 1,786,792.76	$ 1,786,793
Engineering Procurement				$ 18,473,085.57	$ 18,473,086
Construction Management				$ 12,931,159.90	$ 12,931,160
Construction Power				$ 1,626,075.00	$ 1,626,075
Construction Fuel				$ 1,267,643.52	$ 1,267,644
Construction Camp and Catering					$ -
Taxes, Duties & Permits					$ -
1 year Spares & Inventory					$ -
Owner's Cost					$ -
Subtotal Indirect Cost	**-**	**-**	**-**	**103,792,536**	**103,792,536**
Subtotal Direct + Indirect	**$ 60,686,735**	**$ 56,690,438**	**$ 71,542,907**	**$ 103,792,536**	**$ 292,712,616**
Contingency				$ 29,271,261.60	$ 29,271,262
Project Total	**$ 60,686,735**	**$ 56,690,438**	**$ 71,542,907**	**$ 133,063,798**	**$ 321,983,878**

1.14.1.3 Site Infrastructure Capital Costs

Required site infrastructure located close to the process plant is estimated at $20 M. This includes connection to the nearby power grid, offices, gate house, fencing, site access roads, and construction of a dam on the eastern side of open pits 1 and 2 at the south end of Pine Lake.

1.14.1.4 Tailings Storage Facility Capital Costs

The cost to construct the tailings storage facility near the process plant site was estimated at $8 M. The TSF will be of sufficient size for up to 6 years of tailings storage. In-pit tailings storage in mined-out open pits will be utilized subsequently.

1.14.1.5 Owner Capital Costs

Owner capital costs were estimated at $5 M to support the owner's team during Project construction and for mining contractor mobilization.

1.14.1.6 Contingency

A 10% contingency was added to all capital costs except pre-stripping. The total contingency cost was estimated at $43.4 M.

1.14.1.7 Initial Project Capital Costs

A summary of the Project initial capital cost estimates is presented in Table 1.5.

TABLE 1.5
INITIAL PROJECT CAPITAL COST ESTIMATES

Item	Capital Cost ($ M)
Mining Pre-Stripping	17.3
Process Plant	401.3
Site Infrastructure	20.0
Tailings Storage Facility	8.0
Owner Costs	5.0
10% Contingency	43.4
Total	**495.0**

1.14.1.8 Sustaining Capital Costs

A reclamation bond paid over the LOM was estimated at $26 M to cover closure costs.

1.14.1.9 Salvage Value

The salvage value of the process plant is estimated at 10% of its direct capital costs, or $25 M.

1.14.2 Project Operating Costs

1.14.2.1 Mining Operating Costs

Owner mining operating costs were calculated from first principles and were estimated at $1.90/t material. 18% was added to the cost to allow for contractor profit and depreciation costs on equipment. A mining contractor cost over the LOM was thus estimated at $2.25/t of material mined. An additional cost of $0.03/t over the LOM was added for long hauls from the open pits in the southern half of the Property. Therefore, the total mining cost over the LOM was estimated at $2.28/t material. At a LOM strip ratio (waste:process plant feed) of 3.6:1 this equates to a cost of $10.17/t of process plant feed.

1.14.2.2 Process Plant Operating Costs

A summary of the process plant operating cost estimate is presented in Table 1.6. Direct employment during operations will total approximately 109 people.

According to Table 1.6, the total operating cost for the process plant is $8.44 (US$6.16) per tonne ROM material processed.

TABLE 1.6
PROCESS PLANT OPERATING COSTS

Item	Cost US$000/Year	Distribution %	ROM US$/t	PdEq US$/oz
Labour	7,982	21.58	1.33	43.87
Reagents	2,696	7.29	0.45	14.82
Consumables	13,264	35.87	2.21	72.90
Power	9,110	24.64	1.52	50.08
Maintenance	3,029	8.19	0.50	16.65
G&A Costs	900	2.43	0.15	4.95
Total OPEX	**36,980**	**100**	**6.16**	**203.27**

***Note**: ROM = run-of-mine, PdEq = palladium equivalent*

The largest contributors to the process plant operating cost are power, consumables and labour, contributing to 82.1% of the total process plant operating cost.

1.14.2.3 Site General and Administration Operating Costs

General and administration ("G&A") operating costs were estimated at $5 M/yr. Salaries included in G&A were for Management, Mine Management, IT, Security, Health and Safety, Environmental, Accounting, Purchasing, Warehouse, Community Relations and Human

Resources. Other items were general and office expenses, vehicles, software, consultants and insurance. This equated to a G&A unit operating cost of $0.86/t process plant feed over the LOM.

There will be no camp facilities at the Project site. All personnel will be responsible for their own housing and will travel from local communities.

1.14.2.4 Total Project Operating Costs

Table 1.7 presents a summary of estimated Project operating costs.

TABLE 1.7
OPERATING COST ESTIMATES

Item	Operating Cost ($/t)
Mining (per tonne material mined)	2.28
Mining (per tonne process plant feed)	10.17
Process Plant (per tonne process plant feed)	8.44
G&A (per tonne process plant feed)	0.86
Total	**19.47**

1.14.2.5 Site Manpower

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.

1.15 ECONOMIC ANALYSIS

The River Valley Project's economic results are summarized in Table 1.8 and indicate an after-tax net present value ("NPV") of $138 M at a 5% discount rate, an internal rate of return ("IRR") of 10% and a 7 year payback. The initial capital expenditure is estimated at $495 M. All currency values are expressed in Q2 2019 Canadian dollars unless otherwise noted. All cash flows are calculated for the period in which they are incurred and are not adjusted for incoming and outgoing payments.

TABLE 1.8
ECONOMICS RESULTS SUMMARY

Item	Pre-Tax	After Tax
Undiscounted NPV ($M)	586	384
NPV (5%) ($M)	261	138
IRR (%)	13	10
Payback (years)	6.6	7.0

A 3% NSR royalty is currently payable. NAM has the option to reduce the royalty to 1.5% upon making a $1.5 M payment. This cost has been scheduled in the Project financial model to make the $1.5 M payment at the end of the pre-production period in order that a 1.5% royalty is applicable during the production years.

In the first year of production (Year+1), the process plant is assumed to achieve 70% of the nameplate throughput capacity, or 4.2 Mt processed compared to steady-state 6.0 Mtpy design capacity. The process plant will produce a single concentrate for sale using conventional sulphide flotation techniques. It has been assumed that it will be a copper concentrate and will be transported by road to the Sudbury area for smelting and refining. The transport cost has been estimated at $20.6/wet tonne. The moisture content of the concentrate has been assumed to be 8%. Treatment costs (estimated at $123/t), payable metal content, refining costs, marketing, insurance, security and assaying supervision costs have been estimated according to other recent copper concentrate (with PGE credits) contracts that exist in the mining industry.

Mining operations in non-remote areas of Ontario are subject to three tiers of taxes: a federal income tax of 15% under the Income Tax Act (Canada), a provincial income tax of 11.5%, and an Ontario mining tax of 10%. The Ontario tax is applied to the annual profit in excess of $0.5 M. A mining tax exemption of up to $10 M of profit during an exempt period is available for each new mine. The exempt period for a non-remote mine is three years.

The estimated annual LOM cash flow for the River Valley Project is summarized in Table 1.9.

TABLE 1.9
CASH FLOW SUMMARY

Item	Unit	Amount
MINE PRODUCTION		
Waste Mined	Mt	276.4
Overburden Mined	Mt	1.2
Process Plant Feed Mined	Mt	78.1
Total Material Mined	kt	355.7
REVENUE		
	US$(M)	1,930.4
	CDN$(M)	2,644.6
ROYALTIES		
Royalty Payable Including $1.5 M Payment	CDN$(M)	41.2
OPERATING COST		LOM
Mining Cost	$/t material	2.28
Mining Cost	$/t plant feed	10.17
Processing Cost	$/t plant feed	8.44
G&A	$/t plant feed	0.86
Unit Operating	$/t plant feed	19.47
CASH FLOW (LOM)		
Revenue from Concentrate	CDN$(M)	2,644.6
(-) Operating Cost	CDN$(M)	- 1,521.3
(-) Royalties	CDN$(M)	- 41.2
(-) Taxes	CDN$(M)	- 202.5
(-) Capital Spending	CDN$(M)	- 496.1
Cash Flow (undiscounted)	CDN$(M)	383.8
Cash Flow (5%)	CDN$(M)	137.7

Note: *LOM = Life of Mine.*

The River Valley Project sensitivity analysis was conducted on metal price and cost variables. The results are shown in Figure 1.1 and Figure 1.2.

Changes in metal prices will have the greatest impact on the Project economics while capital costs will have the least impact. For instance, the palladium price as of June 25, 2019 was US$1,510/oz, which would return a pre-tax IRR of 21% and an after-tax IRR of 16%.

FIGURE 1.1 NPV 5% SENSITIVITY

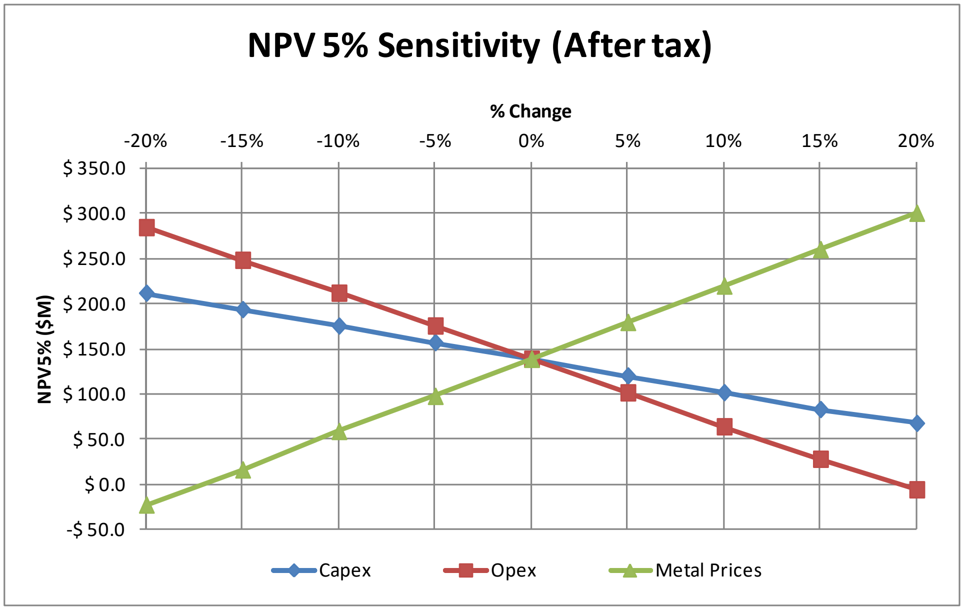
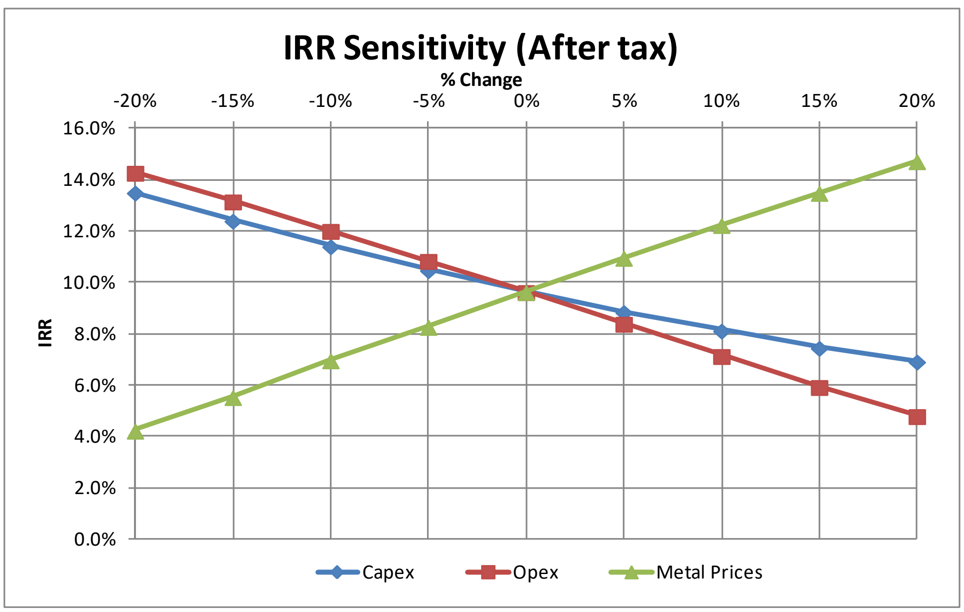


FIGURE 1.2 IRR SENSITIVITY



1.16 PROJECT RISKS AND OPPORTUNITIES

1.16.1 Risks

Approximately 27% of the contained metal at the reported PdEq cut-off grade in the current Updated 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.

Since this study is at a PEA level of engineering and costing, 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.

There have been no bulk density measurements done on waste rock and the tonnage of waste rock in the open pit designs could be higher or lower than noted in the LOM mine production schedule.

Further study is required on the geochemistry of the waste rock since acid generating rock may entail more onerous placement and water treatment costs.

There is currently limited geotechnical information other than rock quality designation (“RQD”) logging and visual inspection of the drill core, and there is no hydrogeological information. Mining costs could increase if poor ground conditions or significant water inflows are encountered.

There is limited metallurgical testwork and parameters such as grind size, flotation performance and metal recovery may not be as assumed in this Technical Report.

1.16.2 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.

The Pine Zone is a recent discovery that is not well understood compared to the contact mineralization. More exploration and study is required since this may expand the Mineral Resource near surface and at depth with higher nickel/PGE values.

Since the majority of production is planned from the four northerly pits, exploration should be concentrated in this region to expand the mine life at potentially reduced mining costs.

The applicability of new innovative technologies to improve PGE recoveries can be investigated.

Rhodium (“Rh”) and silver (“Ag”) grades are included in the Updated 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.

It may be possible to backfill mined-out open pits with waste rock, which will shorten the waste haulage distances and minimize environmental disturbance.

With well-developed open pit grade control programs and blast optimization studies, it may be possible to reduce mining dilution and improve process plant feed grades.

1.17 CONCLUSIONS

1.17.1 Summary

P&E concludes that the River Valley Project has economic potential as an open pit mining operation, utilizing an on-site processing plant to produce a bulk copper concentrate that contains PGE's. The PEA outlines 78 Mt of process plant feed (inclusive of mining dilution and loss factors) with payable metals averaging 0.54 g/t Pd, 0.21 g/t Pt, 0.04 g/t Au, 0.06% Cu, 0.02% Ni, 0.003% Co for a PdEq grade of 0.88 g/t within 14 open pits. The Project has an estimated initial capital cost of $495 M, a strip ratio at 3.6:1, and estimated economics of an after-tax NPV of $138 M at a 5% discount rate, an after-tax IRR of 10%, and a seven year payback period using metal prices of US$1,200/oz Pd, US$1,050/oz Pt, US$1,350/oz Au, US$3.25/lb Cu, US$8.00/lb Ni, US$35.00/lb Co and an exchange rate of US$1.00 = CDN$1.37.

P&E recommends that NAM advance the River Valley Project with extended and advanced drill exploration and technical studies with the intention of moving the Project toward a production decision.

1.17.2 Conclusions and Interpretations

The Property is currently held 100% by NAM.

NAM has a strong understanding of the regional and local geology to support the interpretation of the mineralized zones on the Property. Mineralization is currently defined in nine zones of various thicknesses over a strike length of approximately 16 km.

IP surveys on the footwall contact of the River Valley intrusive have identified an extension of the mineralization (the Pine Zone), which opens up a new area for exploration on the Project. Targets have been discovered on the Property with characteristics of reef-style mineralization that warrant further investigation.

At a PdEq cut-off grade of 0.35 g/t, the combined Updated Measured and Indicated Mineral Resource constrained within a pit shell is 99.2 Mt with an average grade of 0.52 g/t Pd, 0.29 g/t Pt, 0.06 g/t Rh, 0.03 g/t Au, 0.05% Cu, 0.03% Ni, and 0.006% Co. The Updated Inferred Mineral Resource totals 52.2 Mt with an average grade of 0.31 g/t Pd, 0.15 g/t Pt, 0.0 g/t Rh, 0.03 g/t Au, 0.05% Cu, 0.03% Ni, and 0.001% Co.

At a PdEq cut-off grade of 2.00 g/t, the combined Updated Measured and Indicated Mineral Resource underground constrained potential is 76 Kt with an average grade of 2.32 g/t Pd, 0.74 g/t Pt, 0.03 g/t Rh, 0.09 g/t Au, 0.12% Cu, 0.02% Ni, and 0.002% Co. There is no underground constrained Updated Inferred Mineral Resource at this cut-off grade.

The Updated Mineral Resource Zones at the Property remain open in the down-dip direction.

The potentially mineable portion of the Updated Mineral Resource Estimate was determined to be 78 Mt at a PdEq grade of 0.88 g/t from 14 open pits. Waste rock and overburden material was estimated at 278 Mt for a LOM strip ratio of 3.6:1.

Conventional open pit mining equipment and methodologies will be utilized. Contractor mining is planned in order to reduce initial capital costs compared to an owner-operated strategy. The contractor will supply its own maintenance and explosives facilities.

In general, the mine plan initially targeted the large zones in the northwest area of the Property, then advanced southeast. Waste rock storage facilities were designed alongside each open pit, however, there will be opportunity to backfill mine-out pits with waste rock.

Connection to the nearby electrical power grid is planned.

The initial mine site infrastructure planned for the northwest corner of the Property is compact, and NAM will strive to contain this small footprint during future operations. There will be no camp facilities at site. Personnel and contractors will be responsible for their own housing and will travel from local communities. An office complex for NAM management and supporting technical services is required.

Tailings management at River Valley will occur in two phases. For the first 5 to 6 years, tailings will be stored in a surface facility behind within an engineered embankment. Approximately 30 Mt of tailings will be stored on surface. Subsequent tailings will be deposited into mined-out open pits.

Effluent water from the process plant will be directed to a treatment plant. Raw (fresh) water for the process plant will be drawn from local fresh water sources.

The historical metallurgical testwork conducted to date is preliminary but adequate to confirm that a conventional crushing, grinding and flotation flowsheet is required for the production of a single PGE-rich sulphide concentrate. The preliminary River Valley process plant flowsheet and design allows for the treatment of the plant feed as per the process production schedule. The design considers three stages of cleaner flotation. The River Valley processing plant is designed to process 21,920 tpd (6.0 Mtpy) of ROM material.

The testwork to date revealed that a PGE recovery of approximately 80% can be attained for the samples tested. Since the testwork conducted to date is considered preliminary, it is understood that there is potential for PGE and base metal recovery improvements with the completion of an optimized and targeted metallurgical testwork program in the future. Fresh drill core should be obtained for new metallurgical testwork.

The River Valley Project, while a proposed large-scale mining project, is expected to have no discernable off-site impacts during development, operations and closure. No hazardous chemicals will be used to process plant feed material, and the mineralized material and waste rock is not expected to be acid generating or metal leaching.

No significant baseline environmental studies have yet been performed for the River Valley Project. These studies will establish baseline conditions for a detailed Environmental Assessment that will likely be required for the River Valley Project.

The federal and provincial Environmental Assessment ("EA") processes and permitting framework for metal mining in Canada are well established. Following the EA approval, the River Valley Project will enter a permitting phase which will regulate the Project through all phases - construction, operation, closure, and possibly post-closure. Throughout all of these processes, consultation with, and advice from, local First Nations and local communities is considered essential.

NAM will need to develop a reclamation and Closure Plan that will satisfy all regulatory requirements and will be consistent with best Canadian industrial practice.

Open pit mining costs have been estimated to average $2.28/t material over the LOM. At a strip ratio of 3.6:1, mining costs equate to $10.17/t of process plant feed. Processing costs ($8.44/t) and site G&A ($0.86/t) contribute to a total LOM cost of $19.47/t processed.

Initial capital costs are estimated at $495 M and include a 10% contingency. Sustaining capital costs are estimated at $26 M, and a salvage value is estimated at $25 M.

Using the PEA metal pricing of US$1,200/oz Pd, US$1,050/oz Pt, US$1,350/oz Au, US$3.25/lb Cu, US$8.00/lb Ni, US$35.00/lb Co and an exchange rate of US$1.00 = CDN$1.37, the Project has an estimated pre-tax NPV at a 5% discount of $261 M and an IRR of 13%. Post-tax NPV and IRR are estimated at $138 M and 10%, respectively. A 1.5% NSR royalty is payable after a payment of $1.5 M. NPV figures calculated on an after-tax basis factor in a 15% Federal income tax rate, an 11.5% Provincial tax rate and a 10% Ontario mining tax.

The PEA has highlighted several opportunities to increase Project economics and reduce identified risks. These include exploration opportunities to improve the quantity and quality of Mineral Resources and opportunities to optimize the mine plan.

1.18 RECOMMENDATIONS

Additional exploration and study expenditures are warranted to improve the viability of the Project and advance it towards a Pre-Feasibility Study. It is recommended that NAM undertake a two-stage exploration program focused on delineation and expansion drill programs that will concentrate on the open pit potential along strike and down-dip of the known Mineral Resources.

It is recommended that the Phase 1 activities be completed before commencing the Phase 2 activities.

1.18.1 Phase 1

The first exploration program in Phase 1 is planned to expand and increase confidence in the Mineral Resource by improving classification categories in the Dana North area for which 5,000 m of drilling is planned. The Dana North area contains the bulk of the mineralization to be mined in the PEA production plan.

The Dana North area contains the newly discovered Pine Zone. The Pine Zone is located east of the main River Valley Deposit in an area previously not known for mineralization. The 2016 drill program confirmed the higher-grade near-surface PGE discovery made in the 2015 drill program and highlighted the continuity of the PGE mineralization into the footwall. The Pine Zone remains open along strike and at depth.

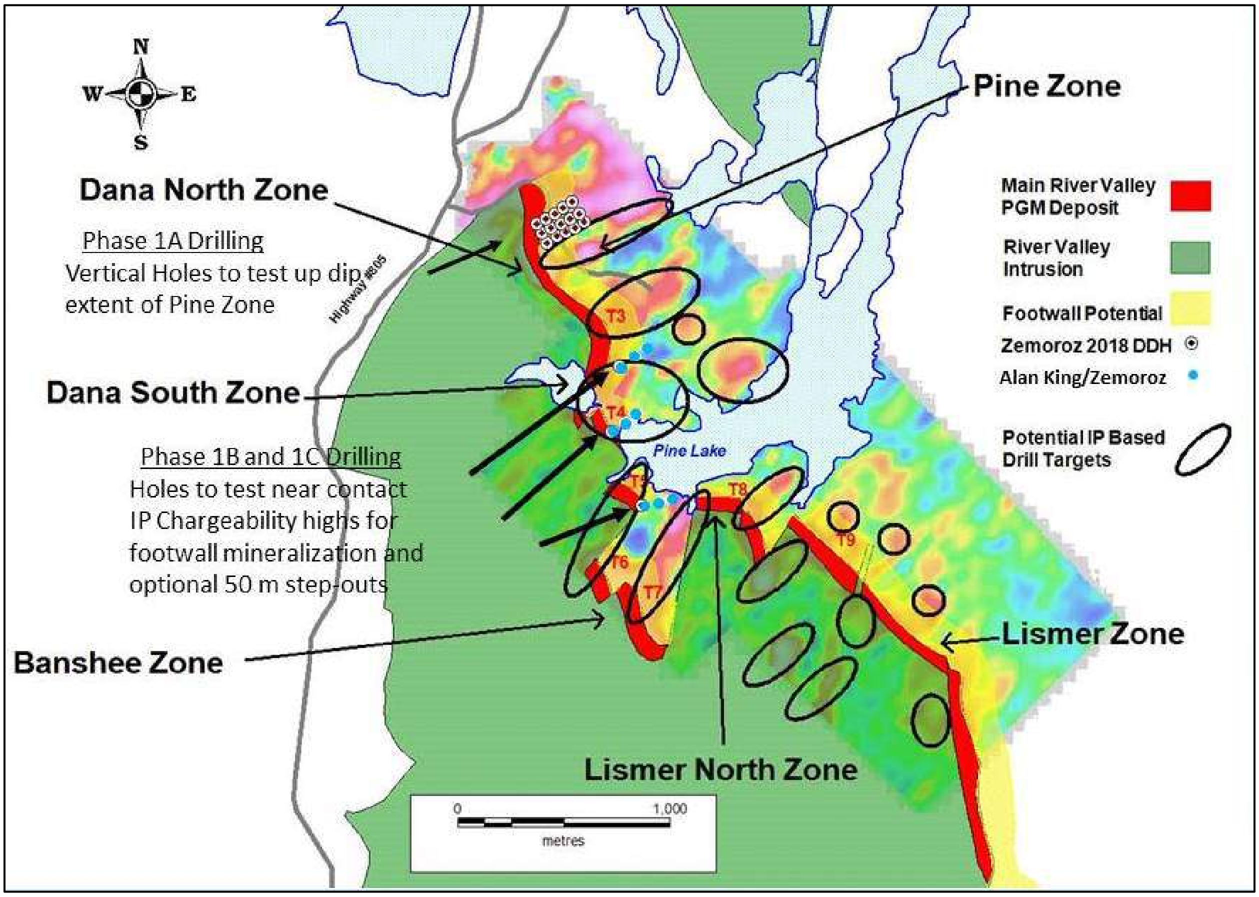
After examination of the data from the 2011 infill drill campaign it was noticed that there appeared to be a repetition of the main breccia zone on the other side of the Archean footwall rocks. Subsequent 3D modelling of the data suggested the existence of an extension of the Deposit eastwards and tucked below the footwall rocks. The 2015 drill program seemed to confirm this theory and it was collaborated by the 2016 drill program results. This new mineralized area was dubbed the "Pine Zone" and in effect is the same mineralization as the main Deposit. An Induced Polarization ("IP") survey was planned based on data obtained from the drilling results. This facilitated the planning and optimal orientation of the grid and allowed a more refined resolution of the ensuing IP survey. This survey was done in the spring of 2017 and was successful in defining many zones of moderate to high chargeability underlying the footwall rocks to the east of the Deposit. Some of these chargeability zones were tested with a drill program in the fall of 2017. All but one hole drilled encountered the Pine Zone. This unit was intersected in drill holes as far as 200 m from the surface projection of the Deposit.

A similar IP survey was conducted in 2018, extending the coverage to 4 km of footwall adjacent to the Deposit. This survey also identified numerous zones of high chargeability adjacent to the Deposit. These zones have yet to be drill tested. The Pine Zone is open to the east and south. In Dana South the Pine Zone appears to come to the surface along the shores of Dana Lake.

A 5,000 m drill program is recommended to test the up-dip extension of the Pine Zone in Dana North and to test some of the better chargeability highs identified in the previously completed IP surveys, see Figure 1.3.

- Phase 1A is composed of three fences of short vertical holes on a nominal 5 x 50 m pattern to test the up-dip and easterly extension of the Pine Zone and the vertical depth of the Pine Zone.
- Phase 1B is to test chargeability highs along and east of the Deposit where good assays were obtained.
- Phase 1C is step-out drilling from Phase 1B in 50 m intervals to test the lateral extent of any mineralization.

FIGURE 1.3 PLAN VIEW SHOWING RECOMMENDED PHASE 1 EXPLORATION



Source: *NAM (2019)*

Follow-up on step-out drilling will be planned based on the results of this program.

IP surveys on the footwall contact of the River Valley intrusive have identified a new style of mineralization (the Pine Zone), which opens up a new area for exploration on the Project. It appears that the Pine Zone is a shelf-like extension of the Deposit that potentially extends the entire 16 km strike length of the Deposit. This raises the potential of adding significantly to the existing Mineral Resource. Several new IP targets south the Pine Zone have been identified for future drilling. An IP program south of the Pine Zone over approximately 12 km is recommended on the adjacent footwall rocks and any identified zones of high chargeability that will need to be drill tested.

Another exploration program in Phase 1 (Phase 1D) should test footwall targets along the Deposit. This is a large program, with 50,000 m planned.

After logging and sampling analysis, the fresh core should be preserved and submitted for mineralogical studies and metallurgical testwork. Subsequent metallurgical studies should be completed to confirm or potentially improve process recoveries and more accurately estimate concentrate grades. The process plant flowsheet would be optimized to support a Pre-Feasibility Study ("PFS").

An environmental baseline study should be initiated. The collection of flora, fauna, water quality, and weather would be done to Ontario Ministry of Environment and Climate Change standards. Initial contact should be made with federal and provincial environmental agencies.

The estimated cost to complete Phase 1 is estimated to be $9.7 M. Table 1.10 summarizes the proposed Phase 1 budget.

TABLE 1.10
PHASE 1 BUDGET

Activity	Rate ($000)	Units	Cost ($000)
Diamond Drilling (NQ) Dana North Phases 1A,1B,1C	0.113	5,000 m	565
Assays, Support for Drill Phases 1A,1B,1C	171	1	171
Induced Polarization Study and Line Cutting, 12.5 km	1,629	1	1,629
Diamond Drilling (NQ) Step-Out, Footwall Phase 1D	0.113	50,000 m	5,650
Assays, Support for Step-Out Drilling Phase 1D	1,270		1,270
Metallurgical Study	200	1	200
Environmental Baseline Study	200	1	200
Total			**9,685**

1.18.2 Phase 2

The Phase 2 exploration program is planned to test the extension and continuity of high-grade mineralized domains.

The geological staff will continue to conduct surface exploration and prospecting of untested anomalies and structure and review the potential of reef style mineralization outside of the known Mineral Resource.

Infill drilling of the footwall mineralization is recommended. This is another large program, with 18,000 m planned.

Once the drilling is near completion, samples can be collected for further metallurgical testing to confirm recoveries in untested Zones and to optimize the process plant flowsheet.

A geotechnical study involving geotechnical logging, orientated drilling and strength testing of drill core is recommended. A geotechnical engineer would train the field geologist to properly collect the geotechnical data from the drill core before sampling. Selected core samples of the various lithologies and mineralization styles would be sent for strength testing. A 3D geomechnical block model would be generated to support a PFS and utilized to estimate pit wall slopes in design sectors. Geotechnical analysis is also required for process plant foundations, TSF construction, and WRF construction.

A hydrogeological study is required to estimate water in-flows to the open pits and generate a site water management plan in support of a PFS.

The PFS will evaluate the Project at an intermediate engineering and financial level of study.

The estimated cost to complete Phase 2 program is approximately $4.5 M. Table 1.11 summarizes the proposed Phase 2 budget.

TABLE 1.11
PHASE 2 BUDGET

Activity	Rate ($000)	Units	Cost ($000)
Infill Drilling (NQ), Footwall	0.113	18,000 m	2,340
Assays, Support for Infill Drilling	457	1	457
Final Metallurgical Study	150	1	150
Geotechnical Study	200	1	200
Hydrogeological Study	150	1	150
Pre-Feasibility Study	1,200	1	1,200
Total			**4,497**

1.18.3 Other Recommendations

1.18.3.1 Mineral Resource Estimate

It is recommended that NAM increase the frequency of bulk density measurements from drill core in order to build up the mineralized and non-mineralized bulk density database. The bulk density database should represent at a minimum 5% of the total assay dataset. In order to build the bulk density data, measurements should be collected at 20 m downhole intervals.

Due to the low-sulphide content of the mineralized rock on the Property, a regression formula is unlikely to be successfully generated using assay data. The bulk density data needs to be linked not only to the analytical results but to the lithology and alteration of the rocks.

It is recommended to continue to analyze a smaller subset of data for rhodium, cobalt, and silver. These minerals are potential payable metals, yet the cost of analysis can be prohibitive to assay every sample. It is recommended to assay approximately 5% of the data with a good representative spatial distribution.

When channel samples are being collected on surface, they should be cut as one continuous swath across the outcrop. The use of channel samples can be important in Mineral Resource estimations as it provides near-surface data which is not available from diamond drill holes and allows confident grade interpolation to surface.

The current storage of course rejects and pulps is subject to contamination. The currently utilized 45 gallon barrels are placed in an upright position and the lids are rusting through. The barrels should be laid on the side and stacked appropriately, or the material placed inside larger storage containers such as shipping containers.

Logging procedures should be modified to initiate the collection of more detailed geotechnical data prior to geological logging and sampling for the purposes of rock mechanics and slope stability studies. A geotechnical engineer can provide the basics of the data collection procedures. This data will form the basis to justify slope angles during any open pit optimization studies.

All the data collected on the Project should be validated and then secured in a single master database system with set policies and procedures as to who has access to the data. A back-up copy of the database should be created weekly and placed in a separate storage location.

Validation of the data completed during this study identified several minor inconsistencies between the database and the logs. Corrections have been made, yet there may be further corrections required in the master file.

The creation of a structural vectoring model is recommended to better understand the geometry of the zones. The presence of potential cross-faults, folds, and footwall mineralization can have a significant impact on the Mineral Resource Estimate.

1.18.3.2 Mining

A geotechnical study is required to estimate the pit wall slopes by design sector, and to provide analysis for process plant foundations, TSF construction, and WRF construction.

A hydrogeological study is required to estimate open pit water in-flows and to generate a site water management plan.

Acid generation and metal leaching tests are required on waste rock and tailings. The potential for metal leaching and acid rock drainage is needed for proper design of material storage facilities and water management.

Discussion with mining contractors is recommended in order that several future quotations can be provided for a PFS.

Discussions with Hydro One for electrical power installation is recommended to determine the costs associated with installing and supplying grid power to the Project site.

1.18.3.3 Mineral Processing and Metallurgical Testing

Further confirmatory testwork through the testing of additional composite and variability samples can improve the process design conditions and PGE recovery and concentrate grade.

Flotation and grindability variability testing on the DSZ and DNZ composites is recommended to identify the variability in flotation performance.

Effective flowsheet configuration: A common approach with this type of nickel-bearing mineralization is a split flowsheet approach where the easy-to-float material is cleaned separately from the difficult-to-float material. This type of approach to the flowsheet design is commonly practiced in nickel-bearing sulphide deposits located in the Sudbury region.

Investigate the applicability of new innovative technologies to improve PGE recoveries. The use of new flotation reagents and/or suites, flowsheet configurations, tank cells and different vertical mills for regrinding are examples of potential opportunities. Trade-off studies on various flowsheet options should be investigated and completed.

Detailed mineralogical examination of the occurrence of PGEs should be considered as this could better define flotation conditions for the recovery of these elements, as well as provide an indication of the maximum recovery of these elements.

Further definition on the effect of primary grind size on flotation recovery is required. Very little attention was given to the effect of regrind size and number of regrind stages in the work to date. A regrind size around a P80 of 20 microns was selected, but not optimized.

Pre-concentration techniques such as mineralized material sorting and dense media separation should be explored for the valuable minerals. It should be noted that mineralized material sorting for the River Valley mineralized material was investigated by DRA and it did not look promising due to very low grades in the feed.

Environment testing on waste rock, and tailings solids and effluent from a locked cycle test, should be completed on samples relevant to the latest LOM plan developed by P&E.

From all the testwork conducted thus far, it was revealed that there is no clear relationship between the process plant head and tailings grades, therefore, a consistent recovery cannot be predicted. Although the Pd recoveries hovered around 70%, a Pd recovery between 70% and 80% can be expected when River Valley is benchmarked against similar PGE projects in the region and also considering the limited amount of testwork conducted to date. A Pd recovery of 80% could be considered an optimistic figure, though possible, through appropriate and targeted testwork.

2.0 INTRODUCTION AND TERMS OF REFERENCE

The following Technical Report was prepared to provide a National Instrument ("NI") 43-101 Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment ("PEA") for the mineralization contained in the River Valley Deposit, Ontario, Canada. The River Valley Property ("the Property") is 100% owned by New Age Metals Inc. ("NAM" or "the Company") and is located approximately 60 km northeast of Sudbury, Ontario. The River Valley Deposit ("the Deposit") mineralization is primarily Platinum Group Elements ("PGE"), with Pd being the dominant metal and lessor amounts of Pt, Au, Cu, Ni and Co. Rh and Ag are also present but are not currently considered payable metals.

This Technical Report was prepared by P&E Mining Consultants Inc. ("P&E") at the request of Mr. Harry Barr, Chairman and CEO, New Age Metals Inc., a public company trading on the Toronto Stock Venture Exchange ("TSX-V") with the trading symbol NAM. NAM has its field office at:

59 Burtch's Lane
Rockport, ON
K0E 1V0
Tel: (613) 659-2773

This PEA Technical Report on the River Valley Project ("the Project") has an effective date of June 27, 2019.

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.

Mr. Todd McCracken, P.Geo., of WSP Canada Inc. ("WSP"), a Qualified Person under the regulations of NI 43-101, is a professional geologist with more than 27 years of experience in exploration and operations, including several years working in magmatic PGE-nickel sulphide deposits. Mr. McCracken visited the Property for one day on July 25, 2011, September 15, 2017, and November 9, 2017. Mr. McCracken was accompanied by Mr. Richard Zemoroz, Senior Project Geologist with NAM.

In addition to the site visits, P&E and WSP 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 outlined in the References section of this Technical Report, for further detail.

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 and the Canadian Securities Administrators ("CSA"). The Mineral Resources in the estimate are considered compliant with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM"), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Mineral Reserve Definitions.

The purpose of this Technical Report is to provide an independent, NI 43-101 Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment on the River Valley Property. P&E understands that this Technical Report will be used for internal decision making purposes and will be filed on SEDAR as required under TSX regulations. The Technical Report may also be used to support public equity or private placement financings.

2.1 SOURCES OF INFORMATION

The data used in the Updated Mineral Resource Estimate and the development of this Technical Report was provided to P&E and WSP by NAM. The Property was the subject of a recent Technical Report by WSP and is presented in a NI 43-101 Technical Report titled "River Valley Mineral Resource Update" dated January 9, 2019 (effective date of October 31, 2018) and is filed on SEDAR under NAM's profile. Parts of Section 4 and all of Sections 5 to 12, 14 and 23 in this Technical Report have been excerpted from the WSP Technical Report.

Table 2.1 presents the authors and co-authors of each section of this Technical Report, who 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" attached to this Technical Report.

TABLE 2.1
REPORT AUTHORS AND CO-AUTHORS

Qualified Person	Employer	Sections of Technical Report
Eugene Puritch, P.Eng.	P&E Mining Consultants Inc.	2,3,15,16,18,19,22,24 and Co-author 1,21,25,26
D. Grant Feasby	P&E Mining Consultants Inc.	20 and Co-author 1,25,26
Todd McCracken, P.Geo.	WSP Canada Inc.	4,5,6,7,8,9,10,11,12,14,23 and Co-author 1,25,26
Jim Kambossos, P.Eng.	DRA Americas Inc.	13,17 and Co-author 1,21,25,26

2.2 UNITS AND CURRENCY

Unless otherwise stated all units used in this Technical Report are metric. PGE assay values are reported in grams of metal per tonne ("g/t") unless ounces per ton ("oz/T") are specifically stated. The CDN$ is used throughout this report unless the US$ is specifically stated. At the time of this Technical Report the rate of exchange between the US$ and the CDN$ is CDN$1.37 = US$1.00.

2.3 TERMS OF REFERENCE

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.

TABLE 2.2 TERMINOLOGY AND ABBREVIATIONS	
Abbreviation	**Meaning**
"AACEI"	Association for the Advancement of Cost Engineering International
"Actlabs"	Activation Laboratories Ltd.
"AI"	abrasion index
"AISC"	all in sustaining cost
"Amplats"	Anglo American Platinum Limited
"ANFO"	ammonium nitrate fuel oil mixture
"ARD"	acid rock drainage
"Au"	gold
"ATV"	all-terrain vehicle
"BMS"	base metal sulphides
"BWI"	ball mill work index
"CAPEX"	capital cost estimate
"CDN$"	Canadian dollar(s)
"CEAA"	Canadian Environmental Assessment Act
"CIM"	Canadian Institute of Mining, Metallurgy and Petroleum
"CMC"	cellulose, carboxymethyl ether, sodium salt
"Co"	cobalt
"CSA"	Canadian Securities Administrators
"Cu"	copper
"DNZ"	Dana North Zone
"DRA"	DRA Americas Inc.
"DSZ"	Dana South Zone
"EA"	Environmental Assessment
"ECA's"	Environmental Compliance Approvals
"EM"	electromagnetic
"EPCM"	Engineering, Procurement and Construction Management
"EPMA"	electron probe micro analysis
"Fe"	iron
"FIDIC"	Fédération Internationale Des Ingénieurs-Conseils
"FTSF"	Flotation tailings storage facility
"G&A"	General and administration
"g/t"	grams of metal per tonne
"GeoSim"	GeoSim Consultants
"HADD"	Harmful Alteration, Disruption or Destruction of Fish Habitat
"ICP"	inductively coupled plasma
"ICP-AES"	inductively coupled plasma-atomic emission spectroscopy
"ID^2"	inverse distance squared
"Inventus"	Inventus Mining Inc.
"IP"	induced polarization
"IRR"	internal rate of return
"ISO"	International Organization for Standardization

TABLE 2.2
TERMINOLOGY AND ABBREVIATIONS

Abbreviation	Meaning
"Kaymin"	Kaymin Resources Ltd.
"LA-ICP-MS"	laser ablation-inductively coupled plasma-mass spectrometry
"LCT"	locked cycle testwork
"LiDAR"	light detection and ranging
"LIL"	large ion lithophile
"LOM"	life-of-mine
"masl"	metres above sea level
"MDEng"	Mine Design Engineering Inc.
"MECP"	Ministry of Environment, Conservation and Parks
"Mg"	magnesium
"MIBC"	methyl isobutyl carbinol
"ML"	metal leaching
"MLA"	mineral liberation analysis
"MLAS"	mining lands administrative system
"MNDM"	Ontario Ministry of Energy, Northern Development and Mines (was Northern Development and Mines)
"Mount Logan"	Mount Logan Resources Ltd.
"MTU"	Michigan Technological University
"NAD"	North American Datum
"NAM"	New Age Metals Inc.
"NAP"	North American Palladium Ltd.
"NI"	National Instrument
"Ni"	Nickel
"NI 43-101"	National Instrument 43-101
"NN"	nearest neighbour
"NPV"	net present value
"NSR"	net smelter return
"OEM"	original equipment manufacturers
"OK"	ordinary kriging
"OPEX"	operating cost
"oz/T"	ounces per ton
"P&E"	P&E Mining Consultants Inc.
"PEA"	Preliminary Economic Assessment
"Pd"	palladium
"PdEq"	palladium equivalent
"PFN"	Pacific North West Capital
"PFS"	Pre-Feasibility Study
"PGE"	platinum group elements
"Pt"	platinum
"Property"	River Valley Property
"QA/QC"	quality assurance / quality control

TABLE 2.2 TERMINOLOGY AND ABBREVIATIONS	
Abbreviation	**Meaning**
"QEMSCAN"	quantitative evaluation of materials by scanning electron microscope
"R^2"	the coefficient of determination
"Rh"	rhodium
"ROM"	run-of-mine
"RQD"	rock quality designation
"RVI"	River Valley intrusion
"RWI"	Bond Rod Mill Index
"S"	sulphur
"SEM"	Scanning Electron Microscopy
"SGS"	SGS Canada Inc. / SGS Lakefield Research
"Si"	silicon
"SIBX"	sodium isobutyl xanthate
"the Company"	New Age Metals Inc.
"the Deposit"	River Valley Deposit
"the Project"	River Valley Project
"the Property"	River Valley Property
"TIC"	total installed cost
"TMF"	tailings management facility
"TSF"	tailings storage facility
"TSX-V"	Toronto Venture Stock Exchange
"US$"	United States dollars
"UTM"	Universal Transverse Mercator
"WSP"	WSP Canada Inc.
"WRF"	waste rock storage facilities
"XPS"	Expert Process Solutions
"XRD"	x-ray diffraction

TABLE 2.3 UNIT MEASUREMENT ABBREVIATIONS			
Abbreviation	**Meaning**	**Abbreviation**	**Meaning**
µm	microns, micrometer	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

TABLE 2.3
UNIT MEASUREMENT ABBREVIATIONS

Abbreviation	Meaning	Abbreviation	Meaning
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	kilometer	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

P&E has 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. While P&E has carefully reviewed all the available information presented to us, P&E cannot guarantee its accuracy and completeness. P&E reserves the right, but will not be obligated to revise the Technical Report and conclusions if additional information becomes known to P&E subsequent to the effective date of this Technical Report.

Copies of the tenure documents, operating licenses, permits, and work contracts were not reviewed. P&E has relied upon tenure information supplied in correspondence with the MNDM Land Tenure and Assessment Unit, and the Mining Lands Section, dated April 2, 2019, and has not undertaken an independent detailed legal verification of title and ownership of the River Valley Property ownership. P&E has not verified the legality of any underlying agreement(s) that may exist concerning the licenses or other agreement(s) between third parties but has relied on, and believes it has a reasonable basis to rely upon NAM to have conducted the proper legal due diligence.

Select technical data, as noted in this Technical Report, were provided by NAM and P&E has reviewed and relied on the integrity of such data.

A draft copy of the Technical Report has been reviewed for factual errors by NAM and P&E has 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 lies within Dana and Pardo Townships and is located about 100 km by road (60 km direct) northeast of the City of Greater Sudbury, Ontario (Figure 4.1 and Figure 4.2), and centered at approximately 555,371 m E and 5,172,514 m N (NAD83-UTM Zone 17T). The Property is accessed from Sudbury by traveling east along Highway 17 for 50 km to the town of Warren, at this point turn north onto Highway 539. Travel north along Highway 539 for 22 km to the junction of Highway 805. Travel 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 mineralized zones.

The Property claim group consists of 318 single cell mining claims and 38 boundary cell mining claims (Table 4.1). The claims are located within Dana, Janes, McWilliams, and Pardo Townships (Figure 4.3). The claim groups are all contiguous and surround two mining leases that total 5,402.12 ha (Table 4.2).

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. The functionality of the new system is being improved over time.

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 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. Once 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.

On April 7, 2011 NAM announced that they 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 NAM's news release of January 31, 2011, a total of 8,117,161 fully paid and non-assessable common shares of NAM (reflecting a 12% interest in NAM based upon the issued and outstanding common shares of NAM as of November 30, 2010 (67,643,008)) and three-year warrants to purchase up to 3,000,000 common shares of NAM 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 NAM with an undivided 100% interest in the Project.

Land or work permits are not required at this stage of the Project.

Initial contact and meetings have been made with aboriginal groups whose jurisdictions overlie the Property. These groups are the Temagami First Nation and Nipissing First Nation. Both the Temagami First Nation and the Nipissing First Nation have visited the Project in 2017 and 2018.

FIGURE 4.1 PROVINCIAL LOCATION MAP

Source: *WSP (2019)*

FIGURE 4.2 LOCATION MAP

Source: *WSP (2019)*

Table 4.1 **River Valley Mining Claims**												
Legacy Claim ID	**Township / Area**	**Tenure ID**	**Tenure Type**	**Anniversary Date**	**Tenure Status**	**Tenure Percentage**	**Work Required**	**Work Applied**	**Available Consultation Reserve**	**Available Exploration Reserve**	**Total Reserve**	**Conversion Bank Credit**
1229153	MCWILLIAMS	337525	Single Cell Mining Claim	25/05/2023	Active	100	200	800	0	0	0	0
1229153	MCWILLIAMS	107066	Single Cell Mining Claim	25/05/2023	Active	100	400	1600	0	0	0	0
1229155	GIBBONS,MCWILLIAMS	193344	Single Cell Mining Claim	25/05/2023	Active	100	200	800	0	0	0	0
1229155	GIBBONS,MCWILLIAMS	130733	Single Cell Mining Claim	25/05/2023	Active	100	200	800	0	0	0	0
1237522	DANA,MCWILLIAMS	105919	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1237522	MCWILLIAMS	243401	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1237522	MCWILLIAMS	183444	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1237522	MCWILLIAMS	171855	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229152	MCWILLIAMS	130032	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229152	DANA,MCWILLIAMS	105944	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229152	DANA,MCWILLIAMS	315379	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229152	MCWILLIAMS	287176	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229152	MCWILLIAMS	248044	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229152	MCWILLIAMS	220638	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229153	MCWILLIAMS	191338	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
1229153	MCWILLIAMS	171854	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229153	MCWILLIAMS	155875	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229154	MCWILLIAMS	279310	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229154	MCWILLIAMS	183473	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229154	MCWILLIAMS	131450	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229154	GIBBONS,MCWILLIAMS	300051	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
1229154	PARDO	102741	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
1229154	PARDO	321720	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
1229154	PARDO	285673	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229155	PARDO	285672	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229155	PARDO	285671	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229155	PARDO	273591	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0

Table 4.1 River Valley Mining Claims												
Legacy Claim ID	**Township / Area**	**Tenure ID**	**Tenure Type**	**Anniversary Date**	**Tenure Status**	**Tenure Percentage**	**Work Required**	**Work Applied**	**Available Consultation Reserve**	**Available Exploration Reserve**	**Total Reserve**	**Conversion Bank Credit**
1229155	PARDO	273590	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
1229155	PARDO	265649	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	226372	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	226371	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	218419	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	PARDO	218418	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	PARDO	218417	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	188469	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	188468	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	170243	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	125099	Boundary Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	PARDO	118059	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	DANA,PARDO	167144	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	PARDO	342062	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	PARDO	271820	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	234448	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	PARDO	234447	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249484	PARDO	234446	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	215899	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249484	PARDO	186618	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	161091	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	DANA,PARDO	290485	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	DANA,PARDO	282412	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	DANA,PARDO	234449	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	109529	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	336442	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	296139	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	296138	Boundary Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0

TABLE 4.1 RIVER VALLEY MINING CLAIMS												
Legacy Claim ID	**Township / Area**	**Tenure ID**	**Tenure Type**	**Anniversary Date**	**Tenure Status**	**Tenure Percentage**	**Work Required**	**Work Applied**	**Available Consultation Reserve**	**Available Exploration Reserve**	**Total Reserve**	**Conversion Bank Credit**
4249485	PARDO	288618	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	288617	Boundary Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249485	PARDO	249014	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	249013	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	241500	Boundary Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4249485	PARDO	228145	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4249485	PARDO	211603	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	PARDO	194387	Boundary Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279901	PARDO	192853	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	PARDO	192852	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	PARDO	174874	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	PARDO	146312	Boundary Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279901	PARDO	140848	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	PARDO	140847	Boundary Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279901	PARDO	140846	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	PARDO	128818	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	105098	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279901	DANA	123996	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	135991	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	151893	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	168514	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	168515	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	187992	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	235842	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279901	DANA	254646	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	254647	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	272511	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279901	DANA	272512	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0

Table 4.1 River Valley Mining Claims												
Legacy Claim ID	**Township / Area**	**Tenure ID**	**Tenure Type**	**Anniversary Date**	**Tenure Status**	**Tenure Percentage**	**Work Required**	**Work Applied**	**Available Consultation Reserve**	**Available Exploration Reserve**	**Total Reserve**	**Conversion Bank Credit**
4279901	DANA	283796	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279901	DANA	283797	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279901	DANA	331076	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	331077	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	182007	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	188795	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	200968	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	218680	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	237441	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	284081	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	284082	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	292141	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	304771	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	311563	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	124148	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	136150	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	181353	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279902	DANA	242130	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	254896	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	254897	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	254898	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	291985	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279902	DANA	304121	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279903	DANA	310897	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	120770	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	339540	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	317442	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	300813	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0

TABLE 4.1
RIVER VALLEY MINING CLAIMS

Legacy Claim ID	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required	Work Applied	Available Consultation Reserve	Available Exploration Reserve	Total Reserve	Conversion Bank Credit
4279903	MCWILLIAMS	280591	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	280577	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	251570	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	244724	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279903	MCWILLIAMS	224527	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	184756	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	148207	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	132754	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279903	GIBBONS,MCWILLIAMS	125448	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	343662	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	312174	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	292759	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	284738	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	256217	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	237559	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	226127	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	218808	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	189442	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	142943	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	MCWILLIAMS	125447	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	GIBBONS,MCWILLIAMS	312175	Single Cell Mining Claim	02/06/2019	Active	100	400	0	0	0	0	0
4279904	GIBBONS,MCWILLIAMS	237560	Single Cell Mining Claim	02/06/2019	Active	100	200	0	0	0	0	0
4279905	DANA	190006	Single Cell Mining Claim	03/06/2019	Active	100	200	0	0	0	0	0
4279905	JANES	306029	Single Cell Mining Claim	03/06/2019	Active	100	400	0	0	0	0	0
4279906	JANES	239409	Single Cell Mining Claim	03/06/2019	Active	100	400	0	0	0	0	0
4279906	DANA,JANES	190005	Single Cell Mining Claim	03/06/2019	Active	100	400	0	0	0	0	0
4279906	DANA	219332	Single Cell Mining Claim	03/06/2019	Active	100	200	0	0	0	0	0
4279906	DANA	239407	Single Cell Mining Claim	03/06/2019	Active	100	200	0	0	0	0	0

Table 4.1 River Valley Mining Claims												
Legacy Claim ID	**Township / Area**	**Tenure ID**	**Tenure Type**	**Anniversary Date**	**Tenure Status**	**Tenure Percentage**	**Work Required**	**Work Applied**	**Available Consultation Reserve**	**Available Exploration Reserve**	**Total Reserve**	**Conversion Bank Credit**
4279906	DANA	322541	Single Cell Mining Claim	03/06/2019	Active	100	200	0	0	0	0	0
4279906	JANES	285826	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	JANES	239410	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	DANA,JANES	172661	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	DANA,JANES	105591	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	JANES	338998	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	JANES	299234	Boundary Cell Mining Claim	10/06/2019	Active	100	200	800	0	0	0	0
4279906	JANES	280039	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	JANES	244692	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	JANES	232529	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	JANES	148177	Boundary Cell Mining Claim	10/06/2019	Active	100	200	800	0	0	0	0
4279906	JANES	132218	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	JANES	132217	Boundary Cell Mining Claim	10/06/2019	Active	100	200	800	0	0	0	0
4279906	JANES	106520	Boundary Cell Mining Claim	10/06/2019	Active	100	200	800	0	0	0	0
4279906	JANES	106519	Single Cell Mining Claim	10/06/2019	Active	100	400	1600	0	0	0	0
4279906	DANA,MCWILLIAMS	223261	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279907	DANA,MCWILLIAMS	163974	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279907	DANA,MCWILLIAMS	104765	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA,MCWILLIAMS	325179	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA,MCWILLIAMS	287204	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279907	DANA,MCWILLIAMS	174048	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	287281	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	CRERAR,DANA	172386	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279907	CRERAR,DANA	191366	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	CRERAR,DANA	228630	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	CRERAR,DANA,GIBBONS, MCWILLIAMS	287205	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279907	DANA	104766	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0

TABLE 4.1
RIVER VALLEY MINING CLAIMS

Legacy Claim ID	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required	Work Applied	Available Consultation Reserve	Available Exploration Reserve	Total Reserve	Conversion Bank Credit
4279907	DANA	127898	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	127899	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	139358	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	228628	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	228629	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	240778	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	240779	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	248077	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279907	DANA	129263	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4265063	DANA	132079	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4265063	DANA	184071	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4265063	DANA	279910	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4265063	DANA	336936	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4265063	DANA	338889	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4265063	DANA	192914	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4265063	DANA	200331	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4265063	DANA	235923	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4265063	DANA	249568	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4265063	DANA	291984	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4265063	DANA	296702	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279910	JANES	239408	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279910	JANES	153888	Single Cell Mining Claim	05/08/2019	Active	100	400	400	0	0	0	0
4279910	DANA,JANES	219331	Single Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279910	JANES	319442	Boundary Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279910	JANES	246712	Boundary Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279910	JANES	150739	Boundary Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279910	JANES	106193	Boundary Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0
4279910	DANA,JANES	319441	Boundary Cell Mining Claim	05/08/2019	Active	100	200	200	0	0	0	0

TABLE 4.1
RIVER VALLEY MINING CLAIMS

Legacy Claim ID	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required	Work Applied	Available Consultation Reserve	Available Exploration Reserve	Total Reserve	Conversion Bank Credit
4279910	MCWILLIAMS	316157	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279910	MCWILLIAMS	300141	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279910	DANA,MCWILLIAMS	316773	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279910	DANA,JANES	170546	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279910	DANA	306030	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279910	DANA	224001	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
1229152	DANA	339000	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
1229152	DANA,JANES	280040	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
1229153	DANA	123988	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
1229153	DANA	140897	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
1229153	DANA	140898	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
1229153	DANA	140899	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
1231181	DANA	192891	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
1231181	DANA	228180	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	228181	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	249552	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265042	DANA	288663	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265042	DANA	105097	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	135986	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265042	DANA	135987	Boundary Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	135988	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265042	DANA	151890	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	168509	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	168510	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265042	DANA	168511	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265042	DANA	168512	Boundary Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	187988	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	217301	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0

TABLE 4.1 RIVER VALLEY MINING CLAIMS												
Legacy Claim ID	**Township / Area**	**Tenure ID**	**Tenure Type**	**Anniversary Date**	**Tenure Status**	**Tenure Percentage**	**Work Required**	**Work Applied**	**Available Consultation Reserve**	**Available Exploration Reserve**	**Total Reserve**	**Conversion Bank Credit**
4265042	DANA	235834	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265042	DANA	237384	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265043	DANA	237385	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265043	DANA	254642	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265043	DANA	254643	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265043	DANA	283790	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265043	DANA	331069	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265043	DANA	331070	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265043	DANA,MCWILLIAMS	231885	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265043	MCWILLIAMS	223852	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265043	MCWILLIAMS	184051	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265043	MCWILLIAMS	165270	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265043	DANA,MCWILLIAMS	338342	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265043	DANA,MCWILLIAMS	316772	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265045	DANA	106571	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265045	MCWILLIAMS	232579	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265045	MCWILLIAMS	177995	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265045	DANA,MCWILLIAMS	299283	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265045	DANA,MCWILLIAMS	132766	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265045	DANA	106572	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265045	DANA	120782	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4265046	DANA	148728	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265046	DANA	177436	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265063	DANA	177437	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265063	DANA	224550	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4265063	DANA	244742	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279904	DANA	244743	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279904	DANA	252094	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0

Table 4.1 River Valley Mining Claims												
Legacy Claim ID	**Township / Area**	**Tenure ID**	**Tenure Type**	**Anniversary Date**	**Tenure Status**	**Tenure Percentage**	**Work Required**	**Work Applied**	**Available Consultation Reserve**	**Available Exploration Reserve**	**Total Reserve**	**Conversion Bank Credit**
4279904	DANA	280041	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279904	DANA	280593	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279904	DANA	299284	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279904	DANA	317461	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279904	DANA	339560	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279905	DANA	120739	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279905	DANA	165929	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279905	DANA	224002	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279905	DANA	299235	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279920	DANA	317409	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279920	DANA	338999	Single Cell Mining Claim	13/09/2019	Active	100	400	0	0	0	0	0
4279920	DANA	339001	Single Cell Mining Claim	13/09/2019	Active	100	200	0	0	0	0	0
4279920	JANES	520435	Single Cell Mining Claim	02/05/2020	Active	100	400	0	0	0	0	0
4279920	JANES	520436	Single Cell Mining Claim	02/05/2020	Active	100	400	0	0	0	0	0
4279920	MCWILLIAMS	521421	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4279920	MCWILLIAMS	521422	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4279920	MCWILLIAMS	521423	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
1229152	MCWILLIAMS	521424	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4265046	MCWILLIAMS	521425	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4265046	MCWILLIAMS	521426	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4265046	MCWILLIAMS	521427	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4265063	MCWILLIAMS	521428	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4265063	MCWILLIAMS	521429	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	521430	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4279903	MCWILLIAMS	521431	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4279910	MCWILLIAMS	521432	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4279910	MCWILLIAMS	521433	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521434	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0

TABLE 4.1
RIVER VALLEY MINING CLAIMS

Legacy Claim ID	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required	Work Applied	Available Consultation Reserve	Available Exploration Reserve	Total Reserve	Conversion Bank Credit
4280834	MCWILLIAMS	521435	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521436	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521437	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521438	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521439	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521440	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521441	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521442	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521443	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521444	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280834	MCWILLIAMS	521445	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280835	MCWILLIAMS	521446	Single Cell Mining Claim	17/05/2020	Active	100	400	0	0	0	0	0
4280835	MCWILLIAMS	338253	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	316152	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	243402	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	183413	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	147447	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	30,825
4280835	MCWILLIAMS	147430	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	105921	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	338225	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	316153	Single Cell Mining Claim	16/11/2021	Active	100	200	600	0	0	0	0
4280835	MCWILLIAMS	287177	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	279263	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	240757	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	231272	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	183415	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	183414	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	163968	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0

TABLE 4.1
RIVER VALLEY MINING CLAIMS

Legacy Claim ID	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required	Work Applied	Available Consultation Reserve	Available Exploration Reserve	Total Reserve	Conversion Bank Credit
4280835	MCWILLIAMS	147429	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280835	MCWILLIAMS	131411	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	106,697
4280835	MCWILLIAMS	131410	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	130026	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	127874	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	307406	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	307405	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	287175	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	240756	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	174020	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	300050	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280836	MCWILLIAMS	300049	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280837	MCWILLIAMS	300048	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280837	MCWILLIAMS	300047	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280837	MCWILLIAMS	223281	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	1,100
4280837	MCWILLIAMS	165173	Single Cell Mining Claim	16/11/2021	Active	100	400	1200	0	0	0	0
4280837	GIBBONS,MCWILLIAMS	231313	Single Cell Mining Claim	16/11/2021	Active	100	200	600	0	0	0	0
4280837	GIBBONS,MCWILLIAMS	231312	Single Cell Mining Claim	16/11/2021	Active	100	200	600	0	0	0	0
4280837	JANES	108177	Single Cell Mining Claim	10/12/2021	Active	70	400	1200	0	0	0	0
4280837	JANES	344324	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	312841	Single Cell Mining Claim	10/12/2021	Active	70	400	1200	0	0	0	0
4280837	JANES	306100	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	306099	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	306098	Single Cell Mining Claim	10/12/2021	Active	70	400	1200	0	0	0	0
4280837	JANES	293433	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	256862	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	256861	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	238217	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0

TABLE 4.1
RIVER VALLEY MINING CLAIMS

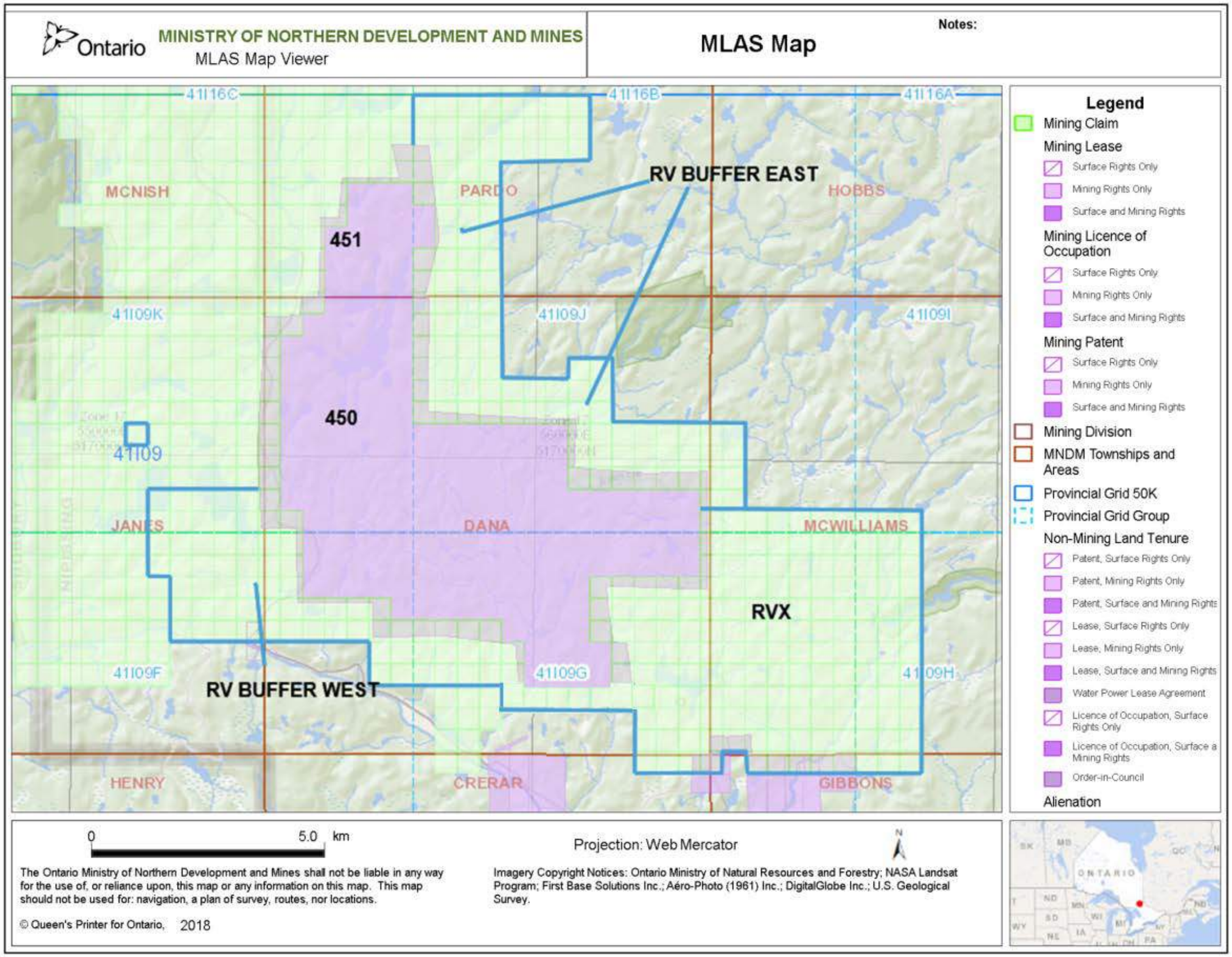
Legacy Claim ID	Township / Area	Tenure ID	Tenure Type	Anniversary Date	Tenure Status	Tenure Percentage	Work Required	Work Applied	Available Consultation Reserve	Available Exploration Reserve	Total Reserve	Conversion Bank Credit
4280837	JANES	238216	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	219500	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	219499	Single Cell Mining Claim	10/12/2021	Active	70	400	1200	0	0	0	0
4280837	JANES	219498	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280837	JANES	202249	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	182812	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	137602	Single Cell Mining Claim	10/12/2021	Active	70	400	1200	0	0	0	0
4280838	JANES	137601	Single Cell Mining Claim	10/12/2021	Active	70	400	1200	0	0	0	0
4280838	JANES	108178	Boundary Cell Mining Claim	10/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	126094	Boundary Cell Mining Claim	17/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	323412	Boundary Cell Mining Claim	17/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	311178	Boundary Cell Mining Claim	17/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	311177	Boundary Cell Mining Claim	17/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	274588	Single Cell Mining Claim	17/12/2021	Active	70	400	1200	0	0	0	0
4280838	JANES	267335	Boundary Cell Mining Claim	17/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	267334	Boundary Cell Mining Claim	17/12/2021	Active	70	200	600	0	0	0	0
4280838	JANES	155440	Boundary Cell Mining Claim	17/12/2021	Active	70	200	600	0	0	0	0
	DANA	551042	Single Cell Mining Claim	04/06/2021	Active	100	400	0	0	0	0	0
	DANA	551043	Single Cell Mining Claim	04/06/2021	Active	100	400	0	0	0	0	0
	DANA	551044	Single Cell Mining Claim	04/06/2021	Active	100	400	0	0	0	0	0
	DANA	551045	Single Cell Mining Claim	04/06/2021	Active	100	400	0	0	0	0	0
	DANA	551046	Single Cell Mining Claim	04/06/2021	Active	100	400	0	0	0	0	0
	DANA	551047	Single Cell Mining Claim	04/06/2021	Active	100	400	0	0	0	0	0

Source: *MNDM (2019)*

TABLE 4.2 RIVER VALLEY MINING LEASES				
Mining Lease	**Size (ha)**	**Township**	**Recorded**	**Current Expiry Date**
CLM450	4,777.181	Dana	01-Nov-11	31-Oct-32
CLM451	624.939	Pardo	11-Jan-12	28-Feb-33

Source: *MNDM (2019)*

FIGURE 4.3 RIVER VALLEY MINING LEASE AND CLAIM MAP



Source: *MNDM (2019)*

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 SITE TOPOGRAPHY, ELEVATION, AND VEGETATION

The Property lies at a mean elevation of approximately 325 masl. Relief is moderate and typical of Precambrian Shield topography. The eastern part around Azen Creek is lower and marshy. Forest cover is mainly poplar with about 25 to 33% white pine regrowth.

Outcrop exposure on the Property is limited to about 20% with the remaining areas covered mostly by a thin (less than 1 m) veneer, yet locally reach 10s of metres of glacial till, gravel, outwash sand, and silt. Most of the area around the Dana Lake Lismer Ridge, Casson, Varley, and Azen Creek areas has been logged within the past 15 years.

5.2 ACCESS

The Property is accessed from Sudbury by travelling east along Trans-Canada Highway 17 for 50 km to the town of Warren, at this point turn north onto Highway 539. Travel north along Highway 539 for 22 km to the junction of Highway 805. Travel 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 mineralized zones.

Lismer Zone 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 for about 6 km.

The region is serviced by Trans-Canada Highway 17 and the Sudbury Regional Airport which has daily regional flights to Thunder Bay, Toronto, Timmins, and Ottawa.

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 comes in the form of 30 to 64 cm of snow in the winter months, and 77 to 101 mm of rain in the summer.
(http://www.theweathernetwork.com/statistics/cl6068150)

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

5.4 INFRASTRUCTURE

The City of Greater Sudbury, a major mining and manufacturing city, can provide all of the infrastructure and technical requirements for any exploration and development work.

A 230 kV transmission line is located passing through 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.

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

6.0 HISTORY

6.1 EXPLORATION HISTORY

The exploration history of the region dates back to the 1960s, with work on the Property starting in earnest in 1999 (Zemoroz, 2008). Table 6.1 summarizes the history of the Property and discloses historical resource estimates. Historical estimates within the table are considered relevant but not reliable. A Qualified Person has not done sufficient work to classify the historical estimate as a current Mineral Resource. 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 of 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.
1999	Mustang Minerals	Prospecting and grab samples on Mustang South & North Grid (Dana Township), 78 km line cutting and magnetic surveying by Dan Patrie Exploration Ltd.

TABLE 6.1 PROJECT HISTORY		
Year	**Company**	**Activities**
1999	Pacific North West Capital ("PFN")/ Amplats	With joint venture partner Amplats established a Phase 1 surface program which 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 South Grid (Crerar Township) and the North Grid (Dana and McWilliams Townships).
2000	PFN/Amplats	Phase 2 program surface 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, Phase 1 drilling program included a total of 2,000 m of drilling in 13 holes with focus on the mineralization at the Dana Lake Area. From June to July, Phase 2 drill program entailed of total of 2,820.8 m of drilling in 14 holes with focus on the mineralization at the Dana Lake Area. In September, Phase 3 drill program consisted of 1,958.5 m in drilling in 10 drill holes at the Dana Lake Area and 3 holes at Lismer's ridge (13 holes total).
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 on Dana North property.
2001	Mustang Minerals	Second phase of mapping and sampling was conducted on three separate grids (North, Southeast, and Regional Central). 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. Seventeen thousand metre diamond drill

TABLE 6.1 PROJECT HISTORY		
Year	**Company**	**Activities**
		program designed and completed.
2001	PFN/Amplats	Phase 3 surface program consisted of sample collections from the property with concentrations in the south eastern and western contact areas. From February to July Phase 4 drilling commenced; a total of 16,027 m drilled in 98 holes.
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	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, Phase V drilling resulted in a total of 83 holes with 22,319 assay samples from Lismer Ridge, Dana South, and Banshee Lake.
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). Fifteen holes were drilled, totalling 2,000 m.
2003	PFN/Amplats	SPECTREM Air flew airborne mag, EM, and radiometric surveys over the River Valley property.
2004	PFN/Amplats	From period May to October, Phase VI surface included extensive geological mapping of the eastern portion of the property with the collection of samples. From period November 2002 to May 2004, Phase VI drill program consisting of a total of 44,131 m of drilling from 208 holes at Dana Lake, Banshee Lake, Lismer Ridge, MacDonalds, Varley, Azen Creek, Razor, Jackson's flat, and Pardo.
2005	PFN/Amplats	From period December to October, a 35 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 extension. Follow-up geological mapping and sampling was carried out. From period September to March Phase VII drilling consisted of 20,516.4 m of drilling in 103 holes with focus on Lismer

TABLE 6.1
PROJECT HISTORY

Year	Company	Activities
		Extension, Varley, Varley Extension/Azen, Pardo, Jackson's flat, and Casson. From period October to November, Phase VIII drill program consisted of 3,681.15 m drilled in 20 holes with focus on Spade Lake, Jackson's Flat South, Varley Extension/Azen Drop Zone, and Casson.
2006	PFN/Amplats	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	Power stripping and channel sampling program was implemented in September and continued into November. 371 m were stripped and 326 samples taken
2008	PFN	Starting in April of 2008, Gord Trimble, an independent consultant, was brought in to conduct a study on Dana North and South. During June and July, in conjunction with the Dana North South Study, cutting channels sample across three stripped zones at the Dana Lake area of the Project. 129 samples were taken and all were approximately 0.35 m long. The channel areas were mapped at a scale of 1:100.
2011-2012	PFN	From period April 2011 to January 2012, Phase IX drill program consisted of 12,767 m drilled in 46 holes with focus on Dana North and Dana South. Completed a surface water, sediment and bathymetric study. Mineral Resource estimation completed on the Project.
2015	PFN	Drilled two holes in Dana North totalling 474 m.
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, staked 8 mining claims adjacent to the River Valley Extension. In November, staked 14 mining claims. Selected grab samples collected from River Valley Extension and Dana South. Five drill holes totalling 1,267 m.
2017	NAM	PFN changes name to New Age Metals. Completes an IP geophysical survey on the Pine Zone and Banshee Zone. Completes 14 holes totalling 3,729 m on Dana North and Pine Zones.

6.2 HISTORICAL METALLURGICAL STUDY

Previous metallurgical studies completed on the Project must be classified as limited and selective. Testing has been done on high-grade samples of limited size and not all the zones were tested.

In the fall of 1999, as part of a senior graduate course at Michigan Technological University ("MTU") and sponsored in part by NAM and Amplats, Erik Luhta obtained a mini-bulk rock sample totalling 4,264 lb from the Dana Lake area. Specifically, the sample was collected (blasted) from the North Zone 2 (1,333.3 lb net crushed) and South Zone (2,197.0 lb net crushed) in areas that had relatively high PGE assays, as determined from 1999 detailed surface sampling (Luhta et al.,1999).

The bulk density of the material was found to be 2.9 t/m^3. Pilot plant grinding and flotation tests resulted in process recoveries of 81.4% copper, 73.4% gold, 68.5% platinum, 74.1% palladium, 27.5% rhodium, and 29.4% nickel. However, steady state was not achieved during this testwork due to the exhaustion of mineralized material after only a few hours of operation.

The 2006 flotation testwork on a sample from the Project, (Malysiak, 2006) compared their results with previous testwork by Hey and Plint in 2001.

The 2006, tests were completed on a composite sample comprised of four samples in equal portions from Dana South Site A – MET 750, Dana South Site B – MET 751, Dana North Road Zone – MET 752, and Dana North Zone 2 – MET 753, while the 2001 testing was conducted on 13 borehole samples and consisted of the highest-grade intersections from each hole.

The platinum and palladium recoveries were enhanced as much as 10% higher by increasing the grind from 60% 75 µm to 80% -75 µm. Nevertheless, the overall flotation response was still low compared to a typical platinum operation.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Paleoproterozoic East Bull Lake Intrusive Suite, dated between 2,491 and 2,475 Ma, consists of nine distinct bodies of dominantly gabbronorite to gabbroic anorthosite that occur in both the Southern and Grenville provinces between Elliot Lake and the Temagami River (Figure 7.1) (Easton, 1999; James et al., 2002a).

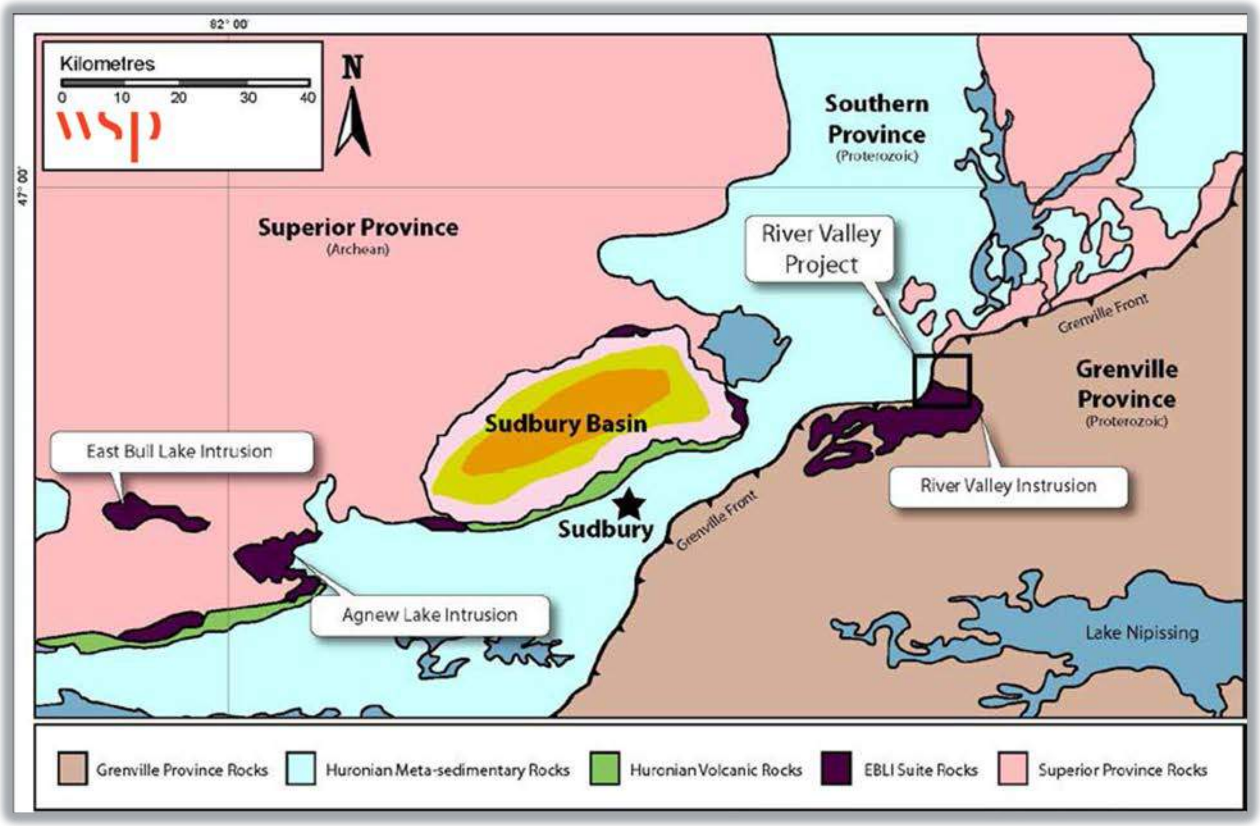
Intrusions of the East Bull Lake Intrusive Suite share a number of common characteristics in addition to lithology, including typically sill-like to lopolithic forms, igneous layering, and anomalous PGE content. The emplacement of the East Bull Lake Intrusive Suite bodies, the subsequent eruption of 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 being derived 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 stratigraphy being preserved, while the East Bull Lake and River Valley Intrusions have roughly only 1 km. The significant volume of melanocratic norites and troctolites recognized 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 part of the stratigraphy (Easton et al., 2004).

FIGURE 7.1 REGIONAL GEOLOGY



Source: *WSP (2019)*

An economically important feature commonly shared by the Agnew Lake, East Bull Lake, and River Valley Intrusions is the occurrence of a copper-nickel-PGE-bearing breccia unit situated at the base of the intrusions, where the footwall contact is preserved. 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, typically in modal amounts from 0.5 to 2%, occur in the matrix of the marginal and brecciated rocks, and occasionally within the breccia's more 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 and underlies parts of Crerar, Dana, Henry, Janes, and McWilliams Townships.

On the ground held by NAM, the contact between the River Valley Intrusion and the Archean basement trends south-easterly for a distance of approximately 16 km, from the northwest corner of Dana Township through to the south-central Dana-McWilliams townships boundary. The mineralized breccia unit occurring at the contact has been identified along most of this 16 km strike length. The contact is divided into several areas. 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 River Valley Extension. Drill data suggests that the dip between the contact of the mineralized breccia and the Archean footwall gneiss ranges from about 65 to 75° west, toward the intrusion. The dip is however highly variable along strike, ranging from 65 to 85° west to 65 to 85° east. East of the Dana South area, drill data suggests that the Archean-River Valley Intrusion contact generally dips into the intrusion at 60 to 70°.

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 forms a contact with mafic and felsic metavolcanic rocks of the lower Huronian Supergroup (Easton and Hrominchuk, 1999).

