# Cracow TSF2 Stage 3B to 5 Lift

## Greenhouse Gas Assessment

### Aeris Resources (Lion Mining Pty Ltd)

Theodore Road
Cracow, QLD 4719

Prepared by:

**SLR Consulting Australia**

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## Revision Record

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| V1.0 | 17 October 2025 | M Pickett | G Starke/ K Wiles | Draft to client |
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# Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Aeris Resources (Lion Mining Pty Ltd) (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

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# Table of Contents

# Tables



# Figures

# 1.0 Introduction

Cracow Gold Mine and Processing Operations (CRO) is owned by Lion Mining Limited, a subsidiary of Aeris Resources Limited. CRO is proposing to facilitate Stages 3B, 4 and 5 lift of the existing Tailings Storage Facility 2 (TSF2) to provide additional storage to support ongoing operations and extend the life of mine (LOM).

CRO intends to submit an application to amend their Environmental Authority (EA) EPML00770913 to facilitate Stage 3B, Stage 4 and Stage 5 lift of the existing TSF2 ('the Project').

This GreenHouse Gas (GHG) emissions assessment has been prepared by SLR Consulting Australia Pty Ltd (SLR) with reference to the 2022 Stage 2 Air Quality Impact Assessment (AQIA) report (SLR, 2022), and the 2025 Stage 3A AQIA and GHG assessment report (SLR, 2025), conducted in accordance with the Guideline Application requirements for activities with impacts to air (DETSI, 2024) with reference to national regulation. This GHG emissions assessment has been undertaken for the Stage 3B–5 Lift to inform the EA EPML00770913 amendment application.

# 2.0 TSF2 Stage 3B to Stage 5 Lift

CRO is located in Central Queensland, northwest of the township Cracow in the Banana Shire. The gold mine lies approximately 40 km southeast of Theodore and approximately 500 km northwest of Brisbane. The TSF2 occurs to the northwest of CRO within ML80144 and ML80089.

The proposed conceptual design for Stage 3B to Stage 5 are detailed in the following points:

- Centre-line raising of the main embankments of each of the three lifts are proposed, per the original concept.
- Eastern embankment in the vicinity of the decant pond to be downstream lift and HDPE geomembrane lined.
- Embankments to be constructed using a combination of:
    - Local clay borrow pits
    - Existing excess soil stockpiles
    - Gabbro Hill hard rock and soft rock quarries
    - NAF mine waste rock from various existing stockpiles
- Additional requirements:
    - Establishing topsoil stockpiles
    - Constructing ramps and perimeter roads
    - Relocating power supply and electrical components
    - Installing instrumentation
    - Relocating fence lines
    - Implementing minor stormwater management and sediment control infrastructure

The TSF2 tailings production (tonnes per annum) for the Stages may be compared in **Table** 1.

**Table 1 TSF2 Storage Capacity by Stage**

| Description | Stage 2 | Stage 3A | Stage 3B | Stage 4 | Stage 5 |
|---|---|---|---|---|---|
| **Storage Capacity** | | | | | |
| Tailings production | 650,000 tpa | 620,000 tpa | 650,000 tpa | 650,000 tpa | 650,000 tpa |
| Life of lift | ~2 years | ~1 year | ~1 year | ~2 years | ~2 years |

Key activities associated with the Stage 3B–5 Lift considered for this GHG assessment are the proposed earthworks, and the consumption of diesel fuel during construction.

# 3.0 Regulatory Framework

## 3.1 Commonwealth Policy and Legislation

Australia ratified the Paris Agreement in 2016, aiming to reduce greenhouse gas emissions by 26-28% below 2005 levels by 2030. In 2022, Australia updated its target to a 43% reduction by 2030 and pledged to achieve net zero emissions by 2050. Other federal actions are briefly outlined below.

### 3.1.1 National Greenhouse and Energy Reporting Act (NGER Act)

The NGER Act introduces a single national framework for reporting and disseminating company information about GHG emissions, energy production, and energy consumption. Under the NGER Act, companies that meet threshold levels for GHG emissions, energy consumption or energy production are required to report their GHG emissions annually. The six GHGs that are reported under the NGER Act include the following compounds and groups of compounds:

- carbon dioxide ($CO_2$)
- methane ($CH_4$)
- nitrous oxide ($N_2O$)
- specified hydrofluorocarbons (HFCs)
- specified perfluorocarbons (PFCs)
- sulfur hexafluoride ($SF_6$).

