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APPENDIX F
COMPARATIVE GREENHOUSE GAS EMISSIONS ASSESSMENT

Intended for

Hydro Aluminium Kurri Kurri Pty Ltd

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Comparative GHG Emissions Assessment (CGHGA) as

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APPENDIX

Appendix F1

Emissions Inventory

1. INTRODUCTION

This Comparative Greenhouse Gas Assessment (CGHGA) has been prepared by Ramboll Environ Australia Pty Ltd (Ramboll Environ) on behalf of Hydro Aluminium Kurri Kurri Pty Ltd (Hydro) to inform a Capped Waste Stockpile Waste Management Options Analysis (the Management Options Analysis) for submission to the Environmental Protection Authority (EPA). This CGHGA was prepared to assess the greenhouse gas (GHG) emissions from the identified Management Options for the Capped Waste Stockpile (CWS) at the former Hydro Aluminium Kurri Kurri aluminium smelter at Hart Road Loxford (the Smelter).

1.1 Background

The objective of the Management Options Analysis relevant to this CGHGA is to prepare a report for submission to the EPA that provides a detailed assessment of the options considered for the management of the wastes within the CWS (the Management Options).

The rational for, and background to, the identified Management Options is detailed in **Section 2** and **Section 3** of the Management Options Analysis. Six options (Management Options 2 to 7) have been identified for the management of the wastes within the CWS and for comparison against a do nothing scenario. These Management Options are the subject of the Management Options Analysis and this CGHGA. A brief description of each of the CWS Management Options is provided in **Table F1.1**.

Table F1.1: Capped Waste Stockpile Waste Management Options

Table F1.1	. Capped Waste Stock	thie waste management Options
Option	Description	Outline
Do Nothing	CWS remains in situ	The CWS would remain in its current location, with no improvement works. Ongoing groundwater, leachate and gas monitoring would occur at the CWS. Visual inspections would also be required to identify any faults in the capping layer. Long-term management and maintenance would comprise vegetation cover maintenance such as mowing, weed and tree/deep rooted plant removal and cap repairs as required.
2	Containment Cell	Removal of the CWS and onsite transport of materials for placement in an onsite Containment Cell. This would involve ongoing long term monitoring and maintenance of the Containment Cell for leachate, gas and any visual changes.
3	Sorting of Recyclables from the CWS and Treatment of Non- Recyclables Placed in Containment Cell	Removal of the CWS and onsite transport of materials for placement in an onsite Containment Cell. Potentially recyclable materials from the CWS (steel and carbon) would be sorted, cleaned, validated and make available for recycling. Non-recyclable materials from the CWS would be crushed prior to being treated to comply with the Chemical Control Order (CCO) and placement in the onsite Containment Cell. The ongoing maintenance and monitoring of the onsite Containment Cell would be as per Management Option 2.
4	Treatment of All Material within Containment Cell	Removal of the CWS and placement of all materials in the onsite Containment Cell with layers of lime interlayered with the placed CWS material. This option does not include any recycling or sorting of material. The ongoing maintenance and monitoring of the onsite Containment Cell would be as per Management Option 2.
5	Offsite Disposal of CWS to Licensed Waste Facility in NSW	Removal of the CWS, separation of the steel for cleaning and recycling and transport of the remaining waste offsite to a licensed waste management facility/facilities in NSW. Treatment to comply with the COO would occur at the receiving facility. There would be ongoing maintenance and monitoring at the receiving waste management facility/facilities.
6	Offsite Disposal of CWS to Salt Mine	Removal of the CWS material, separation of the steel for cleaning and recycling and heat treatment of the remaining material to 600 °C (in an onsite purpose built facility) prior to transportation offsite via road and rail to a salt mine in the Northern Territory. The receiving facility would dispose of the CWS material without further treatment. There would be ongoing maintenance and monitoring at the receiving waste management facility.
7	Onsite Destruction (Plasma Gasification) of CWS Material	Removal of the CWS material, separation of the steel for cleaning and recycling with the remaining waste material being subject to an onsite plasma gasification process to remove fluorides and cyanides. By-products of the plasma gasification process would include vitrified rock (slag) and elemental metal which would theoretically be suitable for a beneficial re-use.

1.2 Comparative Greenhouse Gas Assessment Objective

The purpose of this CGHGA is to assist Hydro in comparatively assessing the GHG emissions arising from the utilisation of any of the seven assessed management options identified for the CWS.

The objective of this CGHGA is to assess the potential GHG emissions associated with each of the Management Options, including estimation of lifecycle emissions where significant.

In addition to considering the GHG emissions associated with the tasks and activities that are required to be undertaken as part of the Option, the CGHGA also assesses the GHG emissions associated with potential tasks or events associated with the Management Options which have a lower probability of occurring. For example, a truck turnover spilling contaminated load on public road or a minor or major cap repair. For the purpose of the Management Options Analysis these are known as 'alternative scenarios'.

1.3 Comparative Greenhouse Gas Assessment Methodology

The CGHGA has been undertaken in accordance with the following guidelines:

- The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition, 2004 (the GHG Protocol), developed by World Resources Institute (WRI) and World Business Council on Sustainable Development (WBCSD).
- National Greenhouse and Energy Reporting (Measurement) Determination 2008 and Technical Guidelines, 2016, Australian Department of the Environment.

These are considered to represent current good practice in Australian GHG accounting. The GHG Protocol describes the process for the accounting of GHG emissions and compiling of GHG emission inventories. This standard is widely accepted for use in Australia.

Within Australia, the National Greenhouse and Energy Reporting System (NGERS) (Act, Regulations, Determination and guidance documents) provides the reporting standard for how large emitters and provides guidance on how emissions should be calculated by Australian companies, including methods for collating activity data, selecting fuel energy content and emissions factors, calculating emissions and estimating uncertainty. NGERS has been designed to be consistent with the GHG Protocol. While the greenhouse gas assessment has not be prepared in full compliance with NGERS, it adheres to the estimation methods and approach and uses the emissions factors defined in the most recent iteration of the Determination.

The National Greenhouse Accounts (NGA) Factors is prepared by the Department of the Environment and is designed for use by companies and individuals to estimate GHG emissions. The NGA Factors are not published for the purposes of reporting under the NGER Act 2007 but have general application to the estimation of a broad range of GHG emissions inventories. The default emission factors listed in the NGA Factors have been estimated using the Australian Greenhouse Emissions Information Systems (AGEIS).

1.4 Scope

The assessment accounts for all significant scope 1 and 2 emissions sources associated with each of the Management Options. This is primarily related to fuel use (for transport and stationary purposes) and electricity (in the case of the Management Option 7). A number of immaterial emission sources are acknowledged in the assumptions but excluded from the analysis.

Under Australian GHG reporting legislation and international GHG standards, the identification of Scope 3 emissions is (in general) not mandatory, as reporting of Scope 3 emissions is essentially accounting for emissions which another entity (the primary emitter) would also be accounting for. However, as part of the GHG assessment of various Management Options, significant sources of Scope 3 GHG emissions associated with upstream and downstream activities of the Project have been considered, particularly in relation to steel and carbon recycling in order to facilitate the comparative analysis of potential emissions between the six Management Options and the do nothing scenario.

For the purposes of this assessment, the time period is the period of active operation by Hydro and contractors to dispose of the waste under each Management Option, as well as any ongoing monitoring (for a period of 5 years) and maintenance (for a period of 30 years) associated with Smelter Site remediation and leachate/groundwater treatment.

1.5 Approach

The overall approach taken for the work included:

- Mapping the activities associated with each Management Option
- Estimating the basic GHG metrics and applying assumptions for the key activities
- Estimating the quantities consumed for inputs to each activity
- Calculating the emissions for each activity by applying relevant conversion and emissions factors to the consumption quantities

GHG emissions in this assessment have been quantified by calculation (rather than direct measurement) by applying emissions factors to estimated quantities. Quantities of fuel, electricity and waste (i.e. activity data) were estimated based on concept design quantities for the Options Study. Emission factors for electricity, diesel, petrol and natural gas were obtained from the 2016 NGER Measurement Determination. When data was unavailable, assumptions and approximations were made to obtain a reasonable estimate of activity data and emission factors. If factors have been sourced elsewhere, the source reference has been provided in this report.

Information was provided by Hydro Aluminium in relation to the SPL disposal volume and typical vehicle types used on-site. Regain provided information on the Regain process and a life cycle assessment of this process.

2. KEY ASSUMPTIONS

Key assumptions for the GHG assessment are outlined in the following section and emissions inventories are provided for each Management Option in **Appendix F1**.

2.1 Emissions Factors

Emission factors for electricity, diesel, petrol and natural gas were obtained from the 2016 NGER Measurement Determination.

2.2 Direct Emissions from Waste (Off-gassing/landfill emissions)

An emission factor for the direct emission from spent pot lining in a landfill was not readily available. In the GHG assessment completed for the Stage 2 Demolition and Remediation Environmental Impact Assessment (Ramboll Environ, 2016), spent pot lining was assumed to be analogous to brick/construction waste for the purposes of calculating emissions from landfill. However, recent site monitoring for fugitive emissions of methane and carbon dioxide from the CWS is subsequently available and indicate that emissions are negligible, accounting for less than 1 tCO2e per year. Fugitive emissions from waste have therefore not been included in the accounting for the Management Options which would involve Do Nothing or containment of the waste in improved circumstances. This source is disregarded as immaterial.

