New World Materials Investor Day

Makuutu – a Long Life, Low-Cost & High-Value, Critical Heavy Rare Earths Project

9 December 2020
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Competent Person Statements

Information in this report that relates to previously reported Exploration Targets and Exploration Results has been cross-referenced in this report to the date that it was originally reported to ASX. Ionic Rare Earths Limited confirms that it is not aware of any new information or data that materially affects information included in the relevant market announcements.

The information in this report that relates to Mineral Resources for the Makuutu Rare Earths deposit was first released to the ASX on 23 June 2020 and is available to view on www.asx.com.au. Ionic Rare Earths Limited confirms that it is not aware of any new information or data that materially affects information included in the relevant market announcement, and that all material assumptions and technical parameters underpinning the estimates in the announcement continue to apply and have not materially changed.
Ionic Rare Earths Limited Corporate Snapshot

**CAPITAL STRUCTURE (as @ 4/12/2020)**

- **Shares Outstanding**: 2,752,028,086
- **Total Options Outstanding**: 463,400,000 (exercisable at 0.75 to 2.15 cents)
- **Performance Rights**: 33,400,000
- **Share Price**: A$0.014
- **Market Capitalisation**: A$52.3 million
- **52 week share price range**: A$0.004 – A$0.019
- **Cash Balance (30/09/2020)**: A$3.03 million

**IXR MAJOR SHAREHOLDERS**

- **Major Shareholders**: 17.0%
- **Executives, Directors & Key Advisors**: 8.7%

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**Key Events**

- **Maiden drill program underway at Makuutu Project**
- **Makuutu Maiden MRE announced**
- **Makuutu Scoping Study Commences**
- **Phase 2 Drilling commenced at Makuutu Project**
- **Makuutu Updated MRE announced**
- **IonicRE ownership increases to 31%**
- **IonicRE ownership increases to 51%**
- **IonicRE ownership increases to 46%**

**SHARE PRICE (ASX: IXR) (Last 12 months)**

- **Covid-19**
- **IonicRE ownership increases to 31%**
- **Phase 2 Drilling commenced at Makuutu Project**
- **Makuutu Updated MRE announced**
- **IonicRE ownership increases to 51%**
- **IonicRE ownership increases to 46%**
A Long Life, Low-Cost & High-Value, Critical Heavy Rare Earths Development Opportunity

IonicRE developing the Makuutu Rare Earths Project

- Strategically / geopolitically significant Critical and Heavy Rare Earth Elements ("REE") project located in Uganda, at advanced exploration and development study stage
- Confirmed Ionic Adsorption Clay (IAC) REE mineralisation;
  - Akin to southern Chinese IAC mines, with IAC-hosted deposits currently the lowest-cost sources of critical and heavy rare earths in the world
  - Majority (>95%) of global supply of Heavy Rare Earths originating from IACs
- Phase 2 drill program has been completed indicating potential for a material Mineral Resource Estimate (MRE) update expected within Q1 2021
- Interim Scoping Study completed in November 2020 and submitted to DGSM for renewal of Retention Licence 1693 → Scoping Study being updated to reflect larger Project scale
  - Exploring analogous low CAPEX, low OPEX modular processing options enabling short construction lead time and ramp up to commercial production → scalable modules to increase production capacity quickly funded by free cash flow
  - Scandium co-product potential at Makuutu is very accretive for negligible additional processing
- Easy highway and road access to site, nearby power infrastructure with readily available hydropower, rail, cell phone communications and water availability
- Strong project support within Uganda from community and government to develop the Project
- IonicRE presently at 51% ownership via earn-in, then up to 60% on completion of Bankable Feasibility Study (BFS)
Pending Mineral Resource Estimate Update

Material MRE update expected in Q1 2021 to support substantial increase in Project scale

- Current MRE of 76.8 Mt @ 840 ppm Total Rare Earths Oxide (TREO)\(^1\), at a cut-off grade of 300 ppm TREO-Ce\(_2\)O\(_3\); while maintaining the Exploration Target at:

  270 - 530 million tonnes grading 0.04 – 0.1% (400 – 1,000 ppm) TREO\(^2\)

This Exploration Target is conceptual in nature but is based on reasonable grounds and assumptions. There has been insufficient exploration to estimate a Mineral Resource and it is uncertain if further exploration will result in the estimation of a Mineral Resource.