The current GHG reporting thresholds for individual facilities are as follows:

- emission of more than 25,000 tonnes of carbon dioxide equivalent (t $CO_2$-e)
- production of 100 terajoules (TJ) or more of energy, or
- consumption of more than 100 TJ of energy per year.

CRO reports under the NGER Scheme for the entire operation, not just the 3B to 5 lift Project.

### 3.1.2 Guideline - Greenhouse Gas Emissions

In May 2024, the Queensland Department of Environment, Tourism, Science and Innovation (DETSI), released the *Guideline Greenhouse Gas Emissions* (DETSI, 2024) (hereafter 'the Guideline', which clarifies existing application requirements under the *Environmental Protection Act 1994* (EP Act) and provides information about how to meet these requirements in relation to GHG emissions.

The Guideline sets out the minimum expectations for GHG emissions information to be provided with applications for new environmental authorities (EAs) and applications to amend existing EAs. The requirements for development applications, and where they are addressed in this report, are summarised **Table 2**.

**Table 2 DETSI Guideline GHG Emissions – Development Application Requirements**

| Requirement | Where Addressed in this Report |
|---|---|
| Details of GHG emissions likely to be generated by the activities of the project over its life. | **Section 5.0** |
| An emissions inventory identifying the GHGs to be emitted and the stage of the project at which the emissions will occur, with a breakdown of GHG emissions by source, that:<br>• Estimates the projected annual scope 1 and scope 2 $CO_2$-e emissions over the life of the project, including both unabated emissions and emissions after all avoidance and abatement measures have been accounted for. | **Section 4.0** |
| A determination as to whether the application meets the threshold for medium to high GHG emission category emitting applications, where:<br>• Applications with expected GHG emissions (scope 1 and scope 2) of 25,000 tonnes $CO_2$-e or more per year (at any time during the life of the project) are considered **medium to high emitters**<br>• Applications with expected GHG emissions (scope 1 and scope 2) of less than 25,000 tonnes $CO_2$-e per year are considered **low emitters**. | **Section 6.0** |
| Details of the management practices proposed to be implemented to prevent or minimise adverse impacts in line with the GHG abatement hierarchy. | **Section 6.0** |
| A risk assessment that outlines the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values. | **Section 5.1** |
| Applications that exceed the threshold for medium to high emitters must also submit a GHG Abatement Plan. | Not required |

## 3.2 GHG Emission Estimation Guidelines

As required by the Guideline, a GHG emission inventory has been compiled for Stage 3b to 5 operations at CRO based on emission factors and reporting guidelines available in the documents and references described below.

### 3.2.1 National Greenhouse Accounts Factors

The National Greenhouse Accounts (NGA) Factors are published annually by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and provide methods to help companies and individuals estimate GHG emissions. The NGA Factors draw on the *National Greenhouse and Energy Reporting (Measurement) Determination* 2008. However, they are not published for the purposes of reporting under the NGER Act; instead they have a more general application to the estimation of a broader range of GHG emission inventories.

The default emission factors listed in the NGA Factors are estimated by DCCEEW using the Australian Greenhouse Emissions Information System and are determined simultaneously with the production of Australia's National Greenhouse Accounts. This promotes consistency

between inventories at company or facility level and the emission estimates presented in the National Greenhouse Accounts.

The 2024 NGA Factors (DCCEEW, 2024) have been referred to in this assessment.

# 4.0 GHG Inventory Methodology

## 4.1 Overview

The GHG inventory methodology was based on these main steps:

1 Definition of the Project boundary; i.e., the 'Project footprint'.

2 Setting out GHG emission sources within the Project footprint during construction.

3 Setting out activity data for each GHG emission source.

4 GHG emissions calculations for each source.

Key sources of GHG emissions were identified using current GHG emission factors published for use in reporting emissions, which use activity data as input. The activity data used in the calculations was compiled using current data in consultation with CRO.

