RICHMOND VANADIUM PROJECT AND IPO UPDATE

HIGHLIGHTS

- **Updated Pre-Feasibility Study completed and Bankable Feasibility Study progressed** for the 1.8Bt Richmond vanadium project in central north Queensland [1]
- The Mineral Resource for the advanced Lilyvale deposit within the project area stands at [1,4]:
  - 560Mt grading 0.48% V_2O_5 for 2.6Mt V_2O_5 at a 0.30% lower cut-off
- The maiden open pit Ore Reserve at Lilyvale is estimated at [5]:
  - **459.2Mt at 0.49% V_2O_5 for 2.25Mt of contained V_2O_5 product**
- Updated Pre-Feasibility Study based on an initial 20-year life (representing 18% of maiden Ore Reserve) demonstrating a financially strong project with the following key metrics[1,5]:
  - Shallow low impact open pit mining producing 80.4Mt of oxide ore at a fully diluted grade of 0.49% V_2O_5 for 15.64Mt of 1.82% V_2O_5 with concentrate production on site
  - Refining overall recovery at 86.1% produces 251,500 tonnes of 98% V_2O_5 commercial grade flake with **average annual production of 12,700t V_2O_5**
  - Modest up-front capital costs of A$243m and operating cash costs of A$8.66/lb of 98% V_2O_5 flake
  - At current spot price of A$16.44/lb V_2O_5, project generates **$NPV_{10\%}$ of A$1.09B with IRR of 62%** and a rapid payback of 1.9 years
- BFS progressing with work to date including **offtake and alliance discussions with electrolyte and battery manufacturers**, final flowsheet design, **onshore refining assessment** and project approvals for advancement to major project status [3]
- Vanadium is an emerging green energy storage mineral with the globally significant project included in the Federal Government's Critical Minerals Prospectus 2020
- Restructure of Horizon's 25% interest with JV partner Richmond Vanadium Technology (75%) to combine interests into a dedicated IPO vehicle and seek an ASX listing [2]
- Intention to distribute up to 50% of Horizon's shares in the IPO vehicle back to Horizon shareholders and priority to invest in the IPO [2]
- Further details on the intended IPO structure, record date for the in-specie distribution and timing will be advised early in the June Quarter 2022 [3]

Commenting on the vanadium project, Horizon Managing Director Mr Jon Price said:

"With sustained increases in vanadium prices, declining supply, increasing demand in grid scale energy storage markets and strong government focus on critical minerals, it couldn't be a better time to be advancing this world class project. It's also a great time to be a Horizon shareholder with our intention to distribute shares back to our supporters and give them a priority offering in the IPO to enable greater exposure to this exciting new energy metal market evolving in Australia."

[1] As announced to the ASX on 16 June 2020 and 27 October 2020. See also Tables and Confirmations on Page 10 [2] As announced to the ASX on 24 November 2021. [3] See Forward Looking and Cautionary Statements on Pages 2 and 24.[4.] See Competent Persons Statement on Pages 6 and 25 and JORC Tables on Page 26.[5] See Tables and Competent Persons Statement on Page 10 and JORC Tables on Page 26.

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Cautionary Statement

The PFS referred to in this announcement is based on Proven and Probable Ore Reserves derived from Measured and Indicated Mineral Resources. No Inferred Resource material has been included in the estimation of Ore Reserves. The Company advises that Proven and Probable Ore Reserves provide 100% of the total tonnage and 100% of the total metal underpinning the forecast production target and financial projections. There is no additional life-of-mine plan material derived from the non-Ore Reserve material. There is no dependence of the outcomes of the PFS and the guidance provided in this announcement on the non-Ore Reserve material. No Inferred Mineral Resource material is included in the life of mine plan (refer Appendix 1 and Forward Looking and Cautionary Statements on Pages 24-26).

Horizon Minerals Limited has concluded it has reasonable basis for providing the forward-looking statements included in this announcement (see pages 24-26). The detailed reasons for that conclusion are outlined throughout this announcement and Material Assumptions are disclosed in Appendix 1. This announcement has been prepared in accordance with the JORC Code (2012) and the ASX Listing Rules.

Overview

Horizon Minerals Limited (ASX: HRZ) (Horizon or the Company) is pleased to announce an update of the Pre-Feasibility Study (PFS or Study) and progress of the Bankable Feasibility Study (BFS) for the Richmond vanadium project located in Central North Queensland (Figure 1).

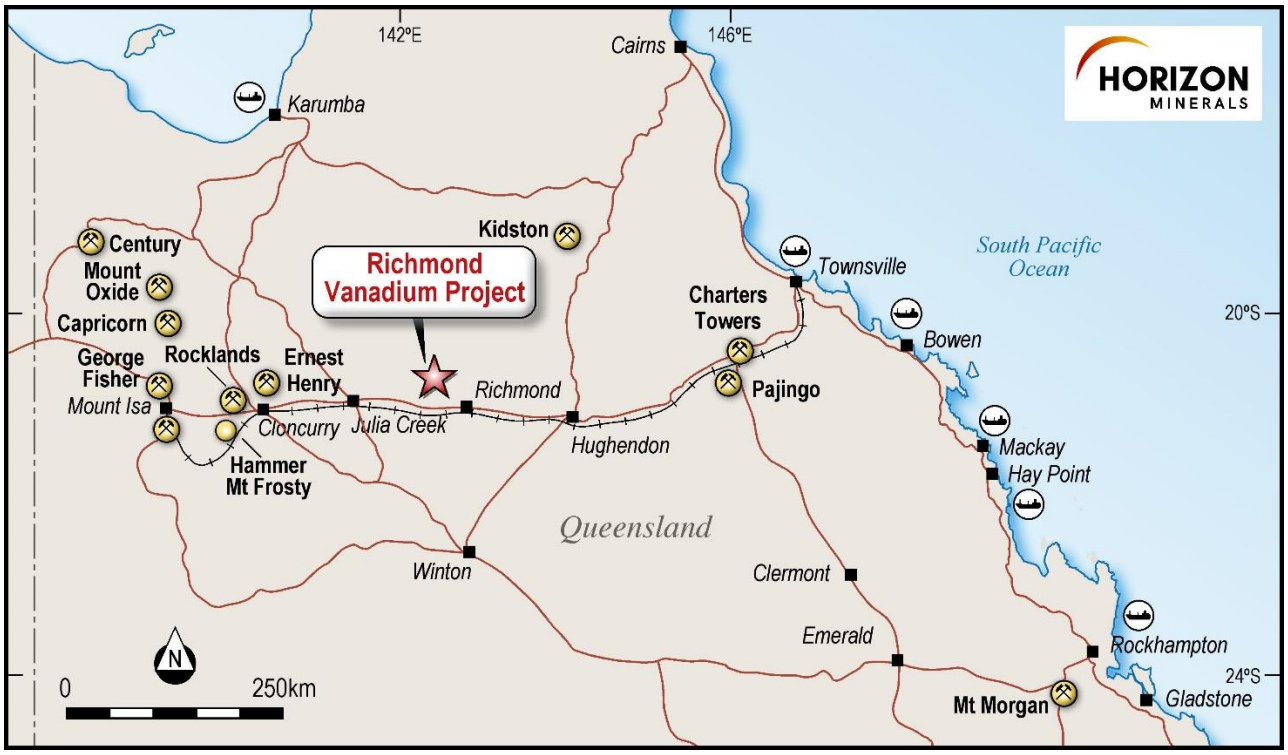

Figure 1: Richmond vanadium project location and surrounding infrastructure

The Richmond vanadium project is located approximately 35km north-west of Richmond in Northwest Queensland. Richmond is a regional service town of 650 people situated 500km by road to the west of Townsville and 400km east of the mining town of Mt Isa (Figure 1).

In December 2016, the Company entered a strategic development Joint Venture (JV) with Richmond Vanadium Technology Pty Ltd (RVT). The JV covered Horizon's 100% interest in the Richmond vanadium project comprising 1,550km^2 of Cretaceous Toolebuc Formation (Figure 2)[1].

RVT completed the initial earn in period in March 2018 and has completed the second stage expenditure commitment over three years inclusive of the PFS to earn its current holding of 75%, with Horizon retaining a 25% interest.

The PFS focussed on the higher grade Lilyvale deposit (Figure 2) following the successful infill drilling program in late 2019 comprising 333 aircore holes for 7,817m which resulted in the updated JORC 2012 Mineral Resource estimate of 0.56Bt grading 0.48% V_2O_5 for 2.6Mt V_2O_5 at a 0.30% lower cut-off[3]. The Mineral Resource update resulted in improved grades over the previous Mineral Resource Estimate, and importantly led to 76% of the Mineral Resource upgraded to the Indicated JORC Category for estimation of maiden Ore Reserves. In addition, a metallurgical (bulk) sample was taken from an existing gravel pit along-strike from the Lilyvale Deposit. The sample is considered representative of the Lilyvale orebody.

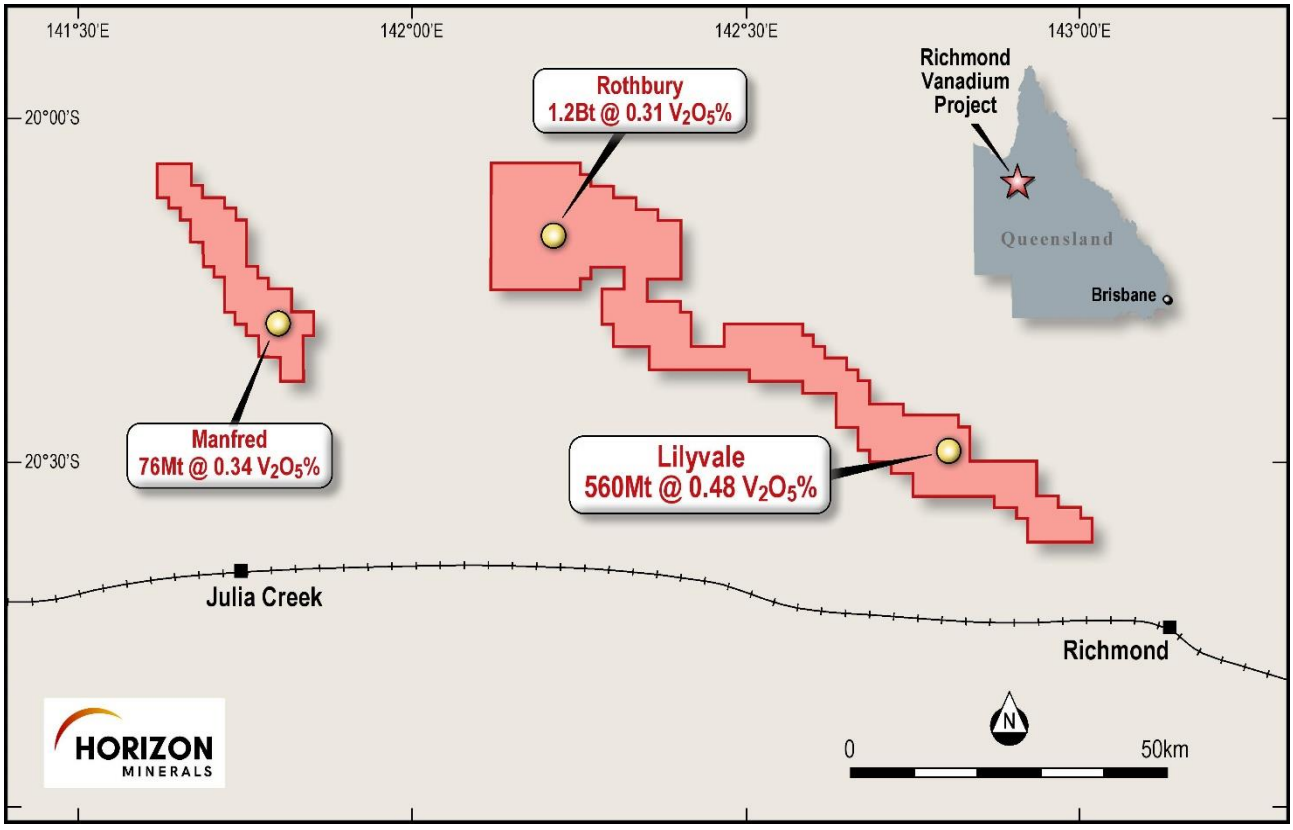

Figure 2: Richmond vanadium project location and Richmond Lease areas

[1] As announced to the ASX on 13 December 2016. [2] See Pages 4-16, Competent Persons Statement on Page 25 and JORC Tables on Page 26
[3] As announced to the ASX on 16 June 2020, see also Tables and Competent Persons Statement on Pages 6 and 25.