The River Valley Intrusion in Dana Township, north of the Sturgeon River Fault, shows an increase in metamorphic grade southeast away from the Grenville Front and into the main Grenville terrane. River Valley Intrusion rocks west of Dana Lake have a mid- to upper-greenschist facies imprint. In the Lismer Ridge Zone metamorphic grade is lower amphibolite facies. East of Lismer, from the Varley to Razor areas, metamorphic grade is mid- to upper-amphibolite.

North of the Sturgeon River Fault in Dana Township, 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.

Two north-trending faults cut the River Valley Intrusion ("RVI") north of the Sturgeon River Fault in Dana Township. These north-south faults (the Drop Zone West and Drop Zone East faults) occur approximately 500 m apart and bound a segment of the RVI intrusion that has an apparent displacement of 1.3 km to the south. It is possible that the West and East Drop Zone faults are 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 in Easton, 2003).

A zone of northwest-trending faults (Turtle Creek, Martin Creek, and Cre-Mac faults) transects the Property held by NAM, and parallels the Sturgeon River Fault. The Sturgeon River Fault is an important structural feature within the River Valley Intrusion, juxtaposing highly deformed and recrystallized River Valley Intrusion rocks of the Grenville Province in Crerar Township against River Valley Intrusion rocks of the Southern-Grenville Province Boundary Zone in Dana Township (Easton, 2003). River Valley Intrusion rocks north of the Sturgeon River Fault generally are much less deformed and often exhibit preserved or partly preserved primary mineralogy. A northwest-trending syncline may form a major structure within the area currently owned by NAM. The syncline (referred to as the Turtle Creek syncline) trends northwest across the eastern portion of the Property. East of the Drop Zone East Fault, the synclinal axis of the fold trends sub-parallel to the River Valley Intrusion- Archean contact (Figure 7.2).

On the basis of surface mapping and diamond drilling, the idealized sectional stratigraphy of the mineralized environment comprises five major units, from the layered rocks of the River Valley Intrusion in the west to the igneous basal contact of the intrusion to the east (Figure 7.3).

- **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.

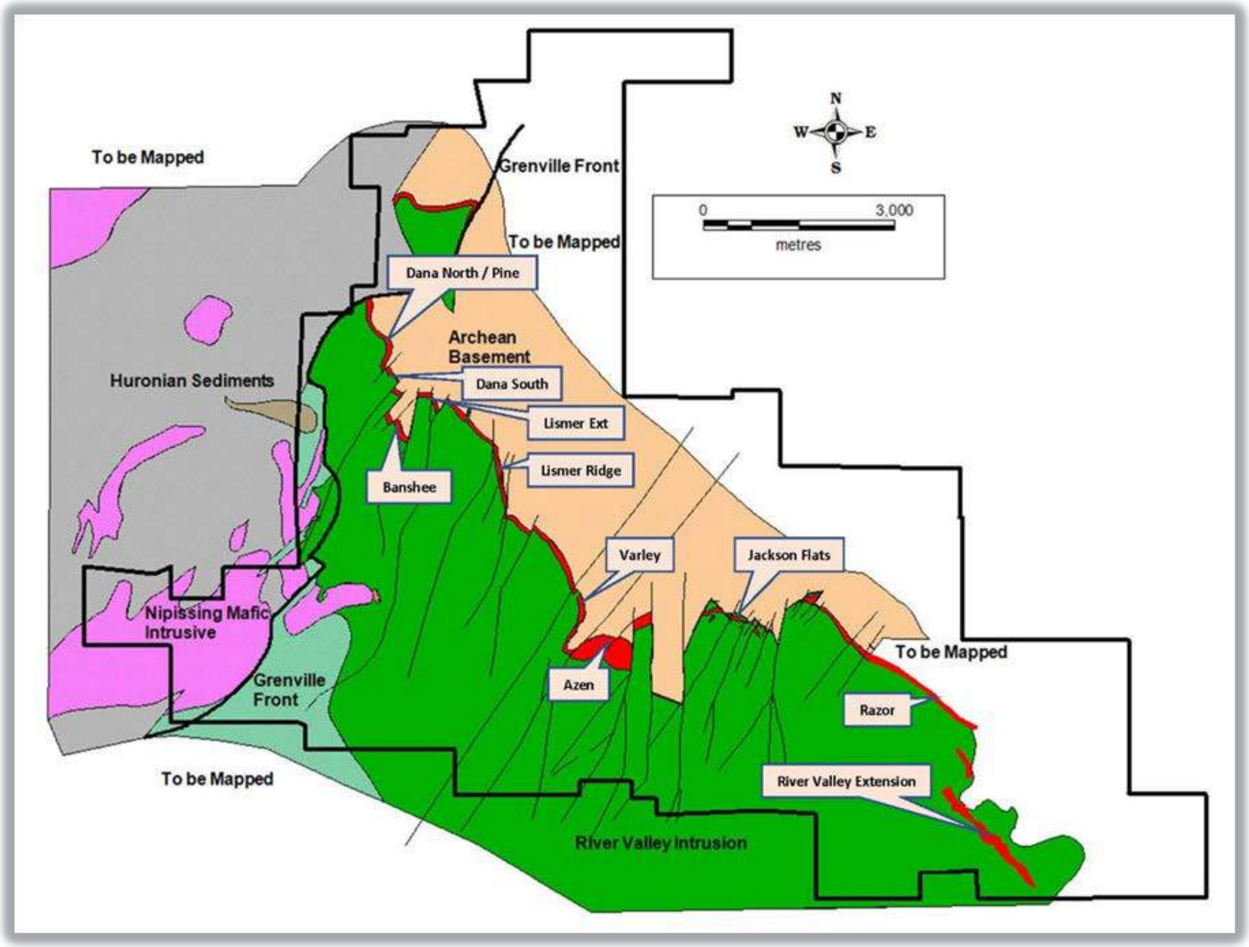
- **Inclusion-bearing Zone**: 1.65 to 98.50 m wide; scattered, elevated PGE values; mainly leucogabbro-gabbro fragments (less than 20% volume) with either fine-grained mafic matrix or medium-grained felsic matrix; fragments are generally larger (decimetre to metre scale) than those in the Breccia Zone.

- **Breccia Zone**: 11.50 to 193.05 m wide; elevated PGE values (Main Zone); mainly gabbro melagabbro fragments (greater than 20% volume) with fine- to medium grained mafic matrix; fragments are generally small (centimetre to decimetre scale).

- **Boundary Zone:** 0 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.

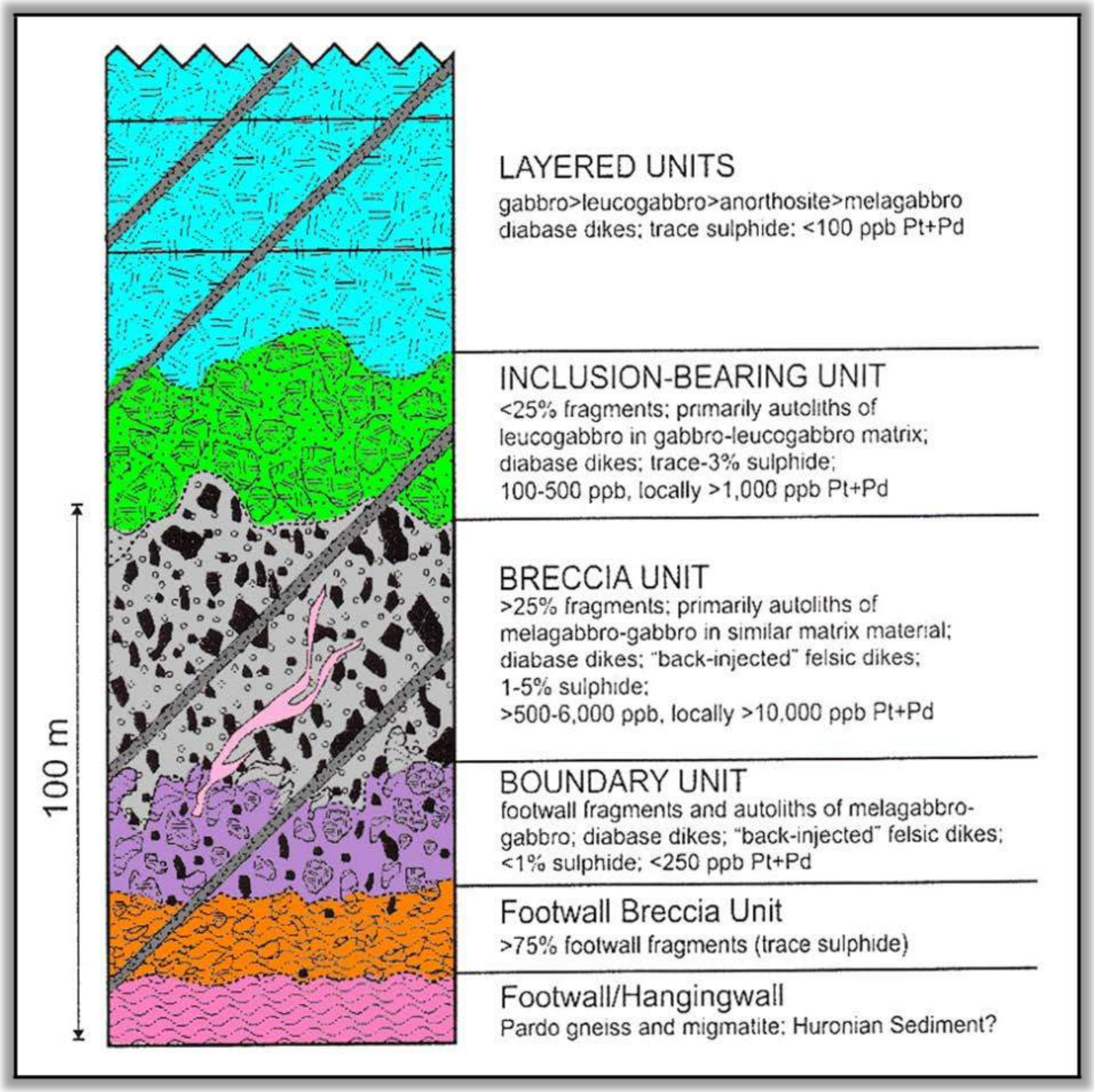
- **Country Rock:** Footwall or hanging wall Archean paragneiss-migmatite- gabbro and possibly Huronian sedimentary rocks.

FIGURE 7.2 PROPERTY GEOLOGY



Source: *WSP (2019)*

FIGURE 7.3 STRATIGRAPHIC SECTION



Source: *WSP (2019)*

7.3 MINERALIZATION

An economically important feature commonly shared by the Agnew Lake, East Bull Lake, and River Valley Intrusions is the occurrence of a copper-nickel-PGE bearing breccia unit situated at the base of the intrusions, where the footwall contact is preserved. 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, typically in modal amounts from 0.5 to 2%, occur in the matrix of the marginal and brecciated rocks and occasionally within the breccia's more mafic fragments. This sulphide mineralization commonly contains between 1 g/t and 5 g/t combined platinum-palladium-gold. On the basis of work completed to date, several important observations and conclusions can be made regarding the geological environment of the contact type PGE-copper-nickel sulphide mineralization on the Property.

- The Breccia Zone (approximately 10 to 195 m intersections), which includes the main mineralized breccia or Main Zone, has relatively consistent, elevated PGE values. The Main Zone occurs within about 20 m of the intrusive contact with Archean paragneiss and migmatite.

- The Inclusion-Bearing Zone (approximately 1.0 to 100 m intersections) is variably mineralized and has scattered, elevated PGE values.

- Sulphide contents generally range from 1 to 5% total sulphide but can be as high as 10% when occurring as localized clusters of disseminated and bleb sulphide. There is a moderate correlation between PGE-bearing sulphide mineralization and patches of blue-grey quartz (referred to as cauliflower) and/or elevated biotite concentrations.

- The majority of sulphide mineralization occurs as magmatic sulphide grains that are primarily disseminated and bleb textured, with subordinate net-textures. Principal sulphide minerals are chalcopyrite, pyrrhotite, and pentlandite with subordinate pyrite, cubanite and bornite.

- Although the mineralized sections at the Dana Lake Area and Lismer Ridge are broadly similar, there are several notable differences. Mafic rocks at Lismer Ridge commonly develop a moderate foliation and tend to have a higher proportion of chlorite and biotite. There is also a higher proportion of visible chalcopyrite relative to pentlandite + pyrrhotite at Lismer Ridge and chalcopyrite is more commonly recrystallized along foliations. At Lismer Ridge, blue quartz is not as prolific within the mineralized sections. These differences are likely the result of a slightly higher metamorphic grade at Lismer Ridge (mid- to upper-amphibolite facies), relative to the Dana Lake Area (greenschist facies).

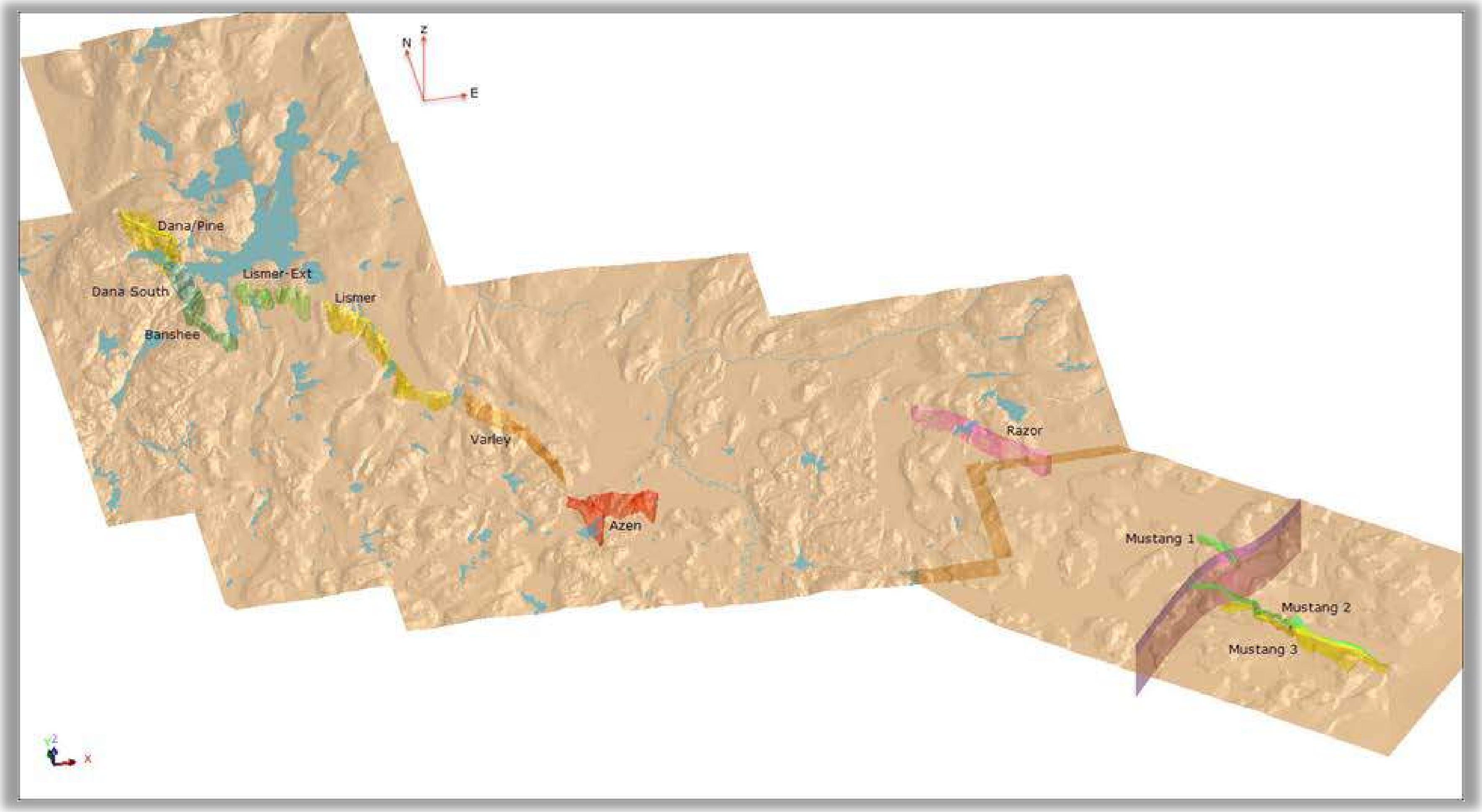
Table 7.1 lists the typical minerals with economic potential that have been observed at the Project by x-ray diffraction and scanning electron microscope studies of hand samples.

TABLE 7.1
RIVER VALLEY MINERALS

Minerals	Formula
Chalcopyrite	$CuFeS_2$
Pyrrhotite	$Fe_{(1-x)}S$
Pentlandite	$(Fe, Ni)_9S_8$
Pyrite	FeS_2
Cubanite	$CuFe_2S_3$
Bornite	Cu_5FeS_4
Sperrylite	$PtAs_2$
Mackinawite	$(Fe, Ni)_9S_8$
Cubanite	$CuFe_2S_3$
Arsenopyrite	FeAsS

The zones of mineralized breccia starting in the northwest and proceeding to the southeastern extent of the contact on the Property are: Dana North, Dana South, Banshee, Lismer's Extension, Lismer's Ridge, Varley, Azen, Razor, and River Valley Extension (Figure 7.4). The River Valley Extension zones in Figure 7.4 are labelled Mustang 1, 2 and 3.

FIGURE 7.4 RIVER VALLEY MINERAL ZONES (OBLIQUE VIEW – NOT TO SCALE)

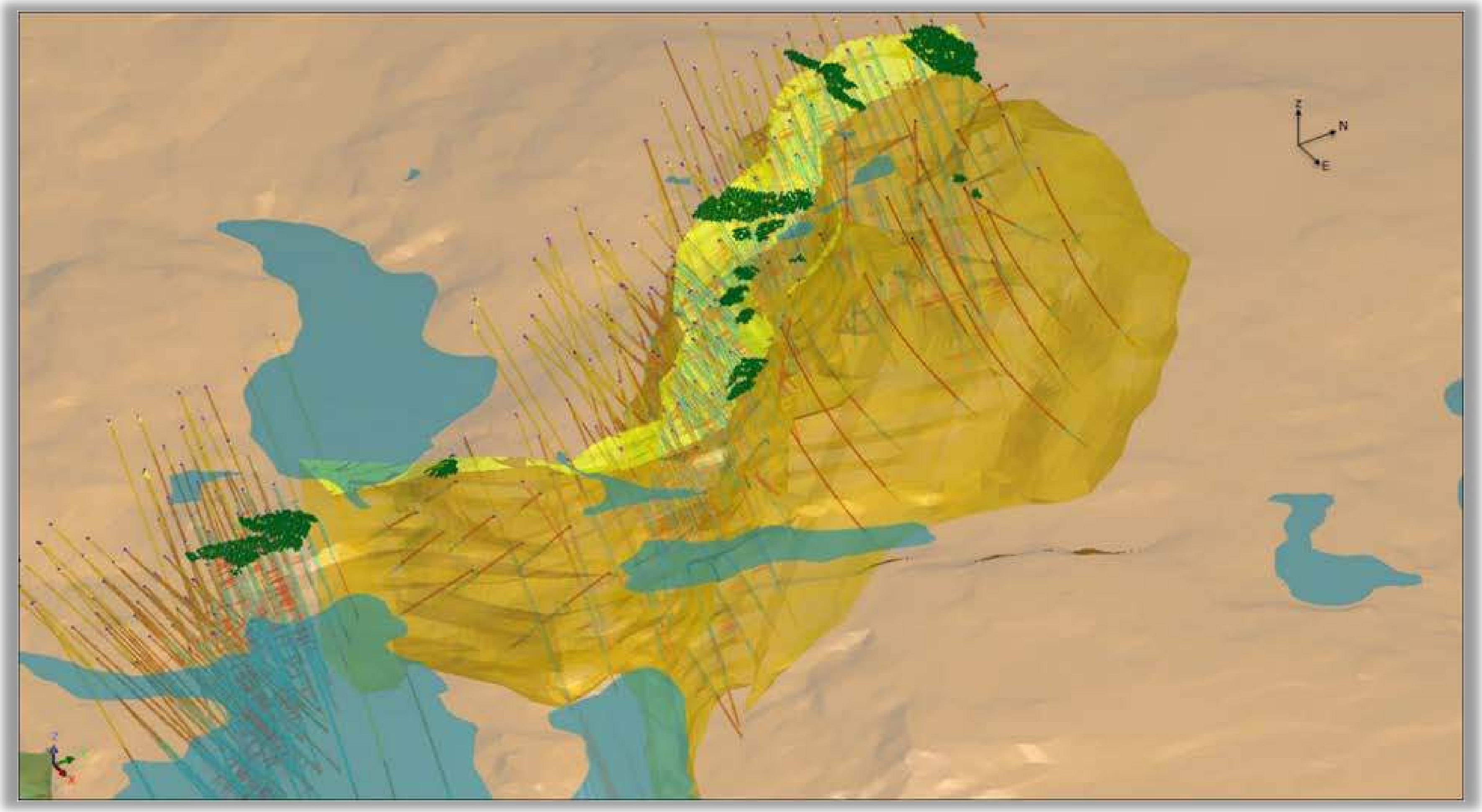


Source: *WSP (2019)*

7.3.1 Dana North / Pine

Dana North, the most northwestern zone, has a strike length of approximately 1,000 m. The zone dips steeply to the west-southwest at 80 to 85°. The rocks have undergone lower- to middle-greenschist facies metamorphism. This area exhibits little structural disturbance. The zone averages 50 m in width but varies greatly from hole to hole (Figure 7.5). The Pine Zone is a mineralized splay off of Dana North. It is unknown at this time if the Pine Zone is structurally emplaced or primary magmatic placement. The strike is roughly perpendicular to Dana North and dips to the southeast at approximately 40° to 45°. The average thickness of the Zone is 45 m, yet thins to 15 m in the east.

FIGURE 7.5 OBLIQUE LONGITUDINAL PROJECTION - DANA NORTH/PINE

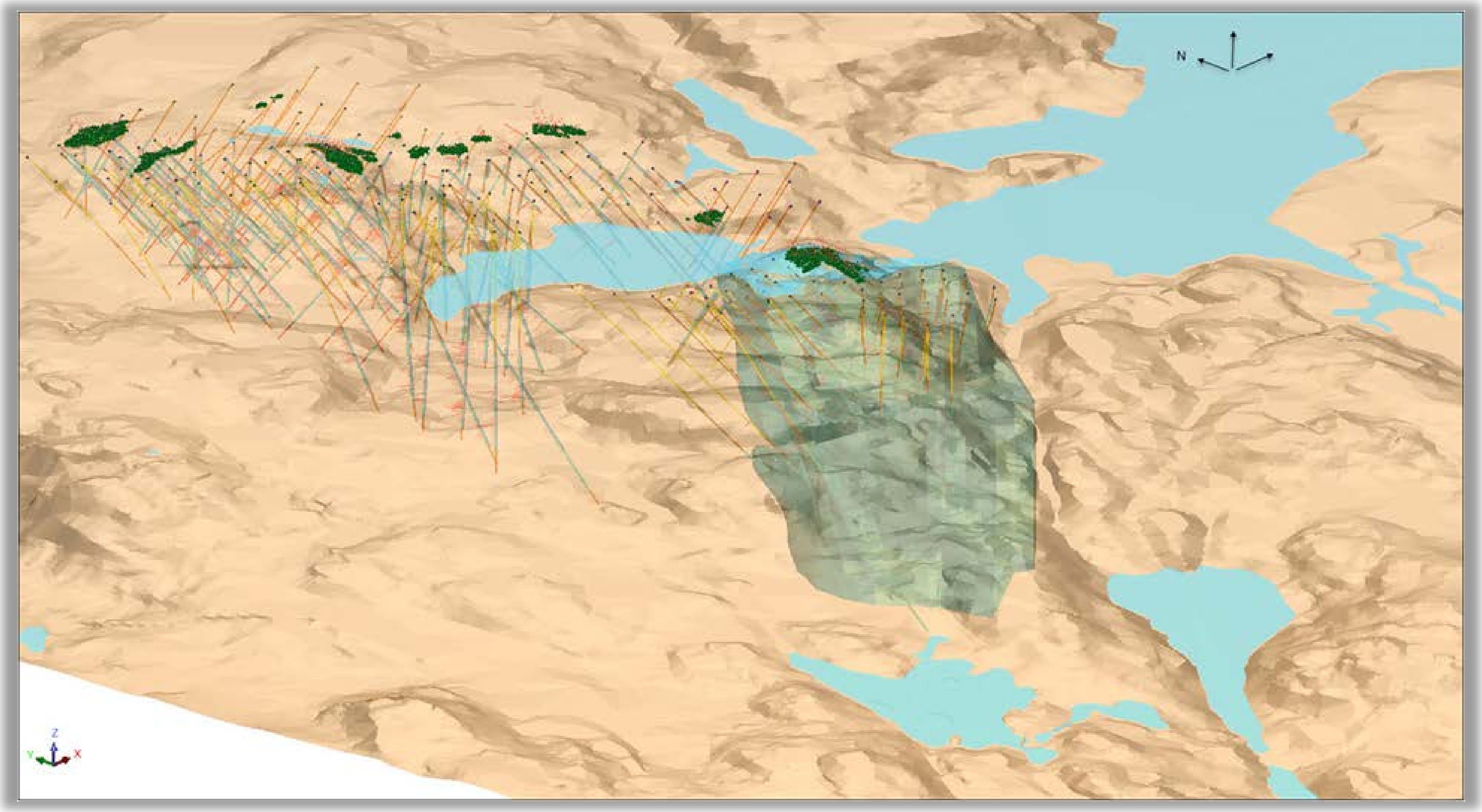


Source: *WSP (2019)*

7.3.2 Dana South

Proceeding southeast, Dana South is approximately 500 m in length, dips at 80 to 85° to the west-southwest, and varies greatly in width between holes and sections. The rocks here 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 (Figure 7.6).

FIGURE 7.6 OBLIQUE LONGITUDINAL PROJECTION - DANA SOUTH

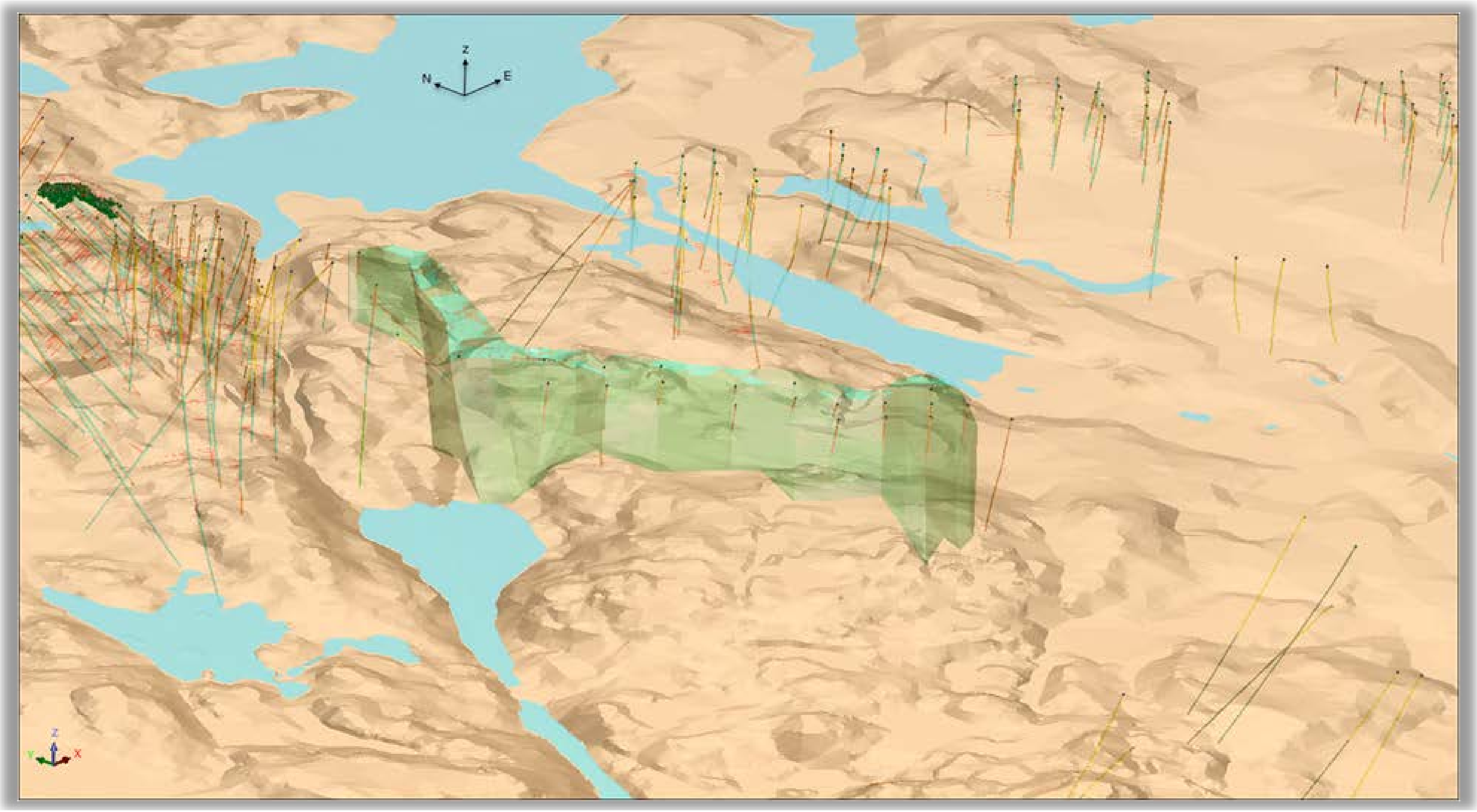


Source: *WSP (2019)*

7.3.3 Banshee

The next zone further to the southeast is Banshee Lake which is a fault-offset band of marginal series rocks. This block of breccia has been displaced approximately 350 m to the southwest. The metamorphic grade of the rock here is lower amphibolite facies. The strike length of this zone is approximately 500 m and dips to the southwest at 60 to 70°. The rocks here show relatively more structural fabric in the way of fracture, shears, and foliation than at Dana (Figure 7.7).

FIGURE 7.7 OBLIQUE LONGITUDINAL PROJECTION - BANSHEE

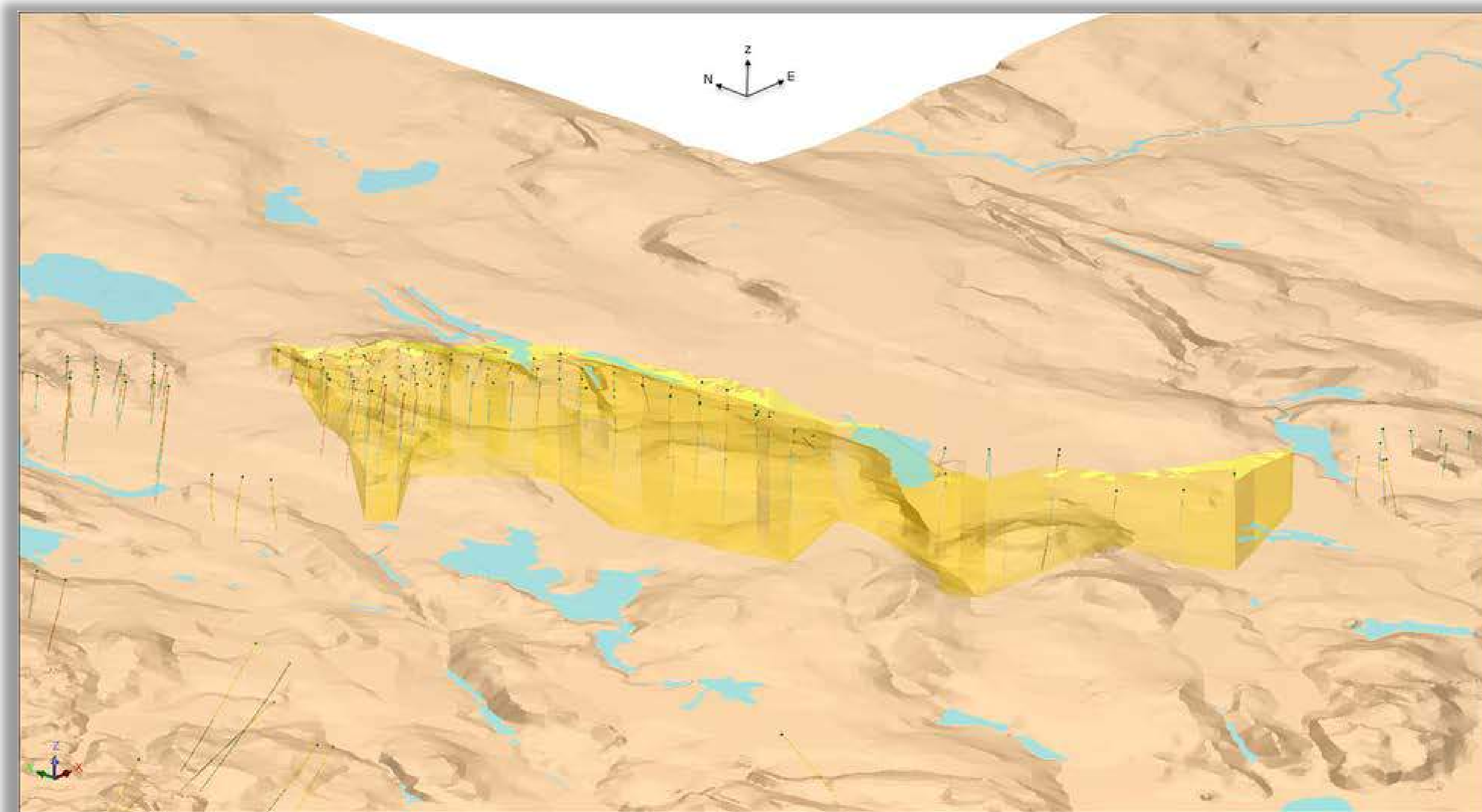


Source: *WSP (2019)*

7.3.4 Lismer Ridge and Lismer Extension

The next two zones, which can be described together due to the proximity and identical geology, are Lismer Extension and Lismer Ridge. These zones have a combined strike length of approximately 2,400 m dip east-southeast at about 60 to 70°. These zones have a lower- to mid-amphibolite grade metamorphic over print and exhibit a more penetrate structural fabric in the way of foliation throughout than the last zones. The rocks are more highly chloritized and carry more biotite relative to the other zones. The sulphides are composed of a higher percentage of chalcopyrite and are recrystallized along foliation planes (Figure 7.8).

FIGURE 7.8 OBLIQUE LONGITUDINAL PROJECTION - LISMER RIDGE AND LISMER EXTENSION

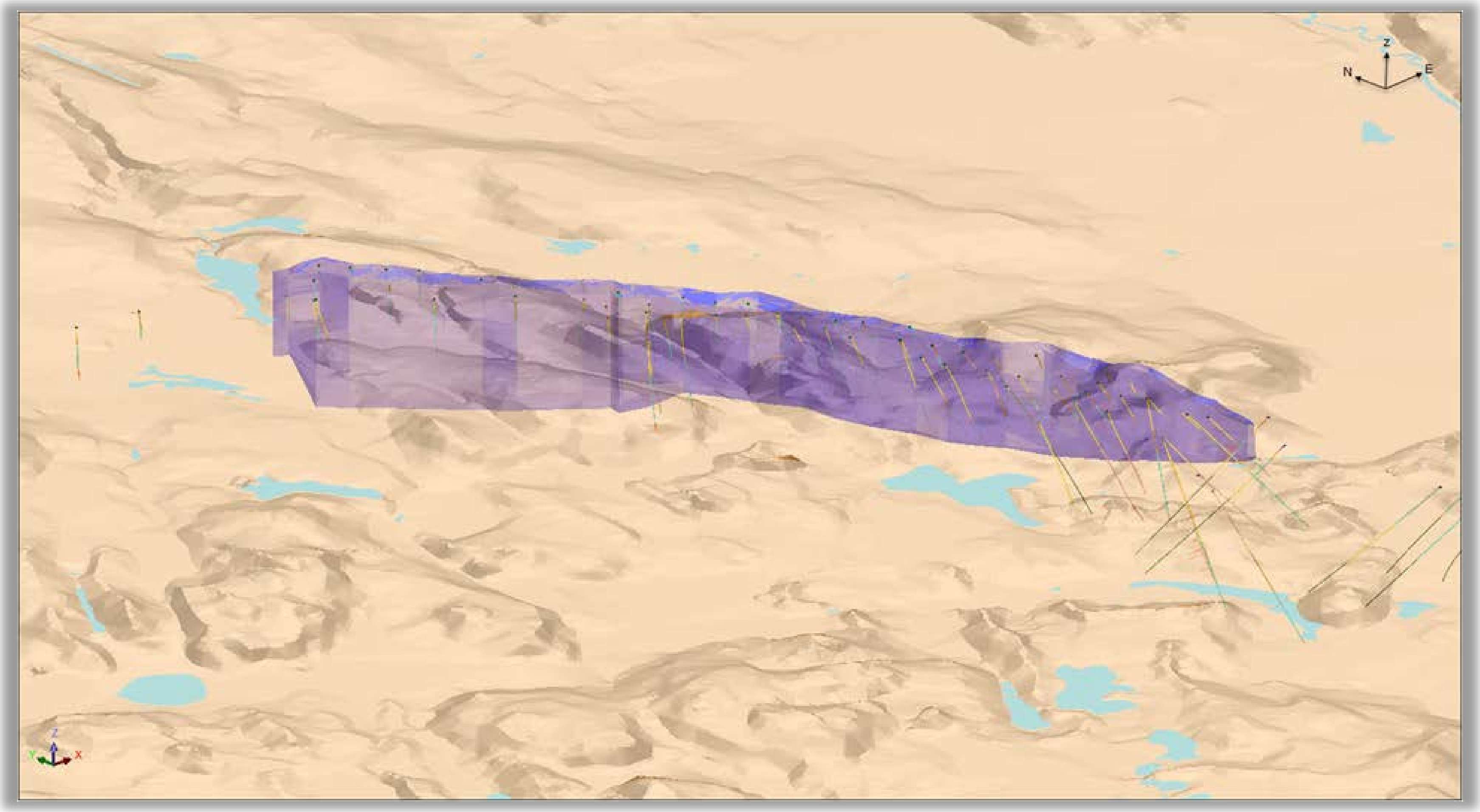


Source: *WSP (2019)*

7.3.5 Varley

The next zone is Varley, which has strike length of approximately 2,500 m and dips to the west at approximately 60 to 70°. The rocks here have undergone lower- to mid-amphibolite grade metamorphism but display little structural deformation (Figure 7.9).

FIGURE 7.9 OBLIQUE LONGITUDINAL PROJECTION - VARLEY

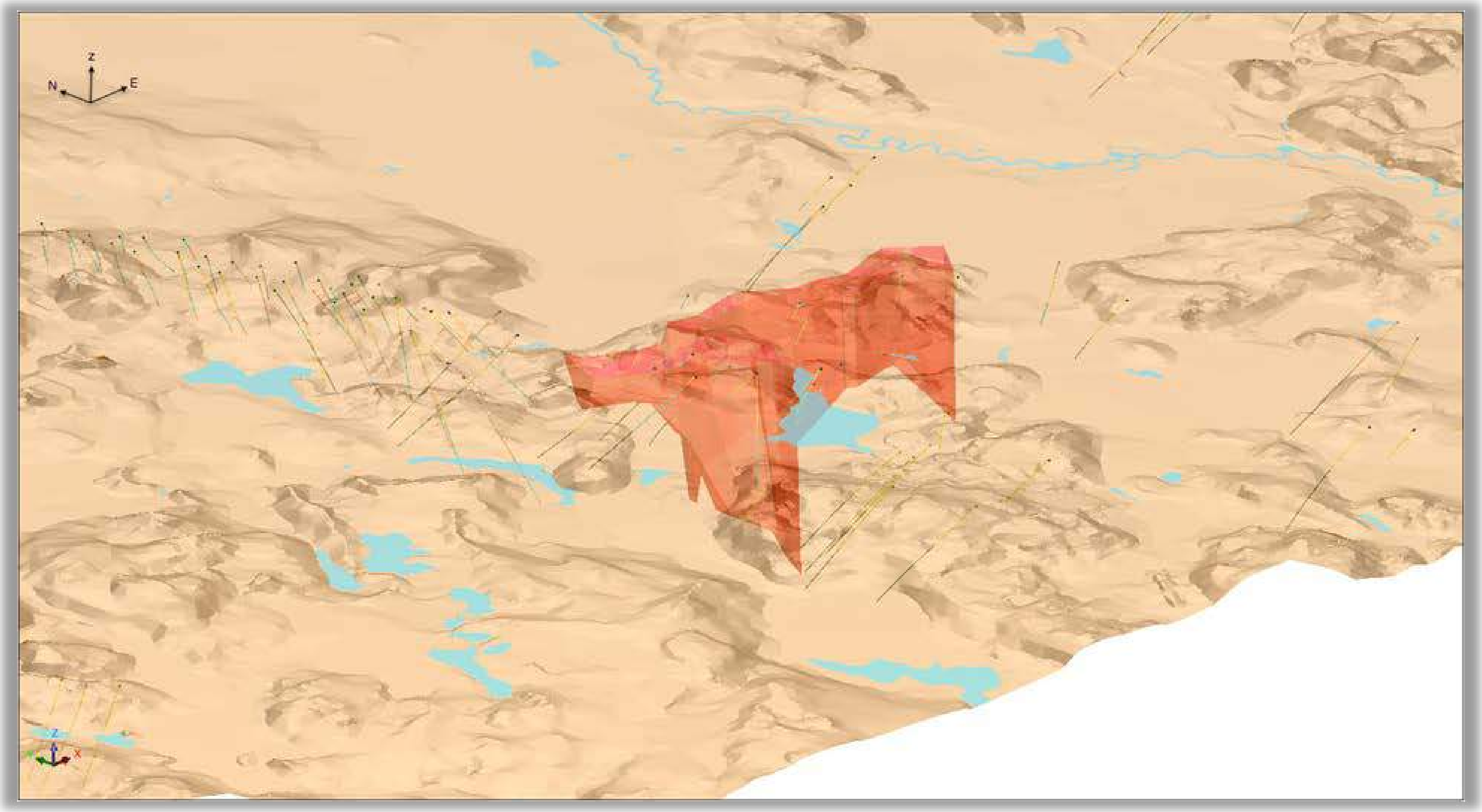


Source: *WSP (2019)*

7.3.6 Azen

At this juncture the contact swings to the east from the previous northwest-southeast orientation and is where the Azen Zone is encountered. This zone has a strike length of approximately 1,300 m and dips 30 to 50° south. The rocks have a mid- amphibolite facies over print (Figure 7.10).

FIGURE 7.10 OBLIQUE LONGITUDINAL PROJECTION - AZEN



Source: *WSP (2019)*

7.3.7 Razor

Razor has a strike length of approximately 1,400 m. This zone dips progressively steeper to the east from about 80° to the south to steeply north at the far eastern end. The rocks have undergone upper amphibolite grade metamorphism (Figure 7.11).

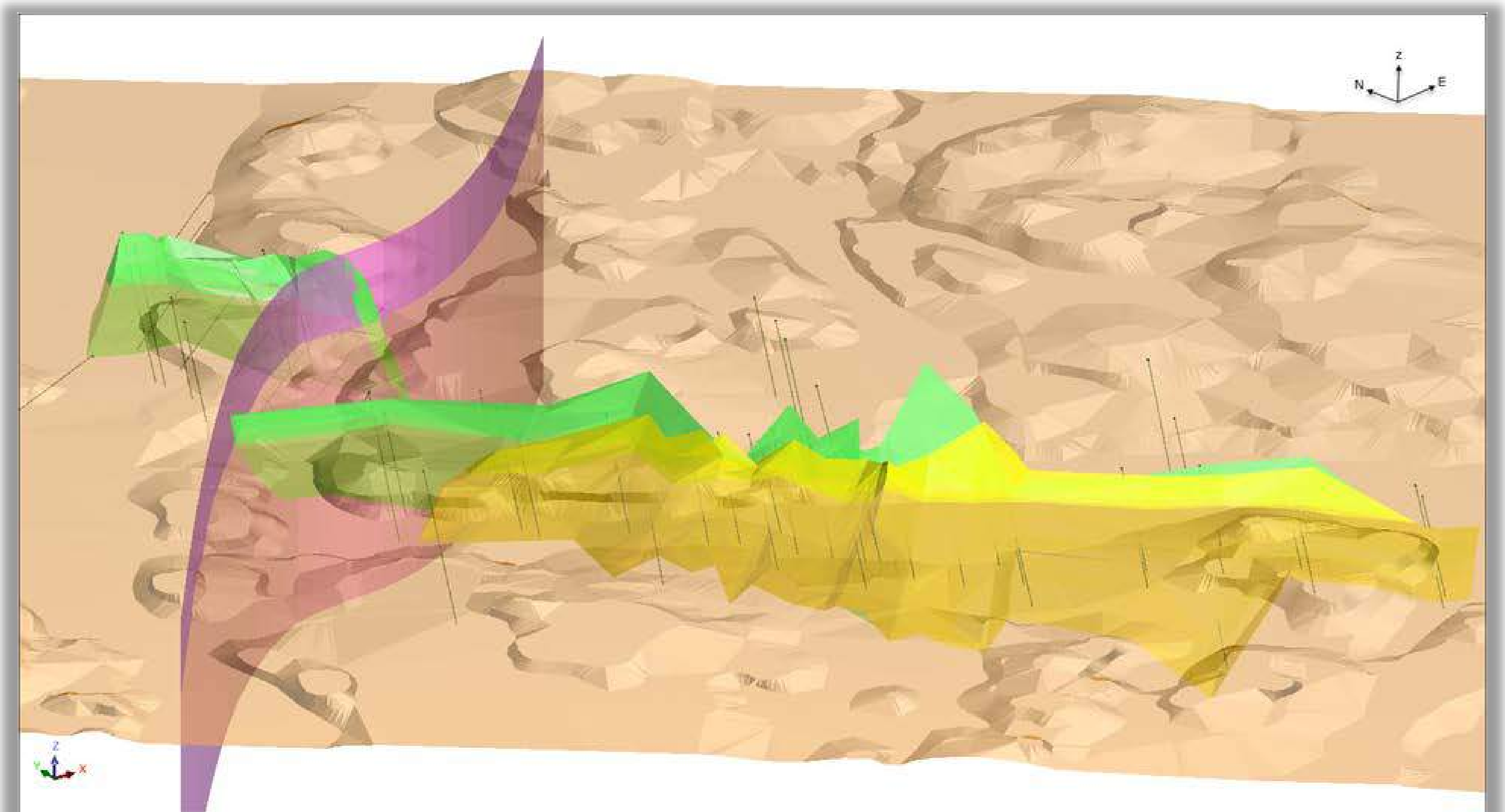
FIGURE 7.11 OBLIQUE LONGITUDINAL PROJECTION - RAZOR

Source: *WSP (2019)*

7.3.8 River Valley Extension

The River Valley Extension has a strike length of approximately 2,400 m. The zone consists of two parallel mineralized horizons that are truncated to the north by a strike-slip fault. To the north of the fault, a single mineralized horizon exists. This zone dips steeply at about 80° to the southwest or northeast depending on the location (Figure 7.12).

FIGURE 7.12 OBLIQUE LONGITUDINAL PROJECTION - RIVER VALLEY EXTENSION



Source: *WSP (2019)*

8.0 DEPOSIT TYPES

Two styles of mineralization have been observed at the Project: contact nickel-PGE mineralization (US Geological Survey #5b) and reef PGE mineralization (US Geological Survey #2b) (http://pubs.usgs.gov/bul/b1693/html/bullfrms.htm).

The presence of several highly-anomalous assays from rocks lying within higher portions of the River Valley Intrusion's stratigraphy suggests that there are opportunities for PGE mineralization such as reef or stratabound-type targets, or narrow, high-grade breccia zones.

8.1 CONTACT-STYLE PGE MINERALIZATION

Contact-style 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 silicon dioxide and/or sulphur can directly result in sulphur-saturation and the separation of a PGE-rich immiscible sulphide. The addition of silicon dioxide 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. Analogies for this model include Lac des Iles (northwestern Ontario), the Platreef (South Africa), and Portimo Complex (Finland).

Contact-style PGE mineralization is the most common form of PGE mineralization within the East Bull Lake Intrusive Suite. Mineralized zones are commonly restricted to within 200 to 300 m of the true footwall contact, and mineralized zones are commonly 20 to 100 m wide. Mineralization occurs typically as fine- to medium- grained disseminated to blebby chalocopyrite+pryrrhotite+pentlandite within a heterolithic gabbro to melagabbro breccia.

8.2 REEF-STYLE PGE MINERALIZATION

Reef-style PGE mineralization is a strata-bound or strata-form style of mineralization that typically occurs higher up in the stratigraphy of the intrusion at the contact between two separate and distinct lithological units. 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 be focused entirely on the productive horizon. In order to identify the proper horizon, geochemical traverses are essential with the goal being to look for systematic changes in PGE and/or nickel- copper tenors across lithological boundaries. Once the specific horizon is identified, then grid sampling and ground-based geophysics should be used over the target area.

9.0 EXPLORATION

9.1 EXPLORATION PRIOR TO 2006

NAM (aka PFN) has conducted exploration on the Property since 1999. A summary of the activities conducted by NAM and/or their joint venture partners is summarized in Table 9.1. The information summarized in the table has not been reviewed by the Qualified Person and had been sourced from various internal Company reports and press releases available from NAM's website.

TABLE 9.1
EXPLORATION WORK PRIOR TO 2006

Year	Company	Activities
1999	PFN/Amplats	With joint venture partner Amplats established a Phase 1 surface program which 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	PFN/Amplats	Phase 2 program surface 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.
2001	PFN/Amplats	Phase 3 surface program consisted of sample collections from the property with concentrations in the south eastern and western contact areas.
2002	PFN/Amplats	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.
2003	PFN/Amplats	SPECTREM Air flew airborne mag, EM, and radiometric surveys over the River Valley property.
2004	PFN/Amplats	From period May to October, Phase VI surface included extensive geological mapping of the eastern portion of the property with the collection of samples.
2005	PFN/Amplats	From period December to October, a 35-40 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 extension. Follow-up geological mapping and sampling was carried out.

9.2 2006 SURFACE PROGRAM

The surface program carried out from May to November 2006 was designed to follow up on the 2004 and 2005 surface programs. Mapping and prospecting was also carried out in areas where previous work was lacking.

The objectives of the surface program were as follows:

- Map and sample areas that contain concentrations of anomalous samples as identified in the 2005 surface program (Figure 9.1, and Table 9.2 and Table 9.3).

- Decipher the contact relations between the River Valley Intrusion and the adjacent Huronian sediments on the western edge of the Property and the River Valley Intrusion outlier in the Pardo area.

- Prospect and map the magnetic anomalies in the River Valley Intrusion/Huronian contact area of the Property.

- Cut a grid of 50-line km in the Jackson's Flats south area and perform IP and magnetic surveys.

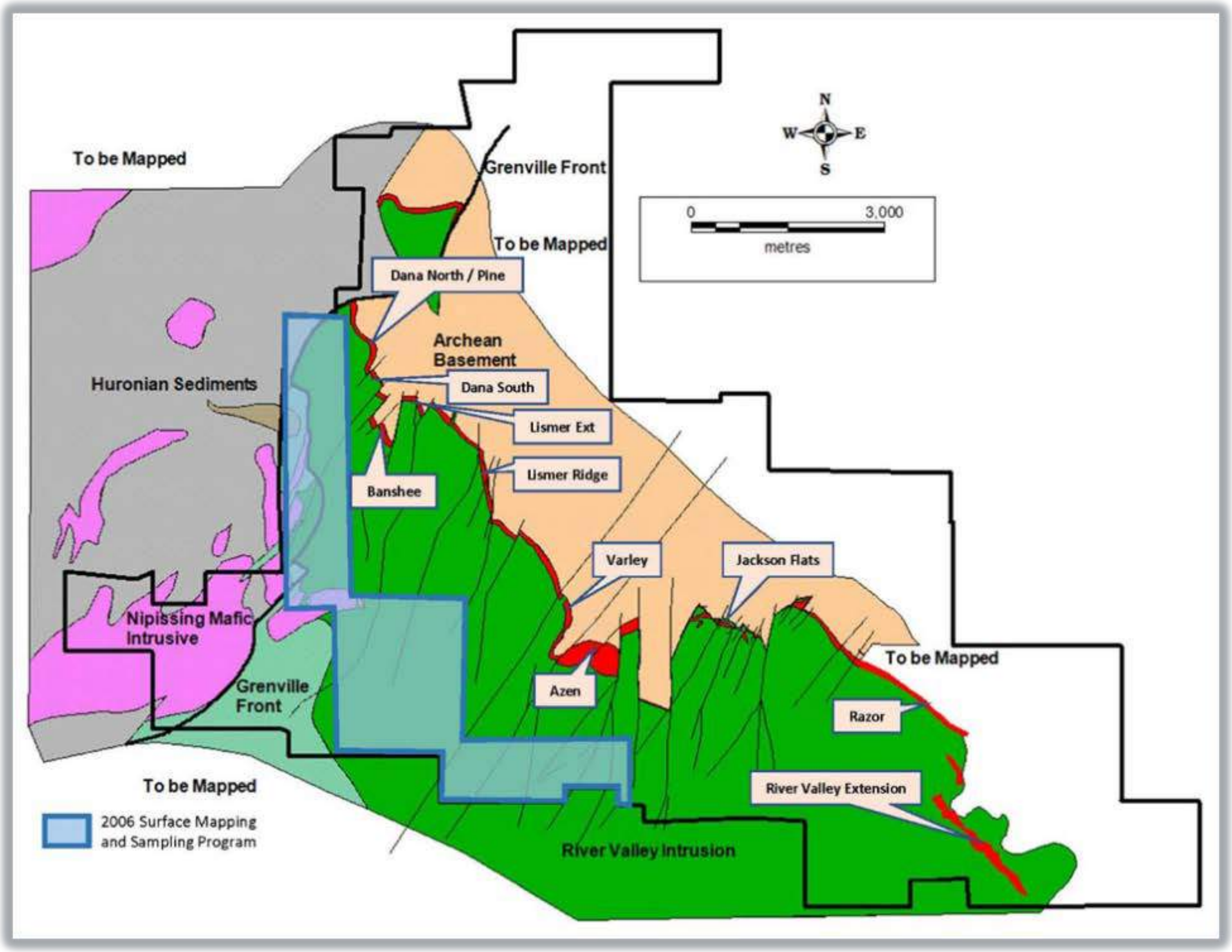
- Prospect and trace the Olivine gabbronorite units exposed along the road in Jackson's Flats south where anomalous samples were yielded during the 2005 surface program.

- Perform gravity survey profiles along selected traverses across the regional stratigraphy to see if this method would be a viable exploration tool and/or reveals useful information about the nature of the River Valley Intrusion.

- Conduct mobile metal ion geochemical orientation surveys over areas of known mineralization to determine whether this method would be responsive in the River Valley Intrusion PGE environment. If good results were obtained, then surveys would be conducted over prospective areas lacking outcrop.

This program consisted of 2,432 grab samples and 341 channel samples being taken.

FIGURE 9.1 2006 SURFACE EXPLORATION



Source: *WSP (2019)*

TABLE 9.2
2006 SURFACE GRAB SAMPLING PROGRAM

Sample No.	Au (ppb)	Pt (ppb)	Pd (ppb)	Pt+Pd+Au (ppb)	Pd:Pt Ratio	Ni (ppm)	Cu (ppm)
ND308-06	65	220	261	546	1.19	204	61
RZ159	5	300	261	566	0.87	20	85
RZ190	211	200	196	607	0.98	2,030	331
ND092-06	10	330	286	626	0.87	52.9	23
ND182-06	76	160	406	642	2.54	197	94
ND257-06	9	440	237	686	0.54	141	12
ND188-06	66	290	336	692	1.16	664	50
PW1286	64	240	391	695	1.63	1,410	620
SB100-06	57	230	413	700	1.80	1,370	143
ND184-06	10	400	360	770	0.90	213	23

TABLE 9.2 2006 SURFACE GRAB SAMPLING PROGRAM							
Sample No.	**Au (ppb)**	**Pt (ppb)**	**Pd (ppb)**	**Pt+Pd+Au (ppb)**	**Pd:Pt Ratio**	**Ni (ppm)**	**Cu (ppm)**
ND298-06	57	470	314	841	0.67	26	301
SB139-06	89	610	162	861	0.27	341	341
ND237-06	341	260	287	888	1.10	3,050	704
PW558	17	660	226	903	0.34	102	18
ND075-06	320	320	269	909	0.84	2,570	651
ND323-06	18	320	670	1,008	2.09	334	20
RZ186	409	380	382	1,171	1.01	3,700	209
ND224-06	417	380	405	1,202	1.07	3,430	872
RZ188	425	460	442	1,327	0.96	4,080	1,280
PW1318	192	1,110	623	1,925	0.56	1,680	68
RZ160	16	910	1,020	1,946	1.12	18	55
ND076-06	850	550	553	1,953	1.01	5,560	1,650
PW415	8	1,920	787	2,715	0.41	127	22
ND183-06	142	1,790	1,390	3,322	0.78	291	51
ND175-06	90	2,160	2,990	5,240	1.38	459	60

TABLE 9.3 HIGHLIGHTS OF THE CHANNEL SAMPLING PROGRAM							
Sample No.	**Au (ppb)**	**Pt (ppb)**	**Pd (ppb)**	**Pt+Pd+Au (ppb)**	**Pd:Pt Ratio**	**Ni (ppm)**	**Cu (ppm)**
DR068	53	810	769	1,632	0.95	71	774
DR283	21	580	859	1,460	1.48	31	287
DR047	26	750	533	1,309	0.71	33	204
DR152	40	690	559	1,289	0.81	18	228
DR260	52	670	566	1,288	0.85	39	187
DR230	26	900	335	1,261	0.37	20	200
DR282	29	680	548	1,257	0.81	47	253
DR048	46	580	542	1,168	0.93	36	123
DR074	102	450	474	1,026	1.05	73	695
DR186	43	550	364	957	0.66	17	156
DR258	40	430	307	777	0.71	45	431
DR042	101	380	280	761	0.74	53	723
DR304	46	430	260	736	0.61	31	183
DR075	33	440	252	725	0.57	30	254
DR121	10	320	370	700	1.16	37	161
DR078	42	330	305	677	0.92	25	439
DR169	35	330	280	645	0.85	29	190

TABLE 9.3 **HIGHLIGHTS OF THE CHANNEL SAMPLING PROGRAM**							
Sample No.	**Au (ppb)**	**Pt (ppb)**	**Pd (ppb)**	**Pt+Pd+Au (ppb)**	**Pd:Pt Ratio**	**Ni (ppm)**	**Cu (ppm)**
DR079	43	330	265	638	0.80	35	543
DR267	19	370	234	623	0.63	44	199
DR044	53	320	241	614	0.75	47	428
DR266	15	290	309	614	1.07	50	167
DR229	11	380	207	598	0.55	21	77.5
DR291	24	270	293	587	1.09	36	270
DR072	15	220	334	569	1.52	33	346

During the 2006 mapping and prospecting campaign, several areas where identified in the interior of the River Valley Intrusion that returned anomalous assays for platinum+palladium+gold. These may be sites of possible reef style PGE mineralization and warrant further work and possibly a drilling program. The 2006 IP survey identified a number of chargeability anomalies, which were ground trued with inconclusive results.

9.3 2007 SURFACE PROGRAM

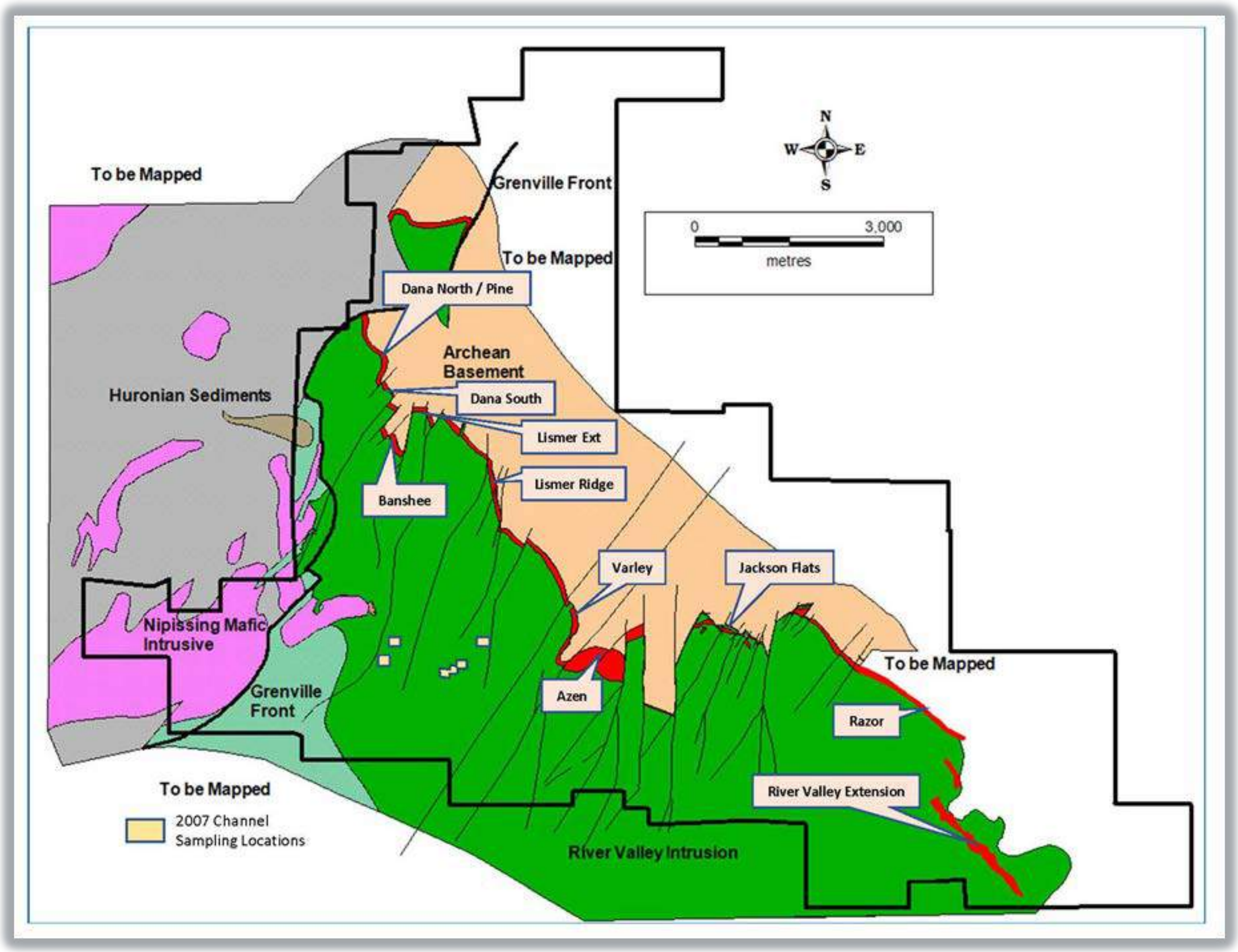
A stripping and channel-sampling program was implemented in September and continued into November. The objective of this program was to sample more completely in and around prospective PGE zones and to determine whether there was any continuity and/or control of the PGE mineralization. 371 m were stripped and 326 samples taken (Table 9.4 and Figure 9.2).

TABLE 9.4 **HIGHLIGHTS FROM 2007 CHANNEL SAMPLES**							
Sample No.	**Lithology**	**Au (ppb)**	**Pt (ppb)**	**Pd (ppb)**	**Pt+Pd+Au (ppb)**	**Ni (ppm)**	**Cu (ppm)**
Dragon Zone							
DR350	Melagabbro	97	1,277	749	2,123	55	312
DR351	Melagabbro	46	329	364	739	178	282
DR352	Melagabbro	44	182	308	534	96	275
DR353	Melagabbro	96	509	512	1,117	89	468
DR368	Leucogabbro	170	854	752	1,776	116	1,654
DR370	Leucogabbro	76	333	360	765	80	1,230
DR378	Foliated Mafic	34	292	267	593	48	420
DR379	Foliated Mafic	64	744	590	1,398	30	409
DR409	Leucogabbro	287	1,190	1,136	2,613	127	1,191
DR411	Leucogabbro	40	441	433	914	50	298
DR412	Melagabbro	97	911	835	1,843	70	613

TABLE 9.4
HIGHLIGHTS FROM 2007 CHANNEL SAMPLES

Sample No.	Lithology	Au (ppb)	Pt (ppb)	Pd (ppb)	Pt+Pd+Au (ppb)	Ni (ppm)	Cu (ppm)
DR413	Melagabbro	43	618	531	1,192	52	359
DR414	Melagabbro	48	488	404	940	167	710
DR417	Gabbro	31	414	267	712	38	136
DR420	Melagabbro	37	378	378	793	31	124
DR480	Anorthosite	81	301	342	724	44	323
DR482	Gabbro	20	475	294	789	35	73
DR493	Mafic Gab	5	948	108	1,061	49	157
East Casson Area							
DR512	Anorthosite	29	293	196	518	30	112
DR594	Melagabbro	17	355	133	505	21	65
Road Zone							
DR601	Nipissing Gabbro	430	313	378	1,121	939	3,378
DR602	Nipissing Gabbro	247	212	248	707	686	2,059
DR603	Nipissing Gabbro	281	274	264	819	831	2,290
DR604	Nipissing Gabbro	264	251	237	752	779	2,329

FIGURE 9.2 2007 CHANNEL SAMPLE LOCATION



Source: *WSP (2019)*

9.4 2008 SURFACE PROGRAM

Starting in April of 2008, Gord Trimble, an independent consultant, was contracted to conduct a study on Dana North and South. The main focus of the Dana North South Study (Trimble, 2008) was the evaluation of the geological setting, the mineralization distribution, and a re-interpretation of the mineralized envelopes.

During June and July, in conjunction with the Dana North and Dana South Study, 13 days were spent cutting channels samples across three stripped zones at the Dana Lake area of the Project. The reason for this was that this area was completed on a 2.5 m x 2.5 m sample spacing with short channel cuts taken.

129 samples were taken and all were approximately 0.35 m long. The old grab channel cuts in the vicinity of the new continuous channel were relabelled with metal tags. The new cuts were labelled by nailing a metal tag in an extra saw cut at the beginning of each sample. Sample descriptions were entered into a Microsoft Excel™ spreadsheet. The channel areas were mapped at a scale of 1:100 and extra care was taken to locate each old sample relative to each new sample for comparison purposes. The samples were delivered to SGS Canada Inc. ("SGS")

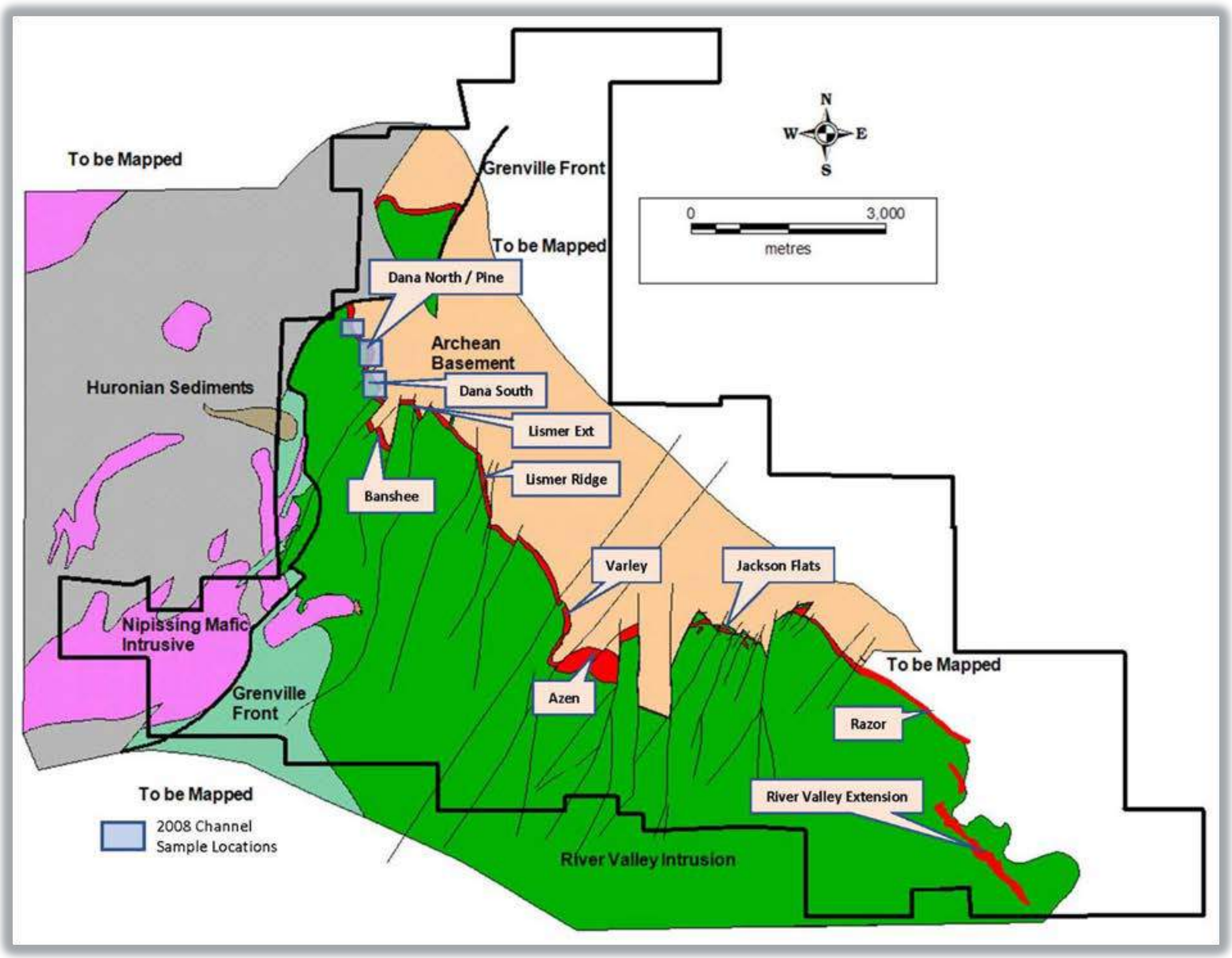
laboratories in Garson, Ontario on July 23, 2008 with a request for a 300 g pulp to be returned. Table 9.5 summarizes the significant results from the sampling program, and Figure 9.3 provides the location of the sampling on the Property.

TABLE 9.5
2008 CHANNEL SAMPLING DANA LAKE

Area	2008 Samples	Au (ppb)	Pt (ppb)	Pd (ppb)	Pt+Pd+Au (ppb)
Dana Lake	08RZ001	121	470	1,540	2,131
Road Zone	08RZ002	102	600	1,860	2,562
	08RZ003	116	790	2,340	3,246
	08RZ004	151	730	2,470	3,351
	08RZ005	146	470	1,400	2,016
	08RZ009	127	610	1,990	2,727
	08RZ013	146	790	2,720	3,656
	08RZ014	130	820	2,320	3,270
	08RZ015	130	780	2,170	3,080
	08RZ016	156	660	2,070	2,886
	08RZ018	139	820	2,910	3,869
	08RZ019	257	1,270	4,080	5,607
	08RZ020	200	720	2,520	3,440
	08RZ021	244	1,440	5,030	6,714
	08RZ022	171	750	2,380	3,301
Dana Lake	08SZ008	108	420	1,380	1,908
South Zone	08SZ010	154	1,020	3,460	4,634
	08SZ013	136	960	3,040	4,136
	08SZ015	166	780	3,270	4,216
	08SZ016	139	900	2,860	3,899
	08SZ017	141	830	2,820	3,791
	08SZ018	181	1,060	3,370	4,611
	08SZ019	95	880	2,330	3,305
	08SZ020	86	870	2,590	3,546
	08SZ021	400	2,230	6,880	9,510
	08SZ030	81	540	1,720	2,341
	08SZ031	101	860	2,970	3,931
Dana Lake	08RZ039	68	480	1,520	2,068
Road Zone	08RZ040	123	940	2,870	3,933
	08RZ041	117	740	2,440	3,297
Dana Lake	08SZ048	138	780	2,420	3,338
South Zone	08SZ049	173	1,540	4,370	6,083
	08SZ050	135	740	2,580	3,455
	08SZ051	186	1,150	3,830	5,166
	08SZ054	89	690	2,210	2,989
	08SZ055	109	510	1,870	2,489

TABLE 9.5 2008 CHANNEL SAMPLING DANA LAKE					
Area	**2008 Samples**	**Au (ppb)**	**Pt (ppb)**	**Pd (ppb)**	**Pt+Pd+Au (ppb)**
	08SZ058	134	960	2,680	3,774
Dana Lake	08CZ003	107	720	2,140	2,967
Central Zone	08CZ004	430	2,550	6,390	9,370
	08CZ005	132	520	1,340	1,992
	08CZ009	151	990	2,670	3,811
	08CZ012	120	480	1,720	2,320
	08CZ014	79	630	2,160	2,869
	08CZ015	190	990	2,900	4,080
	08CZ022	45	720	1,660	2,425

FIGURE 9.3 2008 CHANNEL SAMPLE OF GRID SOUTH, GRID ROAD, AND CENTRAL ZONE



Source: *WSP (2019)*

9.5 2016 SURFACE PROGRAM

The program, 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.

Three of four targeted areas on the River Valley Extension were mapped and sampled by PFN geologists. A grab sample from Target Area 1 returned assay values of 12.60 g/t Pd + Pt from a rusty sulphide zone that extends across the width of the outcrop exposure. Three surface grab samples from Target Area 4 returned Pd + Pt assay values of greater than 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.

Three grab samples from the footwall to Dana South Zone returned assays of greater than 2 g/t Pd + Pt and 0.15% Cu. These three samples were taken from outcrops of River Valley Intrusion along the shores of Dana Lake, approximately 50 m from the east boundary of the Dana South Zone. The area between the outcrop and stripped area is covered, but the indications of high-grade mineralization where samples suggest that the Dana South Zone could potentially be expanded eastward, or that another mineralized zone may be present.

Table 9.6 summarizes the results of the grab samples.

TABLE 9.6 2016 GRAB SAMPLE SUMMARY									
Sample Number	**Zone**	**Easting**	**Northing**	**Pd (g/t)**	**Pt (g/t)**	**Pd+Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**
20429	RV Ext.	565,467	5,164,103	0.516	0.554	1.070	0.120	0.073	0.060
20426	RV Ext.	565,441	5,164,148	1.540	0.901	2.441	0.020	0.183	0.051
25264	RV Ext.	564,562	5,165,932	0.771	0.334	1.105	0.123	0.201	0.130
RZ2016-33	RV Ext.	565,449	5,164,142	0.612	0.553	1.165	0.019	0.019	0.003
RZ2016-38	RV Ext.	564,922	5,164,616	9.524	3.071	12.595	0.070	0.034	0.025
RZ2016-40	RV Ext.	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: *Coordinates, Easting and Northing, are in NAD83 UTM Zone 17T.*

9.6 2017 INDUCED POLARIZATION SURVEY

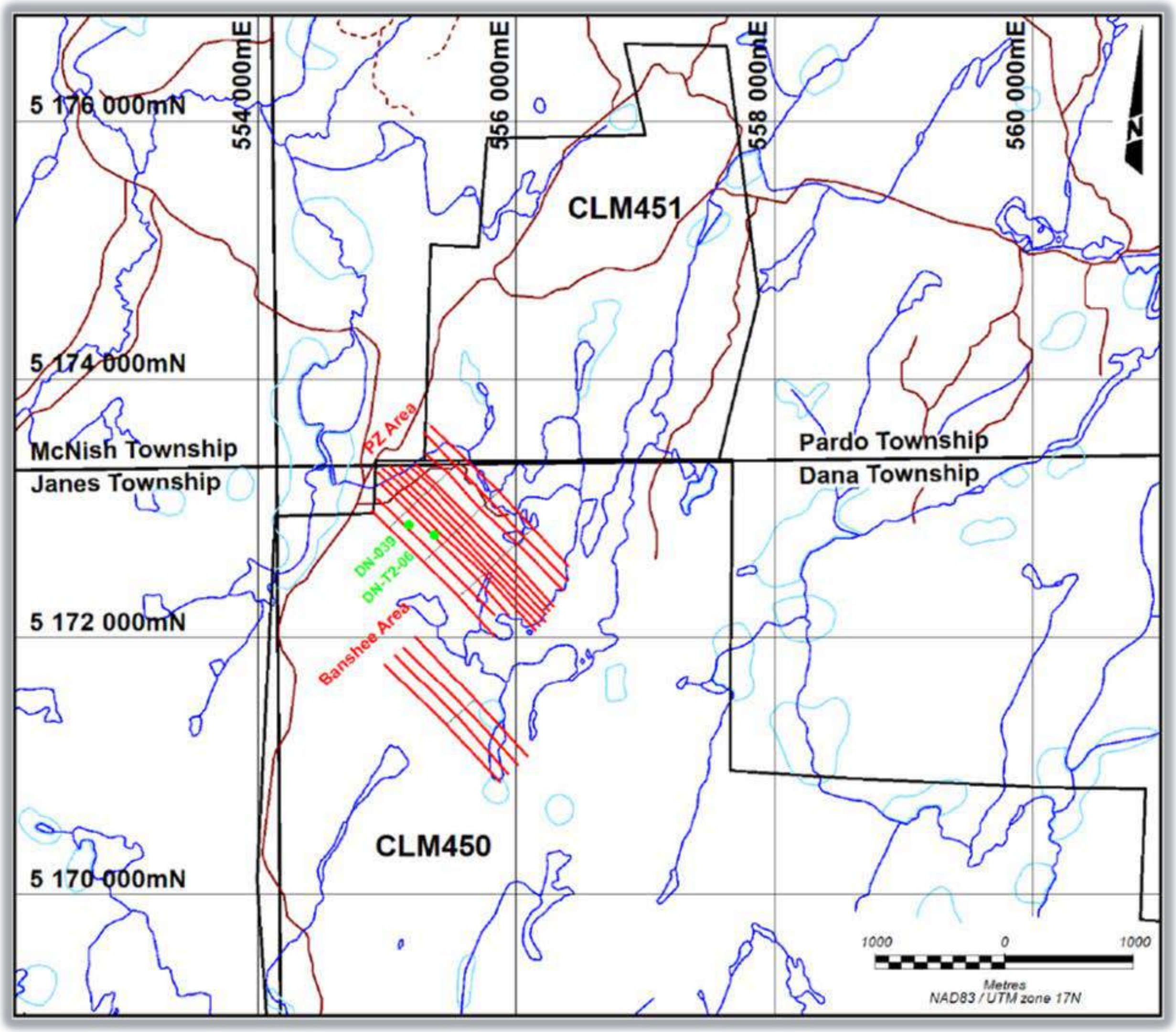
Abitibi Geophysics, based out of Thunder Bay, Ontario, were contracted by NAM, to conduct downhole induced polarization survey ("IP") on two holes (DN-039 and DN-T2-06) and a total of 23.55 lineal km of IP survey on two separate grids (PZ and Banshee) on the Project (Figure 9.4).

The data on the two survey grids were acquired over sixteen days June 4, 2017 to June 15, 2017 (Cole, 2017). The field data were acquired by one field crew consisting of five members, deploying the IRIS Instruments TIPIX and the IRIS Elrec-PRO 10 channel receiver. A team in the Abitibi Geophysics office in Thunder Bay completed the QC review and interpreted the results. The downhole survey data was acquired on June 18, 2017 with a field crew of two.

Following an interpretation of the pseudosections and the downhole survey, a total of 40 chargeable sources were interpreted. The chargeable sources are trending primarily NE/SW, which would be a similar trend displayed at the Pine Zone. 16 of the sources are near surface on the PZ grid and six are near surface on the Banshee grid. All near surface sources could be ground truthed with prospecting and stripping.

18 sources were deeper and would require drilling to evaluate, 13 from the PZ grid and five from the Banshee grid. Most of the targets are in the 150 to 200 m vertical depth with a few targets being 400 m vertically in depth.