## 4.2 Boundary Definition

This section defines the boundaries adopted for the GHG emission inventories compiled as part of this GHG assessment.

The assessment considered Scope 1 and Scope 2 emissions associated with the TSF2 Stage 3B to Stage 5 operations.

Also, GHG emissions will occur during decommissioning of the site at the end of its operational life. GHG emissions associated with project end-of-life were excluded from this assessment, and have no material effect on the outcome of this assessment and will be captured with the decommissioning emissions associated with the wider Mining Operations.

## 4.3 Identification of GHG Emission Sources

Scope 1 and Scope 2 GHG emission sources were identified through a review of the site operational information and in consultation with CRO, summarised in **Table 3**.

The GHG emissions results for CRO Stage 3B to Stage 5 were found to result in low emissions; i.e., less than 25,000 tonnes $CO_2$-e per year (see **Table 2**), as such Scope 3 emissions were not undertaken, which can be a complex exercise.

Also, the relatively small GHG emissions amounts associated with the following activities/sources were excluded from the emission inventory:

- Vegetation clearing – the proposed increase in throughput does not include any additional clearing of vegetation compared to current approved operations. Given this, and the level of uncertainty associated with estimating carbon loss from individual small project areas without detailed vegetation surveys, GHG emissions estimates associated with vegetation clearing were excluded from this assessment.
- Consumption of oils and greases for machinery operation and maintenance – the GHG emissions associated with the relatively small quantities of oils and greases were immaterial to the outcomes of the assessment, thus excluded.

**Table 3 GHG Emission Sources Included in the Inventory for the Project**

| Activity | Description | Scope |
|---|---|---|
| Diesel use excluding transport | • Emissions from diesel use by fixed plant such as power generators, and equipment other than that used for transport e.g. haulage of materials | • Scope 1 |
| Diesel use for transport | • Emissions from diesel use by haul trucks and light vehicles within the Project boundaries | • Scope 1 |
| Gasoline (petrol) use for transport | • Emissions from gasoline combustion in company-owned light vehicles | • Scope 1 |
| Electricity consumption | • Purchase of electricity (generated off-site) | • Scope 2 |

## 4.4 Calculation Methods and Emission Factors Used

### 4.4.1 Scope 1 Emissions

#### Fuel Combustion

Estimates of GHG emissions from the combustion of diesel and gasoline were calculated by multiplying the estimated quantities of each fuel estimated to be combusted each year for current and proposed operations by a fuel-specific energy content factor and fuel-specific $CO_2$-e Scope 1 emission factors. The emission factors used for the combustion of diesel fuel in the heavy construction equipment are those given by the Clean Energy Regulators Emissions and Energy Threshold (CEREET) Calculator Version 1.5 (CER, 2024).

### 4.4.2 Scope 2 Emissions

Scope 2 emissions, which relate to indirect GHG emissions from purchased electricity used in the running of the site office are those given by the CEREET for a Queensland based operation.

## 4.5 Activity Data

The activity from the project data used in the GHG emission calculations are outlined in **Table 4,** based on actual diesel consumption for Stage 2 (which is of similar scope to Stage 3b to 5), and estimates for lengths of haul route length for each stage.

**Table 4 Activity Data – Stage 2 and Stage 3B to Stage 5 Operations**

| Input Data | Units | Scope | Stage 2 [1] | Stage 3B | Stage 4[1] | Stage 5[1] |
|---|---|---|---|---|---|---|
| Diesel consumption – stationary (transport) [3] | kL/annum | 1 | 715 | 2,145 | 2,002 | 2,002 |
| Diesel consumption – non-transport (generator) | kL/annum | 1 | 64 | 42 | 47 | 54 |
| Electricity use – office [2] | kWh/annum | 2 | 1,200 | 1,200 | 1,200 | 1,200 |

[1] Total fuel consumption over two years

[2] An assumed value from a similar sized operation

[3] Average haul route lengths:
Stage 2 – 2 5 km from hard and soft rock quarries and clay pit
Stage 3B – 15km taken from waste rock dump to south east
Stage 4 and Stage 5 – 7km from hard rock quarry.