- Recently completed Phase 2 drill program included additional 3,745 metres (222 holes), testing an area 3 times larger than the current MRE area
- Shallow, near surface mineralisation, with clay layer averaging 11.9m thick under cover approximately 3m deep. Average hole depth
- Results from resource extension drilling have returned confirmation of REE clay mineralisation in line with Exploration Target, confirming 26 km mineralisation corridor
- Drill assay results continue to be reported until the end of 2020 (4 of 7 tranches reported to date)
- Material Mineral Resource Estimate update expected in Q1 2021
- Conversion of majority of existing MRE from Inferred to Indicated

\(^1\) ASX announcement 23\(^\text{rd}\) June 2020; \(^2\) ASX announcement 4 September 2019;

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<table>
<thead>
<tr>
<th>Category</th>
<th>Estimation Domain</th>
<th>Tonnes (Mt)</th>
<th>TREO (ppm)</th>
<th>TREQ no Ce(_2)O(_3) (ppm)</th>
<th>LREQ (ppm)</th>
<th>HREQ (ppm)</th>
<th>CREO (ppm)</th>
<th>Sc2O3 (ppm)</th>
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<tr>
<td>Indicated</td>
<td>Clay</td>
<td>9.5</td>
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<td>200</td>
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<td>Inferred</td>
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<td>860</td>
<td>620</td>
<td>640</td>
<td>210</td>
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<tr>
<td>Total Resource</td>
<td>Clay</td>
<td>78.6</td>
<td>840</td>
<td>610</td>
<td>630</td>
<td>210</td>
<td>310</td>
<td>30</td>
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</tbody>
</table>
Makuutu Eastern Zone – Extending the trend further east …..

MEZ showing elevated HREE content following basin margin east plus new ground applied for

- Radiometric anomaly and basin margin confirmed as limits of REE ionic clay mineralisation → very strong proxy for REE ionic clay at Makuutu
- REEs confirmed on boundary of EL 1766 extending east, with Recent results showing more kaolin (a positive indicator for REE extraction) clay development visually in the drill core and supported by geochemical evaluation;
- A consistent zone of HREO as a percentage of TREO, that is greater than the existing MRE average of 25%. Intercepts in the MEZ range from 21% to 45% HREO in TREO;

Applications for new Exploration Licenses submitted to DGSM in Uganda in Oct 2020
- TN03424 is highly prospective with potential to increase Exploration Target by up to 50%, following radiometric anomaly and basin margin and extending mineralisation corridor from 26km to 37km
- TN03425 provides scope for plant site location options, additional modules and source aggregate for the plant construction

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- TN03425 provides scope for plant site location options, additional modules and source aggregate for the plant construction
Metallurgy and Processing

Simple Heap Leach process selected using dynamic heaps

- Sequential / Counter-Current REE extraction via salt desorption using Ammonium Sulfate ((NH₄)₂SO₄) & Sulfuric Acid (H₂SO₄)
  - Heap leaching using H₂SO₄ analogous with Cu heap leaching with 5-10 g/L H₂SO₄
  - H₂SO₄ provides step change in REE extractions specifically heavy and critical REEs plus Scandium
- Residues washed with reclaimed process water to recover residual REE & reagents prior to backfill to mined areas
- Solution concentrated using membrane process technologies – permeate used for heap washing & concentrate (salts/acid) recirculated back to the process
- Heavy rare earth elements (HREE¹) generally achieve higher recovery compared to the Light rare earth elements (LREE²), with average HREE recovery typically being double the average LREE recovery → HREE increased content in product basket leading to higher value product;
- Mixed rare earth carbonate product with 70% payability → HREO+CREO dominant (~70-75% of product)

REE Extractions, salt only

REE Extractions, salt + H₂SO₄

Metallurgical extraction testwork using a clay composite from across existing MRE area evaluating alternative salts; Extractions calculated from products;

¹ HREE = Sm + Eu + Gd + Tb + Dy + Ho + Er + Tm + Yb + Lu + Y; ² LREE = La + Ce + Pr + Nd;
Advantage of Ionic Adsorption Clays (IAC)

Significant project and cost advantages with IAC projects like Makuutu vs hard rock REE projects

Comparison above of two baskets:

- Bastnaesite at Mountain Pass (USA) on left with nearly 80% made up of low value La/Ce product, basket value US$17/kg and only 35/40% payable without significant capital expenditure to process / crack REE minerals, i.e. value received ~ US$6-7/kg REO; and

- Ionic Adsorption Clay (IAC) from southern China, which is a far more valuable product where La/Ce only makes up approx. 23% of the basket, basket value US$39/kg and payability exceeds 70% with no additional capex required, and no radioactivity issues with tailings, i.e. value received ~ US$27-31/kg REO

Figure 6. Proportions of individual REE in two representative ores: bastnaesite, dominated by La, Ce, and Nd, with Eu through Lu plus Y totaling only 0.4%, and lateritic ion-adsorption ore, Y-dominated. Dark blue and light blue sectors represent lanthanides of even and odd atomic number, respectively (see Figs. 2, 3). Yttrium is indicated by green.