Pre-Feasibility Study (PFS) Parameters

The PFS was based on the following key parameters:

- Vanadium price of V_2O_5 Flake of A$16.44/lb
- Exchange rates of US$0.73 and RMB4.55 to the Australian Dollar
- Open pit mining operations conducted by contractors
- Ore processed on site to produce a V_2O_5 concentrate of 1.82% V_2O_5, railed to port and shipped overseas for refining V_2O_5 flake
- Project implementation and oversight by RVT's team in conjunction with contractors

Study Team

The key consultants and companies engaged during the Study and their areas of responsibility were:

• Feasibility Study Management	Faultzone
• Geology and Resource Estimates	RVT
• Mining and Ore Reserve	Dr Dawei Xu
• Metallurgical Test work	Hunan Nonferrous Metal Research Institute
• Processing facility and infrastructure	Faultzone
• Power Study	Ergon Energy Corporation Limited
• Hydrology and hydrogeology	CDM Smith
• Environmental	Epic Environmental Pty Ltd

Key Outcomes of the Pre-Feasibility Study

The key Study outcomes for the project are included in Table 1 below: The estimated Ore Reserve, which constitutes 100% of the production target, has been prepared by Competent Persons in accordance with JORC Code 2012.[1]

A total of 8.4Mt of total material is mined per annum, generating 4.06Mt of ore mined from the open pit for concentration. This mining rate yields a nominal mine life of over 100 years at Lilyvale. For the purposes of the economic analysis in the PFS, a mine life of only 20 years is considered.

Table 1: Summary of PFS key outcomes [2]

Measure	PFS outcome Study Price (A$16.44/lb)
Life of Mine (Total 110 years)	
Total pit volume (Mt)	951.7
Stripping ratio (waste: ore)	1.07
Mined ore (Mt)	459.2
Ore Grade V_2O_5 (%)	0.49

[1] See competent persons statement on Pages 10 and 25 and JORC Tables on Page 26. [2] See Pages 4-16, Competent Persons Statement on Pages 6, 10 and 25 and JORC Tables on Page 26.

Measure	PFS outcome Study Price (A$16.44/lb)
PFS (Initial 20-year life)	
Mined ore (Mt)	80.4
Ore Grade V_2O_5 (%)	0.49
Concentrate Produced V_2O_5 (Mt)	15.64
Concentrate Grade (%)	1.82
Refining recovery average (%)	86.1
V_2O_5 98% Flake Produced (kt)	251.5
Capital costs ($M)	A$243.0
Operating costs ($/lb)	A$8.66
NPV @ 10% ($m)	A$1,019
Payback (years)	1.9
IRR	62%

The PFS has an annual rate of production of 790,000 tonnes of concentrate, producing 12,701 tonnes of 98% V_2O_5 flake. Operating costs of A$8.66/lb include mining, administration, concentration onsite, transport and refining offshore. Capital costs of A$243.0m include construction of the concentrator via EPCM inclusive of 20% contingency, in addition to a power station, railway siding, bores, administration and accommodation facilities, and an offshore refining plant. Mining capital is provided by the contractor and amortised into the mining rate.

Consideration for refining onshore in regional Queensland was examined in the PFS but discounted at the time due to the high differential in capital and operating costs impacting the projects NPV. **As part of the BFS, onshore refining will be re-evaluated with the Company's preference to produce final product in Australia for domestic use in electrolyte and vanadium redox flow battery manufacture.**

Mineral Resource Estimate

The Project mineralisation is located within marine sediments of the early cretaceous Toolebuc Formation, a stratigraphic unit that occurs throughout the Eromanga Basin in Central-Northern Queensland. Due to the superior grades of the Lilyvale deposit, it was determined to be the most likely to be economically successful and was therefore infilled to improve the classification of the exiting resource with a successful aircore programme completed in late 2019.

The 2019 drilling was compiled to generate an updated independent Mineral Resource estimate compliant with the 2012 JORC Code as shown in the table below *:

Table 2: Lilyvale Mineral Resource Estimates *

JORC Classification	Cut-off grade %	Tonnage	Grade			Metal content (Mt)		
		(Mt)	% V_2O_5	ppm Mo	ppm Ni	V_2O_5	Mo	Ni
Indicated	0.30	430	0.50	240	291	2.10	0.10	0.13
Inferred	0.30	130	0.41	213	231	0.50	0.03	0.03
TOTAL		**560**	**0.48**	**234**	**277**	**2.60**	**0.13**	**0.16**

Importantly, over 76% of the Mineral Resource has been upgraded to the Indicated Category enabling detailed economic evaluation to be completed for Ore Reserve generation.

The global Mineral Resource estimate for the Richmond project area is shown in the Table below*:

Table 3: Richmond Mineral Resource Estimates by Project and Classification *

Project (Res Cat)	Cut-off grade %	Tonnage	Grade			Metal content (Mt)		
		(Mt)	% V_2O_5	ppm Mo	ppm Ni	V_2O_5	Mo	Ni
Rothbury (Inferred	0.30	1202	0.31	259	151	3.75	0.31	0.18
Lilyvale (Indicated)	0.30	430	0.50	240	291	2.15	0.10	0.1
Lilyvale (Inferred)	0.30	130	0.41	213	231	0.53	0.03	0.03
Manfred (Inferred)	0.30	76	0.35	369	249	0.26	0.03	0.02
TOTAL		**1,838**	**0.36**	**256**	**193**	**6.65**	**0.46**	**0.36**

* The Information in this report that relates to Mineral Resources is based on and fairly represents information and supporting documentation prepared by Mr Warwick Nordin, who is a Competent Person and a member of the Australasian Institute of Geoscientists (AIG). Mr Nordin is a full-time employee of Richmond Vanadium Technology Pty Ltd. Mr Nordin has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activities being undertaken 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 Nordin consents to the inclusion in the report of the matters based on his information in the form and context in which it appears. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in those announcements continue to apply and have not materially changed.

The MRE has been estimated by Mr Warwick Nordin, who is a full-time employee of Richmond Vanadium Technology Pty Ltd. Two constraining envelopes (wireframes) were created for two block models (Mineral Resource and Ore Reserve). The wireframe for the Mineral Resource block model did not take any dilution into account. The Ore Reserve wireframe did allow for dilution via incorporating waste (<0.3% V_2O_5), especially in the hanging wall, and was interpolated accordingly. The difference between these two methodologies is illustrated in Figure 3.

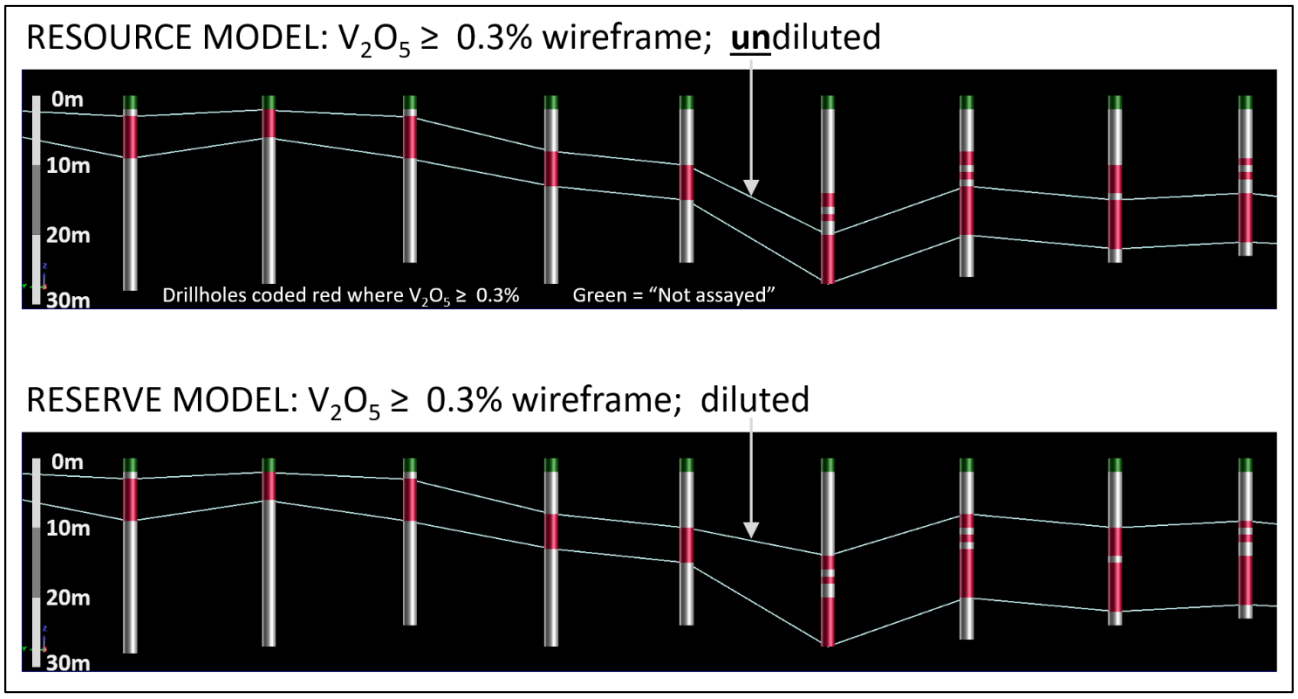

Figure 3: Identical Vertical Sections showing Mineral Resource and Ore Reserve Methodology

Mining

A mining contractor will be engaged to conduct the mining activities with technical and managerial oversight provided by RVT. Mining will utilise conventional open cut methods which shall be 100% free-dig of the ore and waste. No drill and blast is required due to the shallow nature of the oxide pit extending typically to an average depth of between 15 and 25m, and to a maximum depth of 31m to the bottom of the ore zone (see Figure 4 below).

Pre-strip of waste overburden shall be carried out by 200 tonne excavators and 180 tonne trucks, with the waste typically backfilled behind the advancing pit as part of progressive rehabilitation.

Ore mining at the base of the pit shall be undertaken by a 360-tonne excavator into a mobile in-pit sizer/lump breaker, with the ore picked up by a 100 tonne Front End Loader (FEL) and loaded in 180 tonne trucks to the surface concentrator.

Total movement from the LOM pit over a 110-year life is 951.7Mt of rock at a strip ratio of 1.07.