2.3 Equipment

In collaboration with Hydro, Ramboll Environ developed a register of activities and equipment that was associated with each Management Option. Light/private vehicles were calculated by taking an average fuel efficiency for a range of common car types, which amounted to 8 L/100km. Emissions and fuel efficiency factors for heavy vehicles and equipment use has been obtained by researching manufacturer specifications and other publicly available sources of information. Assumptions have also been made in relation to whether the activity would require low, medium or high fuel consumption for those given equipment models, and the average speed of travel of vehicles (generally 70 km/hr on roads) in order to calculate emissions. Different models of equipment with differing fuel consumption may be used, depending on the contractors, and this would change the result. However, as equipment is relatively standard across many of the options (with the exception of certain options which utilise plasma technology or rotary kilns for carbon processing), the results are likely to be proportionally accurate - this emissions assessment is intended to be indicative of the relative scale of emissions between Management Options, rather than as a precise prediction for each individual option.

2.4 Waste Processing

For Management Option 3, emissions for carbon processing is based on a factor of 0.2 t CO2e/tonne quoted by Regain (2014). This factor for the processing of SPL includes recovery, metal sorting, crushing and homogenising along with chemical processing to remove cyanide and explosive gas hazards such that the resultant processed carbon is safe to handle and use and is no longer considered 'hazardous waste' under the EPA's *Waste Classification Guideline* (2014).

For Management Option 6, all crushable waste is required to be heat treated in a rotary kiln to remove the potential for gas generation prior to transport to the salt mine. The Regain value of 0.2 t CO2e/tonne has been adopted as representative of this activity.

2.5 Carbon Recycling

Processed carbon can be substituted for coal as a source of energy to various industrial processes. As such, the emissions of the CWS carbon preparation were calculated and compared to the emissions of coal extraction to achieve a stockpile appropriate for beneficial use of the same calorific value. The calorific value of the available carbon and coal was calculated using the following assumptions:

- Calorific value of first cut spent pot lining is 14.6 16.3 GJ/tonne. Assumed 15.5 GJ/tonne
- Calorific value of anode carbon is approximately 20 GJ/tonne
- Calorific value of coal is between 21 and 27 GJ/tonne. Assumed 24 GJ/tonne

The total energy of the available carbon (18,500 tonnes of first cut spent pot lining and 30,000 tonnes of anode carbon) was calculated to be 886,750 GJ. Therefore, 36,947 tonnes of coal would be required to achieve the same energy output.

The per tonne emissions from extraction and processing of coal from five mines within the Hunter region was calculated from 2015-2016 annual reports to reach an 'average emissions of 1 tonne coal production'. The average emissions of 1 tonne of coal production was calculated to be to be 0.065 tCO2e/tonne. GHG emissions associated with the preparation of the available carbon from the CWS was assumed to be 0.2 tCO2e/tonne based on Regain's quoted 0.2tCO2e/tonne processing factor (Regain 2014). It was determined that the processing of the available carbon from the CWS rather than coal would result in the additional GHG emissions of 7,427 tCO2e. This was accounted for as a positive/emissions benefit within the assessment, as it represent potential emissions offsets from business-as-usual production. **Table F2.1** summarises the assumptions and calculations.

Table F2.1:	Carbon	Recycling	Assumptions	and	Calculations
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Product	Calorific Value	Total tonnage	Extraction/processing emission factor	Total emissions
CWS first cut spent pot lining	15.5 GJ/tonne	18,500	0.2 tCO2e/t	3,700 tCO2e
CWS anode carbon	20 GJ/tonne	30,000	0.2 tCO2e/t	6,000 tCO2e
Coal	24 GJ/tonne	36,947	0.065 tCO2e/t	2,427 tCO2e

2.6 Steel Recycling

For Management Options 3, 5, 6 and 7, emissions from processing of scrap steel in an Electric Arc Furnace (EAF) in an Australian context is estimated to be 1.12 tCO2e/tonne steel (direct and indirect emissions) (IGCC, 2007). It is assumed that scrap steel will be processed using an Electric Arc Furnace, which uses scrap steel as its primary input, rather than a Blast Furnace / Basic Oxygen Steel Making (BF/BOS) which uses iron ore as the primary input. BF/BOS steel production is considerably more greenhouse gas intensive than scrap-based EAF production around 2.3 times the emissions of EAF per tonne of steel produced. The majority of emissions from BF/BOS production are direct (relating to coking coal, a necessary input in the chemical process of converting iron ore to pig iron), while the majority of emissions from scrap-based EAF production are indirect, associated with electricity consumption. However, GHG emissions intensity will vary depending on a number of factors including: the scale/efficiency of the blast furnace, extent to which waste heat is captured, type of steel products produced, proportion of scrap steel used, and location of the plant and corresponding emissions intensity of electricity. The lifecycle benefit associated with using scrap steel from commercial and industrial and construction and demolition sources in New South Wales is estimated to be 0.44 tCO2e/tonne (DECCW, 2010) or 2200 tCO2e in total for the 5000 tonnes of available steel. The above estimate is in the Australian context - a similar study

(http://climate.columbia.edu/files/2012/04/GNCS-Iron-Steel.pdf) of US production estimated an EAF coefficient of 0.6 tCO2 per tonne of steel.

2.7 Train transportation

For Management Option 6, a freight rail emissions factor of 0.01 kgCO2e/tonne km travelled was sourced from Deloitte Access Economics (2011). The emissions calculation for this activity assumes 333,500 tonnes of material is moved via 334 train movements of 6,000 km each which accounts for the empty return trip.

2.8 Plasma Plant usage and efficiency

The plasma gasification plant has been assumed to have a rated power consumption of 7 MW/day based on information provided by a confidential company specialising in waste solutions. Further advice from the same company advises that in the case of spent pot lining (which represents 26% of the material that will be treated), there is an energy recovery/ efficiency of approximately 15%. This would result in the actual consumption of the plant being 6.7 MW/day.

2.9 Other immaterial sources

Emissions associated with the following were excluded from the GHG assessment as being immaterial to the assessment of total emissions:

- The consumption of gaseous fuels for demolition and construction activities (e.g. for welding/oxy cutting)
- Petroleum based oils and greases
- The operation of the water treatment plant
- The use of various hand operated equipment

3. FINDINGS

3.1 Management Options

The total GHG emissions for each of the Management Options was graphed. **Table F3.1** presents the total predicted emissions for each of the Management Options. **Figure F3-1** demonstrates that the transport component of Management Option 6 (that is, the train transportation of treated material to a salt mine in the Northern Territory, entailing 334 movements of over 6,000km each) far outweighs any other emissions source in the Options Study. However even in the instance where the transport component (3,342,157 t CO2e) is removed from Management Option 6, it remains 2.6 times larger than the second largest emission generating Management Option (being Management Option 3). This is as a result of the heat treatment process discussed in **Section 2.4**.

Table F3.1: Total Predicted Emissions for Management Options

Management Option		Total Emissions (t CO2e)
Do Nothing	CWS remains in situ	10
2	Containment Cell	8842
3	Sorting of recyclables from the CWS and treatment of non-recyclables to place in cell	43,519
4	Treatment of all material within Containment Cell	10,773
5	Offsite disposal to licenced waste facility in NSW	27,046
6	Offsite disposal to salt mine in the Northern Territory	3,420,300
7	Onsite destruction using plasma gasification	21,727

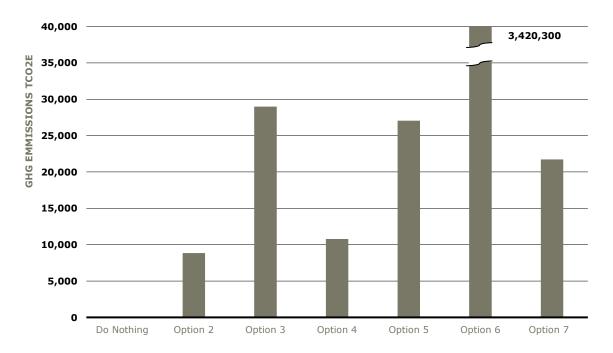


Figure F3-1: GHG Emissions Summary for Management Options

Do Nothing entails very minimal emissions, associated with monitoring and maintenance of the CWS.

Emissions from Management Options 2 and 4 (approximately 9-11 kt CO2e) are primarily from machinery onsite used for material removal and transport and construction of the Containment Cell.

Management Options 3, 5 and 7 (approximately20-30 kt) all involve emissions associated with treatment of the material (waste processing and steel recycling), as well as the lifecycle benefits which may accrue from this processing (that is, offset of emissions from business-as-usual production by using scrap steel or from avoided coal extraction). Management Option 5 also involves emissions associated with offsite heavy vehicle movements to transport the CWS waste material to an offsite licenced waste facility.

The carbon processing component of Management Option 3 is via the Regain treatment process (which would be classified as Scope 3), while Management Options 6 and 7 involves treatment via an onsite rotary kiln or plasma gasification plant (classified as Scope 2 due to the onsite diesel or electricity use).

In terms of the lifecycle emissions benefit, the avoided emissions from using scrap steel offsets approximately half of the emissions used in processing this steel, while additional emissions from processing the same calorific value of CWS carbon compared to Hunter Valley coal extraction are equal to 7,427 t CO2e, as described in **Section 2.5**.