# 5.0 Estimated GHG Emissions

The results for calculated GHG emissions estimates for the project (Stage 3B to Stage 5), and the Stage 2 results comparison, are provided in **Table 5** and **Figure 1**.

**Table 5 Estimated Annual GHG Emissions – Stage 2 and the Project**

| GHG Emission Source | Scope | Estimated GHG Emissions (tonnes $CO_2$-e/annum) | | | | |
|---|---|---|---|---|---|---|
| | | Stage 2 | Stage 3B | Stage 4 | Stage 5 | Total Project (Stage 3B to 5) |
| **Scope 1** | | | | | | |
| Diesel – stationary (transport) | 1 | 1,941.4 | 5,826.4 | 5,438.0 | 5,438.0 | 16,702 |
| Diesel – non-transport (generator) | 1 | 174 | 115 | 127 | 146 | 389 |
| **Total Scope 1 (t $CO_2$-e)** | | **2,115** | **5,941** | **5,565** | **5,584** | **17,091** |
| | | | | | | |
| Electricity consumption | 2 | 0.9 | 0.8 | 0.8 | 0.8 | 2.4 |
| **Total Project (t $CO_2$-e)** | | **2,116** | **5,942** | **5,566** | **5,585** | **17,093** |

**Figure 1 Scope 1 GHG Emissions: Tonnes $CO_2$-e per annum**

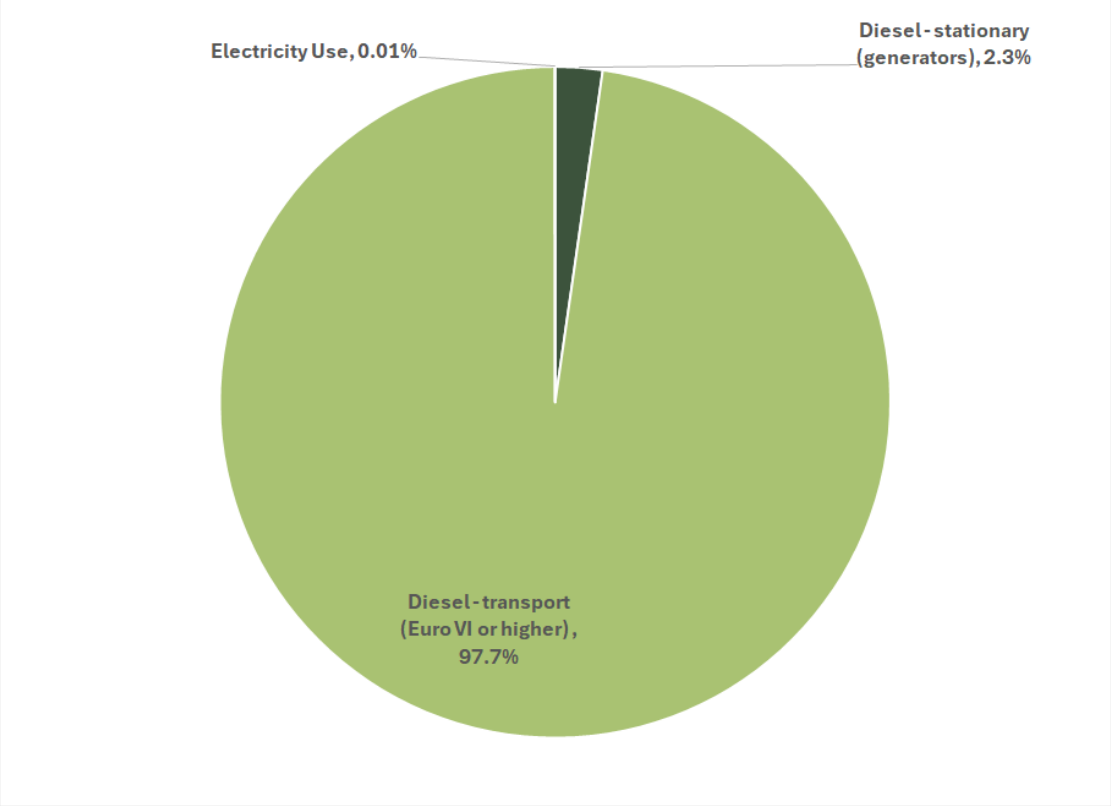
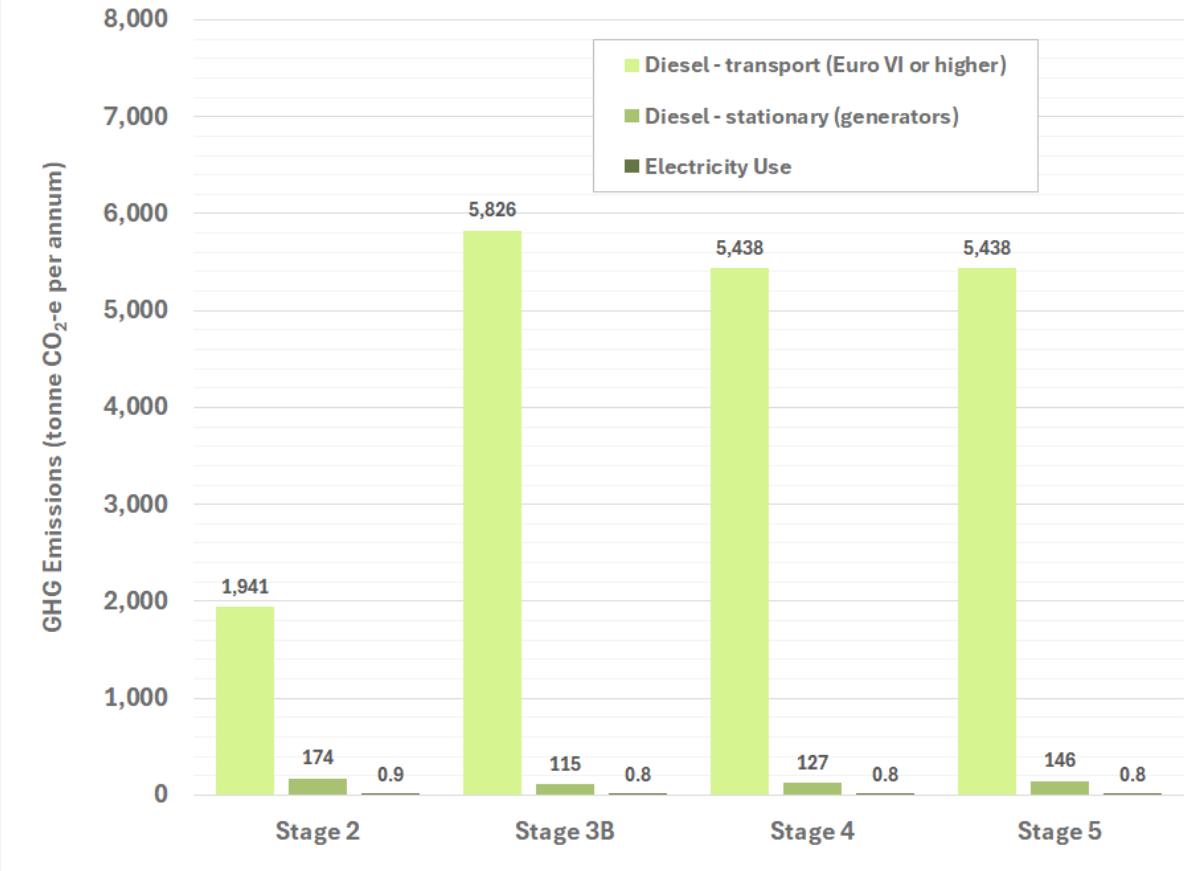


**Figure 2 Scope 1 GHG Emissions: Tonnes $CO_2$-e per annum**




Review of the results for the calculated Scope 1 and Scope 2 emissions shows:

- On site-diesel use in fixed and mobile plant and machinery is the main source of Scope 1 GHG emissions for Stage 3B to Stage 5 operations (97.7%). The next most significant source (2.3%) is diesel use in other equipment such as power generators (**Figure** 1 and **Figure 2**).
- Emissions due to electricity purchases from the grid represents a very minor contribution for all Stages.
- The total estimated annual Scope 1 GHG emissions for the TSF2 Stage 3B to Stage 5 operations are less than 25,000 tonnes $CO_2$-e per year, and as such the Project is categorised as a **low emitter**.