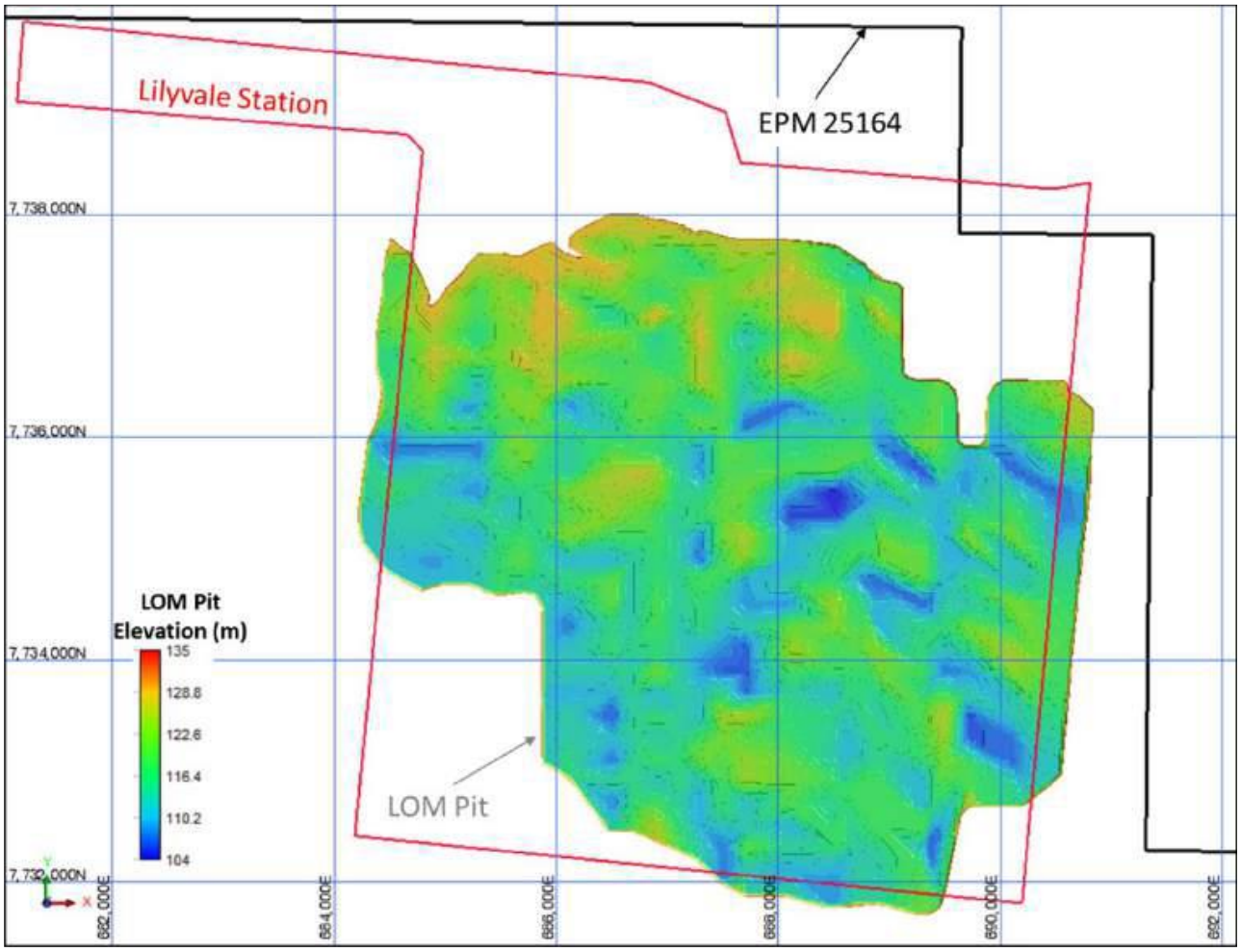

Figure 4: Lilyvale Preliminary Life of Mine (LOM) Pit Design

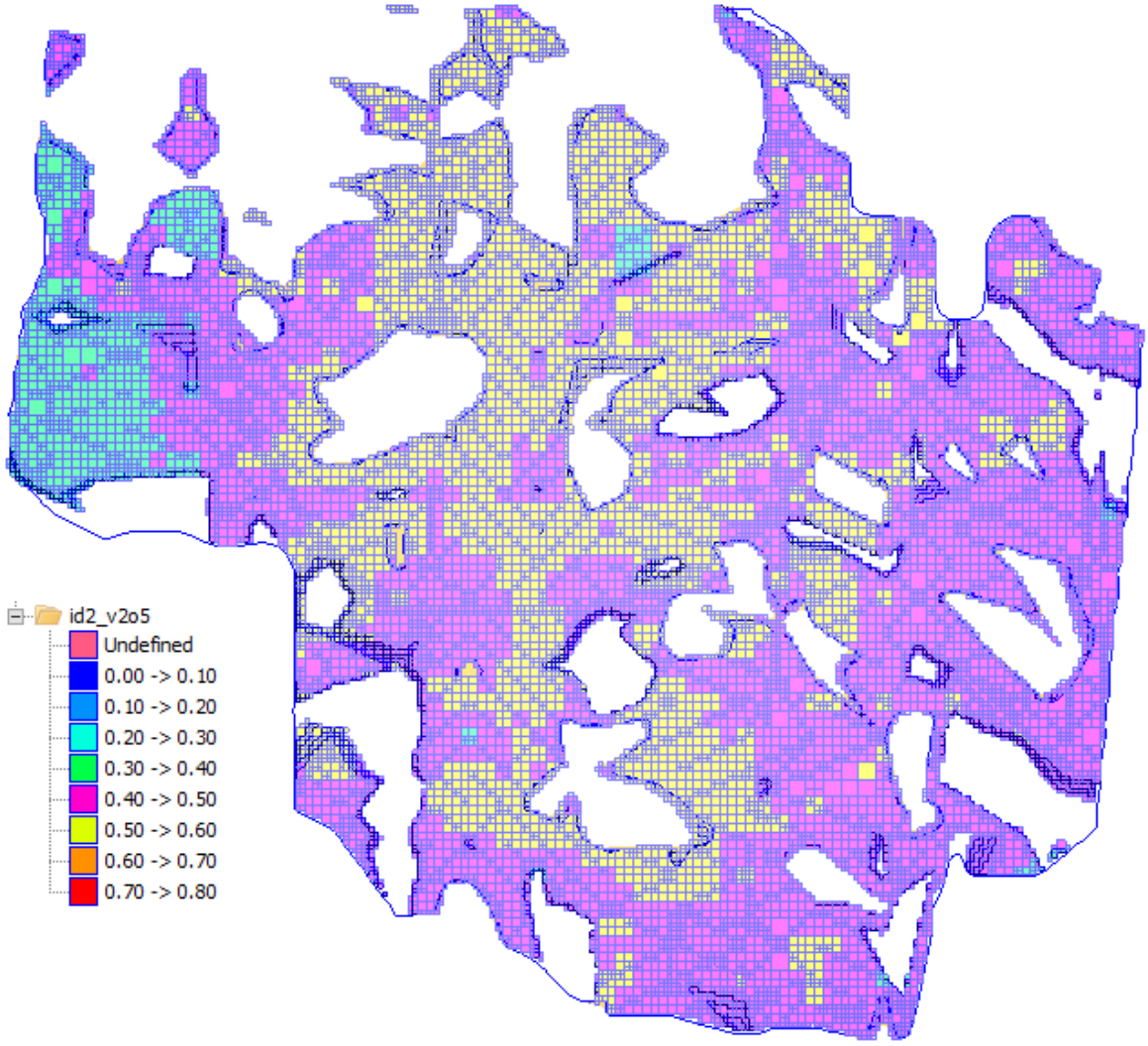

Figure 5: Horizontal Cross Section at 120.5mRL for Orebody Only

Ore Reserve

RVT engaged an independent consultant to conduct the maiden Ore Reserve Study based on preliminary pit designs which was completed with the following material assumptions:

- Mining costs are based on contractor quotations, incorporating equipment and manning schedules.
- Pit slope parameters of 37 degrees with a batter height varying from 1 to 15m, with no allowance for a ramp, with temporary ramps utilised due to the shallow nature of the pit.
- Mining recovery and mining dilution based on deposit geometry diluted Ore Reserve block model (2019diluted_0pt3envelope.mdl). All Inferred Mineral Resources were excluded from the estimation of Ore Reserves.
- The Indicated orebody with cut-off grade of V_2O_5 @ 0.3% was used to guide the preliminary pit designs.

- Detailed metallurgical test work from representative samples along strike of the ore domains within the project were examined by the Hunan Nonferrous Metal Research Institute to conduct a full process of vanadium beneficiation tests, including concentration and smelting tests on the Project's raw ore.
- Bulk densities for waste were assumed to be as per the ore bulk densities of 1.8t/m^3 derived from test work
- A discount factor of 10% has been used in the financial analysis.

The Ore Reserve for the project is reported according to the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves, JORC Code 2012 (Table 4). The Mineral Resource Estimate (MRE) was converted to Ore Reserve in consideration of the level of confidence in the MRE.

Table 4: Summary of Ore Reserves (see also Appendix 1 on Page 26) *

Lilyvale Ore Reserves			
Class	**Ore (Mt)**	**Grade V_2O_5 (%)**	**Metal Content V_2O_5 (Mt)**
Proven	0	0.00	0
Probable	459.2	0.49	2.25
Total	459.2	0.49	2.25

***** The Information in this Report that relates to Ore Reserves is based on information compiled by Dr Dawei Xu, a Competent Person who is a Member of the Australasian Institute of Mining and Metallurgy. Dr Xu is an independent consultant of RVT. Dr Xu has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken 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". Dr Xu consents to the inclusion in the report of the matters based on his information in the form and context in which it appears. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in those announcements continue to apply and have not materially changed.

Ore processing and production

A two-step process has been determined to concentrate the V_2O_5 to a commercial grade product. In the first stage, the pentoxide will be upgraded from a mined grade of 0.49% V_2O_5 to a shipping grade of approximately 1.82% V_2O_5 concentrate. The second stage involves extraction via refining to produce saleable V_2O_5 flake and electrolyte.

The first stage (concentration) is to be based on site. Ore mined from the pit shall be transported to the concentrator and dumped into a hopper and an ABON sizer to break up any clods of material. From the hoppers, the ore will drop through vibrating screens and water added to make a slurry for ease of screening of 90% passing 150 microns. The ore is sent to flotation tanks, where froth from the final tank is sent to the tailings thickener and slurry concentrate to the concentrate thickener, with underflow generating 55% solids. The thickened concentrate will then be filtered via vacuum filters to produce a filter cake ready for storage on a radial stacker prior to train loading.

Nontoxic tailings shall be pumped approximately 500m to a Tailings Storage Facility (TSF) with settling out of solids and water returned to the concentrator plant.

The second stage of beneficiation to produce V_2O_5 flake is proposed to be carried out offshore. The V_2O_5 concentrate shall be transported by rail in Rotobox containers to the Port of Townsville, and then shipped overseas for refining. The beneficiation process involves roasting, grinding, acid leaching / ripening, solids / liquid separation, desilication, ammonium vanadate (AMV) precipitation, and de-ammoniation to produce high grade vanadium pentoxide flake suitable for commercial sale. The direct yield of V_2O_5 smelting is 88.9%, and the total recovery rate is 86.1%.

Ore will be mined at a rate of 4.06Mt per annum, generating 790,000 tonnes of concentrate at 1.82% V_2O_5. After refinement, annual production is 12,701 tonnes of 98% V_2O_5 flake. No allowance has been made for recovery of molybdenum or other base metals in the beneficiation process, and therefore no by-product credits have been applied to the economic analysis.

Infrastructure, Transport and Services

The Lilyvale deposit is located approximately 50km north-west of Richmond in Central North Queensland. Access to the Project area is provided by the east-west Flinders Highway, the main arterial road between Townsville and Mt Isa. Shire roads and pastoral station tracks head north from the highway and provide access to tenement areas.

The Port of Townsville does not currently have the infrastructure to direct load bulk carriers, other than Rotainers/Rotobox within the Stevedoring companies who operate multiuser facilities at the port. A purpose RVT built ship-loading facility built in a berth was also investigated at a capital cost of A$24.1m, however there are restrictions on berths currently, therefore transportation of concentrate shall be via Rotobox and contract loaded onto ships.

Options were examined to transport the concentrate from site to the port, including via roadtrains (owner fleet and contract models) in addition to transport by rail, with the latter the preferred economic option. A rail siding interface shall need to be constructed to support loading the Rotobox containers on to trains consisting of 90 bulk wagons with three locomotives for a 5,850t payload, requiring three trains per week to the port.

Power options considered involved power from aerial reticulation from the Townsville to Mount Isa Power grid, and a Build Own Operate (BOO) Liquified Petroleum Gas (LPG) power plant. Costs from the grid are high due to the condition of the network and are currently in excess of A$0.16/kwh which is comparable to the provision of LPG power and the basis of the power cost estimate for the PFS.

The site would also require 30km of transmission lines to connect to the grid, therefore the costs between the two options are close and will require further investigation in the next level of study.

Other site infrastructure includes mining offices, construction of a TSF, bores for water supply to the concentrator and internal roads and hardstand areas.

The Richmond JV owns approximately 31.5 hectares (ha) of vacant land (Lot 3 on Plan RT78) on the Flinders Highway, west of Richmond, which could be utilised to support the infrastructure needs of the Project.

It is anticipated that initial workforce estimates will be approximately 200. Local resources shall be used as much as possible in relation to employment of some 100 locals in Richmond and surrounding areas, however due to the small local population, an allowance of a 100-person accommodation camp shall be built to account for a FIFO and DIDO workforce to supplement local personnel.

Capital Expenditure

Capital expenditure totals A$243.0m comprising the concentrator plant including the TSF, power station, camp, access road to site, water supply and other associated infrastructure to establish and commission the site. Offsite capital includes a refining plant built offshore in China.

Table 5: Summary of Capital Cost Estimates

Item	Cost (A$m)
Concentrator Processing Plant*	79.8
Refining Plant	111.0
Power Station	9.2
Rail Siding	4.8
Accommodation Camp	9.1
Access Road	4.1
Bores development, headworks and lines	6.6
Other Capex	18.4
TOTAL**	**243.0**

*Includes TSF

**Total includes owners' costs, EPCM, contingency, and escalation.

A site-based refining plant to produce V_2O_5 flake in Australia was investigated, however would have a significantly higher capital cost and was not the preferred solution economically at the time through Discounted Cashflow Analysis (DCF). **This capital cost is being re-assessed in the BFS with preference for in-country refining and discussions will continue at a regional, state and federal level for potential support in reducing overall capital and operating costs.**

Further work undertaken since the PFS, along with changing market conditions, indicate that the BFS will look more closely at the option of processing vanadium ore to flake in Australia. This option would negate the need for purpose-built storage and ship loading at the Port of Townsville. Further to this the Queensland Government announced in November 2021 that they would build and own a new $10m vanadium processing plant in Townsville. The vanadium facility will be part of the Government's plan to make Queensland a leading producer and exporter of new-economy minerals. The Queensland Government's announcement noted that there were several vanadium mines planned for the North-West.

Operating Expenditure

In relation to mining, allowances have been made for mining load and haul fleet, in-pit sizer/lump breaker, ancillary equipment, fuel and lubricants and operators. Mining has been assumed to be provided by contract with the capital input based on a pre-strip tonnage and an establishment fee, which covers workshops and offices in the mining area. The mining cost is based on the mining rate averaged A$2.93/t ore, the waste rate averaged A$2.93/BCM with the values based on the calculation being devised from the total tonnage mined of 8.4Mtpa. It is assumed that RVT will employ 13 direct employees for mine planning and resource development with some 97 people employed on contract.

Operating costs were determined on a A$/t concentrate cost for mining, site administration, concentrating, filtering, transport, ship-loading, freight CIF, corporate costs and refining to feed into the financial model. Operating costs for the project are A$8.66/lb of 98% V_2O_5.

