APPENDIX T: 10 YEAR GREENHOUSE GAS PROJECTION - B2018 PROJECT (GREENBASE)

GREENBASE
ENVIRONMENTAL ACCOUNTANTS

St Ives Gold Mining Company Pty Ltd

Beyond 2018

10 Year Greenhouse Gas Projection

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Table 1 Document Glossary

Term / Acronym	Meaning
Act	The NGER Act 2007 as it applies to the current reporting year
GHG	All greenhouse gases mentioned in the Act
NPI	National Pollutant Inventory
NGER	National Greenhouse and Energy Reporting
CO_2e	Carbon dioxide equivalence
t CO_2e	Tonne of carbon dioxide equivalent
Non-transport	Includes purposes for which fuel is combusted that do not involve transport energy purposes, see Sections 2.20, and 2.42 of the Determination. Otherwise known as Stationary.
Transport	Includes purposes for which fuel is combusted for transport by vehicles registered for road use, rail transport, marine navigation and air transport, see Sections 2.20, and 2.42 of the Determination
Determination	The NGER Determination 2008 as it applies to the current reporting year
Regulations	The NGER Regulations 2008 as they apply to the current reporting year
Scope 1	Emission of greenhouse gas, in relation to a facility, means the release of greenhouse gas into the atmosphere as a direct result of an activity or series of activities (including ancillary activities) that constitute the facility. For example emissions from combustion of fuels in vehicles operating on site.
Scope 2	Emission of greenhouse gas, in relation to a facility, means the release of greenhouse gas into the atmosphere as a direct result of one or more activities that generate electricity, heating, cooling or steam that is consumed by the facility but that do not form part of the facility. For example emissions attributed to the facility from the consumption of electricity purchased.
Scope 3	Emissions of greenhouse gas, in relation to a facility, means the release of greenhouse gas into the atmosphere as an direct result of one or more activities required by the facility but do not form part of the facility. For example emissions from employee travel, clearing of vegetation (CO2 the vegetation doesn't absorb) and freight services.

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1 Introduction

St Ives Gold Mining Company (SIGMC) has engaged Greenbase to provide an estimated GHG Projection for their Beyond 2018 (B2018) Project at St Ives Gold Mine. GHG Estimation is required to satisfy the requirements of the Environmental Scoping Document (ESD) prepared for the B2018 Project.

1.1 Scope of Work

The scope of work for this arrangement was to identify an appropriate methodology for estimating the projected GHG emissions, create a workbook detailing the steps taken to create the model and create a written report. The GHG projection provides both Scope 1 and 2 estimates as per the National Greenhouse and Energy Reporting Scheme (NGERS) rules for a 10 year period from 2018 to 2028. The scope of the facility was the St Ives Gold Mine Site including any new mining being undertaken in the period.

2 Methodology

In order to create a GHG model, first a reliable means to estimate the future numbers must be decided. The Emission Intensity model was chosen in conjunction with SIGMC after some iteration and was found to provide the right balance of accuracy and simplicity.

The Emission Intensity model takes prior years data and calculates how much CO2-e is emitted per Tonne of Material Moved then utilises this value to calculate future years based off the forecasted Material Moved. The prior year in question was the 2016 financial year (FY). Base data used is from the Lake Lefroy Combined Ops section of the FY2016 NGER Report and Lake Lefroy Combined Ops FY2016 NPI Report. The base data used can be accessed via the Greenbase website with a valid Gold Fields login (www.greenbase.com.au).

An emission intensity value was hence calculated for both Scope 1 and Scope 2 from the 2016 FY data. These values were then multiplied by the forecasted material movement values to determine Scope 1 and Scope 2 CO2-e amounts for those years. For the complete calculations and working please see the 'St Ives Beyond 2018 Ledger.xlsx' workbook.

2.1 Assumptions

The assumptions associated with the modelling work undertaken for this project is as follows;

- GHG Emissions are proportional to the total material moved on-site for St Ives operations
- FY2016 GHG intensity is comparable to all projected years GHG intensities
- 350kL of Caves Rocks diesel included in the FY2016 NGER data has a negligible impact on emissions intensity and projected results
- As Scope 3 emissions are not included in the National Energy and Greenhouse Reporting Scheme (NGERS) they were excluded from this model

3 Projection Results and Discussion

Results taken from 'St Ives Beyond 2018 Ledger.xlsx' workbook

Table 2 St Ives GHG 10 year Projection

Year	2018	2019	2020	2021	2022
Scope 1	83,389	65,683	62,174	34,522	38,802
Scope 2	80,551	63,447	60,058	33,347	37,481
Scope 1 + 2	163,941	129,130	122,232	67,869	76,283
Material Moved	33,286,114	26,218,249	24,817,775	13,780,019	15,488,408