3.2 Additional Scenarios

As discussed in **Section 1.2**, in addition to considering the hazards and risks associated with the tasks and activities that are required to be undertaken as part of the Management Option, Ramboll Environ and Hydro also identified future events that could occur during or following the Management Option. These events are referred to as 'Additional Scenarios' and were assigned a probability of occurring. For each Additional Scenario the associated emissions were determined. For example, a truck turnover spilling contaminated load on public road that may occur during the option; or a minor or major cap repair that could occur in the future. The Additional Scenarios which have been included within the assessments and their probability of occurring are presented within the Options Study. The results of the CGHGA including the assessment of the Additional Scenarios are presented in **Figure F3-2**.

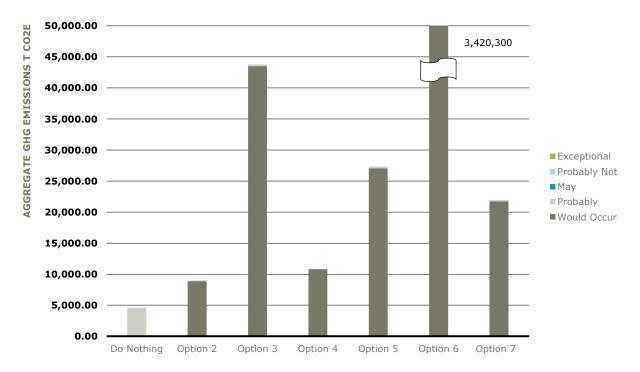


Figure F3-2: Aggregate GHG Emissions Summary for Management Options incorporating Additional Scenarios.

It can be seen from **Figure F3-2** that the Additional Scenarios do not alter the outcomes of the CGHGA nor do they have any material influence. This is mostly due to the short term and one off nature of the Additional Scenarios.

4. CONCLUSION

This CGHGA has been prepared by Ramboll Environ on behalf of Hydro to inform the Options Study for submission to the EPA.

GHG emissions in this assessment have been quantified by calculation (rather than direct measurement), by multiplying estimated quantities by an emission factor. Quantities of fuel, electricity and waste (that is, activity data) were estimated based on concept design quantities for the Options Study. Emission factors for electricity, diesel, petrol and natural gas were obtained from the 2016 NGER Measurement Determination. When data was unavailable, assumptions and approximations were made to obtain a reasonable estimate of activity data and emission factors. If factors have been sourced elsewhere, the source reference has been provided in this report.

The outcome of the CGHGA identifies that the GHG emissions associated with the transport of the CWS waste material to a salt mine in the Northern Territory emits substantially more emissions than the sum total of any other Management Option. The nearest Management Option (Management Option 3) is predicted to emit only 13% of Management Option 6.

Further, the CGHGA also identified in the lifecycle assessment of the carbon from the CWS that the extraction and processing of coal for beneficial reuse results in additional GHG emissions of 7,427 t CO2e when compared to extraction of coal to the equivalent calorific value.

GHG emissions are predictably lowest for the Do Nothing Management Option followed by Management Option 2 which is closely followed by Management Option 4.

5. REFERENCES:

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- Regain Technologies 2014b, *Indicative Life Cycle Assessment of Regain Products which are Derived from By-products of the Kurri Kurri Smelter*. Version 111_163 v0.3B.

6. LIMITATIONS

Ramboll Environ Australia Pty Ltd prepared this report in accordance with the scope of work as outlined in our proposal to Hydro Aluminium Kurri Kurri Pty Ltd and in accordance with our understanding and interpretation of current regulatory standards.

The conclusions presented in this report represent Ramboll Environ's professional judgement based on information made available during the course of this assignment and are true and correct to the best of Ramboll Environ's knowledge as at the date of the assessment.

Ramboll Environ did not independently verify all of the written or oral information provided during the course of this investigation. While Ramboll Environ has no reason to doubt the accuracy of the information provided to it, the report is complete and accurate only to the extent that the information provided to Ramboll Environ was itself complete and accurate.

This report does not purport to give legal advice. This advice can only be given by qualified legal advisors.

6.1 User Reliance

This report has been prepared exclusively for Hydro Aluminium Kurri Kurri Pty Ltd and may not be relied upon by any other person or entity without Ramboll Environ's express written permission.

APPENDIX F1 EMISSIONS INVENTORY

Do Nothina

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Action No.	Key Action	Key Steps	Equipment	#	Source Type		Fuel Consumption (L/hr)		Estimated Timeframe (Days)			Emission factor (kgCO2e/kL)	Emissions (kgCO2e)	Emissions (tCO2e)
1.1	Monitoring													
	Groundwater monitoring at Capped Waste Stockpile location	Ongoing groundwater monitoring (as required)	Light Vehicles	-	Transport Petrol	1	8	Quarterly for 5 years		80	0.64	2312.60	1480.07	1.48
			Hand held tools and equipment											
1.1.2		Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater).												
1.1.3	Leachate monitoring	Compliance with current EPL conditions.												ļ
1.1.4	Gas monitoring	Gas monitoring (quarterly) for ammonia and methane.												
	Long Term Manageme	ent						•	•		-	•		
		Vegetation cover maintenance (mowing, weed and tree/ deep rooted plant removal)	Light Vehicles		Transport Petrol	1	8	Quarterly for 30 years		480	3.84	2312.60	8880.40	8.88
		Repairs and maintenance	Hand held tools and equipment											

10.36

Option 2 - Containment Cell

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n No.	Cey Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Davs)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
	egetation clearance	Clearance of trees and shrubs (using ecologist as required)	Excavators	1	Transport	35			1	20	160		I		
2.1.1	egetation clearance	Grubbing (removal of remaining surface vegetation and		<u> </u>	Diesel Transport				4			5.6	2721.69	15241.44	15.24
-		roots)	Scraper/ Dozer	1	Diesel	60.9			4	20	160	9.744	2721.69	26520.11	26.52
		Mulching of green waste for reuse on site or to be provided to green waste processors	30T Articulated Truck	1	Transport Diesel	37.35			4	20	160	5.976	2721.69	16264.80	16.26
			Mulching/ composting machine	1	Stationary Petrol	60			4	20	160	9.6	2318.76	22260.10	22.26
			Heavy Vehicle Movements	4	Transport Diesel	18.75	70	280			4	0.075	2721.69	204.13	0.20
			Light Vehicles	63	Transport Petrol	8	1400	7000			100	0.8	2312.60	1850.08	1.85
2.1.2 P	reparatory works	Topsoil scraping and stockpiling (including transport to long term stockpile area)	Excavators	2	Transport Diesel	35			18	90	1440	50.4	2721.69	137172.97	137.17
		Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area)	Scraper/ Dozer	2	Transport Diesel	60.9			18	90	1440	87.696	2721.69	238680.98	238.68
		Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment plant.	30T Articulated Truck	2	Transport Diesel	37.35			18	90	1440	53.784	2721.69	146383.16	146.38
		Excavation and construction of perimeter dish drain	Water Cart	1	Transport Diesel	27			18	90	720	19.44	2721.69	52909.58	52.91
			Heavy Vehicle Movements	7	Transport	18.75	70	490			7	0.13125	2721.69	357.22	0.36
			Light Vehicles	8	Transport Petrol	8	6300	50400			720	5.76	2312.60	13320.60	13.32
	ell Base liner	As described in the Concept Design	Excavators	3	Transport	35			26	130	3120				
C	onstruction		Loaders		Diesel Transport	15.3			26	130		109.2	2721.69	297208.11	297.21
-			Compactors	1	Diesel Transport	20.8			26	130		47.736	2721.69	129922.40	129.92
			,		Diesel Transport							21.632	2721.69	58875.51	58.88
			30T Articulated Truck	4	Diesel Transport	37.35			26	130	1	155.376	2721.69	422884.68	422.88
			Water Cart	2	Diesel Transport	27			26	130		56.16	2721.69	152849.89	152.85
			Machinery Service Vehicle	1	Petrol	8			26	130	1040	8.32	2312.60	19240.87	19.24
			Backhoes	4	Transport Diesel	21.9			26	130	4160	91.104	2721.69	247956.48	247.96
			Heavy Vehicle Movements	820	Transport Diesel	18.75	120	98400			1405.7143	26.357143	2721.69	71735.87	71.74
220	apped Waste Stockpi	le Removal	Light Vehicles	16	Transport Petrol	8	9100	145600			2080	16.64	2312.60	38481.73	38.48
	ite Establishment	Installation of water treatment plant.	Backhoes	1	Transport	21.9			10	50	400	8.76	2721.69	23841.97	23.84
		Installation of water collection, pipes and pumping system.	Diesel Pump	1	Stationary	6			10	50	400	2.4	2709.72	6503.33	6.50
		Establishment of capped waste stockpile area.	Heavy Vehicle Movements	2	Transport	18.75	70	140			2				
		Establishment of erosion and sediment control measures.	Light Vehicles	4	Diesel Transport	8	3500	14000			200	0.0375	2721.69	102.06	0.10
2220	ap removal	Removal of grass cover	Excavators		Petrol Transport	35	0000	14000	16	80		1.6	2312.60	3700.17	3.70
2.2.2	ap removar	-			Diesel Transport	60.9			16	80		44.8	2721.69	121931.53	121.93
		Removal and stockpiling of topsoil (to stockpile area). Removal and stockpiling of reusable clay layer for use at the	Scraper/ Dozer 30T Articulated Truck	4	Diesel Transport	37.35			16	80		77.952	2721.69	212160.87	212.16
		containment cell.			Diesel Transport							95.616	2721.69	260236.73	260.24
		Removal of remaining capping layers:	Water Cart Hand held power tools and	1	Diesel	27			16	80	640	17.28	2721.69	47030.73	47.03
		Suitable material stockpiled for use as wet weather cover.	eauipment	1	Tronoport									_	
		Remaining material transported for disposal at containment cell.	Heavy Vehicle Movements	g	Transport Diesel	18.75	70	630			9	0.16875	2721.69	459.28	0.46
			Light Vehicles	12	Transport Petrol	8	5600	67200			960	7.68	2312.60	17760.80	17.76
2.2.3 N	Material removal	Removal of recyclable waste materials:	Excavators	4	Transport Diesel	35			44	220	7040	246.4	2721.69	670623.43	670.62
		Removal of carbon materials (first cut spent pot lining and anodes) of greater than 500mm in size	Scraper/ Dozer	3	Transport Diesel	60.9			44	220	5280	321.552	2721.69	875163.58	875.16
		Removal of metals greater than 500mm in size	Water Cart	1	Transport Diesel	27			44	220	1760	47.52	2721.69	129334.52	129.33
		Transport material to cleaning/ storage shed.	Light Vehicles	8	Transport	8	9100	72800			1040	8.32	2312.60	19240.87	19.24
		Removal of non-recyclable materials and transport to the			Petroi							0.32	2312.00	19240.07	17.24
		sorting area. Removal of waste materials would cease in rain events and the temporary cover placed over the exposed waste.													