Environmental and Permitting

The Richmond Vanadium Project is located on granted Exploration Permits for Minerals (EPMs) 26425, 26426, 25163, 25164 and 25258 located in the Richmond and McKinlay Shires.

There are no major environmental constraints that would prohibit the development from proceeding, with approvals sought to minimise or avoid any potential environmental impacts. The project is considered to bring positive impacts to business and the local communities.

A Preliminary Environmental Assessment (PEA) Report has been compiled for the Project which entails investigations in relation to environmental issues such as flora, fauna, heritage, surface and ground water and soils.

Cultural heritage parties listed for the EPMs include; Mitakoodi and Mayi, Wanamara and the Ngawun Mbara people. Cultural heritage tenement searches using the Queensland Government Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) Aboriginal and Torres Strait Islander Cultural Heritage Database Search Request Form indicate some burial(s), hearth/oven(s) and shell midden(s) have been recorded on EPM26425. All reasonable and practicable measures would need to be taken to ensure Project activities do not harm Indigenous cultural heritage and would respect cultural heritage duty of care as per Section 23 of the Aboriginal Cultural Heritage Act 2003. A search of the National Native Title Tribunal register has not identified any areas of Native Title within the EPMs.

From the PEA, the most significant environmental issue is the potential presence of the Julia Creek Dunnart within the Project area, which shall need to be confirmed or otherwise in the field. Should the species or its habitat be confirmed, it is likely an Environment Protection and Biodiversity Conservation Act 1999 Referral will be considered for the project, with identifying ‘nationally threatened species and ecological communities’ as a controlling provision for the referral.

The PEA identified two potential statutory approval pathways for the project, specifically the Environmental Protection Act 1994 process, and the State Development and Public Works Organisation Act 1971 (SDPWO Act) process, with the latter considered more optimal due to tying in access to water and also approvals with other agencies to streamline the approvals process.

Economic Evaluation

The capital and operating cost estimates (Estimates) presented in the PFS have been compiled based on the Aspen Capital Cost Estimator (ACCE) and the Australasian Institute of Mining and Metallurgy (AusIMM) standards for levels of study. The Estimates are considered to be Class 2 (+/-20%) suitable for a Pre-Feasibility level of study.

The economic evaluation of the project, summarised in Table 1 above, was conducted by Faultzone on behalf of RVT, derived from preliminary take-offs, budget prices from a single source and factoring of previous projects as part of the Feasibility Study.

Ratios for electrical, building costs, engineering, project management, construction facilities, insurance and so on have been factored from Faultzone's historical data base. Although the project life is over 100 years, a discounted cashflow analysis was conducted for a period of 20 years to represent more acceptable accuracy in forecasting.

The evaluation was conducted with the following key assumptions:

- A Vanadium Pentoxide flake A$ price of $16.44/lb
- Exchange rates of US$0.73 and RMB4.55 to the Australian Dollar
- Royalties of 2.7% were subtracted from the V_2O_5 price to generate net revenue
- Open pit mining operations conducted by contractors and based on quotations, incorporating equipment and manning schedules
- Ore processed on site to produce a V_2O_5 concentrate of 1.82% V_2O_5, railed to port and shipped to China for refining V_2O_5 flake
- Processing costs for concentrate are via obtaining the prices for a series of commodities and applying the usage rate based on measured values or experience from other projects to produce the concentrate
- Processing operating costs for refining to produce the flake are based on the Hunan Nonferrous Metal Research Institute Metallurgical test for the extraction of Vanadium Pentoxide
- Additional costs include rail haulage under contract operator, Build-Own-Operate (BOO) Power, and costs for Port Loading facility
- A discount factor of 10% has been used in the financial analysis

Market Analysis

Vanadium produced from primary ore sources is uncommon due to sub-economic grades, with ore typically originating from magmatic sources, although sedimentary mineralisation ore enriched with vanadium also occur to a lesser extent, such as the Richmond vanadium project. Primary ore production accounted for 14% of the 102,365 tonnes produced globally in 2019, with 86% formed from secondary sources, usually as biproduct and recycling.

Vanadium is a fundamental component in steel manufacturing due to the strengthening and ductile properties it affords steel and alloys with the addition of very small amounts of the metal. It is also used in automotive applications, especially with the addition of titanium, in addition to weight reductions in applications in aircraft and aerospace industries, along with rail and building construction materials, which account for 94% of vanadium demand.

The use of vanadium redox flow batteries (2% of vanadium demand) is an emerging market for vanadium with the increasing use of renewable energy, along with the developing lithium-vanadium-phosphate batteries as alternatives for electric vehicles, therefore increasing the requirements for battery energy storage and increasing the derived demand for vanadium.

Vanadium has become a strategic metal in most parts of the world, listed as a critical commodity from Geoscience Australia, and also listed in the Australian Critical Minerals Prospectus 2020 with the Richmond vanadium project listed as a key advanced project.

Intention to Demerge and Complete IPO

As announced to the ASX on 24 November 2022, the Company has executed a Process Deed with joint venture partner Richmond Vanadium Technology Pty Ltd (RVT) to restructure our respective interests in the project into a dedicated IPO vehicle with shares initially held by Horizon (25%) and RVT (75%). On completion of the transaction and establishment of a dedicated Board and experienced executive and management team, the IPO vehicle holding 100% of the project would seek a listing on the ASX through an initial public offering.

The Company's intention is to distribute up to 50% of Horizon's shares in the IPO vehicle free to Horizon shareholders with priority to invest in the IPO.

The amount of funds required as part of the intended IPO will be determined in the June Quarter 2022. The record date for the in-specie distribution for eligible shareholders is yet to be determined and will be advised in the June Quarter 2022.

Next Steps

JV partner RVT has been focussed on progressing environmental and statutory approvals for project development as part of its Bankable Feasibility Study. This has included the completion of an Initial Advice Statement and an application for consideration of the Richmond – Julia Creek Vanadium Project to be declared a Coordinated Project. The application is currently under consideration with a decision expected in the June Quarter 2022.

In addition, discussions have been held with potential offtake and alliance partners for the sale of vanadium flake product domestically and overseas. Despite hosting some of the largest vanadium resources in the world, Australia is not producing flake at present, but electrolyte and vanadium redox flow batteries are being manufactured and sold in Australia. Our aim is to work with these innovative companies and develop a self-sufficient new industry from mining ore to battery manufacture for the benefit of all stakeholders. This work will be completed in parallel with the on shore refining assessment as part of the BFS.

Infrastructure evaluation and site locations together with completion of the final flow sheet design and costing to a BFS level of study is progressing and will be ramped up in the June Quarter 2022.

Discussions will also continue with local, regional, state and federal governments to promote and support this new industry enabling a vertically integrated use of our country's natural resources.

Approved for release by the Board of Directors of Horizon and RVT.

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Listing Rule 5.8.1 Disclosures

Geology and Geological Interpretation

The Richmond-Julia Creek project mineralisation is located within marine sediments of the Early Cretaceous Toolebuc Formation, a stratigraphic unit that occurs throughout the Eromanga Basin in central- northern Queensland.

The Eromanga Basin (Figure 6) is a sub-basin of the Great Artesian Basin and consists of a number of thick sequences of non-marine and marine sedimentary units. The Toolebuc is part of the Rolling Downs Group of the Eromanga Basin that covers a wide but relatively shallow structural depression in eastern Australia, covering 1.5 million km^2. The basin was developed as a major downward warpon a basement of Proterozoic to Palaeozoic metamorphic and igneous rocks during the Jurassic to Cretaceous Periods.

The Toolebuc Formation is a flat lying early Cretaceous (Albian ~ 100My) sediment that consists predominantly of black carbonaceous and bituminous shale and minor siltstone, with limestone lenses and coquinites (mixed limestone and clays). It is composed of two distinct units representing two different facies: an upper coarse limestone-rich-clay-oil shale unit (coquina) and a lower fine-grained carbonate-clay-oil shale unit.

The Toolebuc Formation outcrops only at the margins of the Eromanga and Carpentaria basins, except at Julia Creek where it is draped over an interpreted original basement high and has been structurally brought to the surface. Where the unit outcrops it forms low, rubbly, subtle topographic highs which have been the source of road building materials in many areas.

The limestone within the Toolebuc Formation has an abundant fossil assemblage which has been extensively studied. Two main faunal assemblages have been recognised, corresponding to the upper coquina facies (shelly limestone and clay) and a lower fine-grained carbonate shale facies. The organic matter in the fresh shale is predominantly lamellar and referred to by Hutton et al (1980) as ‘lamosite’ (lamellar oil shale). The organic compounds are described as Alginite B in order to distinguish them from the more generally recognised Alginite A, in which clear evidence of algal morphology can be observed. Alginite B comprises elongate anastomosing films derived from benthonic algae that are attributable to the Cyanophyceae genera of blue-green algae (Ozimic, 1986).

High magnification scanning electron microscopy reveals the oil shale contains abundant micro fossils, dominated by small planktonic foraminifera and coccoliths (algal plates) believed to be derived from Cyanophta / blue- green algae. Average grain size of the lower oil shale calcareous nanofossils and clays are less than 5-7 microns. The blue-green algae are interpreted to have formed extensive algal mats on the sea floor. The preservation of dead algal matter can be related to an oxidising-reducing boundary probably situated immediately below the base of the living algal mat layer and keeping pace with its upward growth. The clays and kerogen are derived from planktonic algae and blue- green benthonic algae with the calcite representing the inorganic component of the organisms.

The episode of clear water calcareous sedimentation represented by the Toolebuc Formation ended when muddy conditions returned, preventing further growth of the benthonic fauna and leading to widespread deposition of the argillaceous sediments of the Allaru Mudstone (Ramsden, 1983).

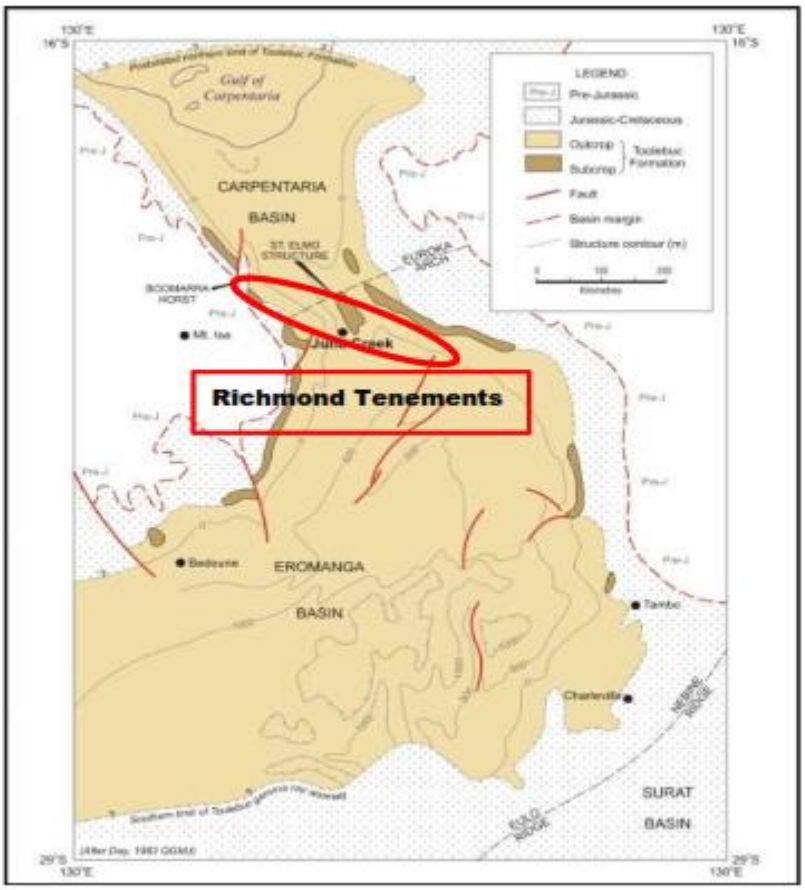

Figure 6: Richmond – Julia Creek Project area regional geology and location

Sampling and Sub-sampling

Sample was collected in large green plastic bags (via cyclone) and delivered to a laydown area in Richmond. Approximately 1kg of material was speared from each bag into a pre-numbered calico bag and sent to ALS Global Pty Ltd laboratory in Townsville.

Sample Analysis Method

The 2019 aircore samples were assayed by ALS Global Pty Ltd in Townsville, Brisbane and Perth using the MS85 (Li borate fusion) method (V only). Every 20th hole was also assayed by ICP61 (Ca, Cu, Fe, Mo, Ni, S and V). A small subset was also submitted for XRF analysis for comparison. There was good agreement between these methods. The stoichiometric factor used to convert V to V_2O_5 was 1.7852 (divided by 10000 to derive a percent figure).

Drilling Techniques

The 2019 Lilyvale deposit drilling was performed by a 150MEX rig with dump mast using a 350psi compressor. The aircore bit had an OD of 84mm. One duplicate in each of the Lilyvale holes drilled in 2019 was submitted for vanadium assay – the agreement between results was acceptable.