FIGURE 9.4 2017 IP SURVEY GRID



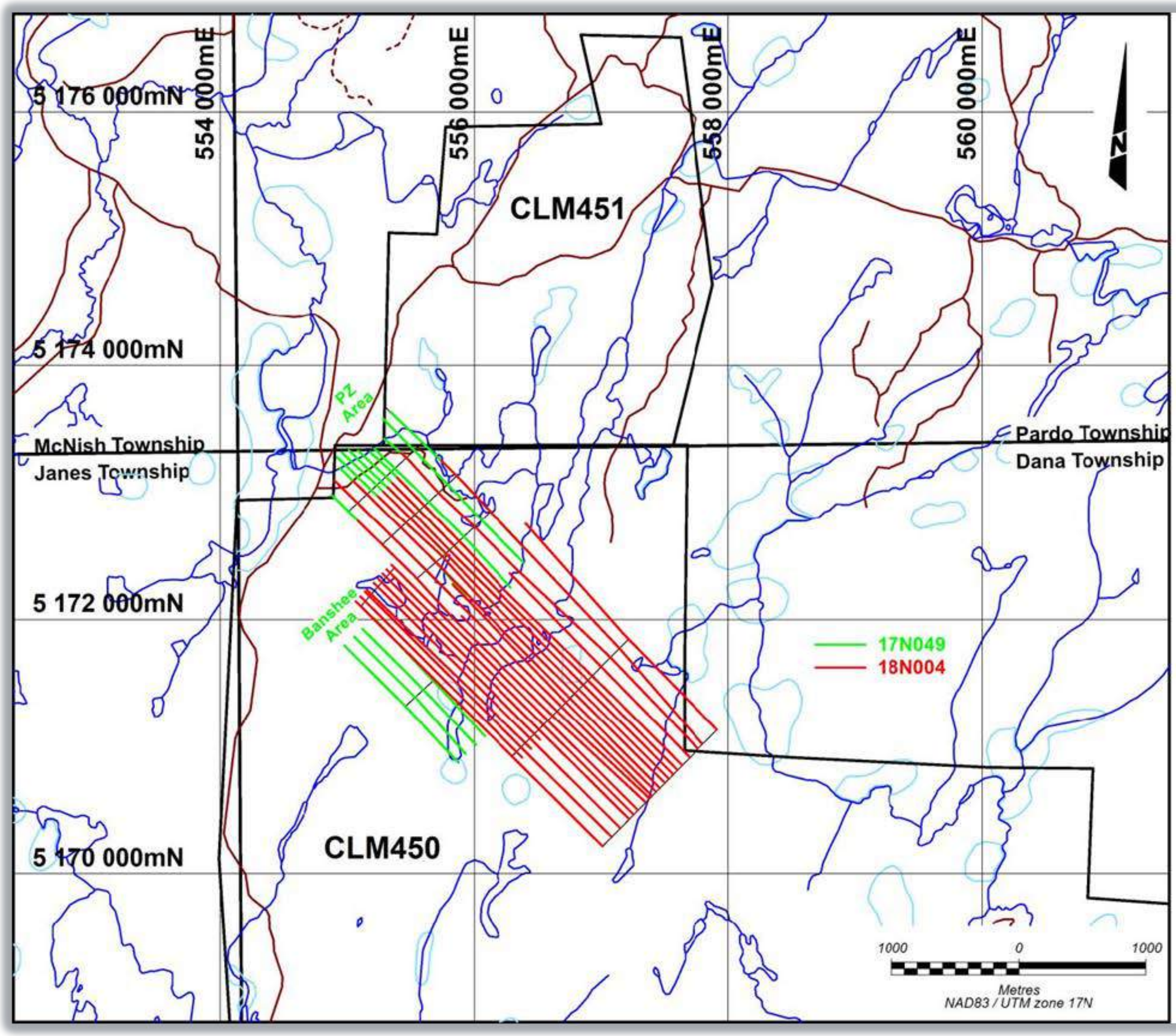
Note: *Coordinates, Easting and Northing, are in NAD83 UTM Zone 17T.*
Source: *WSP (2019)*

9.7 2018 INDUCED POLARIZATION SURVEY

Abitibi Geophysics, based out of Thunder Bay, Ontario, was contracted by NAM, to conduct a total of 63.79 lineal km of IP survey on the Project (Figure 9.5).

The data were acquired over 24 days from January 20, 2018 to February 13, 2018 (Cole, 2018). The field data were acquired by one field crew consisting of five members, deploying the IRIS Instruments TIPIX and the IRIS Elrec-PRO 10 channel receiver. A team in the Abitibi Geophysics office in Thunder Bay completed the QC review and interpreted the results.

FIGURE 9.5 2018 IP SURVEY GRID



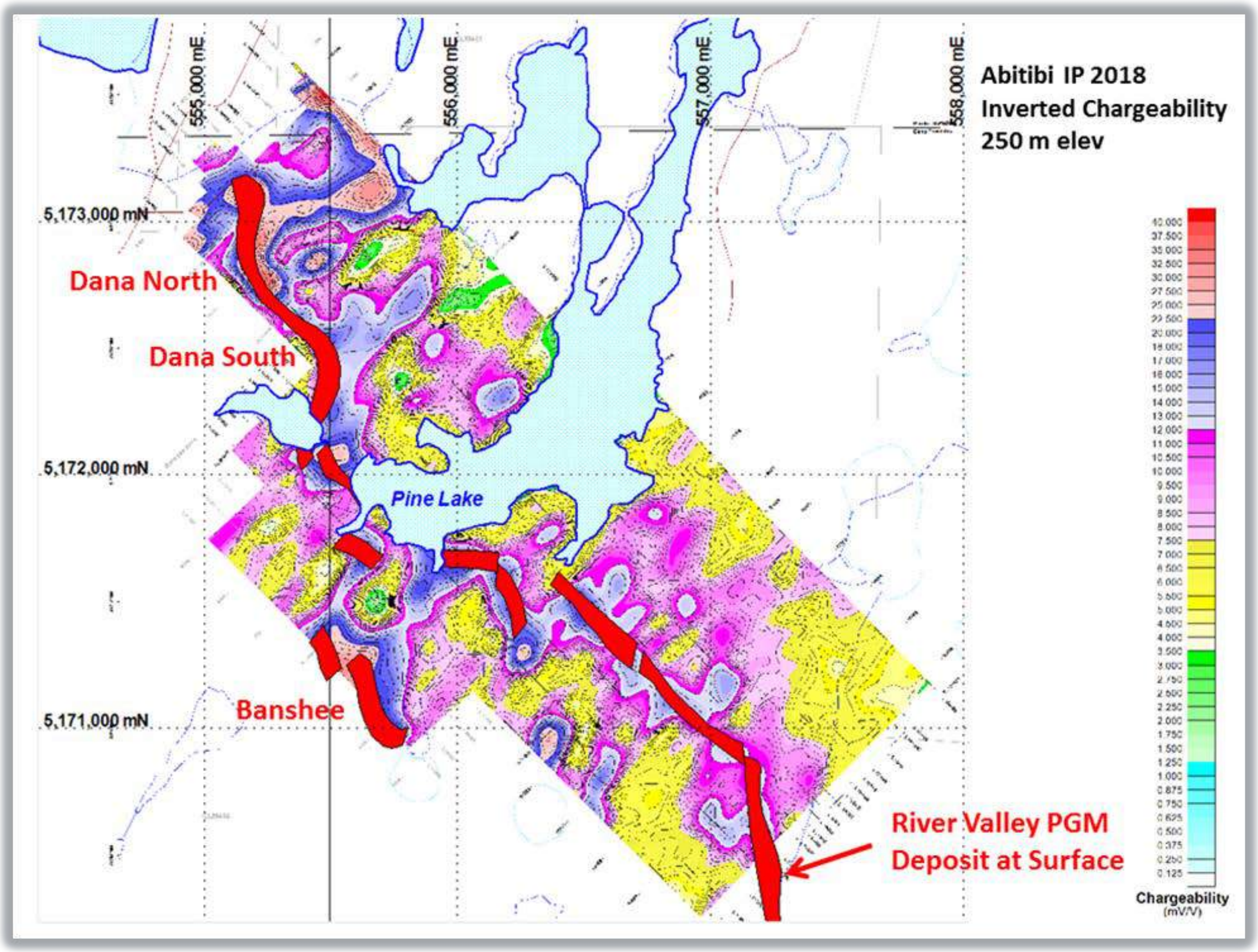
Note: *Coordinates, Easting and Northing, are in NAD83 UTM Zone 17T.*
Source: *Cole (2018)*

Following a detailed interpretation of the pseudosections and with the help of the recovered VOXI vertical sections, a total of 46 chargeable sources were interpreted. The chargeable sources are trending primarily NE/SW, which would be a similar trend displayed at the Pine Zone. 15 of the sources were near surface and could be ground truthed with prospecting and stripping.

27 sources were deeper and would require drilling to evaluate. Most of the targets are in the 200 to 300 m vertical depth with a few targets being 400 m vertical in depth.

Figure 9.6 is an interpretation of the chargeability at around the 250 m elevation, which is approximately 75 m below surface. The areas in the footwall with chargeability above 12,000 mV/V are of interest.

FIGURE 9.6 2018 CHARGEABILITY RESULTS



Note: *Coordinates, Easting and Northing, are in NAD83 UTM Zone 17T.*
Source: *WSP (2019)*

10.0 DRILLING

10.1 DIAMOND DRILLING PRIOR TO 2012

NAM has conducted diamond drilling on the Property since 2000. A summary of these activities up to the end of 2012 conducted by NAM (aka PFN) and/or their joint venture partners is presented in Table 10.1.

TABLE 10.1
DIAMOND DRILL SUMMARY PRIOR TO 2006

Year	Company	Activities
2000	PFN/Amplats	From February to March, Phase 1 drilling program included a total of 2,000 m of drilling in 13 holes with focus on the mineralization at the Dana Lake Area. Drilling by NDS Drilling, NQ core size.
		From June to July, Phase 2 drill program entailed of total of 2,820.8 m of drilling in 14 holes with focus on the mineralization at the Dana Lake Area. Drilling by NDS Drilling, NQ core size.
		In September, Phase 3 drill program consisted of 1,958.5 m in drilling in 10 drill holes at the Dana Lake Area and 3 holes at Lismer's ridge (13 holes total). Drilling by NDS Drilling, NQ core size.
2001	PFN/Amplats	From February to July Phase 4 drilling commenced; a total of 16,027 m drilled in 98 holes. Drilling by NDS Drilling, NQ core size.
2002	PFN/Amplats	From period of November to August, Phase V drilling resulted in a total of 83 holes with 22,319 assay samples from Lismer Ridge, Dana South, and Banshee Lake. Drilling by Bradley Brothers, NQ core size.
2004	PFN/Amplats	From period November 2002 to May 2004, Phase VI drill program consisting of a total of 44,131 m of drilling from 208 holes at Dana Lake, Banshee Lake, Lismer Ridge, MacDonalds, Varley, Azen Creek, Razor, Jackson's Flat, and Pardo. Drilling by Bradley Brothers, NQ core size.
2005	PFN/Amplats	From period September to March Phase VII drilling consisted of 20,516.4 m of drilling in 103 holes with focus on Lismer Extension, Varley, Varley Extension/Azen, Pardo, Jackson's Flat, and Casson. Drilling by Bradley Brothers, NQ core size.
2005	PFN/Amplats	From period October to November, Phase VIII drill program consisted of 3,681.15 m drilled in 20 holes with focus on Spade Lake, Jackson's Flat South, Varley Extension/Azen Drop Zone, and Casson. Drilling by Bradley Brothers, NQ core size.
2011-2012	PFN	From period April 2011 to January 2012, Phase IX drill program consisted of 12,767 m drilled in 46 holes with focus on Dana North and Dana South. Drilling by Foraco Drilling, NQ core size,

The information summarized in Table 10.1, totalling 689 drill holes (154,972 m), was disclosed by the Qualified Person in the 2012 technical report (McCracken, 2012). The information was sourced from various internal company reports and press releases are available from NAM's website.

Ten percent of this data from these diamond drill programs was validated against the original drill logs and assay certificates and were deemed to be suitable for the use in the Mineral Resource Estimate.

10.2 DIAMOND DRILLING

The 2015 drilling program carried out on the Property commenced on January 28, 2015 and was completed on February 2, 2015. Jacob and Samuel Drilling Ltd., based out of Sudbury, Ontario, was contracted to carry out the diamond drill program using a hydraulic VD 5000 diamond drill rig. A total of two holes were drilled totalling 474 m of NQ sized 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., based out of Sudbury, Ontario, was contracted to carry out the diamond drill program using a hydraulic VD 5000 diamond drill rig. A total of five holes were drilled totalling 1,267 m of NQ sized 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., based out of Sudbury, Ontario, was contracted to carry out the diamond drill program using a hydraulic VD 5000 diamond drill rig. A total of 14 holes were drilled totalling 3,728 m of NQ sized core. Dip tests were taken approximately every 50 m with a REFLEX tool.

Table 10.2 summarizes the collars for the drill holes completed between 2015 and 2017. There was no drilling on the Property in 2018. Figure 10.1 displays the location of the drill holes completed between 2015 and 2017.

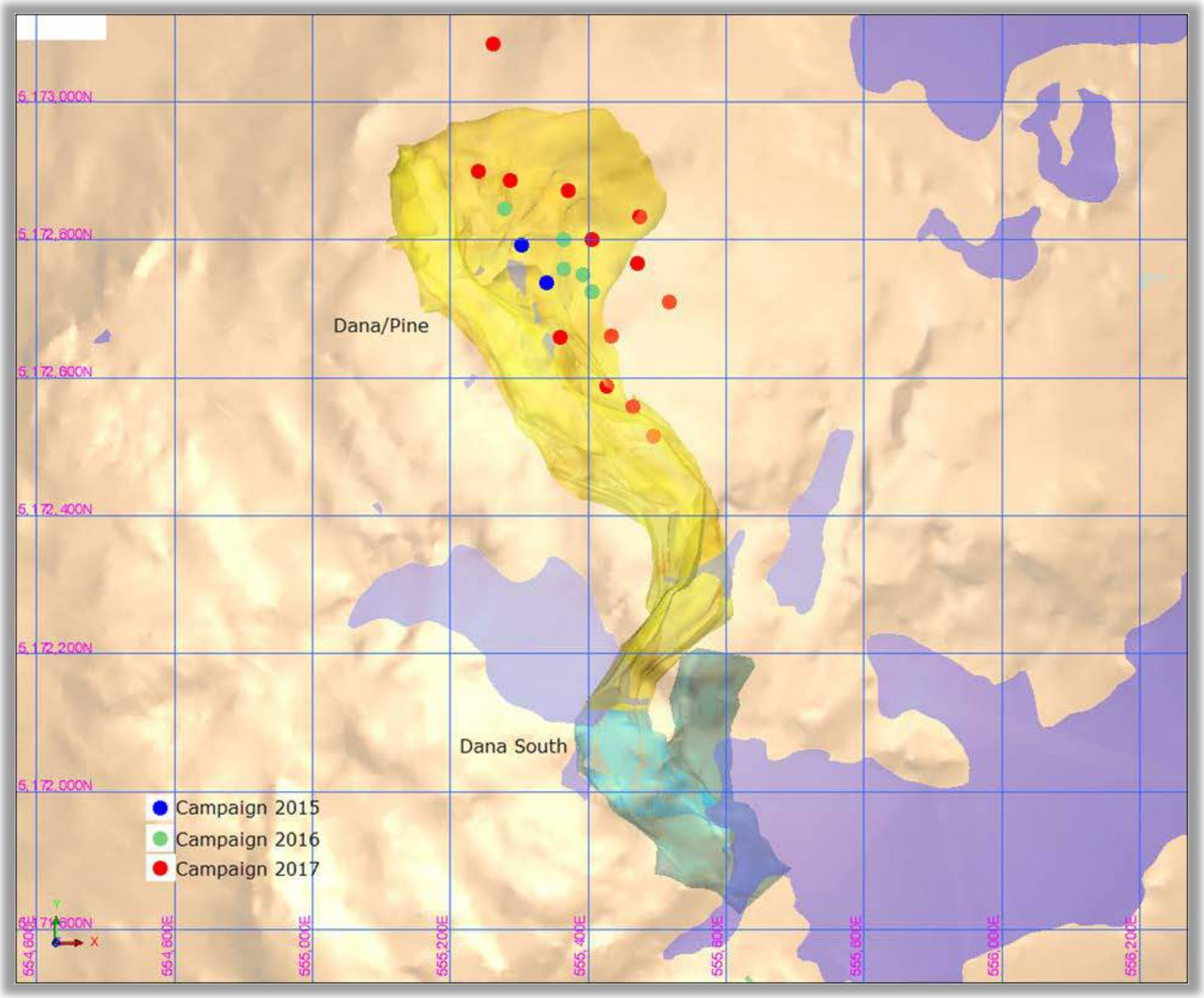
TABLE 10.2
2015 TO 2017 DRILLING COLLAR

Borehole ID	Zone	UTM East	UTM North	Elevation (masl)	Azimuth (°)	Dip (°)	Length (m)
DN-15-001	Dana North	555,339	5,172,738	323	325	-60	258
DN-15-002	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
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	278.04

Table 10.2 2015 to 2017 Drilling Collar							
Borehole ID	**Zone**	**UTM East**	**UTM North**	**Elevation (masl)**	**Azimuth (°)**	**Dip (°)**	**Length (m)**
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	149.59
PZ-17-08	Pine	555,240	5,172,899	325	325	-60	124.2
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	303.37
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: *Coordinates, Easting and Northing, are in NAD83 UTM Zone 17T.*

FIGURE 10.1 2015 – 2017 DRILL COLLAR LOCATIONS



Note: *Coordinates, Easting and Northing, are in NAD83 UTM Zone 17T.*
Source: *WSP (2019)*

10.3 DRILL RESULTS

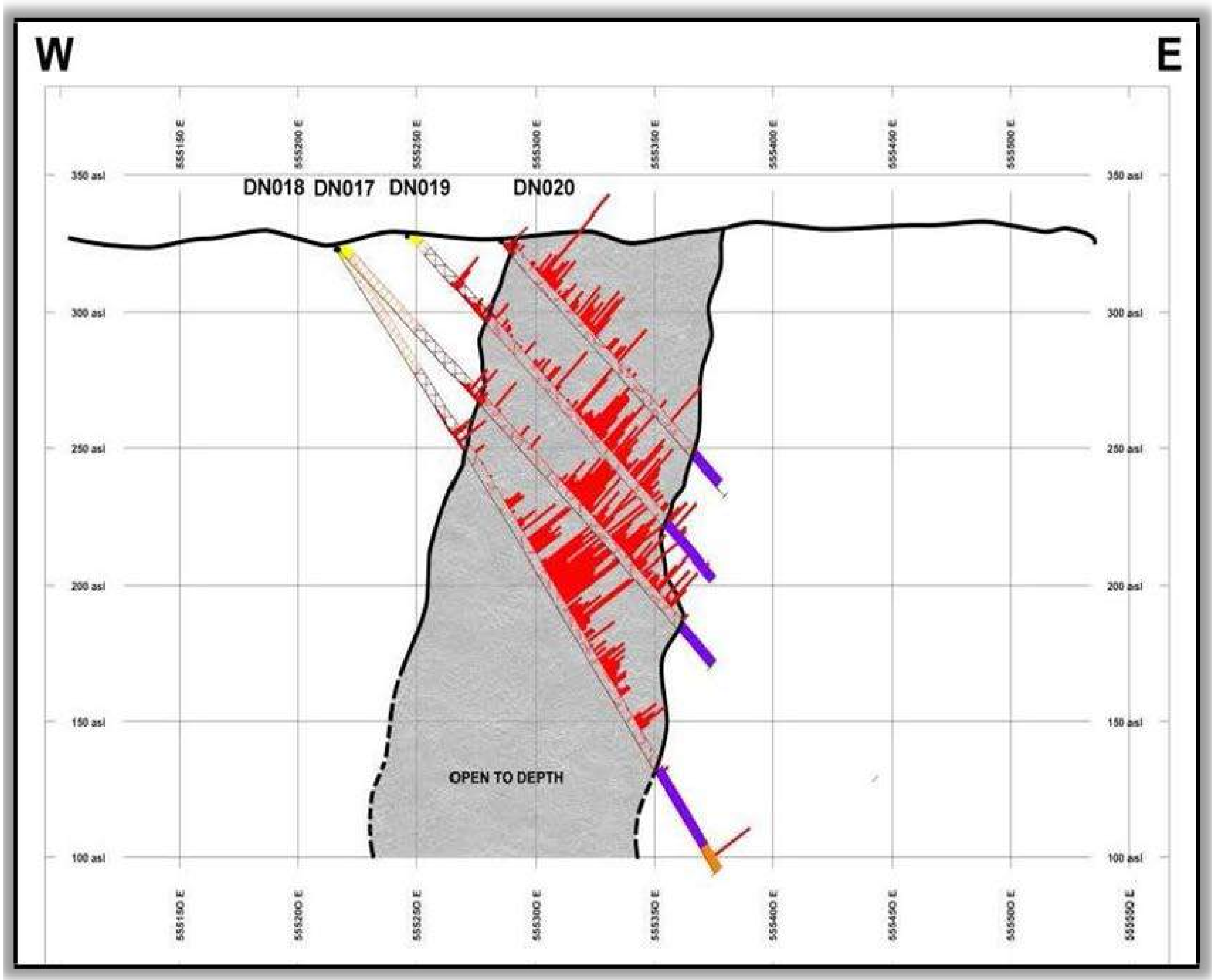
Drilling continued to establish continuity between previously-identified mineralized intercepts on the Deposit. At shallow to moderate depths, drilling encountered moderate- to high-grade PGE mineralization in most of the holes drilled. Low-grade PGE mineralization ranging 0.5 to 1.5 g/t was encountered over wide intersections in many of the holes ranging 8 to 25 m in length. In some holes, multiple wide low-grade zones were cored (Table 10.3). Figure 10.2 to Figure 10.5 are examples of some to the diamond drill results completed during the 2011 drill program.

TABLE 10.3
2015 - 2017 SIGNIFICANT DIAMOND DRILL RESULTS

Drill Hole ID	Interval (m)	Length (m)	Pd (g/t)	Pt (g/t)	Au (g/t)	3E (g/t)	Cu (%)	Ni (%)
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

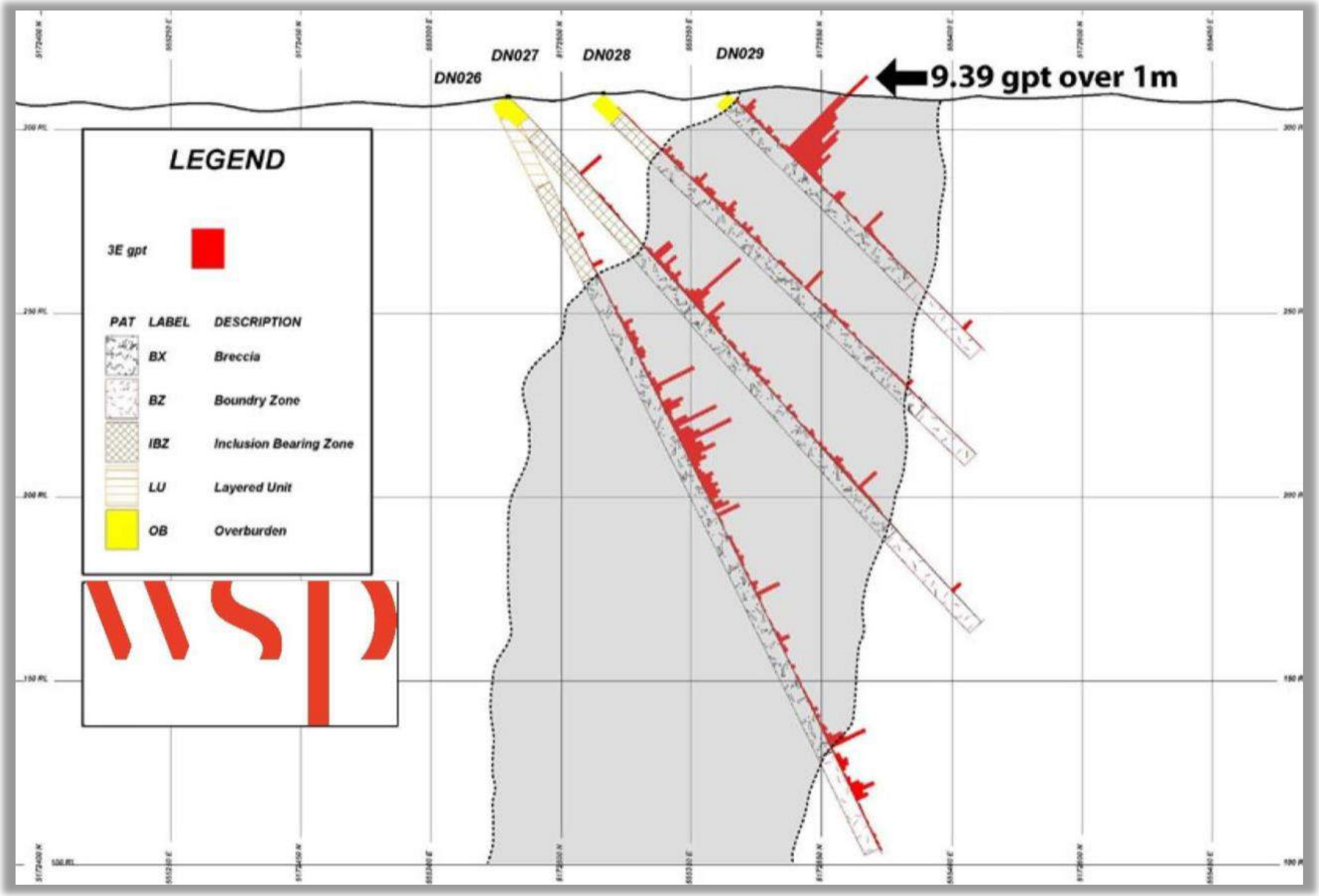
Note: *3E = Pd+Pt+Au*

FIGURE 10.2 17-20 CROSS-SECTION



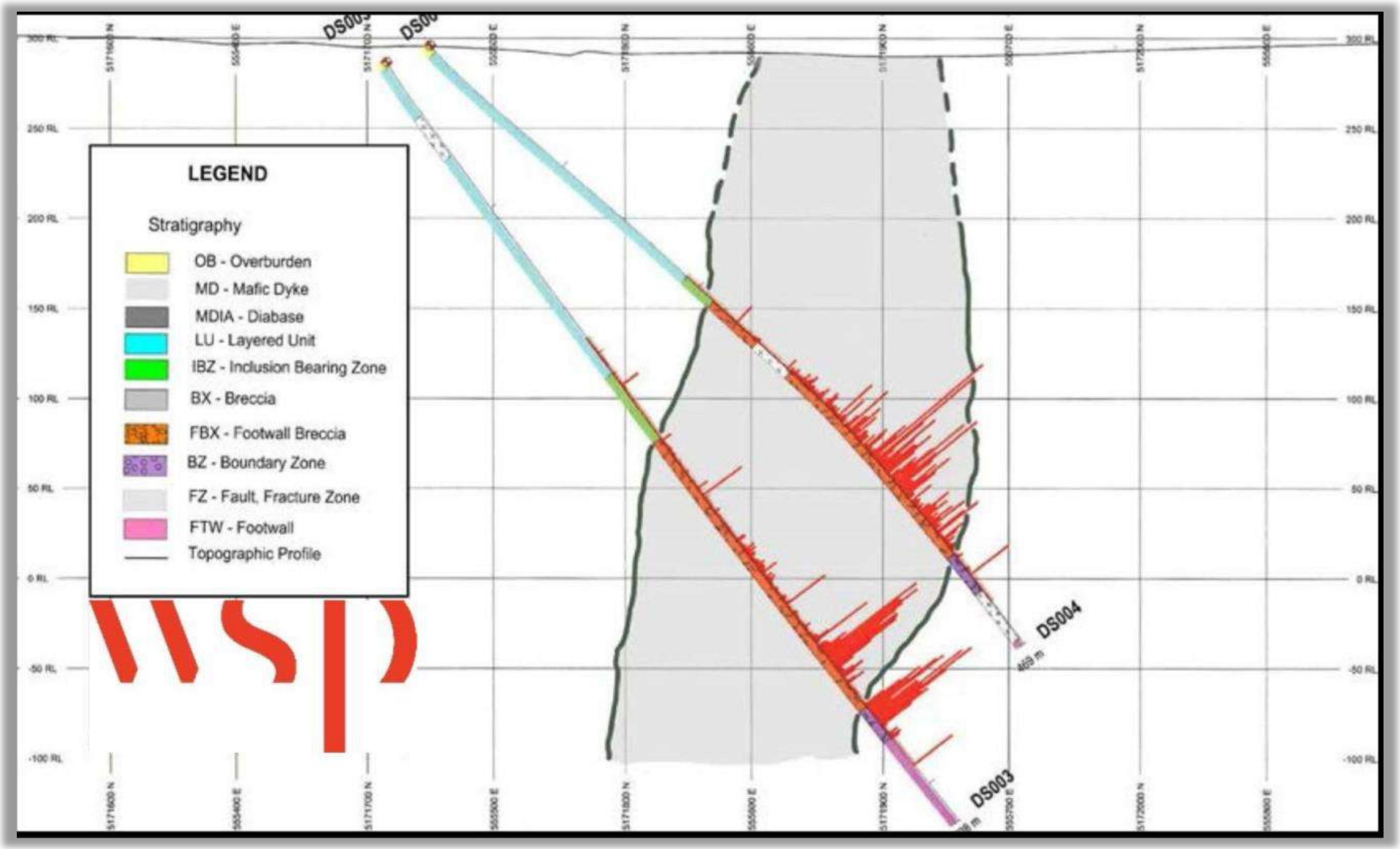
Source: *WSP (2019)*

FIGURE 10.3 26-29 CROSS-SECTION - F



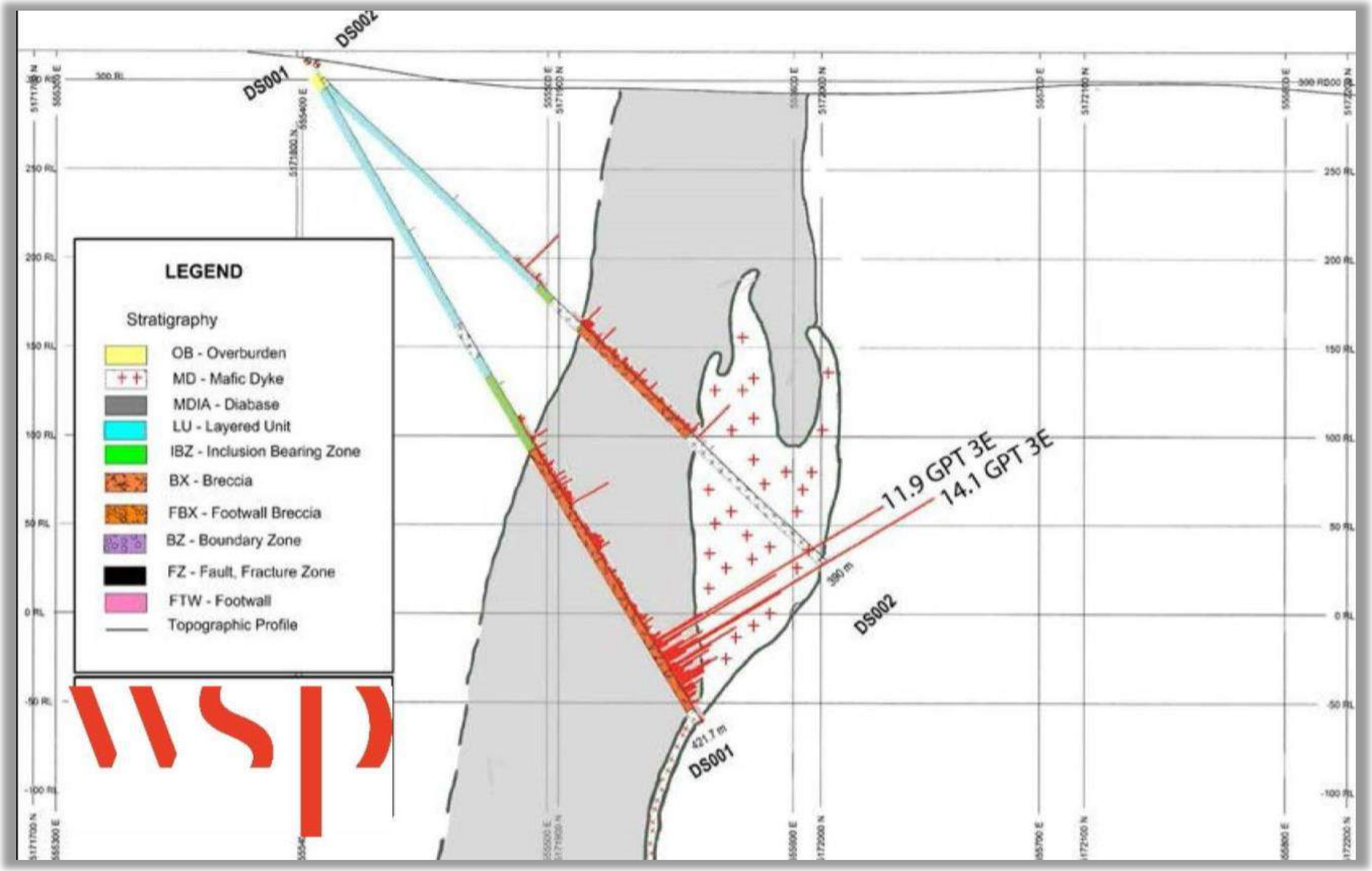
Source: *WSP (2019)*

FIGURE 10.4 DS1 AND 2 CROSS-SECTIONS



Source: *WSP (2019)*

FIGURE 10.5 DS3 AND 4 CROSS-SECTIONS



Source: *WSP (2019)*

11.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY

11.1 CORE LOGGING AND SAMPLING PROCEDURES

Core logging and sampling were completed on a facility rented in the village of River Valley by NAM. The sampling procedure was as follows:

- Diamond drill core was delivered to the core logging facility on a daily basis.
- The sections of core to be sampled were delimited with a grease pencil.
- The core was photographed and racked for sampling.
- The core was split using a diamond saw by a technician. Half the core was sent out for assay, the other half kept for reference.
- Sampling was done 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.
- One standard and one blank were inserted into the sample stream every 40 samples.
- As an additional QA/QC procedure, a second split was prepared from the pulp by the primary laboratory, at a 20-sample interval.
- The remaining half of the core was stored in a tagged core box indicating hole and box numbers as well as downhole interval. The entire core from this phase of drilling was stored temporarily at the River Valley rental facility.
- The core was then transported and laid down in NAM's core storage yard in River Valley (Figure 11.1).

FIGURE 11.1 CORE STORAGE FACILITY

Source: *WSP (2019)*

11.2 SAMPLE PREPARATION

When sufficient samples have been accumulated, all samples, including standards and blanks, are put into rice bags and shipped to the SGS sample preparation facilities in Sudbury, Ontario. SGS has geochemical accreditation that conforms to the requirements of CAN-P-1559 and CAN-P-4E (International Organization for Standardization ("ISO") 17025:2005).

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

- Samples were sorted and dried.
- Once dried, less than 3.0 kg of the sample was crushed to a 90% passing at 2 mm.
- The sample was split to get a 250 g sample for pulverizing.
- Two-hundred and fifty grams of the crushed sample was then pulverized with chromium steel to allow 85% passing of 75 µm.

11.3 SAMPLE ANALYSES

All samples were assayed for platinum, palladium, gold, copper and nickel, and a 33-element inductively coupled plasma ("ICP") suite. Concentrations of platinum, palladium, and gold were determined using standard lead fire assay (FAI313), followed by dissolution with aqua-regia, and measurement with an ICP finish. Lower and upper limits of each element are listed below within a 30 g sample (SGS, 2012):

- Gold 1 ppb – 10,000 ppb;
- Platinum 10 ppb – 10,000 ppb;
- Palladium 1 ppb – 10,000 ppb.

Remaining elements were determined using ICP methods using a two-acid digest (a combination consisting of nitric acid and hydrochloric acid). Once the material was digested, the solution was analyzed by inductively coupled plasma-atomic emission spectroscopy ("ICP-AES"). Two-acid digestion methods were the weakest of the digestions and silicate material was not affected, resulting in partial results for most elements (SGS, 2012).

The ICP14B method used was an aqua-regia digest and is recommended for all samples which contain no organic material and are low in sulphide content. The combination is based on a 3:1 ratio of hydrochloric acid to nitric acid (SGS, 2012).

Concentrations of copper-nickel were determined by ICP methods with detection limit of 0.5 ppm for copper and 1 ppm for nickel; the upper limit for both copper and nickel is 1%.

At no time was a NAM employee or designate of NAM involved in the preparation or analysis of the samples.

11.4 QA / QC PROGRAM

The NAM QA/QC program in 2000 for the Phase 1 drill program consisted of the course reject and pulp duplicates submitted to three analytical laboratories (Jobin-Bevans, 2000). A total of 572 pulps and 168 course rejects were analyzed. The laboratories used were XRAL Laboratories in Rouyn-Noranda, Quebec, Accurassay Laboratories in Thunder Bay, Ontario, and Bondar Clegg in Val-d'Or, Quebec which is now known as ALS Minerals. The results from the Pt-Pd-Au pulp and reject assays were within acceptable levels of reproducibility (±25%).

The NAM QA/QC program in 2000 for the Phase 2 drill program consisted of the pulp duplicates submitted to Accurassay Laboratories in Thunder Bay (Jobin-Bevans, 2000). A total of 296 pulps were analyzed. The results from the Pt-Pd-Au pulp assays were within acceptable levels with an R^2 of 0.91. There was one gold duplicate and four platinum assays that were significantly higher than the original assays.

The NAM QA/QC program in 2000 for the Phase 3 drill program consisted of the pulp duplicates submitted to Accurassay Laboratories in Thunder Bay (Jobin-Bevans, 2000). A total of 94 pulps were analyzed. The results from the Pt-Pd-Au pulp assays were within acceptable levels of reproducibility (±25%) with only four samples exceeding threshold.

The NAM QA/QC program in 2001 for the Phase 4 drill program consisted of the pulp duplicates submitted to Bondar Clegg in Val-d'Or, Quebec which is now known as ALS Minerals (Lyon and Jobin-Bevin, 2001). A total of 805 pulps were analyzed. The results from the Pt-Pd-Au pulp assays were within acceptable levels of reproducibility (±25%) with less than 25% of the samples set exceeding the threshold.

NAM continues to maintain a QA/QC program that has been in place since 2002. WSP has reviewed the results of the QA/QC program conducted from 2002 to 2012 (McCracken, 2012). The QA/QC program remains unchanged and is summarized below.

- Bulk material from the Property was collected for the purpose of creating internal standards that could be submitted in the sample stream as a quality control measure. Three standards were created:
  - a low-grade (approximately 500 ppb platinum-palladium-gold);
  - a mid-grade (approximately 900 ppb platinum-palladium-gold;
  - a high-grade (approximately 2,000 ppb platinum-palladium-gold) sample.

- In addition to the pulp blank, a coarse blank was submitted for every 20 samples to test sample preparation and for contamination.

- One standard and one blank were inserted every 40 samples into the sample stream. These standards were manufactured from River Valley material using carefully chosen sections of NAM's drill core. The standards were prepared for use prior to drilling. Five samples of each standard were sent to five separate accredited laboratories for a round-robin analysis. The mean value for each standard was determined to be the mean value between the five laboratories.

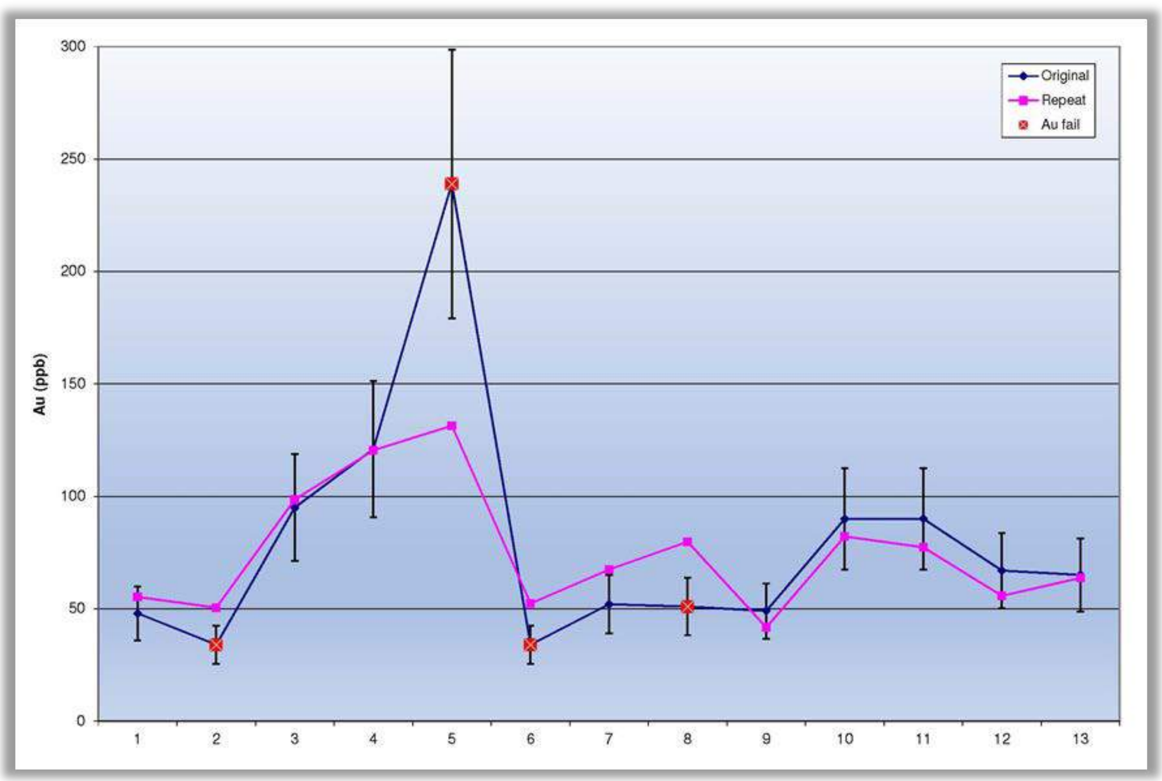
- The geologist would mark on the core where and what type of reference material was to be inserted. The insertion of the material into the sample steam was completed by a technician.

- As an additional QA/QC procedure, a second split was prepared from the pulp by the primary laboratory at a 20-sample interval. This split was sent to a second lab (Activation Laboratories Ltd. ("Actlabs")) where a check assay was done.

The 2002 Phase 5 program included 1,134 duplicates and 96 standards inserted into the sample stream. The results from the Pt-Pd-Au pulp duplicates assays were within acceptable levels with an R^2 of 0.90 and 0.98 depending on the element. The results of the standards were all within ± 2 Standard Deviations (Jobin-Bevin and Lyon, 2002).

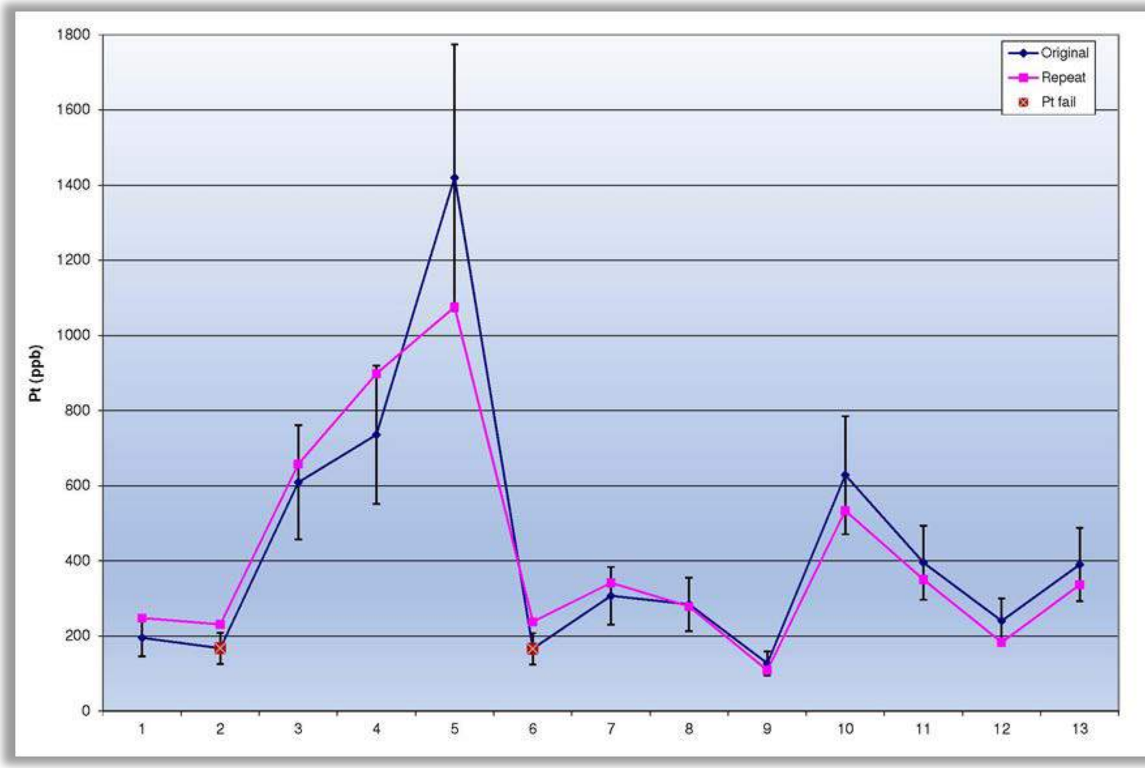
The 2004 Phase 6 program included 13 duplicates and 63 standards inserted into the sample stream. The results from the Pt-Pd-Au pulp duplicates assays indicated there was an issue duplicating the results at low grades. Gold had four samples that exceeded the 25% threshold, yet three of the samples have grades less than 50 ppm (Figure 11.2). Only two platinum duplicates exceeded the 25% threshold (Figure 11.3), yet all thirteen duplicates of palladium exceeded the 25% threshold (Figure 11.4). NAM addressed the issue with SGS (correspondence with SGS, February 2003) and all the samples were re-run using new equipment. The results of the standards were all within ±2 Standard Deviations and have acceptable accuracy.

FIGURE 11.2 PHASE 6 GOLD DUPLICATE



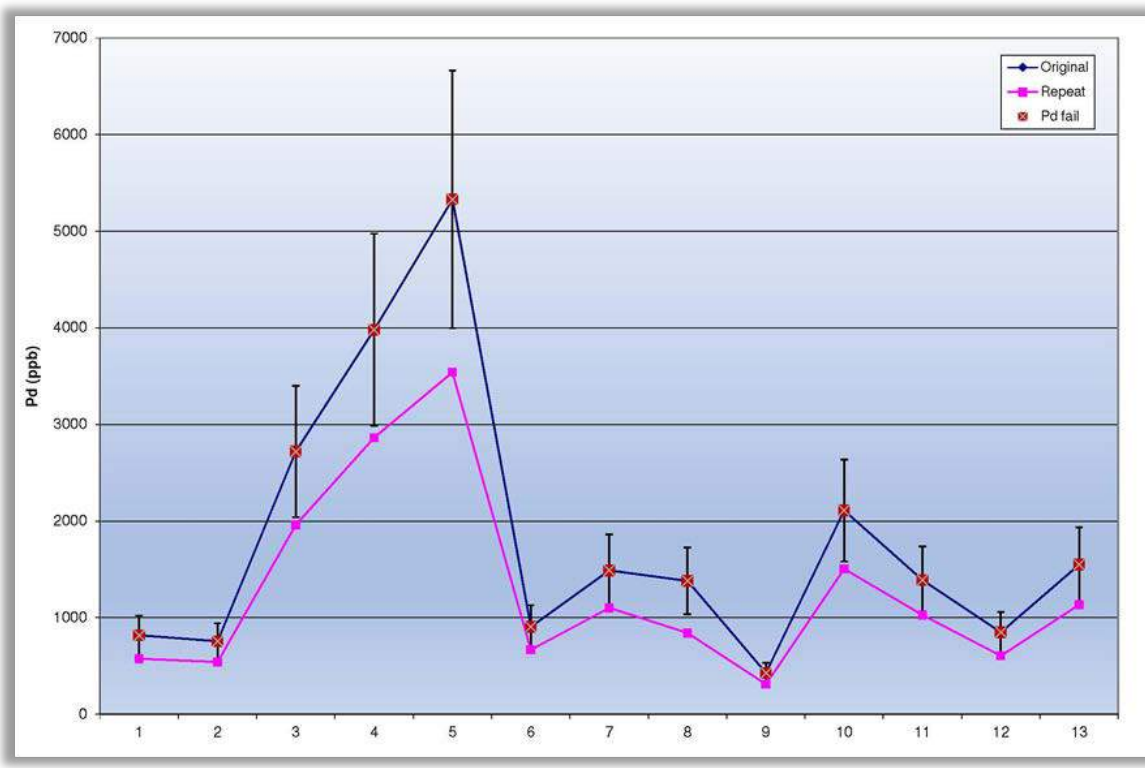
Source: *WSP (2019)*

FIGURE 11.3 PHASE 6 PLATINUM DUPLICATE



Source: *WSP (2019)*

FIGURE 11.4 PHASE 6 PALLADIUM DUPLICATE



Source: *WSP (2019)*

The 2005 Phase 7 program includes 595 check assays, 289 core duplicates, 589 pulp duplicates, and 309 standards (Kelso, 2005). The results from the Pt-Pd-Au core and pulp duplicates assays indicated that there continued to be an issue duplicating the results at low grades. The results of the standards were primarily within ±2 Standard Deviations and have acceptable accuracy.

The 2005 Phase 8 program includes 156 check assays, 89 core duplicates, 170 pulp duplicates and 265 standards. The results from the Pt-Pd-Au core and pulp duplicates assays indicated that there continued to be an issue duplicating the results at low grades. The results of the standards were primarily within ±2 Standard Deviations with only seven samples failing and being re-assayed.

The results from the 2011 Phase 9 program are disclosed in a previous technical report (McCracken, 2012). Table 11.1 summarizes the results.

TABLE 11.1
2011 QA/QC RESULTS

Standard	Sample Count	Out of Control Limit Results
RV-1 Pd	71	5
RV-1 Pt	71	5
Rv-1 Au	71	6
RV-2 Pd	74	6
RV-2 Pt	74	4
Rv-2 Au	74	5
RV-3 Pd	70	1
RV-3 Pt	70	4
Rv-3 Au	70	2
Pd Blank	214	47
Pt Blank	214	1
Au Blank	214	8

For the 2015 to 2018 drill programs, a summary of the QA/QC results is provided in Table 11.2. In general, the Standards all performed within acceptable limits. The results for RV2-Au are bias low, yet still within the specification of the material. The results for the RV3-Au should be reviewed as in the latter half of the program, the results are skewed. The Qualified Person does not consider the results for RV3-Au to be an issue as the values are generally less than 20 ppb. The palladium blanks display a significant variance during the 2015 program. The issues were addressed with the laboratory and there was a marked improvement in the results.

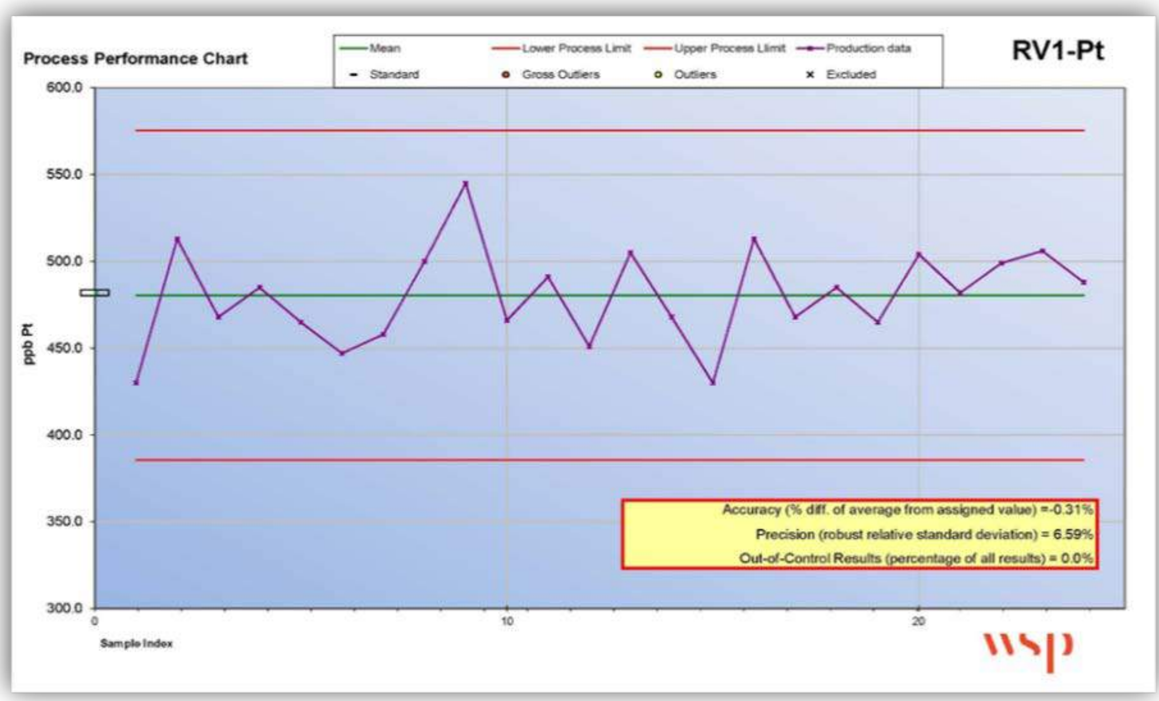
TABLE 11.2 2015-2018 QA/QC RESULTS				
Standard	**Sample Count**	**Accuracy (%)**	**Precision (%)**	**Out of Control Limit Results**
RV-1 Pd	24	-0.98	2.47	0
RV-1 Pt	24	-0.31	6.59	0
Rv-1 Au	24	-2.49	6.61	0
RV-2 Pd	21	-0.87	4.19	0
RV-2 Pt	21	1.43	8.4	1
Rv-2 Au	21	-12.04	6.65	1
RV-3 Pd	22	3.56	4.91	1
RV-3 Pt	22	-3.87	8.25	1
Rv-3 Au	22	6.41	5.68	4
Pd Blank	68	N/A	N/A	5
Pt Blank	68	N/A	N/A	0
Au Blank	68	N/A	N/A	0
Pd Check	142	N/A	N/A	4
Pt Check	142	N/A	N/A	2
Au Check	142	N/A	N/A	4

Figure 11.5 to Figure 11.18 are the charts for the 2015-2018 QA QC program.

FIGURE 11.5 RV1-PALLADIUM STANDARD

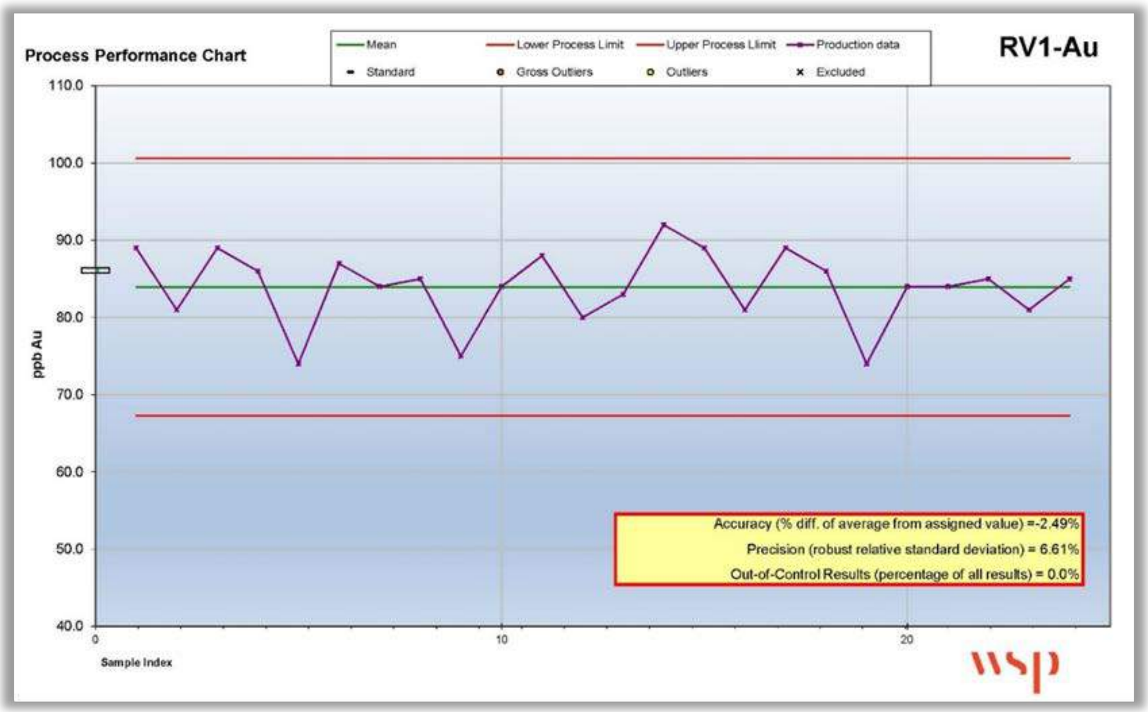
Source: *WSP (2019)*

FIGURE 11.6 RV1-PLATINUM STANDARD



Source: *WSP (2019)*

FIGURE 11.7 RV1-GOLD STANDARD

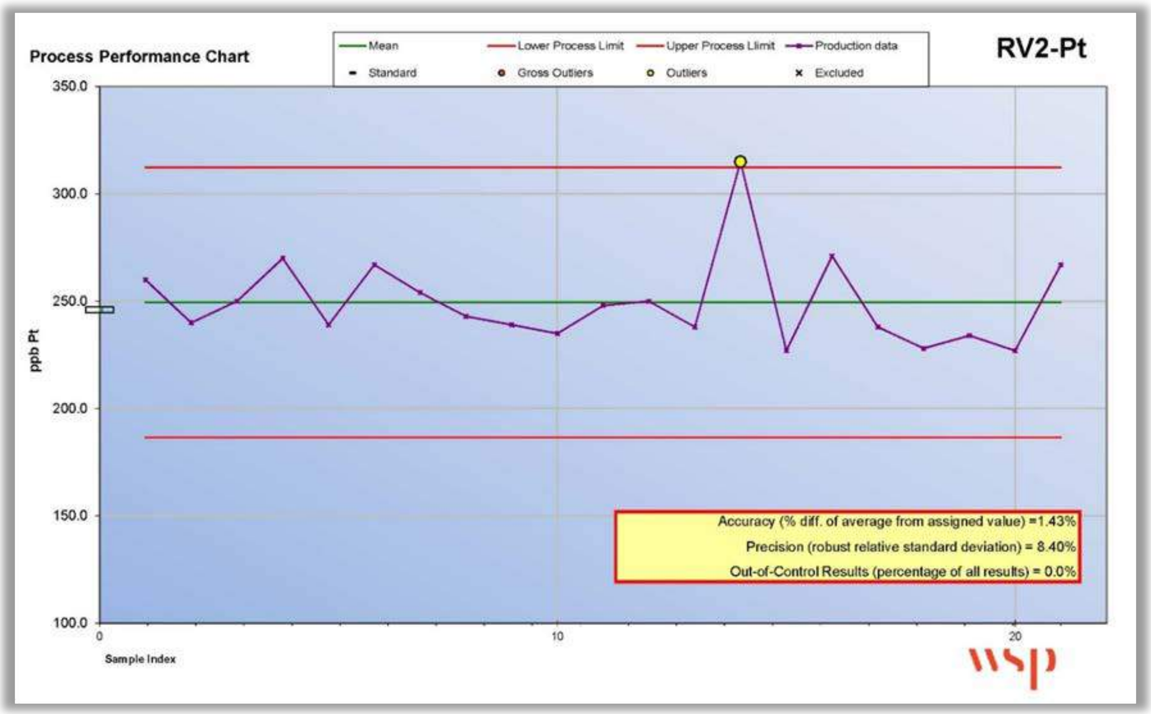


Source: *WSP (2019)*

FIGURE 11.8 RV2-PALLADIUM STANDARD

Source: *WSP (2019)*

FIGURE 11.9 RV2-PLATINUM STANDARD



Source: *WSP (2019)*

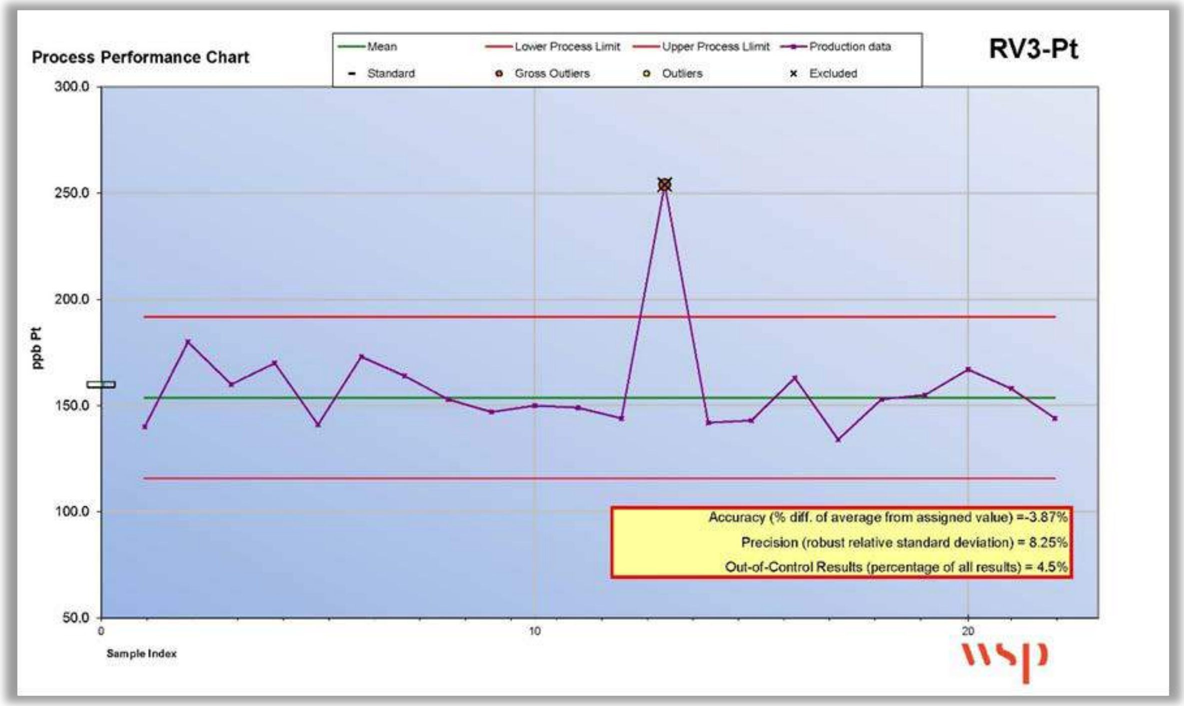
FIGURE 11.10 RV2-GOLD STANDARD

Source: *WSP (2019)*

FIGURE 11.11 RV3-PALLADIUM STANDARD

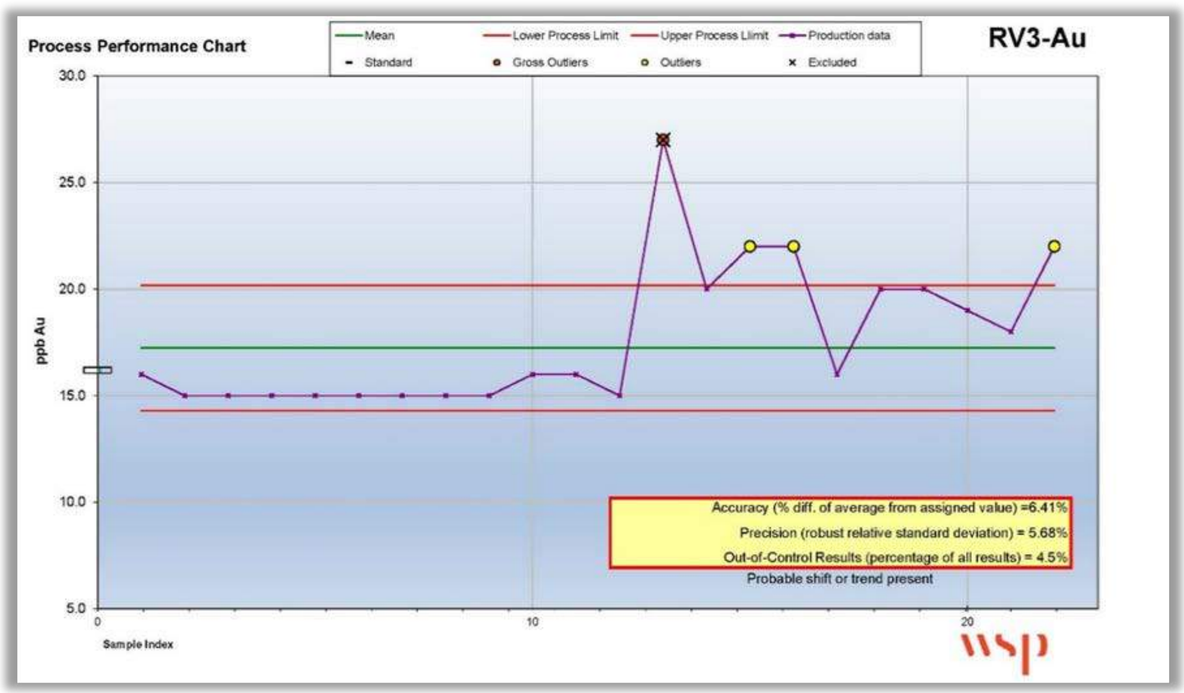
Source: *WSP (2019)*

FIGURE 11.12 RV3-PLATINUM STANDARD



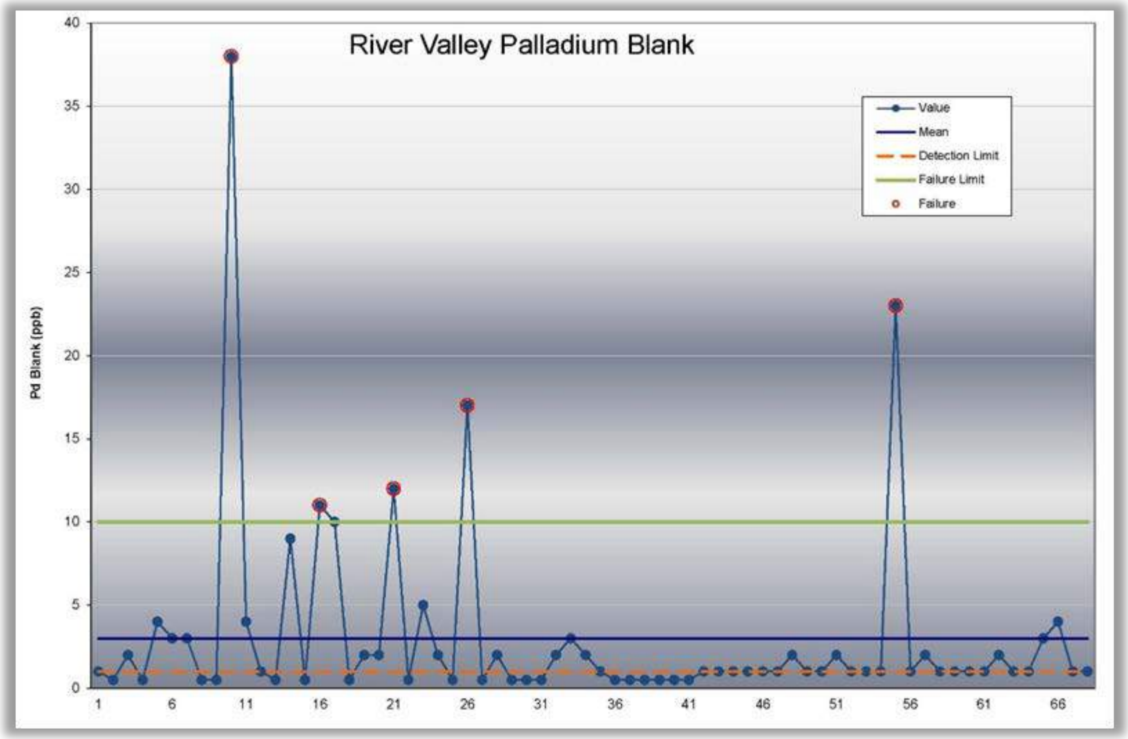
Source: *WSP (2019)*

FIGURE 11.13 RV3-GOLD STANDARD



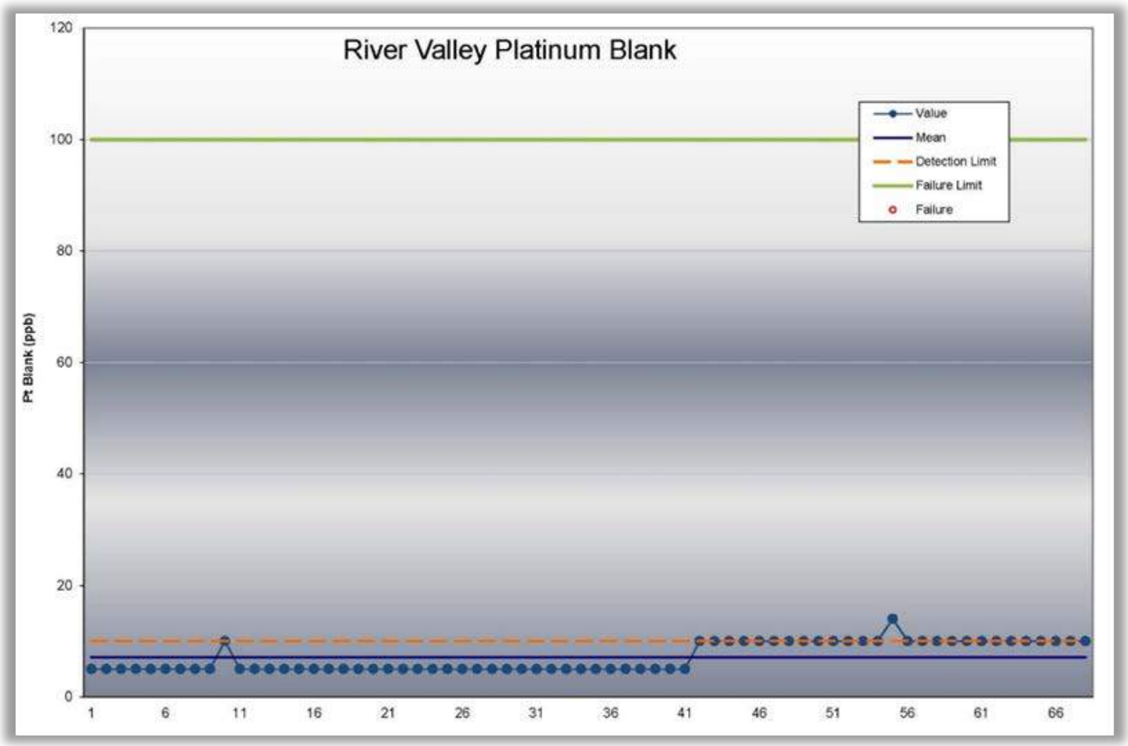
Source: *WSP (2019)*

FIGURE 11.14 PALLADIUM BLANK



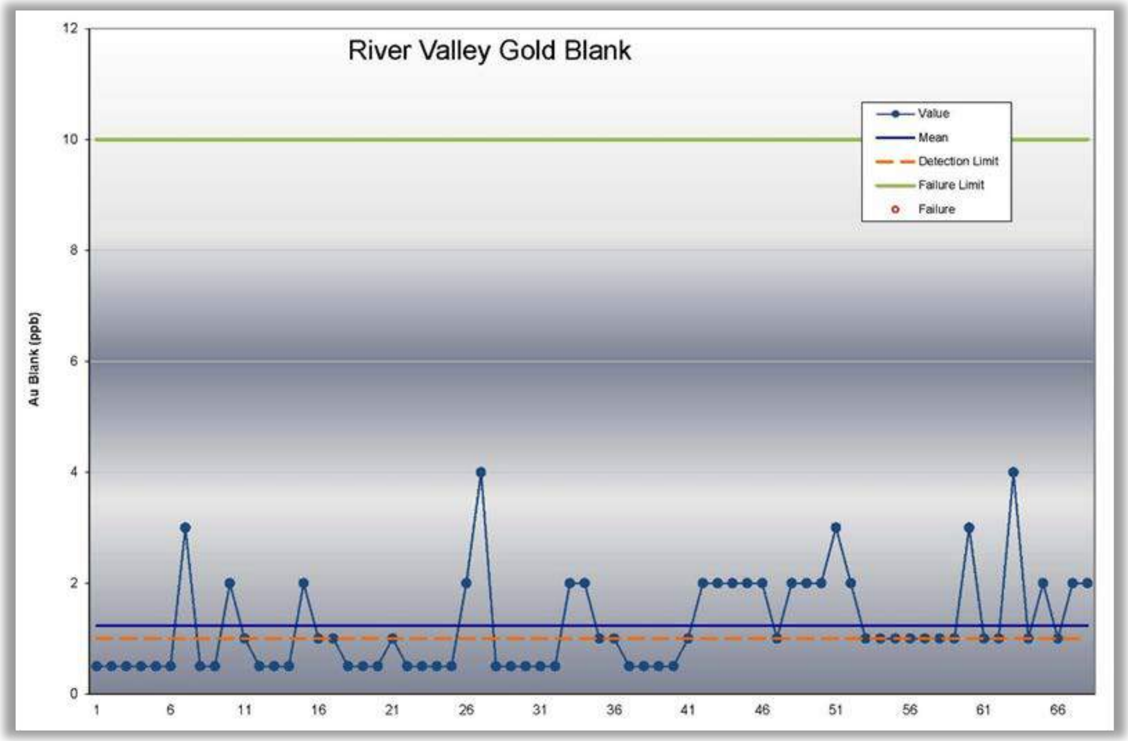
Source: *WSP (2019)*

FIGURE 11.15 PLATINUM BLANK



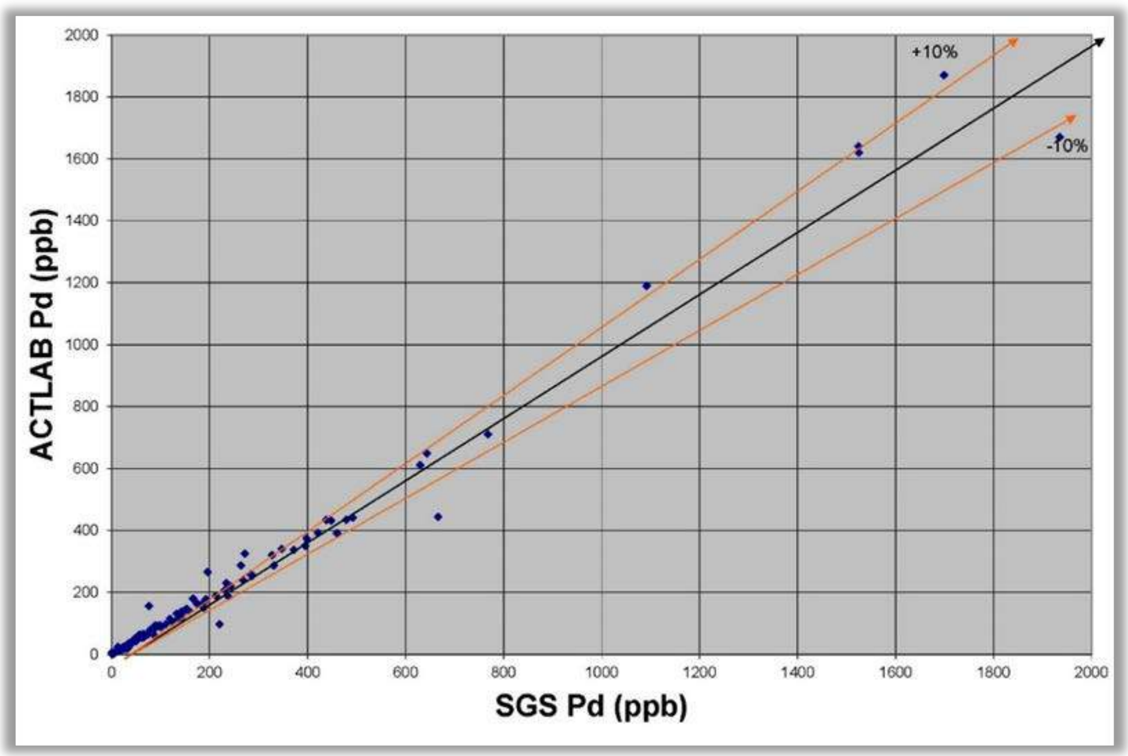
Source: *WSP (2019)*

FIGURE 11.16 GOLD BLANK



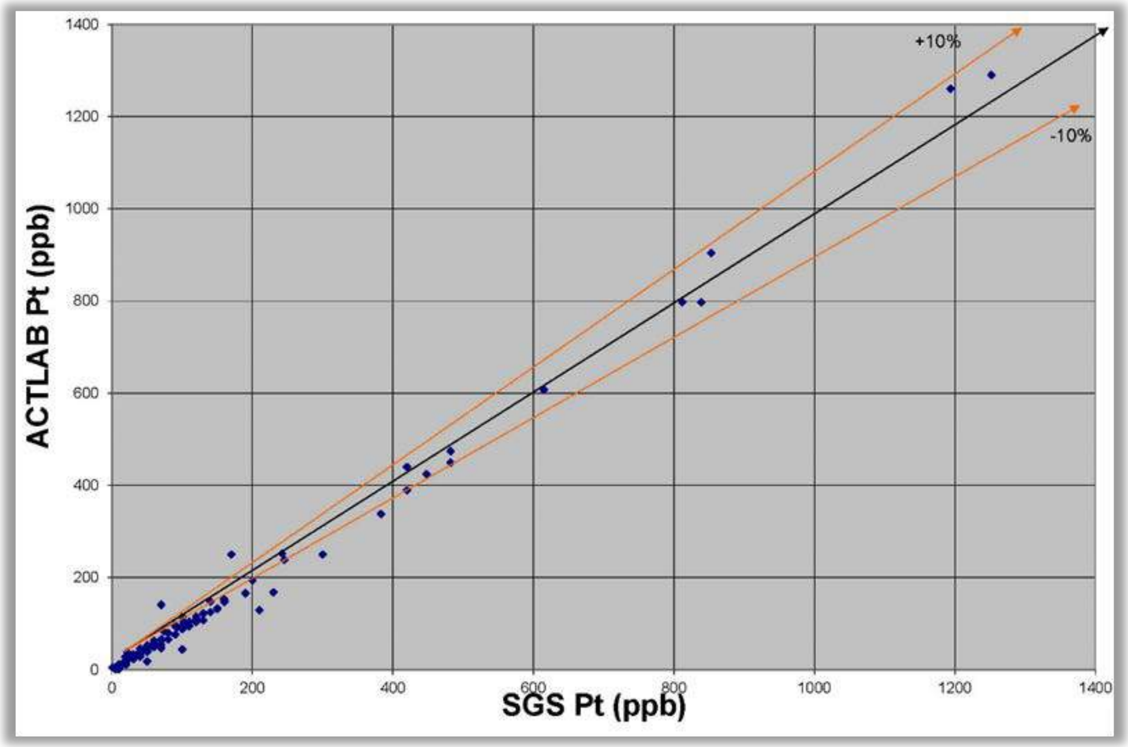
Source: *WSP (2019)*

FIGURE 11.17 PALLADIUM CHECK



Source: *WSP (2019)*

FIGURE 11.18 PLATINUM CHECK



Source: *WSP (2019)*

11.5 QUALIFIED PERSON'S OPINION

It is WSP's opinion that the sample preparation, analytical procedures, and QA/QC program meet industry standards and support the Updated Mineral Resource Estimate.

12.0 DATA VERIFICATION

WSP carried out an extensive validation of the data set in 2011. The validation of the data files in 2011 was completed on 60 of the 596 drill holes in the total database, or 10% of the dataset. The validation was carried out on the diamond drill hole data files against the original drill hole logs and assay certificates.

Data verification was completed on collar coordinates, end-of-hole depth, downhole survey measurements, from and to intervals, assay sample intervals, and analytical results. No errors were identified in the collar, survey, or lithology files.

The assay file contained several drill hole entries where the assays for copper were in the nickel field, and the assays for zinc were in the copper field. This represents less than 0.1% errors within the entire assay dataset. Corrections were made to the dataset. All assays entered as zeros were converted to half the detection limit and were not considered to be errors in the data.

WSP carried out an additional validation of the diamond drill hole data files against the original drill hole logs and assay certificates for the holes completed between 2015 and 2017.

Data verification was completed on collar coordinates, end-of-hole depth, downhole survey measurements, from and to intervals, assay sample intervals, and analytical results. No errors were identified in the collar, survey, assay, or lithology files.

The drill hole data was imported into the Surpac™ program, which has a routine that checks for duplicate intervals, overlapping intervals, and intervals beyond the end-of-hole.

WSP has verified the location of drill hole casings in the field using a Garmin GPSMap 60Csx. The locations inspected included Dana North / Pine, Dana South and River Valley Extension. All collars inspected were within 5 m of the XY coordinates stated on the drill logs.

WSP has visually inspected the drill core from several of the zones against the drill logs.

12.1 QUALIFIED PERSON'S OPINION

It is WSP's opinion that the data is of sufficient quality to support the Updated Mineral Resource Estimate.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 INTRODUCTION

The earliest records for metallurgical testwork regarding the River Valley Project relate to metallurgical testwork on the Dana Lake Deposit with the tests conducted in 1999.