Option 2 - Containment Cell

			U	יוזע		ontainr	nent c	en							
Actio n No.	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption	Distance Travelled	Total Distance	Estimated Timeframe	Estimated Timeframe	Total Operating	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
		Excavation of natural materials affected by wastes and contaminants. Investigations to be undertaken of stockpile footprint to determine soils to be removed.				(L/hr)			(Weeks)	(IJavs)	Hours				
		Removal and transportation of stockpiled wet weather cover material to the containment cell.													
		Material tracking system implemented throughout the removal process.													
		Placement and compaction of suitable material for filling of capped waste stockpile excavation void													
2.2.4	Operate water treatment plant (installed as part of capped waste stockpile removal Key	Leachate and captured stormwater from capped waste stockpile during material removal to be pumped to and treated at the treatment plant.	Diesel Pump	1	Stationary Diesel	6			64	320	2560	15.36	2709.72	41621.30	41.62
		Pumping and treatment of groundwater from below and surrounding the capped waste stockpile footprint.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	5 2721.69	102.06	0.10
		Dam water treatment.	Light Vehicles	2	Transport	8	3220	6440			92	0.736	2312.60	1702.08	1.70
		Discharge of treated water to existing dam.			Petrol							U./36	2312.00	1702.06	1.70
		Groundwater monitoring.			-										
2.2.5	Leachate pond removal at CWS	Excavation of deposited sediments and pond lining.	Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
		Placement of excavated material into the containment cell.	30T Articulated Truck	2	Transport Diesel	37.35			4	20	320	11.952	2721.69	32529.59	32.53
		Operation of temporary leachate collection facilities prior to complete closure of Containment Cell.	Heavy Vehicle Movements	3	Transport Diesel	18.75	70	210			3	0.05625	2721.69	153.09	0.15
			Light Vehicles	- 2	Transport Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
2.3	Haul Road Maintenanc Maintain the Haul	e T			1		I			I			I =======		
2.3.1	Road surface condition	Scraping and grading of the Haul Road surface	Excavators	1	Transport Diesel	35			82	410	3280	114.8	2721.69	312449.55	312.45
		Remove any major material spills along the haul road an transport the material to the Containment Cell for disposal	Scraper/ Dozer	1	Transport Diesel	60.9			82	410	3280	199.752	2721.69	543662.22	543.66
			Grader	1	Transport Diesel	21.1			82	410	3280	69.208	2721.69	188362.44	188.36
			30T Articulated Truck		Transport Diesel	37.35	105	105			1.5	0.056025	2721.69	152.48	0.15
					Transport	8	105	105			1.5	0.038023		27.75	
2.4		I crial Placement and Capping	Light Vehicles		Petrol							0.012	2312.60	27.75	0.03
2.4.1	Cell Material Acceptance and Placement	Transportation of material to the cell	Excavators	3	Transport Diesel	35			44	220	5280	184.8	3 2721.69	502967.57	502.97
		Temporary material stockpiling	Compactors	2	Transport Diesel	20.8			44	220	3520	73.216	2721.69	199270.96	199.27
		Placement of materials in dedicated cell: demolition waste, contaminated soils and capped waste stockpile materials.	30T Articulated Truck	4	Transport Diesel	37.35			44	220	7040	262.944	2721.69	715651.00	715.65
		Cover placed material in the event of predicted rainfall and/ or strong winds.	Light Vehicles	- 2	Transport Petrol	8	2200	4400			62.857143	0.5028571	2312.60	1162.91	1.16
		Material tracking and quantifying/ survey of placed material.	Water Cart	-	Transport Diesel	27			44	220	3520	95.04	2721.69	258669.04	258.67
2.4.2	Operate water treatment infrastructure at the Containment Cell	Installation of water treatment plant.	Hand held power tools and equipm	1	Diesei							73.04	2721.07	230007.04	230.07
		Operation and maintenance of water collection/ sump system and water treatment plant.	Diesel pump	1	Stationary Diesel	6			56	280	2240	13.44	2709.72	36418.64	36.42
		Captured water pumped to water treatment plant.	Tanks and ancillary pipework	L											
			Heavy Vehicle Movements	1	Transport Diesel	18.75	70	70			1	0.01875	2721.69	51.03	0.05
			Light Vehicles	-	Transport Petrol	8	260	520			7.4285714	0.0594286	2312.60	137.43	0.14
2.4.3	Leachate pond removal at Containment Cell	Excavation of deposited sediments and pond lining.	Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
	containment Ceil	Placement of excavated material into the containment cell.	30T Articulated Truck	2	Transport Diesel	37.35			4	20	320	11.952	2721.69	32529.59	32.53
		Operation of temporary leachate collection facilities prior to complete closure of Containment Cell.	Heavy Vehicle Movements		Transport Diesel	18.75	70	210			3	0.05625	2721.69	153.09	0.15
			Light Vehicles		Transport Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
	1	l .	Eight vehicles	_ 4	ILCUOI			·	L		·	U.32	2312.00	740.03	U. /4

Option 2 - Containment Cell

Total Fuel Use (kL) 320 19.488 160 5.976 160 4.33 3 0.05628 320 2.56 080 72.8	6 2721.69 2 2721.69 5 2721.69	Emissions (kgCO2e/kL) 53040.22 16264.80 11757.68	Emissions (tCO2e/kL)
19.488 160 5.976 160 4.33 3 0.05628 320 2.56	6 2721.69 2 2721.69 5 2721.69	16264.80	
3 0.05625 320 2.56	2 2721.69 5 2721.69		
3 0.05625 320 2.56	5 2721.69	11757.68	16.26
320 2.56			11.76
2.50		153.09	0.15
080 72.8	6 2312.60	5920.27	5.92
	8 2721.69	198138.74	198.14
080 43.264	4 2721.69	117751.02	117.75
080	2 2721.69	344761.41	344.76
040 21.944			59.72
000			211.44
000			146.97
6.24	4 2709.72	16908.65	16.91
36.1154	2 2721.69	98294.23	98.29
26.67857	1 2721.69	72610.69	72.61
14.56	6 2312.60	33671.51	33.67
2 0.037	5 2721 69	102.06	0.10
400		1850.08	0.10
0.0	2312.00		1.85
			1.85
80	4 2312.60	1480.07	
0.64	4 2312.60	1480.07	1.48
	4 2312.60	1480.07	
	4 2312.60	1480.07	
		1480.07	
0.64			1.48
0.64	4 2312.60		1.48
0.64	4 2312.60	8880.40	1.48
	126.67. 040 21.94. 080 77.68: 000 5. 040 6.2. 168 36.115. 571 26.67857. 820 14.5:	040 21.944 2721.69 080 77.688 2721.69 000 54 2721.69 040 6.24 2709.72 168 36.1152 2721.69 571 26.678571 2721.69 820 14.56 2312.60	040 21.944 2721.69 59724.68 080 77.688 2721.69 211442.34 000 54 2721.69 146971.04 040 6.24 2709.72 16908.65 168 36.1152 2721.69 98294.23 26.678571 2721.69 72610.69 820 14.56 2312.60 33671.51

8842.02

Option 3 - Sorting of recyclables from the CWS and treatment of Non - recyclables to place in onsite Containment Cell