## 5.1 Risk Assessment

The *Guideline Greenhouse Gas Emissions* (DETSI, 2024) requires that a risk assessment be performed to outline the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values.

For example, for the 2023 reporting year, Australia's total GHG emissions were reported to be 453.449 Mt $CO_2$-e, with 128.125 Mt $CO_2$-e contributed by Queensland (DCCEEW, 2024).

The total annual Scope 1 GHG emissions for the Project were estimated to be approximately 17 kt $CO_2$-e tpa (**Table 5**). This represents 0.004% of Australia's 2023 emissions, and

0.013% of Queensland's 2023 emissions. Clearly the GHG emissions from the TSF2 Stage 3B to Stage 5 Lift operations represent small contributions to the state and national amounts.

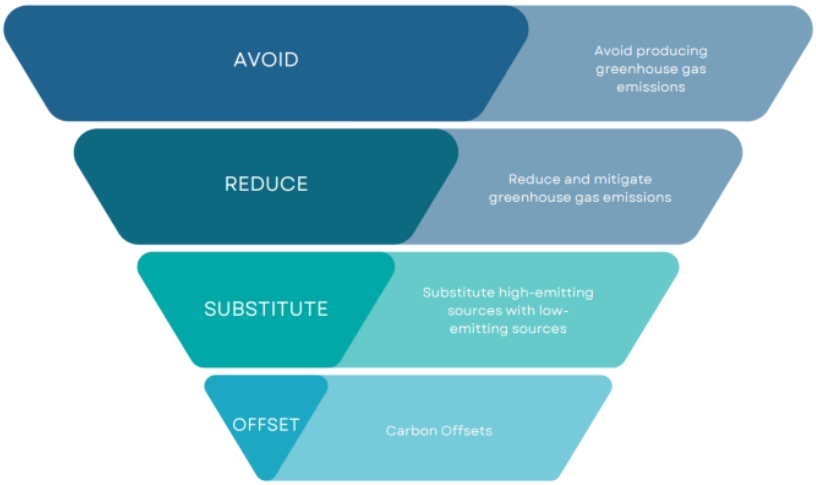
# 6.0 GHG Emissions Abatement

As per the *Guideline Greenhouse Gas Emissions* (DETSI, 2024), projects classified as a low emitter are not required to submit a detailed GHG abatement plan as part of the application process. Nonetheless, CRO has identified the mitigation measures outlined in **Table 6** to minimise and manage GHG emissions and ensure energy use efficiency at the site.

**Table 6 GHG Emissions Mitigation Measures**

| Measure | GHG Abatement Hierarchy *(see **Figure 4**)* |
|---|---|
| Specify and select appropriately sized and energy-efficient equipment – assumed to have already been undertaken on Stage 2 | AVOID |
| Consider solar power system on the offices to provide renewable power and minimise grid consumption | AVOID |
| De-activate plant and equipment when not in constant use; e.g., engines not left idling unnecessarily | AVOID |
| Plan material handling activities to ensure minimal movement of materials; e.g. minimise haul route lengths | REDUCE |
| Regularly maintain equipment and ensure compliance with engine emissions control technology regulations and guidelines as far as practicable | REDUCE |
| Maximise beneficial use of cleared vegetation | REDUCE |

**Figure 3 GHG Abatement Hierarchy**




SOURCE: (DETSI, 2024)

# 7.0 Conclusion

The Scope 1 GHG emissions estimated for the TSF2 Stage 3B to Stage 5 operations are approximately 17 kt $CO_2$-e p.a., which means the Project is classed as a 'low emitter' (i.e. will produce less than 25 kt $CO_2$-e p.a.)

The Project's annual GHG emissions represent very small fractions of Queensland's annual totals, approximately 0.01% only.