None of the drill holes have been twinned for the purposes of QAQC sampling though the quantity of holes duplicated over time, due to differences of methodologies, show a continuity of grade, interpretation continuity and geological consistency.

The variances show that time and methodology do not alter the consistency in the orebody definition.

Estimation Methodology

Each area, Manfred, Rothbury and Lilyvale was interpreted separately and had models created separately due to sizes and lode orientations.

Histograms on the Lilyvale data before and after the 2019 drilling are presented in Figure 7 and Figure 8. The bimodal character of the distribution is pronounced when the 2019 data is included, and there is also a slight increase in the grade tenor. A cumulative probability plot on this latest Lilyvale data supports a grade population break near 0.3% V_2O_5 (Figure 9).

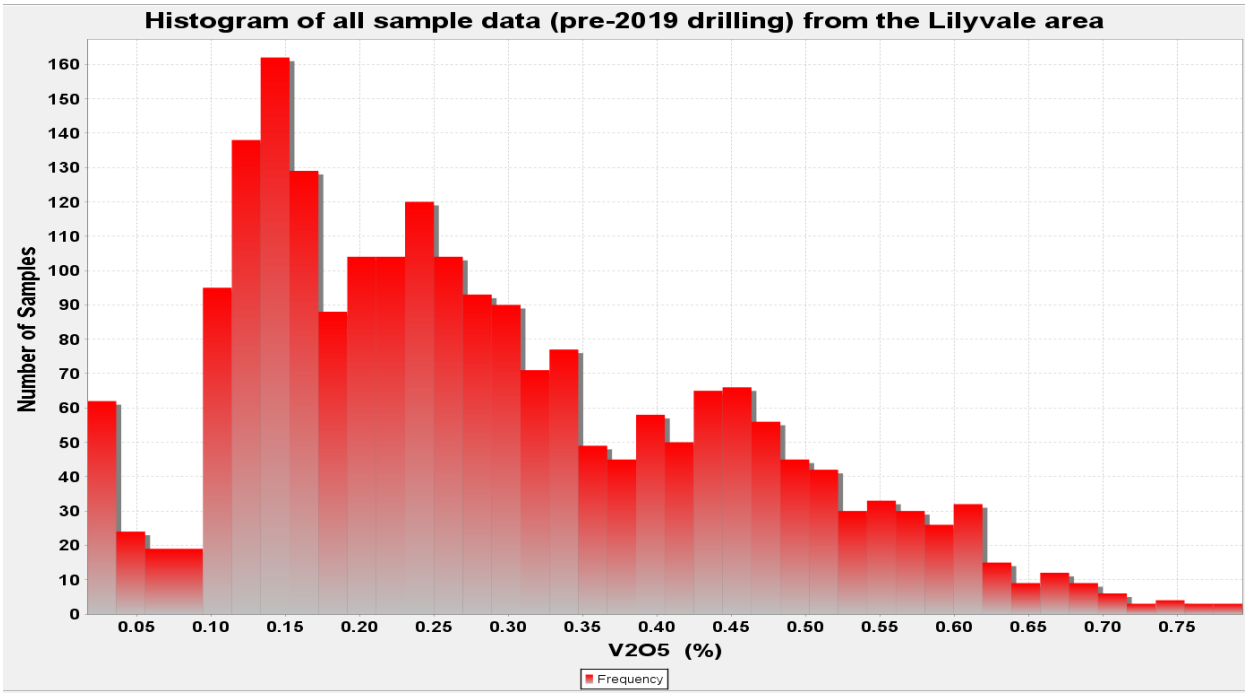

Figure 7: Histogram of all sample data (pre-2019) from the Lilyvale area showing a distinct grade variation at the 0.1%V_2O_5.

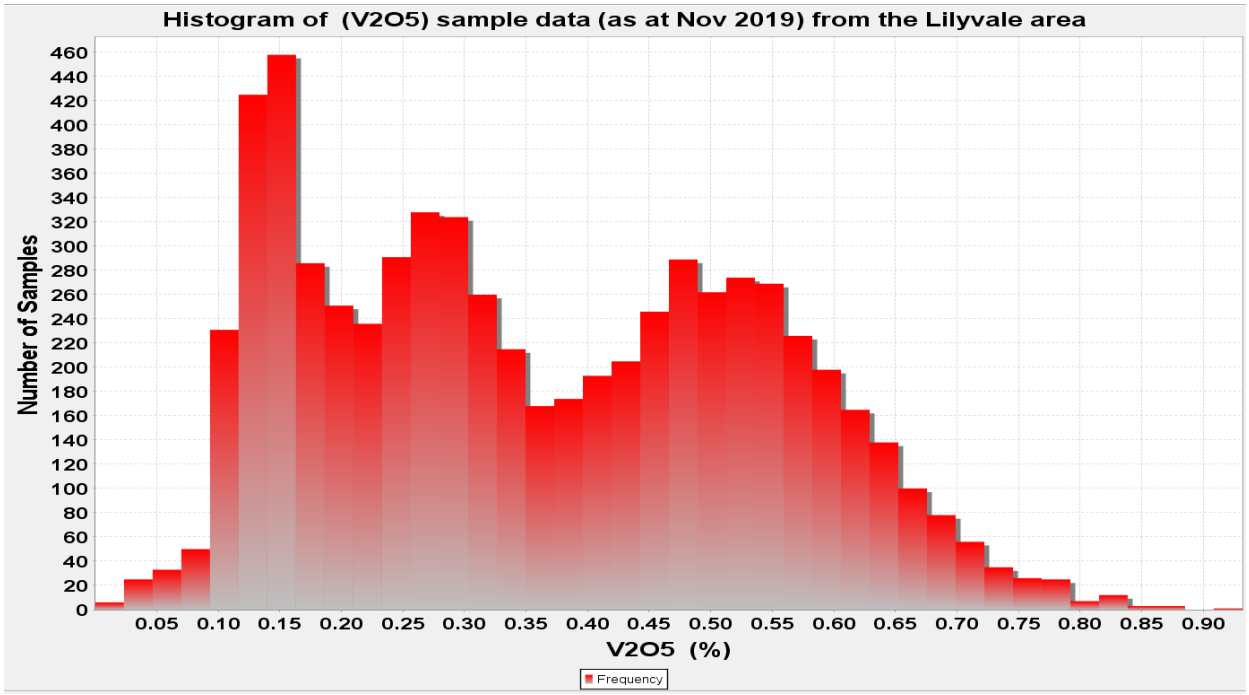

Figure 8: Histogram of all sample data post 2019 drilling showing bimodal distribution attributable to the Indicated portion of the deposit

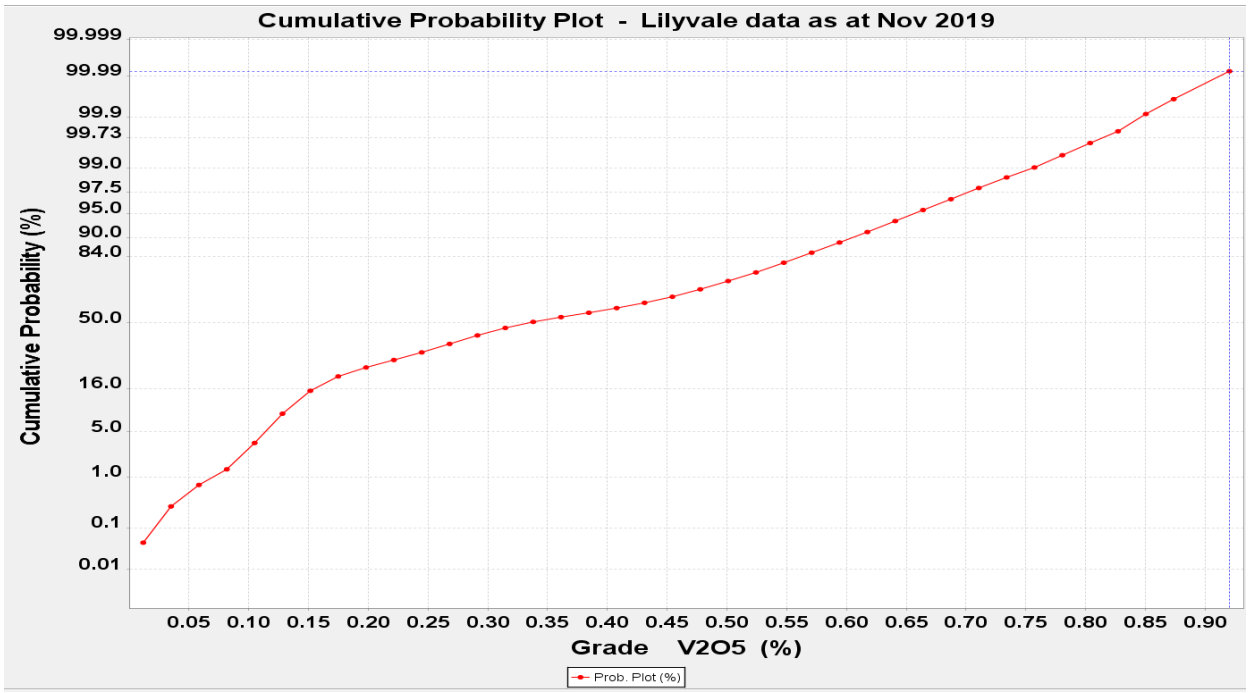

Figure 9: Cumulative probability plot for Lilyvale data indicating population breaks near 0.15%, 0.3% and 0.5% V_2O_5

Criteria used in the interpretations were:

- Interpretations were based on V_2O_5 values only.
- A nominal 0.3% V_2O_5 lower cut-off grade with flexibility for geological continuity.
- Sections extended 100m beyond the last interpreted section.
- Geology mostly comprises the following:

Kloc	COQUINA
Klol	LIMESTONE
Kloy	KAOLINIZED WEATHERED OIL SHALE +V-Mo-Cu
Klos	OIL SHALE

Interpretations were created in cross-sections to correlate with the drilling sections.

The Indicated portion of the Lilyvale deposit shows good continuity of geology and grade between drill holes.

The interpreted sections were wire framed to create solids used in extracting composite data and coding the block models.

Although section spacing is extremely wide the continuity of assay data, interpretation widths and geological recognition identifies the lodes with relative accuracy.

Block Model

The 2020 Lilyvale model was created in Surpac (version 6.9 x64):

- "lilyvale_model_nov2019.mdl".

The interpolation process used Inverse Distance Squared (ID2) as the preferred algorithm. The dynamic anisotropy module (using a trend surface on the lower bound of the >0.3% ore zone) was used when performing the ID2 interpolation of the 2019 Lilyvale model.

Block Model parameters for the Lilyvale deposit are shown below:

Type	Northing	Easting	Elevation
Minimum Coordinates	7731050	680350	90
Maximum Coordinates	7739250	697050	150
User Block Size	100	100	1
Min. Block Size	25	25	0.25
Rotation	0	0	0
Total Blocks	3,127,405		

Bulk Density

Weathering profiles were not created due to the resource being within the oxidised regolith and requiring a single bulk density of 1.8t/bcm.

Mineral Resource Classification

The Mineral Resource model uses a classification scheme based upon both block estimation parameters and other relevant modifying factors as determined by the Competent Person. The block estimation parameters initially used for classification guidance included average distance of points, closest points, number of points and standard deviation.

Following the 2019 drilling a large part of the Lilyvale Mineral Resource (inside the 200m x 400m drill grid) is now upgraded to Indicated.

The Manfred and Rothbury Mineral Resources are classified as Inferred.

Cut-off Grade

The cut-off grade of 0.3% for the stated Lilyvale Mineral Resource Estimate is determined from economic and statistical parameters and reflects the current and anticipated mining practices. The 0.3% cut applies to the geological model wireframe envelopes. The model is considered valid for reporting and potential open pit mine planning.

Mining and Metallurgical Methods and Parameters and other modifying factors considered

Two constraining envelopes (wireframes) were created for two block models (Mineral Resource and Ore Reserve). The wireframe for the Mineral Resource block model did not take any dilution into account. The Reserve wireframe did allow for dilution via incorporating waste (<0.3% V_2O_5), especially in the hanging wall, and was interpolated accordingly, therefore modifying parameters are built within the reserve model.

Preliminary mine designs were undertaken on the Ore Reserve wireframe and block model, and only indicated classified mineral resources were used to generate Ore Reserves, with no Inferred Mineral Resource included for Ore Reserves. The vanadium mineralisation shall be mined by open cut methods using conventional truck and shovel fleets to a maximum depth of 31m. The mineralisation is often less than 10m from the surface, tabular and thick, yielding low strip ratio of 1.07. The pits are determined to be economic.

Significant volumes of testwork have been conducted on the Richmond-Julia Creek Vanadium Project historically. Recent metallurgical testwork has been undertaken on representative material (collected in 2019) from ‘along-strike’ exposure of the orebody. This work was undertaken by Hunan Nonferrous Metal Research Institute to conduct a full process of vanadium beneficiation tests, including concentration and smelting tests on the Project’s raw ore.

