Bangka-Belitung
Mine Land Reclamation Project

Alternative Livelihoods For a Profitable, Healthy Future
Lying off the southeastern coast of Sumatra, the Bangka-Belitung Province is composed of multiple islands, including its two largest, Bangka and Belitung.
Background

• Bangka produces approximately 1/3 of the world’s tin

• This results in an estimated 100,000 hectares (ha) of degraded, polluted land, which is the same size as Hong Kong

• A replicable, and scalable model for restoration has been developed.

• Provides alternative livelihood for Bangka residents.

• Improves ecological health of land.

• Provides profitable agricultural opportunities.
The Tin Working Group, a multi-stakeholder initiative, has invested over ¼ million dollars to establish this project.

Over 4 years of stakeholder consensus building, literature review, interview with reclamation experts and site visits have been completed.

Detailed reclamation plan and best management practices have been established by expert technical team.

Opportunities and constraints identified for project for clear path forward.
Problem Statement

As a result of limited job opportunities, tin mining has a large impact on communities, their workers, and landscapes which are exposed to tremendous hardships in the drive to produce tin ore:

- **Land degradation**, including heavy metal contamination in water supply, soils, and altered landscapes that are devoid of vegetation and eroding into dangerous slopes and gullies;

- **Unsafe work conditions** with no safety measures or compensation post injuries;

- **Lack of opportunities** for alternative, economically viable livelihoods
Project Vision

This project strives to provide a profitable center for reclamation on ex-tin mine land that benefits local communities and can be scalable and replicated across Indonesia.
Before

After

Proposed Vision for 24 ha Site
Offering Opportunity

We are offering a novel opportunity for initial investments in a scalable, replicable model for restoration of ex-tin mine lands in Bangka. This opportunity allows the investor to:

- **Work** with the mining companies, local NGOs, and most importantly, the local communities, on shared community development and restoration;

- **Create productive assets from lands** that have been impacted by tin mining and are currently undeveloped and dormant;

- **Provide an opportunity for financial gain** for the community, the mining company, and the investor through land restoration that turns ex-mining lands into productive agriculture and forestry and provides a model for restoration;

- **Create alternative livelihoods** through agriculture that will develop community businesses and provide economic alternatives to artisanal mining.
The Plan

The reclamation design establishes a 13 step plan towards community development and agricultural production. Agricultural products have been chosen based upon their ability to develop profitable crops and re-forestation as well as increase biodiversity across an already fragmented landscape.
13 Step Plan

1) Community Engagement

2) Land Ownership and Cooperative Agreement Development

3) Site Analysis and Planning

4) Project Design

5) Quick-Wins; Develop Compost Factory, Nursery and Micro-Manufacturing Facilities

6) Site Clearing and Grading

7) Road and Irrigation Infrastructure
13 Step Plan cont.

8) Soil Preparation

9) Site Planning

10) Irrigation, Maintenance and Management

11) Market Production and Establishing Contracts

12) Harvesting & Processing Agriculture and Forest Products

13) Reclamation Site Review and Return of Reclamation Deposit
Agriculture and Forestry Products

**Pineapple** (Ananas comosus) and **Coconut Palm** (Cocos nucifera) will be inter-cropped with anticipated densities of pineapple at 45,000 per ha and coconut palm at 170 per ha.

**Dragon fruit** (Hylocereus undatus) will be grown on post trellis and tire systems, with overall anticipated plant densities of about 2,500 per ha.

**Black peppercorn** (*Piper nigrum*) will be grown on a post trellis system, with overall anticipated plant densities of roughly 1,100 per ha.

**Giant bamboo** (*Dendrocatamnus asper*) and **Citronella grass** (*Cymbopogon winterianus*) will be inter-cropped with anticipated densities of bamboo at 204 per ha and citronella grass at 15,000 per ha.
Market trends for agricultural products identified in the restoration plan and already under production in Indonesia show potential for growth both internationally and domestically.

Indonesia produces approximately 40% of the world market for citronella oil and the demand is growing.

Vetiver oil is used extensively in both flavor and fragrance industry.

The average annual growth for dragon fruit exportation is expanding rapidly in Asia.

Global pepper demand has exceeded supply with the 2016 deficit.

Coconut coir is used by many industries and demand has grown significantly since the 80’s and 90’s.