		Up.	tion 3 - Sorting of recyc	Jables from ti	ne u	JWS and	treatmer		- recycla	ibles to	place	in onsi	ite con	itainmeni	Cell	
1	Action No.	Key Action	Key Steps	Equipment	#	Source Type	Consumption			Timeframe	Timeframe	Operating				
1. Control received Control of Control	3.1	Containment Cell Estab	lishment and Construction	,	_				_			1			_	
Marche of the production and rotation Marche of the production	3.1.1	Vegetation clearance		Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
Preparation by the provided to grams enterpressers Provided to grams e				Scraper/ Dozer	1	Transport Diesel	60.9			4	20	160	9.744	2721.69	26520.11	26.52
Propertion Pro				30T Articulated Truck	1	Transport Diesel	37.35			4	20	160	5.976	2721.69	16264.80	16.26
Preparatory works Topical Excepting (including support from the large large state of the large state					1	Stationary Petrol	60			4	20	160	9.6	2318.76	22260.10	22.26
1. Properatory works				Heavy Vehicle Movements	4	Transport Diesel	18.75	70	280			4	0.075	2721.69	204.13	0.20
3.1.2 Preparatory works Casymin or Succession of France Continuence Ceal Casymin or Continuence Ceal Casymin or Continuence Ceal Casymin or Ca				Light Vehicles	5	Transport Petrol	8	1400	7000			100	0.8	2312.60	1850.08	1.85
Substitution Subs	3.1.2	Preparatory works		Excavators	2	2 Transport Diesel	35			18	90	1440				
International or installation of minist direnage and evolutional direnage and evolutional counts yields and construction of perimeter display and used or realized Truck. 2 Transport Diesel 27			subsurface materials and stockpiling (including wet weather cover, and transport	Scraper/ Dozer	2	? Transport Diesel	60.9			18	90	1440		2721 60	238480 08	238 68
Market M			environmental controls, including water	30T Articulated Truck	2	2 Transport Diesel	37.35			18	90	1440				
Cell Base liner Construction As described in the Concept Design				Water Cart	1	Transport Diesel	27			18	90	720	19.44	2721.69	52909.58	52.91
3.1.3 call Base liner As described in the Concept Design Exavators 3 Transport Diesel 35				Heavy Vehicle Movements	7	Transport Diesel	18.75	70	490			7	0.13125	2721.69	357.22	0.36
3.1 Construction As described in the Concept Design Excavators 3 Transport Diesel 35 .				Light Vehicles	8	Transport Petrol	8	6300	50400			720	5.76	2312.60	13320.60	13.32
Compactors Transport Diesel 20.8 20.8 20.8 20.8 130 1040 21.632 2721.69 58875.51 58.88 20.8 2	3.1.3		As described in the Concept Design	Excavators	3	Transport Diesel	35			26	130	3120	109.2	2721.69	297208.11	297.21
Soft Articulated Truck 4 Transport Diese 37.35 26 130 4160 155.76 2721.69 422884.68 422.88				Loaders	3	Transport Diesel	15.3			26	130	3120	47.736	2721.69	129922.40	129.92
Machinery Service Vehicle Transport Diesel 27				Compactors	1	Transport Diesel	20.8			26	130	1040	21.632	2721.69	58875.51	58.88
Second Machinery Service Vehicle 1 Transport Petrol 8 26 130 1040 8.32 2312.60 19240.87 19.24				30T Articulated Truck	4	Transport Diesel	37.35			26	130	4160	155.376	2721.69	422884.68	422.88
Backhoes 4 Transport Diesel 21.9 21.9 26 130 4160 91.04 2721.69 247956.48 247.96 Light Vehicles 16 Transport Diesel 18.75 120 98400 145600 2080 16.64 2312.60 38481.73 38.48 3.2 Capped Waste Stockpile Removal Installation of water collection, pipes and pumping system. Istallation of water collection, pipes and pumping system. Establishment of capped waste stockpile Removal 21.9 10 50 400 2.4 2709.72 6503.33 6.50 Establishment of capped waste stockpile Removal 21.7 Transport Diesel 18.75 70 140 2.2 0.0375 2721.69 102.06 0.10 Establishment of crosion and sediment control measures. Light Vehicles 4 Transport Diesel 35 18.75 70 140 20 20 1.6 2312.60 3700.17 3.70 3.2.2 Cap removal Removal of grass cover Excavators 2 Transport Diesel 35 16.9 169 2704 94.64 2721.69 257580.36 257580 Removal and stockpiling of reusable clay layer for use at the contamment cell. Removal and stockpiling of reusable clay layer for use at the contamment cell. Removal and stockpiling of reusable clay layer for use at the contamment cell. Removal and stockpiling of reusable clay layer for use at the contamment cell.				Water Cart	2	Transport Diesel	27			26	130	2080	56.16	2721.69	152849.89	152.85
Heavy Vehicle Movements 820 Transport Diesel 18.75 120 98400 1405.714 26.357143 2721.69 71735.87 71.74 Light Vehicles 16 Transport Petrol 8 9100 145600 2080 16.64 2312.60 38481.73 38.48 3.2 Capped Waste Stockpile Removal 3.2.1 Site Establishment Installation of water treatment plant. Backhoes 1 Transport Diesel 21.9 10 50 400 8.76 2721.69 23841.97 23.84 Installation of water collection, pipes and pumping system. Diesel Pump 1 Stationary Diesel 18.75 70 140 2.4 2709.72 6503.33 6.50 Establishment of capped waste stockpile area. Establishment of crasped waste stockpile area. Light Vehicles 4 Transport Diesel 18.75 70 140 2.0 20 1.6 2312.60 3700.17 3.70 3.2.2 Cap removal Removal and stockpiling of topsoil (to stockpile area). Scraper/ Dozer 2 Transport Diesel 60.9 169 169 2704 94.64 2721.69 257580.36 257.58 Removal and stockpiling of reusable clay layer for use at the containment cell. Scraper/ Dozer 2 Transport Diesel 37.35 169 169 169 5408 2721.69 549750.09 549.75				Machinery Service Vehicle	1	Transport Petrol	8			26	130	1040	8.32	2312.60	19240.87	19.24
Light Vehicles 16 Transport Petrol 8 9100 145600 2080 16.64 2312.60 38481.73 38.48				Backhoes	4	Transport Diesel	21.9			26	130	4160	91.104	2721.69	247956.48	247.96
3.2.1 Site Establishment Installation of water treatment plant. Backhoes 1 Transport Diesel 21.9 10 50 400 8.76 2721.69 23841.97 23.84 Installation of water collection, pipes and pumping system. Diesel Pump Diesel 1 Stationary Diesel 1 10 50 400 2.4 2709.72 6503.33 6.50 Establishment of capped waste stockpile area. Establishment of capped waste stockpile area. Light Vehicles 4 Transport Diesel 1 18.75 70 140 2 2 0.0375 2721.69 102.06 0.10 Establishment of erosion and sediment control measures. Light Vehicles 4 Transport Petrol 8 3500 14000 200 1.6 2312.60 3700.17 3.70 3.2.2 Cap removal Removal of grass cover Excavators 2 Transport Diesel 35 169 169 2704 94.64 2721.69 257580.36 257.58 Removal and stockpiling of topsoil (to stockpile area). Removal and stockpiling of reusable clay layer for use at the containment cell. 30T Articulated Truck 4 Transport Diesel 37.35 169 169 5408 201.9888 2721.69 549750.09 549.75				Heavy Vehicle Movements	820	Transport Diesel	18.75	120	98400			1405.714	26.357143	2721.69	71735.87	71.74
3.2.1 Site Establishment Installation of water treatment plant. Backhoes 1 Transport Diesel 21.9 10 50 400 8.76 2721.69 23841.97 23.84 Installation of water collection, pipes and pumping system. 1 Stationary Diesel 6 10 50 400 2.4 2709.72 6503.33 6.50 Establishment of capped waste stockpile area. 1 Transport Diesel 18.75 70 140 2 2 0.0375 2721.69 102.06 0.10 Establishment of erosion and sediment control measures. 1 Ught Vehicles 4 Transport Diesel 8 3500 14000 200 1.6 2312.60 3700.17 3.70 3.2.2 Cap removal Removal and stockpiling of topsoil (to stockpile area). 1 Transport Diesel 60.9 169 169 2704 94.64 2721.69 257580.36 257.58 Removal and stockpiling of reusable clay layer for use at the containment cell. 2 Transport Diesel 37.35 169 169 5408 201.988 2721.69 549750.09 549.75				Light Vehicles	16	Transport Petrol	8	9100	145600			2080	16.64	2312.60	38481.73	38.48
Installation of water collection, pipes and pumping system. Diesel Pump 1 Stationary Diesel 6 10 50 400 2.4 2709.72 6503.33 6.50				I		T T	ı		1			1		1	1	1
Diesel Diese Die	3.2.1	Site Establishment			1	-	21.9						8.70	2721.69	23841.97	23.84
area ready Vertice Modernetts 2 transport Diesel 16.75 70 140 2 0.0375 2721.69 102.06 0.10			pumping system.	Diesel Pump	1		6			10	50	400		2709.72	6503.33	6.50
Control measures. Light Verticles 4 Transport Petrol 8 350 1400 200 1.6 2312.60 3700.17 3.70			Establishment of capped waste stockpile area.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
Removal and stockpiling of topsoil (to stockpile area). Removal and stockpiling of reusable clay layer for use at the containment cell. Removal and stockpiling of reusable clay layer for use at the containment cell. Removal and stockpiling of reusable clay layer for use at the containment cell. Removal and stockpiling of reusable clay layer for use at the containment cell. Removal and stockpiling of reusable clay layer for use at the containment cell.				Light Vehicles	4	Transport Petrol	8	3500	14000			200	1.6	2312.60	3700.17	3.70
Stockpile area). Scraper/ Dozer 2 Hansport Diesel 60.9 169 169 2704 164.6736 2721.69 448189.83 448.19 448	3.2.2	Cap removal	Removal of grass cover	Excavators	2	Transport Diesel	35			169	169	2704	94.64	2721.69	257580.36	257.58
layer for use at the containment cell. 301 Articulated Huck 4 Hairsport Diesel 37.35 169 169 3406 201.9888 2721.69 549750.09 549.75				Scraper/ Dozer	2	Transport Diesel	60.9			169	169	2704	164.6736	2721.69	448189.83	448.19
Special formula formul				30T Articulated Truck	4	Transport Diesel	37.35			169	169	5408	201.9888	2721.69	549750.09	549.75
			Removal of remaining capping layers:	Water Cart	1	Transport Diesel	27			169	845	6760	182.52		496762.13	496.76