Horizon Minerals Limited – Summary of Gold Mineral Resources

Project	Cut-off grade (g/t)	Measured			Indicated			Inferred			Total Resource		
		Mt	Au (g/t)	Oz	Mt	Au (g/t)	Oz	Mt	Au (g/t)	Oz	Mt	Au (g/t)	Oz
Boorara OP	0.5	1.28	1.23	50,630	7.19	1.27	294,140	2.56	1.26	103,470	11.03	1.26	**448,240**
Kalpini	0.8				1.40	2.43	108,000	0.47	2.04	31,000	1.87	2.33	**139,000**
Jacques - Peyes	0.8				0.97	2.59	81,000	0.77	1.98	49,000	1.74	2.32	**130,000**
Teal	1.0				1.01	1.96	63,680	0.80	2.50	64,460	1.81	2.20	**128,140**
Crake	0.8				1.33	1.47	63,150	0.08	1.27	3,300	1.42	1.46	**66,450**
Cannon UG	1.0				0.19	4.8	28,620	0.05	2.30	3,450	0.23	4.29	**32,070**
Rose Hill OP	0.5	0.19	2.00	12,300	0.09	2	6,100				0.29	2.00	**18,400**
Rose Hill UG	2.0				0.33	4.5	47,100	0.18	4.80	27,800	0.51	4.60	**74,900**
Pennys Find (50%)	1.5				0.09	5.71	17,500	0.03	3.74	3,500	0.13	5.22	**21,000**
Gunga West	0.6				0.71	1.6	36,440	0.48	1.50	23,430	1.19	1.56	**59,870**
Golden Ridge	1.0				0.47	1.83	27,920	0.05	1.71	2,800	0.52	1.82	**30,720**
TOTAL		**1.47**	**1.33**	**62,930**	**13.78**	**1.75**	**773,650**	**5.48**	**1.77**	**312,210**	**20.73**	**1.72**	**1,148,790**

Confirmation

The information in this report that relates to Horizon's Mineral Resources estimates is extracted from and was originally reported in Horizon's ASX announcements "Intermin's Resources Grow to over 667,000 Ounces" dated 20 March 2018, "Rose Hill firms as quality high grade open pit and underground gold project" dated 8 December 2020, "Updated Boorara Mineral Resource Delivers a 34% Increase In Gold Grade" dated 27 April 2021, "Penny's Find JV Resource Update" dated 14 July 2021, "Updated Crake Resource improves in quality" dated 7 September 2021, "Jacques Find- Peyes Farm Mineral Resource update" dated 15 September 2021 and "Kalpini Gold Project Mineral Resource Update" dated 28 September 2021, each of which is available at www.asx.com.au. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in those announcements continue to apply and have not materially changed. The Company confirms that the form and context of the Competent Person's findings in relation to those Mineral Resources estimates or Ore Reserves estimates have not been materially modified from the original market announcements.

Horizon Minerals Limited – Summary of Vanadium / Molybdenum Mineral Resources

Project	Cut-off grade (%)	Tonnage (Mt)	Grade			Metal content (Mt)		
			V_2O_5 (%)	Mo (ppm)	Ni (ppm)	V_2O_5	Mo	Ni
Rothbury (Inferred)	0.30	1,202	0.31	259	151	**3.75**	0.31	0.18
Lilyvale (Indicated)	0.30	430	0.50	240	291	**2.15**	0.10	0.10
Lilyvale (Inferred)	0.30	130	0.41	213	231	**0.53**	0.03	0.03
Manfred (Inferred)	0.30	76	0.35	369	249	**0.26**	0.03	0.02
TOTAL		**1,838**	**0.36**	**256**	**193**	**6.65**	**0.46**	**0.36**

Horizon Minerals Limited – Summary of Silver / Zinc Mineral Resources

Nimbus All Lodes (bottom cuts 12g/t Ag, 0.5% Zn, 0.3g/t Au)

Category	Tonnes	Grade	Grade	Grade	Ounces	Ounces	Tonnes
	Mt	**Ag (g/t)**	**Au (g/t)**	**Zn (%)**	**Ag (Moz)**	**Au ('000oz)**	**Zn ('000t)**
Measured Resource	3.62	102	0.09	1.2	**11.9**	10	**45**
Indicated Resource	3.18	48	0.21	1.0	**4.9**	21	**30**
Inferred Resource	5.28	20	0.27	0.5	**3.4**	46	**29**
Total Resource	12.08	52	0.20	0.9	**20.2**	77	**104**

Nimbus high grade silver zinc resource (500g/t Ag bottom cut and 2800g/t Ag top cut)

Category	Tonnes	Grade	Grade	Ounces	Tonnes
	Mt	**Ag (g/t)**	**Zn (%)**	**Ag (Moz)**	**Zn ('000t)**
Measured Resource	0	0	0	**0**	**0**
Indicated Resource	0.17	762	12.8	**4.2**	**22**
Inferred Resource	0.09	797	13.0	**2.2**	**11**
Total Resource	0.26	774	12.8	**6.4**	**33**

Confirmation

The information is this report that relates to Horizon's Mineral Resources estimates on the Richmond Julia Creek vanadium project and Nimbus Silver Zinc Project is extracted from and was originally reported in Intermin's and MacPhersons' ASX Announcement "Intermin and MacPhersons Agree to Merge – Creation of a New Gold Company Horizon Minerals Ltd" dated 11 December 2018 and in MacPhersons' ASX announcements "Quarterly Activities Report" dated 25 October 2018, "Richmond – Julia Creek Vanadium Project Resource Update" dated 16 June 2020, "New High Grade Nimbus Silver Core Averaging 968 g/t Ag" dated 10th May 2016 and "Nimbus Increases Resources" dated 30th April 2015, each of which is available at www.asx.com.au. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original market announcements and that all material assumptions and technical parameters underpinning the estimates in those announcements continue to apply and have not materially changed. The Company confirms that the form and context of the Competent Person's findings in relation to those Mineral Resources estimates have not been materially modified from the original market announcements.

Forward Looking and Cautionary Statements

Some statements in this report regarding estimates or future events are forward looking statements. They include indications of, and guidance on, future earnings, cash flow, costs and financial performance. Forward looking statements include, but are not limited to, statements preceded by words such as “planned”, “expected”, “projected”, “estimated”, “may”, “scheduled”, “intends”, “anticipates”, “believes”, “potential”, “could”, “nominal”, “conceptual” and similar expressions. Forward looking statements, opinions and estimates included in this announcement are based on assumptions and contingencies which are subject to change without notice, as are statements about market and industry trends, which are based on interpretations of current market conditions. Forward looking statements are provided as a general guide only and should not be relied on as a guarantee of future performance. Forward looking statements may be affected by a range of variables that could cause actual results to differ from estimated results, and may cause the Company’s actual performance and financial results in future periods to materially differ from any projections of future performance or results expressed or implied by such forward looking statements. These risks and uncertainties include but are not limited to liabilities inherent in mine development and production, geological, mining and processing technical problems, the inability to obtain any additional mine licenses, permits and other regulatory approvals required in connection with mining and third party processing operations, competition for among other things, capital, acquisition of reserves, undeveloped lands and skilled personnel, incorrect assessments of the value of acquisitions, changes in commodity prices and exchange rate, currency and interest fluctuations, various events which could disrupt operations and/or the transportation of mineral products, including labour stoppages and severe weather conditions, the demand for and availability of transportation services, the ability to secure adequate financing and management’s ability to anticipate and manage the foregoing factors and risks. There can be no assurance that forward looking statements will prove to be correct.

Statements regarding plans with respect to the Company’s mineral properties may contain forward looking statements in relation to future matters that can only be made where the Company has a reasonable basis for making those statements.

This announcement has been prepared in compliance with the JORC Code (2012) and the current ASX Listing Rules.

The Company believes that it has a reasonable basis for making the forward-looking statements in the announcement, including with respect to any production targets and financial estimates, based on the information contained in this and previous ASX announcements.

Competent Person's Statements

The information is this report that relates to exploration results is based on information compiled by Warwick Nordin who is a Member of the Australian Institute of Geoscientists. Warwick Nordin is a full-time employee of Richmond Vanadium Technology Pty Ltd and has sufficient experience which is relevant to the style of mineralisation 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 Nordin has given his consent to the inclusion in this report of the matters based on the information in the form and context in which it appears.

The information is this report that relates to the mineral resource is based on information compiled by Warwick Nordin who is a Member of the Australian Institute of Geoscientists. Warwick Nordin is a full-time employee of Richmond Vanadium Technology Pty Ltd and has sufficient experience which is relevant to the style of mineralisation 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 Nordin has given his consent to the inclusion in this report of the matters based on the information in the form and context in which it appears.

The Information in this Report that relates to Ore Reserves is based on information compiled by Dr Dawei Xu, a Competent Person who is a Member of the Australasian Institute of Mining and Metallurgy. Dr Xu is an independent consultant of RVT. Dr Xu has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken 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". Dr Xu consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Appendix 1 – Lilyvale Vanadium project

JORC Code (2012) Table 1, Section 1 - 4

Mr Warwick Nordin, a full-time employee of Richmond Vanadium Technology compiled the information in Section 1, Section 2 and Section 3 of the following JORC Table 1 and is the Competent Person for those sections. Dr Dawei Xu, Independent Consultant compiled the information in Section 4 of the following JORC Table 1 and is the Competent Person for that section. The following Table and Sections are provided to ensure compliance with the JORC Code (2012 edition) requirements for the reporting of Mineral Resources.

Section 1 Sampling Techniques and Data

Criteria	JORC Code explanation	Commentary
Sampling techniques	• *Nature and quality of sampling (e.g. 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.* • *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* • *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 (e.g. '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 (e.g. submarine nodules) may warrant disclosure of detailed information.*	• Aircore drill sample was collected in large green plastic bags (via cyclone) and delivered to a laydown area in Richmond. Approximately 1kg of material was speared from each bag into a pre-numbered calico bag and sent to ALS Global Pty Ltd laboratory in Townsville. The samples presented for assaying can therefore be considered as being representative and uncontaminated. RVT retain digital photos on file that detail the drilling and field sampling procedures. • One duplicate sample per hole was inserted into the assay stream. Good correlation is observed between these samples. • Time based deviation on internal assay lab QAQC samples showed less than two standard deviations between parent and daughter samples.

Criteria	JORC Code explanation	Commentary
Drilling techniques	• *Drill type (e.g. core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (e.g. 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).*	• Aircore: 333 Holes for 7,178m • An experienced RVT, or contract geologist was present during the drilling – the cyclone was periodically checked (and cleaned). No sample recovery issues were encountered.
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.*	• All the holes within the resource model are vertical air core drilled to a nominal 30m depth. RAB holes exist in the database but are not present within the resource area. Sample interval is 1 metre.
Logging	• *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.* • *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc) photography.* • *The total length and percentage of the relevant intersections logged.*	• Lithology, sample colour and degree of weathering were recorded on paper logs. An estimate of clay content was noted in a number of holes.
Sub-sampling techniques and sample preparation	• *If core, whether cut or sawn and whether quarter, half or all core taken.* • *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* • *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* • *Quality control procedures adopted for all sub-sampling stages to maximise representivity of samples.* • *Measures taken to ensure that the sampling is representative of the in situ material collected, including for instance results for field duplicate/second-half sampling.* • *Whether sample sizes are appropriate to the grain size of the material being sampled.*	• See section on assaying for details of sample preparation.

Criteria	JORC Code explanation	Commentary
Quality of assay data and laboratory tests	• *The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* • *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.* • *Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• All of the samples used to construct the Mineral Resource model were assayed at ALS Laboratories. Vanadium was analysed by the MS85 method (lithium borate fusion, dissolution with ICP finish). • Samples in every 20th hole were also subjected to 4 acid digest followed by ICP-AES and analysed for Ca, Cu, Fe, Mo, Ni, S and V. The V results from this method were consistently (~8%) lower when compared to MS85 or XRF, which substantiated the laboratory claim that the MS85 method liberated V more efficiently. • XRF analyses were performed at the beginning of the program to confirm the validity of the MS85 method - there was a very good correlation between MS85 and XRF which supported the decision to use the MS85 method for all samples. • At the time of drilling 1 duplicate sample was inserted per hole.
Verification of sampling and assaying	• *The verification of significant intersections by either independent or alternative company personnel.* • *The use of twinned holes.* • *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* • *Discuss any adjustment to assay data.*	• Hawker Geological Services Pty Ltd, trading as HGS Australia, conducted an assessment of the database assessing the collars, surveys, geology and assay data in 2017/18. The recent 333 aircore holes were carefully checked and added to this database. • A few of the recent (2019) holes were drilled in close proximity to historical holes; a visual comparison confirms grade thickness and tenor. • V (ppm) was converted to V_2O_5 (%) using a factor of 1.7852 divided by 10000.
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.* • *Specification of the grid system used.* • *Quality and adequacy of topographic control.*	• Collar coordinates were collected using a hand-held GPS in the GDA94 (Zone 54) coordinate system by the field personnel during drilling. • As the holes are shallow and vertical there is no down hole survey data collected for any of the drill holes presented. The depth of the holes in relation to the depth of the ore body will not deviate the orientation of the hole.
Data spacing and distribution	• *Data spacing for reporting of Exploration Results.* • *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.* • *Whether sample compositing has been applied.*	• Holes defining the Lilyvale orebody are constrained between 7730000N and 7739000N; and from 680500E to 696700E. • NS lines spaced at 1000m from 680500E to 684900E, with collars about 400m apart – mostly the western Indicated part of the resource. • NS lines spaced at 400m from 684900E to 690500E, with collars about 200m apart – this largely delineated the Inferred part of the resource. • NS lines spaced at 1000m from 690500E to 696700E, with collars about 400m apart – the eastern Inferred part of the resource. • The 1m samples were not composited.