1 Rare Earth Elements—Critical Resources for High Technology _ USGS Fact Sheet 087-02_files;
**China’s REE Dominance – IACs provides HREE Balance**

Handful of LREE mineral mines with numerous small scale HREE Ionic Adsorption Clay operations

- China derives the bulk of the total REE production for a handful of mineral LREE mines that produce LREE mineral concentrates;
- 3 mines producing LREE mineral concentrates producing bulk of REE supply (86%);
  - Bayan Obo world’s largest REO producer (~74 ktpa REO) via by-product REO from magnetite tailings with REE mineral Bastnaesite
  - Reluctance in China to award quota to monazite only producers (enhanced radionuclide issues with tailings)
- Numerous smaller scale IAC mines, common across southern China, typically smaller production tonnages, high value products
  - Ionic clays produce >95% of the worlds HREE production
  - Low cost and simple to operate

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### 2015 China’s Rare Earth Production Quota By Type & By Province

<table>
<thead>
<tr>
<th>Province (Autonomous Region)</th>
<th>2020 Mining Quota Rare Earth Oxides (REO, t)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rock Type (LREE)</td>
</tr>
<tr>
<td>Inner Mongolia (Bayan Obo)</td>
<td>73,550</td>
</tr>
<tr>
<td>Fujian</td>
<td>-</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>-</td>
</tr>
<tr>
<td>Shandong</td>
<td>4,300</td>
</tr>
<tr>
<td>Hunan</td>
<td>-</td>
</tr>
<tr>
<td>Guangdong</td>
<td>-</td>
</tr>
<tr>
<td>Guangxi</td>
<td>-</td>
</tr>
<tr>
<td>Sichuan</td>
<td>43,000</td>
</tr>
<tr>
<td>Yunnan</td>
<td>-</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>120,850 (86%)</strong></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>140,000</strong></td>
</tr>
</tbody>
</table>

Source: 2016, RARE EARTHS: SHADES OF GREY - Can China Continue To Fuel Our Global Clean & Smart Future;
China's REE Dominance – Depletion of IACs

Excessive and illegal mining of IACs depleted reserves and drove implementation of quotas → Not easily replaced

- China implemented controls in 2006 – China began to exercise total amount control over REE exploitation & put a limit on the total volume of rare-earths mined every year.

- In 2012, China white paper outlined massive depletion of IACs;

  Reserves of ion-adsorption rare earth mines in China’s southern provinces has declined from 50 years of supply two decades ago to 15 years at present. Most of the southern ion-adsorption rare earth deposits mines are located in remote mountainous areas. There are so many mines scattering over a large area that, it is difficult and costly to monitor their operation. As a result, illegal mining has severely depleted local resources, and mines rich in reserves and easy to exploit and are favored over the others…

- China’s IAC reserves are running out which will create a major shortfall in low cost HREEs – China

- Makuutu one of only a handful of IACs outside of southern China not under Chinese control to fill void


Excess IAC mining leading to quotas
Makuutu Basket – Strategic Alternative for CREO/HREO

- Product generated from metallurgical optimisation testwork\(^1\) infers basket price of approx. US$38.70/kg REO\(^2\) at
- Ionic Adsorption Clay (IAC) products achieve payability of 70-80% → received value circa US$27.00 to US$31.00/kg REO payable
- Rare Earth product is dominant in heavy and critical rare earth oxide (CREO) leading to high basket price product;
  - CREO (Nd + Eu + Tb + Dy + Y) > 50% of product mass, or > 55% when including Pr
  - MHREO (Sm + Eu + Gd + Tb + Dy + Ho + Er + Tm + Yb + Lu + Y) > 45-50%
- Strategically important supply alternative for CREO/HREO – provides balance to overall REO supply chain;
  - IAC product complements deficiencies of HREO spread in hard rock REE dominant mineral concentrates
  - Hard rock REE mineral concentrates have only 5-10% HREO → expecting LREE hard rock mines to supply HREE will lead to oversupply of LREE including NdPr
- Basket quality generated from IACs is superior to bastnaesite / monazite mineral concentrate products,
  - Bastnaesite / Monazite mineral concentrate basket circa US$13 to US$20 / kg REO value\(^2\)
  - Bastnaesite / Monazite mineral concentrates only receive 35-40% payability, i.e. US$4.50- US$8.00/kg REO value
- Scandium product potential at Makuutu is very accretive for negligible additional processing to include in bulk mixed rare earth carbonate product
  - Opportunity to separate Scandium as a standalone product to be explored in next stage of the Project

\(^1\) ASX announcement 26\(^{st}\) May 2020; \(^2\) REO Pricing Spot Nov 2020 - [https://institutseltene-erden.de/unser-service-2/metall-preise/seltene-erden-preise/](https://institutseltene-erden.de/unser-service-2/metall-preise/seltene-erden-preise/); \(^3\) Rounding has been applied; \(^4\) Rare Earth Elements—Critical Resources for High Technology _ USGS Fact Sheet 087-02_files;
Tier-One Infrastructure already there!

