11 July 2017

2016 Mineral Resource and Ore Reserve Statements

Following are the statements of Mineral Resources and Ore Reserves for the Ramu Nickel Mine as at 31 December 2016, reported under The JORC Code, 2012 Edition.

These reports were prepared for and are the responsibility of Ramu NiCo Management (MCC) Limited, the operator and manager of the Ramu Nickel/Cobalt Laterite Mine.

ASX Code: HIG
PoMSox Code: HIG
Shares on Issue: 936 million
Performance Rights: 17 million

Directors
Ron Douglas, Chairman
Craig Lennon, MD/CEO
Dan Wood
Bart Philemon
John Wylie

Management
Sylvie Moser, CFO
Ron Gawi, GM Port Moresby
Leslie Nand, GM Exploration Projects

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About Highlands Pacific Limited

Highlands Pacific is a PNG incorporated and registered mining and exploration company listed on the ASX and POMSoX exchanges. Its major assets are interests in the producing Ramu nickel cobalt mine and the Frieda River copper gold project; with exploration in progress in the Star Mountains. Highlands also has exploration tenements at on Normanby Island (Sewa Bay).

Star Mountains Prospects

The Star Mountains exploration tenements are located approximately 20km north of the Ok Tedi mine, in the West Sepik Province, PNG. They lie within the highly prospective New Guinean Orogenic Belt, which hosts the Grasberg, Ok Tedi, Porgera and Hidden Valley mines, as well as the Frieda deposit. The Star Mountains project is held within a joint venture with partner Anglo American plc.

Ramu Nickel Cobalt Mine

The producing Ramu nickel cobalt mine is located 75km west of the provincial capital of Madang, PNG. Highlands 8.56% interest in Ramu will increase to 11.3% at no cost to Highlands after repayment of its share of the project debt. Highlands also has an option to acquire an additional 9.25% interest in Ramu at fair market value, which could increase the company's interest in the mine to 20.55%, if the option is exercised.

Frieda River Copper/Gold Project

The Frieda River copper gold project is located 175kms north-west of the Porgera gold mine and 75km north-east of the Ok Tedi mine. Highlands has a 20% interest in the project and Frieda River Limited (a wholly owned subsidiary of PanAust Limited which in turn is a wholly owned subsidiary of Guangdong Rising Assets Management Co. Ltd.) has 80%.

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Report

Ramu NiCo Mineral Resources Estimate 2016
Ramu NiCo Management (MCC) Limited

ENFI Project No.： Z1378
27th June, 2017

1. Introduction

This update of the Ramu Nickel-cobalt Resource, Papua New Guinea provides a snapshot of the estimated resource remaining for the Ramu nickel cobalt laterite as of December 31st 2016. The results of Ramu Mineral Resources Estimate are seen in Table 1.

Table 1 Results of the Ramu Mineral Resources Estimate 2016

		31-Dec-16	
Category	MTonnes	Ni %	Co %
Kurumbukari			
Measured	37	0.90	0.1
Indicated	5	1.3	0.1
Inferred	2	1.2	0.1
Total	44	0.96	0.1
Ramu West			
Indicated	17	0.9	0.1
Inferred	3	1.5	0.1
Total	20	1.0	0.1
Greater Ramu			
Inferred	60	1	0.1
Global Total	124	1	0.1

Notes:
1.Totals may not equal the sum of the component parts due to rounding adjustments.
2. Tonnes (dry) represent the -2 mm economic portion of resource mineralization in the rocky saprolite .

The report，Update of the Resources of the Ramu Nickel-Cobalt Operation, PNG， was prepared by Xiong Xiaofang of China ENFI Engineering Corporation. The latest resource update report of Ramu project was prepared by Lawrence Queen Chief Geologist of Highlands Pacific Limited on 2015， which stand on the exploration data before the year 1999 and mining production data.

The 2016 update report also based on the exploration data before 1999, but the depletion area was by the date of December 31, 2016. Ramu NiCo Management (MCC) Limited did not carry out any geological exploration work with JORC Code in 2016. There has been no increase in Mineral Resources.

In Appendix JORC TABLE 1, because the input data is identical to that used previously much of the commentary in sections 1 & 2 of Table 1 is drawn from the Highlands Pacific 2015 Mineral Resource and Ore Reserve Statements, 22 March 2016. The Competent Person has evaluated the matters reported in Table 1.

2. Ramu Mineral Resources Summary

A summary of the information used in the December 2016 Ramu Resources estimate update is as follows:

The Ramu Nickel-Cobalt Deposit (Figure 1) is divided up into three Resource Blocks, the Kurumbukari(KBK), Ramu West (RW) and the Greater Ramu(GR) (Figure 2, original 1999 Resource outline).This division is based on the Resource category to which each has been assigned. Kurumbukari and Ramu West are of the Measured and Indicated Resource Categories and Greater Ramu is in the Inferred Category. This culminated in a JORC compliant (2012) table “Table 1 Checklist of Assessment and Reporting Criteria” located at the back of this report. Only the Kurumbukari Resource Block has undergone depletion from mining activities since the Resource Update from 31st December 2015.

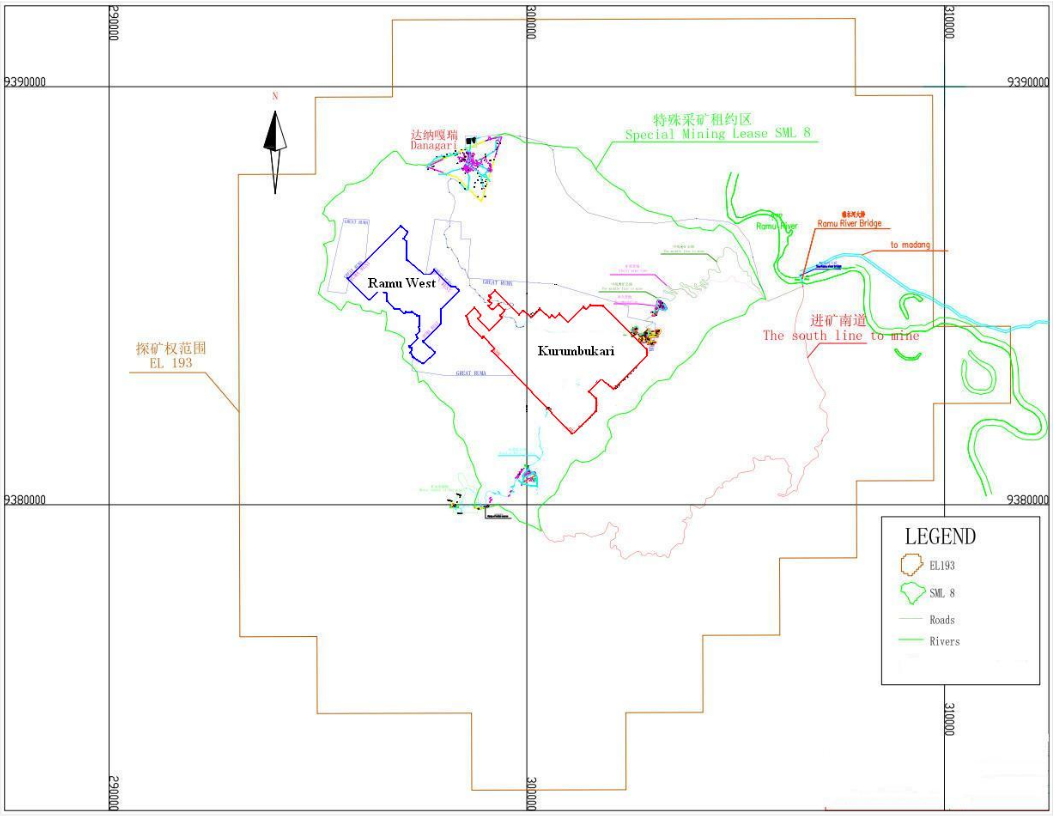

Figure 1 Mining and exploration tenement (EL193 and SML8) location map

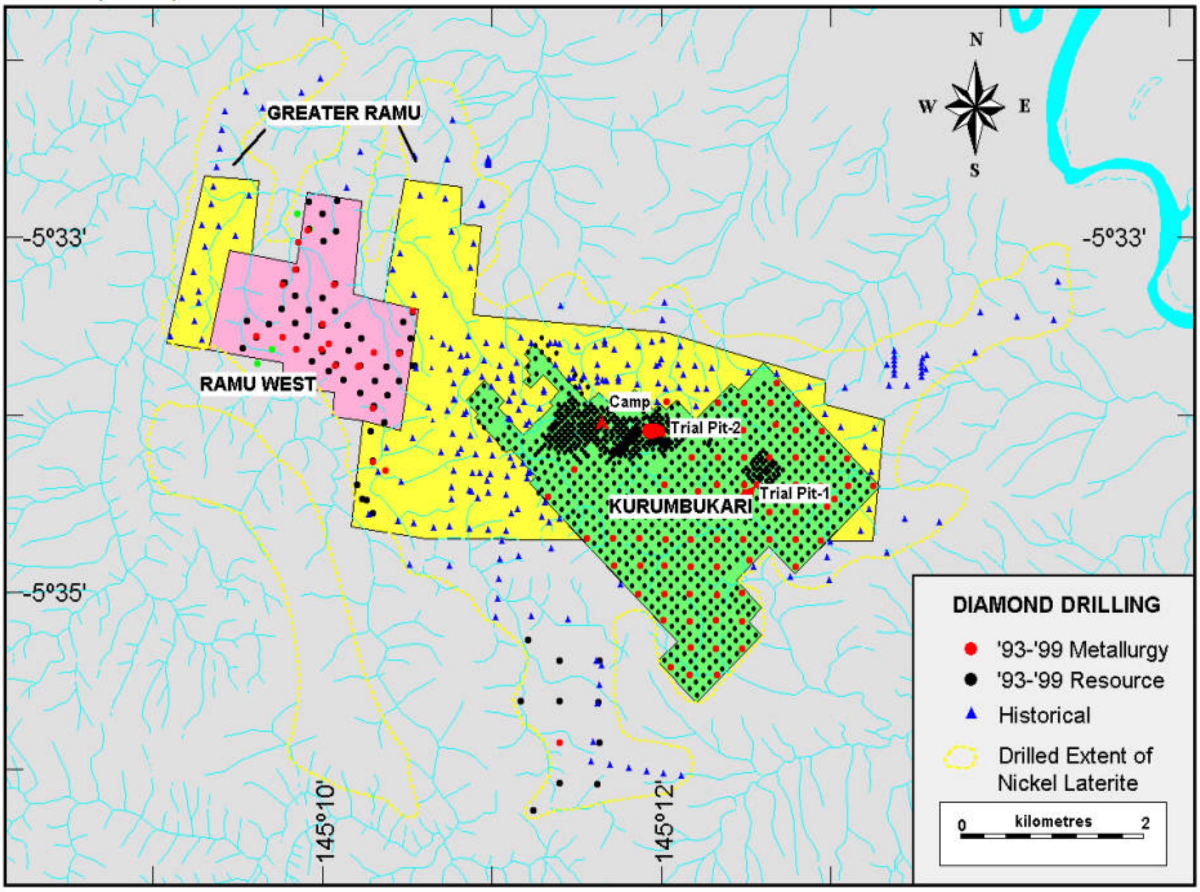

Figure 2 Resource Blocks of Kurumbukari, Ramu West and Greater Ramu

The Ramu Deposit's geological setting is typical of tropical nickel-cobalt laterite deposits, and highlighted in the idealized section in Figure 3. The Deposit sits above a bedrock comprised of ultramafic dunite with minor harzburgite and pyroxenite. The nickel-cobalt mineralization is related to the weathering of the bedrock. The bedrock itself is not ore with typical grades near the mineralization of 0.2% nickel. At Ramu the laterite rocktypes are often called layers. In descending order, the first layer, the overburden is made up of the humic layer and then red limonite which both contain less than 0.5% nickel, underlying this is the mineralization, starting with the yellow limonite (sometimes referred to as limonite) this has the most thicknesses out of all the rock types. The saprolite is next followed by two classes of rocky saprolite, these are termed R1 and R2. R1, the upper rocky saprolite layer is with on average approximately 30% rock. R2, the lower rocky saprolite layer is greater and has on average 60% rock. These rock percentages were determined by measuring volume and weight of rock in the core. R1 is proving its mine ability during mining.

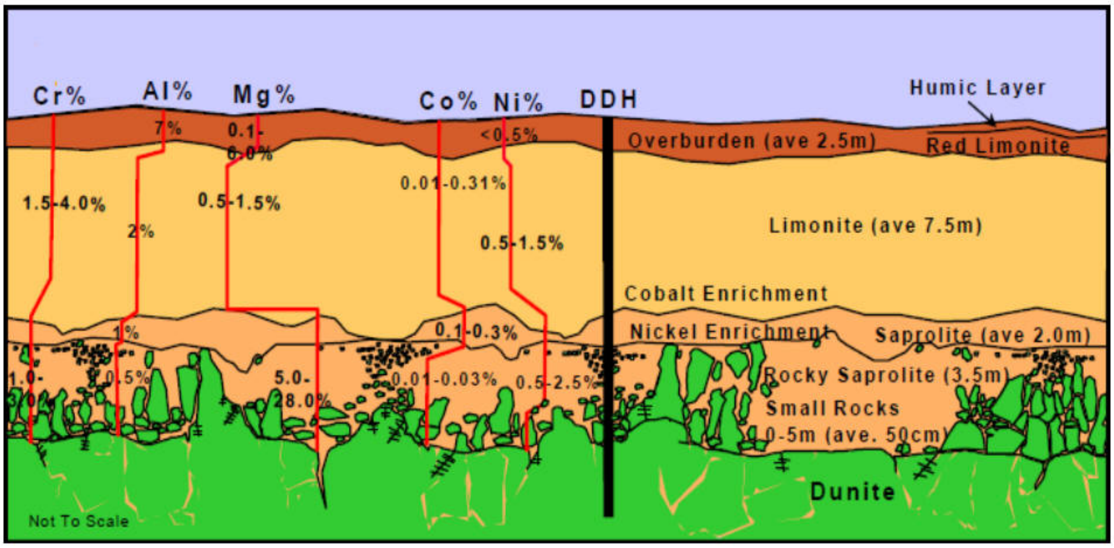

Figure 3 Ramu laterite profile

All three Ramu Resource Blocks are contiguous with each other and the Deposit is broad with dimensions of 8 km (northwest) by 5 km (north east), (AGD 66 grid). Elevations of the mineralization follow the undulating nature of the topography and the depths vary but the typical thickness of the layers is shown in Figure 3.