Criteria	JORC Code explanation	Commentary
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.* • *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.*	• All drilling was vertical, as the orebody is sub-horizontal.
Sample security	• *The measures taken to ensure sample security.*	• Data was presented in Excel format which was imported into a Microsoft Access database referenced by Surpac V6.9.
Audits or reviews	• *The results of any audits or reviews of sampling techniques and data.*	• In 2017 HGS Australia carried out a full review of the data and created an Access database. This database was updated electronically in November 2019 - the data integrity and consistency show sufficient quality to support resource estimation.

Section 2 Reporting of Exploration Results

Criteria	JORC Code 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 security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	• Richmond Vanadium Technology Pty Ltd. (RVT; previously AXF Vanadium Pty Ltd) and Horizon Minerals Limited (HRZ; previously Intermin Resources Ltd) own 100% in five Mineral Exploration Permits (EPM25163, EPM25164, EPM25258, EPM26425 and EPM26426) covering 1550km2 near Richmond. • Project Status was given for the Richmond-Julia Creek Vanadium Project, on 28 August 2017 by the Department of Natural Resources, Mines & Energy (DNRME.)
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	• Previous workers in the area include Aquitane (1969), CSR (1983), CSIRO (1973), CRA (1991), Fimiston (1998).

Criteria	JORC Code explanation	Commentary
Geology	• *Deposit type, geological setting and style of mineralisation.*	• Cretaceous, sedimentary Toolebuc formation

Drill hole Information	• *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:*
	  • *easting and northing of the drill hole collar*
	  • *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar*
	  • *dip and azimuth of the hole*
	  • *down hole length and interception depth*
	  • *hole length.*
	• *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.*
		• Not applicable however Horizon's (ASX HRZ) drilling results have all been released and reported to the ASX.
		• No information is excluded.

Data aggregation methods	• *In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.* • *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.* • *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	• No weighting or averaging calculations were made, assays reported and compiled on the "first assay received" basis. • Cut off grades were routinely applied and reported accordingly and used in the construction of all resource calculations. • No metal equivalent calculations were applied.
Relationship between mineralisation widths and intercept lengths	• *These relationships are particularly important in the reporting of Exploration Results.* • *If the geometry of the mineralisation with respect to the drill 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 (e.g. 'down hole length, true width not known').*	• Oxide mineralisation is predominantly flat lying (blanket like) while fresher mineralisation at depth is interpreted to be gently dipping to the south. The V_2O_5 mineralisation is of a kilometric scale. • Drill intercepts and true width appear to be very close to each other, or within reason allowing for the minimum intercept width of 1m. Horizon estimates that the true width is variable but probably close to 90-100% of the intercepted width. • Given the nature of AC/RC drilling, the minimum width and assay is 1m. Diamond core is best used to determine cm scale mineralisation widths. True intercepts are not known however the

Criteria	JORC Code explanation	Commentary
		downhole intercepts appear to represent very close to true width given the orientation of the vertical drilling and the flat stratigraphy.
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.*	• Summary maps and figures have been included in this release to describe the locations and orientations of the Mineral Resource Estimates.
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.*	• For compilation of Mineral Resource estimates all data is evaluated from the database to form the basis of mineralisation outlines which have been determined nominally ≥ 0.3 % V_2O_5.
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.*	• See details from previous ASX releases from Horizon Minerals Limited (ASX HRZ). These can be accessed via the internet.
Further work	• *The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* • *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	• Scoping or engineering studies have not yet been undertaken. Additional drilling, surveying and metallurgy is planned. • Commercially sensitive.

Section 3 Estimation and Reporting of Mineral Resources

Criteria	JORC Code 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.* • *Data validation procedures used.*	• The database was updated with the (validated) drill data from the 333 aircore holes drilled in 2019 for the purpose of conducting a resource evaluation. • The Mineral Resource evaluation was conducted by Richmond Vanadium Technology Pty Ltd (RVT).

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td>Site visits</td><td>• 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.</td><td>• Frequent site visits were undertaken by W.Nordin of RVT.</td></tr>
<tr><td>Geological interpretation</td><td>• Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.
• Nature of the data used and of any assumptions made.
• The effect, if any, of alternative interpretations on Mineral Resource estimation.
• The use of geology in guiding and controlling Mineral Resource estimation.
• The factors affecting continuity both of grade and geology.</td><td>• The resource area has been sufficiently interpreted by geological consultants and the geology matches grade and geological interpretations as anticipated.
• Criteria used in the interpretations were:
  ○ Interpretations were based on V_2O_5 values only.
  ○ A nominal 0.3% V2O5 lower cut-off grade with flexibility for geological continuity.
  ○ Sections extended 100m beyond the last interpreted section.
  ○ Geology mostly comprises the following:
  ▪ Kloc COQUINA
  ▪ Kloy KAOLINIZED WEATHERED OIL SHALE + (V, Mo, Ni)
  ▪ Klos OIL SHALE</td></tr>
<tr><td>Dimensions</td><td>• 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.</td><td>• Lilyvale is largely a sub-horizontal deposit between 7730000N and 7739000N; and from 680500E to 696700E. It has a roughly WNW-ESE strike. The Indicated resource is roughly 6km x 6km in areal extent. Deposit thickness is defined by V_2O_5 cut-off; at a 0.30% cutoff Lilyvale averages about 10m in thickness.
• Overburden thickness varies between 2m and 15m.</td></tr>
<tr><td>Estimation and modelling techniques</td><td>• 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.
• The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.
• The assumptions made regarding recovery of by-products.
• Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).
• In the case of block model interpolation, the block size in</td><td>• The models were created using Surpac software Version 6.9.
• Interpolation method used is Inverse Distance Squared using dynamic anisotropy following the (0.30% V2O5 cutoff) mineralisation trend. The estimation was carried out in two passes:
  ▪ Search1 = 500m with min/max samples = 10/30 respectively
  ▪ Search2 = 1800m with min/max samples = 5/30 respectively
• Model size and parameters are:

<table>
<tr><th>Lilyvale</th><th>Northing</th><th>Easting</th><th>Elevation</th></tr>
<tr><td>Minimum Coordinates</td><td>7731050</td><td>680350</td><td>90</td></tr>
<tr><td>Maximum Coordinates</td><td>7739250</td><td>697050</td><td>150</td></tr>
<tr><td>User Block Size</td><td>100</td><td>100</td><td>1</td></tr>
<tr><td>Min. Block Size</td><td>25</td><td>25</td><td>0.25</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td>relation to the average sample spacing and the search employed.
• Any assumptions behind modelling of selective mining units.
• Any assumptions about correlation between variables.
• Description of how the geological interpretation was used to control the resource estimates.
• Discussion of basis for using or not using grade cutting or capping.
• The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.</td><td><table><tr><td>Rotation</td><td>0</td><td>0</td><td>0</td></tr><tr><td>Total Blocks</td><td>2384222</td><td></td><td></td></tr></table>• Swathe plots comparing block and drill composite grades in vertical (NS) slices (with 100m WE width) showed good agreement.</td></tr>
<tr><td>Moisture</td><td>• Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.</td><td>• The tonnages are estimated on a dry basis. Value used is 1.8t/bcm.</td></tr>
<tr><td>Cut-off parameters</td><td>• The basis of the adopted cut-off grade(s) or quality parameters applied.</td><td>• Univariate statistics were conducted; an upper cut-off grade was not required. A cumulative probability plot indicated population breaks near 0.15%, 0.3% and 0.5% V_2O_5.</td></tr>
<tr><td>Mining factors or assumptions</td><td>• 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.</td><td>• Mineral Resource economics identifies the probable lower cut-off to be 0.3% V_2O_5 based on the following parameters:
  • V_2O_5 + MoO_3 prices of approximately $23000/tonne
  • Cash operating costs of $100/tonne</td></tr>
</table>

Criteria	JORC Code explanation	Commentary

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.*	• Significant volumes of testwork have been conducted on the Richmond - Julia Creek Project by various permit holders over many years. Early work focused on the search for oil and process test work of the unoxidised kerogen-rich oil shale. RVT's focus is on the metal content only. Initial testwork completed by RVT in 2018 focused on ore preconcentration of the run of mine ore by physical means, followed by both hydrometallurgical and pyrometallurgical testwork on the concentrate to produce a final 98% V_2O_5 flake for use in both the steel and energy storage markets.
		• Testwork included:
		  • Beneficiation by screening
		  • Beneficiation by flotation
		  • Acid leaching and solvent extraction
		  • SO2 pre-leaching
		  • High temperature chlorination
		• Based on the mineralogy study of the ore and mineral processing research, three optimal mineral processes were selected for the concentration of vanadium ore. One preferred option formed the technical basis for the Preliminary Feasibility Study.
		• RVT is confident of an economic processing route for the project based on metallurgical testwork completed to date. Further discussion subsequent to the MRE arising out of the PFS is in Section 4.

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.*	• No environmental assessments had been completed at the time of compiling the Mineral Resource, as a Preliminary Environmental Assessment was being compiled in parallel as part of the pre-feasibility study. Environmental aspects as a result of the PEA, completed in December 2019 are included in Section 4.
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.* • *The bulk density for bulk material must have been measured*	• The tonnages are estimated on a dry basis. Value used is 1.8t/bcm.

Criteria	JORC Code explanation	Commentary
	by methods that adequately account for void spaces (vugs, porosity, etc), moisture and differences between rock and alteration zones within the deposit. • *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	
Classification	• *The basis for the classification of the Mineral Resources into varying confidence categories.* • *Whether appropriate account has been taken of all relevant factors (i.e. 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).* • *Whether the result appropriately reflects the Competent Person's view of the deposit.*	• The 200m x 400m drill density in the central section of the Lilyvale deposit renders that portion Indicated; the balance (to the west and east) is considered Inferred. • The Competent Person believes the mineralised domains have sufficient geological and grade continuity to support the classification applied to the Mineral Resources given the current drill pattern.
Audits or reviews	• *The results of any audits or reviews of Mineral Resource estimates.*	• An internal audit conducted by HRZ did not determine any material issues.
Discussion of relative accuracy/ confidence	• *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.* • *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.* • *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	• The competent person has confidence in the interpretation with regards to accuracy for the classification announced. • The variability in the assay statistics are similar for all three (3) Mineral Resource areas as well as the interpretation shape.