Since then, other metallurgical testwork and mineralogical studies have been carried out to assist in establishing viable process flowsheet options for obtaining a single sulphide concentrate containing Platinum Group Metals ("PGEs") and base metals.

The first of these metallurgical testwork programs was carried out in 1999 at the Michigan Technological University ("MTU"). Initial testwork included mineralogical analysis, specific gravity measurements, physical characterization and pilot plant flotation on Dana Lake samples to produce a sulphide concentrate containing PGEs and base metals.

In 2001, a testwork program was conducted on samples taken from 13 separate drill holes from the River Valley Deposit. These tests were carried out by the owner at the time, Anglo-Platinum, to determine the mineralogical composition. Preliminary flotation tests were also carried out on these samples to determine the mineralogy of the concentrates produced and the recovery of Palladium ("Pd").

In 2004 the new owner of River Valley, Pacific North West Capital Corporation, contracted SGS Lakefield Research ("SGS") to carry out kinetic flotation tests on River Valley Project drill core. The testwork produced a rougher concentrate.

In 2006, flotation testwork was carried out by Anglo-American Metallurgical Services on a River Valley sample. The objective of the study was to investigate possible treatment routes to improve Pt, Pd and Ni recoveries and the concentrate grade. The effect of feed grind size, collector type and dosage, as well as, the impact of dispersants, complexing agents and a higher energy input during flotation on grade-recovery relationship, was evaluated.

In 2013**,** scoping level metallurgical testing was conducted at SGS on a sample from the River Valley PGE Deposit for Pacific North West Capital Corporation. The testwork program produced sample head grades and mineralogical compositions and concentrate for both the Dana South Zone ("DSZ") and Dana North Zone ("DNZ"). A composite sample of both zones was generated with the following analysis conducted:

- 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").

In February 2018, XPS released a report on the "Mineralogical Analysis of Dana and Pine Zone Samples". A mineralogical analysis was completed on four composites from New Age Metal's 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.

13.2 HISTORICAL METALLURGICAL TESTWORK

13.2.1 Metallurgical Feasibility Study of the Dana Lake PGE Area River Valley – 1999

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"). 4,000 lb of high-grade rock were extracted from the Dana North and South Zones.

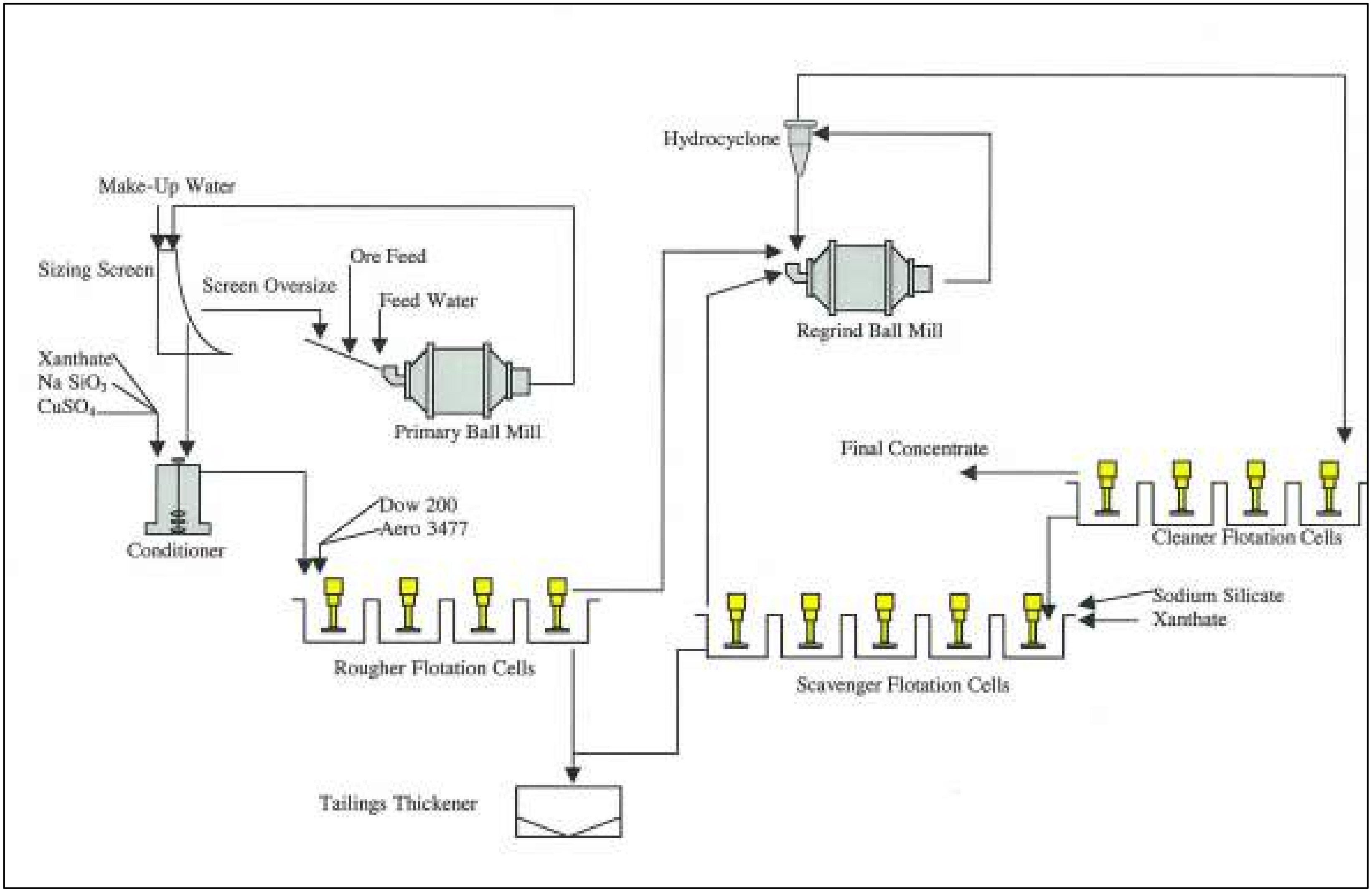
The mineralogy of the samples was determined through x-ray diffraction ("XRD"), reflective light microscopy and Scanning Electron Microscopy ("SEM"). The sulphides identified were chalcopyrite ($CuFeS_2$), pyrrhotite (FeS) and cubanite ($CuFe_2S_3$). The bulk density of the samples was also measured 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 whilst 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. Figure 13.1 below depicts the pilot plant flowsheet utilized.

FIGURE 13.1 FLOWSHEET OF PILOT PLANT CIRCUIT USED TO CONCENTRATE SULPHIDES CONTAINING PGES



Source: *DRA (2019)*

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 recoveries are given in Table 13.1 and Table 13.2.

TABLE 13.1
ANALYTICAL RESULTS FOR DANA LAKE SAMPLE

Sampling Point	Cu %	Ni %	Au g/t	Pd g/t	Pt g/t	Rh g/t	Au+Pd+Pt+Rh g/t
Mill 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 13.2
RECOVERY RATES 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

13.2.2 A Mineralogical and Metallurgical Investigation of 13 Drillholes

13 drill cores from the River Valley Deposit were submitted for metallurgical and mineralogical examination by Anglo-Platinum in 2001. The cores supplied were then sampled using the highest-grade intersections from each of the drillholes. The individual intersections were crushed to less than 3 mm and small subsections of this crushed material 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 13.3.

TABLE 13.3
BULK MINERALOGICAL COMPOSITION OF DRILLCORE, 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	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.

On the basis of the preliminary flotation results 4 samples were chosen for detailed mineralogical examination. These were RV00-03, 08, 12 and 13, which showed good and moderate Pd recoveries, respectively (Table 13.4).

TABLE 13.4
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 (45x30 µm) particle of Pd-arsenide attached to pyrrhotite was observed. This one particle accounts for all the PGE associated with BMS (Table 13.5).

TABLE 13.5
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 cores were individually crushed to less than 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 microns was used throughout the test program (Table 13.6 and Table 13.7).

TABLE 13.6
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.

TABLE 13.7 PT, PD ULTIMATE 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 is expected.*
Note: *Rec. = recovery, Recon. = reconstituted.*

RV00-03 and RV00-13 have the worst grade and recovery for both palladium and platinum. The reason for this is the very high silicate association and fine grain size of the PGEs, see and Table 13.5. 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 BMS. It would also mean that 50% of the grains, by area, would be less than7 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 base metal sulphides. The latter criteria would allow the PGEs to float “piggy-back” with the BMS at a coarser grind.

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 upon either through re-cleaning or a different reagent regime. Finer grinding may also lead to improved recoveries.

The treatment of the complete LOM tonnage will change the grade recovery relationship.

13.2.3 SGS – Production of Rougher Concentrate – for Pacific North West Capital Corporation, 2004

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 core.

- The 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 in order to determine the time required for producing a product size P80 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 13.8.

TABLE 13.8
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

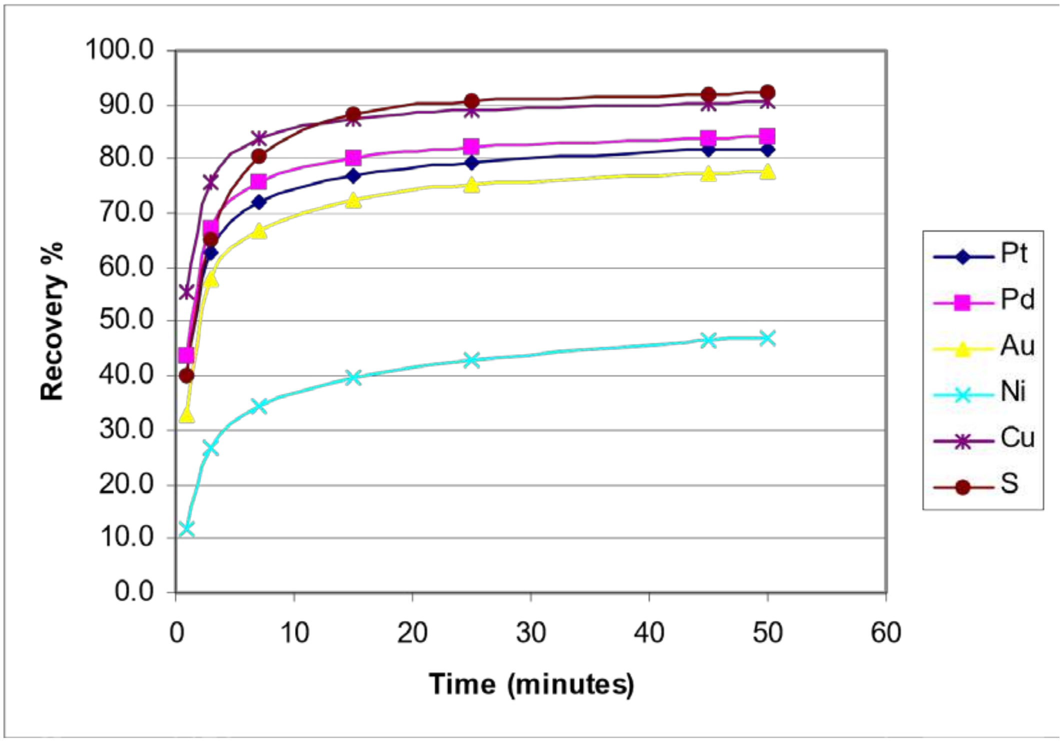
13.2.3.1 Grinding Tests

Grind determination tests were conducted on each of the composites in order 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 upon 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 13.9, below. Assays for Pt, Pd, and Au, are in g/t and those for Ni, Cu, and S are shown as a percentage. The cumulative recovery curve is shown in Figure 13.2.

FIGURE 13.2 CUMULATIVE RECOVERY CURVE



Source: *SGS (2004)*

TABLE 13.9
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

13.2.3.2 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 # F8, F17 and F18 and K80 found to be 62, 74 and 75 microns. The preliminary assay results of the 10 kg floats show similar trends on the rougher concentrate grade. Table 13.10 shows the assay results for the composite rougher floats.

TABLE 13.10
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

13.2.3.3 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's 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 is recommended to provide basic information on probable final concentrate grade.
- The process parameters will need to be optimized to identify probable flow-sheet configuration.

13.2.4 Anglo-American Metallurgical Services Flotation Testwork on a River Valley Sample, October 2006

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 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 13.11.

TABLE 13.11
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 did not enhance the total Pd-bearing minerals recovery.

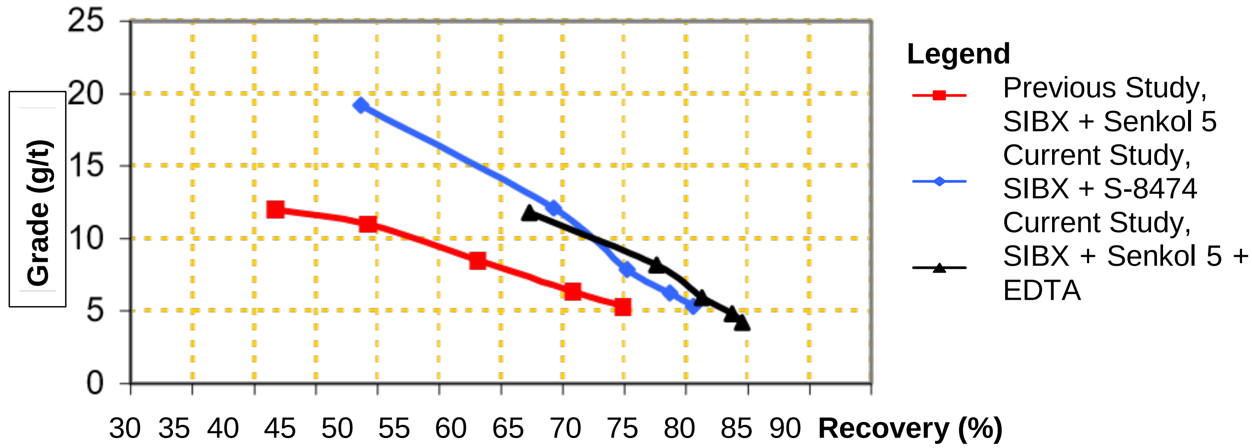
The Pt and Pd grade-recovery curves obtained previously on the River Valley sample at a grind of 60% passing 75 µm (Malysiak, 2006) and the most favourable ones achieved during this study at a grind of 80% passing 75 µm are compared in Figure 13.3.

As depicted in Figure 13.3, 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.

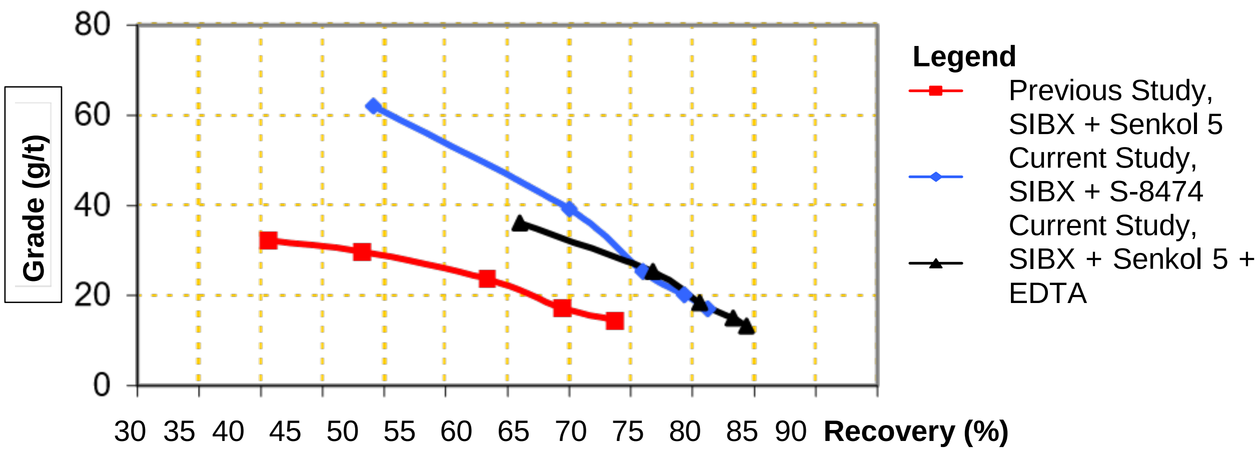
Further investigations, involving a locked cycle test and a possible pilot plant test, will therefore be necessary to optimize the valuable minerals grade-recovery relationship and determine the overall possible recovery and concentrate grade.

FIGURE 13.3 GRADE-RECOVERY CURVES: A. PT BEARING MINERALS, 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 is recommended that the River Valley mineralized material be processed at a grind of 80% passing 75 µm. In terms of the reagent regime, further testwork is 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.

13.2.5 An Investigation into Scoping Level Metallurgical Testing on a Sample from the River Valley PGE Deposit Pacific North West Capital Corporation by SGS – 2013

Testwork was completed on an “Overall” composite prepared from half core intervals from both Dana South Zone (“DSZ”) and Dana North Zone (“DNZ”) of the River Valley Deposit. The Overall composite graded 0.097% Cu, 0.030% Ni, 0.013% Ni(S), and 1.43 g/t PGE. For the purposes of this analysis, PGE is defined as Pt + Pd + Au assays. The nickel sulphide assay suggests that only approximately 40% of the nickel is recoverable through sulphide flotation. Testwork included mineralogical analysis, Bond rod mill grindability, and Bond abrasion testing on both DSZ and DNZ composites. Flotation testwork was completed only on the Overall composite 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 concentrate that targeted a grade at 200 g/t PGE.

The following conclusions can be made from the testwork completed on the Overall Composite from the River Valley Deposit:

- DSZ composite contained 0.092% Cu, 0.026% Ni, 0.010% Ni(S), and 1.25 g/t PGE (Pt+Pd+Au). DNZ composite contained 0.13% Cu, 0.034% Ni, 0.014% Ni(S), and 1.76 g/t PGE. The Overall Composite, a composite of DSZ and DNZ at a ratio of 1:1, contained 0.097% Cu, 0.030% Ni, 0.013% Ni(S), and 1.43 g/t PGE;

- The Bond rod mill grindability tests indicated that the RWI for DSZ and DNZ composites were 19.9 kWh/t and 20.2 kWh/t, respectively. Both composites were identified as being very hard;

- The Bond Abrasion tests (“AI”) determined that both composites were in the moderate to hard abrasive range;

- The modal analysis identified that the dominant minerals in the DSZ and DNZ composites was amphibole/pyroxene and plagioclase, accounting for approximately 54 wt% and 22 to 25 wt%, respectively. The contents of the other minerals present are shown in Table 13.12.

TABLE 13.12
CONTENT OF MINERALS ON THE DSZ AND DNZ COMPOSITES

Minerals	Weight %	
	DSZ Composite	DNZ Composite
Chlorite	13.0	12.0
Quartz	5.0	5.0
Micas	3.0	2.0
K-feldspar	1.0	1.0
Chalcopyrite	0.37	0.48
Ni-sulphides	0.04	0.03
Pyrite	0.14	0.13
Pyrrhotite	0.16	0.28

- The liberation and association analysis of the mineralogy samples, which had a P80 of approximately150 µm, revealed the following:
  - Chalcopyrite was 68% liberated (=>80% mineral-of-interest area percent) with DNZ and 74% with DSZ; and
  - Ni-sulphides were 59% liberated with DNZ and 45% with DSZ.

- The element Ni deportment analysis indicated that the major Ni carriers are as shown in Table 13.13.

TABLE 13.13
NI DEPORTMENT ANALYSIS ON THE DSZ AND DNZ COMPOSITES

Ni Carrier	Mass (% Ni)	
	DSZ Composite	DNZ Composite
Ni-Sulphides	45.0	35.0
Pyrrhotite	4.0	7.0
Silicates	51.0	55.0

The high percentage of Ni carried by silicates resulted in the low Ni flotation recoveries.

- The electron microprobe analysis revealed a high Ni content in pyrrhotite at 0.81%, suggesting that recovering pyrrhotite intentionally in flotation is likely able to improve Ni recovery. The chlorite and amphibole contained 0.06% Ni and 0.03% Ni, respectively. The major losses of nickel occur with the rejection of these two minerals during the flotation process;

- The flotation testwork was completed on the Overall Composite. 11 rougher kinetics tests were performed to evaluate effective reagents, dosages, flotation time and primary grind fineness. The cleaner tests (F7, F13 to F23) were conducted to investigate cleaner circuit configuration, depressants, and regrind fineness.

- A primary grind P80 of 75 µm was selected;

- A collector combination of SIBX and Aero 3477 was identified as a suitable collector suite;

- No non-sulphide gangue depressant was required in the rougher stages. CMC was found to be beneficial in the cleaner stages;

- The best test, F18, produced a concentrate grading 8.94% Cu, 1.22% Ni and 109 g/t PGE (Pt+Pd+Au) at recoveries of 86.8% for Cu, 26.7% for Ni and 71.8% for PGE. This concentrate did not meet the grade target of 200 g/t PGE;

- QEMSCAN analysis on a 3rd cleaner concentrate sample revealed that the liberation of sulphide minerals in the concentrate were high between 76% and 89%. Amphibole/pyroxene and plagioclase were the primary gangue minerals in the concentrate at 19 wt% and 16 wt%, respectively. Silicates in the concentrate exhibited high liberation (87%);

- The cleaner tests (F24 and F25) focused on the depression of the gangue minerals achieved significant improvement on the concentrate grade, producing a concentrate grading 21.4% Cu, 1.63% Ni and 242.7 g/t PGE (Pt+Pd+Au) at recoveries of 75.5% for Cu, 17.9% for Ni and 61.9% for PGE. CMC with Na_2SiO_3 or Aero 8860 GL were found to be effective on depression of non-sulphide gangue minerals, and finer regrind was possibly beneficial to PGE metallurgy;

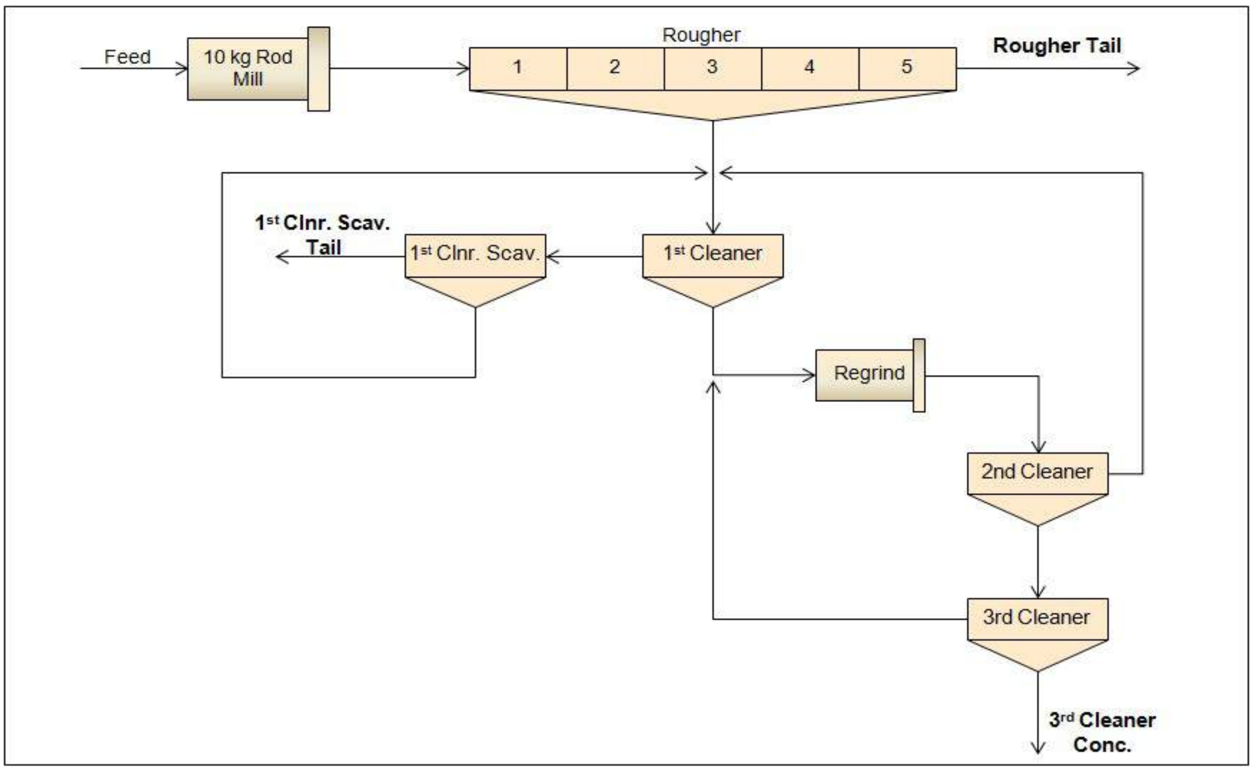
- A LCT produced a concentrate grading 15.5% Cu, 1.67% Ni, and 189 g/t PGE at recoveries of 84.4% for Cu, 22.2% for Ni, and 68.7% for PGE. A P80 of 71 µm was achieved in the primary grind, while 19 µm was achieved in the regrind.

- Reagents selected and applied in the LCT are shown in Table 13.14.

- A flowsheet of the LCT is presented in Figure 13.4, and the results are shown in Table 13.15.

TABLE 13.14 REAGENTS SELECTED AND APPLIED IN THE LCT					
Circuit	**Reagent (g/t)**				
	SIBX	**Aero 3477**	**CMC**	**Na_2SiO_3**	**MIBC**
Rougher	80	30			10
Cleaner	60	30	90	10	15
Total	**140**	**60**	**90**	**10**	**25**

FIGURE 13.4 LOCKED CYCLE TEST



Source: *SGS (2013)*

TABLE 13.15 LOCKED CYCLE TEST PRODUCT ANALYSIS									
Product	**Weight %**	**Assays**				**% Distribution**			
		Cu (%)	**Ni (%)**	**S (%)**	**PGE (g/t)**	**Cu (%)**	**Ni (%)**	**S (%)**	**PGE (%)**
3rd Cleaner Conc.	0.6	15.50	1.670	29.10	189.00	84.4	22.2	67.7	68.7
1st Cleaner Scav Tail	6.0	0.09	0.093	0.81	2.32	4.9	12.9	19.6	8.8
Rougher Tail	93.4	0.012	0.030	0.03	0.38	10.7	64.9	12.6	22.5
Rougher Conc.	6.6	1.44	0.230	3.30	18.7	89.3	35.1	87.4	77.5
Head	**100.0**	**0.11**	**0.043**	**0.25**	**1.58**	**100.0**	**100.0**	**100.0**	**100.0**

The following recommendations are made with respect to additional testwork:

1. Further definition on the effect of primary grind size on flotation recovery. This data should be used in an economic trade-off study with energy requirements as a function of grind size;

2. Mineral sorting and dense media applications could be explored as pre-concentration techniques for the valuable minerals, however, previous mineralogical analysis does not support this;

3. Flotation optimization testing to improve concentrate grades and recoveries looking at the following:

    - Effective flowsheet configuration. A common approach with this type of nickel-bearing mineralization is a split flowsheet approach similar to that shown in Figure 13.4, above, for test F-15, where the easy-to-float material is cleaned separately from the difficult-to-float material. This type of approach is commonly practiced in nickel-bearing sulphide deposits located in the Sudbury region. This flowsheet was not properly assessed in this program;

    - Further investigation should be carried out to explore options to improve nickel recovery. It should be possible to improve recovery from approximately 22% to between 30 and 40%. Variables such as alternative collectors and activators to improve sulphide recovery could be examined;

    - The effect of depressant type and dosage. It was only towards the end of the program when a number of secondary depressants were analyzed. There are other secondary depressants that should be considered. Dosage should be optimized;

    - Effect of regrind size and number of regrind stages. Very little attention was given to this variable in the work to date. A regrind size around a p80 of 20 microns was selected, but not optimized.

- o Detailed mineralogical examination of the occurrence of PGMs should be considered as this could better define flotation conditions for the recovery of these elements, as well as provide an indication of the maximum recovery of these elements.

- o Fresh drill core should be obtained for new metallurgical testwork. All previous metallurgical tests appear to have been conducted on old core and chemical sample rejects.

4. Flotation and grindability variability testing on DSZ and DNZ composite to identify the variability of flotation performance. Variability testing should then extend to investigate a broader range of samples from each zone to investigate the effect of feed grade and rock type on metallurgy.

5. Environment testing on waste rock, and effluent from a locked cycle test, should be completed.

13.2.6 Chemical Analysis of Dana and Pine Zone Samples for New Age Metals – 2018

A mineralogical analysis of the Dana and Pine Zone samples was completed on four composites from the River Valley Property by XPS in 2018. The composites were created from assay rejects and include "typical" grade Pine Zone, "high" grade Pine Zone, "typical" grade Dana Zone and "high" grade Dana Zone. The grades were determined by triplicate assays as shown in Table 13.16.

TABLE 13.16
CHEMICAL ANALYSIS OF THE DANA AND PINE ZONE SAMPLES

Composite	Cu (%)	Ni (%)	S (%)	Pd (ppm)	Pt (ppm)	Au (ppm)	Fe (%)	Mg (%)	Si (%)
Pine Typical	0.20	0.04	0.49	1.50	0.57	0.11	7.59	4.19	22.57
Pine High Grade	0.28	0.06	0.68	2.99	0.84	0.43	8.38	5.02	22.87
Dana Typical	0.11	0.03	0.31	0.77	0.27	0.08	6.61	5.19	24.27
Dana High Grade	0.27	0.06	0.55	3.27	1.08	0.19	8.68	6.03	22.93

The major findings from the analysis are provided below:

- Ni sulphide, dominated by pentlandite with trace levels of millerite and siegenite, represents 40%, 49%, 38% and 44% of the total Ni in the typical grade Pine Zone, high grade Pine Zone, typical grade Dana Zone and high grade Dana Zone, respectively. These values represent a theoretical maximum achievable recovery assuming perfect selectively between Ni sulphide and other Ni-bearing phases (pyrrhotite, pyrite, chlorite, biotite and actinolite);

- Pentlandite contains high levels of cobalt ("Co"). Compositional analysis of pentlandite from all zones averages 2.2% Co;

- Two generations of pyrite have been identified in all four composites – a fresh pyrite with a blocky and sometimes euhedral habit, and an altered pyrite with an unusual elongated fabric. The altered pyrite contains high Ni grades, up to 6.8% in the high grade Dana Zone sample. The combined population of altered pyrite in the four composites has an average Ni grade of 2.9%;

- A comparison of sulphide ratios in the different samples shows that chalcopyrite to Fe sulphides is relatively consistent in all samples. Pyrrhotite to pentlandite ratios, a metallurgical indicator in Sudbury ores, is slightly higher in Pine Zone samples compared to Dana Zone samples. The ratio of pyrite to Ni pyrite (altered pyrite), is relatively consistent in the two Pine Zone samples and the Dana high grade sample. The ratio is much higher in the typical grade Dana sample, indicating less altered pyrite compared to the other three samples;

- A comparison of modal mineralogy indicates that the Pine Zone contains more epidote and more biotite as compared to the Dana Zone samples;

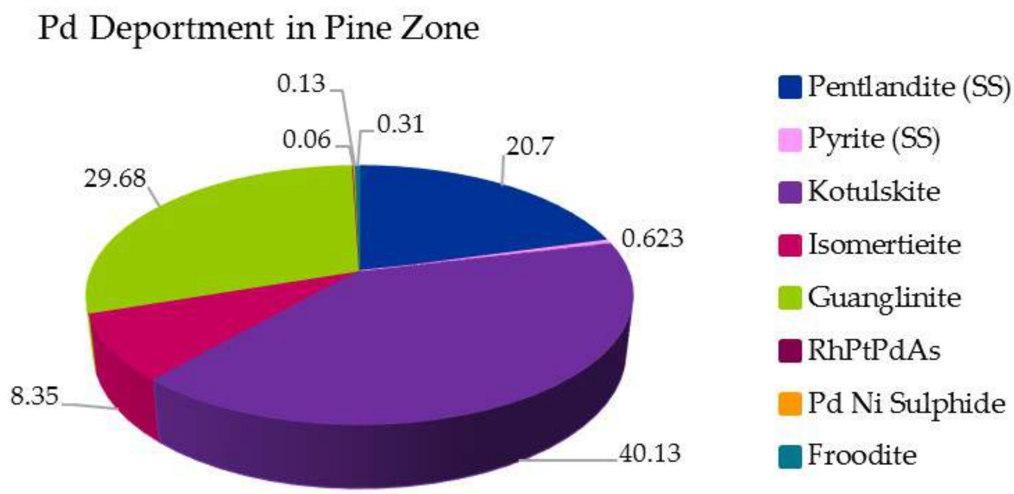
- The high grade PGE samples contain slightly more quartz than the typical grade samples;

- Bright phase searches showed the PGEs are dominated by kotulskite (Pd(Te,Bi)), isomertieite ($Pd_{11}Sb_2As_2$), guanglinite (Pd_3As) and sperrylite ($PtAs_2$);

- At a P80 of 75 µm, 51% and 75% of total PGMs are liberated in the high-grade Pine Zone and high grade Dana Zone concentrates, respectively. When not liberated, the majority of PGMs are locked within silicate gangue. The average grain size of both kotulskite and isomertieite is 5 µm, with the coarsest grains measured in the Dana concentrate up to 30 µm and 60 µm, respectively. Sperrylite averages 4.4 µm in the Pine concentrate and 11 µm in the Dana concentrate. The largest sperrylite is 100 µm, in the Dana concentrate;

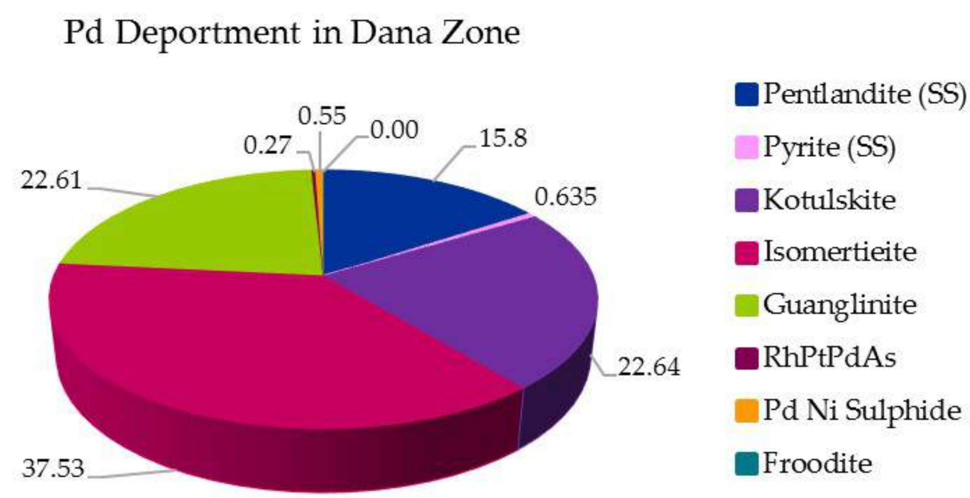
- Element deportment calculations indicate 21% and 16% of Pd in the high-grade Pine Zone and high grade Dana Zone occurs as solid solution within pentlandite. The remaining Pd occurs as discrete grains - kotulskite, isomertieite or guanglinite. Sperrylite makes up 95-96% of the total Pt in both of the zones. Pd deportment is presented in Figure 13.5 for the Pine Zone and Figure 13.6 for the Dana Zone.

FIGURE 13.5 PD DEPORTMENT IN PINE ZONE



Source: *XPS (2018)*

FIGURE 13.6 PD DEPORTMENT IN DANA ZONE



Source: *XPS (2018)*

14.0 MINERAL RESOURCE ESTIMATE

The effective date of the Mineral Resource Estimate is June 27, 2019.

14.1 DATABASE

NAM maintains all drillhole data in a Microsoft Excel™. Header, survey, assays, and lithology tables are saved in individual files. The Microsoft Excel™ files were provided to WSP by NAM on November 28, 2017.

The database contains 710 drillholes with 106,554 assays records in the database, and 2,642 surface channel samplings. Table 14.1 summarizes the borehole database.

TABLE 14.1
DRILLHOLE DATABASE

Item	Number of Drill Holes	Length (m)
Project total	3,351	161,233
Channel samples	2641	792
Drill holes total	710	160,441
Drill holes evaluated	609	135,772
Dana North	142	29,961
Pine Zone	21	5,470
Dana South	85	23,960
Lismer	104	21,064
Lismer-Ext	55	11,758
Varley	58	10,200
Razor	24	4,629
Banshee	22	3,983
Azen	14	3,732
River Valley Extension	84	21,014

The non-assayed intervals within the database were assigned as blank. WSP believes that non-assayed material should not be assigned a zero value, as this does not reflect the true value of the material. Sample intervals with values below detection limit (<) in the database were assigned half the detection limit.

The resource estimation was conducted using Surpac™ (version 6.8.1).

14.2 BULK DENSITY MEASUREMENTS

There is limited bulk density data available on the Project with only 432 samples which represents 0.4% of the total sample database. All the samples are from only three of the zones: Dana North, Dana South, and Lismer Ridge. Table 14.2 summarizes the statistics of the bulk density measurements taken to date.

TABLE 14.2 **BULK DENSITY SUMMARY**				
Zone	**No. of Samples**	**Average t/m^3**	**Minimum t/m^3**	**Maximum t/m^3**
All	432	2.94	2.61	3.26
Dana North	90	2.86	2.66	3.04
Dana South	6	2.88	2.82	2.95
Lismer Ridge	336	2.95	2.61	3.26

WSP reviewed the potential to generate a regression formula for bulk density based on several other elements. Upon review, it was determined that currently a regression formula based on grades cannot be generated due to low correlation factors.

WSP used a uniform bulk density of 2.94 t/m^3 for the Updated Mineral Resource Estimate, which is the length-weighted average of 432 bulk density samples.

WSP recommends that NAM continue to collect bulk density measurements from the various rock types and grade distributions in order to build up the dataset. At a minimum, 5% of the dataset should contain bulk density measurements before an acceptable regression formula can be built.

14.3 PALLADIUM EQUIVALENT FORMULA

The palladium equivalent ("PdEq") calculation is based on the assumptions in Table 14.3. Metal prices are based on an approximate 24-month trailing average at October 31, 2018. Concentrate recovery, smelter payables and refining charges are based on the comparable projects.

TABLE 14.3 **ASSUMPTIONS FOR PDEQ CALCULATION**				
Element	**Metal Price $US/lb or oz**	**Concentrate Recovery (%)**	**Smelter Payable (%)**	**Refining Chg. $US/lb or oz**
Ni	5.25	75	75	0.50
Cu	2.75	70	75	0.08
Au	1,275	85	80	10
Pt	950	85	80	10
Pd	950	85	90	10
Rh	1,500	85	80	10
Co	30	50	70	3

Using these assumptions, the PdEq in g/t is calculated as:

PdEq g/t = (Ni % x 2.55) + (Cu % x 1.34) + (Au g/t x 1.20) + (Pt g/t x 0.89) + (Rh g/t x 1.41) + (Co % x 9.01) + Pd g/t

- Factor1 = 0.0321508 (converts ounces to grams);
- Factor2 = 22.04622 (converts pounds to grade percent);
- Factor3 = 0.002205 (converts pounds to parts per million).

14.4 GEOLOGICAL INTERPRETATION

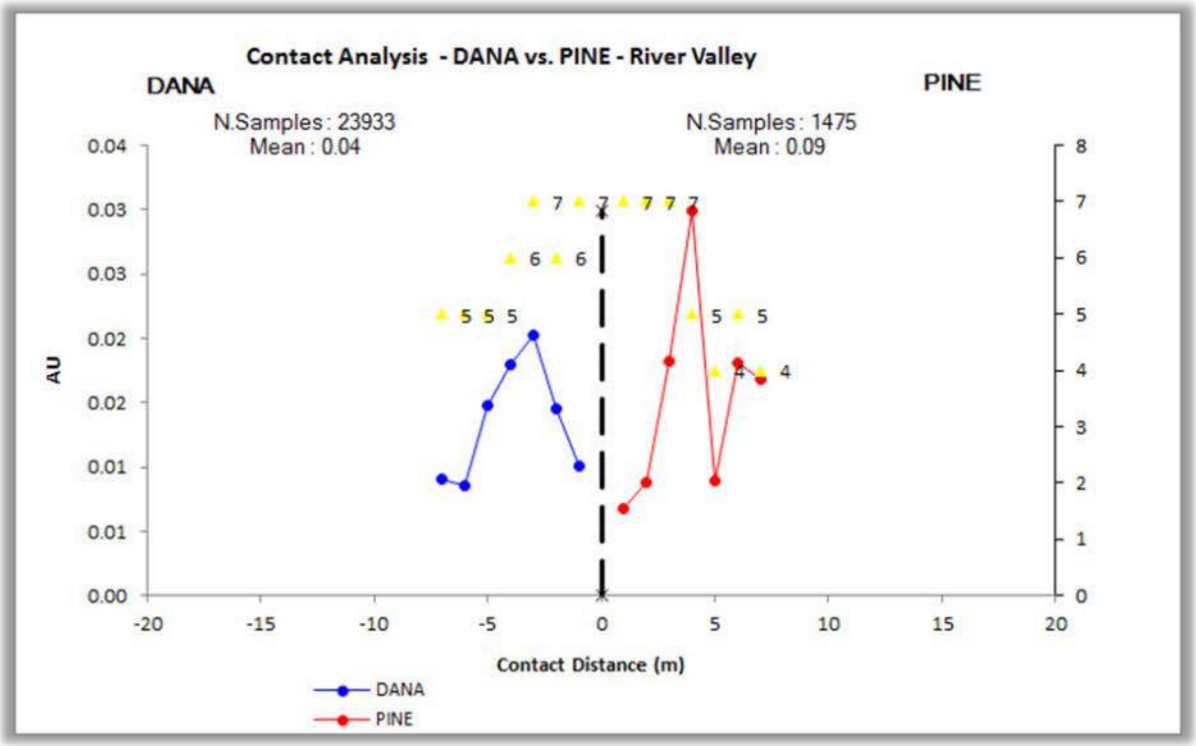
Three-dimensional wireframe models of mineralization were developed in Surpac™ by WSP with approval of all shapes by NAM. The basic wireframe designs were based on design criteria that included a minimum downhole width of 2.0 m and a minimum grade of 0.3 g/t PdEq.

Cross-sectional interpretations were created in Surpac™ software. The cross-section interpretations were then used to create plan view interpretations at 10 m intervals. Those plan view interpretations were linked together with control strings and triangulated to build a three-dimensional solid. Pine Zone was modeled together with Dana North area, due of their proximity and tridimensional shape, which allowed to create a single mineralized body. Also, a set of contact analysis graphs were created for Pd, Pt, Au, Ni, Cu, and Co. Those graphs indicate both Dana North and Pine are the same domain (Figure 14.1 to Figure 14.6). The solids (aka wireframes) were validated in Surpac™ and no errors were found.

The zones of mineralization interpreted for each area were generally contiguous; however, due to the nature of the mineralization there are portions of the wireframe that have grades less than 0.3 g/t PdEq yet are still within the mineralizing trend.

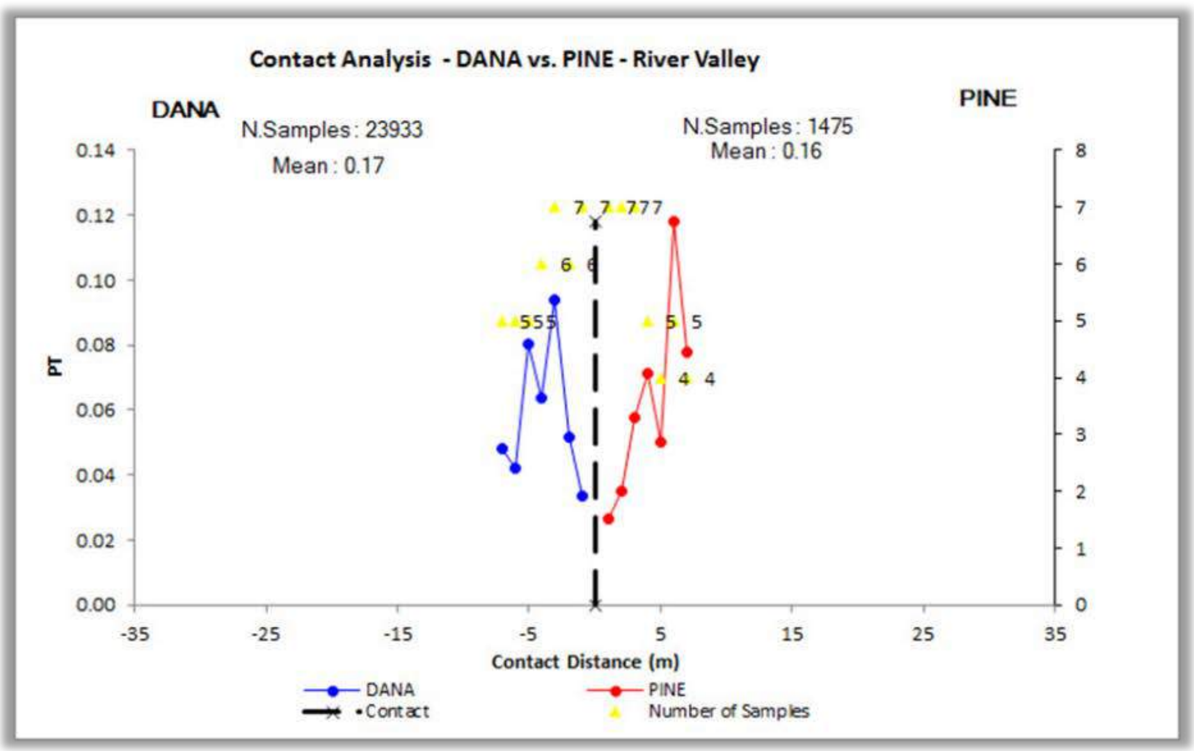
Table 14.4 summarizes the basic parameters of the various mineral wireframes used in this Updated Mineral Resource Estimate.

FIGURE 14.1 CONTACT ANALYSIS - GOLD



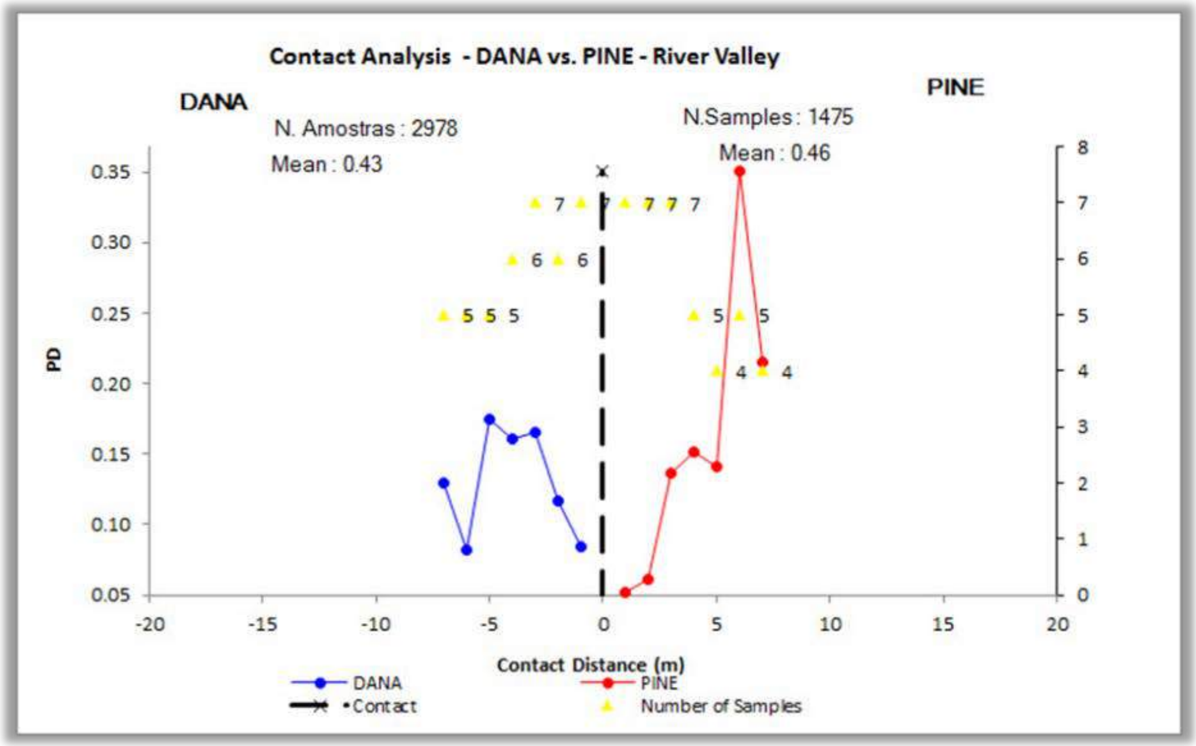
Source: *WSP (2019)*

FIGURE 14.2 CONTACT ANALYSIS – PLATINUM



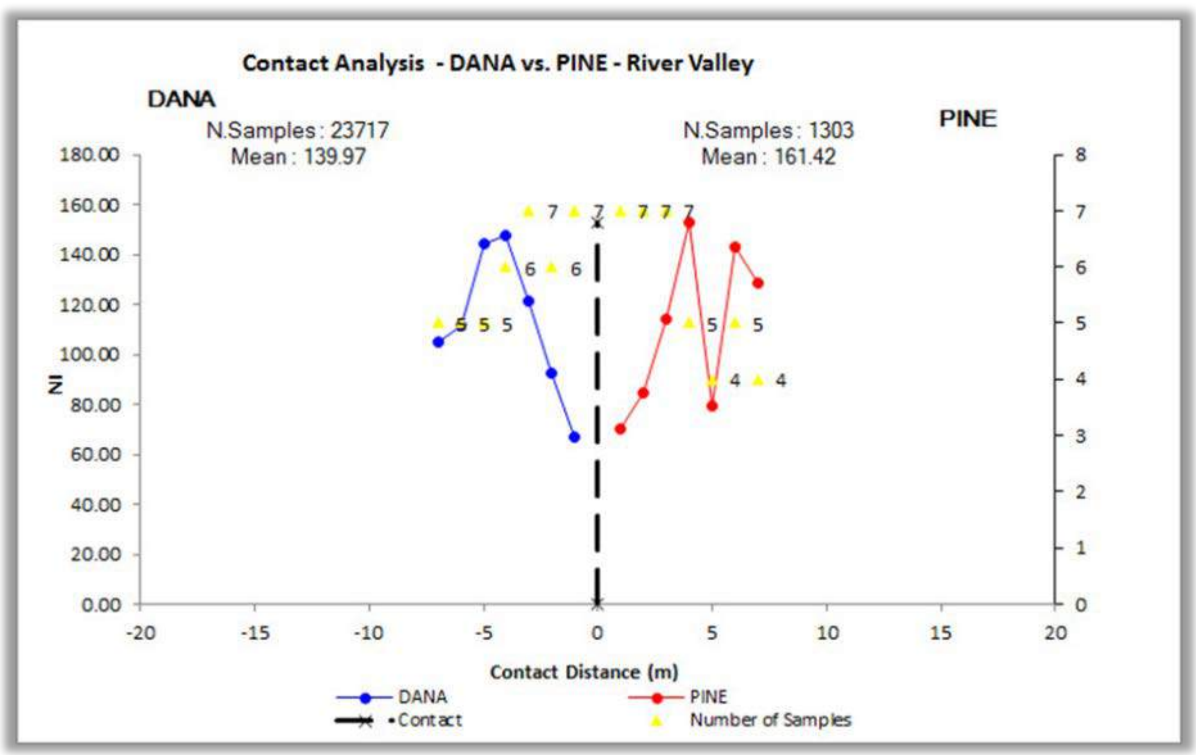
Source: *WSP (2019)*

FIGURE 14.3 CONTACT ANALYSIS – PALLADIUM



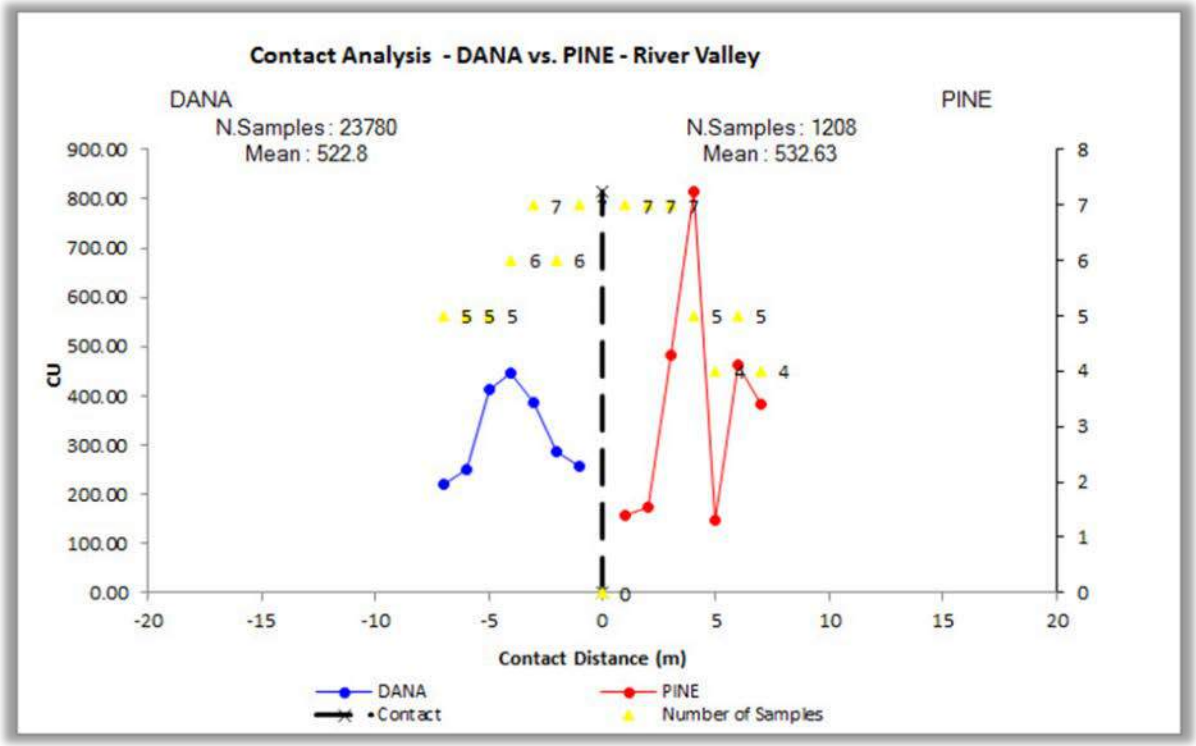
Source: *WSP (2019)*

FIGURE 14.4 CONTACT ANALYSIS – NICKEL



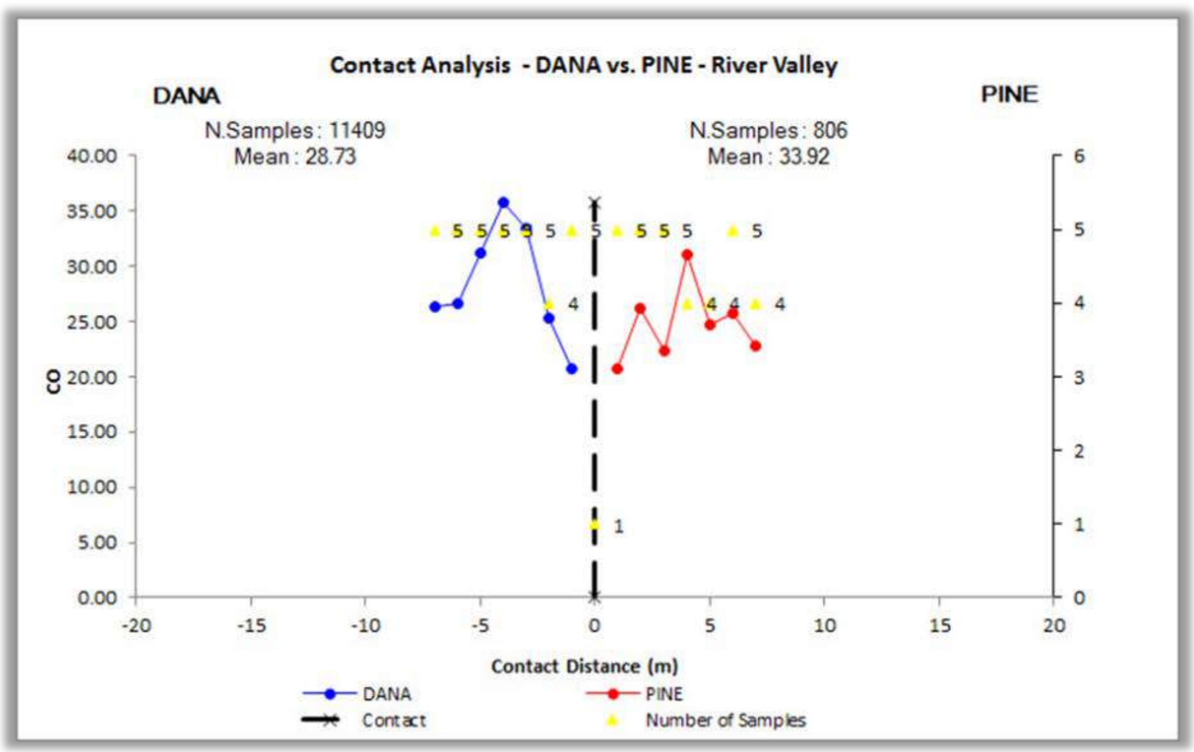
Source: *WSP (2019)*

FIGURE 14.5 CONTACT ANALYSIS – COPPER



Source: *WSP (2019)*

FIGURE 14.6 CONTACT ANALYSIS - COBALT



Source: *WSP (2019)*

TABLE 14.4 WIREFRAME SUMMARY									
Zone	**Domain**	**Minimum X**	**Maximum X**	**Minimum Y**	**Maximum Y**	**Minimum Z**	**Maximum Z**	**Surface Area (m^2)**	**Volume (m^3)**
100-150	Dana - Pine Zone	555,105	555,611	5,172,116	5,172,993	-120	350	1,067,408	22,203,225
200	Dana South	555,380	555,695	5,171,822	5,172,209	-160	306	441,213	10,410,281
300	Lismer	556,764	557,701	5,169,533	5,171,227	-17	322	1,333,680	23,908,113
400	Lismer_Ext	555,927	556,669	5,171,273	5,151,684	-33	315	491,745	7,563,933
500	Varley	557,790	558,526	5,168,052	5,169,547	81	310	736,398	11,900,868
600	Razor	562,009	563,200	5,167,370	5,168,461	20	286	937,427	24,427,631
700	Banshee	555,407	555,882	5,170,899	5,171,733	59	320	517,682	7,096,293
800	Azen	558,434	559,342	5,167,475	5,167,847	-135	282	798,475	13,959,818
910	River Valley Extension	564,281	564,696	5,165,488	5,166,038	56	410	511,829	6,183,081
920	River Valley Extension	564,263	565,712	5,163,662	5,165,186	-154	458	2,081,177	17,620,334
930	River Valley Extension	564,281	564,696	5,165,488	5,166,038	56	410	511,829	6,183,081

Note: *Coordinates, Easting and Northing, are in NAD83 UTM Zone 17T.*

14.5 EXPLORATION DATA ANALYSIS

14.5.1 Assays

The portion of the Deposit included in the Updated Mineral Resource Estimate was sampled by 22,162 PdEq assays, being 21,569 in Dana North, and 594 in Pine. The assay intervals within each zone were captured using a Surpac™ macro into individual drillhole files. These drillhole files were reviewed to ensure all the proper assay intervals were captured in the interpretation of plan view intervals. Table 14.5 summarizes the basic statistics for the assays at River Valley as a whole and for each zone individually.

TABLE 14.5
DRILLHOLE STATISTICS

Zone	Domain	Field	No of Records	Minimum	Maximum	Mean	Standard Deviation
100	Dana	Length	21,569	0.04	4	0.779	0.345
		Au-g/t	21,569	0	1.552	0.031	0.051
		Pt-g/t	21,569	0	5.28	0.166	0.279
		Pd-g/t	21,569	0.001	16.55	0.416	0.846
		Cu-%	21,511	0.00003	1.020	0.052	0.067
		Ni-%	0	0.00005	0.156	0.013	0.012
		Fe-%	11,600	0.005	24.5	7.969	82.554
		Co-ppm	11,600	0.5	294	28.865	15.994
		S-%	5,559	0.005	3.21	0.2	0.209
		Rh-ppb	5,307	0.25	410	18.981	28.212
		Ag-ppm	11,600	0.1	20	0.735	0.869
100	Dana - Channel Samples	Length	2,569	0	2.67	0.045	0.078
		Au-g/t					
		Pt-g/t	2,569	0.01	5520	603.489	780.729
		Pd-g/t	2,569	5	1560	205.605	174.84
		Cu-%					
		Ni-%					
		Fe-%	2,569	0.01	384	13.331	32.809
		Co-ppm					
		S-%	2,569	0.3	0.3	0.3	0
		Rh-ppb					
		Ag-ppm					
150	Pine Zone * *only drill holes drilled after 2013 in Pine Zone area	Length	594	1	1	1	0
		Au-g/t	594	0.001	0.352	0.02	0.038
		Pt-g/t	594	0.005	1.913	0.11	0.226
		Pd-g/t	594	0.001	5.82	0.291	0.688
		Cu-%	594	0.00013	0.533	0.037	0.063
		Ni-%	594	0.00001	0.108	0.015	0.012
		Fe-%	386	0.33	8.57	4.448	1.496

Table 14.5 **Drillhole Statistics**							
Zone	**Domain**	**Field**	**No of Records**	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
		Co-ppm	386	0.25	93	35.15	14.367
		S-%	386	0.01	2.55	0.263	0.303
		Rh-ppb					
		Ag-ppm	386	1	3	1.01	0.144
200	Dana South	Length	14,908	0.05	24.85	0.774	0.522
		Au-g/t	14,908	0.00025	1.396	0.032	0.055
		Pt-g/t	14,908	0.00003	6.73	0.177	0.34
		Pd-g/t	14,908	0.00003	18.03	0.483	1.127
		Cu-%	14,908	0.00003	1.0001	0.037	0.067
		Ni-%	14,908	0.00003	0.164	0.009	0.012
		Fe-%	14,908	0.005	10.8	2.471	1.101
		Co-ppm	14,908	0.5	433	27.621	17.193
		S-%	14,908	0.005	1.58	0.143	0.189
		Rh-ppb	14,908	0.5	280	15	27.557
		Ag-ppm	14,908	0.1	10	0.604	0.56
300	Lismer	Length	14,321	0.05	5.5	0.633	0.266
		Au-g/t	14,321	0.00025	2.43	0.025	0.041
		Pt-g/t	14,321	0.00003	5.63	0.14	0.234
		Pd-g/t	14,321	0.00003	14.99	0.32	0.636
		Cu-%	14,321	0.00003	0.979	0.035	0.058
		Ni-%	14,321	0.00003	0.567	0.011	0.017
		Fe-%	14,321	0.01	6.84	1.72	0.904
		Co-ppm	14,321	0.5	222	23.703	17.694
		S-%					
		Rh-ppb	14,321	0	160	15.024	24.704
		Ag-ppm	14,321	0	4.2	0.44	0.471
400	Lismer Ext	Length	4,617	0.02	10	0.774	0.34
		Au-g/t	4,617	0.00025	0.636	0.029	0.044
		Pt-g/t	4,617	0.00003	22.08	0.178	0.4
		Pd-g/t	4,617	0.00003	51	0.412	1.022
		Cu-%	4,617	0.00003	1	0.046	0.063
		Ni-%	4,617	0.00003	0.115	0.011	0.014
		Fe-%	4,617	0.26	6.69	1.545	0.835
		Co-ppm	4,617	0.5	202	20.714	14.065
		S-%	4,617	0.005	0.97	0.196	0.189
		Rh-ppb					
		Ag-ppm					
500	Varley	Length	3,122	0.1	15	0.99	
		Au-g/t	3,122	0.00025	0.626	0.026	
		Pt-g/t	3,122	0.005	5.383	0.148	

TABLE 14.5
DRILLHOLE STATISTICS

Zone	Domain	Field	No of Records	Minimum	Maximum	Mean	Standard Deviation
		Pd-g/t	3,122	0.00003	14.16	0.376	
		Cu-%	3,122	0.00069	0.531	0.044	
		Ni-%	3,122	0.0005	0.138	0.013	
		Fe-%	3,122	0.44	8.48	2.106	
		Co-ppm	3,122	0.5	117	19.198	
		S-%	3,122	0.005	1.2	0.148	
		Rh-ppb					
		Ag-ppm	3,122	0.1	8.4	0.293	
600	Razor	Length	2,332	0.1	4	0.99	0.12
		Au-g/t	2,332	0.00025	0.956	0.016	0.034
		Pt-g/t	2,332	0.005	3.06	0.086	0.132
		Pd-g/t	2,332	0.00003	3.47	0.191	0.3
		Cu-%	2,332	0.00008	0.448	0.029	0.039
		Ni-%	2,332	0.0007	0.243	0.02	0.024
		Fe-%	2,332	0.28	7.28	1.097	0.655
		Co-ppm	2,332	2	118	14.669	13.262
		S-%	2,332	0.01	2.86	0.152	0.256
		Rh-ppb					
		Ag-ppm	2,332	0.1	9.1	0.315	0.421
700	Banshee	Length	1,676	0.05	1.5	0.775	0.257
		Au-g/t	1,676	0.00025	0.439	0.024	0.035
		Pt-g/t	1,676	0.00003	12.772	0.134	0.306
		Pd-g/t	1,676	0.00003	18.92	0.22	0.529
		Cu-%	1,676	0.00003	0.452	0.036	0.06
		Ni-%	1,676	0.00003	0.093	0.007	0.01
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					
800	Azen	Length	1,123	0.1	1.5	0.978	0.119
		Au-g/t	1,123	0.00025	0.635	0.018	0.029
		Pt-g/t	1,123	0.005	1.31	0.089	0.111
		Pd-g/t	1,123	0.00003	3.456	0.259	0.345
		Cu-%	1,123	0.00049	0.443	0.049	0.053
		Ni-%	1,123	0.0003	0.173	0.024	0.021
		Fe-%	1,123	0.69	5.56	2.016	0.857
		Co-ppm	1,123	5	425	33.424	48.566
		S-%	1,123	0.03	1.24	0.223	0.222
		Rh-ppb					

TABLE 14.5
DRILLHOLE STATISTICS

Zone	Domain	Field	No of Records	Minimum	Maximum	Mean	Standard Deviation
		Ag-ppm	1,123	0.1	50.1	1.934	8.04
910	River Valley Ext Orebody 1	Length	768	0.5	1.5	1.121	0.22
		Au-g/t	768	0.001	0.969	0.033	0.058
		Pt-g/t	768	0.005	3.326	0.147	0.182
		Pd-g/t	768	0	4.79	0.263	0.325
		Cu-%	767	0.001	0.546	0.053	0.052
		Ni-%	767	0.002	0.217	0.027	0.023
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					
920	River Valley Ext Orebody 2	Length	772	0.2	1.5	1.055	0.247
		Au-g/t	772	0.001	0.54	0.038	0.049
		Pt-g/t	772	0.005	4.24	0.168	0.242
		Pd-g/t	772	0	4.878	0.192	0.322
		Cu-%	767	0.001	0.273	0.049	0.050
		Ni-%	767	0.001	0.106	0.018	0.016
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					
930	River Valley Ext Orebody 3	Length	485	0.25	1.5	1.26	0.276
		Au-g/t	485	0.001	0.592	0.032	0.047
		Pt-g/t	485	0.005	3.654	0.174	0.264
		Pd-g/t	485	0.001	3.15	0.311	0.4
		Cu-%	485	0.0007	0.261	0.043	0.046
		Ni-%	485	0.0011	0.457	0.032	0.037
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					

The correlation coefficients for the elements were reviewed prior to any grade capping and compositing to determine if any correlation existed between the elements to allow similar variogram and estimation parameters to be used. Table 14.6 summarizes the correlation between the elements.

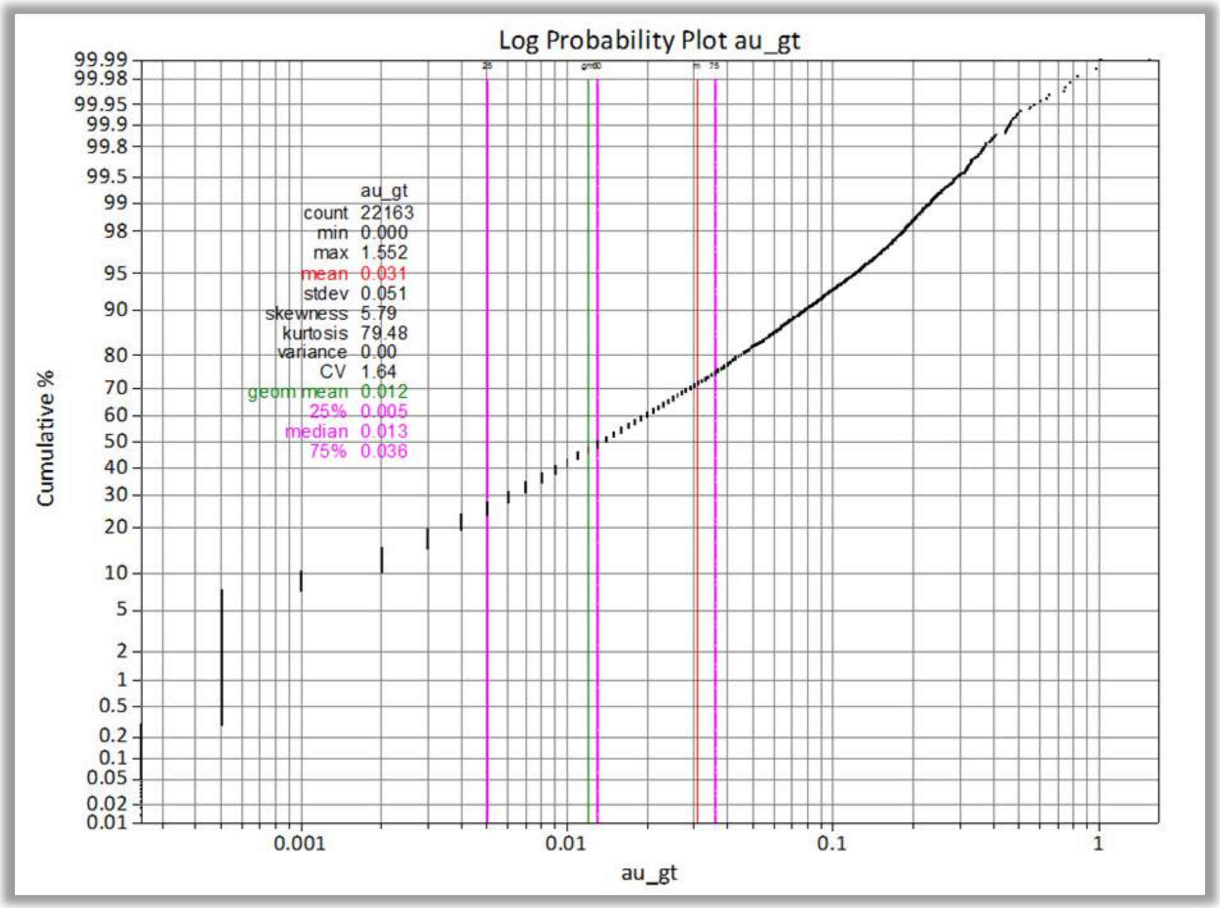
TABLE 14.6 CORRELATION COEFFICIENTS										
Length	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Ni (ppm)**	**Cu (ppm)**	**Fe (%)**	**Co (ppm)**	**S (%)**	**Rh (ppb)**	**Ag (g/t)**
Pd (g/t)	1									
Pt (g/t)	0.87	1								
Au (g/t)	0.81	0.8	1							
Ni (ppm)	0.67	0.63	0.62	1						
Cu ppm)	0.75	0.72	0.79	0.78	1					
Fe (%)	0.1	0.11	-0.04	-0.06	-0.04	1				
Co (ppm)	0.37	0.35	0.36	0.83	0.5	0.11	1			
S (%)	0.17	0.13	0.47	0.74	0.61	0.08	0.73	1		
Rh (ppb)	-0.23	-0.18	0.82	0.64	0.74	-0.08	0.38	0.36	1	
Ag (g/t)	0.13	0.12	0.12	0.11	0.16	0.61	0.21	0.14	0.12	1

14.5.2 Grade Capping

Raw assay data for each element was examined individually to assess the amount of metal that is at risk from high-grade assays. The Surpac™ Decile function along with reviewing the log probability plots was used in determining if grade capping was required (Figure 14.7 to Figure 14.11).

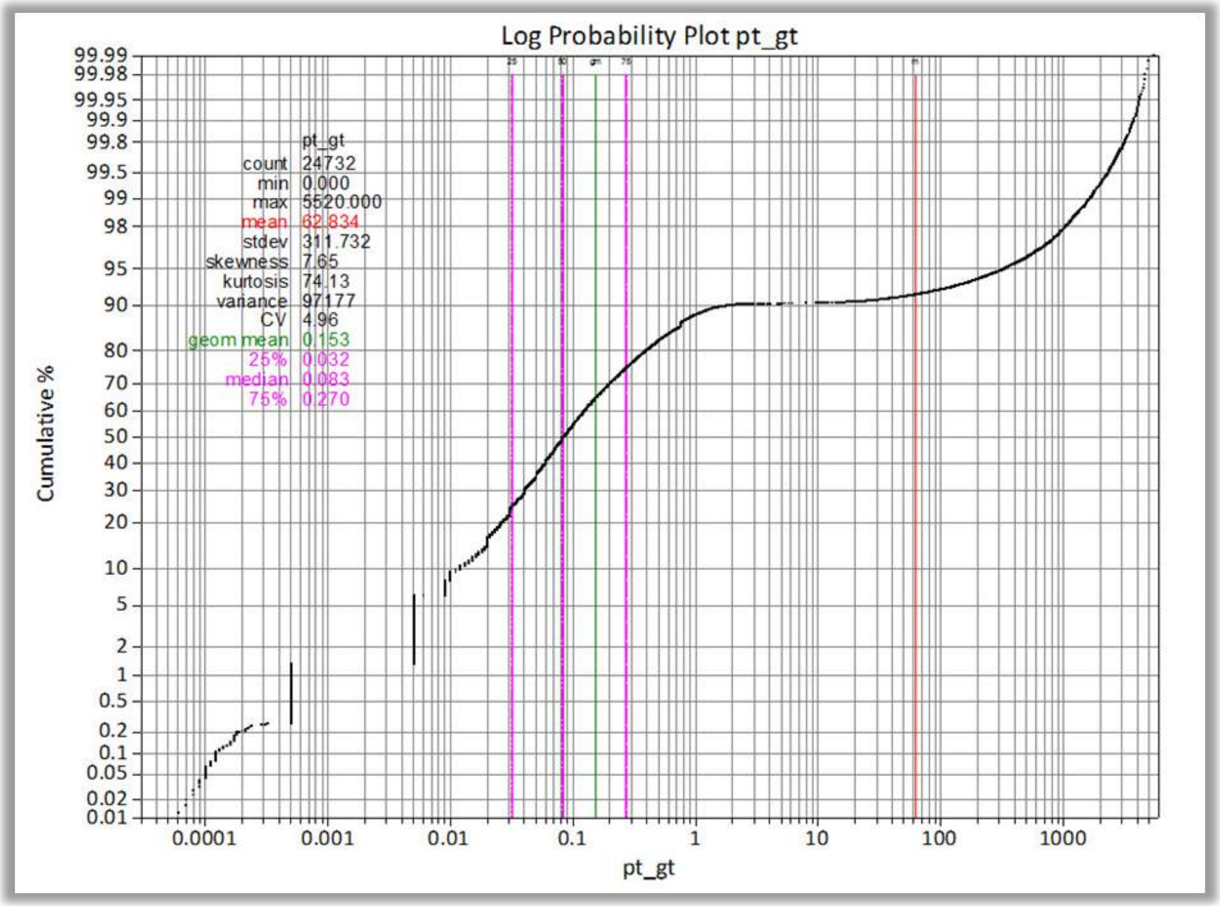
It was determined that grade capping was not required on any element in the dataset. The potential of smearing high-grade samples will be controlled by the kriging process.