While the Project should make every effort to reduce GHG emissions, (as part of a global effort to do so), on their own the Project's GHG emissions are insignificant with respect to impacts on global warming.

# 8.0 References

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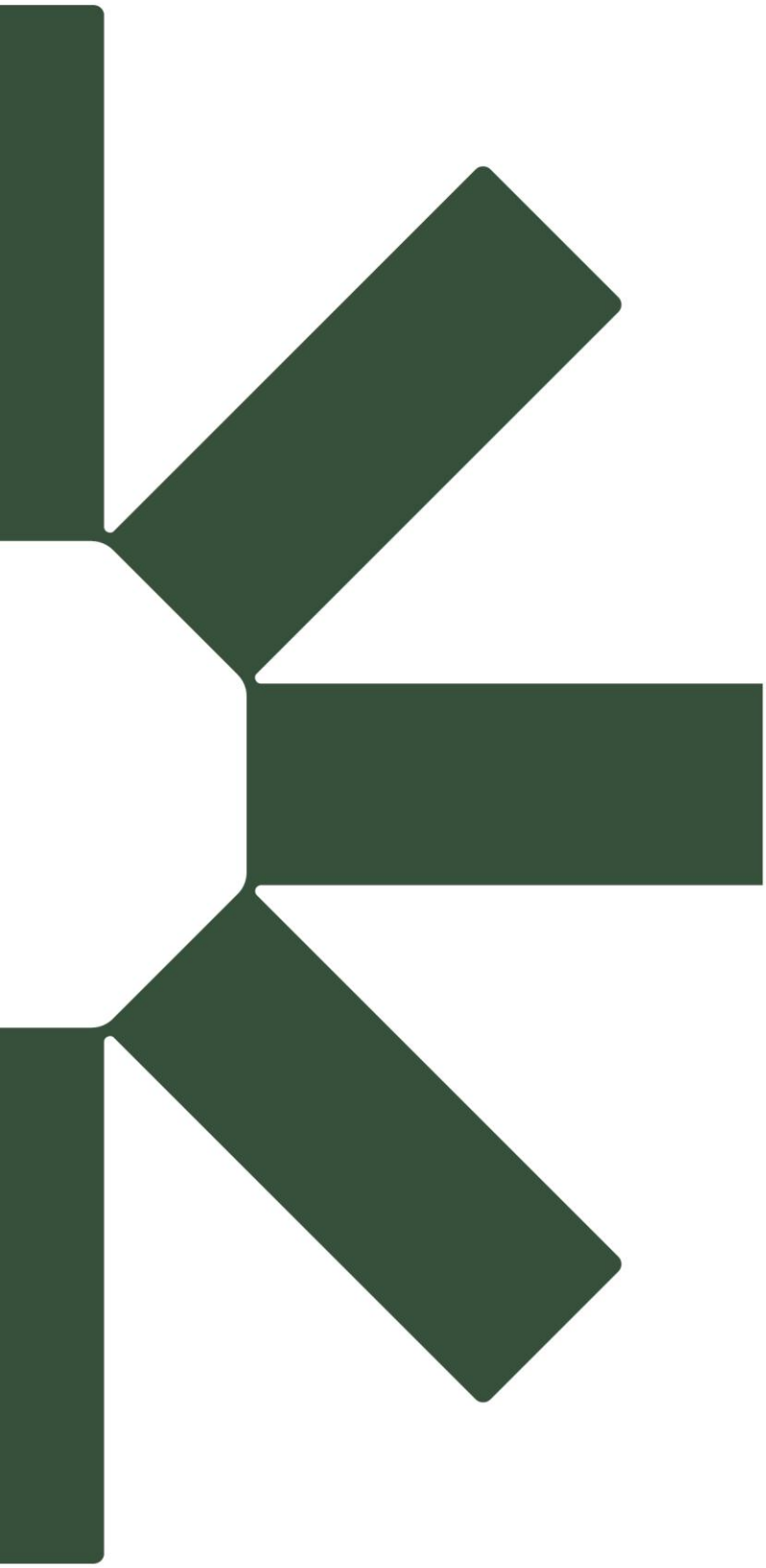

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