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)

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td>Mineral Resource estimate for conversion to Ore Reserves</td><td>• 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.</td><td>• The Mineral Resource block model and dates used as the basis for the Ore Reserve estimation are as follows:
  • 2019diluted_0pt3envelope.mdl
• The Mineral Resources are inclusive of Ore Reserves.
• The following tables comprise the Ore Reserves for the Lilyvale deposit. Any Mineral Resources are reported as wholly inclusive of the Ore Reserves. Note rounding errors may occur.
<table><tr><th colspan="4">Lilyvale Ore Reserve</th></tr><tr><th>Classification</th><th>Ore (Mt)</th><th>Grade V2O5 (%)</th><th>Metal Content V2O5 (Mt)</th></tr><tr><td>Proven</td><td>0</td><td>0.00</td><td>0</td></tr><tr><td>Probable</td><td>459.2</td><td>0.49</td><td>2.25</td></tr><tr><td>Total</td><td>459.2</td><td>0.49</td><td>2.25</td></tr></table></td></tr>
<tr><td>Site visits</td><td>• 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.</td><td>• Dr Dawei Xu did not carry out a site inspection.
• Border restrictions between states due to the COVID-19 pandemic prevented a site inspection being practicable.</td></tr>
<tr><td>Study status</td><td>• 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</td><td>• This Ore Reserve was completed to a Pre-Feasibility Study level of confidence
• A preliminary open pit mine design has been completed for the Life of Mine (LOM) and a starter pit.
• Modifying factors have been considered through a diluted Mineral Resource model.
• Any material classified as an Inferred Mineral Resource was not included in any of the Ore Reserves calculations.
• The mine plan is technically achievable and economically viable as determined by the economic</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
	material Modifying Factors have been considered.	analysis.
Cut-off parameters	• *The basis of the cut-off grade(s) or quality parameters applied.*	• The Indicated orebody with a V_2O_5 cut-off grade (COG) of 0.3% was used to guide the preliminary pit designs
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 optimisation or by preliminary or detailed design).* • *The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.* • *The assumptions made regarding geotechnical parameters (e.g. pit slopes, stope sizes, etc), grade control and pre-production drilling.* • *The major assumptions made and Mineral Resource model used for pit and stope optimisation (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 utilised in mining studies and the sensitivity of the outcome to their inclusion.* • *The infrastructure requirements of the selected mining methods.*	• Open pit mine designs have been completed, including a Life of Mine (LOM) pit and starter pit designs. • The build-up of the mining costs is based on an initial pre-strip of the ore allowing the free dig mining of the ore body using a bucket excavator similar to PC3600 feeding a mobile in-pit sizer/lump breaker which loads CAT 789 haul packs using CAT992 FELs or similar. The pre-strip material will be cleared using EX1900 or similar excavators direct loaded into CAT 789 Haul packs hauled to an initial course waste dump. Once the pit has been established and the set out of the work allows coarse waste will be backfilled. The mined ore will be hauled to a ROM stockpile and loaded into the FEL loaded feed hopper of the screening plant. The mining fleet included standard ancillary machinery - grader, dozer and water cart. • Ore Reserve project costs and parameters were developed by RVT based upon contractor quoted pricing or known RVT cost areas. • Technical work and data consolidation was performed by Dr Dawei Xu, an independent consultant. • Geotechnical parameters were based upon a batter angle of 37° and the batter height varied from 1m to 15m. • Considering the parent cell height in the block model of 2019diluted_0pt3envelope.mdl is 1m, the design bench height is at 1m to minimise the in-pit ore reserve losses, and considered the minimum mining width in the vertical, but no minimum mining widths are required horizontally due to the very large, sub-horizontal orebody. • The mining dilution and mining recovery factors were generated within a diluted resource model for Ore Reserve estimation. Two constraining envelopes (wireframes) were created for two block models (Mineral Resource and Ore Reserve). The wireframe for the Mineral Resource block model did not take any dilution into account. The Ore Reserve wireframe did, however, incorporate waste (<0.3% V_2O_5), especially in the hangingwall, and was interpolated accordingly. • Royalties of 2.7% of revenue was applied to the metal product produced. • The Ore Reserve estimation is inclusive of Indicated Mineral Resource classified material only (using JORC 2012). There is no Measured Mineral Resource to include, with Inferred Mineral Resource excluded from the Ore Reserve estimation.

Criteria	JORC Code explanation	Commentary
		• Mining infrastructure has been assumed to be provided by contract with the capital input based on a pre-strip tonnage and an establishment fee, which includes costs for workshops and offices in the mining area.

Metallurgical factors or assumptions	• *The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.*
	• *Whether the metallurgical process is well-tested technology or novel in nature.*
	• *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.*
	• *Any assumptions or allowances made for deleterious elements.*
	• *The existence of any bulk sample or pilot scale test work 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?*
		• Significant volumes of testwork have been conducted on the Richmond - Julia Creek Project by various permit holders over many years. Early work focused on the search for oil and process test work of the unoxidised kerogen-rich oil shale. RVT's focus is on the metal content only. Initial testwork completed by RVT in 2018 focused on ore preconcentration of the run of mine ore by physical means, followed by both hydrometallurgical and pyrometallurgical testwork on the concentrate to produce a final 98% V_2O_5 flake for use in both the steel and energy storage markets.
		• Testwork included:
		  ○ Beneficiation by screening
		  ○ Beneficiation by flotation
		  ○ Acid leaching and solvent extraction
		  ○ SO2 pre-leaching
		  ○ High temperature chlorination
		• Detailed metallurgical test work as part of the PFS was undertaken from samples collected from 2019 drilling representative of the ore domains within the project were examined by the Hunan Nonferrous Metal Research Institute (HRINM) to conduct a full process of vanadium beneficiation tests, including concentration and smelting tests on the Project's raw ore
		• A two-step process has been determined to concentrate the V_2O_5 to a commercial grade product.
		  ○ In the first stage, the pentoxide will be upgraded from a mined grade of 0.49% V_2O_5 to a shipping grade of approximately 1.82% V_2O_5 concentrate. Ore is loaded into a hopper and an abon sizer to break up any clods of material. From the hoppers, the ore will drop through vibrating screens and water added to make a slurry for ease of screening of 90% passing 150 microns. The ore is sent to floatation tanks, where froth from the final tank is sent to the tailings thickener and slurry concentrate to the concentrate thickener, with underflow generating 55% solids. The thickened concentrate will then be filtered via vacuum filers and to produce a filter cake ready for storage on a radial stacker prior to train loading
		  ○ The second stage of beneficiation to produce V_2O_5 flake is proposed to be carried out in China. The beneficiation process involves roasting, grinding, acid leaching / ripening, solids / liquid separation, desilication, ammonium vanadate (AMV) precipitation, and de-

Criteria	JORC Code explanation	Commentary
		ammoniation to produce high grade vanadium pentoxide flake suitable for commercial sale. The direct yield of V_2O_5 smelting is 88.9%, and the total recovery rate is 86.1%. • This is considered a well-tested existing technology. • There are no deleterious elements in the ore or concentrate produced.
Environmental	• *The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation 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 deposit is located on a granted Exploration Permits for Minerals (EPMs) 26425, 26426, 25163, 25164 and 25258 located across Mitchell Grass pasture lands for cattle grazing. • A Preliminary Environmental Assessment (PEA) Report has been compiled in conjunction with these works to a detailed level. These works include but are not limited to investigations in relation to environmental issues such as flora, fauna, heritage, surface and ground water, soils and database reviews. • A non-toxic slurry of waste sediment will be stored on a permanent basis in a Tailings Storage Facility. • Waste Rock Landforms are not required with waste material being backfilled in the advancing pit and be rehabilitated as per the license requirements. All waste material is oxide and therefore the waste rock being classified as non-acid forming. • A more detailed environmental study shall follow the PEA and shall provide the necessary environmental assessments required for approvals.
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.*	• The Project is located approximately 50kms north-west of Richmond in northwest Queensland. Access to the area is provided by the east-west Flinders Highway, with Shire roads and pastoral station tracks north of the highway providing access to tenement areas. • The JV owns approximately 31.5 hectares (ha) of vacant land (Lot 3 on Plan RT78) on the Flinders Highway, west of Richmond, and could be utilised to support the infrastructure needs of the Project such as the accommodation camp. • The proposed development shall utilise a BOO (Build Own Operate) Liquified Natural Gas (LPG) power plant, however existing grid infrastructure can be accessed via 30km of transmission lines. • Allowances for water for mining, the concentrator plant and the camp have had preliminary investigations; feasibly supplied from bore water located on the JV's tenure. • Transportation of concentrate shall be undertaken via rail on the Mt Isa line in Rotobox containers to the Port of Townsville and then transported to China for refining, with capital allowances for earthworks for a rail siding and access fees to the rail network included in the opex. • Half of the site labour is planned to be sourced from, and commute between, the local Shires of Richmond and McKinlay, with a 100 person camp constructed to supplement the small local population.

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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 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.*	• Capital costs have been included in the economic analysis conducted by Faultzone derived from preliminary take-offs, budget prices from a single source and factoring of previous projects as part of the Feasibility Study • Open pit mining operations conducted by contractors and based on quotations, incorporating equipment and manning schedules • Ore processed on site to produce a V_2O_5 concentrate of 1.82% V_2O_5, railed to port and shipped to China for refining V_2O_5 flake • Processing costs for concentrate are via obtaining the prices for a series of commodities and applying the usage rate based on measured values or experience from other projects to produce the concentrate • Processing operating costs for refining to produce the flake are based on the Hunan Nonferrous Metal Research Institute Metallurgical test for the extraction of Vanadium Pentoxide. • Additional costs include rail haulage under contract operator, Build-Own-Operate (BOO) Power, and costs for Port Loading facility, with rail and port access fees included in the analysis • Mining operating costs were provided by a reputable mining contractor with existing operations in the area. • Processing operating costs are based on a contracted rate via a toll treatment agreement at nearby processing facility in the region. • Elemental analysis and metallurgical characterisation test work carried out as part of this study did not show any deleterious elements that would affect process costs • A Vanadium Pentoxide flake US$ price of $12.00/lb • Exchange rates of $US0.73 and RMB4.55 to the Australian Dollar • Royalties of 2.7% were subtracted from the V_2O_5 price to generate net revenue, with no private royalties payable.
Revenue factors	• *The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* • *The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.*	• The head grade is derived from the Ore Reserve as described above. • A Vanadium Pentoxide flake US$ price of $12.00/lb has been assumed (current spot is US$12.40/lb) • Exchange rates of $US0.73 to the Australian Dollar • Transportation and treatment charges as above.
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*	• China is currently both the biggest vanadium producer and consumer. It is expected that the demand for more vanadium product as a result of the implementation of new rebar standards (increasing the percentage of vanadium in steel), the cut-off of vanadium slag imports, and the strict environmental requirements introduced in China, will cause the vanadium price to rise in

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	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.*	coming years. • Effects of the coronavirus (Covid-19) on the demand for vanadium are unknown, however numerous countries including China have flagged an increase in infrastructure projects which would trigger an increased demand for steel. • The development of Vanadium Redox Flow Batteries (VRFB) technology appears to be a longer-term possibility to offer a new major source of demand • The current Vanadium price is at a low point in the cycle and can be seen as the adjustment period after the high prices (+USD33/lb) in 2018. Historically the price of Vanadium has fluctuated with peaks and troughs occurring regularly. Project OPEX shows that RVT can keep operating marginally during down periods and achieve excellent returns when the Vanadium price increases • Payment will be made based on the value of the 98% V_2O_5 flake produced at the refinery in China either at spot price as quoted by the Refiner on the business day preceding the delivery, or under offtake agreements (yet to be negotiated). • Production rate is 12,701 tonnes of the 98% V_2O_5 flake per annum and the price forecast is US12.00/lb V_2O_5 flake, compared to current spot price of US$12.40/lb.
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.*	• Economic analysis was undertaken based solely on the Ore Reserve pit designs. Only JORC classified Measured and Indicated Material was included in the analysis; all Inferred material was treated as waste. • Inputs to the economic analysis include the Ore Reserve wireframes and block model used in the preliminary pit design, and capital and operating estimates as described above. • A discount rate of 10% has been applied to the economic analysis. • A pre-tax NPV of A$1,092M (US$797.6M) at US$12.00 per pound was calculated from the economic analysis of the Lilyvale deposit 20 Year LOM. • Sensitivity studies were carried out with the commodity price and exchange rates the most sensitive input parameters.
Social	• *The status of agreements with key stakeholders and matters leading to social licence to operate.*	• There are no known significant social licencing requirements for the project. • Pastoral access agreements shall need to be negotiated to access the land for the development and access to ground water, with negotiations underway. • RVT regularly engages with the local community to maintain a healthy relationship.
Other	• *To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:*	• There are no known significant naturally occurring risks to the project. • All current deposits are located on granted Exploration Permits for Minerals (EPMs). • Barring standard economic and/or labour force fluctuations or other unforeseen acts there are

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	• *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 discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	no known significant impacts that could affect the Ore Reserves specific to the area. • RVT will be responsible for all of the construction, mining operations, production of concentrate, rail haulage, and loading of ships, whilst the refinery processing party will be responsible for shipping and refining of the concentrate. • All current deposits are located on granted Exploration Permits for Minerals (EPMs) requiring conversion to Mining Leases with the development subject to the Queensland State Development and Public Works Organisation Act 1971 (SDPWO Act) approval process. There are no currently identified grounds upon which it is likely that approvals will be withheld, noting that the PEA shall need further development to provide documentation for approval applications.
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).*	• Indicated Mineral Resources have been converted to Probable Ore Reserves. • The estimated Lilyvale deposit Ore Reserves are, in the opinion of the Competent Person, appropriate for this style of deposit.
Audits or reviews	• *The results of any audits or reviews of Ore Reserve estimates.*	• No external audits or reviews have taken place for the portion of Ore Reserve covering the Lilyvale deposit. RVT has completed an internal review of this Ore Reserve estimate.
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*	• The level of study carried out as part of this Lilyvale deposit Ore Reserve is to a Pre-Feasibility Study level (+/-20%). The relative accuracy of the estimate is reflected in the reporting of the Ore Reserves as per the guidelines re: modifying factor wireframes, study levels and Competent Persons contained in the JORC 2012 Code. • This statement relates to global estimates of tonnes and grade. • Sensitivity studies were carried out. Standard linear deviations were observed. The project is most susceptible to fluctuations in vanadium price and exchange rates. • No relevant modern production data as yet exists.

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	and the procedures used. • *Accuracy and confidence discussions should extend to specific discussions of any applied Modifying 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.*	