Sampling of the deposit was done using diamond drilling, for the Kurumbukari and Ramu West Resource Blocks NQ and HQ triple tube was used. At every fourth hole, two more holes were drilled, one for Geology reference and the second for metallurgical purposes. All the sampling holes were logged and the whole core was taken to the assay laboratory for assay. However, in the case of The Greater Ramu Resource Block, sampling is from a mix of historical drilling dating back to 1962 when the deposit was first discovered and is a mix of auger and some diamond drilling, most of this drilling is known to have penetrated the limonite but not the saprolite or rocky saprolite layers. All holes were shallow and drilled in a vertical orientation, and as a result no down-hole surveys were done.

Ten percent of samples were sent to outside laboratories for QAQC purposes. However, the quality of the Greater Ramu Resource Block is unknown. A four acid digest was performed for an AAS flame read for the Kurumbukari Block (KBK) and Ramu West with a detection limit of 25ppm for Ni and Co. For the Greater Ramu historical data the methods are believed to be based on AAS. During assaying, blanks, standards and duplicates were used at a rate of 1:10. Samples were pulverized to 85% passing 75 microns and a 25gm charge was used for assaying.

3.Explanation of Ramu Mineral Resources Estimation

China ENFI has established the mineral resources model of the Ramu nickel project, based on the DATAMINE 3-D mining software and the same basic geological data from Highlands Pacific Limited (ACCESS database from HPL). The resources estimate and update is based on the model of China ENFI (2009) and the data of the depletion area by the end of December 31, 2016.

3.1 Explanation of ENFI's resource model

Ordinary Kriging was used to estimate the resources of KBK by both ENFI and HPL, while inverse distance squared method was used for both Ramu West and Greater Ramu. The division and delineation of Ramu's laterite horizons follow the same parameters and principles used by HPL.

3.1.1 Laterite Thickness Model

(1) The 12.5m by 12.5m grid model of the surface was derived from the topographic DTM model, which was built based on the topographic survey point data and the collar coordinates of drilling.

(2) The thickness modeling of laterite, based on the GPR (ground-penetrating radar) data, acted as a "control" model to adjust the total thickness of overburden, limonite and saprolite.

(3) The thickness data of various layers interpreted in the database of drill holes are used to produce the thickness model of respective layers (i.e. overburden, limonite, saprolite, upper rocky saprolite and lower rocky saprolite). The Estimation of Kurumbukari area was based on the Kriging method, and for other areas was based on the inverse distance squared method.

（4）The thickness models of various layers are then adjusted using the GPR model. The thicknesses of various layers are rescaled under the criteria that the sum of the thickness of the overburden, limonite and saprolite layers at any point be equal to the laterite thickness in the GPR model at that point. The thickness of points with no GPR model data will remain unchanged.

3.1.2 Variogram parameters

The data of drill holes are used to calculate the experimental semi-variogram parameters of the laterite in various layers in Kurumbukari and the elements of each layer. Then the fitting system of Datamine Varfit interaction variogram parameter model is used to fit their own theoretical variogram models, and all models used are spherical models.

3.1.3 Block model

The block model of each layer can be built using the respective surface model and the block size defined--12.5m by 12.5m by 2m. And then the parameters of the experimental semi-variogram model are used to estimate the grade of Ni, Co, Mg and Al of each layer for the KBK.

3.1.4 Density

Densities are assigned by laterite layer. They are determined by measurements of core samples and in situ sand displacement measurements.

3.1.5 Mineral Resource Classification

Mineral resource classification still follows the principles of HGP and MRDI described below:

（1）Where the drill grid does not exceed 100m by 100m, the limonite and saprolite are classified as Measured Category, the upper rocky saprolite as Indicated Category, and the lower rocky saprolite Inferred.

（2）Where the drill grid is between 100m by 100m and 200m by 200m, the limonite and saprolite are classified as Indicated Category and the rocky saprolite Inferred.

（3）Where the drill grid is between 200m by 200m and 400m by 400m, resources of all layers are classified as Inferred.

The current drill grid of Kurumbukari is less than 100m by 100m, so the resources of limonite and saprolite are classified as Measured Category, the upper rocky saprolite classified as Indicated Category and the lower rocky saprolite Inferred. As in Ramu West area, the majority of drill grid is ranging from

100m by 100m to 200m by 200m, so the limonite and saprolite are classified as Indicated and the rocky saprolite Inferred. A much lower degree of exploration is completed in Greater Ramu, with the quality of a lot of exploration work not recorded, so resources of this area can only be classified as Inferred.

3.2 Current mining status of laterite mine

Ramu NiCo Management (MCC) Limited (RNML) provided the depletion areas distribution map as of December 31st 2016 for the purpose of updating the Mineral Resources of Ramu project (figure 4). To the end of 2016, the mining areais restricted to KBK resource block. The depletion areas are mainly distributed in the southeast of KBK with irregular shapes. There are 12 depletion areas in total which accumulated to 1.36km^2. The biggest depletion area is 1.15km^2 while the rest amount to 0.21km^2.

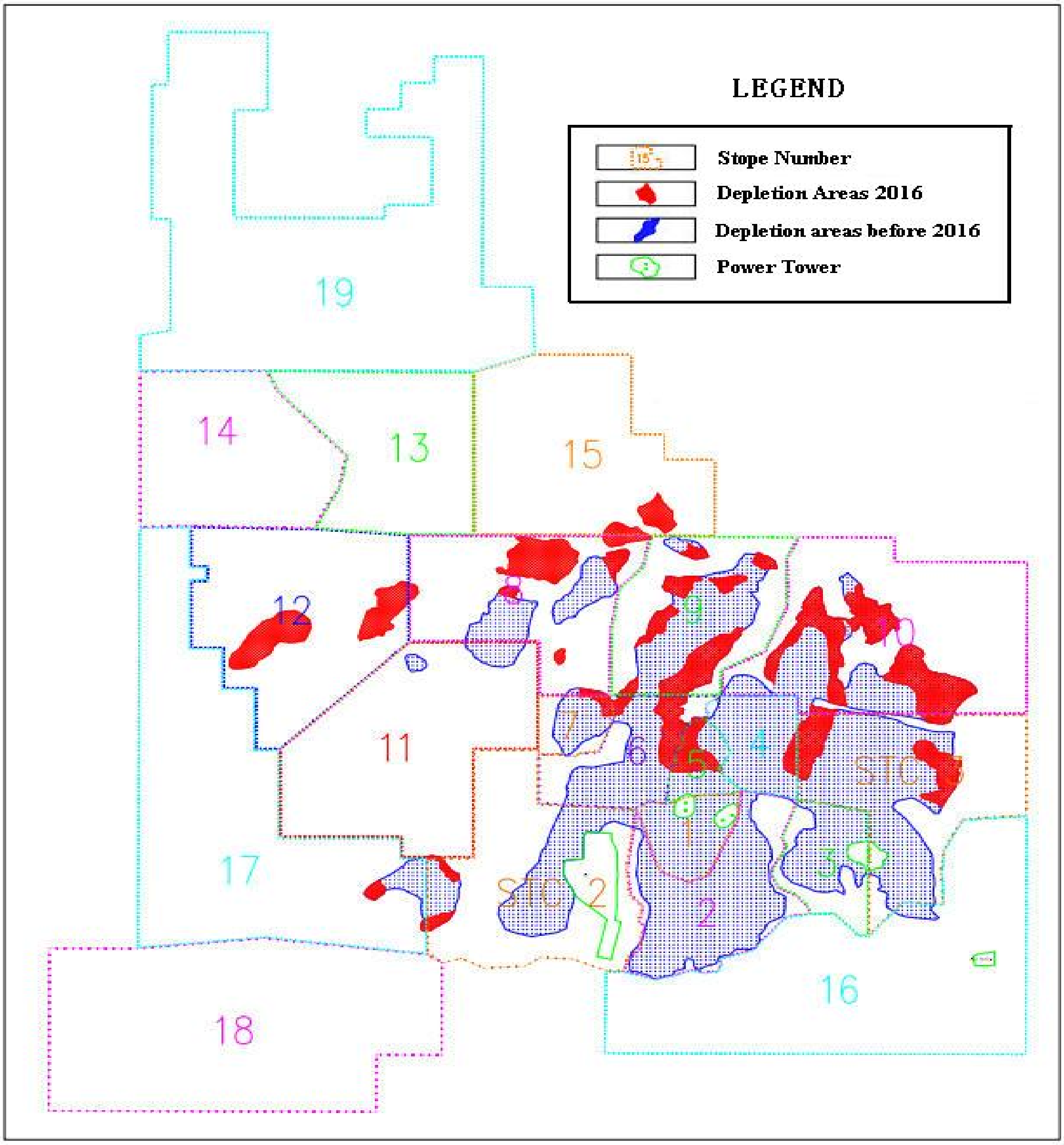

Figure 4   Depletion areas distribution map of Ramu project

3.3 Estimation of remaining in-situ Resources as of December 31st, 2016

The estimationmethod of remaining Resources by the end of 2016 is as follows: first estimate the original in-situ global Mineral Resources (1999 Mineral Resources model) of Ramu nickel project, then estimate the resources of each of the layers which has been mined by the end of 2016 according to the depletion areas and the resources model. The difference between the in-situ global resources and the mined resources estimated according to the block model makes the result of remaining in-situ resources as of December 31st, 2016.

3.3.1 Original in-situ global resources of Ramu nickel project

China ENFI did the modeling on the mineral resources of Ramu project using Datamine software in 2004, and then updated the resource model in 2009. The original in-situ mineral resources of the project estimated by ENFI are listed in table2.

Table 2 Original in-situ global resources estimated by ENFI (2009)

Category	MTonnes	Ni %	Co %
Kurumbukari			
Measured	44.8	0.91	0.11
Indicated	7.3	1.35	0.10
Inferred	4.1	1.30	0.05
Total	56.2	1.00	0.10
Ramu West			
Indicated	17	0.9	0.1
Inferred	3	1.5	0.1
Total	20	1.0	0.1
Greater Ramu			
Inferred	60	1	0.1
Global Total	136.2	1.0	0.1

3.3.2 The depletion mineral resources estimated by resource model and depletion areas.

The mining area was constrained within the KBK resource block by the end of 2016. Both Ramu West and Greater Ramu are unmined. Thus the decrease of resource was estimated only in the KBK area.

The decrease of mineral resources in KBK was estimated using the depletion areas distribution map by the end of 2016 provided by RNML. All resources within the depletion areas were regarded as mined out. The mined-out resource estimates are shown in table3.

Table 3　Mined out resources estimated by ENF I (Dec 31st,2016)

Category	MTonnes	Ni %	Co %
Measured	7.9	0.97	0.12
Indicated	2.0	1.41	0.11
Inferred	1.6	1.40	0.05
Total	11.5	1.1	0.1

3.3.3 Remaining in-situ mineral resources as of December 31st, 2016

The remaining in-situ mineral resources (refer to table 1) were estimated according to the original in-situ mineral resources and mined out resources estimated by resource model and the depletion areas as of December 31st, 2016.

The amount of remaining in-situ mineral resources by December 31st,2016, estimated by the original resources (1999 resources model) and the depleted out resources, is shown in table 1.

4. Comparison of original in-situ resources between ENFI and HPL

Highland Pacific Limited (HPL) estimated the mineral resources of KBK, Ramu West, and Greater Ramu, using a model built with exploration data of the Ramu project prior to 1999. The results show no significant difference between the estimation of ENFI and HPL in Ramu West and Greater Ramu, and only slight differences in KBK. The original in-situ mineral resources of KBK estimated by HPL are shown in table 4.

Table4　Original in-situ mineral resources of KBK estimated by HPL

Category	MTonnes	Ni %	Co %
Measured	42.4	0.93	0.11
Indicated	7.2	1.36	0.10
Inferred	4.2	1.20	0.05
Total	53.8	1.01	0.10

The original in-situ mineral resources estimated by ENFI and HPL respectively are consistent in general according to table 2 and table 4. No clear difference could be found between Indicated and Inferred resources among them, but as to Measured resource ENFI is 2.4Mt more than HPL while HPL's nickel grade a little higher and cobalt grade the same, This difference is the main reason for the amount of remaining in-situ Measured resources in 2016 (Table 6), exceeding the remaining in-situ Measured resources in 2015 (Table 5).

According to the "Update Resources of the Ramu Nickel-Cobalt Operation, PNG Prepared 22 March, 2016" by HPL, the identified mineral resource of KBK as of 31 December 2015 is presented in table 5. The in-situ resources of KBK estimated by ENFI as of 31 December 2016 is shown in table 6.