FIGURE 14.7 LOG PROBABILITY PLOT - GOLD



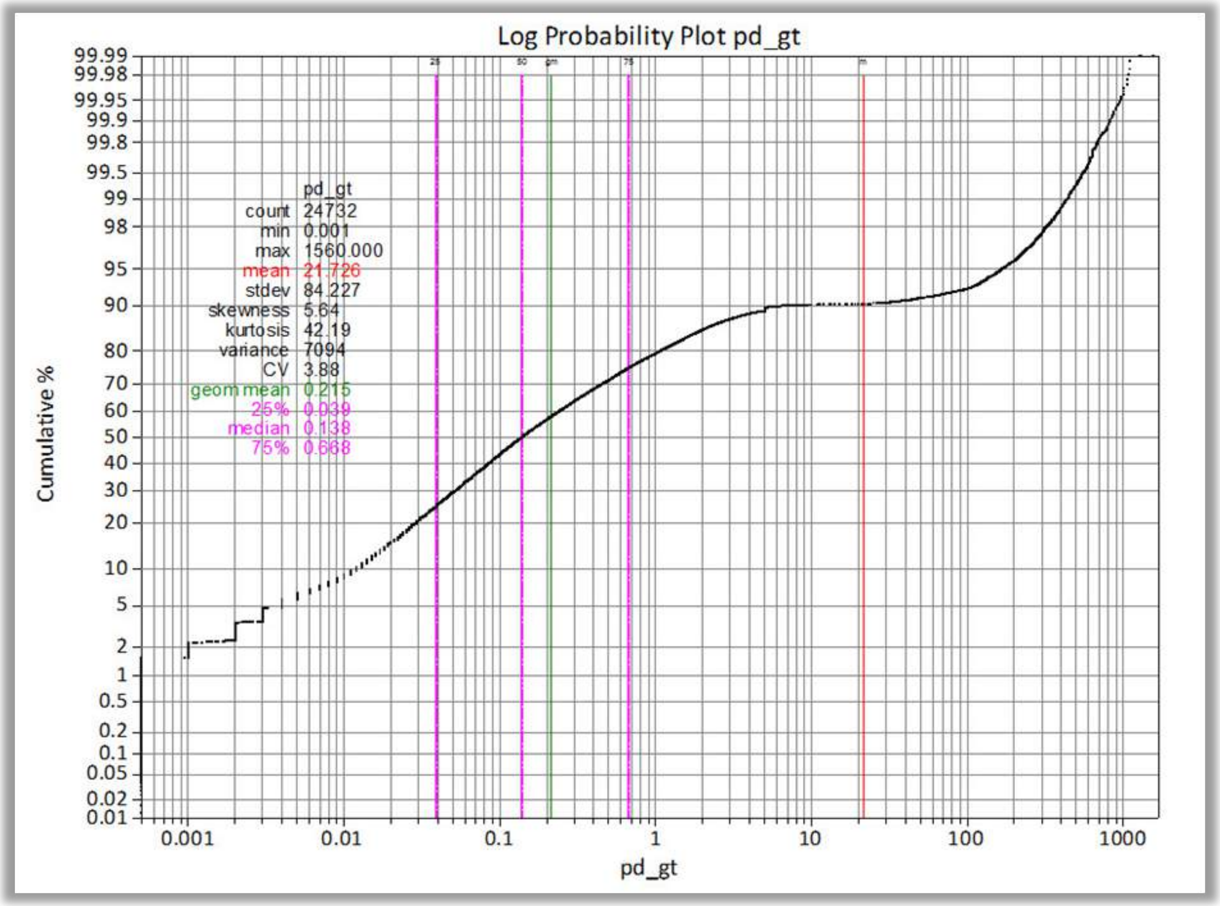
Source: *WSP (2019)*

FIGURE 14.8 LOG PROBABILITY PLOT - PLATINUM



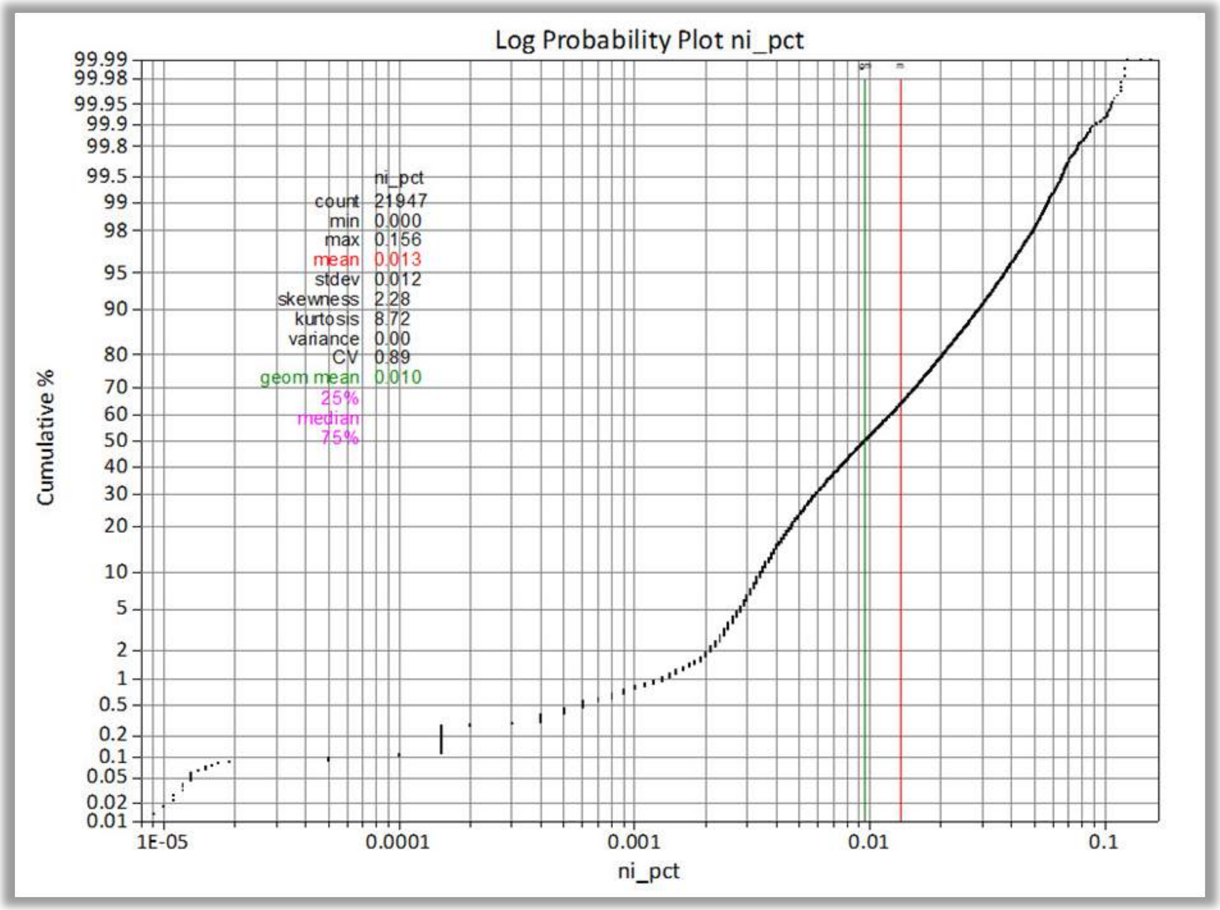
Source: *WSP (2019)*

FIGURE 14.9 LOG PROBABILITY PLOT - PALLADIUM



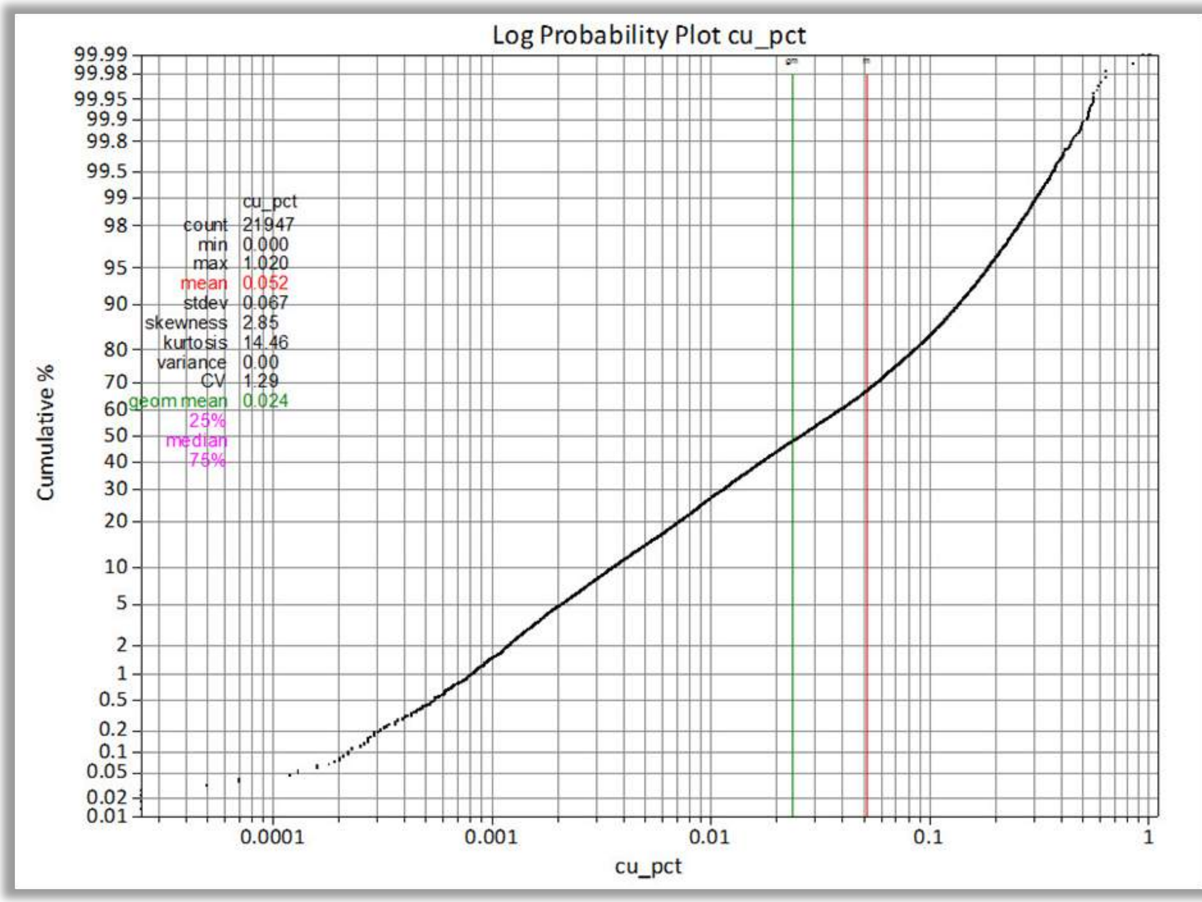
Source: *WSP (2019)*

FIGURE 14.10 LOG PROBABILITY PLOT – NICKEL



Source: *WSP (2019)*

FIGURE 14.11 LOG PROBABILITY PLOT – COPPER

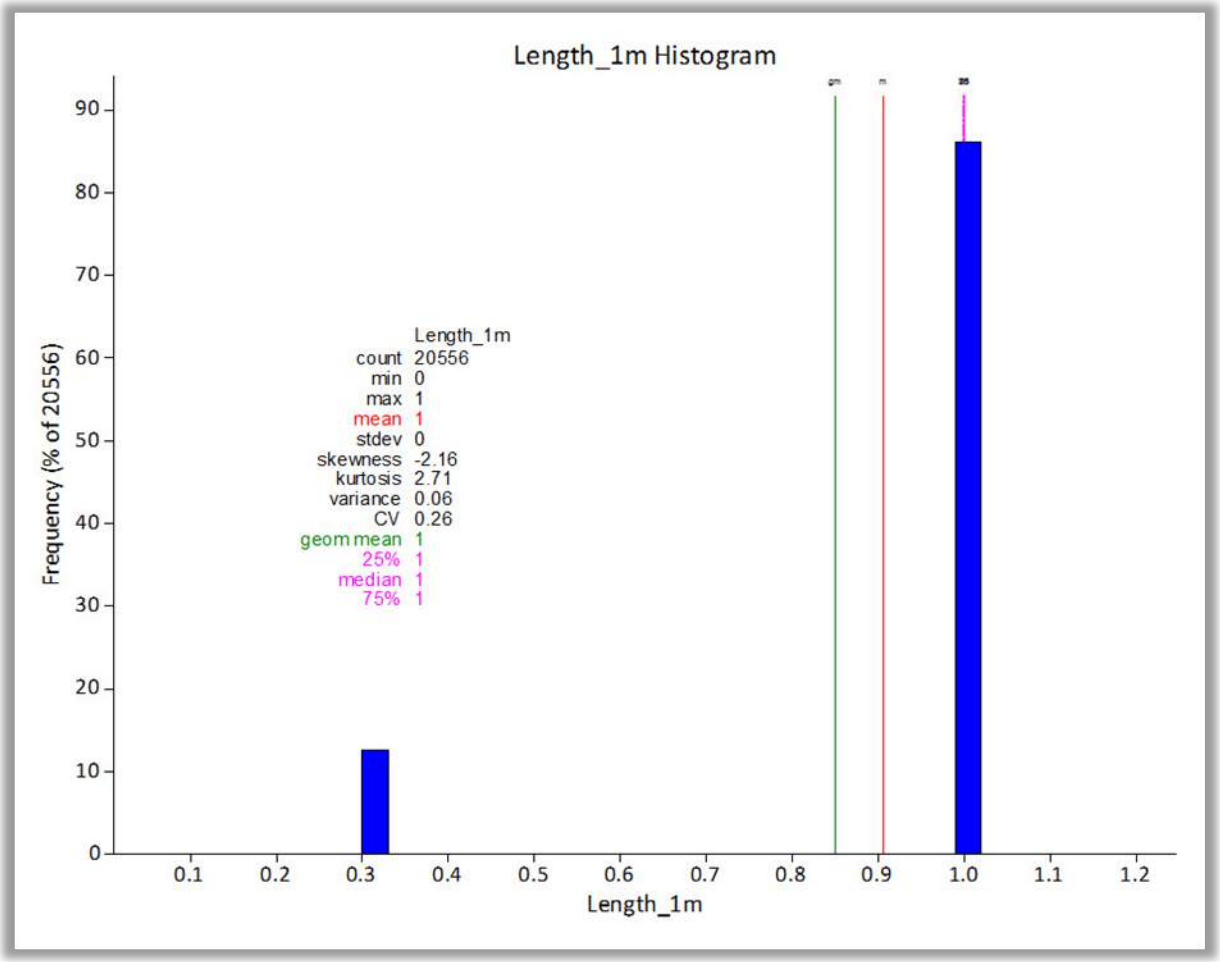


Source: *WSP (2019)*

14.5.3 Compositing

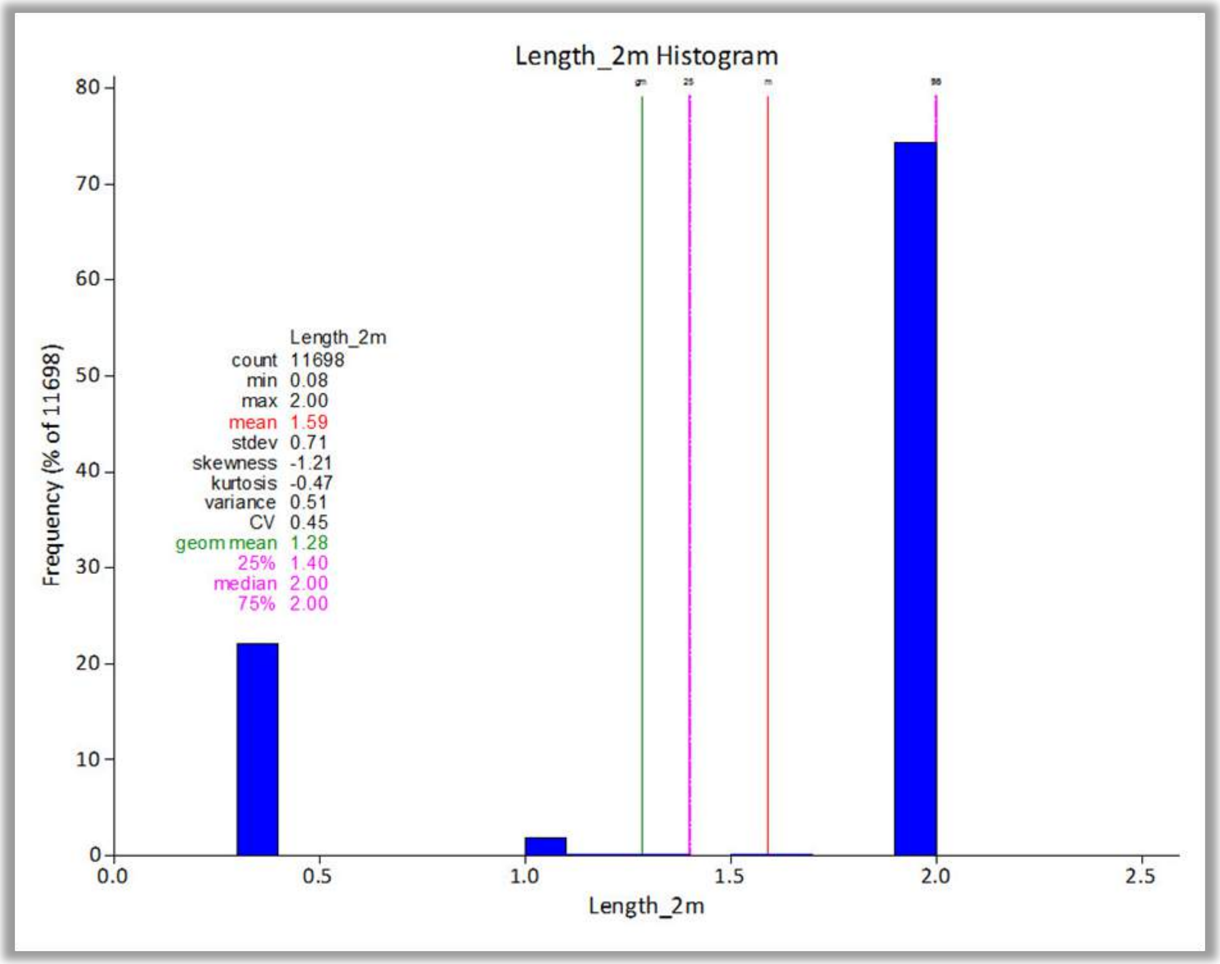
Compositing of all the assay data was completed on various interval lengths from 1 to 5 m honouring the interpretation of the geological wireframes (Figure 14.12 to Figure 14.16).

FIGURE 14.12 RIVER VALLEY 1 M COMPOSITE HISTOGRAM



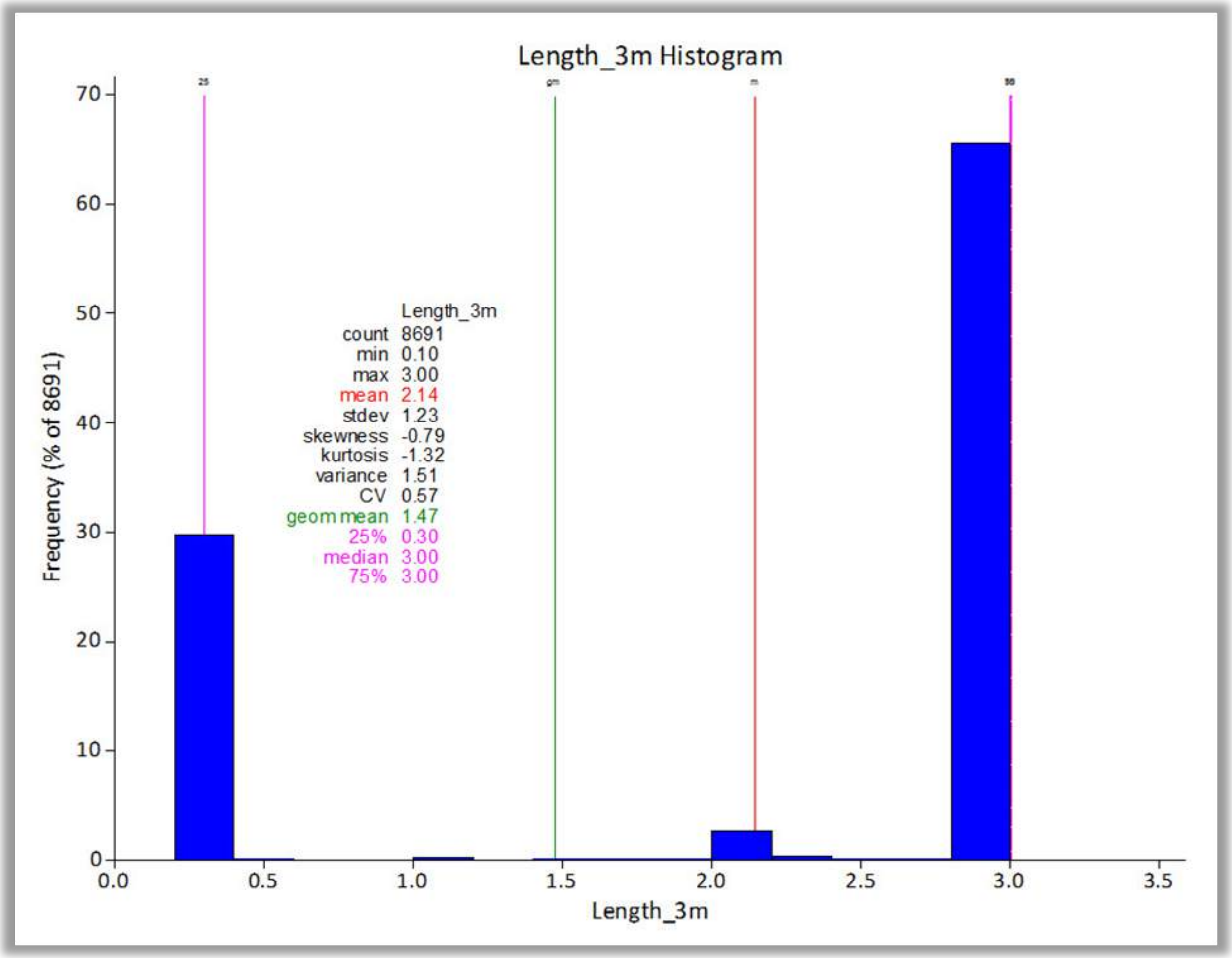
Source: *WSP (2019)*

FIGURE 14.13 RIVER VALLEY 2 M COMPOSITE HISTOGRAM



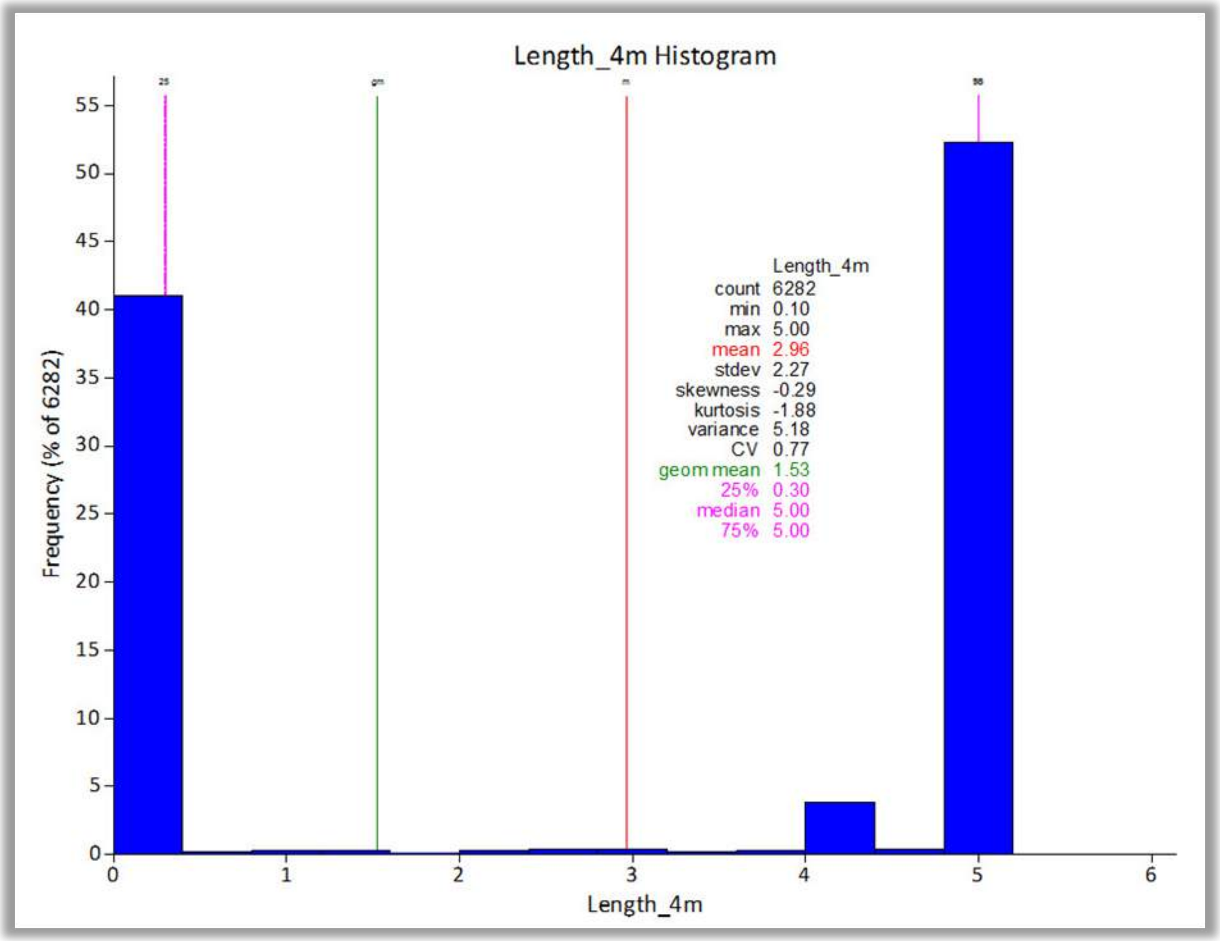
Source: *WSP (2019)*

FIGURE 14.14 RIVER VALLEY 3 M COMPOSITE HISTOGRAM



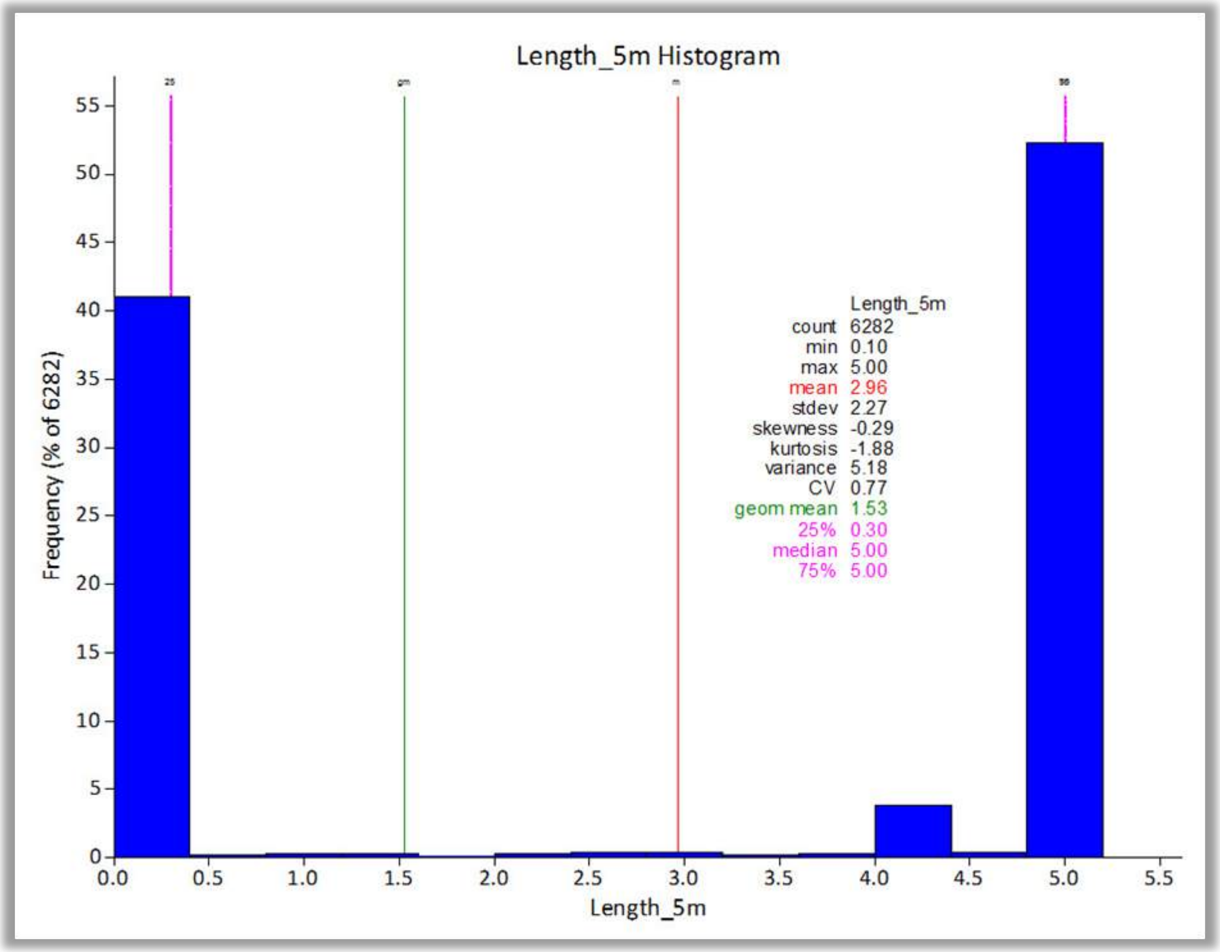
Source: *WSP (2019)*

FIGURE 14.15 RIVER VALLEY 4 M COMPOSITE HISTOGRAM



Source: *WSP (2019)*

FIGURE 14.16 RIVER VALLEY 5 M COMPOSITE HISTOGRAM



Source: *WSP (2019)*

The 2 m composite was selected as it corresponds to approximately one-half the cell widths to be used in the modelling process and displays the most consistent statistics. The back stitching process was used in the compositing routine to ensure all captured sample material was included. The backstitching routine adjusts the composite lengths for each individual drillhole in order to compensate for the last sample interval. The minimum composite length in all runs was set at 0.35 m to allow the small channel samples on surface to remain as individual composites. Table 14.7 summarizes the statistics for the drillholes after compositing.

TABLE 14.7
RIVER VALLEY DRILL HOLE COMPOSITE STATISTICS

Zone	Domain	Field	No of Records	Minimum	Maximum	Mean	Standard Deviation
100	Dana	Au-g/t	11,012	0.001	2.670	0.033	0.052
		Pt-g/t	11,012	0.001	3.904	0.168	0.260
		Pd-g/t	11,012	0.001	12.380	0.435	0.823
		Cu-%	10,998	0.000001	0.563	0.051	0.061
		Ni-%	10,954	0.0004	0.156	0.015	0.013

TABLE 14.7
RIVER VALLEY DRILL HOLE COMPOSITE STATISTICS

Zone	Domain	Field	No of Records	Minimum	Maximum	Mean	Standard Deviation
		Fe-%	5,583	0.340	9.295	2.713	1.110
		Co-ppm	5,583	1.250	160.500	27.956	13.102
		S-%	2,774	0.005	1.590	0.203	0.186
		Rh-ppb	5,394	0.010	384.000	16.095	28.809
		Ag-ppm	5,583	0.100	2.110	0.676	0.384
150	Pine ** ** With composited files from Dana that are inside Pine Zone. Those were considered as part of Pine	Au-g/t	676	0.0005	0.297	0.028	0.043
		Pt-g/t	676	0.0005	1.946	0.162	0.265
		Pd-g/t	676	0.0005	5.869	0.460	0.832
		Cu-%	590	0.00047	0.433	0.052	0.067
		Ni-%	590	0.00001	0.091	0.017	0.012
		Fe-%	416	0.59440	7.811	3.618	1.230
		Co-ppm	416	2.06000	140.100	34.078	14.688
		S-%	416	0.0100	1.806	0.222	0.213
		Rh-ppb					
		Ag-ppm	416	1.00000	2.650	1.015	0.118
200		Au-g/t	6,396	0.000	0.862	0.034	0.049
		Pt-g/t	6,396	0.000	5.475	0.181	0.303
		Pd-g/t	6,396	0.000	14.630	0.504	1.020
		Cu-%	6,396	0.000	0.824	0.041	0.064
		Ni-%	6,396	0.000	0.156	0.010	0.013
		Fe-%	3,296	0.535	7.689	2.473	0.976
		Co-ppm	3,296	3.392	169.489	27.617	14.190
		S-%					
		Rh-ppb	1,200	0.000	343.000	18.356	36.749
		Ag-ppm	3,296	0.100	4.098	0.605	0.463
300		Au-g/t	4,562	0.000	0.384	0.025	0.031
		Pt-g/t	4,562	0.000	5.401	0.141	0.195
		Pd-g/t	4,562	0.000	14.935	0.321	0.536
		Cu-%	4,562	0.000	0.547	0.035	0.049
		Ni-%	4,562	0.000	0.329	0.011	0.014
		Fe-%	1,490	0.275	6.142	1.721	0.776
		Co-ppm	1,490	2.000	98.283	23.720	13.893
		S-%					
		Rh-ppb	187	0.000	160.000	16.544	22.876
		Ag-ppm	1,490	0.100	2.449	0.440	0.359
400		Au-g/t	1,802	0.000	0.346	0.029	0.036
		Pt-g/t	1,802	0.000	6.723	0.177	0.281
		Pd-g/t	1,802	0.001	15.983	0.411	0.753
		Cu-%	1,802	0.000	0.372	0.046	0.055
		Ni-%	1,802	0.000	0.106	0.011	0.013

TABLE 14.7
RIVER VALLEY DRILL HOLE COMPOSITE STATISTICS

Zone	Domain	Field	No of Records	Minimum	Maximum	Mean	Standard Deviation
		Fe-%	328	0.385	4.856	1.545	0.677
		Co-ppm	328	3.000	70.000	20.751	10.765
		S-%					
		Rh-ppb	57	0.000	333.392	31.242	59.673
		Ag-ppm	328	0.100	2.000	0.436	0.306
500		Au-g/t	1,573	0.000	0.429	0.026	0.039
		Pt-g/t	1,573	0.005	2.439	0.147	0.233
		Pd-g/t	1,573	0.000	7.195	0.376	0.638
		Cu-%	1,573	0.002	0.363	0.044	0.041
		Ni-%	1,573	0.001	0.094	0.013	0.009
		Fe-%	590	0.529	6.350	2.116	0.745
		Co-ppm	590	3.500	86.000	19.226	8.374
		S-%					
		Rh-ppb					
		Ag-ppm	590	0.100	3.800	0.292	0.345
600		Au-g/t	1,173	0.000	0.480	0.016	0.025
		Pt-g/t	1,173	0.005	1.679	0.086	0.107
		Pd-g/t	1,173	0.000	2.025	0.191	0.252
		Cu-%	1,173	0.000	0.230	0.029	0.033
		Ni-%	1,173	0.001	0.130	0.020	0.020
		Fe-%	663	0.329	5.305	1.109	0.565
		Co-ppm	663	2.000	86.468	14.898	11.426
		S-%					
		Rh-ppb					
		Ag-ppm	663	0.100	4.625	0.318	0.338
700		Au-g/t	662	0.000	0.236	0.024	0.029
		Pt-g/t	662	0.000	4.115	0.133	0.204
		Pd-g/t	662	0.000	6.750	0.219	0.356
		Cu-%	662	0.000	0.291	0.036	0.054
		Ni-%	662	0.000	0.053	0.007	0.009
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					
800		Au-g/t	561	0.000	0.269	0.018	0.021
		Pt-g/t	561	0.005	0.604	0.089	0.090
		Pd-g/t	561	0.000	2.273	0.259	0.286
		Cu-%	561	0.001	0.348	0.049	0.046
		Ni-%	561	0.000	0.120	0.024	0.018

Table 14.7 **River Valley Drill Hole Composite Statistics**							
Zone	**Domain**	**Field**	**No of Records**	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
		Fe-%	150	0.712	4.179	2.017	0.736
		Co-ppm	150	5.435	306.009	33.411	45.575
		S-%					
		Rh-ppb					
		Ag-ppm	150	0.100	50.100	1.928	5.951
910		Au-g/t	439	0.001	0.490	0.033	0.043
		Pt-g/t	439	0.005	1.766	0.149	0.136
		Pd-g/t	439	0.001	2.495	0.274	0.248
		Cu-%	439	0.001	0.309	0.054	0.046
		Ni-%	439	0.002	0.124	0.027	0.020
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					
920		Au-g/t	419	0.001	0.380	0.041	0.043
		Pt-g/t	419	0.005	2.140	0.172	0.181
		Pd-g/t	419	0.001	2.613	0.195	0.249
		Cu-%	419	0.001	0.221	0.050	0.043
		Ni-%	419	0.001	0.087	0.018	0.013
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					
930		Au-g/t	306	0.001	0.363	0.031	0.035
		Pt-g/t	306	0.005	1.435	0.164	0.176
		Pd-g/t	306	0.001	2.004	0.309	0.341
		Cu-%	306	0.001	0.232	0.042	0.041
		Ni-%	306	0.002	0.457	0.032	0.038
		Fe-%					
		Co-ppm					
		S-%					
		Rh-ppb					
		Ag-ppm					

14.6 SPATIAL ANALYSIS

Variography, using Surpac™ software, was completed for all elements globally for all zones. Downhole variograms were used to determine nugget effect and then correlograms were modelled to determine spatial continuity in the zones.

Table 14.8 summarizes results of the variography, for each of the elements in Dana North and Pine Zones created using Surpac.

The remaining zones are unchanged from the 2012 Technical Report, which used Datamine to create the variograms. Table 14.9 summarizes the Datamine parameters.

TABLE 14.8
SURPAC VARIOGRAM PARAMETERS

Zone	Domain	Field	Nugget	Sill 1st S	Sill 2nd S	Sill 3rd S	Range 1st S	Range 2nd S	Range 3rd S
Dana Pine Zone	100 150	Au-g/t	0.658	0.198	0.145		6.779	50.118	
		Pt-g/t	0.250	0.310	0.440		8.550	61.180	
		Pd-g/t	0.229	0.314	0.458		9.391	62.106	
		Cu-%	0.295	0.625	0.081		13.118	50.061	
		Ni-%	0.295	0.625	0.081		13.118	50.061	
		Fe-%	0.181	0.108	0.449	0.261	16.836	32.101	70.304
		Co-ppm	0.265	0.383	0.258	0.094	13.074	33.295	63.468
		S-%	0.181	0.108	0.449	0.261	16.836	32.101	70.304
		Rh-ppb	0.229	0.314	0.458		9.391	62.106	
		Ag-ppm	0.181	0.108	0.449	0.261	16.836	32.101	70.304
River Valley Extension	910 920 930	Au-g/t	Inverse of distance						
		Pt-g/t							
		Pd-g/t							
		Cu-%							
		Ni-%							
		Fe-%							
		Co-ppm							
		S-%							
		Rh-ppb							
		Ag-ppm							

Note: *S = Structure*

TABLE 14.9 DATAMINE VARIOGRAM PARAMETERS							
Zone	**Domain**	**Field**	**Nugget**	**Sill 1st. S**	**Sill 2nd. S**	**Range 1st. S**	**Range 2nd. S**
Dana South **Lismer** **Lismer Ext** **Varley** **Razor** **Banshee** **Azen**	200 300 400 500 600 700 800	Au-g/t	0.00115	0.00069	0.002	7	90
		Pt-g/t	0.045	0.021	0.045	20	60
		Pd-g/t	0.350	0.370	0.455	23	70
		Cu-%	0.001	0.001	0.003	10	80
		Ni-%	0.00005	0.00006	0.0001	27	100
		Fe-%	50.000	317.666	674.588	3	20
		Co-ppm	150.000	82.839	90.547	14	60
		S-%	0.016	0.008	0.019	10	20
		Rh-ppb	325.000	77.993	642.480	13	30
		Ag-ppm	0.420	0.284		10	

Note: *S = Structure*

14.7 UPDATED MINERAL RESOURCE ESTIMATE BLOCK MODEL

Individual block models were established in Surpac™ for each of the nine zones using one parent model as the origin. The model was not rotated. Drill hole spacing is variable with the majority of the surface drilling spaced at 25 m sections and 25 to 75 m on sections. A block size of 2.5 m x 5 m x 2.5 m was selected in order to accommodate the nature of the mineralization and be amenable for the open pit potential. The final block model is an integration between Dana North/Pine with Dana South, Banshee, Lismer, Lismer-Ext, Varley, Azen and Razor, which were created in Datamine™ Studio (v. 3.19.3638.0).

Table 14.10 summarizes details of the parent block model.

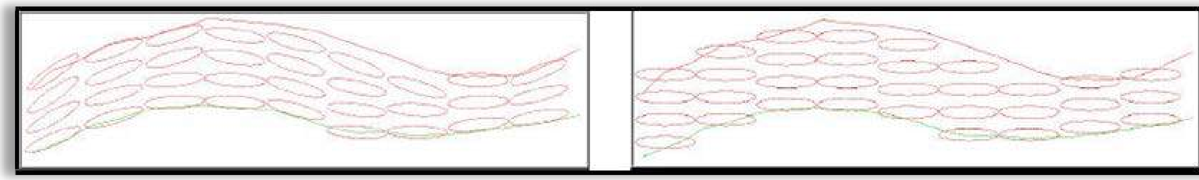
TABLE 14.10 PARENT MODEL PARAMETERS	
Parameter	**Value**
Minimum X Coordinate	555,120
Minimum Y Coordinate	5,163,470
Minimum Z Coordinate	-160
Maximum X Coordinate	566,000
Maximum Y Coordinate	5,172,940
Maximum Z Coordinate	335
Block Size (m)	2.5 x 5 x 2.5
Rotation	0
Sub-block	none
Total No. Blocks	1,632,052,224

14.7.1 Dynamic Anisotropy

Due to the curved nature of the wireframes and the distribution of the mineralization within the zones, a single search ellipse would not be practical and would result in the smearing of grades in a direction that does not represent the true nature of the mineralization.

Dynamic anisotropy is an option in Surpac™ that allows the anisotropy rotation angles that define search volumes and variogram models to be defined individually for each cell in the model, thus allowing the search volume to be precisely oriented to follow the trend of the mineralization. Figure 14.17 is an example of how the orientation of the search ellipse will vary across the mineralized zone using dynamic anisotropy search compared an anisotropic search.

FIGURE 14.17 DYNAMIC ANISOTROPY EXAMPLE



Source: *WSP (2019)*

14.7.2 Estimation Criteria

The interpolations of the zones were completed using the estimation methods nearest neighbour ("NN"), inverse distance squared ("ID^2"), and ordinary kriging ("OK"). The estimations were designed for three passes. In each pass, a minimum and maximum number of samples were required as well as a maximum number of samples from a drillhole in order to satisfy the estimation criteria. Table 14.11 to Table 14.13 summarize the interpolation criteria for the zones.

TABLE 14.11
ESTIMATION CRITERIA

Zone	Estimation Pass No.	Search Ellipse Factor	Minimum No. of Composites	Maximum No. of Composites	Maximum No. of Composites per Drillhole
Dana	1	0.5	6	15	5
	2	1	5	15	4
	3	1.5	4	15	3
	4	2	3	15	2
Pine Zone	1	0.5	6	15	5
	2	1	5	15	4
	3	1.5	4	15	3
	4	2	3	15	2
River Valley Extension 1	1	0.5	6	15	5

TABLE 14.11 ESTIMATION CRITERIA					
Zone	**Estimation Pass No.**	**Search Ellipse Factor**	**Minimum No. of Composites**	**Maximum No. of Composites**	**Maximum No. of Composites per Drillhole**
	2	1	5	15	4
	3	1.5	4	15	3
	4	2	3	15	3
River Valley Extension 2	1	0.5	6	15	5
	2	1	5	15	4
	3	1.5	4	15	3
	4	2	3	15	3
River Valley Extension 3	1	0.5	6	15	5
	2	1	5	15	4
	3	1.5	4	15	3
	4	2	3	15	3

TABLE 14.12
SURPAC™ SEARCH CRITERIA

Zone	Domain	Elements	Azimuth	Plunge	Dip	Major Axis (m)	Semi-Major Axis (m)	Minor Axis (m)	Anisotropy Ratio	
									Major / Semi-Major	Major / Minor
Dana Pine River Valley Extension	100 150 910 920 930	Au-g/t	243.68	-74.21	19.98	32.10	14.29	8.83	2.25	3.64
		Pt-g/t	259.27	-72.04	34.97	61.18	20.28	26.53	3.02	2.31
		Pd-g/t	259.27	-72.04	34.97	62.11	26.91	20.61	2.31	3.01
		Cu-%	243.68	-74.21	19.98	50.06	25.59	18.58	1.96	2.70
		Ni-%	243.68	-74.21	19.98	50.06	25.60	18.57	1.96	2.70
		Fe-%	243.68	-74.21	19.98	32.10	14.29	8.83	2.25	3.64
		Co-ppm	301.53	-69.41	75.03	33.30	13.71	9.51	2.43	3.50
		S-%	243.68	-74.21	19.98	32.10	14.29	8.83	2.25	3.64
		Rh-ppb	259.27	-72.04	34.97	62.11	26.91	20.61	2.31	3.01
		Ag-ppm	243.68	-74.21	19.98	32.10	14.29	8.83	2.25	3.64

TABLE 14.13
DATAMINE SEARCH ELLIPSE CRITERIA

Domain	Elements	Nugget			First Structure (m)			Second Structure (m)		
		Z Rotation	Y Rotation	X Rotation	Along Strike (Y)	Down Dip (Z)	Across Strike (X)	Along Strike (Y)	Down Dip (Z)	Across Strike (X)
200 300 400 500 600 700 800	Au-g/t	30	-60	90	7	21	11	90	100	70
	Pt-g/t	30	-60	90	20	20	5	60	50	40
	Pd-g/t	30	-60	90	23	22	17	70	110	60
	Cu-%	210	-30	90	14	8	20	60	70	60
	Ni-%	30	-60	90	27	12	5	100	110	57
	Fe-%	0	0	0	3	3	3	20	20	20
	Co-ppm	-60	0	120	14	8	20	60	70	60
	S-%	210	-30	90	10	7	72	20	40	31
	Rh-ppb	210	-30	90	13	13	5	30	45	20
	Ag-ppm	0	0	0	10	10	10	0	0	0

14.8 MINERAL RESOURCE CLASSIFICATION

Several factors are considered in the definition of a Mineral Resource classification:

- NI 43-101 requirements;
- Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") guidelines;
- The authors' experience with magmatic PGE-nickel deposits;
- Spatial continuity based on variography of the assays within the drill holes;
- Drill holes spacing and estimation runs required to estimate the grades in a block.

No new drilling has taken place in Dana South, Lismer, Lismer-Ext, Varley, Razor, Banshee, and Azen. The materials included in the Updated Mineral Resource Estimate are based on the 2012 Mineral Resource Estimate block model that remains valid.

Dana North and Pine follow the rule for their classification.

- Variographic pass:
  - 1st pass: 50% of the size of the search ellipsoid for each interpolated element;
  - 2nd pass: 100% of the size of the search ellipsoid for each interpolated element;
  - 3rd pass: 150% of the size of the search ellipsoid for each interpolated element;
  - 4th pass: 200% of the size of the search ellipsoid for each interpolated element.

- Measured Mineral Resource (Code 1):
  - blocks with Palladium Equivalent grade (Pd_Eq) > 0;
  - minimum of 6 samples used for interpolation;
  - only blocks in the 1st and 2nd pass.

- Indicated Mineral Resource (Code 2):
  - blocks with Pd_Eq > 0;
  - blocks not previously classified as "Code 1";
  - all blocks included in the 3rd pass;
  - all remaining blocks from 1st and 2nd pass not classified as "Code 1";
  - blocks not included in the 4th pass.

- Inferred Mineral Resource (Code 3):
  - blocks not previously classified as "Code 1" or "Code 2";
  - all remaining blocks with Pd_Eq > 0.

Due to the nature of the data, the River Valley Extension is considered an Inferred Mineral Resource.

No environmental, permitting, legal, title, taxation, socio-economic, marketing, or other relevant issues are known to WSP that may affect the Mineral Resource Estimate. Mineral Reserves can only be estimated on the basis of an economic evaluation that is used in a Pre-Feasibility Study or a Feasibility Study of a mineral project; thus, no Mineral Reserves have been estimated. As per NI 43-101, Mineral Resources, which are not Mineral Reserves, do not have to demonstrate economic viability.

14.9 UPDATED MINERAL RESOURCE TABULATION

The Updated Mineral Resource Estimate reported as of June 27, 2019 has been tabulated in terms of a PdEq cut-off grade. Mineral Resources are stated as all blocks above the cut-off grade.

In order to evaluate the potentially economic open pit mineralization at River Valley, a pit optimization was undertaken. Measured, Indicated and Inferred Mineral Resources are reported within this conceptual constraining pit shell. The parameters in Table 14.14 were used to justify the cut-off grades 0.35 g/t PdEq for the potential open pit and 2.00 g/t PdEq for the potential underground that determines the potentially economic portions of the mineralization.

Table 14.15 is a breakdown of the Updated Mineral Resource Estimate by classification for the potential open pit Mineral Resource and potential underground Mineral Resource. Table 14.16 is the contained metals by Mineral Resource classification. Table 14.17 is a breakdown of the Updated Mineral Resource Estimate by zone and classification for the potential open pit Mineral Resource. Table 14.18 is a breakdown of the Updated Mineral Resource Estimate by zone and classification for the potential underground Mineral Resource.

TABLE 14.14
POTENTIAL MINING PARAMETERS

Mine	PdEq Price (US$/oz)	Exchange Rate US$:C$	PdEq Recovery (%)	Smelter Payable (%)	Mining Cost ($/t mined)	Process Cost ($/t processed)	G&A Cost ($/t processed)	Pit Slope Angle (degree)	PdEq Cut-off (g/t)
Open Pit	950	0.77	85	90	2.00	10.20	1.25	50	0.35
Underground	950	0.77	85	90	40.00	18.00	2.75	N/A	2.00

TABLE 14.15
RIVER VALLEY UPDATED MINERAL RESOURCE ESTIMATE
(USING 0.35 G/T PDEQ AND 2.00 G/T PDEQ CUT-OFF)

Classification	PdEq Cut-off (g/t)	Tonnes	Pd (g/t)	Pt (g/t)	Rh (g/t)	Au (g/t)	Cu (%)	Ni (%)	Co (%)	PdEq (g/t)
Measured	0.35	56,025,400	0.54	0.20	0.013	0.03	0.06	0.02	0.006	0.94
	2.00	71,300	2.33	0.75	0.036	0.09	0.12	0.02	0.002	3.38
	0.35+2.00	**56,096,700**	**0.54**	**0.20**	**0.013**	**0.03**	**0.06**	**0.02**	**0.006**	**0.94**
Indicated	0.35	43,153,300	0.49	0.19	0.003	0.03	0.05	0.02	0.006	0.84
	2.00	5,200	2.23	0.60	0.003	0.11	0.03	0.04	0.000	3.20
	0.35+2.00	**43,158,500**	**0.49**	**0.19**	**0.003**	**0.03**	**0.05**	**0.02**	**0.006**	**0.84**
Meas +Ind	0.35	99,178,700	0.52	0.20	0.009	0.03	0.06	0.02	0.006	0.90
	2.00	76,500	2.32	0.74	0.034	0.09	0.11	0.02	0.002	3.37
	0.35+2.00	**99,255,200**	**0.52**	**0.20**	**0.009**	**0.03**	**0.06**	**0.02**	**0.006**	**0.90**
Inferred	0.35	52,306,000	0.31	0.15	0.012	0.04	0.04	0.02	0.001	0.63
	2.00	-	-	-	-	-	-	-	-	-
	0.35+2.00	**52,306,000**	**0.31**	**0.15**	**0.012**	**0.04**	**0.04**	**0.02**	**0.001**	**0.63**

TABLE 14.16
RIVER VALLEY UPDATED MINERAL RESOURCE ESTIMATE IN SITU METALS
(USING 0.35 G/T PDEQ AND 2.00 G/T PDEQ CUT-OFF)

Classification	PGE + Au (koz)	Pd (koz)	Pt (koz)	Au (koz)	Rh (koz)	PdEq (koz)	Cu (Mlbs)	Ni (Mlbs)	Co (Mlbs)
Measured	1,394	983	362	49	23	1,701	74.2	24.7	7.4
Indicated	983	678	264	42	43	1,166	47.5	19.0	5.7
Meas +Ind	2,377	1,661	626	91	28	2,867	121.7	43.7	13.1
Inferred	841	521	252	67	20	1,059	46.1	23.0	1.2

TABLE 14.17 RIVER VALLEY PIT CONSTRAINED UPDATED MINERAL RESOURCE ESTIMATE (USING 0.35 G/T PDEQ CUT-OFF)									
Zone	**k Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Measured Mineral Resource									
Dana N/Pine	26,745	0.57	0.22	0.04	0.07	0.02	0.002	0.020	1.00
Dana S	10,084	0.76	0.25	0.04	0.07	0.02	0.003	0.014	1.22
Lismer	19,197	0.39	0.16	0.02	0.04	0.03	0.013	0.003	0.70
Lismer Ext									
Varley									
Razor									
Banshee									
Azen									
River Valley Ext									
Total	**56,025**	**0.54**	**0.20**	**0.03**	**0.06**	**0.02**	**0.006**	**0.013**	**0.94**
Indicated Mineral Resource									
Dana N/Pine	1,137	0.48	0.23	0.02	0.06	0.02	0.001	0.011	0.86
Dana S	540	0.43	0.17	0.03	0.05	0.01	0.011	0.009	0.73
Lismer	10,191	0.46	0.18	0.04	0.05	0.02	0.003	0.008	0.82
Lismer Ext	14,646	0.52	0.21	0.01	0.06	0.03	0.014	0.002	0.89
Varley	16,639	0.49	0.19	0.03	0.05	0.01	0.002	0.000	0.81
Razor									
Banshee									
Azen									
River Valley Ext									
Total	**43,153**	**0.49**	**0.19**	**0.03**	**0.05**	**0.02**	**0.006**	**0.003**	**0.84**
Measured & Indicated Mineral Resource									
Dana N/Pine	27,883	0.57	0.22	0.04	0.07	0.02	0.002	0.020	1.00
Dana S	10,624	0.74	0.25	0.04	0.07	0.02	0.003	0.013	1.20
Lismer	29,388	0.41	0.17	0.02	0.05	0.02	0.010	0.004	0.74
Lismer Ext	14,646	0.52	0.21	0.01	0.06	0.03	0.014	0.002	0.89
Varley	16,639	0.49	0.19	0.03	0.05	0.01	0.002	0.000	0.81
Razor									
Banshee									
Azen									
River Valley Ext									
Total	**99,179**	**0.52**	**0.20**	**0.03**	**0.06**	**0.02**	**0.006**	**0.008**	**0.90**
Inferred Mineral Resource									
Dana N/Pine	139	0.40	0.20	0.00	0.03	0.01	0.000	0.003	0.66

TABLE 14.17 RIVER VALLEY PIT CONSTRAINED UPDATED MINERAL RESOURCE ESTIMATE (USING 0.35 G/T PDEQ CUT-OFF)									
Zone	**k Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Dana S	1	0.36	0.06	0.00	0.03	0.01	0.000	0.006	0.50
Lismer	103	0.32	0.09	0.02	0.05	0.02	0.003	0.000	0.57
Lismer Ext									
Varley									
Razor	10,957	0.36	0.15	0.03	0.05	0.03	0.001		0.70
Banshee	3,359	0.29	0.17	0.03	0.04	0.01	0.000		0.55
Azen	17,566	0.30	0.10	0.02	0.05	0.03	0.003		0.59
River Valley Ext	20,181	0.31	0.18	0.06	0.03	0.00	0.000	0.031	0.65
Total	**52,306**	**0.31**	**0.15**	**0.04**	**0.04**	**0.02**	**0.001**	**0.012**	**0.63**

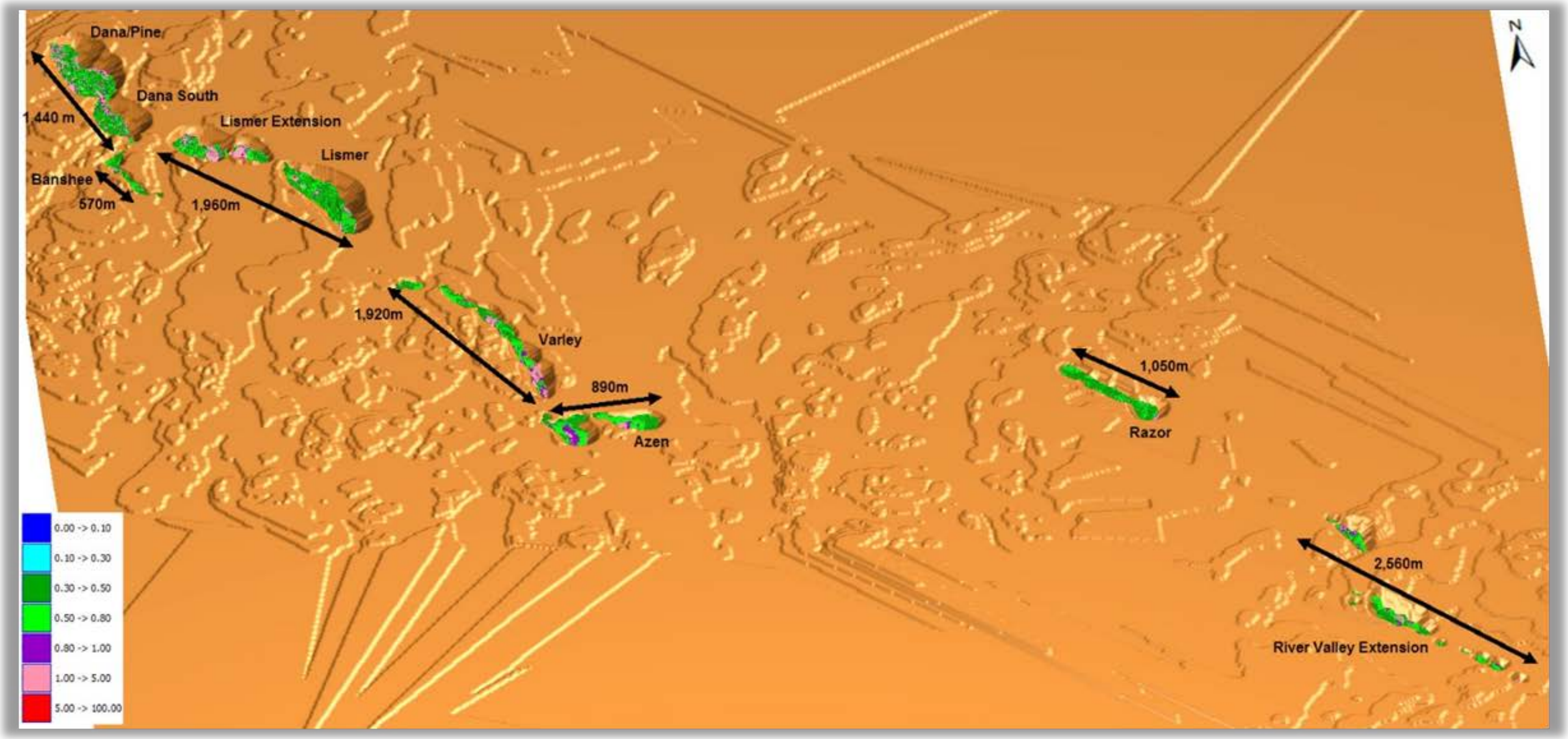
TABLE 14.18 RIVER VALLEY UNDERGROUND UPDATED MINERAL RESOURCE ESTIMATE (USING 2.00 G/T PDEQ CUT-OFF)									
Zone	**k Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
Measured Mineral Resource									
Dana N/Pine	13	2.14	0.67	0.09	0.19	0.04	0.001	0.021	3.23
Dana S	58	2.37	0.77	0.09	0.10	0.02	0.002	0.040	3.41
Lismer									
Lismer Ext									
Varley									
Razor									
Banshee									
Azen									
River Valley Ext									
Total	**71**	**2.33**	**0.75**	**0.09**	**0.12**	**0.02**	**0.002**	**0.036**	**3.38**
Indicated Mineral Resource									
Dana N/Pine	0.5	2.56	0.53		0.21	0.04		0.029	3.46
Dana S	0.5	2.60	0.84	0.02	0.02	0.01	0.002	0.019	3.44
Lismer									
Lismer Ext	4	2.17	0.58	0.13	0.02	0.04			3.15
Varley									
Razor									
Banshee									
Azen									

TABLE 14.18 RIVER VALLEY UNDERGROUND UPDATED MINERAL RESOURCE ESTIMATE (USING 2.00 G/T PDEQ CUT-OFF)									
Zone	**k Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**Rh (g/t)**	**PdEq (g/t)**
River Valley Ext									
Total	**5**	**2.23**	**0.60**	**0.11**	**0.03**	**0.04**	**0.000**	**0.004**	**3.20**
Measured & Indicated Mineral Resource									
Dana N/Pine	14	2.15	0.67	0.09	0.19	0.04	0.001	0.021	3.24
Dana S	59	2.37	0.77	0.09	0.10	0.02	0.002	0.040	3.41
Lismer									
Lismer Ext	4	2.17	0.58	0.13	0.02	0.04	0.000	0.000	3.15
Varley									
Razor									
Banshee									
Azen									
River Valley Ext									
Total	**77**	**2.32**	**0.74**	**0.09**	**0.11**	**0.02**	**0.002**	**0.034**	**3.36**

Figure 14.18 is an inclined plan view of the pit shells generated at River Valley. The approximate strike length of each of the pits is provided to demonstrate the size of the potential Mineral Resource. The blocks displayed inside the pits are greater than 0.35 g/t PdEq.

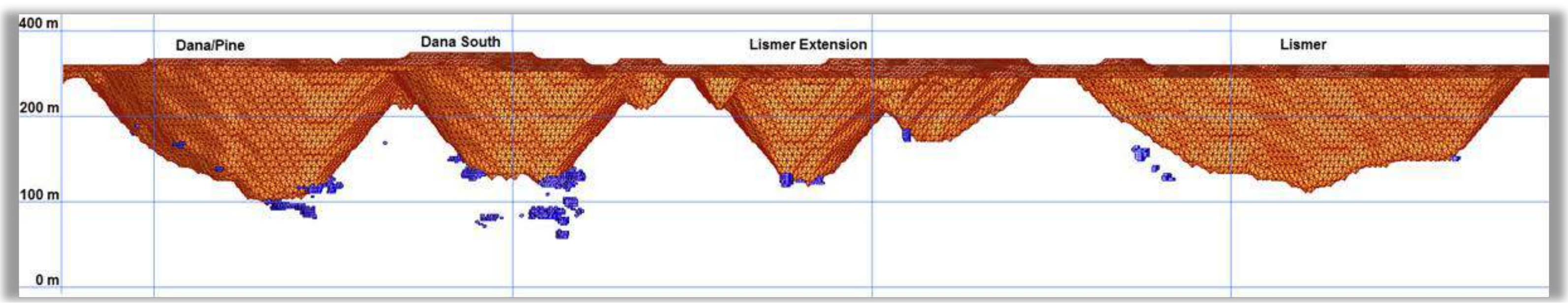
Figure 14.19 is a longitudinal projection displaying the pit shells and the underground Mineral Resource blocks above 2.0 g/t PdEq. All the potential underground Mineral Resources are in close proximity to the bottom of the open pits and can easily be accessed from a portal located near the pit bottoms.

FIGURE 14.18 RIVER VALLEY PIT SHELLS (INCLINED VIEW – NOT TO SCALE)



Source: *WSP (2019)*

FIGURE 14.19 RIVER VALLEY UNDERGROUND MINERAL RESOURCES (LOOKING NORTHEAST)



Source: *WSP (2019)*

14.10 VALIDATION

The River Valley model was validated by three methods:

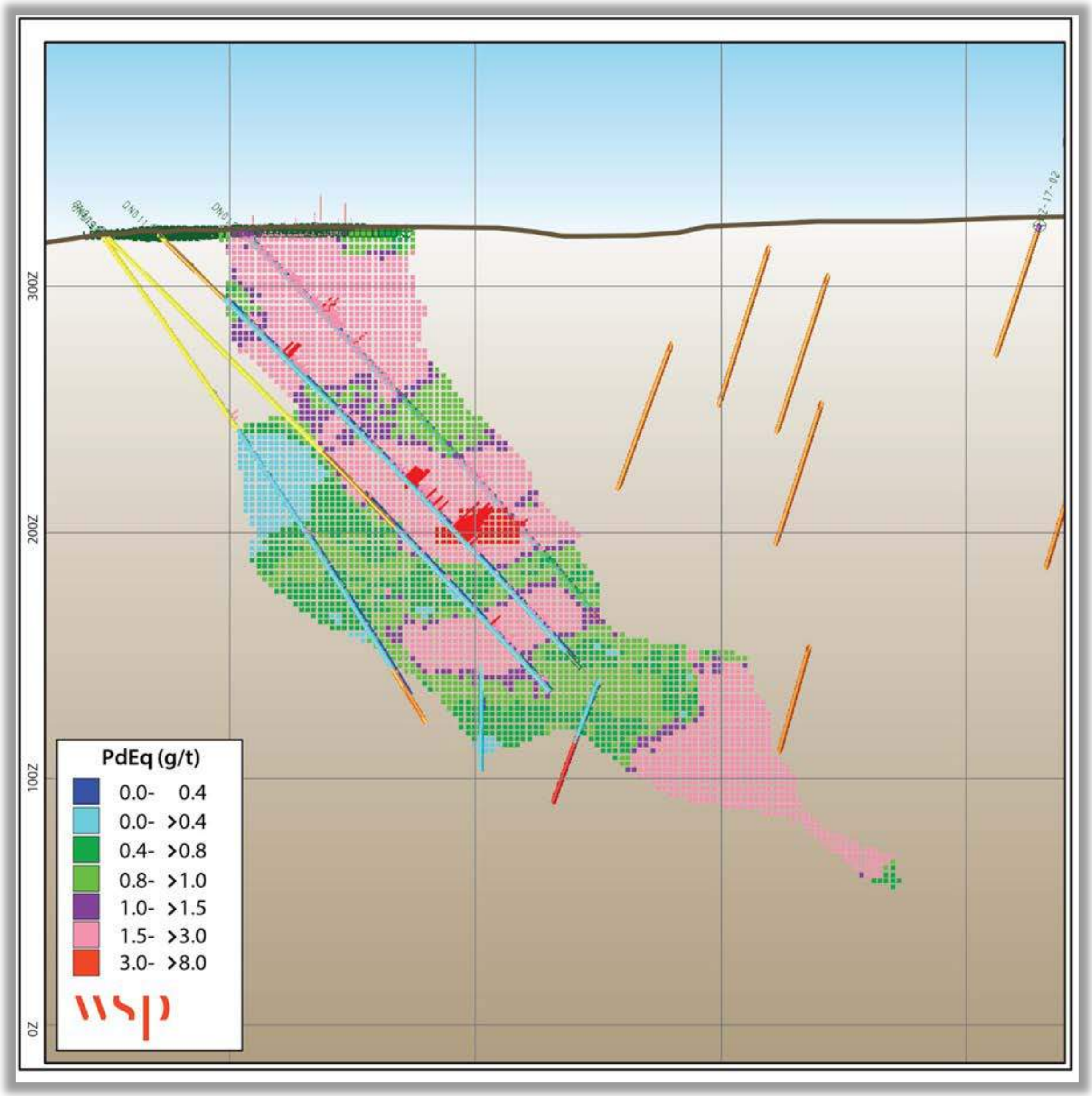
- Visual comparison of colour-coded block model grades with composite grades on section and plan.
- Comparison of the global mean block grades for OK, ID^2, NN, and composites.
- Swath plots of the various zones in both plan and section views.

14.10.1 Visual Validation

The visual comparisons of the block model grades with composite grades for each of the zones show a reasonable correlation between the values. No significant discrepancies were apparent from the sections reviewed, yet grade smoothing is apparent in some locations due to the distance between drill samples being broader in some regions.

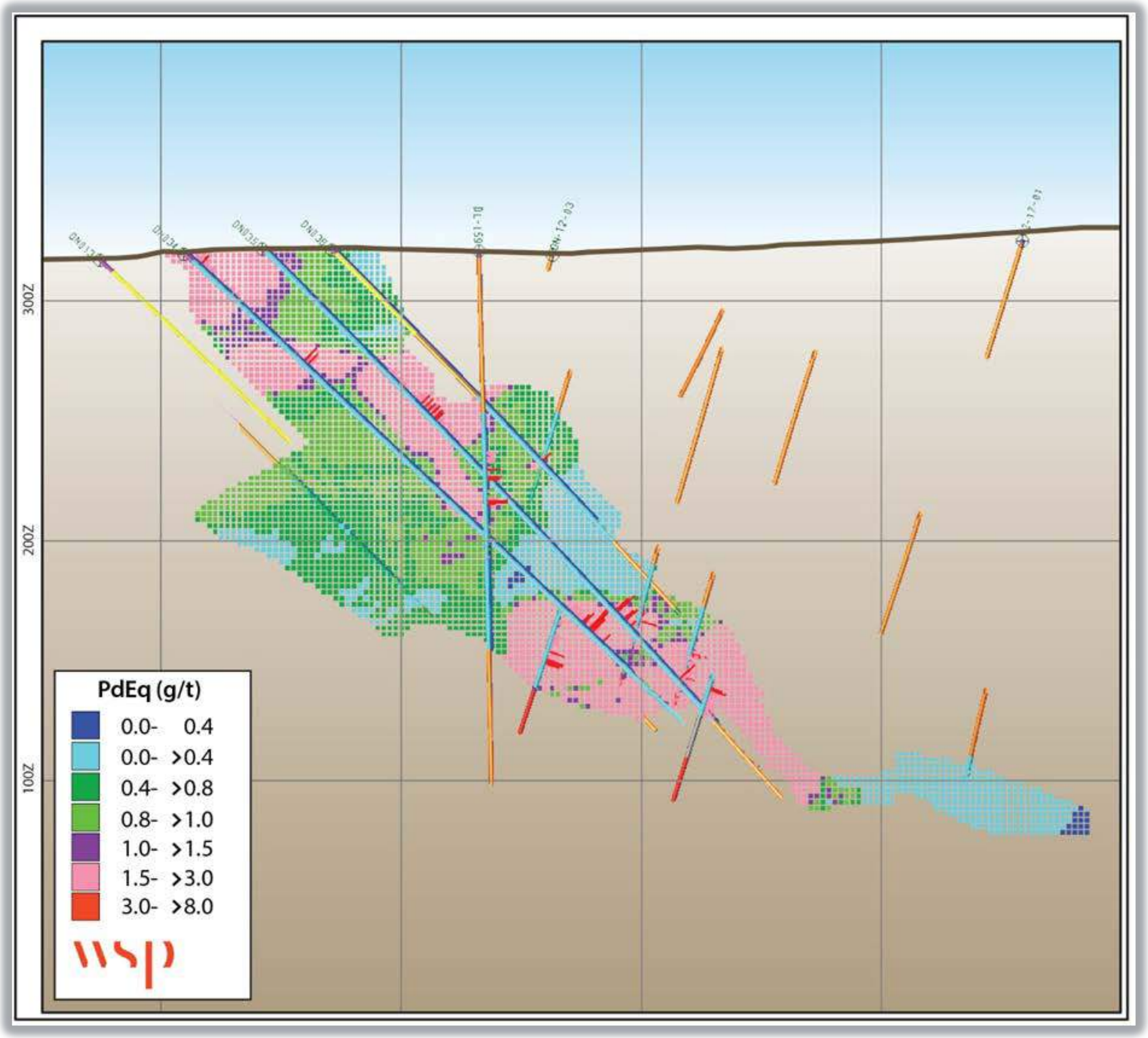
Figure 14.20 to Figure 14.30 display the comparison between the block model and the composited drill holes.