Pineapples are already the third-most produced fruit in Indonesia and international markets are expanding rapidly.
The primary team members include:

- The Mining Company/Concession Holders
- The Local Community
- Non-Governmental Organizations
- Representatives from Women’s Organizations

As well as experts in:

- Finance
- Community Development
- Landscape Restoration
The Cooperative is a collaboration of all stakeholders and will be modeled after successful agricultural and fisheries cooperatives across Indonesia. It will design the leadership structures and oversee day to day management and operation of the project.
Risk Factors

• Post-mining ownership/management of the land
• Encouraging mining companies to voluntarily pay for reclamation
• Few success stories
• Mining lands are severely degraded
• Initial support may be limited.
• Climate Change
• Crop Price Volatility
• Project overspends (CAPEX and/or OPEX)
• Construction over-runs delaying production
• Insufficient hydrological and/or nutrient content in topsoil
• Forced eviction by artisanal miners returning to the site
• Poor management
• High permitting and licensing period
Quick Wins

- **Compost Facility** – Costs $20,000
  - Across Bangka there is approximately 100,000 ha of unrestored land that would require 2 million tons of compost to begin the restoration process, which would cost greater than $90 million.

- **Plant Nursery** – Costs $15,000
  - If plantings occur across the 100,000 ha of unrestored mine lands, there is greater than $286 million worth of plants needed to cover this area.

- **Establishment of Micro-manufacturing Facilities**
  - Distillation House – Costs $15,000
  - Coconut Coir Baling Facility – Costs $10,000
Cost Assumptions

- **Agricultural Composition** - based on 2016 model for a 24 ha site
- **Project Design** – completed, resulting in no costs in this plan
- **Production numbers** - assumed less than optimal growing conditions, reduced yields
- **Distillation of essential oils** - will take place after harvest at the project location
- **Coconut coir** - baled on site
- **Point of Sale** - to wholesalers and customers will be at the project site

**Short Term Yields are anticipated from:**
- **Napier Grass** – First harvest in 3-4 months
- **Citronella** – First harvest in 6 months
- **Vetiver Grass** – First harvest in 9 months
- **Dragon Fruit** – First harvest in 1 year

**Long Term Yields are anticipated from:**
- **Pineapple** – First harvest in 18-20 months
- **Giant Bamboo** – Limited harvest in 2 years
- **Peppercorn** – First harvest in 3 years
- **Coconut Palm** – Limited harvest in 4 years

- **Cost of Land** - not included
- **Return of Restoration Deposit** - not included, could provide additional funds
# Financial Pro Forma

## Production Estimates (kg)

<table>
<thead>
<tr>
<th>YEAR</th>
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<td>5</td>
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<tr>
<td><strong>ESSENTIAL OIL</strong></td>
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<tr>
<td><em>CHRYSOPOGON ZIZANIOIDES/VETIVER GRASS</em></td>
<td>79</td>
<td>81</td>
<td>104</td>
<td>106</td>
<td>109</td>
<td>111</td>
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<tr>
<td><em>Cymbopogon winterianus/Citronella Grass</em></td>
<td>410</td>
<td>584</td>
<td>620</td>
<td>947</td>
<td>1120</td>
<td>1120</td>
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<tr>
<td><strong>AGRICULTURAL FOOD CROPS</strong></td>
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<tr>
<td><em>Hylocereus undatus / Dragon Fruit</em></td>
<td>720</td>
<td>1440</td>
<td>2880</td>
<td>8400</td>
<td>10800</td>
<td>11400</td>
<td>12000</td>
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<tr>
<td><em>Piper nigrum/Peppercorns</em></td>
<td>0</td>
<td>0</td>
<td>2772</td>
<td>3003</td>
<td>3234</td>
<td>5485</td>
<td>5675</td>
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<tr>
<td><em>Ananas comosus/Pineapple</em></td>
<td>0</td>
<td>138000</td>
<td>92000</td>
<td>115000</td>
<td>149500</td>
<td>161000</td>
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<tr>
<td><strong>AGRICULTURAL FIBER CROPS</strong></td>
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<tr>
<td><em>Cocos nucifer/Coconut Palm</em></td>
<td>0</td>
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<td>2258</td>
<td>2446</td>
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<td><em>Dendrocalamus asper/Giant Bamboo</em></td>
<td>0</td>
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<td>15513</td>
<td>31026</td>
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<td><em>Pennisetum purpureum/Napier Grass</em></td>
<td>8000</td>
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</table>