Logistics
- Approximately 10 km from Highway 109, connecting Makuutu to both capital city Kampala and Port of Mombasa, Kenya
- Approximately 20 km from rail line connecting to Port of Mombasa

Power
- Large hydroelectric generation capacity within 80 km of Makuutu project area will deliver very low-cost power
- Existing electrical grid infrastructure near to site

Water
- Plentiful fresh water within and near project area

Workforce
- No camp required – low-cost professional local workforce available

Images: From left, Isimba hydroelectric dam with 183 MW installed capacity at Jinja, rail line connect to Kampala and Port of Mombasa, all weather access roads connecting site to highway, sealed highway running directly adjacent site, and 132 kV power lines running through site.
<table>
<thead>
<tr>
<th>Project Description</th>
<th>Commence By</th>
<th>Complete By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receipt of Renewal of RL 1693, new EL applications awarded</td>
<td>In progress</td>
<td>Q4 2020</td>
</tr>
<tr>
<td>Mineral Resource Update</td>
<td>After final assays</td>
<td>Q1 2021</td>
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<tr>
<td>Updated Scoping Study</td>
<td>In progress</td>
<td>Q1 2021</td>
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<tr>
<td>Environmental and Social Impact Assessment (ESIA) – Commence Study</td>
<td>Q2 2021</td>
<td>Q3 2022</td>
</tr>
<tr>
<td>Phase 2 Metallurgical Variability Test Program</td>
<td>Q2 2021</td>
<td>Q3 2021</td>
</tr>
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<td>Exploration Drill Program</td>
<td>Q2 2021</td>
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<td>Bankable Feasibility Study</td>
<td>Q2 2021</td>
<td>Q4 2022</td>
</tr>
<tr>
<td>Demonstration Plant / Field Trials</td>
<td>Q3 2021</td>
<td>Q3 2022</td>
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<tr>
<td>Ore Reserve Estimate</td>
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<td>Q4 2022</td>
</tr>
<tr>
<td>Submit Mining Licence Application</td>
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<td>Q4 2022</td>
</tr>
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</table>
IonicRE Value Proposition

Makuutu – a Long Life Asset to Supply Low-Cost, High-Value Critical & Heavy Rare Earths

- A unique opportunity – vastly different to the numerous REE hard rock projects looking for financing
- Exploration Program has defined Mineral Resource Estimate with scope for a material near term update
  - Recently completed Phase 2 drill program confirming mineralisation extends at least 26 km long with material update expected Q1 2021
  - Enhanced HREO content at EL 1766
  - Exploration Targeting using radiometrics identified large radiometric anomaly immediately adjoining existing EL 1766 and new application lodged (TN03424) with expected award before the end of 2020
- Metallurgical results indicate simple low-CAPEX and low-OPEX mining and processing operation potential allowing modular expansion to ramp up REO production
  - Low capex requirement to a mixed rare earth carbonate product – no cracking plant required – very simple
  - Indicative product quality suggests a CREO/HREO dominant product with a high value basket content, circa US$39/kg REO (at today's prices) which will achieve a high payability and no radioactive content → this is a highly desirable product
  - Incremental ramp up of REO production (1,000 tpa REO to 4,000 tpa REO equivalent capacity) with addition of modules potentially funded by free cash flow
  - Scandium co-product potential (20 tpa Sc₂O₃ expandable up to 80+ tpa Sc₂O₃)
- Strategically and geopolitically significant Critical / Heavy Rare Earths supply in stable jurisdiction
  - Diversified supply of CREO/HREO to offset depletion of IACs in southern China → China has moved to prioritise / secure their own supply of HREOs
  - Potential for a long life CREO/HREO asset (25 – 30 years+)
- Strong Third-party strategic interest in Makuutu as an IAC hosted REE deposits given demonstrated simple low-cost nature
- Active development pathway leading to regular news flow over the next 6 months into Q2 2021
- Experienced, motivated and proven team in place to advance Makuutu through development to operations stage