Table 5 Identified mineral resource –KBK (31-Dec-2015, HPL)

Category	MTonnes	Ni %	Co %
Measured	36	0.89	0.1
Indicated	7	1.4	0.1
Inferred	4	1.2	0.1
Total	46	1.0	0.1

Table 6 Identified mineral resource –KBK (31-Dec-2016, ENFI)

Category	MTonnes	Ni %	Co %
Measured	37	0.9	0.1
Indicated	5	1.3	0.1
Inferred	2	1.2	0.1
Total	44	0.96	0.1

Comparing table 5 to table 6, the Measured Resources of KBK increased from 36 MTonnes to 37 MTonnes while the Indicated Resources and Inferred Resources decreased 2 MTonnes each. The total mineral resources reduced 2

MTonnes from 2015's 46 MTonnes to 2016's 44 MTonnes after one year's production. The increase in Measured Resources was due to ENFI and HPL using slightly different block models to estimate the resources. ENFI's original estimation exceeded HPL's by 2.4 MTonnes, resulting in the aforementioned increase in the reporting of the 2016 Ramu Mineral Resource.

Regarding the actual production of 2016, the ore mined totaled 2,387,875t, with the grade of nickel reaching1.098%, and cobalt 0.113%, compared to the depletion resources estimation of 2.61Mt with an average nickel grade of 1.032% and cobalt 0.104%. Please refer to Appendix JORC TABLE 1, section 3 for more details.

5. Competent Person's Statement

The information in this report that relates to Ramu Mineral Resources is based on information compiled by Xiong Xiaofang, who is a Fellow of The Australasian Institute of Mining and Metallurgy. Mr Xiong Xiaofang is a full-time employee of China ENFI Engineering Corporation and has sufficient experience which is relevant to the style of mineralization and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr Xiong Xiaofang consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Qualifications

China ENFI Engineering Corporation is based on mineral industry consultants and metallurgical engineering whose businesses include the estimation of Mineral Resources and Ore Reserves for public reporting.

China ENFI Engineering Corporation has carried out a number of technical consulting assignments for Ramu NiCo Management (MCC) Limited (RNML) in the period 2006 to 2016. In carrying out these consulting assignments, China ENFI Engineering Corporation and the Competent Person has acted as an independent party and has no business relationship with Ramu NiCo other than the carrying out of individual consulting assignments as engaged.

The Ramu mine and Basamuk process plant is a joint venture between Highlands Pacific Limited (8.56%), the PNG Government and Landowners (6.44%) and Ramu Nico (85%). Metallurgical Corporation of China Limited holds a 61% interest in Ramu NiCo, with the remaining 39% held by a number of other Chinese entities.

While some employees of China ENFI Engineering Corporation may have small direct or beneficial shareholdings in Metallurgical Corporation of China Limited or Highlands Pacific Limited, neither China ENFI Engineering Corporation nor the contributors to this report nor members of their immediate families have any interests that could be reasonably construed to affect their independence. China ENFI Engineering Corporation has no pecuniary interest, association or employment relationship with these listed entities.

Metallurgical Corporation of China Limited holds 100% China Nonferrous Engineering Co. Ltd ,and China Nonferrous Engineering Co. Ltd holds 90% China ENFI Engineering Corporation.

This document and the conclusions in it are effective at 31 December 2016. Those conclusions may change in the future with changes in relevant metal prices, exploration and other technical developments in regard to the operation, Mineral Resource and exploration tenements and the market for mineral properties. This document may not be relied on by any party than Ramu NiCo, its officers and employees.

Geologist: 27th June, 2017

Appendix

JORC TABLE 1

Section 1 Sampling Techniques and Data

Criteria	Explanation	commentary
Sampling techniques	• Nature and quality of sampling (eg cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc). These examples should not be taken as limiting the broad meaning of sampling.	Kurumbukari Resource (KBKK) Block- Primary sample interval is 1 metre except at saprolite/rocky saprolite interface, which is geologically determined. The sample database comprises 22,145 samples of which 12,609 are within ore. KBK - The resource estimate is based on 972 diamond drill holes totaling 20,096m. Maximum drill spacing is 100m x 100m The Kurumbukari site was drilled by using three portable drill rigs with NQ core diameter. It was drilled at 100m centres. The central area has been drilled at 50m centres with two smaller areas drilled at 25 m centres. At every drilling site out of four a metallurgical and geological are drilled the geological hole was kept in its entirely. The entire core was processed. Drill holes are all have vertical dip to suit the flat lying nature of the laterite ore body. KBK- The drilling work took place in two phases. Phase 1 commenced in October 1993 and ended in July 1994 under Highlands Pacific Limited (HPL, which was then called Highland Gold Properties Ltd HGP). During this phase a total of 384 HQ geochemical and 25 PQ metallurgical holes have been done. Both tungsten and diamond bits were used in each hole. Hole depth averaged 26 m. An FMC mounted, top drive, Longyear 38 rig was utilised in the program. The holes were drilled using a PQ/HQ using a tungsten bit until a boulder or harder material is encountered. The tungsten bit was pushed down using the rod weight with minimum amount of rotation. Water and polymer were used in minimum quantities. When boulders were encountered, the tungsten bit was replaced by a diamond bit which was then used until the completion of the hole.

Criteria	Explanation	commentary
		KBK - The second phase of drilling was conducted by HPL from 1996 to 1997 to produce all the drilling within the Kurumbukari Resource block. Ramu West is nominally 200m x 200m sampling from diamond drilling pre 1990 shallow vertical holes as a result no down hole surveys were. Sample intervals were primarily 1 metre and adjusted at the boundaries of different rock types. There were 1093 samples of which 681 were within ore.. Resulting in 58 diamond drillholes being used to interpolate the thickness and grade. Greater Ramu - There are 184 holes within the Greater Ramu boundary of which 113 are auger holes and the remainder are diamond. Nominal drilling spacing is 400 metres x 400 metres. Greater Ramu- The above drilling was part of the original drilling and was completed between 1970 and 1982. During this period the larger Kurumbukari area was drilled on a 400 x 400 m grid with local areas of 200 x 200 m infill drilling. A total of 1,098 auger holes, 207 diamond holes and 39 pits were completed in this phase. Greater Ramu -Drill spacing in the Greater Ramu Area is 400 m by 400 m. Figure 2 shows the drill hole collar locations for this area. Drill collars in the Greater Ramu Area were picked up by a qualified surveyor using an electronic distance measuring machine (EDM). Topographic survey data outside of the KBK Resource Block is patchy and of questionable reliability.
	• Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.	KBK- All surveys were EDM surveys based on three GPS measurement stations. Topographic data was built by Highlands Pacific based on survey points as well as drill hole collar elevations. Collar elevations were compared to a topographic map, on five metre intervals from a model without the collar elevations, no unacceptable differences found. Although it was found that new recent holes drilled for grade control infill purposes in 2008 onwards were found to not always match the original Resource drilling hole elevations in close proximity. In both the KBK and Ramu West (RW) Resource areas no downhole surveys were done as holes were all drilled in a vertical orientation and are very short. There were no structural controls to the mineralization so orientating the core was not warranted. At the time no certified standards were commercially available for nickel-cobalt laterite deposits. Highlands Pacific Limited (HPL) made several in house standards that were sent to 6 outside laboratories to characterize the mean values and the standard deviations of the

Criteria	Explanation	commentary
		standards. Standards and blank samples were inserted into the sample sequences in accordance to Highlands Pacific QAQC procedures. Primary and duplicate samples, standards and blank samples assaying was undertaken by the primary Laboratory- Astrolabe Pty Ltd. (This was HPL's in house company Laboratory which has since closed) with 10% of all samples checked by external commercial laboratory ALS in Brisbane, Australia. Sampling position did not adjust according to the topographic data surveyed during 2008.
	• Aspects of the determination of mineralisation that are Material to the Public Report. In cases where 'industry standard' work has been done this would be relatively simple (eg 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (eg submarine nodules) may warrant disclosure of detailed information.	All NQ diamond drilling. The entire core was submitted for assay. There is a ' Core sample protocols' document including a flow diagram. Termination of a hole based on the last 1.5m of bedrock or the last 3m comprising greater than 50% rocks of more than 15cm each. Samples intervals are nominally 1m lengths and are shortened at strong geological contacts. Core is photographed prior to the sampling. Sample weight recorded. Samples of red limonite and yellow limonite are prepared for drying directly from the trays for 12hours at 950C. for Saprolite and rocky Saprolite processing. Sample is weighed. Using 10 mesh brass sieve a -10 and +10 mesh fraction is produced the fraction is allowed to soak in a water bath in the sieve prior to agitation this is done gently without force by a gloved hand. The +10 while wet volume measured by water displacement. The sample rejoins the general protocol at the crushing point. The -10 fraction together with the water from the water bath will be placed in filter press and the water evacuated, transferred to sample tray and dried before weighing. 500gm prepared assay standard included after last sample of every fourth hole. At Astrolabe sample preparation weighed and dried again jaw crusher -12mm entire then fed to secondary -6mm crusher. The LM5 is run for 3-4 minutes with a maximum of 5kg. while in the pulveriser bowl 250gm is taken by 10gm numerous scoops from the pulverized samples. Samples ending in 9 have a second 250gm split that is sent to ALS in Brisbane for Ni and Co assay. For KBK Resource area nickel and cobalt were determined by four acid digest with flame AAS determination to a detection limit of 25ppm. The acids used were HF Hydrofluoric, HCL Hydrochloric, Nitric, perchloric Assays undertaken by Astrolabe Pty Ltd with 10% of all samples

Criteria	Explanation	commentary
		checked by external commercial laboratories in Australia Mainly ALS in Brisbane. In all cases the nickel- cobalt laterite mineralisation is broad and continuous.
Drilling techniques	• Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc).	The Kurumbukari site was drilled by using three portable drill rigs with NQ core diameter. It was drilled at 100m centres with the central area being drilled at 50m centres with two smaller areas drilled at 25 m centres. At every drilling site out of four a metallurgical and geological hole were drilled and the geological hole was stored in it's entirely. The entire sample core was processed. Drill holes all have a vertical orientation to suit the flat lying nature of the laterite ore body. Core was not orientated because holes were shallow and vertical. Triple tube was used and core was NQ and HQ. Holes were drilled with a tungsten bit for the non-rocky portion of the core and switched to a diamond bit for the rocky saprolite. The rigs were man portable rigs custom made by Edson RP-70 in Indonesia. The holes from May 1997 to the end of HPL drilling were drilled in NQ. Drilled by United Pacific Drilling Ltd. The KBK resource estimate is based on 972 diamond drill holes totaling 20,096m. The Ramu West Resource Block is based on pre-1990 diamond drilling with a nominal drill spacing of 200m by 200m. A total of 58 holes were used to interpolate the layer thicknesses and grades.
Drill sample recovery	• Method of recording and assessing core and chip sample recoveries and results assessed. • Measures taken to maximise sample recovery and ensure representative nature of the samples. • Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	Recoveries were measured at the drill site. Hole depth was determined by the driller counting and measuring core barrels. The 'true' depth was marked on blocks and put in the core box at the end of each run. Recoveries are the length of the recovered core/ by true drilled length. (Note- the holes were prone to partial collapse if the driller pulled the bit up from the bottom of the hole at the end of a core run). A small amount of laterite would fall to the bottom of the hole and then be recovered in the next run. This material was unconsolidated and easy to recognize so it was removed from the core tray by the rig geologist before the core was measured or sampled. Core recoveries were assessed with all types giving 85% of full recovery except for rocky saprolite where recoveries fell below 75% due to the difficulty of drilling a material comprising hard rock in a very soft matrix. The nickel in the sample does not preferentially increased or decreased by the recovery, plus the whole core was taken for analysis Core Recovery by Drilling Technique

<table>
<tr><th>Criteria</th><th>Explanation</th><th>commentary</th></tr>
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<table>
<tr><td>Drill Method</td><td>Carbide Bit</td><td>Dimond Core</td></tr>
<tr><td>Average Recovery</td><td>93%</td><td>87%</td></tr>
<tr><td>Percentage of Program</td><td>42%</td><td>58%</td></tr>
</table>
Recoveries in limonite and saprolite zones are possibly overestimated due to the tendency to compress extra material from in front of the drill bit annulus into the core barrel due to rod pressure on the drilling face. On removal from the drill barrel this material expands giving the impression of higher recoveries. Table 2.7 shows the core recovery break down by mineralisation.
Core Recovery by Mineralisation Domain
<table>
<tr><td>Lithology</td><td>Recovy %</td></tr>
<tr><td>Overburden</td><td>91</td></tr>
<tr><td>Limonite</td><td>95</td></tr>
<tr><td>Saprolite</td><td>91</td></tr>
<tr><td>Rocky saprolite</td><td>78</td></tr>
</table>
</td></tr>
<tr><td rowspan="3">Logging</td><td>• Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.</td><td>All the core was logged geologically but geotechnical logging was not conducted for mineralization purposes as there is no structural control to the mineralization. Later on after the Resource drilling geotechnical holes were conducted to check on ground conditions for the processing plants. For every four holes drilled two more holes were drilled for geological metallurgical studies. The geological hole remained in storage for references purposes. Only the lateritic material is considered ore, once the drill hole intercepts bedrock nickel grade falls off dramatically. There are no pit walls expected for the deposit as all the lateritic material is continuous and will be mined.</td></tr>
<tr><td>• Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.</td><td>The logging is both qualitative and quantitative in nature including records of lithology, (ore layer type), mineralogy, textures, oxidation state and colour. Visual estimates of percentages of key minerals associated with nickel mineralization and their appearance and percent weight of rock in each sample the corresponding rock volume as a percent. All core was photographed. As supporting evidence but not used in the Resource calculation large trial pits were mined and the geology logged and documented</td></tr>
<tr><td>• The total length and percentage of the relevant intersections logged</td><td>All holes drilled were logged</td></tr>
</table>