Option 3 - Sorting of recyclables from the CWS and treatment of Non - recyclables to place in onsite Containment Cell

Marchan Marc			otion 3 - 301 ting of recyc	Jabies II em ti		orro ana		Distance	Tooyon							
Second Content		Key Action	Key Steps	Equipment	#	Source Type		Travelled per				Total Operating Hours				
Marchan Microsophic production Microsoph					1											
Accordance of the properties water in the control of the properties water in the control of the properties water in the prop				Heavy Vehicle Movements	9	Transport Diesel	18.75	70	630			9	0.16875	2721.69	459.28	0.46
3.2 Software Processing and Software Processing Software Software Processing Softw				Light Vehicles	12	Transport Petrol	8	1120	13440			192	1.536	2312.60	3552.16	3.55
Removal of castless restricted from state Service of this part of castless Service of the	3.2.3		Removal of recyclable waste materials:	Excavators	4	Transport Diesel	35			169	169	5408				
Secretar material in clearing storage Light vehicles Françeis February 18 11830 94640 1185 1184 35,500 272 (40) 90,952 (43) 90,953 100,953		sort	Removal of carbon materials (first cut spent pot lining and anodes) of greater than 500mm in size	Scraper/ Dozer	3		60.9			169	169	4056				
Transport notice to deservery designation to deservery strongery of the Section				Water Cart	1	Transport Diesel	27			169	169	1352	36.504	2721.69	99352.43	99.35
International Content of Statistics and Consult materials accordance as in many covers placed over the support young placed over the support of statistics			Transport material to cleaning/ storage	Light Vehicles	8	Transport Petrol	8	11830	94640			1352	10.816			
Excession of natural materials affected by reaches and the temporary cover placed over the exposed vession.				Wash-down bay	1		15			169	845	6760	101.4	2709.72	274765.61	274.77
wastes and contaminants. Investigations to be undertaken of stocking toopprint to the contaminant cell. Without a stocking system implemented waster for compaction of stocking and the contaminant cell.			rain events and the temporary cover placed													
weather cover material to the containment cell containment cell interest in rectangular tracking system implemented introduction of suitable accordance of the containment cell interest in the contai			wastes and contaminants. Investigations to be undertaken of stockpile footprint to determine soils to be removed.													
Introughout the removal process.																
Departe water Continued of part of the process of the part of																
1.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2.2			material for filling of capped waste stockpile excavation void													
below and surrounding the capped waste stockpile footprint. Light Vehicles 2 Transport Diesel 18.75 70 140 2 0.0375 2721.69 102.06 0.10	3.2.4	treatment plant (installed as part of	capped waste stockpile during material removal to be pumped to and treated at the	Diesel Pump	1		6			185	925	7400		2709.72	120311.57	120.31
Discharge of treated water to existing dam. Discharge of treated water to exist the provided water t			below and surrounding the capped waste	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
Discharge of treated water to existing dam.			Dam water treatment.	Light Vehicles	2	Transport Petrol	8	12950	25900			370	2.96	2312.60	6845.31	6.85
Second Excavation of deposited sediments and pond removal at CWS Excavation of deposited sediments and pond removal at CWS Excavation of deposited sediments and pond removal at CWS Franch Placement of excavated material into the containment cell. So TArticulated Truck Transport Diesel 37.35 4 20 320 11.952 2721.69 32529.59 32.53			Discharge of treated water to existing dam.													
1 1 1 1 1 1 1 1 1 1			Groundwater monitoring.													
Placement of excavated material into the containment cell. Operation of temporary leachate collection facilities prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete closure of Containment Cell. In a substituting prior to complete	3.2.5			Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
facilities prior to complete closure of Containment Cell. Heavy Vehicle Movements 3 Transport Diesel 18.75 70 210 3 0.05625 2721.69 153.09 0.15					2	Transport Diesel	37.35			4	20	320	11.952			
3.3 Recyclables Cleaning and Storage Carbon and carbon with embedded steel materials cleaning High pressure cleaning of material to remove asbestos and other fines. Dight vericles 2 Transport Diesel 35 Transport Diesel 35 177 885 14160 495.6 2721.69 1348867.58 1348.87 177 885 7080 106.2 2709.72 287772.26 287.77			facilities prior to complete closure of	Heavy Vehicle Movements	3	Transport Diesel	18.75	70	210			3	0.05625	2721.69	153.09	0.15
3.3.1 With embedded steel materials cleaning High pressure cleaning of material to remove assets and other fines. Wash-down bay Transport Diesel 35 Transport Diesel 35 Transport Diesel 35 Transport Diesel 35 Transport Diesel 36 Transport Diesel 37 Transport Diesel 38 Transport Diesel 37 Transport Diesel 38 Transport Diesel 37 Transport Diesel 38 Transport Diesel 39 Transport Diesel 30 Transport Diesel 31 Transport Diesel 35 Transport Diesel 36 Transport Diesel 37 Transport Diesel 37 Transport Diesel 38 Transport Diesel 38 Transport Diesel 39 Transport Diesel 39 Transport Diesel 39 Transport Diesel 30 Transport Diesel 30 Transport Diesel 30 Transport Diesel 30 Transport Diesel 37 Transport Diesel 38 Transport Diesel 38 Transport Diesel 39 Transport Diesel 39 Transport Diesel 39 Transport Diesel 30 Transport Diesel 37 Transport Diesel 38 Transport Diesel 38 Transport Diesel Trans				Light Vehicles	2	Transport Petrol	8	1400	2800			40	0.33	2312.60	740.03	0.74
3.3.1 with embedded steel materials cleaning afterial. Stationary Approximaterial to remove asbestos and other fines. Stationary Diesel Transport Diesel 35 177 885 14160 495.6 2721.69 1348867.58 1348.87 1348.87 177 885 7080 106.2 2709.72 287772.26 287.77	3.3	Recyclables Cleaning a	nd Storage	Light Vehicles									0.32	2312.00	740.03	0.74
High pressure cleaning of material to remove asbestos and other fines. Wash-down bay Stationary Diesel 15 177 885 7080 106.2 2709.72 287772.26 287.77	3.3.1	with embedded steel		Excavators	2	Transport Diesel	35			177	885	14160		2721.69	1348867.58	1348.87
Turner Ottol 0 (1979 01700) 07.10					1		15			177	885	7080				
				Light Vehicles	4	Transport Petrol	8	61950	247800	_		3540	28.32	2312.60	65492.95	65.49

Option 3 - Sorting of recyclables from the CWS and treatment of Non - recyclables to place in onsite Containment Cell