FIGURE 14.20 DANA NORTH – PINE MODEL VS. DIAMOND DRILL HOLE COMPARISON – SECTION 250



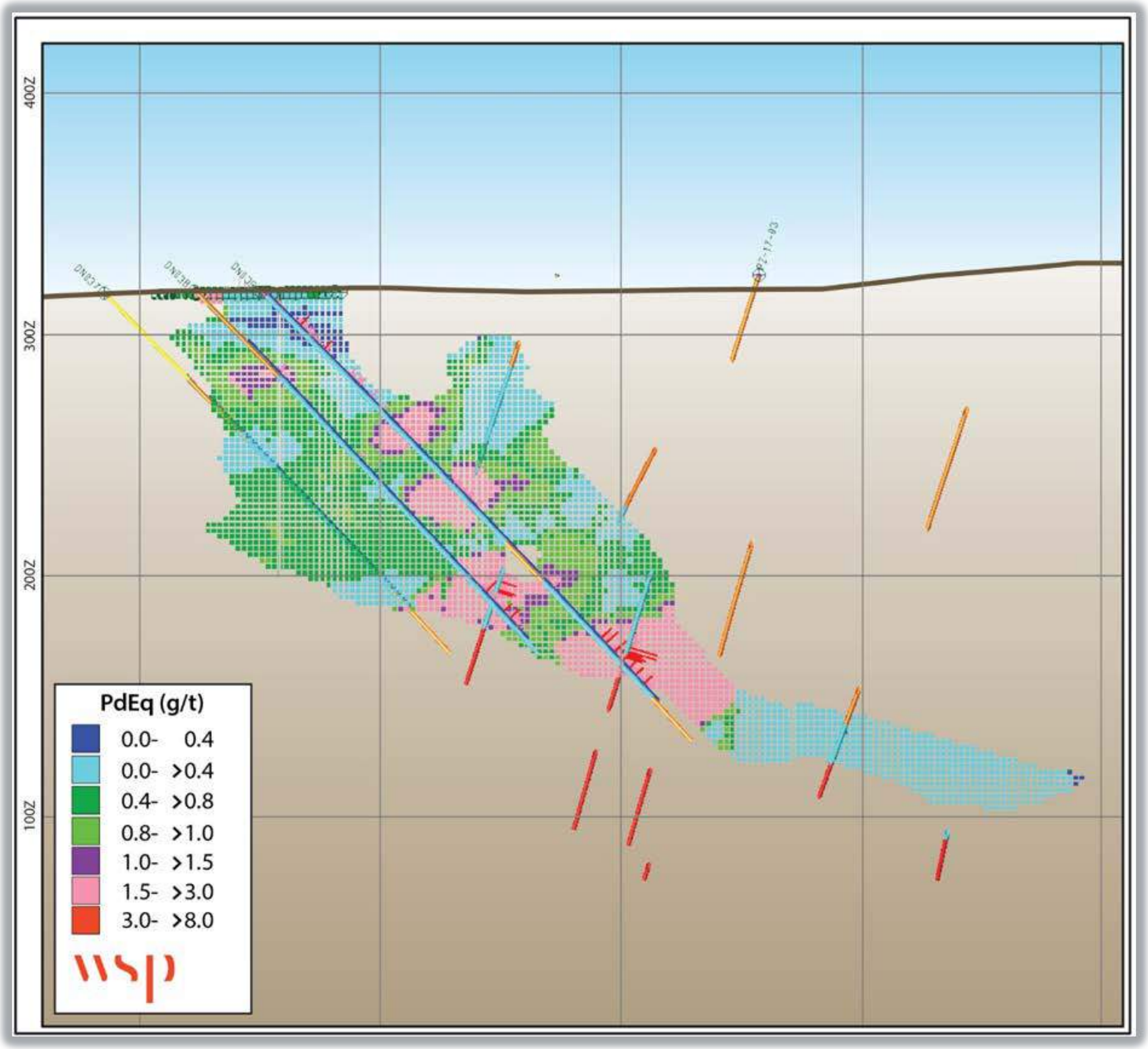
Source: *WSP (2019)*

FIGURE 14.21 DANA NORTH – PINE MODEL VS. DIAMOND DRILL HOLE COMPARISON – SECTION 270



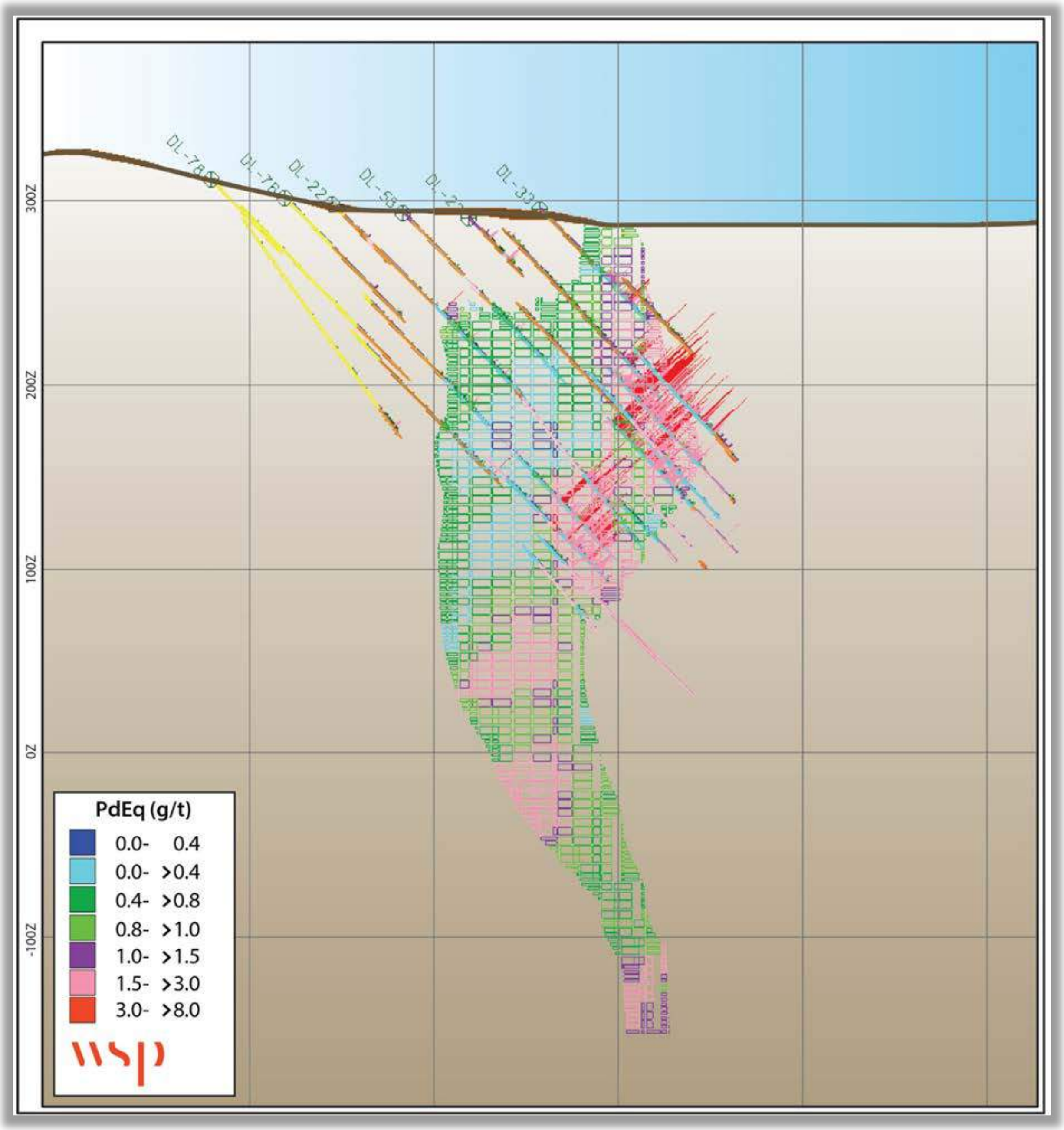
Source: *WSP (2019)*

FIGURE 14.22 DANA NORTH – PINE MODEL VS. DIAMOND DRILL HOLE COMPARISON – SECTION 290



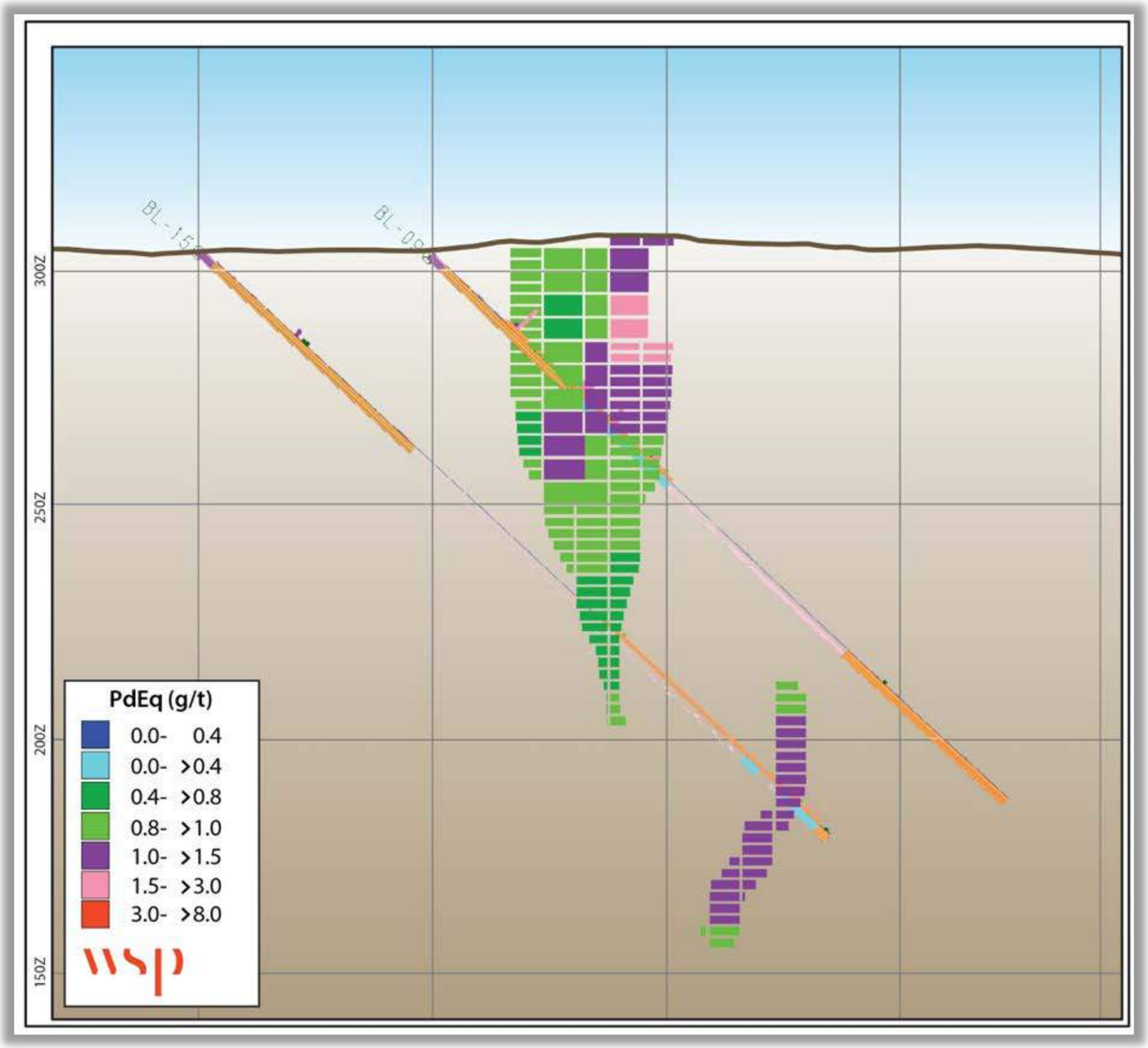
Source: *WSP (2019)*

FIGURE 14.23 DANA SOUTH MODEL VS. DIAMOND DRILL HOLE COMPARISON



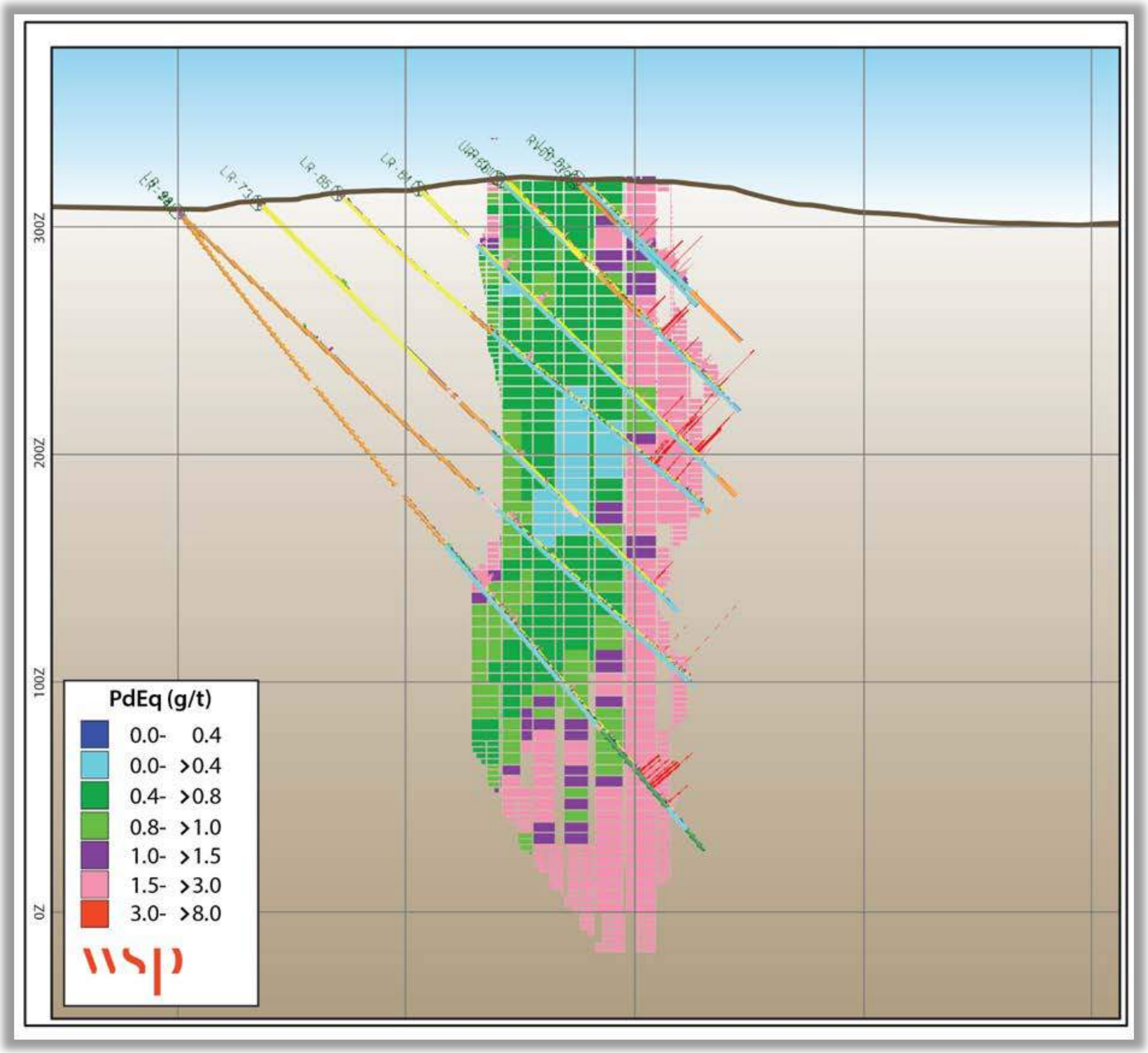
Source: *WSP (2019)*

FIGURE 14.24 BANSHEE MODEL VS. DIAMOND DRILL HOLE COMPARISON



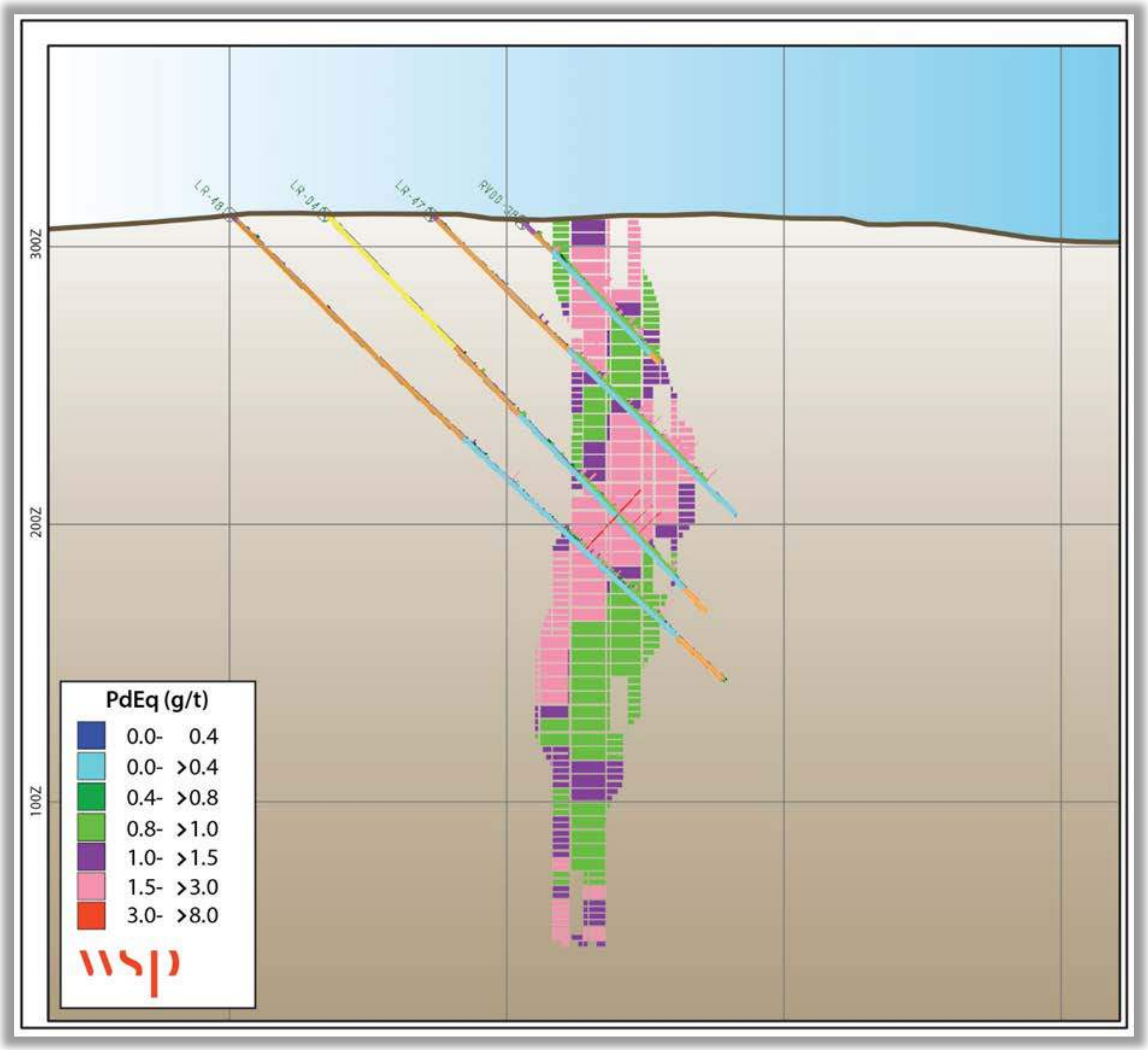
Source: *WSP (2019)*

FIGURE 14.25 LISMER MODEL VS. DIAMOND DRILL HOLE COMPARISON



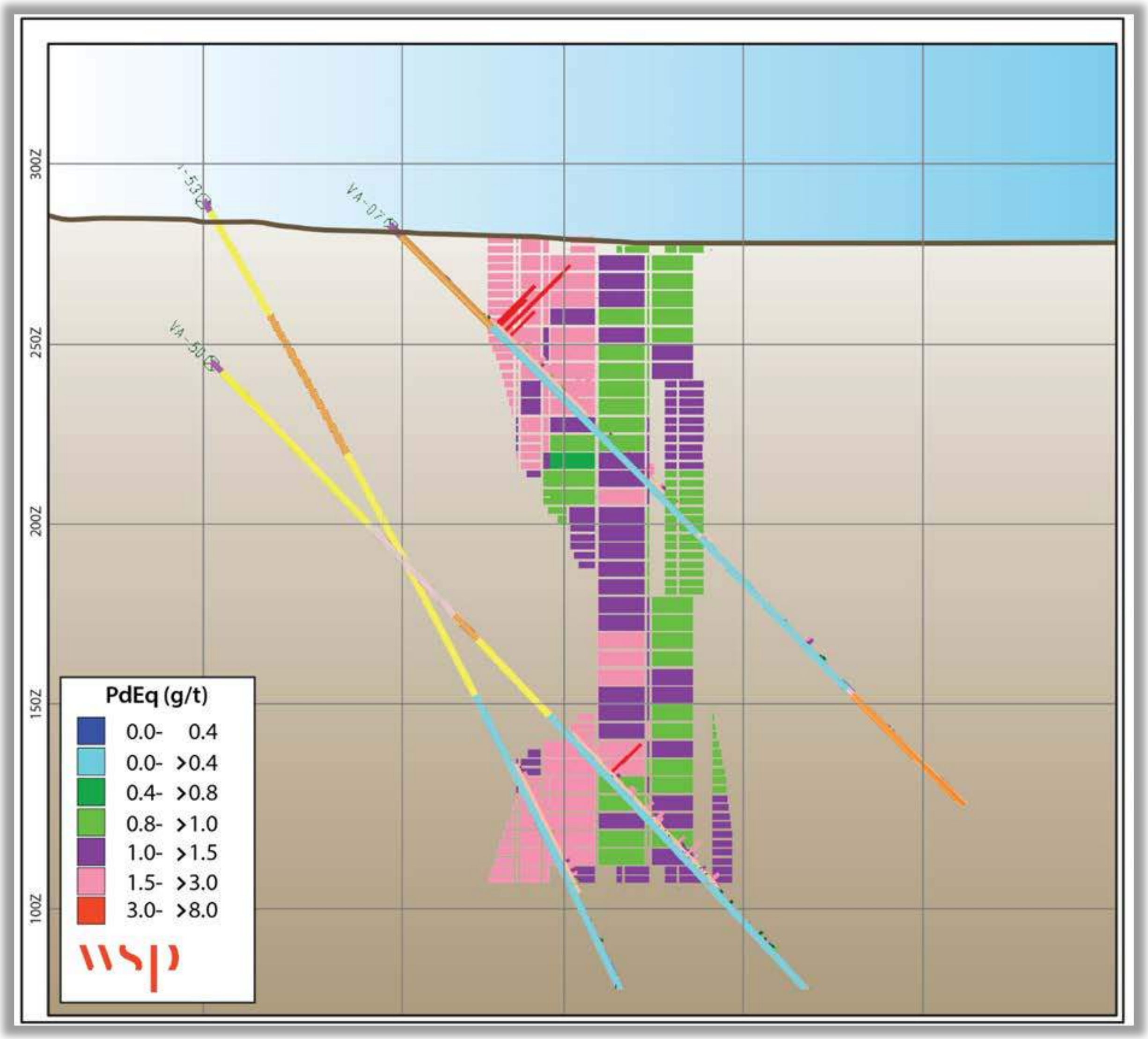
Source: *WSP (2019)*

FIGURE 14.26 LISMER EXTENSION MODEL VS. DIAMOND DRILL HOLE COMPARISON



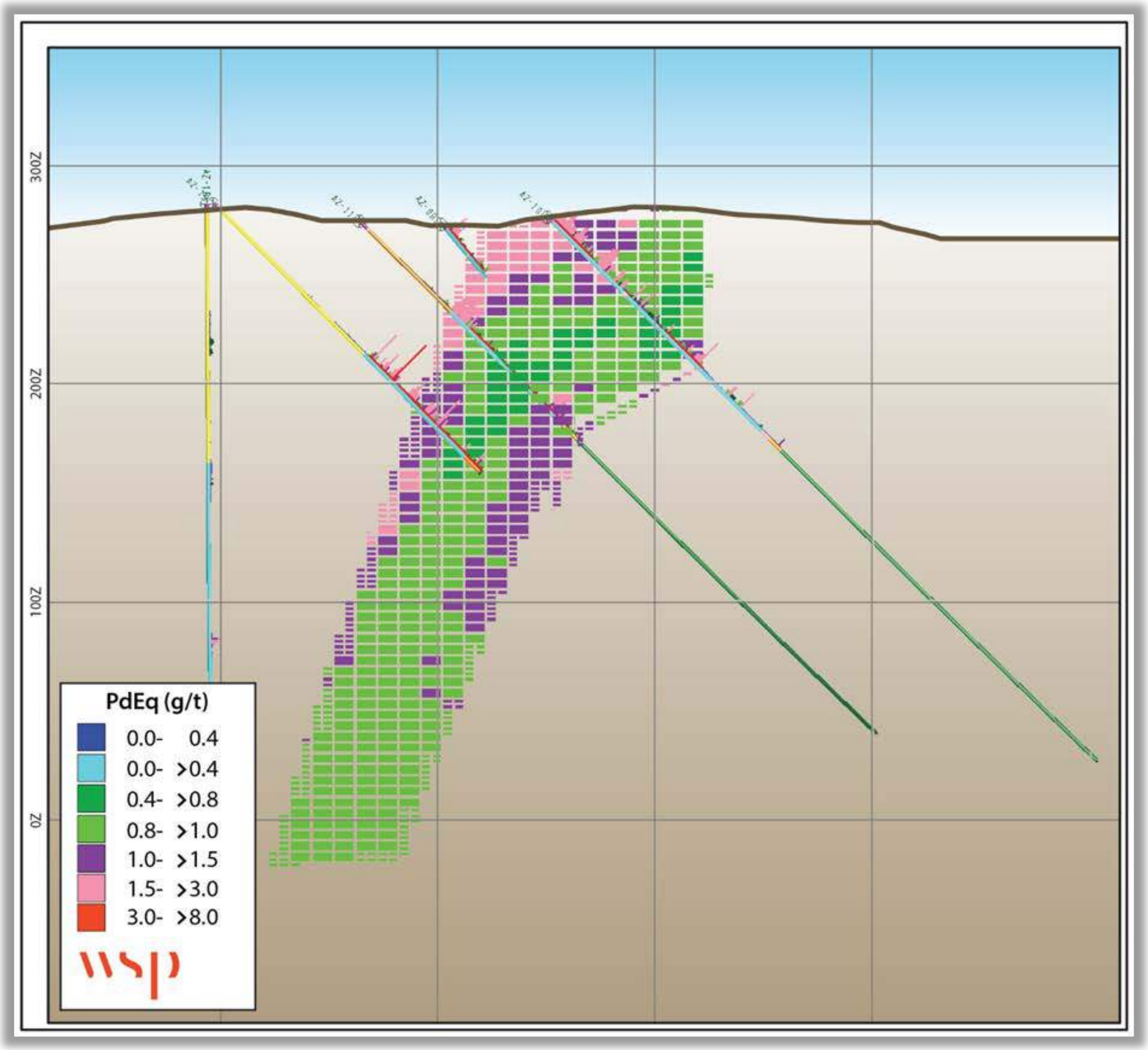
Source: *WSP (2019)*

FIGURE 14.27 VARLEY MODEL VS. DIAMOND DRILL HOLE COMPARISON



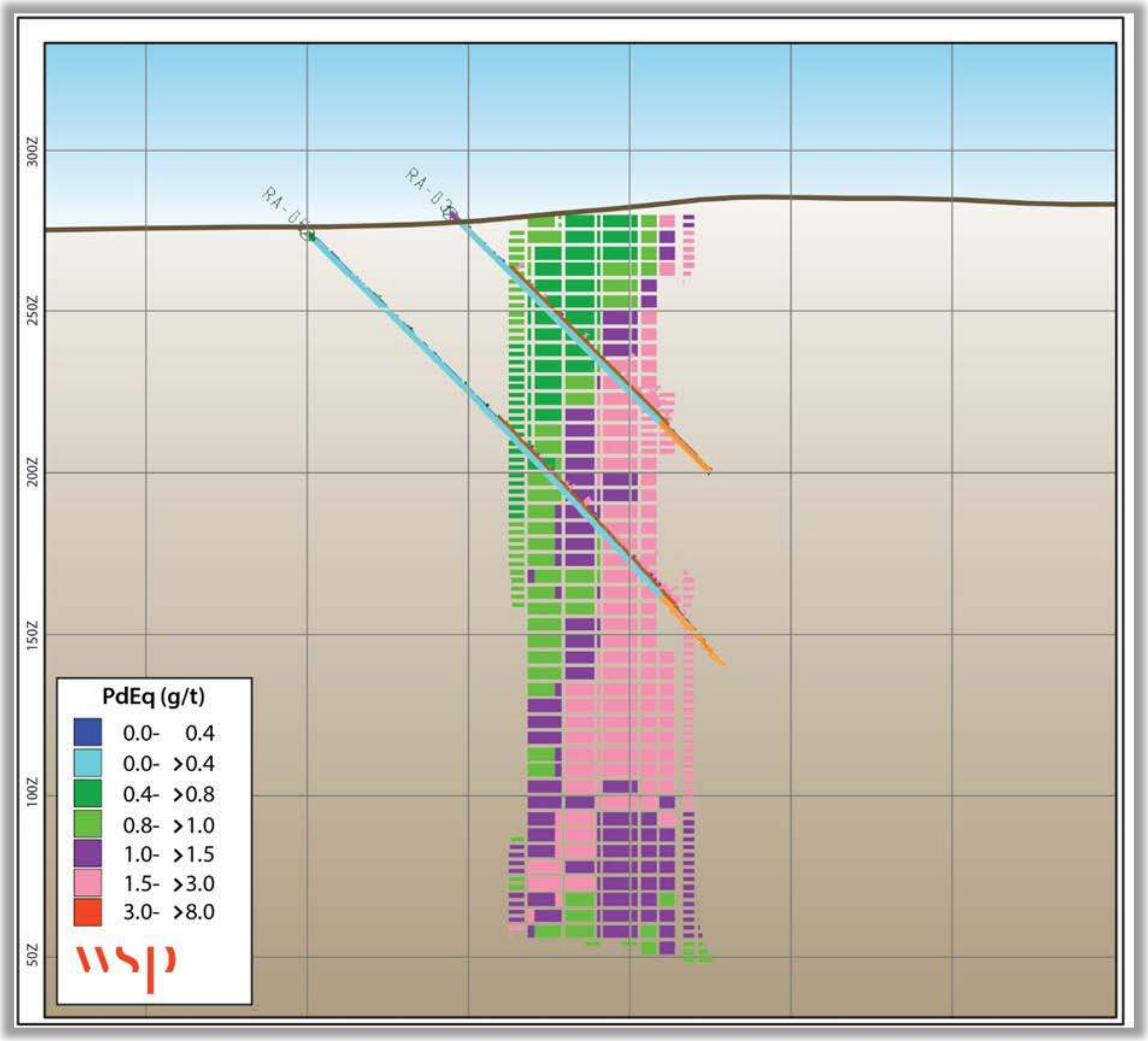
Source: *WSP (2019)*

FIGURE 14.28 AZEN MODEL VS. DIAMOND DRILL HOLE COMPARISON



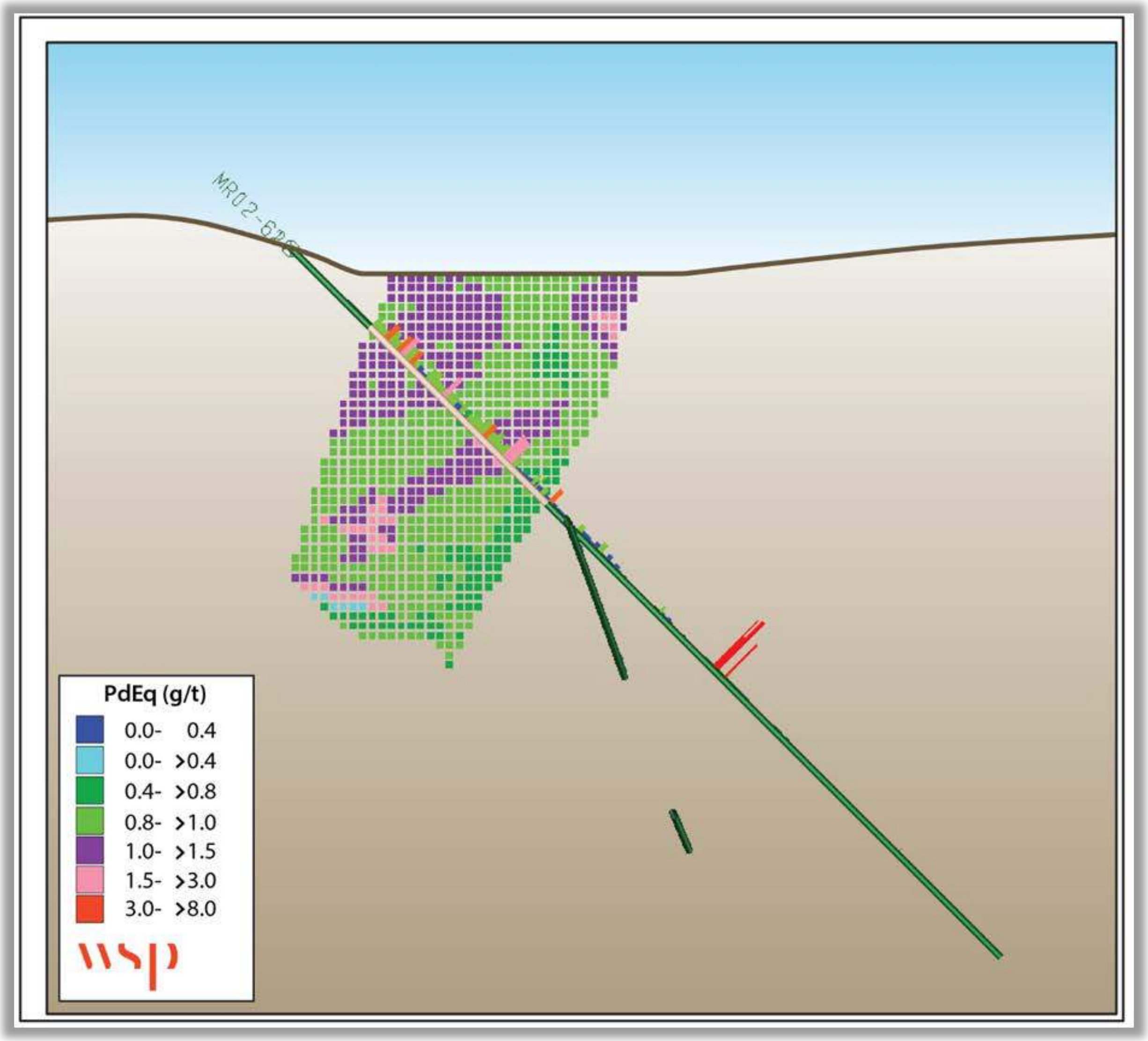
Source: *WSP (2019)*

FIGURE 14.29 RAZOR MODEL VS. DIAMOND DRILL HOLE COMPARISON



Source: *WSP (2019)*

FIGURE 14.30 RIVER VALLEY EXTENSION MODEL VS. DIAMOND DRILL HOLE COMPARISON – NORTH LIMB



Source: *WSP (2019)*

14.10.2 Overall Comparison

The overall block model statistics for the OK model were compared to the overall ID^2 and NN model values as well as to the composite capped drillhole data. Table 14.19 shows this comparison of the global estimates for the three estimation method calculations. In general, there is agreement between the OK, ID^2, and NN models. Larger discrepancies are reflected as a result of lower drill density in some portions of the model. There is a degree of smoothing apparent when compared to the diamond drill statistics. Comparisons were made using all blocks at a 0.001 g/t cut-off grade.

TABLE 14.19 **COMPARISON OF ESTIMATION METHOD CALCULATIONS**						
Zone	**Domain**	**Elements**	**DDH Capped Composite**	**NN Grade**	**ID^2 Grade**	**OK Grade**
Dana	100	Au-g/t	0.033	0.025	0.025	0.025
		Pt-g/t	0.168	0.143	0.148	0.148
		Pd-g/t	0.435	0.348	0.359	0.361
		Cu-%	0.051	0.044	0.045	0.046
		Ni-%	0.015	0.013	0.013	0.013
		Fe-%	2.713	5.627	5.776	5.726
		Co-ppm	27.956	18.739	18.330	18.322
		S-%	0.203	0.104	0.101	0.102
		Ag-ppm	0.676	0.481	0.309	0.305
Pine Zone	150	Au-g/t	0.028	0.020	0.020	0.020
		Pt-g/t	0.162	0.127	0.128	0.114
		Pd-g/t	0.460	0.328	0.330	0.314
		Cu-%	0.052	0.042	0.041	0.039
		Ni-%	0.017	0.014	0.014	0.014
		Fe-%	3.618	4.358	4.400	4.311
		Co-ppm	34.078	27.173	27.324	27.216
		S-%	0.222	0.162	0.165	0.159
		Ag-ppm	1.015	0.238	0.216	0.828
Dana South	200	Au-g/t	0.034	0.029	0.030	0.029
		Pt-g/t	0.181	0.160	0.165	0.163
		Pd-g/t	0.504	0.425	0.436	0.427
		Cu-%	0.041	0.036	0.037	0.036
		Ni-%	0.010	0.009	0.009	0.009
		Fe-%	2.473			2.315
		Co-ppm	27.617	26.514	26.782	26.870
		S-%				0.085
		Ag-ppm	0.605			0.542
Lismer	300	Au-g/t	0.025	0.021	0.023	0.022
		Pt-g/t	0.141	0.122	0.125	0.125
		Pd-g/t	0.321	0.289	0.296	0.296
		Cu-%	0.035	0.037	0.040	0.040
		Ni-%	0.011	0.013	0.014	0.014
		Fe-%	1.721			1.014
		Co-ppm	23.720	21.521	21.518	21.760
		S-%				0.000
		Ag-ppm	0.440			0.137
Lismer Ext	400	Au-g/t	0.029	0.028	0.029	0.029
		Pt-g/t	0.177	0.184	0.178	0.180
		Pd-g/t	0.411	0.423	0.415	0.422

TABLE 14.19 COMPARISON OF ESTIMATION METHOD CALCULATIONS						
Zone	**Domain**	**Elements**	**DDH Capped Composite**	**NN Grade**	**ID^2 Grade**	**OK Grade**
		Cu-%	0.046	0.046	0.049	0.049
		Ni-%	0.011	0.012	0.012	0.012
		Fe-%	1.545			0.817
		Co-ppm	20.751	19.293	17.244	17.623
		S-%				0.026
		Ag-ppm	0.436			0.103
Varley	500	Au-g/t	0.026	0.023	0.023	0.022
		Pt-g/t	0.147	0.130	0.128	0.129
		Pd-g/t	0.376	0.327	0.315	0.321
		Cu-%	0.044	0.043	0.042	0.042
		Ni-%	0.013	0.012	0.012	0.012
		Fe-%	2.116			1.614
		Co-ppm	19.226	20.918	18.542	18.700
		S-%				0.110
		Ag-ppm	0.292			0.113
Razor	600	Au-g/t	0.016	0.019	0.018	0.018
		Pt-g/t	0.086	0.086	0.086	0.086
		Pd-g/t	0.191	0.199	0.199	0.197
		Cu-%	0.029	0.033	0.031	0.031
		Ni-%	0.020	0.021	0.020	0.021
		Fe-%	1.109			0.601
		Co-ppm	14.898	14.233	13.665	13.636
		S-%				0.085
		Ag-ppm	0.318			0.069
Banshee	700	Au-g/t	0.024	0.021	0.020	0.020
		Pt-g/t	0.133	0.131	0.110	0.113
		Pd-g/t	0.219	0.223	0.183	0.195
		Cu-%	0.036	0.035	0.032	0.032
		Ni-%	0.007	0.007	0.006	0.007
		Fe-%				
		Co-ppm				
		S-%				
		Ag-ppm				
Azen	800	Au-g/t	0.018	0.017	0.017	0.017
		Pt-g/t	0.089	0.086	0.081	0.083
		Pd-g/t	0.259	0.260	0.242	0.250
		Cu-%	0.049	0.052	0.048	0.049
		Ni-%	0.024	0.025	0.024	0.024
		Fe-%	2.017			0.500

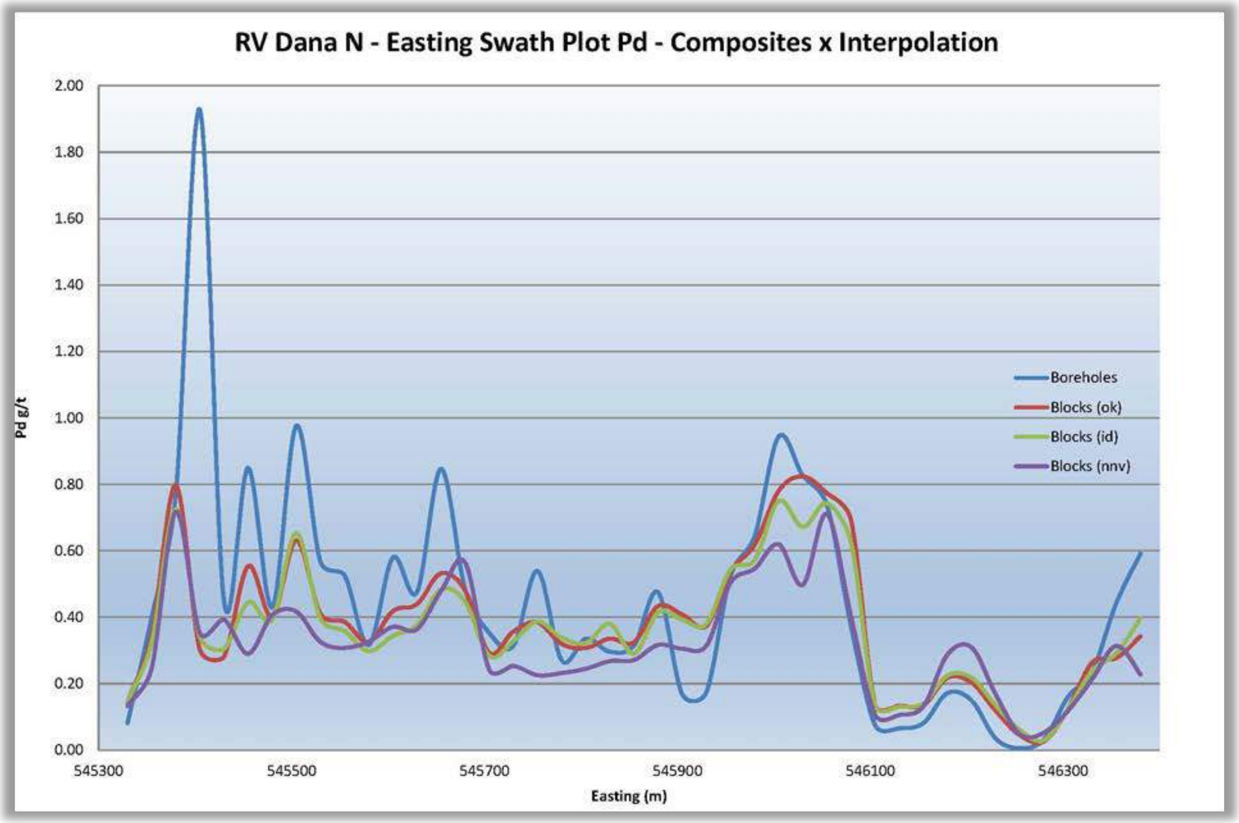
TABLE 14.19 **COMPARISON OF ESTIMATION METHOD CALCULATIONS**						
Zone	**Domain**	**Elements**	**DDH Capped Composite**	**NN Grade**	**ID^2 Grade**	**OK Grade**
		Co-ppm	33.411	22.564	32.252	32.646
		S-%				0.049
		Ag-ppm	1.928			0.132
River Valley Extension	910	Au-g/t	0.033		0.020	
		Pt-g/t	0.149		0.132	
		Pd-g/t	0.274		0.277	
		Cu-%	0.054		0.049	
		Ni-%	0.027		0.025	
		Fe-%				
		Co-ppm				
		S-%				
		Ag-ppm				
River Valley Extension	920	Au-g/t	0.041		0.022	
		Pt-g/t	0.172		0.151	
		Pd-g/t	0.195		0.183	
		Cu-%	0.050		0.044	
		Ni-%	0.018		0.015	
		Fe-%				
		Co-ppm				
		S-%				
		Ag-ppm				
River Valley Extension	930	Au-g/t	0.031		0.021	
		Pt-g/t	0.164		0.153	
		Pd-g/t	0.309		0.307	
		Cu-%	0.042		0.039	
		Ni-%	0.032		0.030	
		Fe-%				
		Co-ppm				
		S-%				
		Ag-ppm				

14.10.3 Swath Plots

Swath plots of eastings, northings, and elevations were generated for each mineralized zone respectively. These plots are comparing the OK estimates with the NN and ID^2 estimates and the associated boreholes.

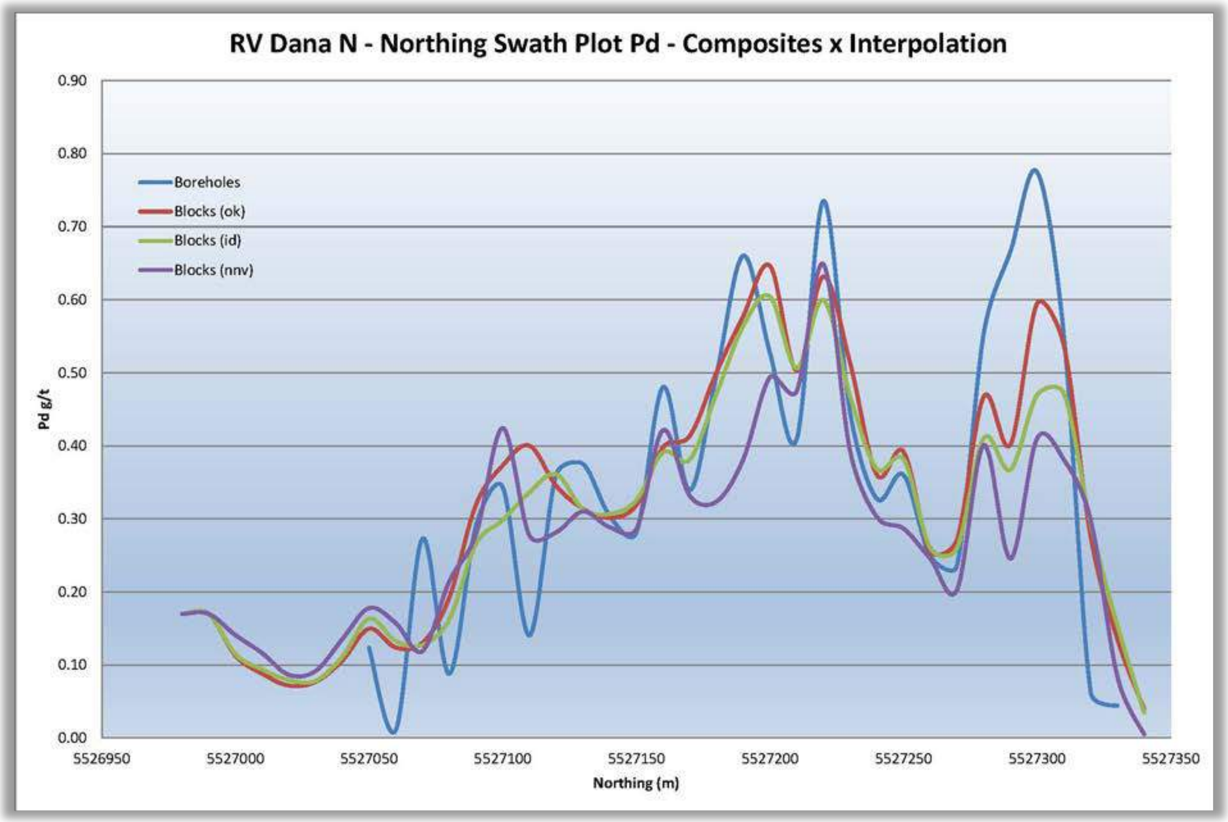
For each element, there is correlation between the three estimation methods. There is grade smoothing of the block models compared to the drillhole data, which is a common effect of the modeling process. Figure 14.31 to Figure 14.36 are an example of the swath plots created to validate the block model results.

FIGURE 14.31 DANA NORTH PALLADIUM EASTING SWATH PLOT



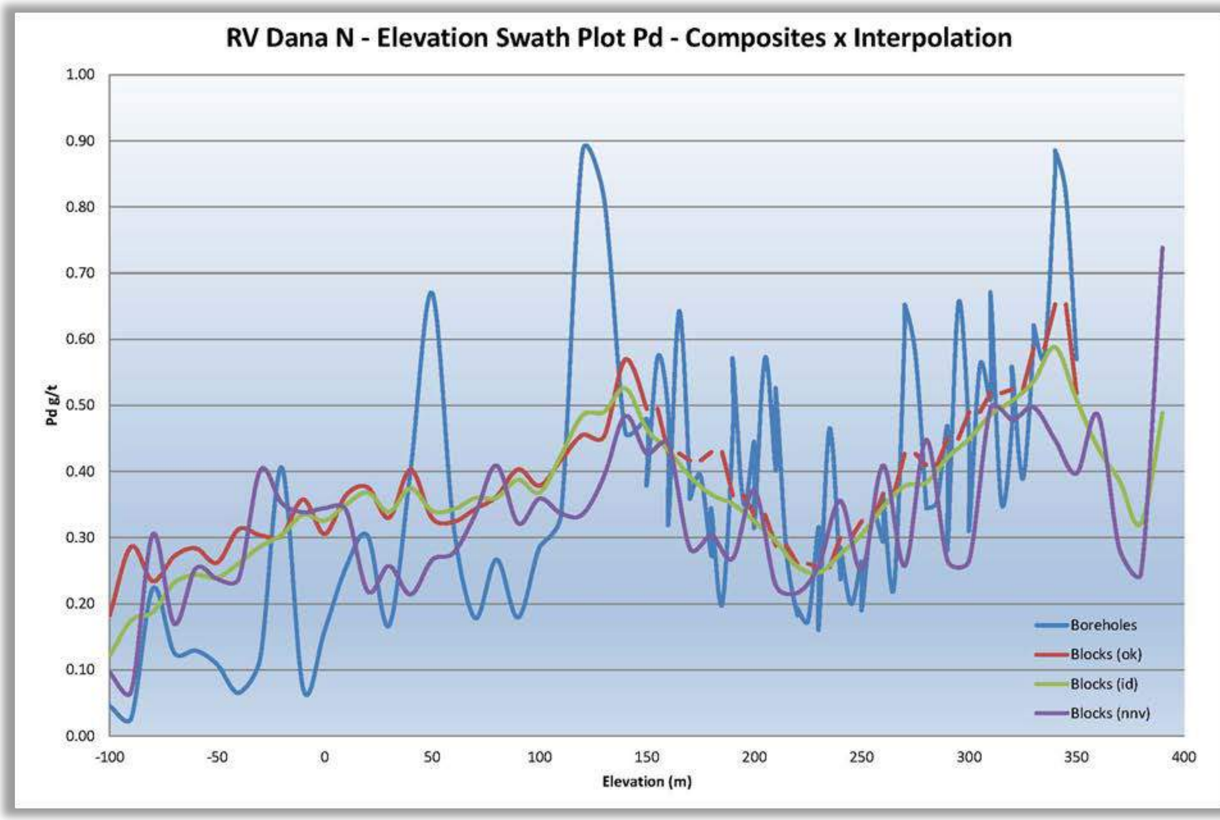
Source: *WSP (2019)*

FIGURE 14.32 DANA NORTH PALLADIUM NORTHING SWATH PLOT



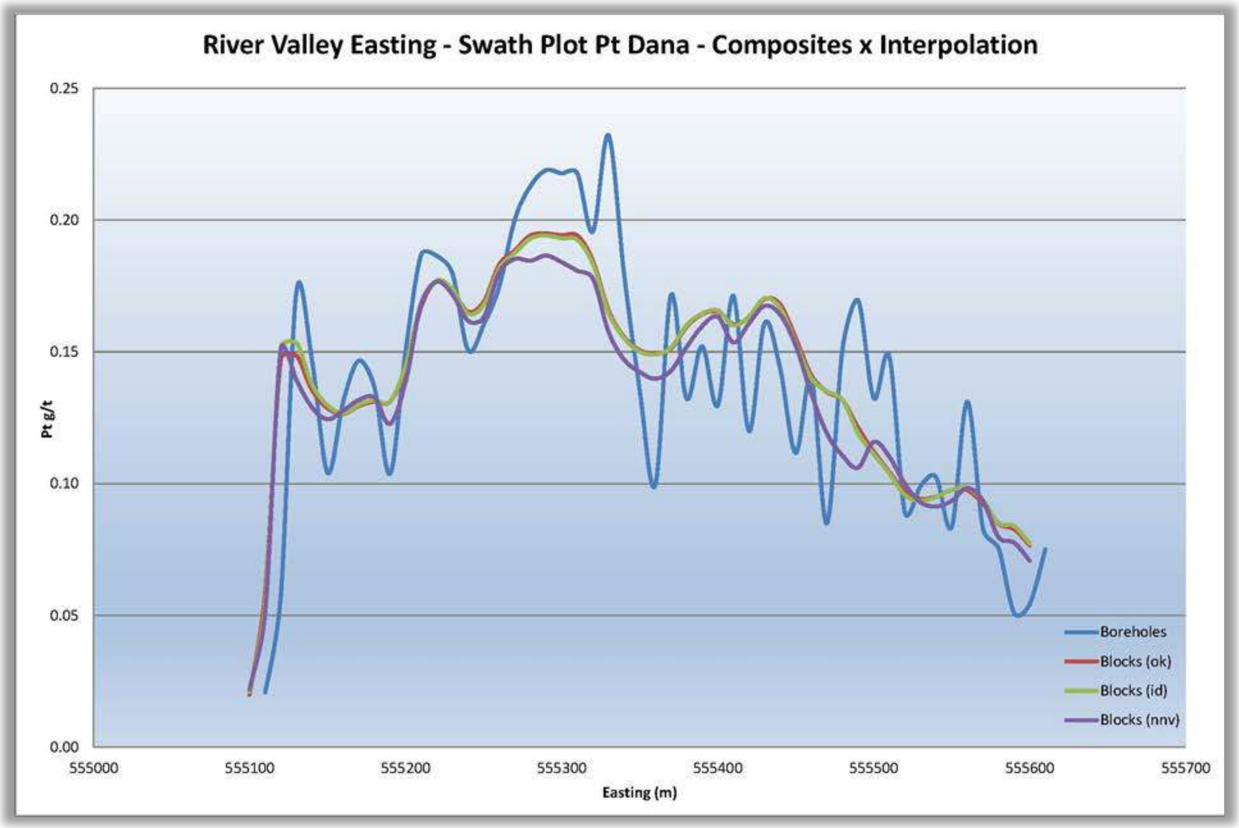
Source: *WSP (2019)*

FIGURE 14.33 DANA NORTH PALLADIUM ELEVATION SWATH PLOT



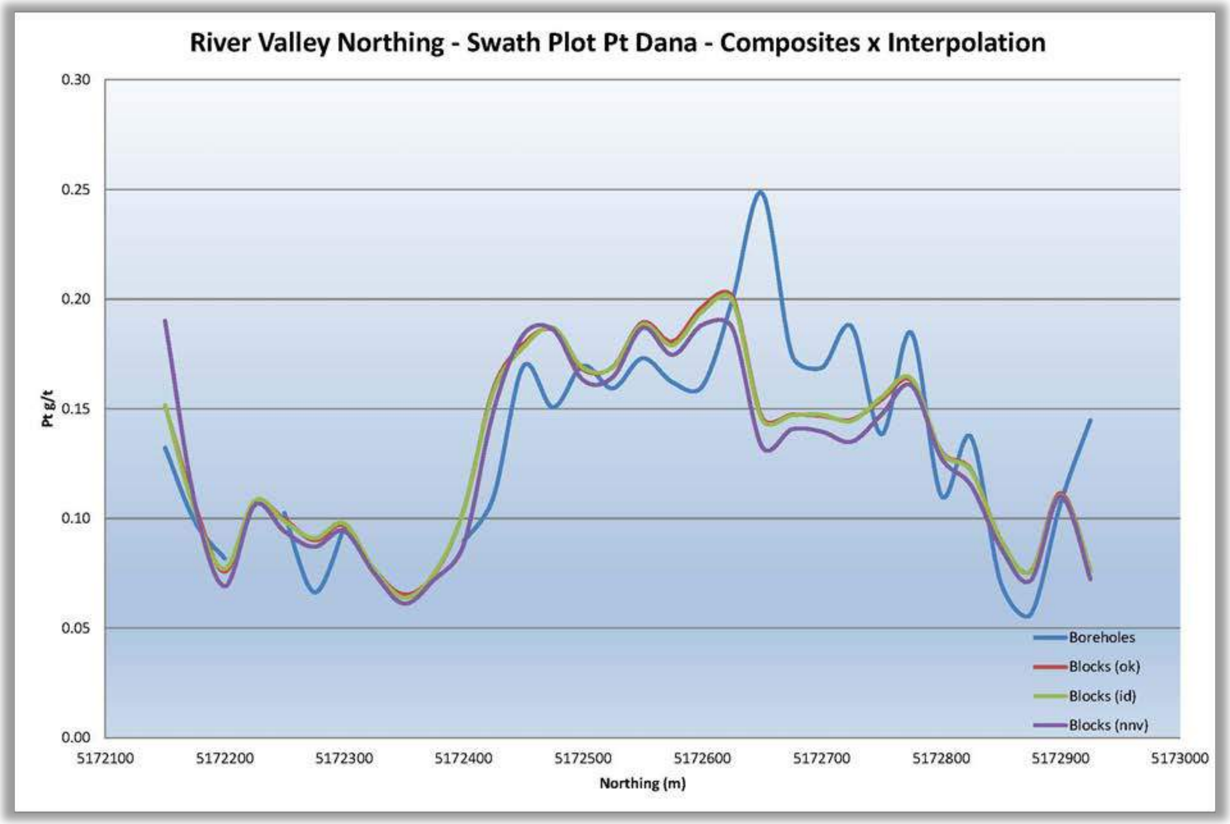
Source: *WSP (2019)*

FIGURE 14.34 DANA NORTH PLATINUM EASTING SWATH PLOT



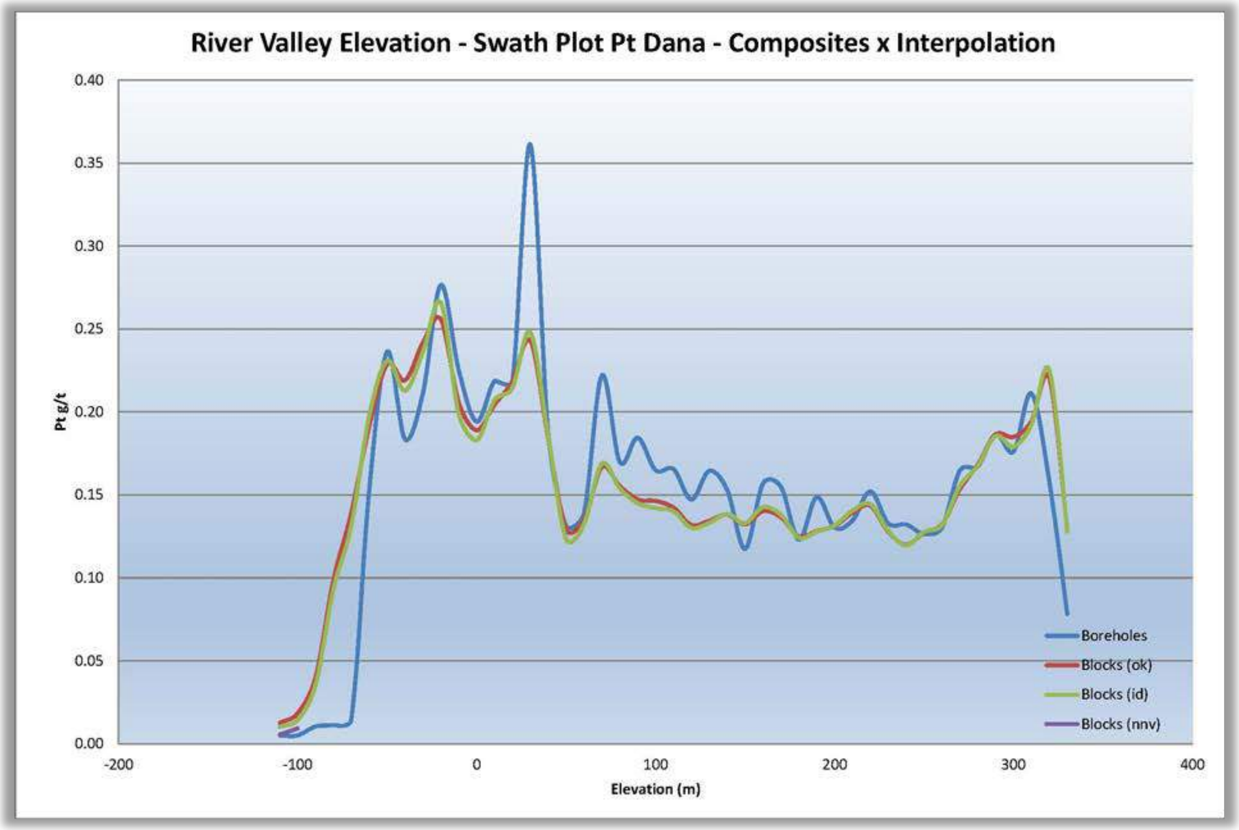
Source: *WSP (2019)*

FIGURE 14.35 DANA NORTH PLATINUM NORTHING SWATH PLOT



Source: *WSP (2019)*

FIGURE 14.36 DANA NORTH PLATINUM ELEVATION SWATH PLOT



Source: *WSP (2019)*

14.10.4 Previous Mineral Resource Estimates

PFN and their joint venture partner have completed four Mineral Resource Estimates prior to 2012. Table 14.20 summarizes the previous results. WSP has not reviewed the models, however, consider the models to be material. The information summarized in the table has been sourced from various internal company reports and press releases available from NAM's website.

TABLE 14.20
SUMMARY OF PREVIOUS MINERAL RESOURCE ESTIMATES

Year	Company	Activities	Results
2001	PFN/ Amplats	An Independent Mineral Resource Study was carried out by Derry Mitchener Booth and Wahl (DMBW) as of September 26, 2001 which incorporated Phase I to IV of drilling which amounted to 22,791.74 m in 138 holes. Report estimated an in situ resource at Dana Lake and Lismer Ridge (Booth and Wahl, 2001).	13 Mt (measured + indicated + inferred) at 0.35 g/t Pt, 1.04 g/t Pd, & 0.07 g/t Au using a 0.7 g/t Pt + Pd cut-off grade. This was non-compliant.
2002	PFN/ Amplats	DMBW completed a Revised Mineral Resource Estimate, as of September 13, 2002 to incorporate Phase V drill program for the Dana Lake and Lismer's Ridge deposits. A total of 42,627 m in 221 holes had been conducted in 5 phases of drill programs (Booth and Wahl, 2002).	18.1 Mt (measured + indicated) at 0.344 g/t Pt, 1.016 g/t Pd, & 0.063 g/t Au using a 0.7 g/t Pt+Pd cut-off grade. An additional 5.8 Mt added as inferred at 0.290 g/t Pt, 0.819 g/t Pd, & 0.050 g/t Au using a 0.7 g/t Pt+Pd cut-off grade.
2004	PFN/ Amplats	DMBW completed a Revised Mineral Resource Estimate, as of April 30, 2004 to incorporate Phase VI drill program for the Dana Lake, Lismer's Ridge, and Varley deposits. A total of 83,838 m in 416 holes had been conducted in 6 phases of drill programs (Booth and Wahl, 2004).	25.4 Mt (measured + indicated) at 0.335 g/t Pt, 0.979 g/t Pd, & 0.061 g/t Au using a 0.7 g/t Pt+Pd cut-off grade. An additional 3.6 Mt added as inferred at 0.278 g/t Pt, 0.760 g/t Pd, & 0.049 g/t Au using a 0.7 g/t Pt+Pd cut-off grade.
2006	PFN/ Amplats	DMBW completed a Revised Mineral Resource Estimate, as of March 27, 2006 to incorporate Phase VI and VII drill program for the North Lismer and Varley Zones. A total of 83,838 m in 416 holes had been conducted in previous estimate in 2004, an additional 31 holes from Lismer's Ridge Zone and 70 core holes at Varley were utilized for the purpose of the Revised Mineral Resource Estimate (Booth and Wahl, 2006).	19.3 Mt (measured + indicated) at 0.395 g/t Pt, 1.181 g/t Pd, & 0.070 g/t Au using a 1.0 g/t Pt+Pd cut-off grade. An additional 881,000 t added as inferred at 0.465 g/t Pt, 1.356 g/t Pd, & 0.073 g/t Au using a 1.0 g/t Pt+Pd cut-off grade.
2012	PFN	Tetra Tech completed a revised Mineral Resource Estimate, as of June13, 2012 to incorporate Phase VIII drilling program. A total of 135 holes were included in the estimate (McCracken, 2012).	91.3 Mt (measured + indicated) at 0.22 g/t Pt, 0.58 g/t Pd, & 0.040 g/t Au using a 0.8 g/t PdEq cut-off grade. An additional 35.9 Mt added as inferred at 0.14 g/t Pt, 0.36 g/t Pd, & 0.03 g/t Au using a 0.8 g/t PdEq cut-off grade.

14.10.5 Comparison of Current Updated Mineral Resource Estimate with 2012 Estimate

PFN commissioned Tetra Tech Inc. to complete a revised Mineral Resource Estimate on the River Valley Property in 2012. A copy of "Technical Report and Resource Estimate on the River Valley PGE Project, Northern Ontario" prepared by Tetra Tech is available on SEDAR by searching Pacific North West Capital Corporation technical reports (McCracken, 2012).

Table 14.21 compares the basic parameters of the 2012 Resource Estimate with the current 2018 NI 43-101 Mineral Resource Estimate. Table 14.22 illustrates the differences in the prior Mineral Resource Estimate with the current 2018 Mineral Resource Estimate.

The fundamental difference between the 2012 Tetra Tech Mineral Resource Estimate and the 2018 WSP Mineral Resource Estimate is that the 2018 WSP Mineral Resource Estimate adds the Pine and River Valley Extension Zones to the Mineral Resource Estimate totals. The new geological model also included rhodium in the PdEq formula, which was not incorporated in the Tetra Tech model. A change of the metal pricing affected the results of the PdEq values within the WSP model even though the individual grades would not have changed.

TABLE 14.21
2012 VS. 2018 MODEL COMPARISON

Item	2012 Tetra Tech Model	2018 WSP Model
Number of Drill holes	462 evaluated.	609 evaluated.
Grade Capping	Parrish Analysis No grade capping on any elements.	Parrish Analysis and log Probability plots No grade capping on any elements.
Composite Length	2.0 m average for all zones back stitching allows for "tail" material to be spread evenly over the entire hole composite.	2.0 m average for all zones back stitching allows for "tail" material to be spread evenly over the entire hole composite.
Cutoff Grade	0.8 g/t PdEq.	0.35 g/t PdEq and 2.00 g/t PdEq.
Number of Mineral Zones	8	10
Bulk Density	2.94 t/m^3 (length weighted mean of 432 samples).	2.94 t/m^3 (length weighted mean of 432 samples).
Block Size	10 x 10 x 5 (500 m^3) - single subcell.	2.5 x 5 x 2.5 (31.25 m^3) - no subcell.
Estimation Method	OK with ID^2 and NN validation.	OK with ID^2 and NN validation.

Table 14.22 Differences Between 2012 and 2018 Mineral Resource Estimates									
Item	**k Tonnes**	**Pd (g/t)**	**Pt (g/t)**	**Rh (g/t)**	**Au (g/t)**	**Cu (%)**	**Ni (%)**	**Co (%)**	**PdEq (g/t)**
2012 Tetra Tech Model									
Measured Resource @ 0.8 g/t PdEq cut-off	25,585	0.63	0.23		0.04	0.06	0.02	0.003	
Indicated Resource @ 0.8 g/t PdEq cut-off	65,755	0.56	0.21		0.04	0.06	0.02	0.002	
Inferred Resources @ 0.8 g/t PdEq cut-off	35,911	0.36	0.14		0.03	0.06	0.03	0.002	
2018 WSP Model									
Measured Resource @ 0.35 g/t + 2.00 g/t PdEq cut-off	56,097	0.54	0.36	0.102	0.03	0.05	0.04	0.008	0.51
Indicated Resource @ 0.35 g/t + 2.00 g/t PdEq cut-off	43,158	0.49	0.20	0.011	0.03	0.05	0.02	0.002	0.82
Inferred Resources @ 0.35 g/t + 2.00 g/t PdEq cut-off	52,202	0.31	0.15	0.000	0.03	0.05	0.03	0.001	0.63

15.0 MINERAL RESERVE ESTIMATE

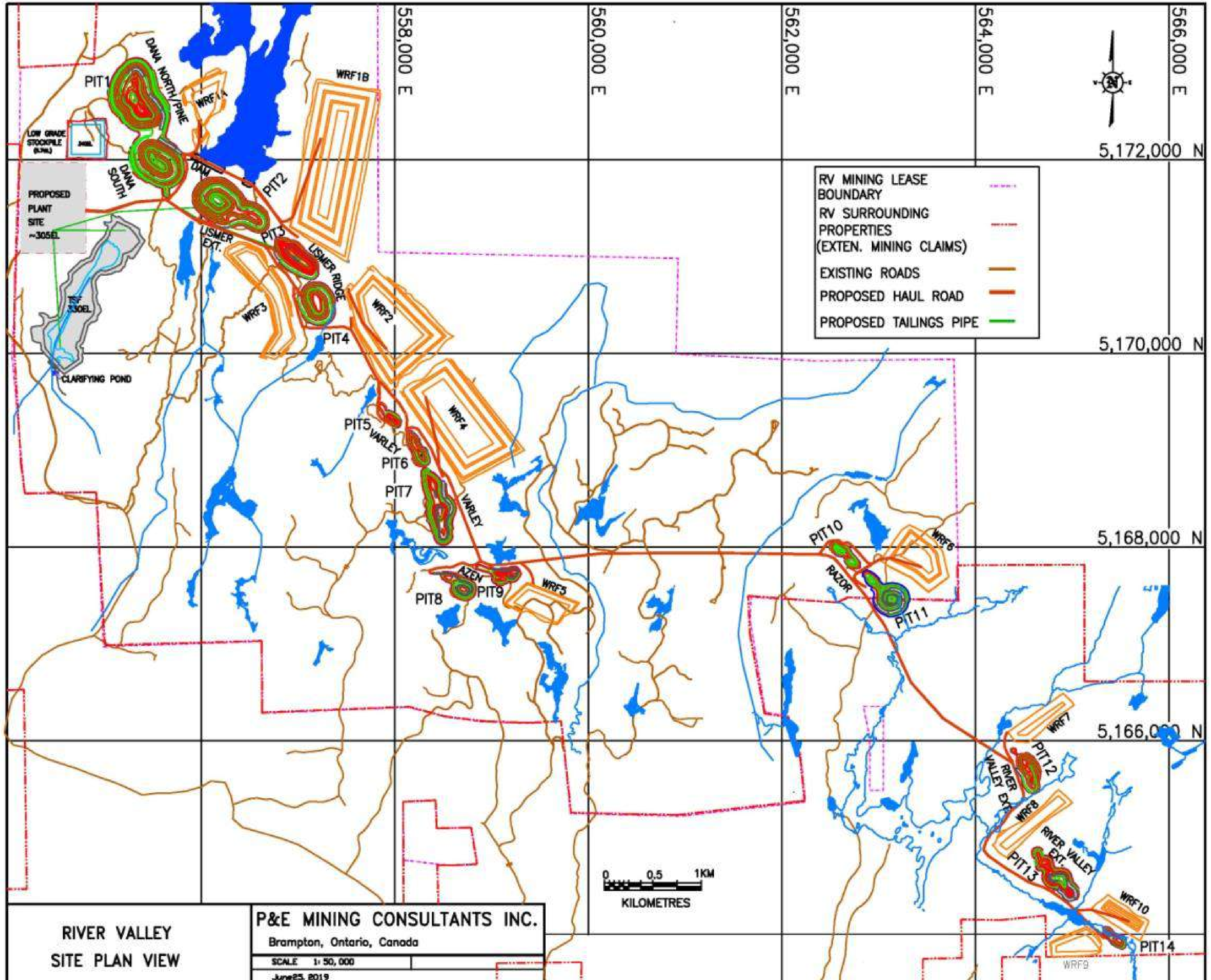
There is no Mineral Reserve Estimate stated for the River Valley Deposit. This section does not apply to this Technical Report.

16.0 MINING METHODS

The River Valley Deposit is relatively shallow and lends itself to conventional open pit mining methods. Accordingly, the PEA mine plan entails developing fourteen (14) open pits aligned across the Property. Figure 16.1 provides a general overview of the Project site showing the location of the open pits, waste rock facilities and the process plant site.

Separate open pit 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.

FIGURE 16.1 PROJECT SITE PLAN VIEW



16.1 OPEN PIT MINING

14 open pits will be developed over the life of the Project. The mining operation will excavate three different materials:

- Overburden (spotty 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.
- 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 Updated Mineral Resource Estimate block model based on the formula in red font at the bottom of Table 16.1. A series of pit optimizations were conducted for all pits simultaneously using an NSR cut-off value of $11.45/t (processing cost plus G&A cost), with a mining cost of $2.00/t, and a pit slope angle of 48° (flattened from the recommended pit slope angle of 50° to account for haulage ramps). The NSR cut-off value was equivalent to a PdEq grade of 0.35 g/t. The analysis examined a wide range of revenue factors, from 10% to 120%.

TABLE 16.1
NSR VALUE CALCULATION

Element	Metal Price $US/lb or oz	Concentrate Recovery	Smelter Payable	Refining Charge $US/lb or oz	Average Grade % or g/t
Ni	$7.42	17%	91%	$0.50	1.000%
Cu	$3.09	85%	85%	$0.10	1.000%
Au	$1,304	60%	87%	$10.00	1.000
Pt	$1,026	66%	89%	$10.00	1.000
Pd	$1,077	80%	93%	$10.00	1.000
Co	$27.85	18%	50%	$2.50	1.000%
CDN$/US$		$0.775			
Mass Pull	0.28%				
Concentrate Moisture	8.0%				
Concentrate Freight C$/t	$20				
Smelter Treatment US$/t	$125				
Element	**Payable Metal $C/tonne**	**PdEq Ratio**			
Ni	$30.45	0.92			
Cu	$61.45	1.87			
Au	$28.02	0.85			
Pt	$24.76	0.75			
Pd	$32.93	1.00			
Co	$64.90	1.97			
Subtotal	**$242.52**				
Conc Freight & Smelter Treatment C$/t	**$0.51**				
NSR	**$242.01**				
NSR=((Ni % x 30.45)+(Cu % x 61.45)+(Au g/t x 28.02)+(Pt g/t x 24.76)+(Pd g/t x 32.93)+(Co % x 64.90))-0.51					

The optimization results are shown graphically in Figure 16.2 (NPV and Profit) and Figure 16.3 (tonnage and strip ratio). These charts provide an estimate for the potentially mineable portion of the Updated Mineral Resource for each revenue factor as well as potential strip ratio. The optimized pit shell forms the basis for the actual pit design and in this case the 94% revenue factor pit was selected as the optimal pit.

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 after mining dilution and mining recovery are applied.

FIGURE 16.2 PIT OPTIMIZATION NPV AND PROFIT VS REVENUE FACTOR

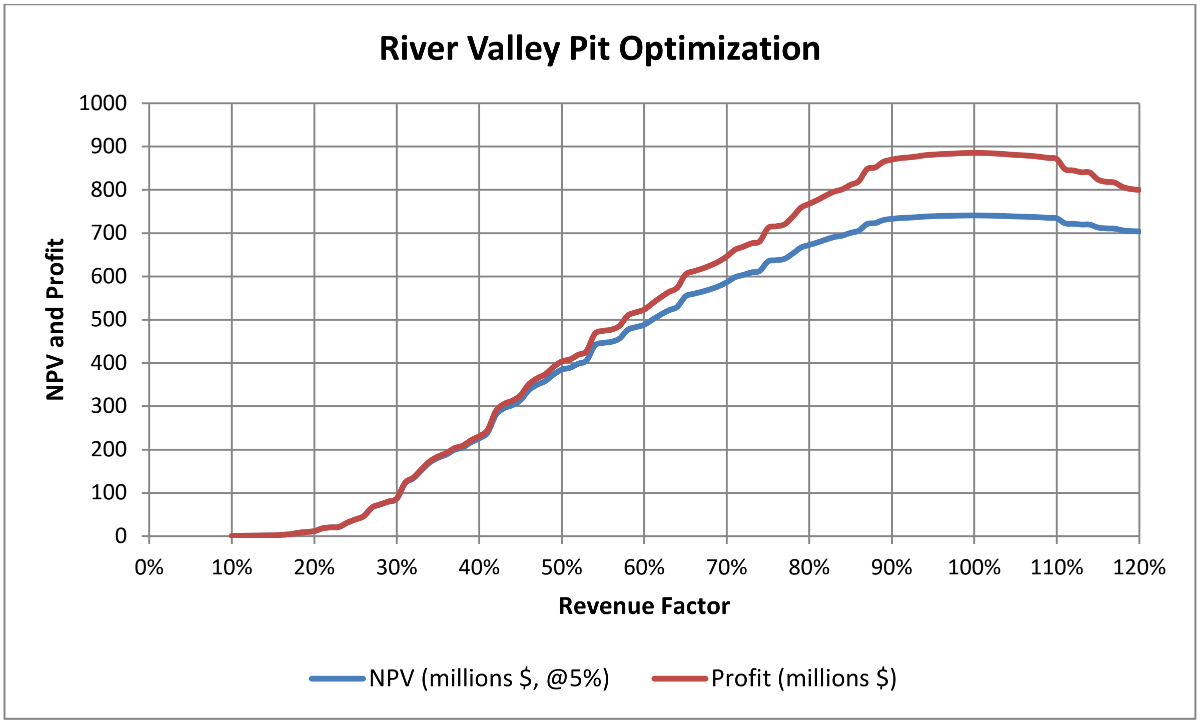
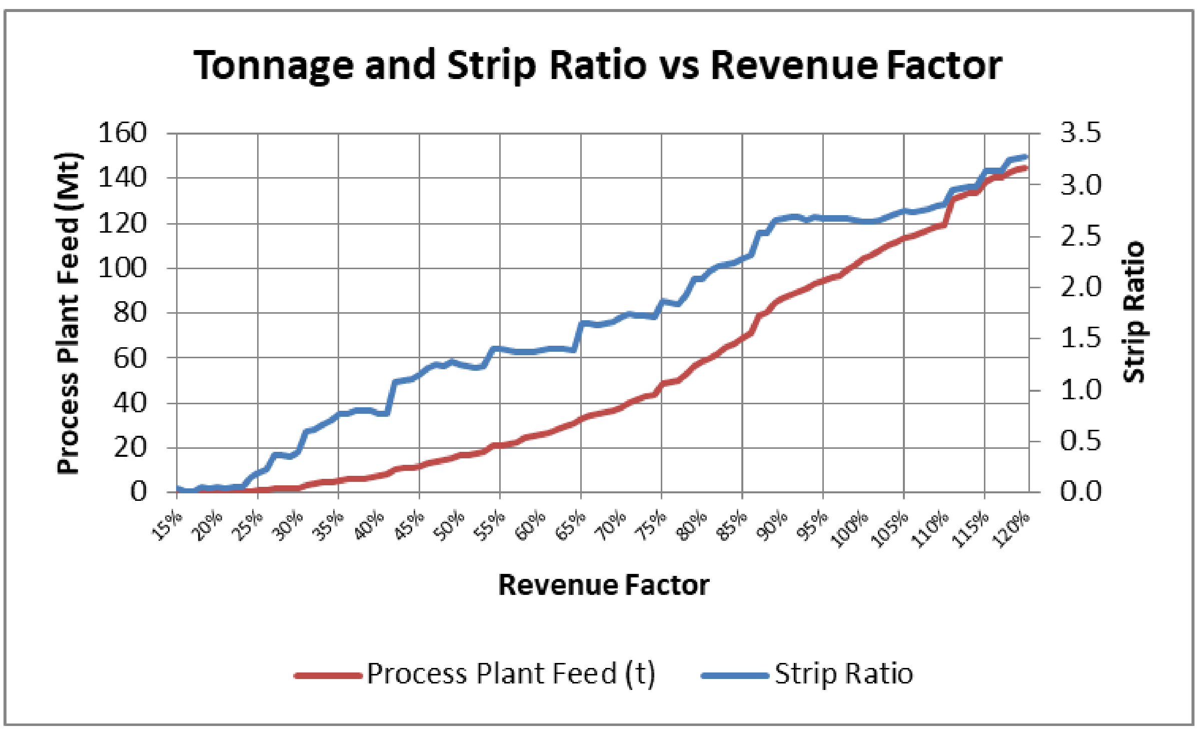


FIGURE 16.3 OPTIMIZATION PROCESS PLANT FEED TONNAGE AND STRIP RATIO



16.1.2 Open Pit Designs

14 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 16.1, above.

TABLE 16.2
PIT DESIGN PARAMETERS

Item	Unit	Measurement
Ramp Design		
Haul Ramp Width (double)	m	30
Haul Ramp Width (single)	m	12
Ramp Grade	%	10
Pit Slopes		
Inter-ramp Angle	deg	50
Bench face angle	deg	75
Bench Height	m	10
Benching (single or double)	#	double
Bench width (m)	m	11.4

Note: *In some pits a 15% ramp grade has been used near the pit bottom when accessing the lower most benches.*

16.1.2.1 Geotechnical Study

A PEA level geomechanical site investigation and preliminary design for the proposed River Valley pits was undertaken by Mine Design Engineering Inc. ("MDEng") of Kingston, Ontario. MDEng used the geological and geotechnical data (primarily rock quality designation ("RQD") logging of the Dana/Pine Zone) provided by NAM as well as geological reports developed by the Ontario Geological Survey for areas close to the Property. Empirical design methods were used to provide preliminary recommendations for pit slope angles. MDEng recommended a slope angle of 50° for PEA level pit optimization.

16.1.2.2 Hydrogeological Studies

No hydrogeological studies have been completed at this study stage to assess groundwater conditions.

16.1.2.3 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 Pits 1, 2, 3, 4, 7 and 13 were used for analysis. For the selected benches a 1.5 m wide envelope of diluting material was assumed around the mineralized domains. The average dilution percentage was applied to the insitu tonnes and grade to determine the diluted tonnes and grade. 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 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 (%)
9.5%	3%	0.22	0.01	0.05	0.07	0.04	0.02	0.01

16.1.3 Potentially Mineable Portion of the Updated Mineral Resource

After the pit designs were finalized, the potentially mineable portion of the Updated 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)

Process Plant Feed From	Process Plant Feed (Mt)	PdEq (g/t)	Waste Rock (Mt)	Total Material (Mt)	Strip Ratio (W:O)
Pit 1	28.6	1.07	137.0	165.6	4.8
Pit 2	11.2	0.84	49.2	60.3	4.4
Pit 3	5.1	0.72	13.7	18.8	2.7
Pit 4	5.7	0.79	17.8	23.6	3.1
Pit 5	0.8	0.61	0.8	1.6	0.9
Pit 6	2.1	0.69	2.6	4.7	1.2
Pit 7	7.7	0.94	20.9	28.6	2.7
Pit 8	2.9	0.64	3.9	6.8	1.4
Pit 9	1.6	0.58	2.2	3.9	1.4
Pit 10	1.1	0.59	2.1	3.2	1.8
Pit 11	3.2	0.84	12.9	16.1	4.0
Pit 12	2.8	0.71	4.8	7.6	1.7
Pit 13	4.7	0.68	8.7	13.4	1.8
Pit 14	0.6	0.66	1.0	1.6	1.7
Total	**78.1**	**0.88**	**277.6**	**355.7**	**3.6**

Note: *w:o = waste:process plant feed ratio*
Note: *The potentially mineable portion of the Updated 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 into the process plant feed, the larger Pit 1 was sub-divided into three phases. All other pits were mined as single phase pits due to their smaller size.

16.1.4 Production Schedule

The open pit production schedule consists of one year of pre-production for pre-stripping followed by 13 years of mining and a partial final year of stockpile reclaim. The target peak annual mining rate is 40 Mt tonnes of material per year, or 110,000 tpd. Table 16.5 provides the open pit total material schedule by year and by pit, and Figure 16.4 presents the annual tonnages graphically. Table 16.6 presents only the mineralized material mined per year and by pit source, and Figure 16.5 presents the pit tonnages graphically. The processing plant schedule (Table 16.7) extends for 14 years and includes grade stockpiling operations. Figure 16.6 presents the average PdEq g/t head grade per annum.

TABLE 16.5
OPEN PIT PRODUCTION SCHEDULE (TOTAL MATERIAL MT)

Production From	Total	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Pit 1	165.6	7.7	22.5	9.9	19.8	0.7	19.3	36.6	34.0	12.1	2.9					
Pit 2	60.3					38.0	19.0	3.4								
Pit 3	18.8						1.7			6.3	10.0	0.8				
Pit 4	23.6			12.9	9.5	1.2										
Pit 5	1.6													1.6		
Pit 6	4.7											3.3	1.5			
Pit 7	28.6		2.5	16.2	9.7	0.1										
Pit 8	6.8									1.2				5.5		
Pit 9	3.9													0.6	3.2	
Pit 10	3.2													3.2		
Pit 11	16.1										6.5	8.9	0.7			
Pit 12	7.6									0.4		6.1	1.2			
Pit 13	13.4												11.6	1.8		
Pit 14	1.6														1.6	
Total	**355.7**	**7.7**	**25.0**	**39.0**	**39.0**	**40.0**	**40.0**	**40.0**	**34.0**	**20.0**	**19.5**	**19.0**	**15.0**	**12.7**	**4.6**	

FIGURE 16.4 OPEN PIT MATERIAL PER ANNUM

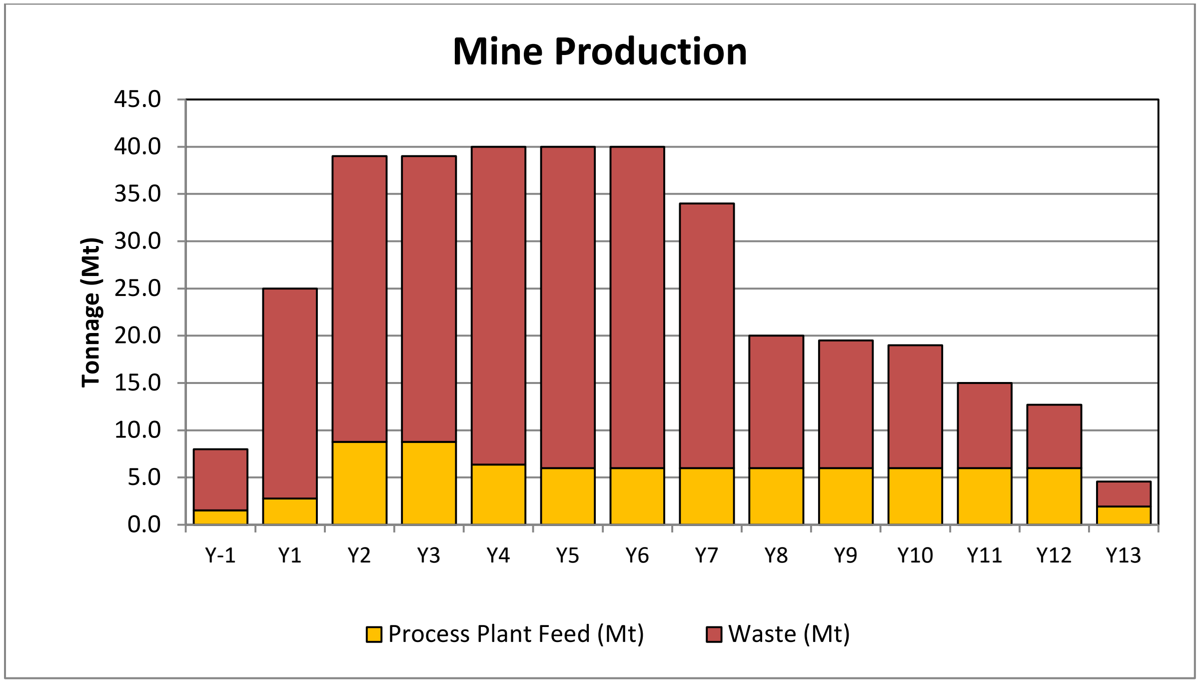


TABLE 16.6
OPEN PIT PRODUCTION SCHEDULE (PROCESS PLANT FEED ONLY) (MT)

Production From	Total Mt	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Pit 1	28.6	1.5	2.8	3.0	2.1	0.2	1.3	4.3	6.0	5.4	1.9					
Pit 2	11.2					5.2	4.3	1.7								
Pit 3	5.1						0.3			0.6	3.8	0.4				
Pit 4	5.7			2.1	2.7	0.9										
Pit 5	0.8													0.8		
Pit 6	2.1											1.1	1.0			
Pit 7	7.7			3.7	3.9	0.1										
Pit 8	2.9													2.9		
Pit 9	1.6													0.3	1.3	
Pit 10	1.1													1.1		
Pit 11	3.2										0.3	2.2	0.6			
Pit 12	2.8											2.2	0.6			
Pit 13	4.7												3.8	0.9		
Pit 14	0.6														0.6	
Total	**78.1**	**1.5**	**2.8**	**8.8**	**8.8**	**6.4**	**6.0**	**6.0**	**6.0**	**6.0**	**6.0**	**6.0**	**6.0**	**6.0**	**1.9**	

FIGURE 16.5 PROCESS PLANT FEED BY PIT

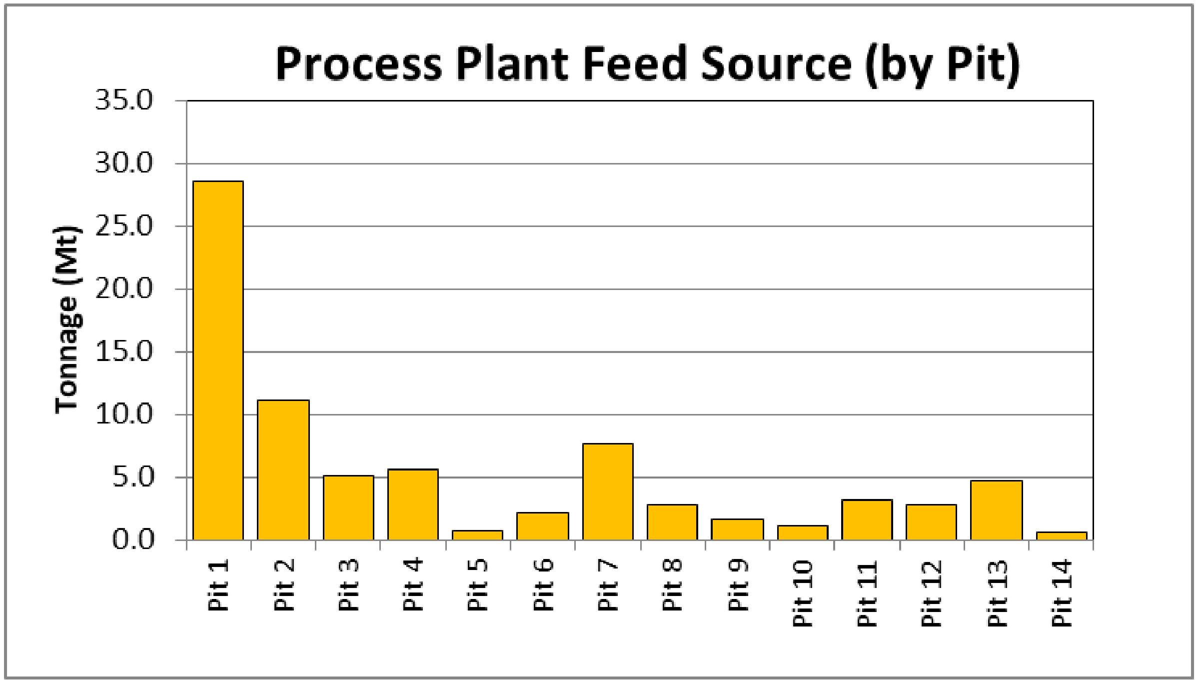
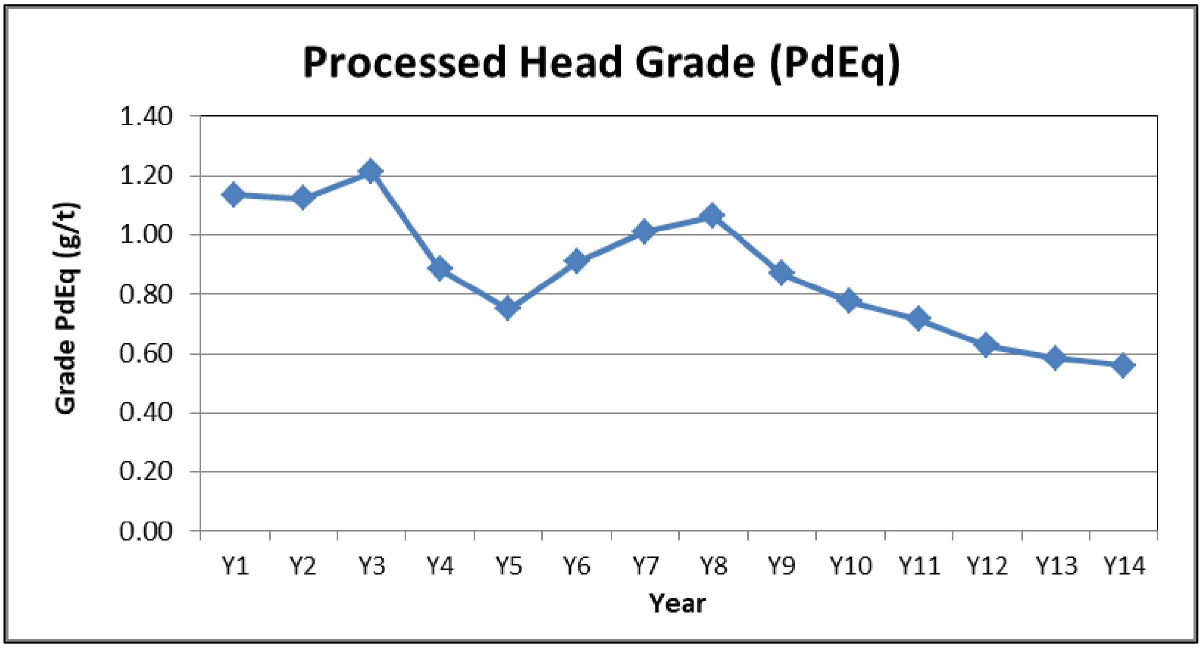


TABLE 16.7
PROCESSING PLANT SCHEDULE

	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Process Plant Feed (Mt)	78.1	4.2	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	1.9
PdEq (g/t)	0.88	1.13	1.12	1.21	0.89	0.75	0.91	1.01	1.06	0.87	0.78	0.72	0.63	0.58	0.56
Au (g/t)	0.04	0.05	0.04	0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02
Ag (g/t)	0.30	0.58	0.41	0.44	0.26	0.17	0.33	0.46	0.37	0.29	0.09	0.05	0.12	0.40	0.34
Pt (g/t)	0.21	0.26	0.25	0.28	0.23	0.18	0.21	0.23	0.24	0.21	0.19	0.19	0.14	0.13	0.13
Pd (g/t)	0.54	0.71	0.73	0.78	0.55	0.45	0.56	0.63	0.67	0.54	0.46	0.39	0.36	0.34	0.33
Rh (g/t)	0.011	0.026	0.013	0.010	0.019	0.007	0.013	0.017	0.017	0.015	0.002	0.001	0.001	0.006	0.008
Cu (%)	0.064	0.076	0.069	0.073	0.055	0.059	0.067	0.072	0.075	0.057	0.058	0.064	0.056	0.053	0.049
Ni (%)	0.019	0.018	0.016	0.017	0.014	0.016	0.017	0.017	0.017	0.016	0.031	0.029	0.027	0.018	0.016
Co (%)	0.003	0.004	0.003	0.003	0.003	0.002	0.003	0.004	0.003	0.003	0.002	0.001	0.002	0.003	0.003

FIGURE 16.6 PDEQ PROCESS PLANT HEAD GRADE PER ANNUM



16.1.5 Open Pit Mining Practices

For the PEA, it is assumed that the open pits will be operated as a contract mining operation. Owner operated mining, including leasing of major equipment units, are options, however, were evaluated to yield lower Project economics due to the high costs of purchasing the mining equipment or the increased operating costs due to leasing during the Project payback period.