Criteria	Explanation	commentary
Sub-sampling techniques and sample preparation	• If core, whether cut or sawn and whether quarter, half or all core taken.	All the core was taken for assaying
	• If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry..	No non-coring drilling was done
	• For all sample types, the nature, quality and appropriateness of the sample preparation technique.	Samples intervals are nominally 1m lengths and are shortened at strong geological contacts. Core was photographed prior to the sampling. Sample weight was recorded. Samples of red limonite and yellow limonite are prepared for by drying directly from the trays for 12hours at 950C. For Saprolite and rocky Saprolite sample processing, the sample was weighed. Then using a 10 mesh brass sieve, the -10 and +10 mesh fractions were produced. The +10 fraction was allowed to soak in a water bath in the sieve prior to agitation this was done gently without force by a gloved hand. The +10 while wet the volume was measured by water displacement. The sample rejoins the general protocol at the crushing point. The -10 fraction together with the water from the water bath was placed in a filter press and the water evacuated, transferred to sample trays and dried before weighing. 500gm of sample was prepared for assay and a standard sample was included after last sample of every fourth hole. At Astrolabe analytical pty ltd the sample was weighed and dried again and submitted to a jaw crusher -12mm then fed to secondary - 6mm crusher. The LM5 is run for 3-4 minutes with a maximum of 5kg. while in the pulveriser bowl 250gm is taken by 10gm numerous scoops from the pulverized samples. Another 250gm split that is sent to ALS in Brisbane for Ni and Co assay.
	Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.	Nickel and cobalt were determined by four acid digest with flame AAS determination to a detection limit of 25ppm.
	Measures taken to ensure that the sampling is representative of the in situ materialcollected, including for instance results for field duplicate/second-half sampling.	Assays were undertaken by Astrolabe Pty Ltd with 10% of all samples checked by external commercial laboratories in Australia mainly ALS in Brisbane.
	• Whether sample sizes are appropriate to the grain size of the material being sampled.	Sample sizes are considered appropriate as the whole of the NQ core was submitted for assay
Quality of	• The nature, quality and appropriateness of the assaying and laboratory	At Kurumbukari resource area nickel and cobalt were determined by four acid digest with flame AAS determination to a detection limit of

Criteria	Explanation	commentary
assay data and laboratory tests	procedures used and whether the technique is considered partial or total.	25ppm. Assays were undertaken by Astrolabe Pty Ltd with 10% of all samples checked by external commercial laboratories at ALS in Australia. The assaying Technique was considered total as the four acids are well known to digest all materials. Bias was discovered and corrected to modeled grades, once improved and corrected where needed, after compiling the results of blind check assay and standard re-submittals, the QAQC program allowed MRDI (Highlands Pacific Limited consultant) to identify and study a number of assaying biases for Al, Mg and Mn. As a result, and in order to eliminated non-conservative errors of unknown origin, MRDI and Highlands Pacific Limited applied the following corrections applied to the corresponding grades after their modeling: corrected Al%=1.10* (Al%+0.48), Corrected Mg%=Mg%+0.5, Corrected Mn%=1.17*Mn%. These corrections were obtained using regression techniques after eliminating obvious outliers. The Resource estimate approved by MRDI include these corrections..
	• For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.	The thickness of the rock-free portion of the laterite (overburden, limonite and saprolite) is controlled by a combination of drill hole data and a ground penetrating radar (GPR) survey. The GPR survey covers 85% of the Kurumbukari and Ramu West areas at a nominal grid of 2m by 100m. Thickness of the rocky saprolite is a linear interpolation between holes. The use of GPR was truthed against drillhole data and outcrop where these were available and found to be most effective.
	• Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.	The QAQC program at Ramu is limited to the Astrolabe internal QAQC program, which includes, for each assay batch of 40 assays 2 random check assays 2 custom standards One blank For 1 sample in 10, a pulp sent to ALS in Brisbane for check assaying. In addition, Astrolabe subscribed to a voluntary check program from Ganett, in which unknown standards are received monthly for assaying and upon receipt of results by Ganett, a performance assessment report is issued to Astrolabe. One of the added advantages of this program is its blindness aspect with respect to the laboratory personnel. It was in MRDI's opinion that the sampling and QAQC procedures at HPL and Astrolabe are now reaching a level of depth, detail and scrutiny that place them above industry standards. The quality and reliability of the data used in the resource modeling exercise at Ramu have been properly characterized and controlled, biases detected and corrected, reproducibility established and maintained.

Criteria	Explanation	commentary
Verification of sampling and assaying	• The verification of significant intersections by either independent or alternative company personnel.	. All the way through the resource drilling program and the modeling stages Mineral Resources Development, Inc. ("MRDI") audited and assessed the work including core and examinations of cross sections and core photographs.
	• The use of twinned holes.	Every four hole that was drilled was twinned with a geological reference hole and metallurgy all holes were logged geology corresponds well in each hole. The whole core sample was submitted for assay. Metallurgy holes were bulked to carryout metallurgy studies the grades of Ni and Co have good correlation with the drill hole assay holes.
	• Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.	. The core was logged on site and sample intervals were finalized at the core yard logs were on paper and were entered into a Microsoft Access .mdb relational database. Validation was done during data entry, hole coordinates were compared to survey collar coordinates and log sheet and drill plods and nominal collar coordinates. Total hole depths were checked against original logging data and drill plods. Sample_id's were checked against the original on the logging sheets.
	• Discuss any adjustment to assay data.	No adjustment of assay data were made.
Location of data points	• Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.	No down hole surveys were done as the holes were all vertical, shallow and in soft material. All holes were surveyed and all surveys were EDM surveys based on three GPS measurement stations.
	• Specification of the grid system used.	The grid system used was the Ramu '93 grid system this is transformed from AGD 66 grid as described below:

Grid Conversion						
ID	AGD 66			RAMU 93		
	North	East	Elevation	North	East	Elevation
PSM31155	9379921.998	298748.214	803.618	77977.493	26006.445	837.768
PSM31253	9384181.880	299966.780	685.620	80151.652	29867.084	719.770
STN10	9383823.360	300069.905	691.591	79824.123	29688.490	725.741
PSM31156	9386107.802	304818.807	243.740	78111.899	34672.367	277.890

Criteria	Explanation	commentary
	• Quality and adequacy of topographic control.	The upper surface is based on a detailed ground survey with more than 20, 000 spot heights using the same EDM survey system as the hole surveys. In order to verify both the adequacy of this topographic model and the collar surveys, MRDI initially examined a plot of the photogrammetric topography over-plotted with drill hole collar elevations. Unfortunately, at Ramu, due to the thick and variable vegetation cover, the photogrammetric topography model is not precise enough to perform such verification efficiently, and regionalized differences of up to 30m are not rare. At MRDI's request, Highlands Pacific therefore also plotted a topographic map, on five metre intervals, from a model built without using the collar elevations, and over-plotted it with the drill hole collar elevations. MRDI examined the resulting map in detail, hole per hole, and found no unacceptable differences except for two collar elevation typographic mistakes in the computer database which were immediately corrected by Highlands Pacific. At Ramu west, -the diamond holes are shallow and vertical no down hole surveys were done. The northing and easting of the collar co-ordinates are considered accurate but the elevation of the collars was done by matching to contours at 10m intervals from aerial photos and would need to be surveyed with GPS instrument to be suitable for detailed mine planning. Ramu West - wherever possible the collars were located on the ground off a surveyed grid. At drill hole completion the collars were picked up by a qualified surveyor using an electronic distance measuring machine (EDM).. The upper surface is based on a detailed ground survey with more than 20, 000 spot heights using the same EDM survey system as the hole surveys. In order to verify both the adequacy of this topographic model and the collar surveys, MRDI initially examined a plot of the photogrammetric topography over-plotted with drill hole collar elevations. Unfortunately, at Ramu, due to the thick and variable vegetation cover, the photogrammetric topography model is not precise enough to perform such verification efficiently, and regionalized differences of up to 30m are not rare. At MRDI's request, Highlands Pacific therefore also plotted a topographic map, on five metre intervals, from a model built without using the collar elevations, and over-plotted it with

Criteria	Explanation	commentary
		the drill hole collar elevations. MRDI examined the resulting map in detail, hole per hole, and found no unacceptable differences except for two collar elevation typographic mistakes in the computer database which were immediately corrected by Highlands Pacific.
Data spacing and distribution	• Data spacing for reporting of Exploration Results.	The resource estimate is based on 972 diamond drill holes totaling 20,096m. Maximum drill spacing is 100m x 100m. The Ramu West Block - Holes were drilled on 200m x 200m spacing
	• Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.	The data and distribution is sufficient to demonstrate spatial and grade continuity of the mineralized horizons to support the definition of Inferred/Indicated Mineral Resources under the 2012 JORC code Ramu west- the primary sample interval is 1m the sample database comprises 1,093 samples of which 681 are within ore. The spacing is 200m x 200m and their area is suitable classified as an Indicated Resource.
	• Whether sample compositing has been applied.	Samples were composited by ore type for the grade estimation. The primary sample interval is 1 metre. There is some adjustment made to the sample interval at the boundaries between rock types.
Orientation of data in relation to geological structure	• Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.	All the holes were drilled with a vertical dip so the grid is immaterial, however, the Ramu '93 grid broadly runs grid north along the long axis of the plateaus of the mountain ranges. There were no structures that controlled mineralization. The nickel laterite layers are flat lying in there orientation.
	• If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.	Diamond drilling confirmed that drilling the orientation did not introduce any bias regarding the orientation of the lateritic units. The orientation of the samples was vertical this is ideal as the rock types are layered and drape at the same orientation of the topography. Ground penetrating radar totaling 60 line kilometers at 100 by 2 m grid was used for KBK Resource estimate as a hard surface this is described detail below in the 'Estimating and Reporting of Mineral Resources' section. It gave a hard boundary for the top of rocky saprolite. The boundary truth tested well when compared to geological log data down hole and coupled with the Topographic surface was used as a hard boundary for thickness interpolation.
Sample security	• The measures taken to ensure sample security.	Detailed protocols for sample security are well documented in Highlands Pacific Limited's "Ramu Project core sample protocols" all data are recorded every step of the way to maintain integrity of the results through the process.

Criteria	Explanation	commentary
Audits or reviews	• The results of any audits or reviews of sampling techniques and data.	A series of audits verifications were carried out by Mineral Resources Development Inc. (MRDI) during the drilling phase with audits of both drilling sampling sample processing assay verifications and model strategies and checks that culminated in the HIGHLANDS PACIFIC LIMITED (HPL) COMPETENT PERSON REPORT ON THE RESOURCES OF THE RAMU NICKEL/COBALT PROJECT, PNG prepared in October 1998, prepared by Dominique M. Francois-Bongarcon MINERAL RESOURCES DEVELOPMENT San Mateo, California, USA. Larry D Queen, Chief Geologist of Highlands Pacific Limited is Acting as Competent Qualified Person for this JORC 2012 update report. Mr Queen has visited the Site many times and has carried out several audits and during the Resource drilling stages and also during the feasibility studies and into the mining activities. Also the China ENFI Engineering Corporation have done audits and investigations in there 2 reports titled "Ramu Nickel- Laterite Project Papua New Guinea Feasibility Study Report" of 2005 and then the Revised version of 2007

Section 2 Reporting of Exploration Results

Criteria	Explanation	commentary
Mineral tenement and land tenure status	• Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.	The Ramu project area consist of one Exploration License "EL193" which surrounds the Special Mining License "SML 8". The Kurumbukari and Ramu West Resource block lie entirely within SML8. The current registered holder of these tenements on behalf of a Joint Venture arrangement is Ramu. Ramu NiCo Management (MCC) Limited comprising MCC Ramu NiCo Limited (MCC) (RNML 85%), Ramu Nickel Limited (RNL 8.56%, this is the subsidiary of Highlands Pacific

Criteria	Explanation	commentary
		Limited), Mineral Resources Ramu Limited (MRRL 3.94%) and Mineral Resources Madang Limited (MRML 2.5%). Ramu Nickel Joint Venture (RNJV) was founded in 2004. Ramu NiCo Management (MCC) Ltd (RNML) was appointed by the RNJV as the manager for the construction and operation of the Project. MCC Ramu is a joint venture of four companies; namely MCC China (61%), Jinchuan Nonferrous Metal Co. (13%), Jien Nickel Industries Co.(13%) and Jiuquan Iron & Steel Co.(13%). Jinchuan and Jien are the largest and second largest nickel producers in China. Jiuquan is the third largest stainless steel producer in China. The operation consists of four component sites; Kurumbukari mine site (SML8 and EL193); Pipeline route; Basamuk process site; and Rai Coast limestone mining operations.
	• The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	In addition to Exploration License "EL193" due for renewal in February 27, 2014 did not get delayed approvals, the others are in good standing
Exploration done by other parties	• Acknowledgment and appraisal of exploration by other parties.	There is a long exploration history since the nickel discovery by Australian Bureau of Mineral Resources in 1962. The Drill holes used in the Resource estimate of KBK and RW are the most recent Nord Limited on its own completed the RW diamond drilling from the late 1980's to 1990. Under a joint venture agreement between Nord and Highlands Pacific Limited, Nord partially drilled out the KBK block with diamond drilling until 1993, whence Highlands Pacific Limited explored and managed further diamond drilling on the KBK resource area and the ground penetrating radar, Resource Estimation and feasibility study until the Joint venture was struck with MCC in 2004. MCC did a small amount of check holes, (that corresponded to HPL drilling), their own Resource model and feasibility studies, constructed the processing plant and started mining in early 2011. The KBK Resource estimate is entirely base on 972 diamond drill holes totaling 20,096m. maximum drill spacing is 100x100m. The RW estimate is based on a drill spacing of 200x 200 m, a total of 69 holes were used to interpolate the layer thickness and grades there are 56 holes inside the RW boundary there are 1,644 samples at nominally 1m with 1,033 being in ore.
Geology	• Deposit type, geological setting and style of mineralisation.	The deposit is called a "Tropical Nickel – Cobalt laterite Deposit". The distribution of the laterite profile is influenced by the Ramu-Markham Graben Fault. Movement along this fault has resulted in the uplifting of the Ramu area to form a plateau landscape which in turn has promoted the laterisation process.