	<u> </u>	otion 3 - Sorting of recyc	Jables II olli ti	ie (JVV 3 ariu	treatmen		- recycla	ables to	place	111 01151	te con	taninent	Cell	
Action No.	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled per movement (km)	Total Distance (km)	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
3.3.2	Metals cleaning	Approximately 5,000T of recyclable metal	Excavators	1	Transport Diesel	35			50	250	2000	70	2721.69	190518.02	190.52
			Wash-down bay	1	Stationary Diesel	15			50	250	2000	30	2709.72	81291.60	81.29
			Light Vehicles	Δ	Transport Petrol	8	17500	70000			1000	8	2312.60	18500.83	18.50
3.3.3	Separation of Carbon from embedded	Physical removal of steel from carbon	Eight vehicles		Transport Diesel	35			66	330	2640		2012.00	10000.00	10.00
0.0.0	metals	Thysical removal of steel well cargon	Excavators	1	Stationary							92.4	2721.69	251483.79	251.48
			Wash-down bay	1	Diesel	15			66	330	2640	39.6	2709.72	107304.91	107.30
3.3.4	Final carbon clean (second clean) and store	Cleaning as above, 48,500 T carbon	Excavators	1	Transport Diesel	35			162	810	6480	226.8	2721.69	617278.38	617.28
		Cleaned carbon to be transported for appropriatestorage.	Wash-down bay	1	Stationary Diesel	15			162	810	6480	97.2	2709.72	263384.78	263.38
		Storage location to be recorded within the	wasii-dowii bay		Transport Diesel	37.35			5	25	400	77.2	2107.12	203304.70	203.30
		internal material tracking system.	30T Articulated Truck	2			-/		_			14.94		40661.99	40.66
	Final steel clean		Light Vehicles	4	Transport Petrol	8	56700	226800			3240	25.92	2312.60	59942.70	59.94
3.3.5	(second clean) and store	Cleaning as above, 5,000T of separated steel	Excavators	1	Transport Diesel	35			50	250	2000	70	2721.69	190518.02	190.52
		Cleaned metals to be transported for storage adjacent to other stored metals.	Wash-down bay	1	Stationary Diesel	15			50	250	2000	30	2709.72	81291.60	81.29
		Storage location to be recorded within the internal material tracking system.	30T Articulated Truck	2	Transport Diesel	37.35			1	5	80	2.988	2721.69	8132.40	8.13
			Light Vehicles	4	Transport Petrol	8	17500	70000			1000	8	2312.60	18500.83	18.50
3.4	Recyclable Material Tra	ansport	ı				ı						1		ı
3.4.1	Load and Transport 48,500 tonnes of cleaned and crushed carbon to carbon	Load 28,500 tonnes of carbon into 20 tonne articulated trucks			Transport Diesel	35			162	810	25920				
	processing facility		Excavators	4								907.2	2721.69	2469113.54	2469.11
		Truck 28,500 tonnes of carbon to carbon recycling facility	Loaders	1	Transport Diesel	15.3			163	815	6520	99.756	2721.69	271504.51	271.50
			Light Vehicles	6	Transport Petrol	8	11410	68460			978	7.824	2312.60	18093.81	18.09
			Heavy Vehicle Movements	2425	Transport Diesel	18.75	70	169750			2425	45.46875		123751.66	123.75
3.4.2	Load and Transport 5,000 tonnes of cleaned steel to steel processing facility	Load 5000 tonnes of steel into 30 T articulated trucks	Excavators	4	Transport Diesel	35			50	250	8000	280		762072.08	762.07
		Truck 5,000 tonnes of steel to steel recycling facility	Loaders	1	Transport Diesel	15.3			50	250	2000	30.6	2721.69	83283.59	83.28
			Light Vehicles	4	Transport Petrol	8	17500	70000			1000	30.6	2312.60	18500.83	18.50
			Heavy Vehicle Movements	250	Transport Diesel	18.75	70	17500			250	4.6875	2721.69	12757.90	12.76
3.5	Recyclable Material Pro	ocessing T	I												I
3.5.1	Processing of 48,500 tonnes of cleaned and crushed carbon at a carbon processing facility	This would generally include: initial crushing (where necessary); blending with other additives, as required; fine milling; thermal treatment; crushing and mixing (as required) and subsequent distribution to end markets.	Emissions fo	r SPL į	processing (carbor	n component) is b	pased on a factor	of 0.2 t CO2e/toi	nne quoted by	Regain, whic	h includes all	recovery, cru	ushing etc. See 3.!	5.1.	9,700.00
3.5.2	Processing of 5,000 tonnes of cleaned Steel at a steel processing facility	Generally steel recycling involves breakdown of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material.		-	Emissions from pro	ocessing of scrap	steel in an EAF =	= 1.12 tCO2e/ton	ne steel (dired	and indirect	emissions) (see Factors to	ab)		5,600.00

Option 3 - Sorting of recyclables from the CWS and treatment of Non - recyclables to place in onsite Containment Cell

	<u> </u>	tion 3 - Sorting of recyc	Jubica II oili ti	10	JWS and	treatmen		- recycla	ibics to	place	111 01131	te con	itainment	Cell	
Action No.	Key Action	Key Steps	Equipment		Source Type	Fuel Consumption (L/hr)	Distance Travelled per movement (km)	Total Distance (km)	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
3.6	Non-Recyclable Materia	al Sorting and Treating													
3.6.1	Transport untreated non-crushable/ non-recyclable material to the Containment Cell	Transportation of removed materials would include:	Excavators	2	Transport Diesel	35			169	169	2704	94.64	2721.69	257580.36	257.58
		All truck loads are to be covered.			Transport Diesel	37.35			169	169	2704				
		Trucks transporting capped waste stockpile materials to have priority on haul road.	30T Articulated Truck Light Vehicles	2	Transport Petrol	8	11830	47320	107	107	676	100.9944 5.408		274875.04 12506.56	274.88
3.6.2	Crushing of fines and crushable materials	Jaw crushing/screening – to size fraction required for mixing (50-100T/hr)	Excavators	2	Transport Diesel	35			173	865	13840	484.4		1318384.70	1318.38
		Pulverising to minus 10mm (5-10T/hr)	Diesel Pump	1	Stationary Diesel	6			173	865	6920	41.52	2709.72	112507.57	112.51
			Impact Crusher	1	Stationary Diesel	35			173	865	6920	242.2		656294.18	656.29
			Tracked Stockpiler	1	Stationary Diesel	9			173	865	6920	62.28		168761.36	168.76
			Wash-down bay	1	Stationary Diesel	15			173	865	6920	103.8	2709.72	281268.94	281.27
			Light Vehicles	2	Transport Petrol	8	60550	181650			2595	20.76	2312.60	48009.66	48.01
3.6.3	Treatment Material Delivery	Filling of trucks	Scraper/ Dozer	1	Transport Diesel	60.9			39	195	1560	95.004		258571.06	258.57
	Donver y	Transport of 50,000 tonnes lime	Heavy Vehicle Movements	2000	Transport Diesel	18.75	610	1220000			17428.57	326.78571	2721.69	889408.10	889.41
		Delivery and stockpiling of lime	Light Vehicles	1	Transport Petrol	8	13650	13650			195	1.56	2312.60	3607.66	3.61
3.6.4	Calcium treating of fines and crushables	Crushed material will be mixed with lime slurry in pug mill and transported directly for disposal in the containment cell. Batch process.	Excavators	1	Transport Diesel	35			144	360	2880	100.8	2721.69	274345.95	274.35
			Pug mill	1	Stationary Diesel	29			144	360	2880	83.52	2709.72	226315.81	226.32
			Wash-down bay	1	Stationary Diesel	15			144	360	2880	43.2	2709.72	117059.90	117.06
		Transport of pug mill componenets to Smelter Site	Heavy Vehicle Movements	6	Transport Diesel	18.75	60	360			5.142857	0.0964286	2721.69	262.45	0.26
			Light Vehicles	8	Transport Petrol	8	50575	404600			5780	46.24	2312.60	106934.81	106.93
3.6.5	Transport treated fines and crushables to the Containment Cell	Transportation of removed materials would include:	Excavators	2	Transport Diesel	35			144	216	3456	120.96	2721.69	329215.14	329.22
	3011	Transportation to cease during rain events.	30T Articulated Truck	2	Transport Diesel	37.35			144	216	3456	129.0816	2721.69	351319.58	351.32
		All truck loads are to be covered.	Water Cart	1	Transport Diesel	27			144	216	1728	46.656	2721.69	126982.98	126.98
		Trucks transporting capped waste stockpile materials to have priority on haul road.	Light Vehicles	7	Transport Petrol	8	20230	141610			2023	16.184	2312.60	37427.18	37.43
3.7	Haul Road Maintenance	e I			T	ı		ı		1			1	1	T T
3.7.1	Maintain the Haul Road surface condition	Scraping and grading of the Haul Road surface	Excavators	1	Transport Diesel	35			289	11.115385	44.46154	1.5561538	2721.69	4235.36	4.24
		Remove any major material spills along the haul road an transport the material to the Containment Cell for disposal			Transport Diesel	60.9			289	289	1156				
			Scraper/ Dozer	1	ļ							70.4004	2721.69	191607.78	191.61
			Grader	1	Transport Diesel	21.1			289	289	1156	24.3916	2721.69	66386.28	66.39
			30T Articulated Truck	1	Transport Diesel	37.35	722.5	722.5			10.32143	0.3855054	2721.69	1049.22	1.05
			Light Vehicles	1	Transport Petrol	8	722.5	722.5			10.32143	0.0825714	2312.60	190.96	0.19

Option 3 - Sorting of recyclables from the CWS and treatment of Non - recyclables to place in onsite Containment Cell

	<u> </u>	otion 3 - Sorting of recyc	nabics iroin ti	110	JVV J aria	treatmen		- recycle	ibics to	place	111 01131	te con	taninicin	OCII	
Action No.	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled per movement (km)	Total Distance (km)	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
3.8	Containment Cell Mater	rial Placement and Capping													
3.8.1	Cell Material Acceptance and Placement	Transportation of material to the cell	Excavators	3	Transport Diesel	35			186	223.2	5356.8	187.488	2721.69	510283.46	510.28
		Temporary material stockpiling	Compactors	2	Transport Diesel	20.8			186	223.2	3571.2	74.28096	2721.69	202169.45	202.17
		Placement of materials in dedicated cell: demolition waste, contaminated soils and capped waste stockpile materials.	30T Articulated Truck		Transport Diesel	37.35			186	223.2	7142.4	266.76864	2721.69	726060.47	726.06
		Cover placed material in the event of predicted rainfall and/ or strong winds.	Water Cart	2	Transport Diesel	27			186	930	14880	401.76	2721.69	1093464.57	1093.46
		Material tracking and quantifying/ survey of placed material.													
3.8.2	Operate water treatment infrastructure at the Containment Cell	Installation of water treatment plant. Operation and maintenance of water	Hand held power tools and	1 1	Challana										
		collection/ sump system and water treatment plant. Captured water pumped to water treatment	Diesel Pump	1	Stationary Diesel	6			186	930	7440	44.64	2709.72	120961.90	120.96
		plant.	Tanks and ancillary pipewo	1											
			Heavy Vehicle Movements	. 1	Transport Diesel	18.75	70	70			1	0.01875	2721.69	51.03	0.05
			Light Vehicles	2	Transport Petrol	8	13020	26040			372	2.976	2312.60	6882.31	6.88
3.8.3	Leachate pond removal	Excavation of deposited sediments and pond lining.	Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
		Placement of excavated material into the containment cell.	30T Articulated Truck	2	Transport Diesel	37.35			4	20	320	11.952	2721.69	32529.59	32.53
		Operation of temporary leachate collection facilities prior to complete closure of Containment Cell.	Heavy Vehicle Movements	: 3	Transport Diesel	18.75	70	210			3	0.05625	2721.69	153.09	0.15
			Lieba Melelee		Transport Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
3.8.4	Haul road surface scrape	Scraping top xx mm of haul road for placement within the Containment Cell prior to closure	Light Vehicles Scraper/ Dozer	2	Transport Diesel	60.9			4	20	320	19.488		53040.22	53.04
			30T Articulated Truck	1	Transport Diesel	37.35			4	20	160	5.976	2721.69	16264.80	16.26
			Water Cart	1	Transport Diesel	27			4	20	160	4.32	2721.69	11757.68	11.76
			Heavy Vehicle Movements	. 3	Transport Diesel	18.75	70	210			3	0.05625	2721.69	153.09	0.15
			Light Vehicles	2	Transport Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
3.8.5	Containment Cell Cap Construction	As described in the Concept Design	Excavators	2	Transport Diesel	35			26		2080	72.8	2721.69	198138.74	198.14
			Compactors	2	Transport Diesel	20.8			26	130	2080	43.264	2721.69	117751.02	117.75
			Scraper/ Dozer	2	Transport Diesel	60.9			26	130	2080	126.672	2721.69	344761.41	344.76
			Grader	1	Transport Diesel	21.1			26	130	1040	21.944	2721.69	59724.68	59.72
			30T Articulated Truck	2	Transport Diesel	37.35	-		26	130	2080	77.688		211442.34	211.44
			Water Cart Hand held tools and equip	1	Transport Diesel	27			26	130	1040	28.08	2721.69	76424.94	76.42
			Diesel Pump	1	Stationary Diesel	6			26	130	1040	6.24	2709.72	16908.65	16.91
			Heavy Vehicle Movements	830		18.75	120				1422.857	26.678571	2721.69	72610.69	72.61
			Light Vehicles	14	Transport Petrol	8	9100	127400			1820	14.56	2312.60	33671.51	33.67