Startup costs, price per kilogram, anticipated yield, and gross sales are based upon information received from local Indonesian NGO’s and their conversations with banks and community farmers on potentials for each of the products in July 2017. There is no guarantee that degraded mine land can produce these numbers, even with the addition of compost and restorative methods.
# Financial Pro Forma

## Project Costs

<table>
<thead>
<tr>
<th>CAPEX (Capital Cost)</th>
<th>$213,922</th>
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</thead>
<tbody>
<tr>
<td><strong>Grading and Improvement</strong></td>
<td>$109,099</td>
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<tr>
<td>Mobilization and Demobilization</td>
<td>$264</td>
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<td>Earthwork</td>
<td>$35,142</td>
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<td>Drainage and Irrigation</td>
<td>$28,692</td>
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<td>Distillation Houses</td>
<td>$30,000</td>
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<tr>
<td>Coconut Coir Baling Facility</td>
<td>$15,000</td>
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<tr>
<td><strong>Planting Construction</strong></td>
<td>$94,636</td>
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<tr>
<td>Analysis of Soil Quality</td>
<td>$3,367</td>
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<td>Plant Purchase</td>
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<tr>
<td>Plant Materials and Labor</td>
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<td><strong>Contingency</strong></td>
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## Operating Expenses

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<th>Site Maintenance</th>
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<tr>
<td>Annual Site Maintenance (Increases Annually at 1%)</td>
<td>$19,874.00</td>
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## Financial Pro Forma

### Base Case Valuations

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>NPV (NET PRESENT VALUE)</strong></td>
<td>$93,849</td>
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<tr>
<td><strong>IRR (INTERNAL RATE OF RETURN)</strong></td>
<td>17%</td>
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<tr>
<td><strong>RETURN</strong></td>
<td>$238,099</td>
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<tr>
<td><strong>ROI</strong></td>
<td>111%</td>
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<tr>
<td><strong>ANNUALISED ROI</strong></td>
<td>16%</td>
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<td><strong>DISCOUNTED PAYBACK</strong></td>
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<td><strong>NON-DISCOUNTED PAYBACK</strong></td>
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### Annualized Breakdown

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<tbody>
<tr>
<td><strong>REVENUE</strong></td>
<td>$-</td>
<td>$29,724</td>
<td>$44,796</td>
<td>$66,765</td>
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<td><strong>ESSENTIAL OIL</strong></td>
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<td><strong>FOOD CROPS</strong></td>
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<td>$20,073</td>
<td>$20,273</td>
<td>$20,476</td>
<td>$20,681</td>
<td>$20,888</td>
<td>$21,097</td>
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<td><strong>CAPEX</strong></td>
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<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
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<tr>
<td><strong>OPEX</strong></td>
<td>$-</td>
<td>$19,874</td>
<td>$20,073</td>
<td>$20,273</td>
<td>$20,476</td>
<td>$20,681</td>
<td>$20,888</td>
<td>$21,097</td>
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<tr>
<td><strong>DISCOUNT FACTOR</strong></td>
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<td>0.93</td>
<td>0.86</td>
<td>0.79</td>
<td>0.74</td>
<td>0.68</td>
<td>0.63</td>
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<tr>
<td><strong>CUMULATIVE CASH FLOW</strong></td>
<td>$-213,922</td>
<td>$-204,072</td>
<td>$-179,349</td>
<td>$-132,857</td>
<td>$-60,840</td>
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<td>$-146,699</td>
<td>$-93,764</td>
<td>$-35,555</td>
<td>$30,330</td>
<td>$93,849</td>
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Financial Pro Forma

Conclusions

- NPV shows high sensitivity to changes in revenue, with oil and food products creating the greatest disturbance.
- Economic analysis of a Preliminary Economic Assessment indicates that a semi-agricultural remediation design has a mid-range prospect of being an economically viable project.
- The base-case pre-tax NPV is $72,849 at an 8% discount rate with a pre-tax IRR of 14% on an initial investment of $234,922.
- Payback will be in Year 5 of production over an assumed investment period of 7 years.

Disclaimer

Although we believe that the expectations reflected in these forward-looking statements are reasonable, these statements are not guarantees of future performance and are subject to certain risks, uncertainties, and other factors, some of which are beyond the Company’s control, are difficult to predict, and could cause actual results to differ materially from those expressed or forecasted. We assume no obligations to revise or update any forward-looking statements for any reason, except as required by law.
Thank you for your consideration!!