Criteria	Explanation	commentary
		The idealized laterite profile at Ramu is described from the surface down as follow: -Humic layer. -Red limonite - Predominantly overburden with low nickel and cobalt grades. The humic and red limonite layers together comprise an average thickness of 2.5 metres as overburden. -Yellow limonite - The limonite ore has elevated levels of nickel and cobalt. This horizon hosts the bulk of the known nickel and cobalt resource, and averages 7.5 metres thick. -Saprolite - The saprolite is enriched in nickel and cobalt, and has an average thickness of 2.0 metres -Rocky saprolite - This horizon contains varying quantities of weathered dunite boulders in a saprolite matrix and is 3.5 metres in average thickness. -Bedrock - Comprises unltramafic dunite with minor harzburgite and pyroxenite The principle ore minerals identified in the Ramu deposit include goethite, asbolan and garnierite. Goethite is found as ochre-coloured, porous, cryptocrystalline, needle-like matrix in the limonite and saprolite zones of the laterite. The average nickel grade contained within the goethite structure has been measured at 1.6 percent nickel in the limonite zone and 2.9 percent nickel in the saprolite zone. Asbolan occurs as bluish black dendrites and fracture coatings throughout the laterite profile. In the limonite zone, the asbolan assays 8.4% cobalt and 5.2 percent nickel and, in the saprolite zone, it assays 5.6 percent cobalt and 15.1 percent nickel. Garnierite, or nickeliferous serpentine is found at deeper levels in the deposit in the alkaline weathering zone, generally at the base of the limonite horizon and in the saprolite and rocky saprolite zones. Chromite, in non-economic quantities, occurs as a residual mineral and has been concentrated in shallower levels by mechanical processes. The formation of the laterite profile results from the decomposition and leaching of the constituent ferromagnesium minerals in the ultramafic bedrock. A tropical climate with monsoonal rainfall and atmospheric carbon dioxide assists the lateritisation process. Local fault structures within the license area have focused the laterite forming processes resulting in a thicker profile in areas of more dense fracturing and faulting. The Ramu Ore Resource is divided up into three Resource blocks, Kurumbukari, Ramu West and the Greater Ramu Resource Blocks.
Drill hole Information	• A summary of all information material to the understanding of the exploration results including a tabulation of the following	No new drilling exploration results are reported with this mineral resource report.

Criteria	Explanation	commentary
	information for all Material drill holes:	
	• easting and northing of the drill hole collar	No new drilling exploration results are reported with this mineral resource report.
	• elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar	No new drilling exploration results are reported with this mineral resource report.
	• dip and azimuth of the hole	No new drilling exploration results are reported with this mineral resource report.
	• down hole length and interception depth	No new drilling exploration results are reported with this mineral resource report.
	• hole length.	No new drilling exploration results are reported with this mineral resource report.
	• If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.	No new drilling exploration results are reported with this mineral resource report.
Data aggregation methods	• In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.	During reporting of exploration no top cuts to elements were used. A cutoff grade of 0.5% Nickel was used. Most samples taken from diamond drilling were nominally 1m intervals and these were length weight averaged and these were reported for each of the laterite rock types. Ore is defined as being above 0.5% nickel grade and below this grade forms the overburden. For the rocky saprolite layers only the saprolite component of the sample was assigned. The rock component is treated as waste material and is assumed to be removed by the mine site process facility.
	• Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.	High grade aggregations were not reported.
	• The assumptions used for any reporting of metal equivalent values should be clearly stated.	No metal equivalent values were used for reporting exploration results
Relationship between mineralisation widths	• These relationships are particularly important in the reporting of Exploration Results. • If the geometry of the mineralisation with respect to the drill	The orientation of the drilling was vertical and the geometry of the mineralization is well known. The laterite rock types are gently undulating and have similar orientation to the topographic surface and drape over the bedrock. The rock types

Criteria	Explanation	commentary
and intercept lengths	hole angle is known, its nature should be reported. • If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').	vary in thickness and these thickness and typical grade occurrences are summarized in Figure 3. Vertical orientated drilling is the ideal orientation. (please refer to figure 3)..
Diagrams	• Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.	Maps of the drill hole area, collar location plans and an idealized section are presented in figure 2 and figure 3
Balanced reporting	• Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.	All results are reported
Other substantive exploration data	• Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.	Ground penetrating radar was substantially used and should be reported here as in many cases it was used to determine thickness of the material layers. The thickness of the rock-free portion of the laterite (overburden, limonite and saprolite) is controlled by a combination of drill hole data and a ground penetrating radar survey (GPR). The GPR survey covers 85% of the Kurumbukari area at a nominal grid of 2m by 100m. the thickness of the rocky saprolite is a linear interpolation between holes. The rocky saprolite tonnage and grade have been estimated by a -2mm rock free material as this is more accurately reflects the potential feed to the proposed beneficiation plant. The tonnage and grade of the rocky saprolite have been estimated from drill hole intercepts, which have been disaggregated into a -2mm and +2mm (rock) fractions which in turn have been weighed and assayed separately. Metallurgical test work has shown that the grade of the resource may be upgraded by using gravity techniques to remove the barren chromite and fine rock fragments of the in-situ resource. The lower boundary of the rocky saprolite is determined by either the first 1.5m boulder intersected or a 3 metre intersection of greater than 50% or the volume of the intercept being rock. Dry in-situ density is estimated from a database of 1550 measurements. MRDI recommended comparative studies using various methods after implementation and there results analysed, all observerable differences were and the Vernier method was retained as the most reliable. In conclusion, MRDI believes the densities used in the modeling to be the best available. Two trial mining pits were dug in 1997 to gain an understanding of mining

Criteria	Explanation	commentary
		requirements, obtain bulk samples for metallurgical test work and to gather additional geological information. MRDI also examined the more recently acquired AL and/or Al203 grades (covering approximately 20% of the sample data). As was expected, they do indicate the sporadic presence of aluminous dykes, but their frequency is low, as confirmed by the logging. These dykes are not considered to have any significant impact on the resource estimates. During the KBK drilling 1,550 samples were tested for Dry insitu density. No density samples were taken at RW. The Vernier method of density measurement was found to be the most accurate
Further work	• The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling).	Diamond drilling need to be adopted to upgrade the indicated mineral resource to measured resource in KBK block. Diamond drilling need to be adopted to upgrade both Indicated and Inferred resource in Ramu West. Diamond drilling need to be adopted to upgrade Inferred resource in Greater Ramu. There is potential to increase resources substantial in all directions.
	• Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	In order to conduct the laterite mining in 2017, infill drilling will be carried at south of KBK, drilling grid of 50m by 50m is selected for this work. Meanwhile resource exploration will be completed at both northeast and south of outside KBK area to find more mineral resources which a drilling grid of 100m by 100m will be adopted.

Section 3 Estimation and Reporting of Mineral Resources

Criteria	Explanation	commentary
Database integrity	• Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.	Many measures were taken including reviews by Mineral Resources Development Incorporated (MRDI). MRDI examined in detail the topographic data used in the modeling of the resource, and found the topographic model is adequate for resource modeling and mine planning. The densities and the part of the database for which manual transcriptions of assays had occurred. Errors are minimal or non-existent, and that the quality of the database is at or above industry standards. And MS Access database. Validation protocols are described in Section 1. In summary MRDI audited and verified the following: Data entry of data especially assay data from Laboratory The topographic model and collar surveys for adequacy and for modeling and mine planning Astrolabes' grade assaying on-going test results. Grade Cross sections of drill hole assays, geological interpretation, estimation zones, block model grades and resource classification codes at the proper, same scale. Plan views of block model, with drill hole pierce point assays and rock types and estimation zones. Variograghy study backup notes, as well as exploratory data analysis (stats) printouts/report. Resource reporting software. All grade estimation parameter and run files 。 Ground penetrating radar derived profiles .
	• Data validation procedures used.	Validation of the data include checks for overlapping intervals, missing survey data, missing incorrectly recorded assay data, missing lithological data and missing collars. Data for KBK and RW are stored in separate databases

Criteria	Explanation	commentary
Site visits	• Comment on any site visits undertaken by the Competent Person and the outcome of those visits. • If no site visits have been undertaken indicate why this is the case.	China ENFI Engineering Corporation has always provided consulting services for Ramu NiCo Management(MCC) Limited from 2005 to date. The resource block models were formed in 2004 and then updated in 2009. Many site visits were undertaken by geologists from ENFI since 2004. Mr. Xiong Xiaofang, fellow of the Australasian Institute of Mining and Metallurgy(AusIMM) and senior geologist of ENFI, paid site visit to Ramu nickel project as the competent person of this JORC 2012 compliant update on January 2-12, 2017。The investigation scope included the 2016 exploration works, laterite mine site, sample preparation and analysis laboratory, mining survey as well as the processing plant which located in Basamuk.
Geological interpretation	• Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.	There is strong confidence in the geological interpretation of the lateritic layers (rock types) of the orebody . The upper layers, especially the limonite layer are usually continuous, at least in their presence/absence. The absence of the limonite layer is never fortuitous or unexpected, but always due to erosion, and therefore confined to well identified geographic areas. The grades including cobalt, are usually continuous and show little lateral variability. The ground penetrating radar(GPR) data was collected over Kurumbukari (KBK) Resource Block of the deposit, so that the local behavior of the layers (i.e. between drill holes) is usually well known. However at Ramu West (RW) Resource area because of funding and time constraints, GPR was not used and a linear interpretation between drill hole rock types is done.
	• Nature of the data used and of any assumptions made.	For KBK Assay data, geological logging, outcrop mapping, two trial pits mapping and channel sampling and GPR have been used to interpret the geology. MRDI examined each interpreted GPR line, and compared them to the interpretation of the Top of Rocky Saprolite (TORS) Contact in the corresponding drill logs. As expected from the test lines, the matching is virtually perfect wherever drill hole exist to calibrate the profile interpretation. GPR has not been undertaken at RW.

Criteria	Explanation	commentary
	• The effect, if any, of alternative interpretations on Mineral Resource estimation.	As discussed above GPR as used at the KBK resource area coupled with drilling data has proved to be an accurate method to delineate the rock types. Where it has not been used a linear interpolation of rock types between drill holes was used such as at RW resource area which is an approximate method.
	• The use of geology in guiding and controlling Mineral Resource estimation.	The grade and lithological interpretations forms the basis for the modeling. Grades have all been estimated constraining within the lateritic layers (rock types).
	• The factors affecting continuity both of grade and geology.	As explained in the first point the Grade and geological continuity are remarkably continuous and well known. At the KBK Resource Block the deposit drilling includes significant portions of 50 and 25 metre grids, so that the local behavior of grades is well known. Both the bedrock and laterite geologies are very uniform on the entire property, as a result even in areas of wide spaced drilling of i.e. 300 to 400m centres with nickel resources could reasonable considered at least Indicated.
Dimensions	• The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.	The Kurumbukari and Ramu West Resource blocks form the north and south areas of the measured and Indicated Resource surrounded by the "Greater Ramu Resource Block". It is characterized by having ultramafic rocks of dunite sometimes harzburgite and pyroxenite underlying it. In plan the KBK block is approximately 4 by 4km north- south and in the east-west directions. The RW block is approximately 2 by 2km in the north-south, east-west directions (Ramu '93 grid). The laterite profile mineralization varies in thickness from centimeters up to 30m. The overburden is from 20cm to 20m in thickness. Overburden is thickest in the gullies and valleys and thinnest on the plateau portions of the orebody. Please refer to figure 2 and figure 3 for the average typical grades and thicknesses of the mineralization. The laterite profile averages 15m in thickness with maximum of 59 metres.

Criteria	Explanation	commentary
Estimation and modelling techniques	• The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.	Both KBK and RW Resource area use the gridded seam modeling technique making use of the DATAMINE software. This was based on the layer-type geometry of the laterite deposit and the fairly limited vertical extension of each identified layer/rock type in the alteration profile. Because of the general lack of correlation between grades and thicknesses and of the variations of thickness at small to medium scale, it was decided that grades should be interpolated directly from layer composite grades, with no length-weighting. Thickness modeling for the KBK and Ramu West Resource area underwent the following process: the various layers relevant to the modeling were delineated using 'hard profiles' (i.e. the topographic surface and the Ground Penetrating Radar (GPR) Top of Rocky Saprolite (TORS) Contact), and 'soft profiles' (i.e. the Overburden/Limonite, Limonite/Saprolite and Rocky Saprolite /Bedrock contacts, and the Co and Ni Interpolation zones). Kurumbukari Block-Grades were interpolated by ordinary kriging - search radius of 150m in limonite and saprolite. – Minimum number of composites set at 2, maximum at 20 seam cells 12.5 x 12.5m (to get a good definition of contact surfaces). Ramu West Block-Grades were interpolated by inverse distance squares method(IDS). Due to wider spaced drilling the search radius was set at 300 m for all layers. – Minimum number of composites set at 2, maximum at 20 seam cells 12.5 x 12.5m Ni does not seem to present any significant horizontal anisotropies, and that it has a longer range and a larger nugget effect in the saprolite than in the limonite. Co in the limonite has a slightly shorter range than Ni. Ranges vary between 100 and 200 metres, and most of the actual variability is believed to be vertical. Because of this omni-directional horizontal variograms were modeled and used for each layer. Ramu West-The surface modeling method of various horizons is similar to HGP, with cell dimension of 12.5 x12.5 metres. Grade was interpolated using inverse distance squares method(IDS). Ramu West-The thickness of the limonite and saprolite is a linear interpolation between holes.