The following sections describe the anticipated mining equipment fleet, however, mining contractors may choose to use different equipment based on their experience and their current fleet inventory.

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 factor for both waste rock and process plant feed is 0.30 kg/t.

16.1.5.2 Loading and Hauling

Diesel powered hydraulic excavators with a 29 m^3 heavy rock bucket will be used to excavate the blasted rock. The excavators will load 221 t off-highway haul trucks with a four-pass loading match. The truck fleet will peak at eight trucks.

Excavator loading operations will be supported by a wheel loader with a 29 m^3 rock bucket, although only approximately 15% of the truck loading will be by wheel loader.

From the remote pits in the southeast half of the Property, it is assumed that smaller on-road trucks will be used to deliver feed from each pit to the process plant. The furthest pit (#14) is 15.7 km away from the process plant site (see Figure 16.1, above).

16.1.5.3 Pit Dewatering

The open pits will likely experience groundwater seepage in addition to regular precipitation events and snowmelt. No quantitative information was available to adequately predict the expected water inflows into the pits. 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 16.8.

16.1.5.5 Waste Rock Storage Facilities

The open pit operation will require the development of several waste rock storage facilities ("WRF") located near the mining areas, as shown in Figure 16.1, above.

Where overburden is encountered, it will be hauled to the same WRF location as the waste rock for each pit, but will be placed in a dedicated portion of the facility.

It may be possible to backfill some of the mined-out pits with waste rock, however, there are also plans to backfill some of the pits with tailings. More detailed planning of this will be required at the next study stage.

16.1.6 Open Pit Equipment

The mine operations at River Valley will employ methods and technologies used at other locations around Canada where similar rock and climatic conditions are found. Table 16.8 lists the anticipated peak mine equipment fleet requirements.

TABLE 16.8 ANTICIPATED CONTRACTOR EQUIPMENT FLEET (EXAMPLE YEAR 5)	
Equipment	**Year 5**
P&H 77XR Drill	4
Stemming Truck, 15 t	1
Hydraulic Shovel, 29 m^3 (PC5500)	2
Wheel Loader 29 m^3 (L1850)	1
Haul Truck 221 t (830E)	8
Personnel Van	2
Crane, Grove 40 t	1
Dozer (D375A)	4
Mechanic & Welding Truck	2
Excavator, 4 m^3 (PC390)	1
Fuel & Lube Truck	2
Grader 16H-class 16' blade	2
Flat Deck w Hiab	1
Light Plant	5
Tire Manipulator	1
Truck and Trailer, 200 t	1
Pickup Truck	8
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, 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. The mine office will provide for mine management, engineering, geology and mine maintenance services.

A maintenance shop which will provide pit support services will be located near the process plant. The mine contractor 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 mining operation will require a steady-state open pit workforce of approximately 189 personnel, as summarized in Table 16.9. Manpower numbers will fluctuate as mining volumes and operating equipment needs change.

The contract 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, training;
- Mine operations crews;
- Mine support crews;
- Mine maintenance crews.

TABLE 16.9
OPEN PIT MANPOWER (YEAR 5)

Category	Year 5
Driller	13
Stemming Operator	2
Blaster	2
Blasting Helper	4
Truck Drivers	31
Shovel Operators	5
Loader Operators	1
Heavy Duty Mechanic	26
Pit Services (Dewatering)	4
Grader Operator	8
Dozer Operator	12
Water/Sand Truck Operator	4
Utility Operators	8
Mine Superintendent	1
Mine General Foremen	1
Mine Foremen	8
Drill and Blast Foremen	2
Mine Clerk	1
Dispatch Engineer	1
Dispatchers	4
Equipment Trainer	2
Maintenance General Foreman	1
Maintenance Foreman	4

TABLE 16.9
OPEN PIT MANPOWER (YEAR 5)

Category	Year 5
Shop Foreman	4
Maintenance Clerk	1
Planner	1
Scheduler	1
Welder	4
Gas Mechanic	2
Fuel and Lube Person	4
Tireman	4
Partsman	2
Labourer	4
Chief Mine Engineer	1
Senior Pit Engineer	1
Drill & Blast Engineer	1
Project Engineer	1
Reliability Engineer	1
Geologist	2
Surveyor	2
Survey Technician	2
Mine Technician	2
Ore Control Technician	2
Geotechnical Engineer	1
Tailings Engineer	1
Total	**189**

17.0 RECOVERY METHODS

17.1 INTRODUCTION

The preliminary process plant design is derived from the results obtained from historical testwork with emphasis on the pilot plant testwork conducted by MTU in 1999 and the LCT testwork conducted by SGS in 2013. The data and results were used to develop the process design criteria, the mass balance, the equipment sizes the operating cost estimate ("OPEX") and the capital cost estimate ("CAPEX"). The reason why these two particular tests were used is because they were based on the most optimized results obtained from all previous mineralogical, elemental deportment and kinetics tests, and because LCTs simulate how the actual process plant will be running, therefore, valuable predictions about the success of the process can be made.

The crushing and grinding circuit configuration is based upon that of operating North American Platinum Ltd. ("NAP") which processes a similar type of mineralized material. The size of the crushing and grinding equipment is based on the mine production plan provided by P&E and the feed material competency and hardness obtained through the available testwork. The comminution circuit equipment sizing is based on achieving the primary grind size required to obtain optimal flotation performance and based upon the outcomes of the metallurgical testwork and considering industry practice. Grinding circuit sizing calculations were completed using first principle, power-based modelling methods.

The flotation circuit configuration and design is based on the LCT conducted by SGS in 2013. The results provided the basis for recovery, grade calculations, and residence times. The flotation cell sizes are based on the mass balance and the corresponding cell size available from vendor brochures.

Concentrate and tailings products are dewatered using high-rate thickeners and the concentrate is further dewatered by conventional plate and frame pressure filtration. The design of the high-rate thickeners is based on typical solids loading rates for sulphide concentrates and silica tailings. The filtration circuit design is based on pressure filtration common design practices for concentrate.

For equipment which is influenced by the volumetric flow (tanks and pumps), the sizing requirement is based off the requirement for 115% of the instantaneous flow.

Process water is recovered from the concentrate and tailings thickener overflow. Raw water is assumed to be sourced from the local environment and is used as make-up water. Part of the water that ends up in the tailings pond is recovered to complement make-up water requirements. It is assumed that 10% of the fresh water make-up will come from fresh water sources in case there is not enough recovered water from the TSF during very dry conditions.

A 230 kV transmission line is located passing through the village 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. Therefore, it is assumed that electrical power will be provided by the local utility via either of these overland power lines. It is assumed that a diesel generator will be used for emergency power.

17.2 PROCESS FLOW SHEET

The process plant is designed to produce a single saleable PGE concentrate.

The run-of-mine ("ROM") mineralized material from the mine is crushed in a single primary crushing stage prior to the milling circuit. The primary crushing stage consists of a primary jaw crusher driven by a 400 kW (536 hp) motor. The discharge is conveyed to a live stockpile, which provides an operating buffer between the crushing and grinding circuits.

The grinding circuit consists of a SAG mill in closed circuit with a pebble crusher and two ball mills in parallel. The SAG mill has a diameter of 9.7 m and a length of 4.3 m and is driven by a 7,460 kW (10,000 hp) motor. The SAG mill output is directed to a vibrating screen where oversized material is directed to the pebble crusher. The pebble crusher is essentially a cone crusher of dimensions 2.3 x 2.4 x 0.6 m (90 x 93 x 23 in) and is driven by a 315 kW (422 hp) motor. The pebble crusher product is returned to the SAG mill. The undersize material from the vibrating screen is discharged to a pump box which splits the stream to feed between two ball mills in parallel.

Each ball mill has a diameter of 6.7 m and length of 9.1 m and is driven by a 7,460 kW (10,000 hp) motor and it is in closed circuit with a hydrocyclone cluster to produce an overflow with a P_{80} of 75 µm.

Hydrocyclone underflow material is returned to the ball mills, while the overflow reports to a flotation conditioning tank that feeds the flotation circuit.

The flotation circuit feed is conditioned with CMC depressant, SIBX, AERO 3477, MIBC and Na_2SiO_3. The conditioned slurry is directed to the rougher feed box and into the first of four rougher flotation tank cells with 200 m^3 of volume each. Rougher tailings are sent to the tailings thickener, while the rougher concentrate is pumped to the first cleaner stage.

The first stage of cleaning consists of four conventional forced air flotation cells with 15 m^3 of volume each. Tails from the 1st cleaner cells are pumped to the 1st cleaner scavenger feed box and then to three conventional forced air 1st cleaner scavenger flotation cells, each with 15 m^3 of volume. Tails from the 1st cleaner scavenger cells are directed to the tailings thickener. Concentrate from the 1st cleaners is pumped to the 2nd cleaners, while concentrate from the 1st cleaner scavengers is returned to the 1st cleaner feed box.

The 2nd cleaner bank consists of eight conventional forced air flotation cells, each with 1.4 m^3 of volume. The concentrate from this stage is pumped to a regrinding vertically stirred media mill (vertimill) before feeding the 3rd cleaner stage. A grind size P_{80} of 20 µm is targeted. The 2nd cleaner tails are directed to the 1st cleaner feed box.

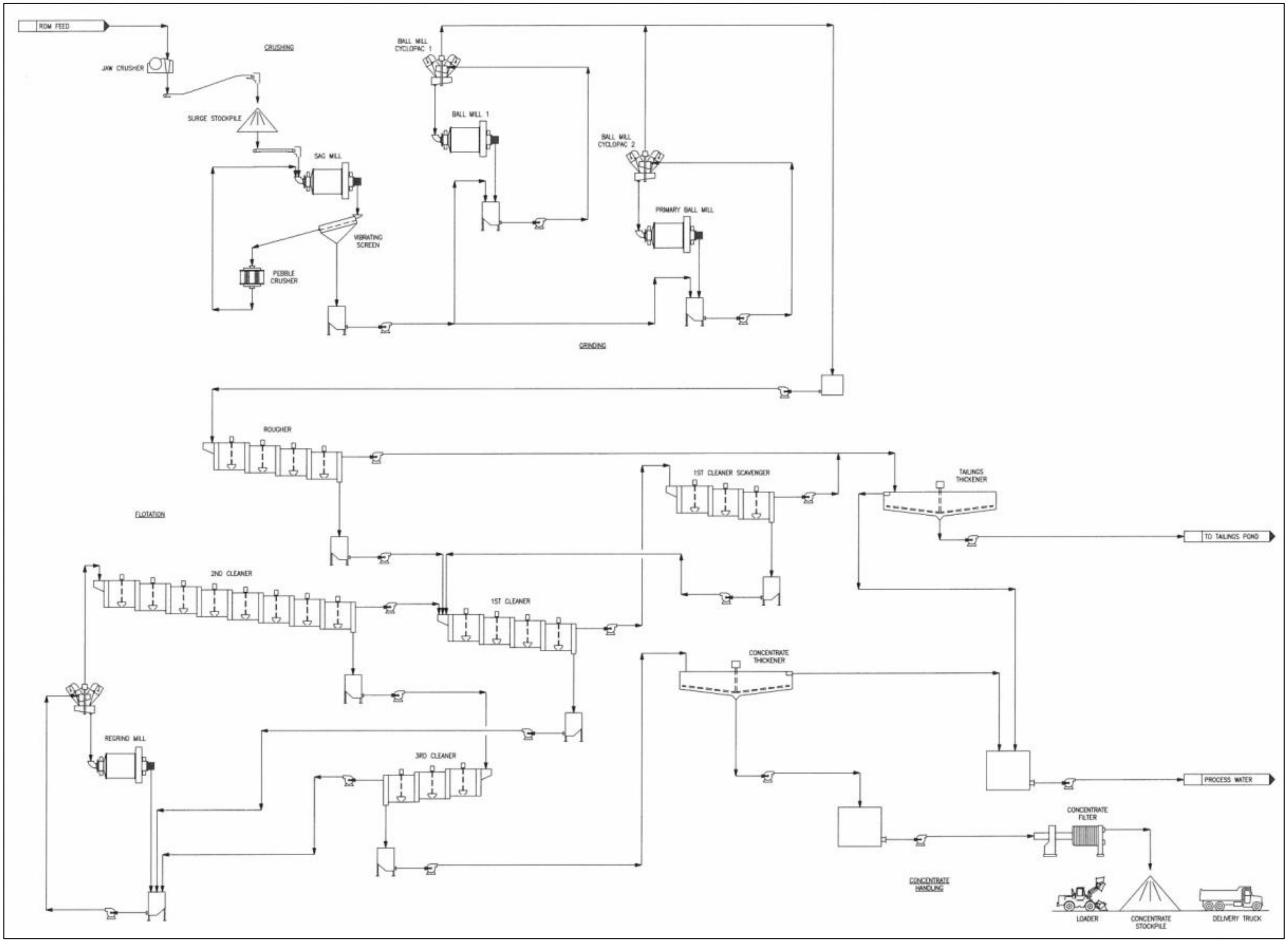
The 3rd cleaner bank consists of three conventional forced air flotation cells, each with 0.3 m^3 of volume. The 3rd cleaner concentrate reports to the concentrate thickener, while the 3rd cleaner tailings report to the 1st cleaner feed box.

The final concentrate, as it comes out of the concentrate thickener is filtered using a single plate and frame filter press prior to shipment.

The underflow from the tailings thickener is pumped to the tailings pond while the overflow is directed to the process water tank. Water recovered from the concentrate thickener and filtering is also directed to the process water tank. The water from the process water tank is distributed to all the areas of the processing plant.

Figure 17.1 illustrates the process plant flowsheet for the River Valley Project.

FIGURE 17.1 SIMPLIFIED OVERALL PROCESS PLANT FLOW DIAGRAM



Source: *DRA (2019)*

17.3 PROCESS PLANT DESIGN

The processing plant is designed to process 6.0 million tonnes per year of run-of-mine ("ROM") mineralized material. The plant will produce a sulphide concentrate using a sequential conventional flotation flowsheet. Plant tailings will be pumped to the tailings pond.

The feed grades were taken from the mine production schedule provided by P&E. Table 17.1 summarizes the main process design criteria.

TABLE 17.1
SUMMARY OF PROCESS DESIGN CRITERIA

Description	Unit	Design
Nominal Throughput – Daily	tonnes/day	21,920
Nominal Throughput – Annual	tonnes/annum	6,000,000
Average Feed to Plant		
- Fe	%	1.571
- Mg	%	0.802
- S	%	0.078
- Ag	g/t	0.300
- Au	g/t	0.036
- Pt	g/t	0.207
- Pd	g/t	0.542
- Rh	g/t	0.011
- Co	%	0.003
- Cu	%	0.063
- Ni	%	0.019
Utilization		
- Crushing circuit	%	75
- Concentrator	%	92
- Tails Filtration	%	92
Ore hardness		
- Abrasion Index ("AI")	kWh/t	0.427
- A x B	g	29.8
- Bond Ball Mill Work Index ("BWI")	kWh/t	19.2
Primary Crushing		
- Type	-	Single Toggle
- Installed Power	kW	400
- Feed Size F80	mm	500
- Closed Size Setting	mm	150
SAG Mill		
- Dimensions (Dia. X EGL)	m	9.7 x 4.3
- Installed Power	kW	7,460
- Feed Size F80	mm	150
- Product Size	mm	2.5
Pebble Crushing		
- Dimensions	in	90 x 93 x 23

Table 17.1 **Summary of Process Design Criteria**		
Description	**Unit**	**Design**
- Installed Power	kW	315
- Feed Size F80	mm	76
- Crusher Product P80	mm	15
Ball Mills		
- Dimensions (Dia. X EGL)	m	6.7 x 9.1
- Quantity of Ball Mills	-	2
- Installed Power	kW	7,460
- Circulating Load	%	250
- Primary Grinding Product P80	µm	75
Flotation Circuit		
- Rougher Residence Time	min	21
- Rougher Cell Volume	m^3/cell	200
- No. Rougher Cells	-	4
- 1st Cleaner Residence Time	min	20
- 1st Cleaner Cell Volume	m^3/cell	14.6
- No. 1st Cleaner Cells	-	4
- 1st Cleaner Scavenger Residence Time	min	20
- 1st Cleaner Scavenger Cell Volume	m^3/cell	14.6
- No. 1st Cleaner Cells	-	3
- Second Cleaner Residence Time	min	20
- Second Cleaner Cell Volume	m^3/cell	1.42
- Second Cleaner Cells	-	8
- Concentrate Regrind P80	µm	20
- Third Cleaner Residence Time	min	20
- Third Cleaner Cell Volume	m^3/cell	0.34
- Third Cleaner Cells	-	3
Thickening and Filtration		
- Concentrate Thickener Solids loading	$t/h/m^2$	0.25
- Percent Solids in Underflow	%	55
- Tailings Thickener Solids loading	$t/h/m^2$	0.15
- Percent Solids in Underflow	%	55
- Solids in Filter Feed	%	45
- Filtered cake moisture content	%	20

17.4 PRODUCTION SUMMARY

A mine production schedule for the process plant was provided by P&E and was developed with the following considerations:

- The process plant nominal throughput rate is 6,000,000 tpy;
- The Life of Mine ("LOM") is estimated at 14 years; and
- The ROM grades were provided for each year based on grade, recovery, Net Smelter Return ("NSR") and metal price.

Table 17.2 outlines the anticipated production results over the LOM according to the production schedule provided by P&E. The basis for the development of the concentrate recoveries and grades were the locked cycle tests carried out at SGS during the 2013 metallurgical program, in consideration of the proposed flow sheet. Life of mine Au recovery in the concentrate is estimated at 60%, Pt at 65.9%, Pd at 80.0%, Cu at 85.1%, Ni at 17.2% and Co at 17.8%. These values are anticipated to change as the Project proceeds into further definition and more testwork is conducted.

TABLE 17.2
RIVER VALLEY LOM PROCESS PLANT PRODUCTION SCHEDULE

Elements	Total Mill Feed	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
	78,127,022	**4,200,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**6,000,000**	**1,927,022**
PdEq (g/t)	**0.88**	1.14	1.12	1.21	0.88	0.75	0.91	1.01	1.07	0.87	0.77	0.72	0.63	0.58	0.56
Au (g/t)	**0.04**	0.05	0.04	0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.02
Ag (g/t)	**0.3**	0.6	0.4	0.4	0.3	0.2	0.3	0.5	0.4	0.3	0.1	0.1	0.1	0.4	0.3
Pt (g/t)	**0.21**	0.26	0.25	0.28	0.23	0.18	0.21	0.23	0.24	0.21	0.19	0.19	0.14	0.13	0.13
Pd (g/t)	**0.54**	0.71	0.73	0.78	0.54	0.45	0.56	0.63	0.67	0.54	0.46	0.39	0.36	0.34	0.33
Rh (g/t)	**0.011**	0.026	0.013	0.010	0.019	0.007	0.013	0.017	0.017	0.015	0.002	0.001	0.001	0.006	0.008
Cu (%)	**0.063**	0.076	0.069	0.073	0.055	0.059	0.067	0.071	0.075	0.057	0.058	0.063	0.056	0.053	0.049
Ni (%)	**0.019**	0.018	0.016	0.017	0.014	0.016	0.017	0.017	0.018	0.015	0.031	0.029	0.027	0.019	0.016
Co (%)	**0.003**	0.004	0.003	0.003	0.003	0.002	0.003	0.004	0.003	0.003	0.001	0.001	0.002	0.003	0.003
S (%)	**0.078**	0.209	0.076	0.075	0.046	0.053	0.110	0.145	0.125	0.040	0.040	0.037	0.051	0.060	0.059
Mg (%)	**0.802**	1.300	1.159	1.192	0.858	0.522	0.825	0.933	0.760	0.941	0.342	0.265	0.446	0.870	1.227
Fe (%)	**1.571**	2.479	2.149	2.140	1.302	1.095	1.827	2.288	2.193	1.585	0.661	0.542	0.833	1.465	1.939

17.5 ENERGY, WATER AND PROCESS MATERIAL REQUIREMENTS

17.5.1 Reagents and Consumables

- The following reagents are used throughout the process plant: Methyl Isobutyl Carbinol ("MIBC") – frother;
- Aerophine 3477 – collector;
- Sodium Isobutyl Xanthate ("SIBX") – primary sulphide mineral collector;
- Cellulose, Carboxymethyl Ether, Sodium Salt ("CMC") – primary non-sulphide depressant;
- Vanfloc Flocculant – for increased settling rates in thickeners; and
- Sodium Silicate (Na_2SiO_3) – secondary non-sulphide depressant.

Reagent mixing will be completed in a designated area within the process plant. The design of this area will include features such as bunding, with dedicated sump pumps. The layout and general arrangement of the reagent area will have to account for the need to prevent contact of incompatible reagent types. Separate onsite long-term reagent supply storage will be provided a safe distance away from the process plant.

Reagents are made up or diluted with fresh water (where necessary); dry flocculants are made using clean fresh or raw water. SIBX collector will be diluted with fresh water prior to addition. Collector 3477 and MIBC are delivered in 1,000 L bulk containers and added to the flotation circuit neat using dosing pumps.

Grinding media is supplied in 200 L steel drums (steel balls for the primary grinding mill) or 500 kg supersacs while the ceramic grinding media for the regrind mills will be delivered in 500 kg supersacs.

17.5.2 Air

Dedicated, independent, low and high pressure air blowers and distribution systems will supply the process air required for each flotation circuit. In each circuit, one blower will be operational, the other will be on standby.

Compressed air for plant distribution will be provided by the centralized plant compressor plant. Air receivers will be positioned throughout the process plant to buffer and control fluctuations within the system.

Instrument air for the process plant will be provided by drying an off-take stream from the centralized compressed air plant. Air receivers will be positioned throughout the plant to buffer and control fluctuations within the system.

Compressed air for the truck shop and primary crusher area will be provided by independent systems due to their distance away from the main process plant.

17.5.3 Water

The use of external make-up water has been minimized as part of the process plant design. Process water is recovered within the circuit using thickeners and filtration unit operations. A process water tank and pump have been incorporated into the design.

Raw (fresh) water will be withdrawn from local fresh water sources. A combined raw and fire water tank will hold sufficient quantities of water to meet the instantaneous process demands of the plant.

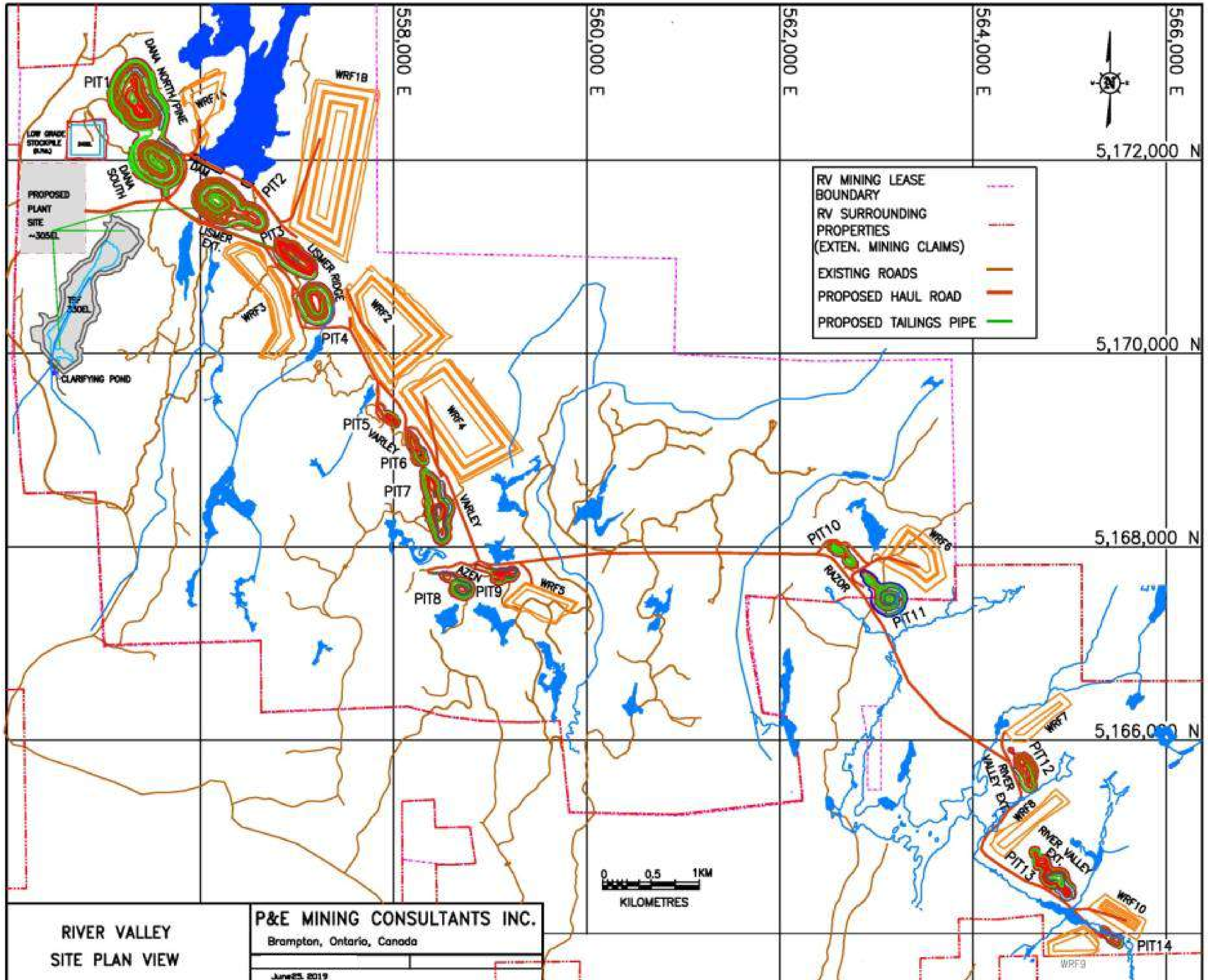
17.5.4 Energy

A 230 kV transmission line is located passing through 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. It is assumed that electrical power will be provided by the local utility via either of these overland power lines. A diesel generator will be used for emergency power generation at the process plant.

18.0 PROJECT INFRASTRUCTURE

There is currently no mining or mineral processing infrastructure at the River Valley Project site. There are logging roads and exploration drilling trails in place, but no buildings or facilities. Hence, the infrastructure required for the Project will need to be developed. Figure 18.1 shows the proposed locations of the process plant, tailings storage facility ("TSF"), low grade stockpile, open pits, waste rock facilities and open pit access roads. The initial mine site infrastructure in the northwest corner of the Property 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.

FIGURE 18.1 PROJECT SITE PLAN



18.1 MINE SITE INFRASTRUCTURE

Contracted mining operations are planned for open pit extraction. Required infrastructure includes access roads to the each open pit and to overburden and waste rock storage areas. The contractor will install its own equipment maintenance facilities in locations specified by the owner, with the main location near the process plant.

A portable office for supporting technical services is required for the owner's supervisory personnel.

A workspace for maintenance and parking areas will be supplied for the owner's support vehicles. Additionally, a covered workspace for mechanics to perform breakdown repairs and maintenance will be provided by the mining contractor.

An explosives magazine and bulk explosives plant will be established by the mining contractor at required safe distances from the process plant/office/maintenance facility area.

There will be no camp facilities at site. Personnel and contractors will be responsible for their own housing and will commute from local communities.

18.2 MINERAL PROCESSING PLANT BUILDINGS

The mineral processing facilities will be located at the northwest corner of the Property in order that they are close to Pits 1 to 4, which contain the bulk of the process plant feed.

The process plant facilities will consist of the following:

- Primary crusher building;
- Grinding, flotation, thickening and filtration building that will also house areas for:
    - Laboratory,
    - Offices,
    - Lunchroom,
    - Medical services,
    - Control room,
    - Water treatment plant;
- Reagents storage and mixing building;
- Spare parts warehouse building;
- Main electrical substation.

18.3 ROADS

A gravel access road to the site and process facilities will be established by a contractor. This will be followed by haul roads for the mining equipment to Pit 1 and its waste rock storage facility, along with roads to the TSF and low grade stockpile. An arrangement of gravel roads will be built using waste rock from the pre-stripping of Pit 1. The width of these roads will be 30 m wide, enough to accommodate three times the operating width of the largest hauling equipment. As mining progresses, haul roads to the other open pits and waste rock facilities will be constructed on an as-required basis.

18.4 POWER SUPPLY

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. It is assumed that electrical power will be provided by the local utility via either of these overland power lines. The total absorbed electrical power estimate for the process plant, during steady state operation, is estimated at 26.7 MW. A diesel generator located at the process plant will be used for emergency power.

18.5 FUEL SUPPLY

Diesel fuel storage will be provided at site for the contract mining equipment and the owner's equipment. A fuel storage tank with proper spillage control is included in the process plant infrastructure.

18.6 WATER SUPPLY

Potable water will be sourced from local lakes, and will be treated to make it potable if necessary.

The use of external make-up water for the process plant has been minimized as part of the process plant design. Process water is recovered within the circuit using thickeners and filtration unit operations. It is assumed that 10% of the fresh water make-up will come from fresh water sources in case there is not enough recovered water from the TSF during very dry conditions. A process water tank and pump have been incorporated in the design.

A combined raw and fire water tank will hold sufficient quantities of water to meet the instantaneous process demands of the plant.

18.7 SANITARY WASTE

Sanitary waste water will likely be directed to a septic tank and weeping tile system.

18.8 TAILINGS MANAGEMENT

Tailings management at River Valley will occur in two phases. For the first 5 to 6 years, tailings will be stored in a surface facility with an engineered embankment. Approximately 30 Mt of tailings will be stored on surface.

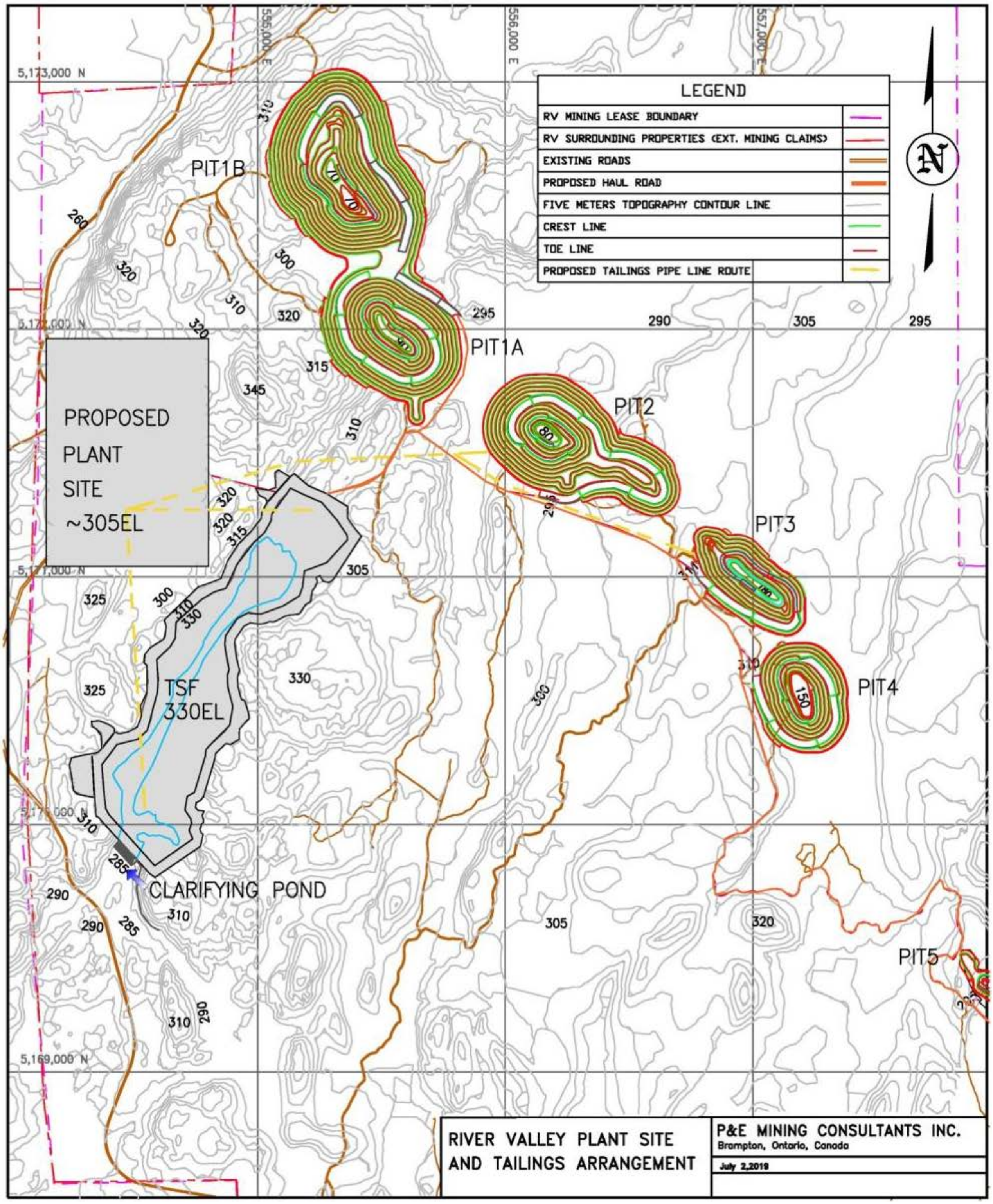
Subject to testing confirmation, River Valley tailings are expected to be neither acid generating or metal leaching.

18.8.1 Surface TSF Site Selection

Several site options have been examined from surface tailings storage. Aspects considered included type of tailings facility, distance from the process plant, minimization of the disturbance of local ecology, potential for advancing in-pit disposal and closure.

A valley close to the proposed process plant location has been selected as the optimum location for early years of the River Valley Project. The location is shown in Figure 18.2. The location provides maximum natural tailings containment of solid rock and is expected to offer a rigid, stable base for the perimeter engineered embankment. The catchment basin is limited and the diversion of surface water appears to be readily achievable. However, the site currently includes a significant pond and some wetland. As discussed in Section 20 of this Technical Report, significant studies are expected to be required to address ecological compensation.

FIGURE 18.2 TSF LOCATION RELATIVE TO PROCESS PLANT LOCATION AND FIRST FOUR OPEN PITS



18.8.2 TSF Embankment Design and Sequencing

A single perimeter embankment will be required for the surface TSF. The embankment will be a downstream design constructed mainly with sized waste rock. The anticipated maximum embankment height will be 25-30 m at the southwest corner of the TSF. The upstream embankment face will be composed of a protected, impervious layer which will be keyed into a solid rock base below the embankment. The impervious layer will be backed by a filter zone. The natural pond water and forest vegetation will be removed (pumping and harvesting) before constructing starter embankment. Organic-rich soils will be collected and stockpiled for TSF closure applications. No conduits will be constructed at any location through the embankment. The embankment will be raised on two or more occasions, during the late summer season.

18.8.3 Surface TSF Management

To minimize size segregation of tailings solids, the tailings will be thickened in the plant to 55% solids or more before being pumped to the surface TSF for deposition. Tailings deposition will be from the perimeter of the TSF, including the embankment during the early years followed by deposition in central zones to result in a gentle slope profile at the end of the surface TSF use.

The tailings are expected to consolidate to a density of 1.6 t/m^3 or higher, which with adequate freeboard will require a TSF capacity of approximately 20 Mm^3.

Tailings water and precipitation will be collected by a floating barge and discharged to a clarifying pond facility at the base of the main embankment.

At the end of 5 or 6 years of operation, the surface TSF will cease to operate. Closure is expected to include the spreading of stockpiled organic-rich soils and till and the construction of a rock-armoured surface drainage channel and a spillway excavated in solid rock.

The long-term management requirements related to the surface TSF are expected to be minimal.

18.8.4 In-Pit Disposal

In-pit tailings disposal is expected to be straight forward but different than for the surface TSF. Thickened tailings will be deposited under a water/ice cover in a mined-out pit. A water cover will be maintained with the excess water clarified in dedicated surface ponds for either treatment and release or returned to the process plant.

In-pit tailings facilities will be closed out with a water cover. Pit water quality is expected to be high to permit natural ecological development.

18.9 WASTE ROCK STORAGE

Waste rock mined from the open pits will be either overburden or broken hard rock. The overburden thickness is relatively thin, less than 10 m in most places, and only 1.2 Mt of overburden will be mined over the LOM, compared to 276.4 Mt of waste rock. The broken hard rock will be the product of blasting the host rock surrounding the mineralized zones in each Deposit.

Waste rock storage facilities ("WRF") will be located adjacent to each open pit, or pair of pits. The locations were selected in order that there would be minimal interference with wetlands and lakes, and would be at least 100 m from each pit for stability reasons. The WRFs will be established in sequence with the production schedule.

The WRFs have been designed with a face angle of 23°, and a 20 m wide safety berm for every 30 m of height. Run-off water from the rock will be collected in perimeter diversion ditches that are channelled to settling ponds. Metal leaching and acid rock drainage ("ARD") are not anticipated. At mine closure, the WRFs will be dozed and covered with overburden, then seeded.

18.10 WATER MANAGEMENT

Effluent water from the process plant will be directed to a treatment plant.

Operations will manage water within the mining areas from direct precipitation, run-off, and mine water. It is not anticipated that mine water, contact water and stockpile run-off will require treatment to meet discharge standards. Mine water pumped from the open pits will flow to holding ponds where suspended solids will settle out and final water quality will be checked before the water is released. If necessary, pH adjustment using lime will be implemented.

19.0 MARKET STUDIES AND CONTRACTS

19.1 METAL PRICES AND FOREIGN EXCHANGE

P&E followed the approximate long term price consensus forecasts by various banks and brokerage firms for Au, Pt, Ni and Cu. For Pd, Co and the CDN$:US$ exchange rate, these were adjusted to more closely follow recent trends. The metal prices and FX are listed in Table 19.1.

TABLE 19.1
METAL PRICE ASSUMPTIONS AND FX (US$)

Commodity	Au/oz	Pd/oz	Pt/oz	Ni/lb	Cu/lb	Co/lb	CDN$:US$
Price	1,350	1,200	1,050	8.00	3.25	35.00	1.37

19.2 CONTRACTS

There are no existing contracts in place related to the River Valley Project. Parameters related to smelting and refining that would form the basis of a smelting and refining agreement are discussed in Section 22 of this Technical Report.

20.0 ENVIRONMENTAL STUDIES, PERMITS, AND SOCIAL OR COMMUNITY IMPACTS

The River Valley PGE Property is located equally distant from Sudbury and North Bay (100 km by road each) and 20 km north of the Trans Canada Highway # 17. The Property area is uninhabited with the closest full-time habitation 7 km south at Glen Afton, and at the village of River Valley a further 10 km south-east along the Sturgeon River. Previous exploration activities on the Property have included trenching, surface drilling, geophysical surveys, geological mapping and exploration trail development as indicated in Figure 20.1. No significant environmental liabilities related to previous exploration activities are known to exist at the Property. The trails and cleared zones to the east of the Deposit (Figure 20.1) are the result of provincially-permitted forestry.

FIGURE 20.1 RIVER VALLEY PROPERTY LOCAL ENVIRONMENT EXPLORATION SITES – RED ARROWS

Source: *Google Earth 2018*

The River Valley PGE Project, while a proposed large-scale mining project, is expected to have no discernable off-site impacts during development, operations and closure. No hazardous chemicals will be used to process mineralized feed material which along with waste rock is not expected to be acid generating or metal leaching. Elements of potential concern often found with Mineral Resources – e.g. arsenic, are present at background concentrations. The Project will be designed for closure with mined-out pits to be used for tailings disposal 5-6 years after Project commencement, and the initial tailings storage facility ("TSF") will cease operation in the early years of the Project.

A major environmental aspect of the River Valley Project that will be outlined in a Project Description and in the expected Environmental Assessments is the intrusion of open pits into the footprint of a few small and one larger surface water body (Pine Lake) on the Project site.

The partitioning off of surface water-bodies for mining has been a relatively common occurrence in Canada. Engineered dykes have been used at gold (Nunavut), uranium (Saskatchewan), diamonds (Northwest Territories) mines and at several others to temporarily isolate a portion of a lake in order to safely allow a pit development. In general, when mining is completed, the dykes are breached to allow the lake footprint to be re-established.

Protection of fish habitat by either temporarily or permanently establishing habitat that is similar to that which has been removed is a general strategy that is employed at mine sites. Protection of lake water quality is usually another key aspect that will be undertaken in agreement with River Valley Project environmental criteria and with official regulations.

20.1 ENVIRONMENTAL STUDIES

Baseline environmental studies for the River Valley Project have been limited to a 2011 study of surface water quality, sediment analyses and benthic identifications. The DST Consulting Engineers study was based on November 2011 sampling of an area representing locations of a part of the Mineral Resource and mining-related activity. More extensive baseline environmental studies will be required in the earliest stage of the Project development and an Environmental Impact Assessment. These studies are expected to include:

- Meteorology and air quality. The nearest climate station data may be the Sudbury airport about 50 km west of the Project site.

- Soils. The soil cover in the area is mainly composed of glacial till. The soils study will include the consideration of organic and aggregate resources suitable for the developing and closing out the Project. The soils at the proposed process plant and infrastructure locations will be closely evaluated.

- Waste rock and mineralization geochemistry. This will be a laboratory-based testing program for acid generation (“ARD”) and metal leaching (“ML”).

- Hydrology. Seasonal drainage patterns and flows will be assessed for the Project area. Potential interruption (i.e. diversion) of surface hydrology by infrastructure, pit and TMF development will outlined. Groundwater flows to creeks, lakes and wetlands will be evaluated and is expected to be limited.

- Hydrogeology. An assessment is needed to determine the hydraulic properties of the overburden and of the bedrock, particularly in the pit locations. Groundwater quality will be determined from existing drill holes.

- Surface water quality. Both upstream and downstream of the mines and surface facilities will be sampled to represent seasonal variations.

- Stream sediment analyses. Upstream and downstream sediment will be sampled.
- Aquatic resources. Multi-season studies of fisheries and aquatic resources will be carried out, with a focus on the aquatic resources that may be impacted by open pit and TMF development.
- Vegetative communities of the Project Area.
- Wildlife surveys including a Species at Risk Assessment.

These studies will establish baseline conditions for a detailed Environmental Assessment that will likely be required for the River Valley Project.

Two areas of environmental-engineering focus will be the tailings embankment base and the bathymetry profiles and foundation geotechnical characteristics for the placement of dykes in Pine Lake to permit the development of Open Pits 1 and 2 and possibly in other un-named water bodies for the development of other open pits in future years of operations.

20.2 ENVIRONMENTAL REGULATIONS AND PERMITTING

The federal and provincial Environmental Assessment ("EA") processes and permitting framework for metal mining in Canada are well established. Following the EA approval, the River Valley Project will enter a permitting phase which will regulate the Project through all phases - construction, operation, closure, and even post-closure. Throughout all of these processes, consultation with, and advice from, local First Nations and local communities is considered essential.

20.2.1 Federal Environmental Assessment Process

In 2012, the 1992 Canadian Environmental Assessment Act ("CEAA") was updated to CEAA 2012. CEAA 2012 is currently being updated under Federal Legislation C-69, which if implemented, will increase the potential for stronger public participation in consideration of whether or not a project should proceed. The updated act includes the earlier definition of what aspects may "trigger" a federal EA. Under CEAA 2012 and C-69, an EA focuses on issues within federal jurisdiction including:

- Fish, fish habitat and other aquatic species;
- Migratory birds;
- Federal lands and effects of crossing interprovincial boundaries;
- Effects on Aboriginal peoples such as their use of traditional lands and resources; and
- A physical activity that is designated by the Federal Minister of Environment that can cause adverse environmental effects or result in public concerns.

Since the development of open pits and to a lesser extent tailings management can be considered to adversely impact fish habitat, a federal EA may be triggered by that aspect alone. However, with careful design, the anticipated impact of the River Valley Project on fisheries could be considered small. In other words, the Harmful Alteration, Disruption or Destruction of Fish

Habitat ("HADD") is anticipated to be small, and a detailed fisheries compensation plan and the absence of significant public concern could potentially allow the Federal Minister to waive the need of a federal EA. However, Federal Legislation C-68, which is currently being considered by the Canadian Senate, strengthens the protection of fisheries habitat and public input.

A requirement of an EA under federal legislation is anticipated for the River Valley Project.

20.2.2 Provincial Environmental Assessment Process

The Ontario EA process is administered by the recently renamed Ministry, the Ministry of Environment, Conservation and Parks ("MECP"). In addition to promoting responsible environmental management, interested third parties (e.g. members of the public) can comment on a mining project and request that the MECP minister call for an EA.

Ontario mining projects are not often subject to the EA Act because many mine development activities are not specified in the relevant Act. However, specifications do include:

- Transfer of Crown resources including land;
- Building electric power generation facilities or transmission lines;
- Constructing new roads and transport facilities; and
- Establishing a tailings management facility.

Other than marginal timber resources, no Crown resources are affected by the Project. The construction of a power line allowance and a 115 KV transmission line will require Provincial approval. Upgrading of the 6 km trail from Glen Afton will be required to handle industrial transport and provide safe access for workers.

20.2.3 Environmental Assessment Requirements for the River Valley Project

This section briefly summarizes EA requirements for the Project.

20.2.3.1 Federal EA Requirements

NAM will consult with the CEAA Agency in the near future to determine whether the Project is subject to a Federal EA. The submission of a Project Description is the initial step. As noted above, since mining and tailings management is expected to impact fisheries habitat, a Federal EA can be anticipated. The large scale of mine and processing operations could also be a factor in triggering a Federal EA.

20.2.3.2 Provincial EA Requirements

It is reasonably possible, if a Federal EA is required, a joint Federal-Provincial EA would be agreed upon by the respective agencies. The Province of Ontario will review, in particular, monitoring commitments by River Valley as well as Closure Plans and associated financial commitments.

20.2.3.3 Project Permitting

The Project will seek all permits, Environmental Compliance Approvals ("ECA's") and authorizations from both federal and provincial agencies to construct, operate and close out the River Valley Project. These permit items are quite numerous and will require significant commitment by Project personnel.

A high level of compliance is anticipated for the Project. Challenges experienced during operations by other projects of similar size and scope in the Province of Ontario usually revolve around the management of ammonia (from blasting) and suspended solids in effluents from surface water run-off, waste rock management and open pit water. Tailings decant water originating from the TSF and from open pit tailings disposal will be returned to the process plant during operations.

20.3 SOCIAL AND COMMUNITY REQUIREMENTS

River Valley will consult in a meaningful way with all local communities and the two local First Nations organizations that have traditional interests in the River Valley Project site.

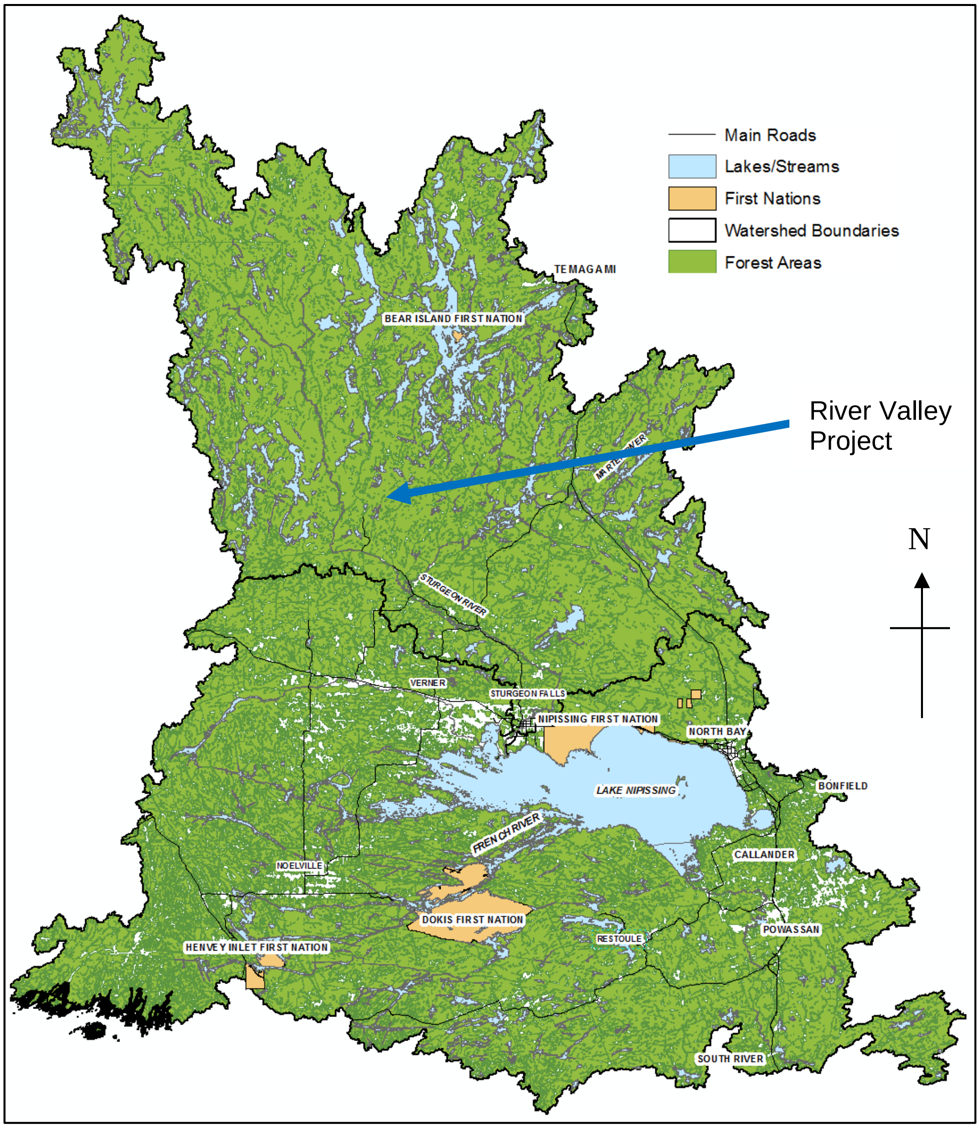
The two First Nations are the Temagami First Nation which has an interest in the northern section of the Project site, and the Nipissing First Nation which has an interest in the southern section. Both the Nipissing First Nation and the Temagami First Nation have visited the Project in 2017 and 2018. The locations of these First Nations relative to the Project site are shown in Figure 20.2.

It is anticipated that Participation Agreements may be entered into with these First Nations and these Agreements could cover the following aspects:

- Environmental protection;
- Employment;
- Education and training;
- Business opportunities; and
- Financial.

Communities in the area south of the Project site including as far south as Verner and West Nipissing (formerly Sturgeon Falls) as well as small communities on the Sturgeon River (e.g. River Valley, Field) are also expected to express interest in the opportunities and potential risks represented by the Project. Some interest may arise from the fact that the Project site drains west into the Sturgeon River. The Temagami River is another major river in the area and flows into the Sturgeon River at River Valley. The combined rivers flow through West Nipissing into Lake Nipissing. The Sturgeon River is the source of municipal water in West Nipissing.

FIGURE 20.2 FIRST NATIONS, RIVER VALLEY PROJECT LOCATIONS IN THE LAKE NIPISSING WATERSHED



Source: *https://lnsbr.nipissingu.ca/, Lake Nipissing State of the Basin Report*

The River Valley Project locations are indicated by the blue arrow in Figure 20.2.

20.4 MINE CLOSURE

NAM will develop a reclamation and Closure Plan that will satisfy all regulatory requirements and will be consistent with best Canadian industrial practice. The Plan will be submitted to the Ontario Ministry of Northern Development, Mines and Energy and is expected to include:

- Results of consultations with First Nations, local communities and provincial agencies;
- Provision for progressive closure of tailings, waste rock storage and mined-out open pits;

- Restoration of creek diversions, ponds and dyked lake sections; and
- Restoration of plant and infrastructure sites.

For closure planning and financial assurance considerations closure will be addressed in four phases:

- Construction and Pre-production;
- Production and modification of production;
- End of operations; and
- Post-closure.

The closed-out Project site should essentially be a "walk-away" situation, that is, no post operation active treatment should be required. Surface water quality should return to pre-mining conditions and pits will either be flooded, allowing aquatic biology to self-establish, or will be filled with tailings. A vegetative cover will be established on the in-pit tailings once self-consolidation of the tailings mass is completed.

21.0 CAPITAL AND OPERATING COSTS

Capital and operating costs are listed in Canadian dollars ("$") unless stated as United States dollars ("US$").

21.1 CAPITAL COST ESTIMATE

21.1.1 Mining Capital Costs

Mining capital costs are for pre-stripping Open Pit 1. A total of 7.7 Mt of material, mostly waste rock, will be mined during the pre-production period at a cost of $2.25/t for a total estimated cost of $17.3 M. A 1.5 Mt stockpile of process plant feed will also be established during pre-production.

21.1.2 Process Plant Capital Costs

The overall process plant capital cost estimate was compiled by DRA and is summarized in Table 21.5. DRA developed the process plant and plant infrastructure capital cost estimates for the Project scope described in this Technical Report. External inputs received are given in Section 21.1.2.3 Estimate Criteria.

All costs are expressed in United States Dollars (US$), with conversions to Canadian dollars at an exchange rate of 1.37 CDN:US$, and are based on Q2 2019 pricing. The process plant capital cost estimate is deemed to have an accuracy of ±50% and was prepared in accordance with the AACEI (Association for the Advancement of Cost Engineering International) Class 5 estimating standard.

The process plant capital cost estimated was developed based on a typical Engineering, Procurement and Construction Management ("EPCM") project execution model. Major equipment was specified, and priced quotations obtained from reputable Original Equipment Manufacturers ("OEM").

Table 21.1 presents the process plant and utilities CAPEX, estimated at $89.4 M (US$ 65.3 M).

TABLE 21.1 PROCESS PLANT AND UTILITIES CAPITAL COST SUMMARY				
Description	**Labour Installation Cost (US$000)**	**Material Cost Total Cost (US$000)**	**Equipment Supply Cost Total Cost (US$000)**	**Total Installed (US$000)**
Factored Commodities				
Earthworks and Civil	4,608	512	-	5,120
Concrete	4,320	5,280	-	9,600
Structural Steel	4,608	6,912	-	11,520
Platework	2,304	2,816	-	5,120
Electrical	3,456	2,419	5,645	11,520
Instrumentation	2,688	1,997	2,995	7,680
Piping	6,400	5,760	640	12,800
Insulation and Protection	960	960	-	1,920
Subtotal Process Plant Factored Commodities	**29,344**	**26,656**	**9,280**	**65,279**

21.1.2.1 Plant Infrastructure Capital Cost

The process plant and infrastructure capital cost estimate is based on the facilities described in this Technical Report and can be summarized as follows:

- Process plant: feed receiving, crushing, grinding, flotation, tailings thickening, concentrate thickening, plant services and utilities, and reagents.

- Waste management: Flotation tailings storage facility (“FTSF”), waste rock, surface water management and effluent water treatment.

- Plant infrastructure: site development and roads, power generation and distribution, and buildings.

The plant and infrastructure capital cost estimate is summarized in Table 21.2, and is estimated at $$77.9 M (US$ 56.9 M).

TABLE 21.2 SUMMARY OF PROCESS PLANT INFRASTRUCTURE CAPITAL COST SUMMARY				
Description	**Labour Installation Cost (US$000)**	**Material Cost (US$000)**	**Equipment Supply Cost (US$000)**	**Total Installed (US$000)**
Plant Terracing - General Site Clearing & Grubbing	1,170	-	-	1,170
Primary Crusher Building	1,500	2,025	225	3,750
Process Building	15,400	20,790	2,310	38,500
Reagent Storage	480	720	-	1,200
Flocculant area	300	450	-	750
Main Electrical Substation	900	-	3,600	4,500
Overland Tailings piping	506	557	62	1,125
Water Treatment Plant	416	211	583	1,210
Satellite Communications System	168	94	218	480
Plant Mobile Equipment	419	-	3,770	4,189
Subtotal Plant Infrastructure	**21,259**	**24,846**	**10,769**	**56,874**

21.1.2.2 Basis of Estimate

This section describes the basis and methodology used to compile the capital cost estimate, covering initial and sustaining capital requirements, including direct, indirect and contingency. The capital cost estimate provides a substantiated assessment of capital requirements for the defined scope to provide a basis to allow Project economic evaluation and provide a budget for Project implementation.

Process Plant Capital Cost Estimate Basis

The basis for the capital cost estimate is summarized in the Table 21.3.

TABLE 21.3 PROCESS PLANT CAPITAL COST ESTIMATE BASIS	
Description	**Basis**
Process	
Process Design Criteria (PDC)	Preliminary
Process Block Flow Diagram	Preliminary
Mechanical Equipment List (MEL)	Preliminary
Mass and Water Balance	Preliminary
Engineering	
Site Location	Preliminary

TABLE 21.3 PROCESS PLANT CAPITAL COST ESTIMATE BASIS	
Description	**Basis**
Electrical Load List	Preliminary
Infrastructure	
Plant Utilities	Factored
Plant Infrastructure	Factored

Quantity Development and Pricing Basis

Bulk commodity quantities were derived mainly through preliminary engineering factored from similar project designs with the necessary adjustment. Pricing was determined using a percent factor of the total process equipment installed cost based on historical data and benchmarked industry factors and allowances. Table 21.4 summarizes the source of pricing used by major commodity expressed as a percentage by value of the process equipment cost.

TABLE 21.4 BULK COMMODITY QUANTITIES FOR PROCESS PLANT			
Description	**Factor %**	**Process Equipment Cost (US$000)**	**Commodity Cost (US$000)**
Earthworks and Civil	8.0	63,999	5,120
Concrete	15.0	63,999	9,600
Structural Steel	18.0	63,999	11,520
Platework	8.0	63,999	5,120
Electrical	18.0	63,999	11,5201
Instrumentation	12.0	63,999	7,680
Piping	20.0	63,999	12,800
Insulation and Protection	3.0	63,999	1,920
Total			**65,279**

21.1.2.3 Estimate Criteria

Base Date

The base date for the capital cost estimate is April 2019.

Base Currency

The estimate is presented in United States Dollars (US$). Prices obtained in other currencies have been converted to US$ using the applicable exchange rates. Equipment and services quoted in other currencies were converted using the appropriate exchange rates. These exchange rates have been used and fixed in the estimate data sheet and all costs quoted in these currencies have been linked to these exchange rates to enable them to be changed at a later stage, if required.

Accuracy

The capital cost estimate is deemed to have an accuracy of ±50% and was prepared in accordance with the AACEI (Association for the Advancement of Cost Engineering International) Class 5 estimating standard.

Escalation

Escalation after the estimate base date has not been allowed for in the capital cost estimate.

Estimating System and Format

The estimate was prepared in the DRA estimating system in MS Excel format.

Estimate Report Requirements

The capital cost estimate is presented as a fully detailed estimate, together with a summary sheet. The summary sheet has been compiled with the following area breakdowns in order that the total cost for each area can be immediately identified:

- Process Plant;
- Utilities;
- Processing Plant Infrastructure;
- Contractor Indirects;
- Spare Parts;
- Initial Fills;
- Vendor Supervision;
- Freight and Logistics;
- Third Party Engineering;
- Start-up/Commissioning Support;
- Engineering Procurement;
- Construction Management;
- Construction Power;
- Construction Fuel;
- Contingency.

Cost Categories

The cost category for the allocation of costs to the engineering disciplines, as well as the defined Project support functions are as follows:

- Earthworks and Civil;
- Concrete;
- Structural Steel;

- Platework;
- Electrical;
- Instrumentation;
- Piping;
- Insulation and Protection.

Estimating Responsibility

DRA prepared the estimate for the process plant, the associated equipment and infrastructure. P&E was responsible for the mining and tailings areas.

21.1.2.4 Estimate Methodology

The general approach followed to estimating the process plant capital cost was to measure each cost element from the mechanical equipment list and the motor list.

Budget quotations from vendors were obtained for the all major items of mechanical and electrical equipment whereas minor items of mechanical or electrical equipment, in general, were taken from the DRA database.

The estimate for the processing plant has been developed assuming a continuous engineering, procurement and construction effort with no interruption of the implementation program after funding approval has been obtained.

The estimate is based on an EPCM Project execution strategy whereby the Project execution will be managed by an EPCM Contractor who would work in conjunction with the Owner's Team that would provide overall direction and oversight. The EPCM Contractor would place contracts for and on behalf of the Owner. Contracts for major construction work packages would be tendered to multiple regional pre-selected Construction Contractors, covering the general disciplines of Earthworks, Civil Works (Concrete), Structural Steel, Platework, Piping, Mechanical Installation, Electrical and Instrumentation Installation. Mechanical and Electrical equipment will be supplied by OEMs and free-issued to the appointed erection contractors for installation or erected by the OEM.

The total process plant Project cost and duration has been estimated on a single shift basis and therefore no secondary shifts, or overtime work, has been allowed for in the estimate.

DRA utilized the internationally recognized FIDIC (Fédération Internationale Des Ingénieurs-Conseils) suite of contract terms and conditions for all measurable construction work packages and DRA's standard terms and conditions for equipment supply packages.

Earthworks

Earthworks costs were estimated as a percentage of the total process plant equipment installed cost. The factor used, based on historical data from other projects was 8.0%.

Civil Works

Civil works costs were estimated as a percentage of the total process plant equipment installed cost. The factor used, based on historical data from other projects was 15.0%.

Building Works

The building works were quantified from a very preliminary estimate of the total area required for the entire process plant site based on similar size projects, as well as, taking the major process equipment sizes into consideration and comparing them to similar area requirements for other projects.

Building rates were obtained from DRA's internal database information and used to populate the estimate.

Structural Steelwork Supply and Erection

Steelwork costs were estimated as a percentage of the total process plant equipment installed cost. The factor used, based on historical data from other projects was 18.0%.

Platework and Lining

All platework and liner costs were estimated as a percentage of the total process plant equipment installed cost. The factor used, based on historical data from other projects was 8.0%.

Mechanical Equipment

DRA issued budgetary/email enquiries, complete with all preliminary size and power specifications, to prominent suppliers for the major process mechanical equipment and received more than three quotations per major equipment.

The erection cost for the mechanical equipment was based on historical internal data from other projects and adjusted accordingly.

Conveyors

Conveyor cost was estimated as a percentage of the process plant total installed cost.

Piping

Piping costs were estimated as a percentage of the total process equipment installed cost. The factor used, based on historical data from other projects was 20.0%.

Insulation and Protection

Insulation and corrosion protection costs were estimated as a percentage of the total process plant equipment installed cost. The factor used, based on historical data from other projects was 3.0%.

Electrical

Electrical costs were estimated as a percentage of the total process plant equipment installed cost. The factor used, based on historical data from other projects was 18.0%.

Instrumentation

Instrumentation costs were estimated as a percentage of the total process plant equipment installed cost. The factor used, based on historical data from other projects was 12.0%.

Contractor Indirect Costs

The contractor indirect costs were estimated as a percentage of the total direct cost. The factor used, based on historical data from other projects was 30.0%.

First Fill and Consumables

An allowance of $3.3 M (US$2.4 M) has been allotted for the cost of initial fills based on other similar projects.

Spare Parts

The cost for spare parts was estimated as a percentage of the difference between the total direct cost of the process plant mechanical equipment cost minus the mobile equipment cost. The factor used, based on historical data from other projects was 5.0%.

Vendor Supervision

The cost for vendor supervision was estimated as a percentage of the total direct cost of the process plant mechanical equipment. The factor used, based on historical data from other projects was 5.0%.

Freight, Transport and Insurance for Process Equipment

The cost for spare parts was estimated as a percentage of the total direct cost. The factor used, based on historical data from other projects was 10.0%.

Freight, Transport and Insurance for Steel EC&I and Piping

The cost for spare parts was estimated as a percentage of the total direct cost. The factor used, based on historical data from other projects was 8.0%.

Third Party Engineering

The cost for third party engineering services was estimated as an allowance based on historical in-house data. For this size of process plant, an allowance of $0.75 M (US$0.55 M) was made.

Start-up and Commissioning Support

The cost for start-up and commissioning was estimated as a percentage of the total process mechanical equipment cost. The factor used, based on historical data from other projects was 3.0%.

Engineering Procurement

The cost for engineering procurement was estimated as a percentage of the difference between the total direct cost of the process mechanical equipment cost minus the mobile equipment cost. The factor used, based on historical data from other projects was 11.0%.

Construction Management

The cost for construction management was estimated as a percentage of the difference between the total direct cost of the process mechanical equipment cost minus the mobile equipment cost. The factor used, based on historical data from other projects was 8.0%.

Construction: Power and Fuel

The cost for power during construction and fuel required to power all construction mobile equipment estimated as an allowance based on historical in-house data. For this size of process plant, the allowance for power required during construction is based on the amount of fuel required. The allowance was estimated at $1.8 M (US$1.3 M). Also, for this size of process plant, the allowance for fuel required for all construction mobile equipment was estimated at $1.7 M (US$1.3 M).

Assumptions

The following assumptions have been made in the preparation of this estimate:

- Quotes from vendors for equipment and materials are valid for budgetary purposes only.
- Engineering and construction activities will be carried out in a continuous program with full funding available including contingency.
- Labour productivities are established with input from experienced local contractors and checked against DRA's in-house database of current projects.

- Bulk materials such as cement, rebar, structural steel and plate, cable, cable tray, and piping are all readily available in the scheduled timeframe.

Exclusions

The following are not included in the capital cost estimate:

- Escalation.
- Cost of schedule delays such as those caused by:
  - Scope changes.
  - Events that would be considered Force Majeure.
- Environmental permitting activities.
- Cost of financing.
- Acquisition costs.
- Sunk costs.
- Additional studies prior to EPCM.
- All royalties, commissions, lease payments, rentals and other payments to landowners, title holders, mineral rights holders, surface right holders, and / or any other third parties not mentioned in this documentation.
- Forward cover for any foreign content, (it is assumed that this would be accommodated by the client if necessary).
- All operating costs.
- Any work outside the defined battery limits.
- Any provision for Project risks outside of those related to design and estimating confidence levels.
- Fuel storage, other than the provision of any fuel bunkers, in the scope of work.
- Interest on capital loans.
- Any costs to be expended following completion of this PEA study and prior to Board approval for project implementation.
- Mineral rights and the purchase or use of land.
- The costs of any trade off studies.
- Post-closure operating costs.
- Scope outside of the battery limits as defined by the block plan, PFD's, equipment list and scope specifically defined in this Technical Report.
- Any management reserves required by the owner outside of contingency, including Project risk reserve.
- Construction camp and catering. There is no camp planned. Company personnel and contractors will commute to the Project site from surrounding communities.
- Taxes, Duties and Permits.
- 1-year Spares and Inventory.
- Owner's Cost.

21.1.2.5 Escalation

Escalation costs past the base date have not been allowed for in the estimate.

21.1.2.6 Contingency

Estimating Accuracy and Design Development Allowance

The Project capital estimate was developed as described in this section, supported by preliminary engineering which varies in level of development in specific discipline areas. The estimate is considered comprehensive and adequate for a PEA. Contingency was assessed per discipline considering the level of engineering development, level and confidence of market pricing for supply and erection costs received.

A schedule and Project duration have been considered in the development of this estimate detailing the design development assessment and contingency value assigned to each discipline.

Contingency has been assessed as a percentage for the individual cost components, from which an overall estimating design development allowance has been derived.

The design development allowance, reflected as contingency, is assessed as a measure of the confidence in the design and estimating processes /outputs. The confidence in each design and engineering discipline has been assessed against the following scale with the following scale with the associated contingency allowance:

- HH (High High Confidence) 5%
- H (High Confidence) 7.5%
- HM (High Medium Confidence) 10%
- M (Medium Confidence) 12.5%
- ML (Medium Low Confidence) 15%
- L (Low Confidence) 20%

It should be noted that the design development allowance / estimating contingency is applicable only to potential quantity and rate inaccuracies within the estimate.

For this estimate a total contingency of 10.0% has been provided.

21.1.2.7 Total Capital Cost

The process plant Total Installed Cost (“TIC”) is estimated at $441 M (US$322 M), as presented in Table 21.5.

Table 21.5
Total Installed Cost for the Process Plant in US$

Description	Installation Cost	Material Cost	Equipment Supply Cost	Subcontractor	Total Installed
Factored Commodities					
Earthworks and Civil	$ 4,607,925	$ 511,992	$ -		$ 5,119,916
Concrete	$ 4,319,929	$ 5,279,914	$ -		$ 9,599,843
Structural Steel	$ 4,607,925	$ 6,911,887	$ -		$ 11,519,811
Platework	$ 2,303,962	$ 2,815,954	$ -		$ 5,119,916
Buildings, Architectural	$ -	$ -	$ -		$ -
Building Services	$ -	$ -	$ -		$ -
Electrical	$ 3,455,943	$ 2,419,160	$ 5,644,708		$ 11,519,811
Instrumentation	$ 2,687,956	$ 1,996,767	$ 2,995,151		$ 7,679,874
Piping	$ 6,399,895	$ 5,759,906	$ 639,990		$ 12,799,790
Insulation and Protection	$ 959,984	$ 959,984	$ -		$ 1,919,969
Subtotal Process Plant Factored Commo	**$ 29,343,519**	**$ 26,655,563**	**$ 9,279,848**	**$ -**	**$ 65,278,931**
Subtotal Process Plant	**38,468,560**	**31,249,563**	**59,559,759**	**$ -**	**$ 129,277,882**
Utilities					
Flocculant Plant	$ 157,281	$ 71,218	$ 237,412		$ 465,910
Air Reticulation	$ 235,774	$ 80,015	$ 471,618		$ 787,407
Process Water	$ 59,171	$ 54,897	$ 29,739		$ 143,806
Gland Water	$ 48,478	$ 44,949	$ 24,429		$ 117,856
Fire Water	$ 157,510	$ 169,207	$ 56,983		$ 383,700
Reagent mixing Plant	$ 300,850	$ 174,326	$ 394,117		$ 869,294
Subtotal Plant Utilities	**959,064.6**	**594,611.8**	**1,214,297.0**	**-**	**2,767,973.5**
Infrastructure					
Plant Terracing-General Site Clearing & Grub	$ 1,170,000				$ 1,170,000
Primary Crusher Building	$ 1,500,000	$ 2,025,000	$ 225,000		$ 3,750,000
Process Building	$ 15,400,000	$ 20,790,000	$ 2,310,000		$ 38,500,000
Reagent Storage	$ 480,000	$ 720,000	$ -		$ 1,200,000
Flocculant area	$ 300,000	$ 450,000	$ -		$ 750,000
Main Electrical Substation	$ 900,000	$ -	$ 3,600,000		$ 4,500,000
Overland Tailings piping	$ 506,250	$ 556,875	$ 61,875		$ 1,125,000
Water Treatment Plant	$ 415,938	$ 210,788	$ 583,275		$ 1,210,000
Satelite Communications System	$ 168,000	$ 93,600	$ 218,400		$ 480,000
Plant Mobile Equipment	$ 418,922		$ 3,770,302		$ 4,189,224
Subtotal Plant Infrastructure	**21,259,110**	**24,846,263**	**10,768,852**	**-**	**56,874,224**
Total Direct Cost	**60686734.92**	**$ 56,690,438**	**$ 71,542,907**	**$ -**	**$ 188,920,080**
Indirect Costs					
Contractor Field Indirects				$ 51,724,639.61	$ 51,724,640
Spare Parts				$ 2,382,390.34	$ 2,382,390
Initial Fills				$ 2,400,000	$ 2,400,000
Vendor Supervision				$ 2,382,390.34	$ 2,382,390
Freight, Transport and Insurance for Process Equipment				$ 5,723,432.57	$ 5,723,433
Freight, Transport and Insurance for Steel, EC&I & Piping				$ 2,544,926.63	$ 2,544,927
Third Party Engineering				$ 550,000.00	$ 550,000
Start-up/Commissioning Support				$ 1,786,792.76	$ 1,786,793
Engineering Procurement				$ 18,473,085.57	$ 18,473,086
Construction Management				$ 12,931,159.90	$ 12,931,160
Construction Power				$ 1,626,075.00	$ 1,626,075
Construction Fuel				$ 1,267,643.52	$ 1,267,644
Construction Camp and Catering					$ -
Taxes, Duties & Permits					$ -
1 year Spares & Inventory					$ -
Owner's Cost					$ -
Subtotal Indirect Cost	**-**	**-**	**-**	**103,792,536**	**103,792,536**
Subtotal Direct + Indirect	**$ 60,686,735**	**$ 56,690,438**	**$ 71,542,907**	**$ 103,792,536**	**$ 292,712,616**
Contingency				$ 29,271,261.60	$ 29,271,262
Project Total	**$ 60,686,735**	**$ 56,690,438**	**$ 71,542,907**	**$ 133,063,798**	**$ 321,983,878**

21.1.3 Site Infrastructure Capital Costs

Required site infrastructure located close to the process plant is estimated at $20 M. This includes connection to the nearby Ontario Power grid, offices, gate house, fencing, site access roads, and construction of a dam on the eastern side of open pits 1 and 2 at the south end of Pine Lake.

21.1.4 Tailings Storage Facility Capital Costs

The cost to construct the tailings storage facility near the process plant site was estimated at $8 M. The TSF will be of sufficient size for up to 6 years of tailings storage. In-pit tailings storage in mined-out open pits will be utilized after that.

21.1.5 Owner Capital Costs

Owner capital costs were estimated at $5 M to support the owner's team during Project construction, and for mining contractor mobilization.

21.1.6 Contingency

A 10% contingency was added to all initial capital costs except pre-stripping. The total contingency cost was estimated at $43.4 M.

21.1.7 Initial Capital Costs

A summary of the initial capital cost estimates is presented in Table 21.6.

TABLE 21.6
INITIAL CAPITAL COST ESTIMATES

Item	Capital Cost ($ M)
Mining Pre-Stripping	17.3
Process Plant	401.3
Site Infrastructure	20.0
Tailings Storage Facility	8.0
Owner Costs	5.0
10% Contingency	43.4
Total	**495.0**

21.1.8 Sustaining Capital Costs

A reclamation bond paid over the LOM was estimated at $26 M to cover closure costs.

21.1.9 Salvage Value

The salvage value of the process plant is estimated at 10% of its direct capital costs, or $25 M.

21.2 OPERATING COST ESTIMATE

21.2.1 Mining Operating Costs

Owner mining operating costs were calculated from first principles and were estimated at $1.90/t material. 18% was added to the cost to allow for contractor profit and depreciation costs on equipment. A mining contractor cost over the LOM was thus estimated at $2.25/t material. An additional cost of $0.03/t over the LOM was added for long hauls from the open pits in the southern half of the Property. Therefore, the total mining cost over the LOM was estimated at $2.28/t material. At a LOM strip ratio (waste:process plant feed) of 3.6:1 which equates to a cost of $10.17/t of process plant feed.

21.2.2 Process Plant Operating Costs

This Technical Report section describes the basis of estimate and approach taken in the PEA process plant operating cost estimation ("OPEX").

The process plant operating cost estimate is presented in United States dollars ("US$") and recognizes prices obtained in Q1 2019. This OPEX estimate is deemed to have an accuracy between ±35 and ±50%.

All labour, materials and consumables required for the operation of the process facility have been included in this estimate. The process plant inputs were generated by DRA, based on data obtained from metallurgical testwork results using quotations from reputable suppliers for reagents and consumables, as well as current design and DRA database information.

The operating cost is only for the process plant and is comprised of the following subsections:

- Labour;
- Reagents;
- Consumables;
- Power;
- Maintenance; and
- G&A.

The OPEX is based on 6,000,000 tpy of ROM process plant feed, with a crushing plant availability of 75% and a grinding/flotation plant availability of 92%. It is also based on a concentrate mass pull of 0.5% of new feed rate or 30,000 tpy and a total PGE content in the concentrate of 188.6 g/t as per the latest SGS testwork program conducted in 2013.

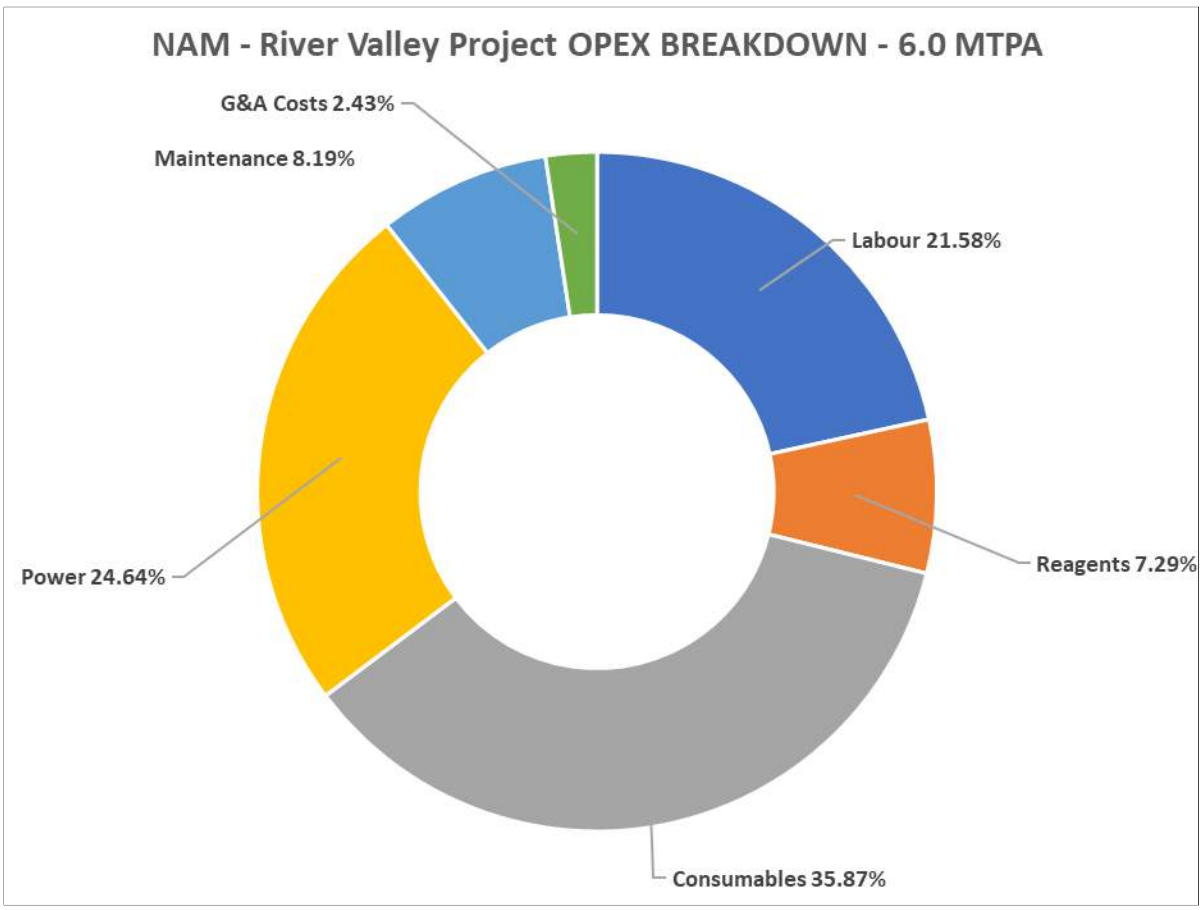
A summary of the overall process plant operating cost by subsection is presented in Table 21.7.