2023	2024	2025	2026	2027	2028
44,712	39,284	69,804	60,940	73,248	62,121
43,190	37,947	67,428	58,866	70,755	60,007
87,902	77,232	137,232	119,806	144,002	122,129
17,847,422	15,680,909	27,863,250	24,325,177	29,237,915	24,796,706

Results Graph;

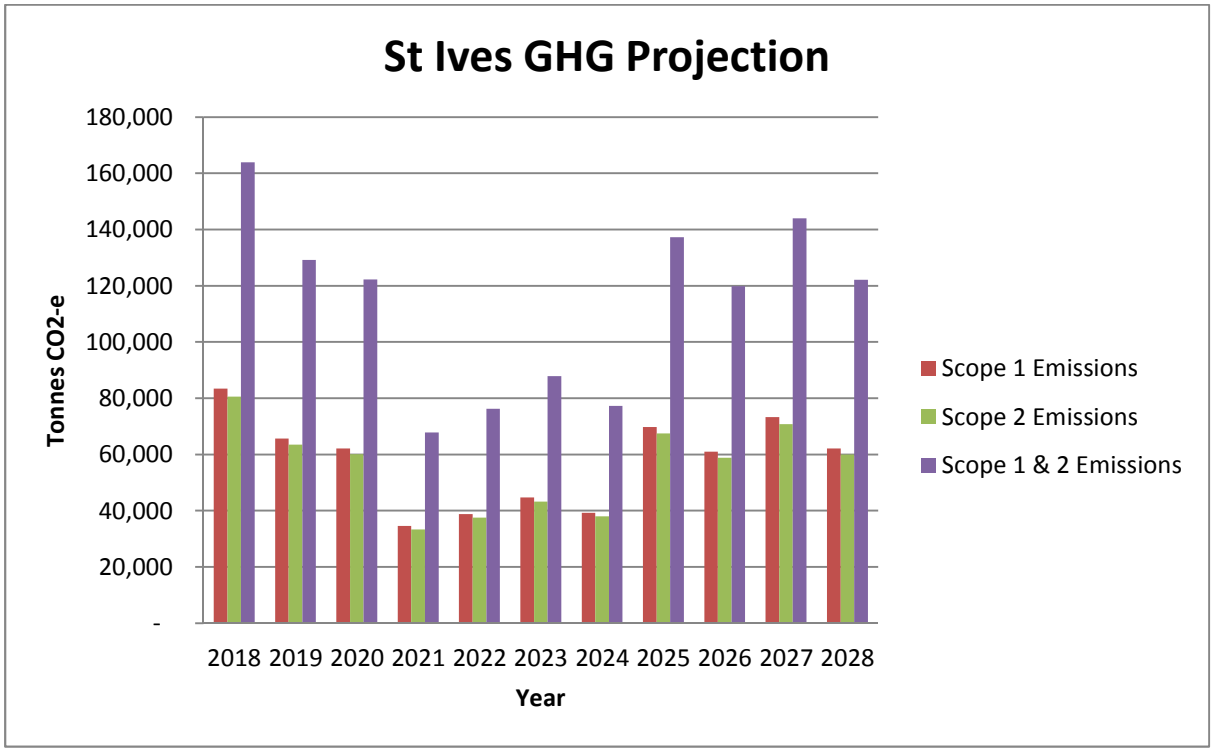

Figure 1 St Ives 10 year GHG Projection

3.1 Discussion

To get an indication of the impact the project will have on SIGMC's GHG emissions the past three years of NGER emissions at SIGMC are tabled below.

Table 3 St Ives Past Years NGER Emissions

Year	2015	2016	2017
Scope 1	78,720	90,739	101,589
Scope 2	92,034	87,650	90,059
Scope 1 + 2	170,755	178,389	191,648
Material Moved	19,776,745	36,219,759	42,758,373

As illustrated above the past three years are similar to the 2018 projection, before the projections start to drop down as the material movements scale back. The Material Moved in 2015 is lower compared to subsequent years, although the total CO2 emissions are within the same magnitude. This is a result of larger amount of waste stored underground in 2015 which was not consequently recorded as part of Material Moved. Material Moved is almost doubling in 2016 and 2017 as compared to 2015 and is expected to remain at this level during 2018 as operations are more focussed on open pit mining.

It is important to note that the current mining operations will slow down and cease while the B2018 Project pits are starting up and heading into full production. Taking this into account and looking at the projected material movements it can be predicted that the B2018 project should have the same or lower overall GHG impact compared to the current operations.