Criteria	Explanation	commentary
		Ramu West-No upper cutoff was used. Maximum grade (lithology composite) is 2.12% nickel and 0.57% cobalt. Kurumbukari block –no upper cut off was used. Maximum grade (lithology composite) is 3.44% Ni and 0.91% Co.
	• The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.	In 2008 to 2010 a series of close spaced 25 x 25 m spaced drill infilling (but not duplicating the Resource drill holes) were drilled these were combined with the Resource drilling and then modeled using inverse distance squared. There is limited production data available that also confirms the appropriateness of the Resource model.
	• The assumptions made regarding recovery of by-products.	All through the drilling and modelling process and then entering into mining operations the nickel and cobalt metals have had all the economic value placed on them. Although care has been taken to produce good grades of Chromite concentrate suitable for marketing and a bagging facility has been built for bagging the concentrate (at close proximity to the Mine site) to date no Chromite Concentrate has been sold. Chromium (Cr) was assayed for in bulk sample using four acid digest it is not a total fusion method and is not strictly comparable to Chromite (Cr_2O_3).
	• Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).	The most significant deleterious element for the Ramu nickel/ cobalt laterite mineralization are magnesium concentrations as high magnesium consumes excessive acid during processing in the High Pressure Acid Leach system (HPAL). Aluminium is elevated (above 7% Al) in the overburden which was thought to be removed prior to mining and was only generally assayed for about 20% of all samples. However, during close spaced drilling for grade control purposes Al has been routinely assayed and modeled providing a chemical indication coupled with the nickel grade (<0.5% Nickel) as to the overburden limonite contact. During mining overburden Al grade estimates are needed for use if dilution occurs. Noted here there was a bias correction to modeled grades derived from the QAQC program which allowed MRDI to identify and study a number of assaying biases for Al, Mg and Mn. As a result, and in order to eliminate non-conservative errors of unknown origin, MRDI recommended the following corrections be applied to the corresponding grades after their

Criteria	Explanation	commentary
		modeling: Corrected Al%=1.10* (Al%+0.48). Corrected Mg%=Mg%+0.5. Corrected Mn%=1.17*Mn%. These corrections were obtained using regression techniques after eliminating outliers. The resources estimate approved by MRDI include these corrections. Estimates were made by HPL of aluminum grade from composites per lithologic unit, (made for metallurgical use) after the above corrections were made. metallurgical composites also gave information about the chromium grade but this was not modeled and remains indicative (see figure 3). Mg grade is highest in the rocky saprolite. Is lowest in the Limonite and increases with depth. It is important to blend the ore during mining to present a feed that minimizes Mg variation and gives the Mg grade within bounds needed by the High Pressure Acid Leach plant (HPAL) to gain maximum nickel recovery and the lowest cost.
	• In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.	Thickness model was built according to the topographic data and ground penetrating radar(GPR) data, thickness of points with no GPR model data will remain unchanged. Block size was determine 12.5m by 12.5m considering both the drill grid and undulation of laterite layers. The average sample size is 1m but at the contacts between the ore layers sampling was confined to an individual layer rather than sampling across layers. The blocks had variable thicknesses for each rock type depending on the interpolation of rock type thickness discussed elsewhere. A single composite for each rocktype downhole was generated for the modeling process. Drilling was 100x 100m and in some small areas 50m by 50m or 25m by 25m, a 12.5m by 12.5m block spacing is reasonable.
	• Any assumptions behind modelling of selective mining units.	No selective mining units were assumed in this estimate.
	• Any assumptions about correlation between variables.	No strong correlations were found between the grade variables. However there are interesting rocktype correlation and trends. Mg increases with depth until bedrock where Mg grades are high and no more ore. Mg is lowest in the Limonite layer at 0.38% and highest in the lower rocky saprolite layer 11.44%. Ni also increases with depth, limonite 0.9% Ni, lower rocky saprolite,rock free portion 1.30%. Cobalt is highest in the Saprolite and lower in the limonite and rocky saprolite. Aluminum is highest

Criteria	Explanation	commentary
		in the overburden and coupled with Ni below the 0.5% nickel defines the overburden.
	• Description of how the geological interpretation was used to control the resource estimates.	The thickness model of Ramu laterite mine needs two control models, i.e. the digital topographic model(DTM) and the GPR upper rocky saprolite surface model. The procedure of this is described as follows in detail: (1) The topographic DTM model was built according to topographic survey point data and collar coordinates of drilling already provided. (2) The thickness model of laterite was built using GPR data. (3) The thickness data of various layers interpreted in the database of drill holes are used to produce thickness model of various layers(i.e. overburden, limonite, saprolite, upper rocky saprolire and lower rocky saprolite). Kriging is used for estimation of Kurumbukari and inverse distance method for other areas. (4) The thickness models of various layers are corrected using GPR model and the thickness of various layers are rescaled so that the thickness sum of overburden, limonite and saprolite at any point is equal to the laterite thickness in the GPR model at the same point. The thickness of points with no GPR model data will remain unchanged. The thickness model of various layers form the base of the project mineral resources. The Rocky Saprolite/Bedrock contact was relevant to the estimation of the Inferred Resources in the Lower Rocky Saprolite layer (LRS). In places, it was possible to interpret it, from the GPR data, this interpretation, where it exists, showed that in general, the contact tends to mimic the undulations of the TORS contact. Because of this contact was estimated by interpolating the thickness of the LRS. Rocky Saprolite is important as it has the highest nickel grade and it is proving upgradeable by screening off of the rock material, and all elements were separately assayed for two distinct size fractions: -2mm (upgraded ore) and +2mm. Also the core recovery showed a marked decrease in the upper rocky saprolite layer, less consolidated portion of rocky layer, core data in the rocky saprolite layer are subject to two types of interpretation: (a) optimistic; the missing portions of the core area assumed to be made of

Criteria	Explanation	commentary
		same material as the remainder of it; pessimistic: the missing portions are assumed entirely made of rock (i.e. barren). However, data on the Rocky Saprolite rock percentage in weight in eight test pits and in the corresponding centre drill holes, strongly suggest that only the more optimistic, saprolite loss option seems to be supported by observation. The layer may not be entirely mineable, due to the presence of sizable rock boulders and pinnacles, and possibly not entirely treatable (from metallurgical point of view) due to its increasing magnesium content at depth. As a result, the following methodology was used: (1) a Rocky Saprolite Mineable Limit(RSML), base on both Mg content and rock percentage, has been established in each drill hole in order to define a soft contact in the model. The thickness down to this contact is to be interpolated. (2) the bedrock as logged (defined as either the beginning of the first full metre of rock, or of the first three meters containing at least 50% rock).Is to be interpolated from its absolute elevation in drill holes , and any inconsistency with the RSML or the GPR TORS edited and resolved. Where core is lost, the weight of the upgraded ore will be realistically corrected assuming saprolite core losses. The URS estimates of ore tonnes and grades were classified as Indicated resources at Kurumbukari that had drill centres of 100m x 100m and GPR and the LRS Inferred because of uncertainty of ore recovery. At Ramu west where drill centres were nominally 200m x 200m RS was classed as Inferred and Limonite and Saprolite Resources were reported as Indicated. Grades have been estimated constraining within each of the lateritic layers.
	• Discussion of basis for using or not using grade cutting or capping.	At the KBK Block no upper cut was used. Maximum grade (lithology composite) is 3.44% Ni and 0.91% Co. At RW no upper cut was used maximum grade (lithological composite) was 2.12% Ni and 0.57% Co. Raw nickel values from drilling results have a pseudo normal distribution for all the laterite rock types and tails evenly to its highest value without disintegrating or being isolated from the body of the values making top

Criteria	Explanation	commentary
		cutting unjustified. Cobalt is skewed to the left but its highest values in the drill hole database are not isolated from the body of values so top cutting was not justified.
	• The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.	3-D Visual verification was done to check the consistency between the thickness model, block model and the raw drill hole data. The thickness of overburden, limonite and saprolite are highly agree with drill hole data and the total thickness of the three layers are quite similar to the GPR top surface of upper rocky saprolite comparing to the decline of general accuracy of rocky saprolite,. This may be caused by the complexity of the material composition and the mix of ore and waste in the rocky saprolite, and thus it is difficult to control the thickness and grade efficiently under the same drill grid.
Moisture	• Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.	The tonnages are estimated on a dry tonnes basis.
Cut-off parameters	• The basis of the adopted cut-off grade(s) or quality parameters applied.	No upper cut was used. A lower cut off 0.5% Ni is used to define the downhole limit of the overburden. Up to 2m of internal waste is included in resource blocks if, when averaged with the immediately adjacent intersections, the nickel grade exceeds the lower cutoff grade. The overburden below 0.5% Ni is a natural cut off the overburden also aluminum grade is elevated in the overburden so together Ni and Al define overburden often the overburden is red in colour below the humic layer but this is not always the case.
Mining factors or assumptions	• Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.	No effect of dilution was factored into the model. On the KBK Block, in depleting the model there were sterilized areas where the processing plants, offices and workshops are located, power towers are unlikely to be moved so ore sterilized below these as well. There has been sterilization of some ore that has been backfilled over by chromite tailings and by rock backfill.. The laterite deposit is formed by weathering. All the laterite layers are distributed on the top of the surface and very shallow, so the only mining method is open-pit mining. The bench height is 5-10m according to the design and articulated trucks are selected to transport ore and waste

Criteria	Explanation	commentary
		mined out from the deposit. Two types of hydraulic pressure excavators i.e. face shovel and backhoe are selected for mining. Face shovel is mainly used to load at the upper part of bench while backhoe under the bench during production. The loss ratio during mining is 5% and dilution is 3%. For large parcels of ore and all rock types mined in their entirety the grade is accurate, but conversely not so accurate over short time frames and if partial blocks are mined. Mining at the Ramu Ni-Co operation from the KBK block is going on and ramping up as the nickel-cobalt High Pressure Acid Leach plant at Basamuk refinery increases its capacity towards full production as it works through its production bottle necks.
Metallurgical factors or assumptions	• The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.	For KBK Resource block Metallurgy diamond drill holes only for Metallurgy were done 1 in every 4 on a 100m x 100m spacing. The main metallurgical criticality of the Resource was how to treat ore with rock in it. Early on the metallurgical test work showed that the grade of the resource may be upgraded by using gravity techniques to remove the barren chromite and fine rock fragments of the in-situ resource. Another point was the rocky saprolite tonnage and grade have been estimated for a -2mm rock free material as this more accurately reflects the potential feed to the proposed beneficiation plant. The tonnage and grade of the rocky saprolite have been estimated from the drill hole intercepts that have been disaggregated into a -2mm and +2mm (rock) fractions which in turn have been weighed and assayed separately. The inclusion of a portion of the rocky saprolite resources in the indicated resource category was studied in detail, this is called the upper rocky saprolite (URS) layer. Only the rock free portion of rocky saprolite is considered as a Resource. At KBK it is has been given an Indicated Resource category. At Ramu West drill centres are 200 x 200metres and all the rocky saprolite Resources are given Inferred Resource status. Both the mine department and the processing plant of Ramu nickel project all reach the design capacity at present and the production keeps stable and regular all the way.

Criteria	Explanation	commentary
Environmental factors or assumptions	• Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.	All the overburden material lies on top of the ore and is non toxic other than it can be a source of sediment run off into the environment. The sediment run off coats and clogs up creeks and streams and discolors river water, suspended solids can block light into the river affecting plant and fish life leading to decreased oxygen in the water. Sediment ponds and dams are built near the mine to catch any sediment run off and allow settling in the dam and later once full the dam is cleaned out. Sediment run off is being controlled by only clearing just enough land of vegetation ahead of mining so as not to constrain the mining plan but minimize the area of cleared land. Rehabilitation of the land should be done as soon as possible and must include physical controls such as bunding and others to minimize erosion and water velocity. During the resource drilling and modeling the main environmental concerns were compensation for trees that were removed and land usage fees to pay for access and further negotiations with landholders for future mining purposes. During mining there has been increased sediment runoff that the mining personnel have now begun to control with small catchments and diversions. These problems have all helped to turn the mining department into a conscious, active environmental entity. Two major settling ponds are in place now and a plan of sediment settling ponds has been designed with installation of these scheduled to be done when the mining path travels through the area.
Bulk density	• Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.	Densities were determined after comparative studies using various methods were implemented and their results analysed, all the observable differences were explained and the vernier method was retained as the most reliable in conclusion. For the KBK Resource Block, dry in-situ density is assigned by mean density of a layer from a database of 1,550 measurements. Whereas at Ramu West and the Greater Ramu Resource Block density data is not available and each layer was assigned the mean bulk density from the Kurumbukari Mine Block.
	• The bulk density for bulk material must have been measured by methods that adequately account for void spaces(vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit.	At the KBK Resource Block, vernier density determinations were undertaken as well as a number of sand replacement determinations in the vicinity of one of the test pits. The vernier determinations, available for each sample interval, were finally selected by HPL for the density

Criteria	Explanation	commentary
		modeling and tonnage calculations. This decision is supported by the following reasons: Although paired data are not available, the sand-replacement method did confirm the average vernier densities in Limonite and Saprolite much better than the Shelby densities, with the vernier densities slightly lower than sand-replacement densities: Limonite (g/cm^3) Saprolite (g/cm^3) VERNIER 0.95 0.73 SAND_REP.: 0.97 0.75 SHELBY: 0.84 0.71 At Ramu West, bulk density data is not available from inside this area. Each layer has been assigned the equivalent mean bulk density from the Kurumbukari Mine Block.
	• Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.	The bulk density of a rock type are remarkably consistent within the rock type.
Classification	• The basis for the classification of the Mineral Resources into varying confidence categories.	From the 100m drill grid centres and down the limonite and saprolite resource are Measured, and the upper rocky saprolite, given its other factors of uncertainty, Indicated, this was verified by MRDI by kriging a block representing one year of production in the 25m drilling grid area, and quantifying the variations of the estimated average Ni grades to the more reliable estimated based on the 25m grid. A variation of +/-3 percent at the 90% confidence interval was found, showing that at 100m centres, the resource should be considered Measured. Resource classification: KBK classification- the limonite and saprolite resources are measured, upper rocky saprolite resource Indicated and lower rocky saprolite resource Inferred. The resource classification is based on the rock types distribution and downgraded from the top downward, this classification is reasonable under the same drill grid and it is consistent with material composition of each layer(rock content), which is clear that no rock can be found above saprolite, but rock content remarkably increase in upper and