TABLE 21.7 PROCESS PLANT OPERATING COST ESTIMATE BREAKDOWN PER AREA				
Item	**US$/Year (000)**	**% Distribution**	**US$/t ROM**	**US$/oz PdEq**
Labour	7,982	21.6%	1.33	43.9
Reagents	2,696	7.3%	0.45	14.8
Consumables	13,264	35.9%	2.21	72.9
Power	9,110	24.6%	1.52	50.1
Maintenance	3,029	8.2%	0.50	16.7
G&A Costs	900	2.4%	0.15	5.0
Total OPEX	**36,980**	**100%**	**6.16**	**203.4**

At a 1.37 CDN:US$ exchange rate, the unit OPEX is estimated at $8.44/t.

The percent contribution of each item of the process plant OPEX is depicted in Figure 21.1.

FIGURE 21.1 PROCESS PLANT OPEX BREAKDOWN – PERCENT CONTRIBUTION OF EACH SUBSECTION TO THE TOTAL OPEX



From Figure 21.1, the three major contributors to the process plant OPEX are Labour with a contribution of 21.6%, Consumables with a contribution of 35.9% and Power with a contribution of 24.6%.

21.2.2.1 Labour Costs

Process plant labour costs reflect the labour complement as provided in Table 21.7, above. The labour rates used for this study have been taken from typical salaries in northern Ontario from recent projects that DRA has completed.

The process plant labour costs exclude any cost for administration and security. These costs are covered under the general G&A costs for the Project.

Operating personnel complements are based on two rotational shift teams. Allowances have been made for leave and absenteeism within the process and engineering teams. A total staff complement of 109 people has been allowed for to cover the process plant management, operations and engineering maintenance functions.

Table 21.8 provides a summary of the overall labour costs for the process plant.

TABLE 21.8
PROCESS PLANT LABOUR COMPLEMENT AND COST

Description	Category	Schedule	No of Shifts	No of employees per Shift	Base Salary (CAD/y)	Bonus (CAD/y)	Fringe Benefits (CAD/y)	Overtime (CAD/y)	Total cost (CAD/y)	Total cost (USD/y)
Mill Administration										
Mill Manager	Staff	Office	1	1	200 000	20,000	60 000	0	$ 280,000	$ 210,000
Mill Superintendent	Staff	Office	1	1	160 000	16,000	48 000	0	$ 224,000	$ 168,000
Mill Clerk	Staff	Office	1	1	60 000	6,000	18 000	0	$ 84,000	$ 63,000
Janitor	Hourly	Office	2	1	50 000	0	15 000	0	$ 130,000	$ 97,500
Sub-Total Mill Administration									**$ 438,000**	**$ 538,500**
Mill Operations										
General Operations Foreman	Staff	Office	1	1	130 000	13,000	39 000	0	$ 182,000	$ 136,500
Shift Foreman	Hourly	Shift	2	2	100 000	0	30 000	5 000	$ 540,000	$ 405,000
Trainer & Safety Coordinator	Staff	Office	1	1	100 000	10,000	30 000	0	$ 140,000	$ 105,000
Control Room Operator	Hourly	Shift	2	2	85 000	0	25 500	4 250	$ 459,000	$ 344,250
Plant Operators	Hourly	Shift	2	2	75 000	0	22 500	3 750	$ 405,000	$ 303,750
Plant Helpers	Hourly	Shift	2	6	65 000	0	19 500	3 250	$ 1,053,000	$ 789,750
Mill Labour - (incl. mobile equipr	Hourly	Shift	2	4	55 000	0	16 500	2 750	$ 594,000	$ 445,500
Sub-Total Mill Operations									**$ 3,373,000**	**$ 2,529,750**
Mill Maintenance										
General Maintenance Foreman	Staff	Office	1	1	130 000	13,000	39 000	0	$ 182,000	$ 136,500
Mechanical Maintenance Forem	Staff	Office	1	1	95 000	9,500	28 500	0	$ 133,000	$ 99,750
Electrical & Instrumentation For	Staff	Office	1	1	95 000	9,500	28 500	0	$ 133,000	$ 99,750
Maintenance Planner	Staff	Office	1	1	90 000	9,000	27 000	0	$ 126,000	$ 94,500
Maintenance Journeyman	Hourly	Shift	2	2	65 000	0	19 500	3 250	$ 351,000	$ 263,250
Maintenance Apprentice	Hourly	Shift	2	2	55 000	0	16 500	2 750	$ 297,000	$ 222,750
Electrical Journeyman	Hourly	Shift	2	2	65 000	0	19 500	3 250	$ 351,000	$ 263,250
Electrical Apprentice	Hourly	Shift	2	4	55 000	0	16 500	2 750	$ 594,000	$ 445,500
Instrumentation Technician	Hourly	Shift	2	4	65 000	0	19 500	3 250	$ 702,000	$ 526,500
Instrumentation Apprentice	Hourly	Shift	2	2	55 000	0	16 500	2 750	$ 297,000	$ 222,750
Sub-Total Mill Maintenance									**$ 3,166,000**	**$ 2,374,500**
Mill Metallurgy										
Chief Metallurgist	Staff	Office	1	1	130 000	13,000	39 000	0	$ 182,000	$ 136,500
Senior Metallurgist	Staff	Office	1	2	100 000	10,000	30 000	0	$ 280,000	$ 210,000
Junior Metallurgist	Staff	Shift	2	2	80 000	8,000	24 000	4 000	$ 464,000	$ 348,000
Metallurgical Technician	Staff	Shift	2	3	75 000	7,500	22 500	3 750	$ 652,500	$ 489,375
Environmental Coordinator	Staff	Office	0	0	70 000	7,000	21 000	0	$ -	$ -
Environmental Technician	Staff	Office	0	0	70 000	7,000	21 000	0	$ -	$ -
HSEC Technician	Staff	Shift	2	4	70 000	7,000	21 000	3 500	$ 812,000	$ 609,000
Chief Assayer	Staff	Office	1	1	85 000	8,500	25 500	0	$ 119,000	$ 89,250
Senior Assayer	Staff	Office	2	2	60 000	6,000	18 000	0	$ 336,000	$ 252,000
Assay Laboratory Technician	Hourly	Shift	2	2	55 000	0	16 500	2 750	$ 297,000	$ 222,750
Bucker (sample prep.- assay lal	Hourly	Shift	2	2	45 000	0	13 500	2 250	$ 243,000	$ 182,250
Sub-Total Mill Metallurgy									**$ 3,385,500**	**$ 2,539,125**
Total Process Manpower									**$ 10,642,500**	**$ 7,981,875**

21.2.2.2 Process Plant Power Costs

The electrical load requirements for the process plant were prepared in the overall process plant load list. The total absorbed electrical power estimate for the process plant, during steady state operation, is estimated at 26.7 MW (Table 21.9). The estimated average running load has been calculated using expected power draw as determined for individual items, and after applying utilization and electrical correction factors.

Based on the operating schedules for the various areas, this equates to approximately 182.7 GWh/year.

The electrical tariff supply cost for the project is $0.069 (US$ 0.05) / kWh and is the price stated for industrial use in the region of Sudbury.

The power costs for process and raw water supply pumps, camp or office buildings, HVAC, and change house have been factored at 5% of the total process plant equipment power cost.

TABLE 21.9
PROCESS PLANT ELECTRICAL CONSUMPTION AND COST

Description	Quantity	Units
Installed Crushing Power	400	kW
Installed Grinding Power	22,380	kW
Plant Load (full Production, excluding Mill)	3,934.9	kW
Total Power Consumption	182,732,439	kWh / annum
Power Cost	0.05	US$ / kWh
LOM Average Annual Power Costs	9,110,308	US$ / annum

21.2.2.3 Process Plant Reagents

Various reagents are consumed in the plant, all of which are detailed in the Process Design Criteria ("PDC"). The consumption rates for the various reagents are based on results obtained from laboratory scale testwork, particularly the LCT conducted by SGS in 2013. The consumption of diesel fuel is based on the emergency power required in case of a shut down or "black-out". The equipment required to continue running in case of a shut down or a black-out are the flotation cells, the blowers and the thickeners to prevent settling of solids in these pieces of equipment and to inch rotate the mills if necessary. The emergency power required was estimated to be 467,174 kWh/year, equating to an installed power of 1,130 kW. Emergency power is generated by an on-site diesel generator. The supply prices for all the reagents are based on recent budget quotations obtained from reputable industry suppliers. The costs include a quoted freight cost of $0.089 (US$ 0.065) / kg of reagent.

The reagent operating costs are presented in Table 21.10, and are estimated at $0.62/t (US$ 0.45/t).

Grinding media consumption and liner wear rates are based on results obtained from testwork, namely abrasion indices, ball mill work indices, similar projects, and established models.

Consumption rates have been verified by vendors. Supply prices for grinding media, are based on quotations obtained from reputable suppliers. Grinding media operating cost estimates are presented in Table 21.11, and are estimated at $3.03/t (US$ 2.21/t).

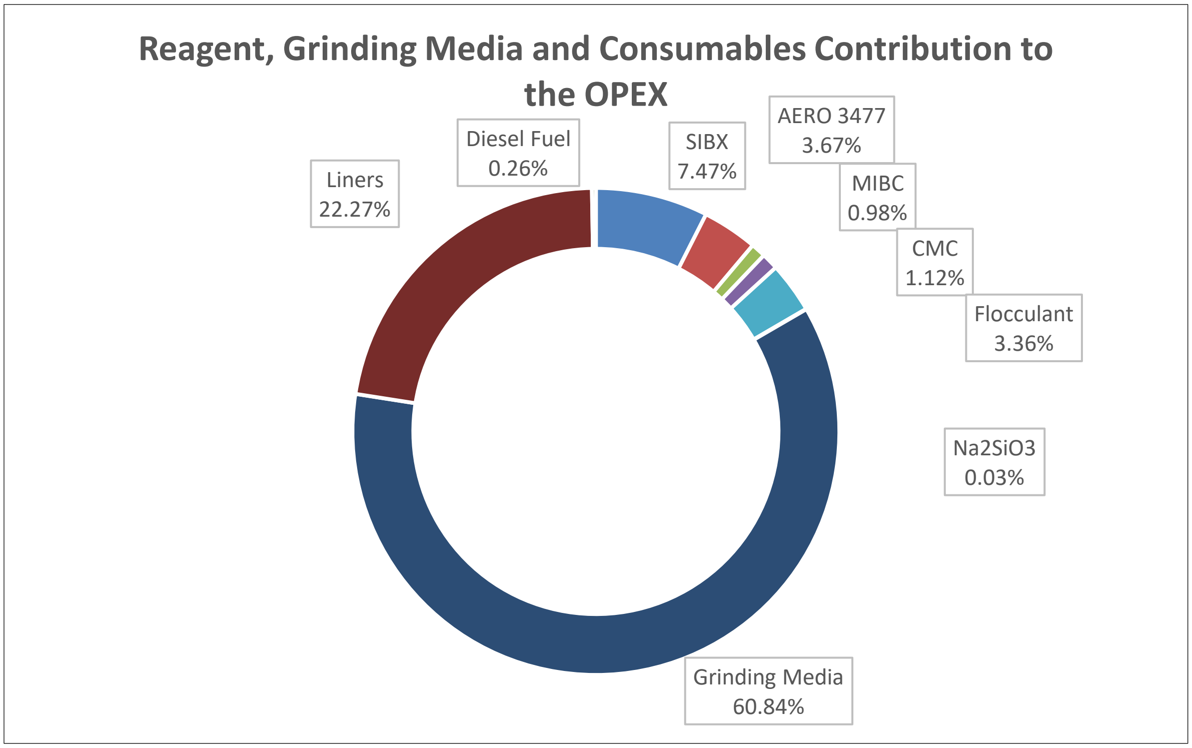
All reagents and consumables that are consumed in the laboratory, as well as all minor reagents, have not been included as their contribution to OPEX is regarded as insignificant.

Figure 21.2 provides a summary breakdown of the cost contribution for all reagents, grinding media and consumables. The chart clearly illustrates that grinding mill media is the highest cost contributor, followed by liners, SIBX and followed by the other reagents.

TABLE 21.10 PROCESS PLANT REAGENTS COST						
Description	**Supply Cost US$/kg**	**Freight Allowance US$/kg**	**Unit Consumption kg/t Processed**	**Annual Consumption kg**	**Annual Cost US$000**	**Unit Cost US$/t Processed**
SIBX	2.25	0.065	0.070	515,280	1,193	0.199
AERO 3477	2.90	0.065	0.027	197,640	586	0.098
MIBC	2.20	0.065	0.009	68,820	156	0.026
CMC	3.30	0.065	0.007	52,920	178	0.03
Flocculant	2.92	0.065	0.024	179,700	536	0.089
Na2SiO3	0.70	0.065	0.001	5,880	4	0.001
Diesel Fuel	$0.90 / ltr	-	-	46,717 L	42	0.01
Total - Reagents					**2,696**	**0.45**

TABLE 21.11 PROCESS PLANT GRINDING MEDIA COSTS						
Description	**Unit Cost US$/kg or per Set**	**Freight Allowance US$/kg**	**Unit Consumption kg/t Processed**	**Annual Consumption tonnes**	**Annual Cost US$000**	**Unit Cost US$/t Processed**
SAG Mill Grinding Media	1.06	0.065	0.442	2,649	2,981	0.50
Ball Mill Grinding Media	1.06	0.065	0.94	2,809	6,322	1.05
Regrind Vertimill Grinding Media	1.15	0.065	3.98	334.4	406	0.07
Primary Jaw Crusher Liners	138,000	-	-	2 sets	276	0.05
Pebble Crusher Liners	85,378	-	-	2 sets	171	0.03
SAG Mill Liners	659,100	-	-	2 sets	1,318	0.22
Ball Mill Liners	659,100	-	-	1 set	1,318	0.22
Regrind Mill Liners	74,048	-	-	2 sets	148	0.02
Auxiliary Equipment	10%	-	-	-	323	0.05
Total – Consumables Cost					13,264	2.21

FIGURE 21.2 PROCESS PLANT REAGENT, GRINDING MEDIA AND CONSUMABLES COST CONTRIBUTION



21.2.2.4 Engineering Maintenance

The annual engineering and plant maintenance costs at this stage of the study were estimated simply as a factored percentage of the total process plant equipment cost. The percentage selected was 7.5%. This yielded an annual maintenance cost of $4.1 M (US$ 3.0 M). The equipment costs were obtained from reputable vendors. The unit cost per tonne of process plant feed was estimated at $0.69/t (US$ 0.50/t).

21.2.2.5 Process Plant General and Administrative Costs (G&A)

The process plant G&A cost was taken from a similar project and factored to reflect the process plant production schedule for the River Valley Project. The G&A cost was estimated at $1.2 M (US$ 0.9 M) per year, equating to $0.21/t (US$ 0.15/t).

21.2.3 Site General and Administration Operating Costs

General and administration ("G&A") operating costs were estimated at $5 M/yr. Salaries included in G&A were for Management, Mine Management, IT, Security, Health and Safety, Environmental, Accounting, Purchasing, Warehouse, Community Relations and Human Resources. Other items were general and office expenses, vehicles, software, consultants and insurance. This equated to a G&A unit operating cost of $0.86/t process plant feed over the LOM.

There will be no camp facilities at the Project site. All personnel will be responsible for their own housing and will travel from local communities.

21.2.4 Total Project Operating Costs

Table 21.12 presents a summary of estimated operating costs.

TABLE 21.12
TOTAL PROJECT OPERATING COST ESTIMATE

Item	Operating Cost ($/t)
Mining (per tonne material mined)	2.28
Mining (per tonne process plant feed)	10.17
Process Plant (per tonne process plant feed)	8.44
G&A (per tonne process plant feed)	0.86
Total	**19.47**

21.2.5 Site Manpower

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.

22.0 ECONOMIC ANALYSIS

22.1 SUMMARY

The River Valley Project's economic results are summarized in Table 22.1 and indicate an after-tax net present value ("NPV") of $138 M at a 5% discount rate, an internal rate of return ("IRR") of 10% and a 7 year payback. The initial capital expenditure would be $495 M. All currency values are expressed in Q2 2019 Canadian dollars unless otherwise noted. All cash flows are calculated for the period in which they are incurred and are not adjusted for incoming and outgoing payments.

TABLE 22.1
ECONOMICS RESULTS SUMMARY

Item	Pre-Tax ($M)	After Tax ($M)
Undiscounted NPV	$ 586	$ 384
NPV (5%)	$ 261	$ 138
IRR	13%	10%
Payback (years)	6.6	7.0

22.2 ASSUMPTIONS

A discounted cash flow analysis of the River Valley Project has been prepared based on technical and cost inputs developed by the PEA engineering team.

The discounted cash flow analysis was performed on a stand-alone Project basis with annual cash flows discounted. The financial evaluation uses a discount rate of 5% and was performed at commencement of construction (Year -2 of the Project).

Head office administration costs were not included.

22.2.1 Metal Prices Assumptions

The River Valley's key financial input assumptions are summarized in Table 22.2. Given the Project being located in Canada, operating and sustaining costs will be predominately denominated in Canadian dollars with revenues from metals being US dollar denominated. The economics of the Project will therefore be sensitive to US currency fluctuations relative to the Canadian dollar. Capital costs have been quoted in the PEA based on an exchange rate of 1.37 US dollars to 1.00 Canadian dollar.

TABLE 22.2 METAL PRICE ASSUMPTIONS		
Commodity	**Price**	**Unit**
Au	1,350	$US/oz
Pt	1,050	$US/oz
Pd	1,200	$US/oz
Cu	3.25	$US/lb
Ni	8.00	$US/lb
Co	35.00	$US/lb
CDN$:US$ Exchange	1.37	

22.2.2 Capital Costs

Total capital costs are estimated at $495 M as outlined in the Capital and Operating Cost Section 21 of this Technical Report. The initial capital costs are incurred over a two year construction period.

22.2.3 Ramp-Up Assumptions

In the first year of production (Year+1), the process plant is assumed to achieve 70% of the nameplate throughput capacity, or 4.2 Mt processed compared to steady-state 6.0 Mtpy capacity.

22.2.4 Sustaining Capital Costs

$26 M is accumulated over the LOM to pay for closure costs. The salvage value of the process plant is estimated at 10% of its direct capital costs, or $25 M. The net sustaining cost over the LOM is estimated at $1 M.

22.2.5 Royalties

A 3% NSR royalty is currently payable. NAM has the option to reduce the royalty to 1.5% upon making a $1.5 M payment. It has been scheduled in the Project financial model to make the $1.5 M payment at the end of the pre-production period in order that a 1.5% royalty is applicable during the production years.

22.2.6 Smelting and Refining

The process plant will produce a single concentrate for sale using conventional sulphide flotation techniques. It has been assumed that it will be a copper concentrate and will be transported by road to the Sudbury area for smelting and refining. The transport cost has been estimated at $20.6/wet tonne. The moisture content of the concentrate has been assumed to be 8%. Treatment costs (estimated at $123/t), payable metal content, refining costs, marketing, insurance, security and assaying supervision costs have been estimated according to other recent copper concentrate (with PGE credits) contracts that exist in the mining industry.

22.3 INCOME TAXES AND MINING TAXES

Mining operations in Ontario are subject to three tiers of taxes: a federal income tax under the Income Tax Act (Canada), a provincial income tax, and an Ontario mining tax. The following is a summary of the significant taxes applicable to the River Valley Project.

22.3.1 Federal Income Tax

Federal income tax is applied to the Project's taxable income (generally being net of operating expenses, depreciation on capital assets and the deduction of exploration and pre-production development costs). The current federal income tax rate in Canada is 15%.

22.3.2 Provincial Income Tax

An Ontario provincial income tax is based on a similar taxable income as the federal calculation of taxable income. The current provincial income tax rate in Ontario is 11.5%.

22.3.3 Ontario Mining Tax

An Ontario provincial mining tax is imposed on profits from the extraction of mineral substances. The tax rate on taxable profit subject to mining tax is 10% for non-remote mines.

The tax is applied to the annual profit in excess of $0.5 M. A mining tax exemption of up to $10 M of profit during an exempt period is available for each new mine. The exempt period for a non-remote mine is three years.

22.4 CASH FLOW SUMMARY

The estimated annual LOM cash flow for the River Valley Project is summarized in Table 22.3.

Table 22.3 Cash Flow Summary		
Item	**Unit**	**Amount**
MINE PRODUCTION		
Waste Mined	Mt	276.4
Overburden Mined	Mt	1.2
Mineralized Material Mined	Mt	78.1
Total Material Mined	kt	355.7
REVENUE		
	US$(M)	1,930.4
	CDN$(M)	2,644.6
ROYALTIES		
Royalty Payable Including $1.5 M Payment	CDN$(M)	41.2
OPERATING COST		LOM
Mining Cost	$/t material	2.28
Mining Cost	$/t feed processed	10.17
Processing Cost	$/t feed processed	8.44
G&A	$/t feed processed	0.86
Unit Operating	$/t feed processed	19.47
CASH FLOW (LOM)		
Revenue from Concentrate	CDN$(M)	2,644.6
(-) Operating Cost	CDN$(M)	- 1,521.3
(-) Royalties	CDN$(M)	- 41.2
(-) Taxes	CDN$(M)	- 202.5
(-) Capital Spending	CDN$(M)	- 496.1
Cash Flow (undiscounted)	CDN$(M)	383.8
Cash Flow (5%)	CDN$(M)	137.7

Note: *LOM = Life of Mine.*

A summary of the River Valley Project financial model is presented in Table 22.4.

TABLE 22.4 RIVER VALLEY PROJECT FINANCIAL MODEL SUMMARY

New Age Metals   River Valley Project, Ontario   Financial Model

Canadian dollars unless otherwise stated

Au (US$/oz)	Ag (US$/oz)	Pt (US$/oz)	Pd (US$/oz)	Rh	Cu (US$/lb)	Ni (US$/lb)	Co (US$/lb)	Exch Rate (US$:CDN$)
$1,350.00	$18.00	$1,050.00	$1,200.00	$1,941.00	$3.25	$8.00	$35.00	$1.37

	Units	Inputs	Totals	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Mill Processing Rate	t/month			-	-	350,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	160,585
	t/year			-	-	4,200,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	1,927,022
MINE PRODUCTION																			
Waste Mined	t		276,475,448		5,732,287	22,059,152	30,175,409	30,183,654	33,544,609	33,963,343	34,000,000	28,000,000	13,969,722	13,391,666	12,984,965	8,946,209	6,623,896	2,900,536	-
Overburden Mined	t		1,156,179		453,233	163,054	58,056	53,186	92,506	36,657	-	-	30,278	108,334	15,035	53,791	76,104	15,945	
Ore Mined	t		78,127,022		1,512,781	2,777,794	8,766,535	8,763,160	6,362,885	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	1,943,867	-
Total Material Mined	t		355,758,649	-	7,698,301	25,000,000	39,000,000	39,000,000	40,000,000	40,000,000	40,000,000	34,000,000	20,000,000	19,500,000	19,000,000	15,000,000	12,700,000	4,860,348	-
Strip Ratio	w:o		3.55																
PROCESSING				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Ore Processed	tpy		78,127,022		-	4,200,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	6,000,000	1,927,022
PdEq	g/t		0.88			1.14	1.12	1.21	0.89	0.75	0.91	1.01	1.06	0.87	0.78	0.72	0.63	0.58	0.56
Copper Concentrate																			
Mass Pull	%					0.36%	0.33%	0.35%	0.27%	0.24%	0.29%	0.33%	0.33%	0.27%	0.27%	0.26%	0.24%	0.23%	0.21%
Concentrate Tonnes (dry)	t		223,577			15,023	19,568	21,137	16,381	14,342	17,420	19,629	19,516	16,403	16,289	15,649	14,697	13,507	4,016
Concentrate tonnes (wet)	Moisture=	8.0%	241,463	-	-	16,225	21,133	22,828	17,691	15,489	18,814	21,199	21,077	17,715	17,592	16,901	15,873	14,588	4,337
REVENUE				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Concentrate Values (per dmt)																			
Copper Concentrate	US$ / dmt			$ -	$ -	$ 8,831	$ 9,661	$ 9,665	$ 9,001	$ 8,756	$ 8,760	$ 8,613	$ 9,168	$ 8,873	$ 8,033	$ 7,681	$ 7,221	$ 7,257	$ 7,472
Revenues																			
Total NSR Revenue	US$(000)		$ 1,930,361.2			$ 132,669.8	$ 189,053.9	$ 204,278.7	$ 147,449.9	$ 125,578.6	$ 152,605.3	$ 169,064.3	$ 178,929.1	$ 145,548.4	$ 130,841.6	$ 120,194.8	$ 106,126.4	$ 98,013.6	$ 30,006.8
Total NSR Revenue	$(000)		$ 2,644,594.9			$ 181,757.6	$ 259,003.8	$ 279,861.8	$ 202,006.3	$ 172,042.7	$ 209,069.3	$ 231,618.1	$ 245,132.8	$ 199,401.3	$ 179,253.0	$ 164,666.9	$ 145,393.2	$ 134,278.6	$ 41,109.3
NSR per tonne	$/t		$33.85			$43.28	$43.17	$46.64	$33.67	$28.67	$34.84	$38.60	$40.86	$33.23	$29.88	$27.44	$24.23	$22.38	$21.33
OPERATING COST				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Mining Cost	$/t matl	$2.25	$ 784,581.0			$ 56,250.0	$ 87,750.0	$ 87,750.0	$ 90,000.0	$ 90,000.0	$ 90,000.0	$ 76,500.0	$ 45,000.0	$ 43,875.0	$ 42,750.0	$ 33,750.0	$ 28,575.0	$ 10,935.8	$ 1,445.3
Long distance haul cost	$(000)		$ 9,888.8				$ 692.3	$ 746.7	$ 41.8	$ 3.1			$ 6.3	$ 179.7	$ 2,352.6	$ 3,184.9	$ 1,957.0	$ 724.5	
Processing Cost	$/t	$8.44	$ 659,329.6			$ 35,444.6	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 50,635.2	$ 16,262.5
G&A	$(000)	$ 5,000.00	$ 67,500.0			$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 5,000.0	$ 2,500.0
Total operating Cost	$(000)		$ 1,521,299.5			$ 96,694.6	$ 144,077.5	$ 144,131.9	$ 145,677.0	$ 145,638.3	$ 145,635.2	$ 132,135.2	$ 100,641.5	$ 99,689.9	$ 100,737.8	$ 92,570.1	$ 86,167.2	$ 67,295.5	$ 20,207.8
Unit Operating	$/t plant feed		$19.47			$23.02	$24.01	$24.02	$24.28	$24.27	$24.27	$22.02	$16.77	$16.61	$16.79	$15.43	$14.36	$11.22	$10.49
Unit Mining Cost	$/t plant feed		$10.17			$20.25	$10.01	$10.01	$14.14	$15.00	$15.00	$12.75	$7.50	$7.31	$7.13	$5.63	$4.76	$5.63	$0.75
Unit Mining Cost	$/t material		$2.28			$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$2.25	$0.75
G&A Cost	$/t plant feed		$0.86			$1.19	$0.83	$0.83	$0.83	$0.83	$0.83	$0.83	$0.83	$0.83	$0.83	$0.83	$0.83	$0.83	$1.30
ROYALTIES																			
Royalty Paid on	$(000)		$ 2,644,594.9			$ 181,757.6	$ 259,003.8	$ 279,861.8	$ 202,006.3	$ 172,042.7	$ 209,069.3	$ 231,618.1	$ 245,132.8	$ 199,401.3	$ 179,253.0	$ 164,666.9	$ 145,393.2	$ 134,278.6	$ 41,109.3
Royalty Payable After $1.5M Payment	$(000)	1.50%	$ 41,168.9			$ 4,226.4	$ 3,885.1	$ 4,197.9	$ 3,030.1	$ 2,580.6	$ 3,136.0	$ 3,474.3	$ 3,677.0	$ 2,991.0	$ 2,688.8	$ 2,470.0	$ 2,180.9	$ 2,014.2	$ 616.6
CAPITAL COSTS				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Initial Project Capital	$(000)		$ 495,051.62	$ 160,520.16	$ 334,531.46														
Total Sustaining Capital	$(000)		$ 1,000.00			$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 2,000.00	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00	-$ 22,000.00
Total Capital	$(000)		$ 496,051.62	$ 160,520.16	$ 334,531.46	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 2,000.00	$ 2,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00	-$ 22,000.00
CASH FLOW				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Revenue from Concentrate	$(000)		$ 2,644,594.9			$ 181,757.6	$ 259,003.8	$ 279,861.8	$ 202,006.3	$ 172,042.7	$ 209,069.3	$ 231,618.1	$ 245,132.8	$ 199,401.3	$ 179,253.0	$ 164,666.9	$ 145,393.2	$ 134,278.6	$ 41,109.3
(-) Operating Cost	$(000)		-$ 1,521,299.5			-$ 96,694.6	-$ 144,077.5	-$ 144,131.9	-$ 145,677.0	-$ 145,638.3	-$ 145,635.2	-$ 132,135.2	-$ 100,641.5	-$ 99,689.9	-$ 100,737.8	-$ 92,570.1	-$ 86,167.2	-$ 67,295.5	-$ 20,207.8
(-) Working Capital	$(000)	$ 16,115.8				-$ 16,115.8													$ 16,115.8
(-) Royalties	$(000)		-$ 41,168.9			-$ 4,226.4	-$ 3,885.1	-$ 4,197.9	-$ 3,030.1	-$ 2,580.6	-$ 3,136.0	-$ 3,474.3	-$ 3,677.0	-$ 2,991.0	-$ 2,688.8	-$ 2,470.0	-$ 2,180.9	-$ 2,014.2	-$ 616.6
(-) Capital Spending	$(000)		-$ 496,051.6	-$ 160,520.2	-$ 334,531.5	-$ 1,000.0	-$ 1,000.0	-$ 1,000.0	-$ 1,000.0	-$ 1,000.0	-$ 1,000.0	-$ 1,000.0	-$ 2,000.0	-$ 2,000.0	-$ 3,000.0	-$ 3,000.0	-$ 3,000.0	-$ 3,000.0	$ 22,000.0
Pre-Tax Cashflow	$(000)		$ 586,074.9	-$ 160,520.2	-$ 334,531.5	$ 63,720.8	$ 110,041.3	$ 130,532.0	$ 52,299.3	$ 22,823.7	$ 59,298.1	$ 95,008.6	$ 138,814.3	$ 94,720.4	$ 72,826.5	$ 66,626.9	$ 54,045.1	$ 61,969.0	$ 58,400.7
(-) Taxes	$(000)		-$ 202,536.5					-$ 9,821.3			-$ 5,938.0	-$ 23,669.1	-$ 43,310.9	-$ 29,408.5	-$ 23,316.6	-$ 22,018.2	-$ 18,101.0	-$ 21,465.9	-$ 5,487.0
After-Tax Cashflow	$(000)		$ 383,538.4	-$ 160,520.2	-$ 334,531.5	$ 63,720.8	$ 110,041.3	$ 120,710.8	$ 52,299.3	$ 22,823.7	$ 53,360.1	$ 71,339.5	$ 95,503.4	$ 65,311.9	$ 49,509.9	$ 44,608.6	$ 35,944.0	$ 40,503.1	$ 52,913.6
Disc AT Annual Cash Flow	$(000)	5.0%	$ 137,675.0	-$ 160,520.2	-$ 318,601.4	$ 57,796.7	$ 95,057.8	$ 99,309.0	$ 40,977.8	$ 17,031.4	$ 37,922.0	$ 48,285.4	$ 61,562.4	$ 40,095.8	$ 28,947.4	$ 24,839.8	$ 19,061.9	$ 20,456.8	$ 25,452.4
Cumulative DC AT Cash Flow	$(000)			-$ 160,520.2	-$ 479,121.5	-$ 421,324.9	-$ 326,267.1	-$ 226,958.1	-$ 185,980.2	-$ 168,948.8	-$ 131,026.8	-$ 82,741.4	-$ 21,179.0	$ 18,916.8	$ 47,864.2	$ 72,703.9	$ 91,765.8	$ 112,222.6	$ 137,675.0

Net Present Value			Pre-Tax	After-Tax
	NPV (0%)	$M	$ 586	$ 384
	NPV (5%)	$M	$ 261	$ 138
	IRR	%	13%	10%
	Payback period	yrs	6.6	7.0

22.5 ECONOMIC SENSITIVITIES

The River Valley Project sensitivity analysis was conducted to the metal price and cost variables. The results are shown in Table 22.5, below, and Figure 22.1 and Figure 22.2.

Changes in metal prices will have the greatest impact on the Project economics while capital costs will have the least impact. For instance, the palladium price as of June 25, 2019 was US$1,510/oz, which would return a pre-tax IRR of 21% and an after-tax IRR of 16%.

FIGURE 22.1 NPV 5% SENSITIVITY

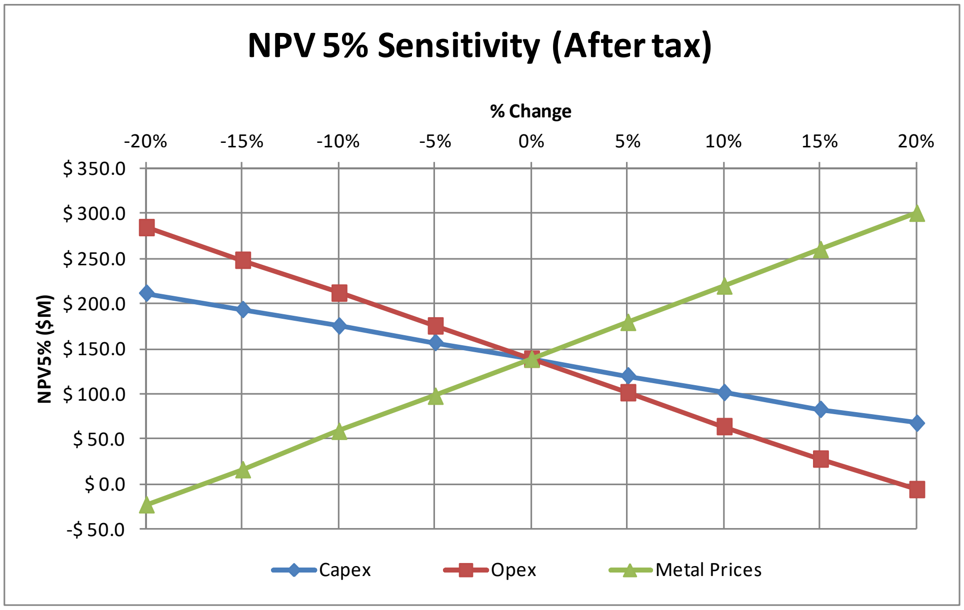


FIGURE 22.2 IRR SENSITIVITY

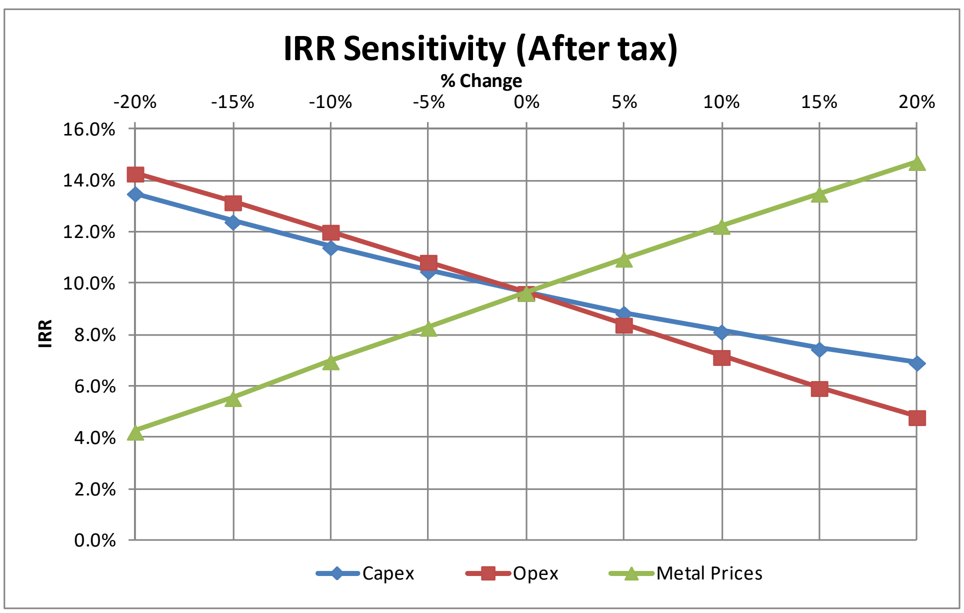


Table 22.5
Sensitivity Analysis

Project Sensitivity Analysis									
Pd Price Sensitivity									
%	**-20%**	**-15%**	**-10%**	**-5%**	**Base Case**	**+5%**	**+10%**	**+15%**	**+20%**
US$/oz	**960**	**1,020**	**1,080**	**1,140**	**1,200**	**1,260**	**1,320**	**1,380**	**1,440**
NPV (CDN$ M)	-23	15	58	97	**138**	178	219	259	299
IRR(%)	4	6	7	8	**10**	11	12	13	15
OPEX Sensitivity									
%	**-20%**	**-15%**	**-10%**	**-5%**	**Base Case**	**+5%**	**+10%**	**+15%**	**+20%**
Cost Per Tonne	**16**	**17**	**18**	**18**	**19**	**20**	**21**	**22**	**23**
NPV (CDN$ M)	211	193	175	156	**138**	119	101	82	67
IRR(%)	13	12	11	10	**10**	9	8	7	7
CAPEX Sensitivity									
%	**-20%**	**-15%**	**-10%**	**-5%**	**Base Case**	**+5%**	**+10%**	**+15%**	**+20%**
CAPEX (CDN$ M)	**397**	**422**	**446**	**471**	**496**	**521**	**546**	**570**	**595**
NPV (CDN$ M)	284	247	211	175	**138**	101	63	27	-7
IRR(%)	14	13	12	11	**10**	8	7	6	5

22.6 PALLADIUM EQUIVALENT CASH COST

The cash cost for palladium equivalent production is summarized in Table 22.6. The LOM cash cost is estimated at $971/oz (US$709/oz). The all in sustaining cost ("AISC") is estimated at $972/oz (US$709/oz). Sustaining costs are offset with salvage value of the process plant upon closure, and the LOM net sustaining cost is estimated at $1.0 M, therefore, the difference between palladium equivalent cash costs and AISC is small.

TABLE 22.6
PALLADIUM CASH COST

Item	Unit	Amount	Amount
Total produced equivalent payable Pd	oz	1,608,600	
Pd produced (oz per yr average)	oz/yr	119,000	
		CDN$	**US$**
Cash cost	$M	1,562	
Cash Cost per oz Pd	$/oz	971	709
All in Sustaining Cost	$M	1,563	
AISC Cost per oz Pd	$/oz	972	709

23.0 ADJACENT PROPERTIES

Inventus Mining Inc. ("Inventus") entered into a share purchase agreement with the shareholders of Mount Logan Resources Ltd. ("Mount Logan") which included the purchase of all outstanding shares of Mount Logan. Mount Logan owned a 100% interest in 23 unpatented mining claims northeast of Sudbury and holds an option to acquire up to a 70% interest in a further 16 claims which are contiguous to the 23 claims in the same area known as the Pardo Property.

Aggressive drilling programs have been completed from 2009 to 2017 on the Pardo Property. Inventus extracted a 1,000 t surface bulk sample in 2017 and processed the material at the McEwen Mining's Black Fox Process Plant near Timmins.

24.0 OTHER RELEVANT DATA AND INFORMATION

The following Project risks and opportunities were identified.

24.1 RISK ASSESSMENT

Approximately 27% of the contained metal at the reported PdEq cut-off grade in the Updated 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, however, it is not guaranteed.

Since this study is at a PEA level of engineering and costing, 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.

There have been no bulk density measurements done on waste rock and the quantity of waste rock in the open pit designs could be higher or lower than noted in the LOM production schedule.

Further study is required on the geochemistry of the waste rock since large quantities of acid generating rock may entail more onerous placement and water treatment costs.

There is currently limited geotechnical information other than rock quality designation ("RQD") logging and visual inspection of the drill core, and there is no hydrogeological information. Mining costs could increase if poor ground conditions or significant water inflows are encountered.

There is limited metallurgical testwork and parameters such as grind size, flotation performance and metal recovery may not be as assumed in this Technical Report.

24.2 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.

The Pine Zone is a recent discovery that is not well understood compared to the contact mineralization. More exploration and study is required since this may expand the Mineral Resource near surface and at depth with higher nickel/PGE values.

Since the majority of production is planned from the four northerly pits, exploration should be concentrated in this region to expand the mine life at potentially reduced mining costs.

The applicability of new innovative technologies to improve PGE recoveries can be investigated.

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 so that the metals are payable.

It may be possible to backfill mined-out open pits with waste rock, which will shorten the waste haulage distances and minimize environmental disturbance.

With well-developed open pit grade control programs and blast optimization studies, it may be possible to reduce mining dilution and improve process plant head grades.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 INTRODUCTION

P&E concludes that the River Valley Project has economic potential as an open pit mining operation, utilizing an on-site processing plant to produce copper concentrates that contain PGE's. The PEA outlines 78 Mt of process plant feed (inclusive of mining dilution and loss factors) with payable metals averaging 0.54 g/t Pd, 0.21 g/t Pt, 0.04 g/t Au, 0.06% Cu, 0.02% Ni, 0.003% Co for a PdEq grade of 0.88 g/t within 14 open pits. The Project has an estimated initial capital cost of $495 M, a strip ratio at 3.6:1, and estimated economics of an after-tax NPV of $138 M at a 5% discount rate, an after-tax IRR of 10%, and a seven year payback period using metal prices of US$1,200/oz Pd, US$1,050/oz Pt, US$1,350/oz Au, US$3.25/lb Cu, US$8.00/lb Ni, US$35.00/lb Co and an exchange rate of US$1.00 = CDN$1.37.

P&E recommends that NAM advance the River Valley Project with extended and advanced drill exploration and technical studies with the intention of moving the Project toward a production decision.

The following itemizes the conclusions that can be drawn from the information provided in this PEA. The conclusions highlight facts which characterize the study or are otherwise significant in terms of defining the Project value.

25.2 MINERAL RESOURCE ESTIMATE

The Property is currently held 100% by NAM.

The Property is analogous to contact-style PGE mineralization developed as the result of sulphur-saturation brought on by the interaction of the fertile parental magma with the surrounding country rock lithologies. This style of mineralization is present in other Mineral Resources in the region.

The Property is associated with various phases of mafic to ultramafic intrusives with variable alteration and minor sulphide content.

The brecciated basal contact with the Archean footwall is the primary target zone for PGE mineralization.

NAM has a strong understanding of the regional and local geology to support the interpretation of the mineralized Zones on the Property.

Mineralization is currently defined in nine zones of various thicknesses over a strike length of approximately 16 km.

IP surveys on the footwall contact of the River Valley intrusive have identified an extension of the mineralization (the Pine Zone) underlying the Archean footwall rocks, which opens up a new area for exploration on the Project.

Targets have been discovered on the Property with characteristics of reef-style mineralization that warrant further investigation.

Drilling and sampling procedures, sample preparation, and assay protocols are generally conducted in agreement with best practices.

Verification of the drill hole collars, surveys, assays, core, and drill hole logs indicates the NAM data is reliable.

Based on the QA/QC program, the data is sufficiently reliable to support the Updated Mineral Resource Estimate generated for the nine Zones on the Property.

The bulk density value used to determine that tonnage was derived from limited samples, which may reflect a lack of precision with respect to the Updated Mineral Resource tonnages.

The Updated Mineral Resource block model has been constructed in conformance to industry standard practices. The geological understanding is sufficient to support the Updated Mineral Resource Estimate.

At a PdEq cut-off grade of 0.35 g/t, the combined Measured and Indicated Mineral Resource constrained within a pit shell is 99.2 Mt with an average grade of 0.52 g/t Pd, 0.29 g/t Pt, 0.06 g/t Rh, 0.03 g/t Au, 0.05% Cu, 0.03% Ni, and 0.006% Co. The Inferred Mineral Resource totals 52.2 Mt with an average grade of 0.31 g/t Pd, 0.15 g/t Pt, 0.0 g/t Rh, 0.03 g/t Au, 0.05% Cu, 0.03% Ni, and 0.001% Co.

At a PdEq cut-off grade of 2.00 g/t, the combined Measured and Indicated Mineral Resource constrained within potential underground remnants is 76 Kt with an average grade of 2.32 g/t Pd, 0.74 g/t Pt, 0.03 g/t Rh, 0.09 g/t Au, 0.12% Cu, 0.02% Ni, and 0.002% Co. There is no Inferred Mineral Resource at this cut-off grade.

The Property contains Mineral Resources that are comparable to other advanced PGE projects in Ontario.

The Mineral Resource Zones at the Property remain open on strike and in the down-dip directions.

25.3 MINING METHODS AND INFRASTRUCTURE

WSP completed an Updated Mineral Resource Estimate for the River Valley Deposit. P&E completed this PEA based on the Updated Mineral Resource Estimate. The reporting of the Updated Mineral Resource Estimate complies with all disclosure requirements for Mineral Resources set out in the NI 43-101 Standards of Disclosure for Mineral Projects. The classification of the Updated Mineral Resource is consistent with CIM Definition Standards - For Mineral Resources and Mineral Reserves.

The potentially mineable portion of the Updated Mineral Resource Estimate was determined to be 78 Mt at a PdEq grade of 0.88 g/t from 14 open pits. Waste rock and overburden material was estimated at 278 Mt for a LOM strip ratio of 3.6:1.

Conventional open pit mining equipment and methodologies will be utilized. Contractor mining was planned in order to reduce initial capital costs compared to an owner-operated strategy. The contractor will supply its own maintenance and explosives facilities.

In general, the mine plan initially targeted the large Zones in the northwest area of the Property, then advanced southeast. Waste rock storage facilities were designed adjacent to each open pit, however, there will be opportunity to backfill mine-out pits with waste rock.

Connection to the nearby Hydro One electrical power grid is planned.

The initial mine site infrastructure planned for the northwest corner of the Property is compact, and NAM will strive to contain this small footprint during future operations. There will be no camp facilities at site. Personnel and contractors will be responsible for their own housing and will travel from local communities. An office complex for NAM management and supporting technical services is required.

The process plant facilities will consist of the following:

- Primary crusher building;
- Grinding, flotation, thickening and filtration building that will also house areas for:
  - Laboratory,
  - Offices,
  - Lunchroom,
  - Medical services,
  - Control room,
  - Water treatment plant;
- Reagents storage and mixing building;
- Spare parts warehouse building; and
- Main electrical substation.

Tailings management at River Valley will occur in two phases. For the first 5 to 6 years, tailings will be stored in a surface facility with an engineered embankment. Approximately 30 Mt of tailings will be stored on surface. Subsequent tailings will be deposited into mined-out open pits.

Effluent water from the process plant will be directed to a treatment plant. Raw (fresh) water for the process plant will be withdrawn from local fresh water sources.

25.4 METALLURGICAL TESTING AND RECOVERY METHODS

The River Valley Project is currently at a PEA stage. The historical metallurgical testwork conducted to date is preliminary but adequate to confirm that a conventional crushing, grinding and flotation flowsheet is required for the production of a single PGM-rich sulphide concentrate.

The testwork to date revealed that a PGE recovery of approximately 80% can be attained for the samples tested. As the testwork conducted to date is considered preliminary, it is understood that there is potential for PGE and Base metal recovery improvements with the completion of an optimized and targeted metallurgical testwork program in the future.

These tests will involve the use of new flotation reagents, updated reagent suites, new equipment types and creative flowsheet configuration(s). The impact of mineralized material variability, regrind size, and mineralogy on recoveries will be analyzed.

In a conventional copper and platinum flotation process flowsheet, the implementation of new equipment and creative process configurations, including Eriez's CrossFlow® and/or Hydrofloat® Separators has been shown to give increase in overall copper and PGE recoveries of 3% to 5%.

The items listed above have the potential to raise the PGE recoveries to 80% when NAM is benchmarked against similar PGE projects in the region and also considering the limited amount of testwork conducted on the Project to date. However, the grade of the concentrate needs to be considered. A Pd recovery of 80% could be considered an optimistic figure. The testwork conducted to date, though, is sufficient to provide an OPEX and CAPEX estimate to an accuracy of ± 50%.

25.4.1 Mineral Processing and Metallurgical Testing

A significant amount of testwork was conducted to develop a preliminary flowsheet for the development of the River Valley process plant design. The feasibility of using flotation to produce a PGE-rich sulphide concentrate was examined through kinetic flotation testwork, LCT and pilot plant testwork. At the PEA level, the preliminary testwork conducted so far is sufficient to be used as a basis to establish preliminary process plant design criteria and a process plant flowsheet.

25.4.2 Recovery Methods

The preliminary process plant design is derived from the results obtained from historical testwork with an emphasis on the pilot plant testwork conducted by MTU in 1999 and bench scale LCT testwork conducted by SGS in 2013. The data and results were used to develop the process design criteria, the mass and water balance, sizing of the major equipment the OPEX and CAPEX. The reason why these two particular tests were used as a basis for design is due to being based on the most optimized results obtained from all previous mineralogical, elemental deportment and kinetics tests, and because the LCTs simulate how the actual process plant will be running, therefore, valuable predictions about the success of the process can be made.

The preliminary River Valley process plant flowsheet and design allows for the treatment of the plant feed per the process production schedule. The design considers three stages of cleaner flotation. The River Valley processing plant is designed to process 21,920 tpd (6.0 Mtpy) of ROM material.

The process plant will produce a single concentrate for sale using conventional sulphide flotation techniques. Flotation (plant) tailings will be dewatered and disposed of in a single tailings storage facility (“TSF”) in the early years and later in mined-out open pits.

The testwork results provided the basis for recovery, grade calculations, and residence times. The flotation cell sizes are based on the mass balance and the corresponding cell size available from vendor brochures.

Concentrate and tailings products are dewatered using high-rate thickeners and the concentrate is further dewatered by conventional plate and frame pressure filtration. The design of the high-rate thickeners is based on typical solids loading rates for sulphide concentrates and silica tailings. The filtration circuit design is based on pressure filtration common design practices for concentrate.

Process plant water is recovered from the concentrate and tailings thickener overflow. Raw water is assumed to be sourced from the local environment and is used as make-up water. Part of the water that ends up in the tailings pond is recovered to complement make up water requirements. It is assumed that 10% of the fresh water make-up will come from fresh water sources in case there is not enough recovered water from the TSF during very dry conditions.

25.5 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

The River Valley Project, while a proposed large-scale mining project, is expected to have no discernable off-site impacts during development, operations and closure. No hazardous chemicals will be used to process plant feed material, and the mineralized material and waste rock is not expected to be acid generating or metal leaching.

A major environmental aspect of the River Valley Project that will be outlined in a Project Description and in the expected Environmental Assessments is the intrusion of mine pits into the footprint of a few small and one larger surface water body (Pine Lake) on the Project site.

Protection of fish habitat by either temporarily or permanently establishing habitat that is similar to that which has been removed is a general strategy that is employed at mine sites. Protection of lake water quality is usually another key aspect that will be undertaken in agreement with River Valley Project environmental criteria and with official regulations.

No significant baseline environmental studies have yet been performed for the River Valley Project. These studies will establish baseline conditions for a detailed Environmental Assessment that will likely be required for the River Valley Project.

The federal and provincial Environmental Assessment (“EA”) processes and permitting framework for metal mining in Canada are well established. Following the EA approval, the River Valley Project will enter a permitting phase which will regulate the Project through all phases - construction, operation, closure, and possibly post-closure. Throughout all of these processes, consultation with, and advice from, local First Nations and local communities is considered essential.

NAM will need to develop a reclamation and Closure Plan that will satisfy all regulatory requirements and will be consistent with best Canadian industrial practice.

25.6 ECONOMIC ANALYSIS

Open pit mining costs have been estimated to average $2.28/t material over the LOM. At a strip ratio of 3.6:1 mining costs equate to $10.17/t of process plant feed. Processing costs ($8.44/t) and site G&A ($0.86/t) contribute to a total LOM cost of $19.47/t processed.

Initial capital costs are estimated at $495 M and include a 10% contingency. Sustaining capital costs are estimated at $26 M, and a salvage value is estimated at $25 M.

Using the PEA metal pricing of US$1,200/oz Pd, US$1,050/oz Pt, US$1,350/oz Au, US$3.25/lb Cu, US$8.00/lb Ni, US$35.00/lb Co and an exchange rate of US$1.00 = CDN$1.37, the Project has an estimated pre-tax NPV at a 5% discount of $261 M and an IRR of 13%. Post-tax NPV and IRR are estimated at $138 M and 10%, respectively. A 1.5% NSR royalty is payable after a payment of $1.5 M. NPV figures calculated on an after-tax basis factor in a 15% Federal income tax rate, an 11.5% Provincial tax rate and a 10% Ontario mining tax.

The PEA has highlighted several opportunities to increase Project economics and reduce identified risks. These include exploration opportunities to improve the quantity and quality of Mineral Resources and opportunities to optimize the mine plan.

26.0 RECOMMENDATIONS

Specific recommendations for the River Valley Project are summarized below for each area.

Additional exploration and study expenditures are warranted to improve the viability of the Project and advance it towards a Pre-Feasibility Study. It is recommended that NAM undertake a two-stage exploration program focused on delineation and expansion drill programs that will concentrate on the open pit potential along strike and down-dip of the known Mineral Resources.

It is recommended that the Phase 1 activities be completed before commencing the Phase 2 activities.

26.1 PHASE 1

The first exploration program in Phase 1 is planned to expand and increase confidence in the Mineral Resource by improving classification categories in the Dana North area for which 5,000 m of drilling is planned. The Dana North area contains the bulk of the mineralization to be mined in the PEA production plan.

The Dana North area contains the newly discovered Pine Zone. The Pine Zone is located east of the main River Valley Deposit in an area previously not known for mineralization. The 2016 drill program confirmed the higher-grade near-surface PGE discovery made in the 2015 drill program and highlighted the continuity of the PGE mineralization into the footwall. The Pine Zone remains open along strike and at depth.

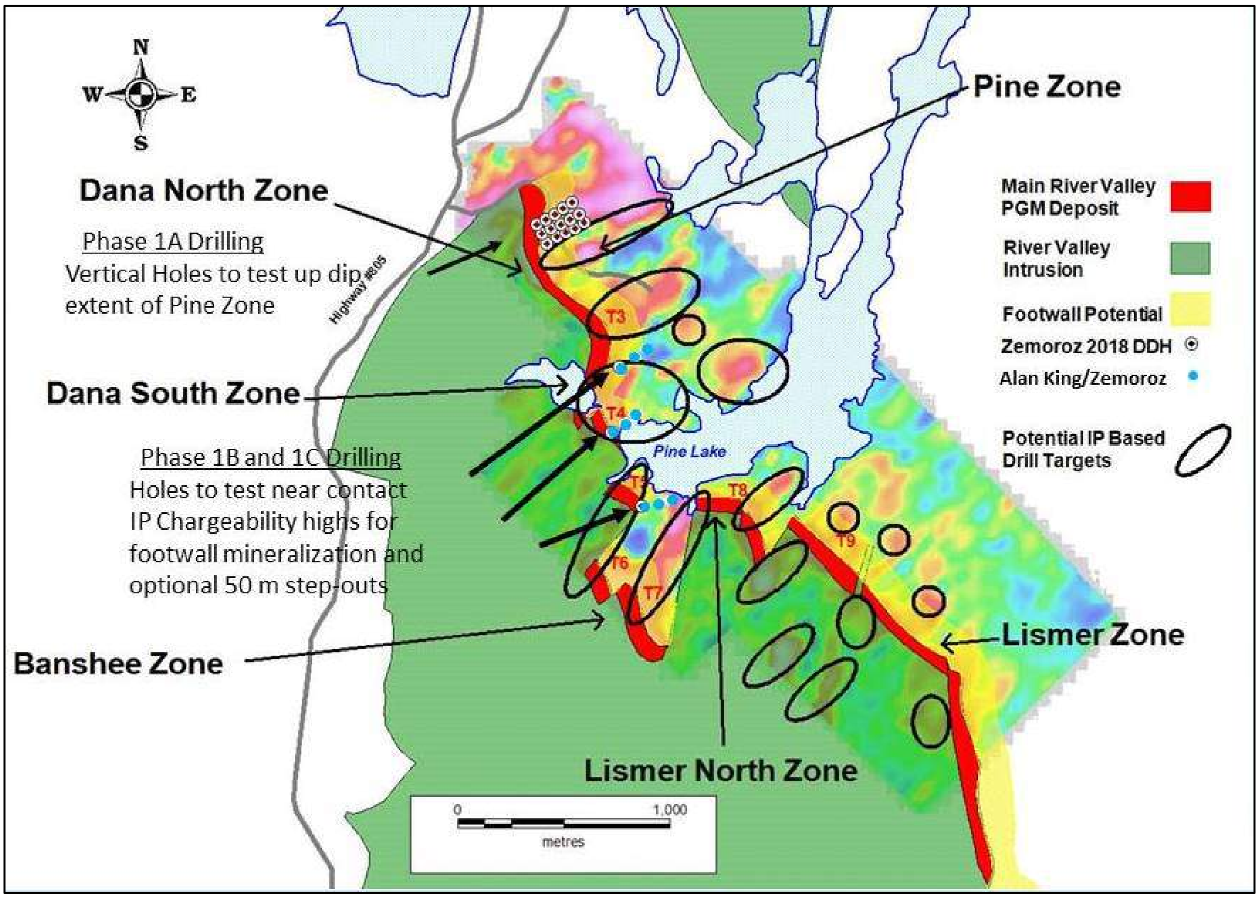
After examination of the data from the 2011 infill drill campaign it was noticed that there appeared to be a repetition of the main breccia zone on the other side of the Archean footwall rocks. Subsequent 3D modelling of the data suggested the existence of an extension of the Deposit eastwards and tucked below the footwall rocks. The 2015 drill program seemed to confirm this theory and it was collaborated by the 2016 drill program results. This new mineralized area was dubbed the “Pine Zone” and in effect is the same mineralization as the main Deposit. An Induced Polarization (“IP”) survey was planned based on data obtained from the drilling results. This facilitated the planning and optimal orientation of the grid and allowed a more refined resolution of the ensuing IP survey. This survey was done in the spring of 2017 and was successful in defining many zones of moderate to high chargeability underlying the footwall rocks to the east of the Deposit. Some of these chargeability zones were tested with a drill program in the fall of 2017. All but one hole drilled encountered the Pine Zone. This unit was intersected in drill holes as far as 200 m from the surface projection of the Deposit.

A similar IP survey was conducted in 2018, extending the coverage to 4 km of footwall adjacent to the Deposit. This survey also identified numerous zones of high chargeability adjacent to the Deposit. These zones have yet to be drill tested. The Pine Zone is open to the east and south. In Dana South the Pine Zone appears to come to the surface along the shores of Dana Lake.

A 5,000 m drill program is recommended to test the up-dip extension of the Pine Zone in Dana North and to test some of the better chargeability highs identified in the previously completed IP surveys, see Figure 26.1.

- Phase 1A is composed of three fences of short vertical holes on a nominal 5 x 50 m pattern to test the up-dip and easterly extension of the Pine Zone and the vertical depth of the Pine Zone.
- Phase 1B is to test chargeability highs along and east of the Deposit where good assays were obtained.
- Phase 1C is step-out drilling from Phase 1B in 50 m intervals to test the lateral extent of any mineralization.

FIGURE 26.1 PLAN VIEW SHOWING RECOMMENDED PHASE 1 EXPLORATION



Source: *NAM (2019)*

Follow-up on step-out drilling will be planned based on the results of this program.

IP surveys on the footwall contact of the River Valley intrusive have identified a new style of mineralization (the Pine Zone), which opens up a new area for exploration on the Project. It appears that the Pine Zone is a shelf-like extension of the Deposit that potentially extends the entire 16 km strike length of the Deposit. This raises the potential of adding significantly to the existing Mineral Resource. Several new IP targets south the Pine Zone have been identified for future drilling. An IP program south of the Pine Zone over approximately 12 km is recommended on the adjacent footwall rocks and any identified zones of high chargeability that will need to be drill tested.

Another exploration program in Phase 1 (Phase 1D) should test footwall targets along the Deposit. This is a large program, with 50,000 m planned.

After logging and sampling analysis, fresh core should be preserved and submitted for mineralogical studies and metallurgical testwork. Subsequent metallurgical studies should be completed to confirm or potentially improve process plant recoveries and more accurately estimate concentrate grades. The process plant flowsheet would be optimized to support a Pre-Feasibility Study ("PFS").

An environmental baseline study should be initiated. The collection of flora, fauna, water quality, and weather would be done to Ontario Ministry of Environment and Climate Change standards. Initial contact should be made with federal and provincial environmental agencies.

The estimated cost to complete Phase 1 is estimated to be $9.7 M. Table 26.1 summarizes the proposed Phase 1 budget.

TABLE 26.1
PHASE 1 BUDGET

Activity	Rate ($000)	Units	Cost ($000)
Diamond Drilling (NQ) Dana North Phases 1A,1B,1C	0.113	5,000 m	565
Assays, Support for Drill Phases 1A,1B,1C	171	1	171
Induced Polarization Study and Line Cutting, 12.5 km	1,630	1	1,630
Diamond Drilling (NQ) Step-Out, Footwall Phase 1D	0.113	50,000 m	5,650
Assays, Support for Step-Out Drilling Phase 1D	1,270		1,270
Metallurgical Study	200	1	200
Environmental Baseline Study	200	1	200
Total			**9,685**

26.2 PHASE 2

The Phase 2 exploration program is planned to test the extension and continuity of high-grade mineralized domains.

The geological staff will continue to conduct surface exploration and prospecting of untested anomalies and structure and review the potential of reef style mineralization outside of the known Mineral Resource.

Infill drilling of the footwall mineralization is recommended. This is another large program, with 18,000 m planned.

Once the drilling is near completion, samples can be collected for further metallurgical testing to confirm recoveries in untested Zones and to optimize the process plant flowsheet.

A geotechnical study involving geotechnical logging, orientated drilling and strength testing of drill core is recommended. A geotechnical engineer would train the field geologist to properly collect the geotechnical data from the drill core before sampling. Selected core samples of the various lithologies and mineralization styles would be sent for strength testing. A 3D geomechnical block model would be generated to support a PFS and utilized to estimate pit wall slopes in design sectors. Geotechnical analysis is also required for process plant foundations, TSF construction, and WRF construction.

A hydrogeological study is required to estimate water in-flows to the open pits and generate a site water management plan in support of a PFS.

The PFS will evaluate the Project at a high-level engineering and financial study.

The estimated cost to complete Phase 2 program is approximately $4.5 M. Table 26.2 summarizes the proposed Phase 2 budget.

TABLE 26.2
PHASE 2 BUDGET

Activity	Rate ($000)	Units	Cost ($000)
Infill Drilling (NQ), Footwall	0.113	18,000 m	2,340
Assays, Support for Infill Drilling	457	1	457
Final Metallurgical Study	150	1	150
Geotechnical Study	200	1	200
Hydrogeological Study	150	1	150
Pre-Feasibility Study	1,200	1	1,200
Total			**4,497**

26.3 OTHER RECOMMENDATIONS

26.3.1 Mineral Resource Estimate Recommendations

The following recommendations are suggestions for policy and procedures conducted by NAM to further enhance the potential viability of the Project. The recommendations are not in order of importance.

It is recommended that NAM increase the frequency of bulk density measurements from drill core in order to build up the mineralized and non-mineralized bulk density database. The bulk density database should represent at a minimum 5% of the total assay dataset. In order to build the bulk density data, measurements should be collected at 20 m intervals.

Due to the low-sulphide content of the mineralized rock on the Property, a regression formula is unlikely to be successfully generated using assay data. The bulk density data needs to be linked not only to the analytical results but to the lithology and alteration of the rocks.

It is recommended to continue to analyze a smaller subset of data for rhodium, cobalt, and silver. These minerals are potential payable metals, yet the cost of analysis can be prohibitive to assay every sample. It is recommended to assay approximately 5% of the data with a good representative spatial distribution.

When channel samples are being collected on surface, they should be cut as one continuous swath across the outcrop. The use of channel samples can be important in Mineral Resource estimations as it provides near-surface data which is not available from diamond drill holes and allows confident grade interpolation to surface.

The current storage of course rejects and pulps is subject to contamination. The currently utilized 45 gallon barrels are placed in an upright position and the lids are rusting through. The barrels should be laid on the side and stacked appropriately, or the material placed inside larger storage containers such as shipping containers.

Logging procedures should be modified to initiate the collection of more detailed geotechnical data prior to geological logging and sampling for the purposes of rock mechanics and slope stability studies. A geotechnical engineer can provide the basics of the data collection procedures. This data will form the basis to justify slope angles during any open pit optimization studies.

All the data collected on the Project should be validated and then secured in a single master database system with set policies and procedures as to who has access to the data. A back-up copy of the database should be created weekly and placed in a separate storage location.

Validation of the data completed during this study identified several minor inconsistencies between the database and the logs. Corrections have been made, yet there may be further corrections required in the master file.

The creation of a structural vectoring model is recommended to better understand the geometry of the Zones. The presence of potential cross-faults, folds, and footwall mineralization can have a significant impact on the Mineral Resource.

26.3.2 Mining Recommendations

A geotechnical study is required to estimate the pit wall slopes by design sector, and to provide analysis for process plant foundations, TSF construction, and WRF construction.

A hydrogeological study is required to estimate open pit water in-flows and to generate a site water management plan.

Acid generation and metal leaching tests are required on waste rock and tailings. The potential for metal leaching and acid rock drainage is needed for proper design of material storage facilities and water management.

Discussion with mining contractors is recommended in order that several future quotations can be provided for a PFS.

Discussions with Hydro One for electrical power installation is recommended to determine the costs associated with installing and supplying grid power to the Project site.

26.3.3 Mineral Processing and Metallurgical Testing Recommendations

- Further confirmatory testwork, through the testing of additional fresh sample composites and variability samples, can improve the process plant design conditions and PGE recovery. Flotation and grindability variability testing on DSZ and DNZ composite is recommended to identify the variability of flotation performance. Variability testing should then extend to investigate a broader range of samples from each zone to investigate the effect of feed grade and rock type on metallurgy.

- Flotation and grindability variability testing on DSZ and DNZ composite is recommended to identify the variability of flotation performance.

- Effective flowsheet configuration. A common approach with this type of nickel-bearing mineralization is a split flowsheet approach where the easy-to-float material is cleaned separately from the difficult-to-float material. This type of approach is commonly practiced in nickel-bearing sulphide deposits located in the Sudbury region. This flowsheet was never properly assessed in the SGS program.

- Further investigation should be carried out to explore options to improve nickel recovery. It should be possible to improve recovery from approximately 22% to between 30 and 40%. Variables such as alternative collectors and activators to improve sulphide recovery could be examined.

- Investigate the applicability of new innovative technologies to improve PGE recoveries. The use of new flotation reagents and/or suites, flowsheet configurations, tank cells and verti-mills for regrinding are examples of potential opportunities. The effect of depressant type and dosage; it was only towards the end of the program when a number of secondary depressants were analyzed. There are other secondary depressants that should be considered. Dosage should be optimized. Trade-off studies on various flowsheet options should be investigated and completed.

- Detailed mineralogical examination of the occurrence of PGEs should be considered as this could better define flotation conditions for the recovery of these elements, as well as provide an indication of the maximum recovery of these elements.

- Further definition on the effect of primary grind size on flotation recovery is required. This data should be used in an economic trade-off study with energy requirements as a function of grind size. Effect of regrind size and number of regrind stages; very little attention was given to this variable in the work to date. A regrind size around a P80 of 20 microns was selected, but not optimized.

- Pre-concentration techniques may be considered for River Valley mineralized material, but the chances of success are considered to be very low.

- Environment testing on tailings solids and effluent from a locked cycle test should be completed on samples relevant to the latest LOM production plan developed by P&E.

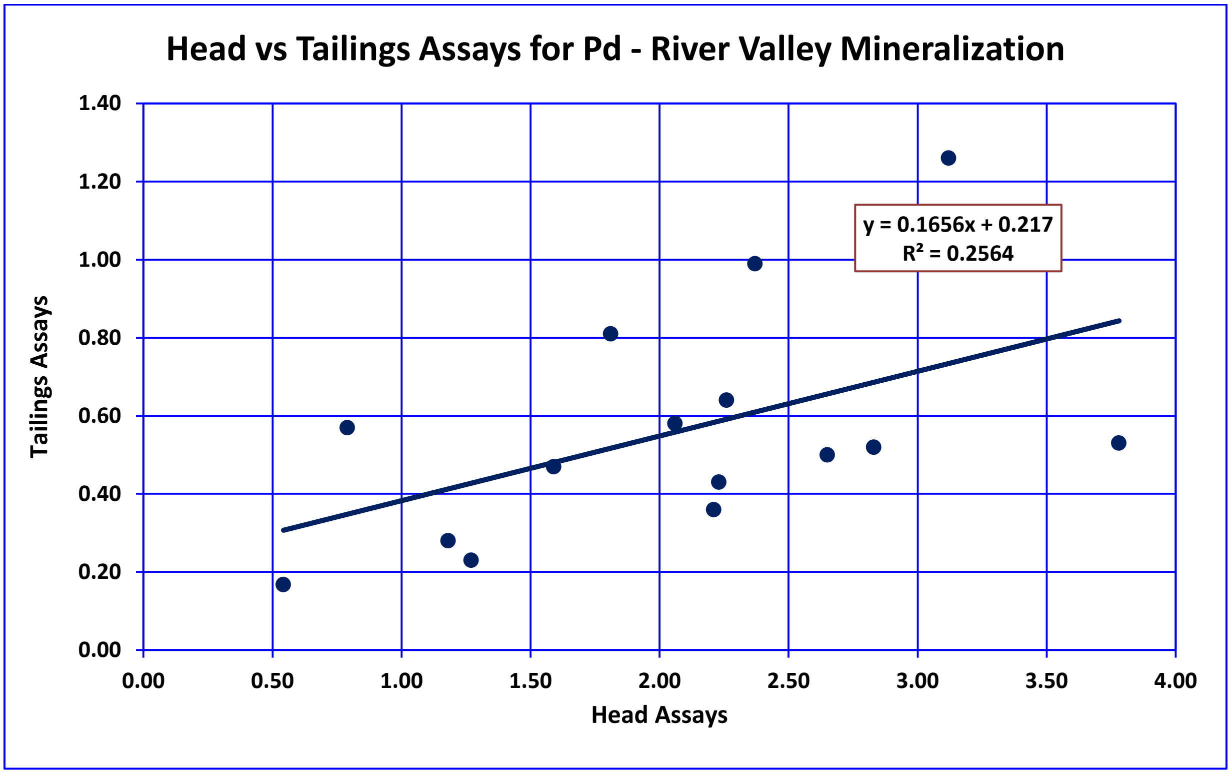
From all the testwork conducted thus far, a comparison table (Table 26.3) and a scatter plot (Figure 26.1) between the head and tailings grades were created to assess the existence of a relationship between the head grades and the tailings grades such that a consistent recovery can be predicted. A regression analysis of the data revealed that there is no clear relationship between the head and tailings grades as the correlation coefficient, R2, was too low (0.26) as shown in Figure 26.1. Though, the sample covariance is positive, indicating that the data loosely move in the same direction, it is close to zero, signifying that there is a weak relationship between them. Also, R2 is very low at 26%, indicating again that there is no strong relationship. For scientific studies, involving the physical sciences, an R2 < 80% is considered low. This is particularly true when comparing the Marathon Project with the River Valley Project which are quite similar to each other in mineral composition and processing method. Therefore, a consistent process recovery cannot be predicted. Taking the historical metallurgical testwork and other similar projects into consideration (Table 26.3), a Pd recovery between 70% and 80% can be expected as the testwork conducted to date was preliminary and, therefore, there is room for improvement per the recommendations stated above.

TABLE 26.3
METALLURGICAL TESTWORK SUMMARY

Item / Commodity	**Units**	**New Age Metals Inc.** **River Valley Project**	**Marathon PGM Corporation** **Marathon Project**	**North American Palladium** **Suhanko Project**	**Ursa Major Minerals Inc.** **Shakespeare Ni Deposit Project**
Pit 1 - total Mined	**t**			17,500,000	
Pit 2 – total Mined	**t**			57,500,000	
Total Mined	**t**			75,000,000	
Pit 1 – total Mined	**%**			23.3	
Pit 2 – total Mined	**%**			76.7	
Total Mined	%			100.0	
Availability	%	92	90	90	92
Mill Feed	tpa	6,000,000	8,030,000	7,500,000	1,642,500
	tpd	17,868	24,444	22,831	4,500
	t/h	744.5	1,018.5	951.3	203.8
Mill Feed					
Grades					
Ni	wt%	0.02		0.09	0.33
Cu	wt%	0.063	0.247	0.22	0.35

Item / Commodity	Units	New Age Metals Inc.	Marathon PGM Corporation	North American Palladium	Ursa Major Minerals Inc.
		River Valley Project	Marathon Project	Suhanko Project	Shakespeare Ni Deposit Project
Pd	g/t	0.542	0.834	1.49	0.366
Pt	g/t	0.207	0.237	0.36	0.332
Au	g/t	0.036	0.085	0.15	0.186
Ag	g/t	0.3	1.442		
Rh	g/t	0.011	0.0069	0.02	
Concentrate					
Concentrate Production	ktpa	30	82	150	66
	dry tpd	89.3	251.0	456.6	180.9
	t/h	3.7	11.6	19.0	8.2
Mass Pull	%	0.50	1.03	2.00	4.02
Grades					
Ni	wt%	1.7	-	2.9	6.2
Cu	wt%	14.8	22	8.1	8.3
Pd	g/t	138	67.9	48.8	3.8
Pt	g/t	42.8	16.7	12.7	6.2
Au	g/t	7.76	6.6	5.7	1.8
Ag	g/t		127.0	-	-
Rh	g/t		0.95	-	-
Recoveries					
Ni	%	17.16		65.0	76.0
Cu	%	85.07	90.8	73.5	95.5
Pd	%	69.15	80.1	65.5	42.0
Pt	%	65.89	71.0	70.4	75.0
Au	%	60.03	79.9	75.5	38.0
Ag	%		74.5	-	
Tailings					
Tailings Flow	ktpa	5,970	7,948	7,350	1,576
	dry tpd	17,778	24,193	22,374	4,319
	t/h	741	1,007	932	195.6
Ni	%				
Cu	%	0.01	0.02	0.06	0.02
Pd	g/t	0.17	0.17	0.53	0.22
Pt	g/t	0.07	0.07	0.11	0.09
Au	g/t	0.01	0.02	0.04	0.12
Ag	g/t	0.30	0.37		

FIGURE 26.2 RELATIONSHIP BETWEEN PROCESS PLANT HEAD GRADES AND FLOTATION TAILINGS GRADES FOR RIVER VALLEY MINERALIZATION



Source: *DRA (2019)*

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28.0 CERTIFICATES

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, 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 "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", (The "Technical Report") with an effective date of June 27, 2019.
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 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 Sections 2,3,15,16,18,19,21,22,24 and co-authoring Sections 1,21,25,26 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 Project 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 27, 2019
Signing Date: August 7, 2019
{SIGNED AND SEALED}
[Eugene Puritch]

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Eugene Puritch, P.Eng., FEC, CET

CERTIFICATE OF QUALIFIED PERSON

D. GRANT FEASBY, P. ENG.

I, D. Grant Feasby, P. Eng., residing at 12,209 Hwy 38, Tichborne, Ontario, K0H 2V0, do hereby certify that:

1. I am currently the Owner and President of:
   FEAS - Feasby Environmental Advantage Services
   38 Gwynne Ave, Ottawa, K1Y1W9
2. This certificate applies to the 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", (The "Technical Report") with an effective date of June 27, 2019.
3. I graduated from Queens University in Kingston Ontario, in 1964 with a Bachelor of Applied Science in Metallurgical Engineering, and a Master of Applied Science in Metallurgical Engineering in 1966. I am a Professional Engineer registered with Professional Engineers Ontario. I have worked as a metallurgical engineer for over 50 years since my graduation from university.

   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 has been acquired by the following activities:
   - Metallurgist, Base Metal Processing Plant.
   - Research Engineer and Lab Manager, Industrial Minerals Laboratories in USA and Canada.
   - Research Engineer, Metallurgist and Plant Manager in the Canadian Uranium Industry.
   - Manager of Canadian National Programs on Uranium and Acid Generating Mine Tailings.
   - Director, Environment, Canadian Mineral Research Laboratory.
   - Senior Technical Manager, for large gold and bauxite mining operations in South America.
   - Expert Independent Consultant associated with several companies, including P&E Mining Consultants, on mineral processing, environmental management, and mineral-based radiation assessment.
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Section 20 and co-authoring Sections 1, 25, 26 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 Project that is the subject of this Technical Report.
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 27, 2019
Signed Date: August 7, 2019

{SIGNED AND SEALED}
[D. Grant Feasby]

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D. Grant Feasby, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

JIM KAMBOSSOS, P. ENG.

To Accompany the NI 43-101 Technical Report entitled "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", prepared for New Age Metals Inc. with an effective date of June 27, 2019 (the "Technical Report").

I, Jim Kambossos, P. Eng., do hereby certify that:

1. I am a Principal Process Engineer with DRA Americas Inc., with an office at 20 Queen Street West, 29th Floor, Toronto, ON M5H 3R3, Canada;
2. I am a graduate from the University of Toronto, with a B.A.Sc. in Chemical Engineering awarded in 1993 and an M.A.Sc. in Chemical Engineering awarded in 2005;
3. I am a Professional Engineer licensed by Professional Engineers Ontario (Membership Number 100074183);
4. I have worked as an Engineer in the Mining & Metals industry continuously since my graduation from university;
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 by 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 am responsible for authoring Sections 13 and 17, and co-authoring Sections 1, 21, 25, 26 of this Technical Report;
7. I have not visited the site;
8. I have had no prior involvement with the Project that is the subject of this Technical Report;
9. At the date of the 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;
10. I have no personal knowledge, as of the date of the Technical Report, of any material fact or material change which is not reflected in this Technical Report;
11. I am independent of the issuer as defined in Section 1.5 of NI 43-101;
12. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form;

This 7th day of August 2019

{SIGNED AND SEALED}
[Jim Kambossos]

Jim Kambossos, P. Eng.
Principal Process Engineer
DRA Americas Inc.

CERTIFICATE OF QUALIFIED PERSON

TODD MCCRACKEN, P. GEO.

I, Todd McCracken, P.Geo., of Sudbury, Ontario do hereby certify:

1. I am a Manager of Mining with WSP Canada Inc. with a business address at 93 Cedar Street, Suite 300, Sudbury, Ontario P3E 1A7.

2. This certificate applies to the technical report entitled "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" for New Age Metals Inc., NI 43-101 & 43-101F Technical Report (the "Technical Report") with an Effective Date of June 27, 2019.

3. I am a graduate of the University of Waterloo, B.Sc. (Honours) Applied Earth Sciences, 1992. I am a member in good standing of Association of Professional Geoscientists on Ontario (APGO) License #0631. My relevant experience includes more than 27 years of experience in exploration and operations, including several years working in magmatic PGE-nickel sulphide deposits. I am a "Qualified Person" for the purposes of National Instrument 43-101 (the "Instrument").

4. My most recent personal inspection of the Property was one day on July 25, 2011, September 15, 2017, and November 9, 2017, inclusive.

5. I am responsible for authoring Sections 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 23, and co-authoring Sections 1, 25, 26 of the Technical Report.

6. I am independent of New Age Metals as defined by Section 1.5 of the Instrument.

7. I have prior involvement with the Property that is the subject of this Technical Report having been a QP on technical reports in June 2012 and January 2019.

8. I have read the Instrument and the sections of the Technical Report that I am responsible for have been prepared in compliance with the Instrument.

9. As of the date of this certificate, to the best of my knowledge, information, and belief, the sections of the Technical Report that I am responsible for contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Signed and dated this 7th day of August 2019 at Sudbury, Ontario.

Original signed and stamped by
Todd McCracken, P.Geo.

Todd McCracken, P.Geo.
Manager - Mining
WSP Canada Inc.