Criteria	Explanation	commentary
		lower rocky saprolite. Ramu West classification- In the 100-200 m centre areas, the limonite and saprolite resources are downgraded (compared to the Kurumbukari Block) to Indicated, and the upper rocky saprolite to Inferred. Small portions of the deposit with a lesser drilling density but ‘enclaved’ in areas with 200m centres should also be included in the same categories..
	• Whether appropriate account has been taken of all relevant factors (ie relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).	The input data is comprehensive in its coverage of the mineralization and does not favour or misrepresent in-situ mineralization. Geological controls are well understood and the definitions of mineralized zones are based on a high level of geological understanding producing a robust model of mineralized domains. The model has been confirmed by infill drilling and mining activities which support the interpretation. The validation of the block model shows good correlation of the input data to the estimated grades.
	• Whether the result appropriately reflects the Competent Person's view of the deposit.	The Mineral Resources estimate appropriately reflects the view of the Competent Person.
Audits or reviews.	• The results of any audits or reviews of Mineral Resource estimates.	All factors of the primary Resource estimate and process were carefully reviewed by Dominique M. Francois-Bongarcon of Mineral Resources Development Incorporated (MRDI) from the Resource drilling, assay Laboratory continuously through the modeling process. After verification of the final seam model by examining maps of the estimated Ni and Co grades and thickness in the modeled seams for Limonite, Saprolites and Rocky Saprolites on which the drill hole data composites were posted and cross sections of the various profiles were also examined, MRDI remarked that the Ni grade was generally found to be over-smoothed, probably due to the large nugget effect in the models of the variogram used to interpolate the grade. However since there is no lateral mining selectivity involved in the future exploitation, the smoothing has no significant effect on the resource estimates. Only large scale mine planning would be affected, but the smoothing is not so severe as to invalidate such exercises. The Co grade was found to be reasonable, locally and globally, in each rock-type. Thickness was reasonably interpolated. For this JORC 2016 update Xiong Xiaofang is the Competent Person and

<table>
<tr><th>Criteria</th><th>Explanation</th><th>commentary</th></tr>
<tr><td></td><td></td><td>has verified the Resource depletion compared to actual production and checked the JORC model.</td></tr>
<tr><td rowspan="3">Discussion of relative accuracy/ confidence</td><td>• Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.</td><td>The relative accuracy of the Mineral Resource estimate is reflected in the reporting of the Mineral Resources to a Measured, Indicated and Inferred classification as per the guidelines of the 2012 JORC code. This has been covered in the ‘classification’ above.</td></tr>
<tr><td>• The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.</td><td>The statement relates to global estimates of tonnes and grade.</td></tr>
<tr><td>• These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.</td><td>Comparison of the 2016 depletion resources estimated from the block model versus the actual production
<table>
<tr><th rowspan="2">Comparison items</th><th rowspan="2">Tonnes</th><th colspan="2">Grade</th><th colspan="2">Metal</th><th rowspan="2">comments</th></tr>
<tr><th>Ni(%)</th><th>Co(%)</th><th>Ni(t)</th><th>Co(t)</th></tr>
<tr><td>Actual production</td><td>2387875</td><td>1.098</td><td>0.113</td><td>26224</td><td>2706</td><td></td></tr>
<tr><td>Depletion resource</td><td>2610444</td><td>1.032</td><td>0.104</td><td>26952</td><td>2722</td><td></td></tr>
<tr><td>Absolute errors</td><td>-222569</td><td>0.066</td><td>0.009</td><td>-728</td><td>-16</td><td rowspan="3">Above or below Resource</td></tr>
<tr><td>Relative errors(%)</td><td>-8.5</td><td>6.3</td><td>8.4</td><td>-2.7</td><td>-0.6</td></tr>
<tr><td>Variation of resource</td><td>91.5</td><td>106.3</td><td>108.4</td><td>97.3</td><td>99.4</td></tr>
</table>
Note: the grades of the actual production may not be accurate.</td></tr>
</table>

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Report

Ramu Nico Ore Reserve Estimate 2016
Ramu Nico Management (MCC) Limited

ENFI Project No.：Z1378
18th May，2017

Ramu Nickel Mine Open pit Ore Reserve Estimate Update

The following tables detail the open pit Ore Reserve estimate update for the Ramu nickel-cobalt laterite mine completed in April 2017. The Ore Reserve estimates are reported below the 31 December 2016 open pit mined surface.

The significant figures in these tables are intended to reflect the estimation accuracy.

Table 1 shows the Ore Reserve estimate by classification.

Table 1 31th December 2016 Ramu open pit Ore Reserve by classification

Reserve Classification	Ore Tonnes (Mt)	Ni, %	Co, %	Rock +2mm (Mt)
Proved	29	0.9	0.1	-
Probable	20	1.0	0.1	9
Total	49	1.0	0.1	9

Notes:

1. Totals may not equal the sum of the component parts due to rounding adjustments.

2. Ore tonnes (dry) represent the -2 mm economic portion of resource mineralization. Rock represents an estimate of oversize material (+2 mm) that includes low-grade rocks and rock fragments that occur in the rocky saprolite mineralized zone and are considered as internal waste. The rock will be removed by a simple screening process prior to beneficiation. Accordingly, the ore tonnage is reported after initial screening prior to the beneficiation plant.

3. The Ore Reserve estimate was made using metal prices of US$17,045/t nickel and US$25,412/t cobalt.

4. Cut-off grade is variable and equates to 0.58% nickel equivalent, including credit for recovered cobalt metal.

The estimated split of reserves by Ramu mining area is set out in Table 2.

Table 2 Estimated split of Ore Reserves by Ramu mining area

Reserve Classification	Ore Tonnes (Mt)	Ni, %	Co, %	Rock +2mm (Mt)
Kurumbukari				
Proved	29	0.9	0.1	-
Probable	6	1.3	0.1	9
Total Kurumbukari	35	1.0	0.1	9
Ramu West				
Proved	-	-	-	-

Reserve Classification	Ore Tonnes (Mt)	Ni，%	Co，%	Rock +2mm (Mt)
Probable	14	0.9	0.1	-
Total Ramu West	14	0.9	0.1	-

Notes:

1. Totals may not equal the sum of the component parts due to rounding adjustments.

2. Ore tonnes (dry) represent the -2 mm economic portion of resource mineralization. Rock represents an estimate of oversize material (+2 mm) that includes low-grade rocks and rock fragments that occur in the rocky saprolite mineralized zone and are considered as internal waste. The rock will be removed by a simple screening process prior to beneficiation. Accordingly, the ore tonnage is reported after initial screening prior to the beneficiation plant.

3. The Ore Reserve estimate was made using metal prices of US$17,045/t nickel and US$25,412/t cobalt.

4. Cut-off grade is variable and equates to 0.58% nickel equivalent, including credit for recovered cobalt metal.

Commissioning of the Ramu mine and processing plants began in April 2012, with ramp-up of production continuing through to 2016. The 2015 Ore Reserve, reported in Highlands Pacific Limited's 2015 Annual Report, was based on the Modifying Factors defined by the Competent Person from historical production, long-term mine plans, and corporate projects at that time. The 2015 Ore Reserve is shown in Table 3 to allow comparison with the 2016 Ore Reserve.

Table 3 December 2015 Ramu open pit Ore Reserve by classification

Reserve Classification	Ore Tonnes (Mt)	Ni，%	Co，%	Rock +2mm (Mt)
Proved	31	0.9	0.1	-
Probable	20	1.0	0.1	9
Total	51	1.0	0.1	9

Notes:

1. Totals may not equal the sum of the component parts due to rounding adjustments.

2. Ore tonnes (dry) represent the -2 mm economic portion of resource mineralization. Rock represents an estimate of oversize material (+2 mm) that includes low-grade rocks and rock fragments that occur in the rocky saprolite mineralized zone and are considered as internal waste. The rock will be removed by a simple screening process prior to beneficiation. Accordingly, the ore tonnage is reported after initial screening prior to the beneficiation plant.

3. The Ore Reserve estimate was made using metal prices of US$17,764/t nickel and US$ 26,448/t cobalt.

4. Cut-off grade is variable and equates to 0.58% nickel equivalent, including credit for

recovered cobalt metal.

The updated Ore Reserve estimate shows a decrease in ore tonnes and contained metal when compared to the 2015 Ore Reserve, principally due to reserve depletion from mining in the Kurumbukari (KBK) open pit. A summary of the major changes from the 2015 estimate to the 2016 estimate is shown in Table 4.

Table 4 Summary of major changes

Category	Ore Tonnes (Mt)
Mining depletion in KBK	-2.3
In-pit backfill sterilization of reserve in KBK	-0.2
Total	-2.5

Notes:

1. Total differences between Table 1 and 3 may not equal these major changes due to rounding adjustments.

Depletion

Kurumbukari open pit mined areas have been depleted to the end-of-month survey shell as at 31 December 2016.

Sterilization

In-pit backfill and rehabilitation in the Kurumbukari open pit mined area has buried and sterilized unmined reserve, as defined by survey.

The nickel (equivalent) cut-off grade is 0.58%, similar to 2015, and the main factors considered discussed below.

Metallurgical factors

Mine and process plant commissioning started in April 2012. Ongoing improvements to production performance during 2016 and improvement plans continue to support the process plant throughput rate assumption of 100% nameplate nickel capacity (equivalent to 3.21 Mtpa dry refinery feed), unchanged from the 2015 Ore Reserve estimate.

Forecast processing costs decreased from US$68/t to US$60/t refinery feed (dry tonnes delivered in slurry), due to increased production rate and changed material price.

Forecast nickel metal recovery will decrease to 84.8% from 86.8% assumed for the 2015 Ore Reserve estimate, and forecast cobalt metal recovery increased from 72.4% used for the 2015 Ore Reserve estimate to 80.6%, based on processing plant performance.

Metal prices

The cut-off grade is variable per ore block in the Ore Reserve model. The average cut-off grade is approximately 0.58% nickel equivalent, including credit for cobalt metal, based on revised production rates and operating costs, processing recoveries, and metal prices. The cut-off grade was previously 0.58% nickel equivalent.

The metal prices used to determine the cut-off grade were decreased from US$17,764/t nickel and US$26,448/t cobalt to US$17,045/t nickel and US$25,412/t cobalt.

Based on sales terms achieved during 2016, and projected product prices fo the project. Payability for nickel was unchanged at 75%, for cobalt was unchanged at 60%.

Mining factors

The major mining method is still the open pit mining, and the experimental production of hydraulic mining is added.

Forecast total mining operating costs(include mechanical mining and hydraulic mining) average US$2.72t (wet).

For the purpose of forming a view on the appropriate nickel and cobalt prices to use to determine the cut-off grade, ENFI has had regard to the long-term metal price assumptions provided by Highlands Pacific Limited, historical spot prices and current forward prices.

Given the volatility in commodity markets, the current levels of commodity prices relative to historical long-run prices, and the widely varying views of industry analysts, assumptions regarding future metal prices are inherently subject to considerable uncertainty. It should be noted that the value of the mineral assets could vary materially based on changes in commodity price expectations.

An attribution similar to that shown below should accompany any formal reporting of the Ore Reserve estimates detailed in this letter.

Competent Person's Statement

The information in this report that relates to Ramu Ore Reserves is based upon information compiled by Mr Chao An Deng, who is a Deputy Chief Engineer of China ENFI Engineering Corporation and a Fellow of the Australasian Institute of Mining and Metallurgy. Mr Chao An Deng is a full-time employee of China ENFI Engineering Corporation and has sufficient experience relevant to the style of mineralization and type of deposit under consideration to qualify as a Competent Person as defined in the 2012 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code)". Mr Chao An Deng consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Qualifications

China ENFI Engineering Corporation is based on mineral industry consultants and metallurgical engineering whose businesses include the estimation of Mineral Resources and Ore Reserves for public reporting.

China ENFI Engineering Corporation has carried out a number of technical consulting assignments for Ramu NiCo Management (MCC) Limited (RNML) in the period 2006 to 2016. In carrying out these consulting assignments, China ENFI Engineering Corporation has acted as an independent party and has no business relationship with Ramu NiCo other than the carrying out of individual consulting assignments as engaged.

The Ramu mine and Basamuk process plant is a joint venture between Highlands Pacific Limited (8.56%), the PNG Government and Landowners (6.44%) and Ramu Nico (85%). Metallurgical Corporation of China Limited holds a 61% interest in Ramu NiCo, with the remaining 39% held by a number of other Chinese entities.

While some employees of China ENFI Engineering Corporation may have small direct or beneficial shareholdings in Metallurgical Corporation of China Limited or Highlands Pacific Limited, neither China ENFI Engineering Corporation nor the contributors to this report nor members of their immediate families have any interests that could be reasonably construed to affect their independence. China ENFI Engineering Corporation has no pecuniary interest, association or employment relationship with these listed entities.

Metallurgical Corporation of China Limited holds100% China Nonferrous Engineering Co. Ltd ,and China Nonferrous Engineering Co. Ltd holds 90% China ENFI Engineering Corporation.

This document and the conclusions in it are effective at 31 December 2016. Those conclusions may change in the future with changes in relevant metal prices, exploration and other technical developments in regard to the operation, Mineral Resource and exploration tenements and the market for mineral properties. This document may not be relied on by any party than Ramu NiCo, its officers and employees.

Mineral Processing Engineer/Deputy Chief Engineer:

Appendix A

JORC Code Table 1

1 JORC Code, 2012 Edition – Table 1 report template

1.1 Section 4 Estimation and Reporting of Ore Reserves

(Criteria listed in Section 1, and where relevant in Sections 2 and 3, also apply to this Section.)

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	• Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve. • Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.	• The Mineral Resource estimates for the Kurumbukari and Ramu West deposits at Ramu in Papua New Guinea (PNG), on which these Ore Reserves are based, are the same as used for the 2015 Ore Reserve Estimate as the 2016 Ramu Nickel Resource Statement issued concurrently with this Ore Reserve estimate, was not available in time for use as the basis for the 2016 Ore Reserve estimate. Detailed in Sections 1 to 3 of this Table 1. • The Mineral Resource estimates referenced above are inclusive of the Ore Reserves.
Site visits	• Comment on any site visits undertaken by the Competent Person and the outcome of those visits. • If no site visits have been undertaken indicate why this is the case.	• The Competent Person conducted a site visit from 13 to 22 March 2017, and reviewed the mining and processing operation at Kurumbukari and Basamuk. • N/A
Study status	• The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves. • The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.	• The Ramu Nickel Resource is currently being mined by open pit methods, with operating contracts and arrangements in place. An owner-mining open pit excavation methodology has been applied in determining these Ore Reserves. • Previous studies include the Feasibility Study (February 2007) on which the project was established. This Ore Reserve estimate follows from the estimate of the 2016 Mineral Resources. Pit optimizations were conducted to define economic pit shells and form the pit design boundaries. The optimization confirmed current operating pit areas are contained within the resultant optimization pit shell.
Cut-off parameters	• The basis of the cut-off grade(s) or quality parameters applied.	• A 0.5% nickel cut-off grade was applied for modelling of mineralization and reporting of Mineral Resources. A variable nickel equivalent cut-off (including credit for cobalt metal) of approximately 0.58% nickel has been applied in reporting of Ore Reserves.

Criteria	JORC Code explanation	Commentary
		Calculation formula for nickel equivalent: Nickel Equivalent = Cobalt Recovery * Cobalt Price * Cobalt Pricing Coefficient / (Nickel Recovery * Nickel Price * Nickel Pricing Coefficient) = 1.13 Cut-Off Grade（Nickel Equivalent）= Operating Cost / ((1-Dilution Ratio) * Nickel Beneficiation Recovery *Nickel Metallurgical Recovery * Nickel Price * Nickel Pricing Coefficient)=0.58% • The primary assumptions used to generate the cut-off grade and equivalent coefficientinclude: Ni price of US$17,045/t nickel . Co price of US$25,412/t cobalt. CIF insurance of 2% net smelter revenue. Royalty of 2% net smelter revenue. • Dilution Ratio is taken on average of 3%. • Payable revenue based on sale of mixed hydroxide product (MHP) at 75% of nickel price and 60% of cobalt price. • A forecast process recovery for Ni and Co that is variable based on feed grades. Metallurgical recoveries of 84.8% nickel and 80.6% cobalt is assumed. • A process cost (inclusive of site overheads and administration) that is variable depending on material type and equates to US$60 per dry tonne refinery feed and freight cost of US$35 per tonne of product shipped. • Operating cost is estimated to be $61.5 USD/t which includes the cost occurred during the process of mining, beneficiation, refinery and etc. Site overheads and administration fee is excluded.
Mining factors or assumptions	• The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimization or by preliminary or detailed design). • The choice, nature and appropriateness of the	• The Ramu deposit is currently mined by open pit methods and this method has been assumed as the basis for these Ore Reserves. • The multiple open pits use truck-and-excavator operations, with two stopes using hydraulic mining. The mineralization stated within this Ore Reserve is located entirely within Special Mining Lease SML 8 (Kurumbukari and Ramu West).

Criteria	JORC Code explanation	Commentary
	selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc. • The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling. • The major assumptions made and Mineral Resource model used for pit and stope optimization (if appropriate). • The mining dilution factors used. • The mining recovery factors used. • Any minimum mining widths used. • The manner in which Inferred Mineral Resources are utilized in mining studies and the sensitivity of the outcome to their inclusion. • The infrastructure requirements of the selected mining methods.	• Due to the relatively shallow nature of the open pits, the pit slope angle is not critical for pit design or optimization. A 45 degree overall slope angle was assumed for pit optimization. • The 2016 Mineral Resource models were used for pit optimization as detailed below. • The Mineral Resource has been interpreted using a cut-off of 0.5% nickel and has no application of mining dilution. Dilution in the Ore Reserves was applied by dilution skins on overburden contact (0.25 m) and road construction material (20% of road thickness). • Ore loss and mining recovery factors in the Ore Reserves were applied by ore loss skins on overburden (0.5 m) and rocky saprolite contact (0.25 m) and the application of an overall 95% mining tonnage recovery factor assuming that some areas of the deposit are not mined due to topography, narrow ore zone widths, and permanent access roads. • The mining recovery factor includes an allowance for minimum mining width. • The pit optimization process used Measured and Indicated Mineral Resource material. Inferred material occurs in mineralization zones beneath the reserve material and is treated as waste within these Ore Reserves. • General infrastructure at Ramu is already established and no significant additional capital is anticipated. Allowance for sustaining capital has been included in the cost models, basis of design and the optimization.
Metallurgical factors or assumptions	• The metallurgical process proposed and the appropriateness of that process to the style of mineralization. • Whether the metallurgical process is well-tested technology or novel in nature. • The nature, amount and representativeness of metallurgical testwork undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied. • Any assumptions or allowances made for	• The Kurumbukari washing plant and beneficiation plant, and Basamuk refinery have been processing the Ramu mineralization for approximately 5 years. The +2 mm sized fraction of the ore is removed by simple screening processes and the -2 mm mineralization is currently treated in the refinery at rates in the order of 2.3 Mtpa dry feed. • The processing method is appropriate for the mineralogy that presents in the orebody, a lateritic nickel-cobalt ore, which is processed using traditional high-pressure acid leach and precipitation to produce an intermediate product (mixed hydroxide precipitate or MHP) that is sold to smelters.

Criteria	JORC Code explanation	Commentary
	deleterious elements. • The existence of any bulk sample or pilot scale testwork and the degree to which such samples are considered representative of the orebody as a whole. • For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?	• The recovery for nickel and cobalt is variable and is based on operational results. Metallurgical recoveries of 84.8% nickel and 80.6% cobalt are assumed. • Refinery operating cost includes cost allowances for aluminium and magnesium content in the ore. • The processing plants are operational. • The MHP produced at Basamuk refinery is specified in off-take agreements.
Environmental	• The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterization and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.	• The mineralization that is the subject of this Mineral Resource is located within Special Mining Lease SML 8 (Kurumbukari and Ramu West). There are no Native Title interests, nor are there any other historical or environmental issues considered material to this Ore Reserve. Ramu is an approved and operating mine and processing facility and the relevant environmental and mine closure plans are in place. Waste dumping requirements and areas, along with subsea tailings disposal have been planned, regulatory approved and in operation.
Infrastructure	• The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.	• General infrastructure at Kurumbukari and Basamuk is in place and there are currently no further large capital items planned. • Existing infrastructure includes: • Ore washing plant, beneficiation plant, ore slurry pipeline, and refinery processing plant, and associated maintenance and storage facilities. • Mobile equipment operations and maintenance facilities. • Administration and security facilities. • Electricity generation and distribution systems, and water supply and storage facilities. • Subsea tailings disposal system.
Costs	• The derivation of, or assumptions made, regarding projected capital costs in the study. • The methodology used to estimate operating costs. • Allowances made for the content of deleterious elements. • The derivation of assumptions made of metal or	• Allowance has been made for sustaining capital. No further expansionary capital costs have been included as it is assumed that the current infrastructure is adequate and will be maintained for the life of asset. • The operating costs are underpinned by operating budgets and historical costs, which are converted to life-of-mine unit costs for the optimization.

Criteria	JORC Code explanation	Commentary
	commodity price(s), for the principal minerals and co-products. • The source of exchange rates used in the study. • Derivation of transportation charges. • The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc. • The allowances made for royalties payable, both Government and private.	• The mining costs are material type dependent and average US$2.72 per wet tonne. The processing cost of US$60 per dry tonne refinery feed is derived from a 3.21 Mtpa processing rate scenario and inclusive of each stage of processing, and the technical services and general and administrative costs. • For the purpose of forming a view on the appropriate nickel and cobalt prices to use to determine the cut-off grade, ENFI has had regard to the long-term metal price assumptions provided by Highlands Pacific Limited, historical spot prices and current forward prices. • The metal price assumptions are US$17,045/t nickel and US$25,412/t cobalt. All costs are supplied, applied and reported in United States dollars (USD). • The product is sold CIF–Cost, Insurance and Freight (named port of destination). A freight cost of US$35 per tonne of MHP shipped is applied, supplied by MCC. Transport costs for slurry delivery by pipeline to the refinery, and port handling at the refinery are included in the total processing operating cost. • The MHP produced at Basamuk refinery is specified in off-take agreements. This details the percentage price payable. • A 2% Papua New Guinea Government royalty is included in the cost assumptions.
Revenue factors	• The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc. • The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.	• Revenue assumptions were provided by MCC and HPL from operating experience and corporate forecasts. • Metal prices were provided by HPL from operating experience and corporate forecasts.
Market assessment	• The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future. • A customer and competitor analysis along with the	• Ramu has in place offtake agreements for MHP. MCC relies upon advisory sources when assessing future trends and factors influencing supply and demand. The Ore Reserve estimate has been completed on the basis that all product can be sold.

Criteria	JORC Code explanation	Commentary
	identification of likely market windows for the product. • Price and volume forecasts and the basis for these forecasts. • For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.	• Ramu is an operating asset and has established relationships with customers and market acceptance for its product. • The Ore Reserve estimate has been completed on the assumption that all product can be sold, based on MCC and advisory forecasts. • MHP from Ramu is an established product.
Economic	• The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc. • NPV ranges and sensitivity to variations in the significant assumptions and inputs.	• The discount rate adopted for the optimization and economic analysis is 10%, based on MCC corporate forecasts. • NPV shells are utilized to determine the range of pit shells for various revenue factors. Operational ramp-up from commissioning is ongoing. The operational costs are continuously improving but are based on the current performance plus production improvements from defined enhancement projects.
Social	• The status of agreements with key stakeholders and matters leading to social licence to operate.	• Ramu has undertaken considerable community consultation in association with local, provincial, and federal PNG government communication resulting in a licence to operate under the relevant licences. • Ramu participates in regular community meetings that assist with the communication of mine development, community feedback, and thus the ongoing social licence to operate.
Other	• To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves: • Any identified material naturally occurring risks. • The status of material legal agreements and marketing arrangements. • The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and	• On April 12, 2016, at 7:30 a.m., the RNML Basamuk Refinery suffered a catastrophic pipe rupture at the High Pressure Acid Leaching plant on E102, Train 3 resulting in a fatality (HPAL operator) and injuries to another two trainee operators. And led to the refinery processing plant to stop 78 days. • Legal and marketing agreements associated with the sale of MHP are in place through the off-take agreements. • The Mine Lease is currently in good standing. Ramu is an approved and operating mine and the relevant environmental and mine closure plans are in place. Waste dumping requirements and areas, along with subsea tailings disposal, have been planned, have regulatory approval and are in operation. Future approvals will be required to allow the full extraction of the Ore Reserve.

Criteria	JORC Code explanation	Commentary
	discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.	
Classification	• The basis for the classification of the Ore Reserves into varying confidence categories. • Whether the result appropriately reflects the Competent Person's view of the deposit. • The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).	• The Ore Reserve is classified as Proved and Probable in accordance with the 2012 JORC Code, corresponding to the resource classifications of Measured and Indicated. Inferred Mineral Resources were treated as waste in the Ore Reserve estimate. • The Ramu project continues to optimize performance. Like all Ore Reserve statements, it contains both risk and opportunities. The Competent Person feels that the statement provides a reasonable balance and is consistent with industry practice and the intent of the 2012 JORC Code. • No Probable Ore Reserves are derived from Measured Mineral Resources.
Audits or reviews	• The results of any audits or reviews of Ore Reserve estimates.	• No audits conducted.
Discussion of relative accuracy/ confidence	• Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate. • The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used. • Accuracy and confidence discussions should extend to specific discussions of any applied Modifying	• Mine and process plant were commissioned in April 2012. Although the rated production capacity has not been achieved (3.21 Mtpa dry refinery feed), but the existing facilities of the mine and refinery have already had the nameplate production capacity. The production indicators keep improving. The Competent Person feels that it is reasonable that the Ore Reserve estimate was based on 100% nameplate capacity (3.21 Mtpa, dry basis). • Based on the estimated reserves of ore consumed in 2016, the actual amount of ore produced is compared and analyzed, and the estimation of reserves is considered appropriate. • The modifying factors that are most critical to the operation are: Nickel price. Metallurgical recoveries. Production rates and operational costs. • The actual amount of ore produced in 2016 is about 2.6Mt (dry volume, Ni @ 1.1%). The amount of qualified slurry delivered to the refinery is 2.4Mt (dry volume, Ni @ 1.1%), the ore reserves consumed are about 2.3Mt (dry volume, Ni @ 1.0%).

Criteria	JORC Code explanation	Commentary
	Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage. • It is recognized that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.	