Option 3 - Sorting of recyclables from the CWS and treatment of Non - recyclables to place in onsite Containment Cell

	<u> </u>	tion 3 - Sorting of recyc	ciables iroin ti	ie c	JVV 3 ariu	tieatinei		- recycle	ables to	piace	111 01131	te con	taniment	Cell	
Action No.	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled per movement (km)	Total Distance (km)	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
3.9	Post Works Activities									1					
3.9.1	Decommission water treatment infrastructure	Decommission Capped Waste Stockpile water treatment plant, pumping well network and dams.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Restoration of water treatment plant location (regrading and surface stabilisation).	Light Vehicles	2	Transport Petrol	8	3500	7000			100	0.8	2312.60	1850.08	1.85
3.1	Operation/ Post-Compl	etion Phase Activities													
3.10.1	Groundwater monitoring at Capped Waste Stockpile location	Ongoing groundwater monitoring (as required)	Light Vehicles	1	Transport Petrol	8					80	0.64	2312.60	1480.07	1.48
3.10.2	Undertake monitoring of the Containment Cell	Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater).													
		Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater).													
		Gas monitoring (quarterly) for ammonia and methane.													
3.10.3	Maintenance activities (as required)	Vegetation cover maintenance (weed and tree/ deep rooted plant removal)	Light Vehicles	1	Transport Petrol	8					480	3.84	2312.60	8880.40	8.88
		Water treatment plant servicing/ maintenance (in accordance with manufacturer's requirements)	Hand held power tools and	equip	ment										
3.10.4	Leachate treatment	Captured leachate pumped to water treatment plant and treated; OR	Light Vehicles	1	Transport Petrol	8					480	3.84	2312.60	8880.40	8.88
		Captured leachate pumped to truck for off- site treatment and disposal.	Hand held power tools and	equip	ment										
			Wastewater truck	1	Transport Diesel	27					480	12.96	2721.69	35273.05	35.27
	Carbon Benefits														
	Processing of 5,000 tonnes of cleaned Steel at a steel processing facility	Lifecycle benefit associated with using scrap	steel - Estimation of the net	benef	fit of recycling 1 to	onne of steel from	commercial and	industrial (C&I)	and construct	ion and demol	ition (C&D) s	ources in New	v South Wales (0.	44 tCO2e/tonne)	(2,200.00)
	Processing of 48,500 tonnes of cleaned and crushed carbon at a carbon processing facility	Lifecycle benefit assoc	iated with using SPL rather t	than c	oal - estimation o	f lifecycle emission	n of the avoided	emissions of an ϵ	equivalent cald	orific value of o	coal being pro	oduced (see F	actors tab).		
	l														7,272.77

43,519.56

Option 4 - Treatment of all material within the Containment cell

			Option 4 -	1100	itment of a	ili illatei	iai witi	IIII tile	Contai	nment	cen				
Actio n No.	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
4.1	Containment Cell Estat	blishment and Construction			•				1	1				•	
4.1.1	Vegetation clearance	Clearance of trees and shrubs (using ecologist as required)	Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
		Grubbing (removal of remaining surface vegetation and roots)	Scraper/ Dozer	1	Transport Diesel	60.9			4	20	160	9.744	2721.69	26520.11	26.52
		Mulching of green waste for reuse on site or to be provided to green waste processors	30T Articulated Truck	1	Transport Diesel	37.35			4	20	160	5.976	2721.69	16264.80	16.26
			Mulching/ composting machine	1	Stationary Petrol	60			4	20	160		2318.76	22260.10	22.26
			Heavy Vehicle Movements	4	Transport Diesel	18.75	70	280			4				1
			Light Vehicles	5	Transport Petrol	8	1400	7000			100	0.075	2721.69 2312.60	204.13 1850.08	0.20 1.85
4.1.2	Preparatory works	Topsoil scraping and stockpiling (including transport to long term stockpile area)	Excavators	2	Transport Diesel	35	1400	7000	18	90	1440	50.4	2721.69	137172.97	137.17
		Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area)	Scraper/ Dozer	2	Transport Diesel	60.9			18	90	1440	87.696	2721.69	238680.98	238.68
		Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment plant.	30T Articulated Truck	2	Transport Diesel	37.35			18	90	1440	53.784	2721.69	146383.16	146.38
		Excavation and construction of perimeter dish drain	Water Cart	1	Transport Diesel	27			18	90	720	19.44	2721.69	52909.58	52.91
			Heavy Vehicle Movements	7	Transport Diesel	18.75	70	490			7	0.40405	0704 (0	057.00	0.04
			Light Vehicles	Ω	Transport Petrol	8	6300				720	0.13125	2721.69 2312.60	357.22 13320.60	0.36 13.32
4.1.3	Cell Base liner	As described in the Concept Design	Excavators	2	Transport Diesel	35	0300	30400	26	130	3120				
4.1.3	Construction	As described in the Concept Design		3					26			109.2	2721.69	297208.11	297.21
			Loaders Compactors	3	Transport Diesel Transport Diesel	15.3 20.8			26 26	130 130	3120 1040	47.736 21.632	2721.69 2721.69	129922.40 58875.51	129.92 58.88
			30T Articulated Truck	4	Transport Diesel	37.35			26	130	4160		2721.69	422884.68	422.88
			Water Cart	2	Transport Diesel	27			26		2080		2721.69	152849.89	152.85
			Machinery Service Vehicle	1	Transport Petrol	8			26	130	1040	8.32	2312.60	19240.87	19.24
			Backhoes	4	Transport Diesel	21.9			26	130	4160	91.104	2721.69	247956.48	247.96
			Heavy Vehicle Movements	820	Transport Diesel	18.75	120	98400			1405.7143	26.357143	2721.69	71735.87	71.74
			Light Vehicles	16	Transport Petrol	8	9100	145600			2080			38481.73	38.48
4.2	Capped Waste Stockpi	le Removal	3												
4.2.1	Site Establishment	Installation of water treatment plant.	Backhoes	1	Transport Diesel	21.9			10	50	400	8.76	2721.69	23841.97	23.84
		Installation of water collection, pipes and pumping system.	Diesel Pump	1	Stationary Diesel	6			10	50	400	2.4	2709.72	6503.33	6.50
		Establishment of capped waste stockpile area.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Establishment of erosion and sediment control measures.	Light Vehicles	4	Transport Petrol	8	3500	14000			200	1.6	2312.60	3700.17	3.70
4.2.2	Cap removal	Removal of grass cover	Excavators	2	Transport Diesel	35			16	80	1280	44.8		121931.53	121.93
		Removal and stockpiling of topsoil (to stockpile area).	Scraper/ Dozer	2	Transport Diesel	60.9			16	80	1280	77.952	2721.69	212160.87	212.16
		Removal and stockpiling of reusable clay layer for use at the containment cell.	30T Articulated Truck	4	Transport Diesel	37.35			16	80	2560	95.616	2721.69	260236.73	260.24
		Removal of remaining capping layers:	Water Cart	1	Transport Diesel	27			16	80	640	17.28	2721.69	47030.73	47.03
		Suitable material stockpiled for use as wet weather cover.	Hand held power tools and equipment	1											
		Remaining material transported for disposal at containment cell.	Heavy Vehicle Movements Light Vehicles	9	Transport Diesel Transport Petrol	18.75	70 5600	630 67200			960	0.16875 7.68	2721.69 2312.60	459.28 17760.80	0.46 17.76
40-				12		8	3600	67200				7.68	2312.00	17700.00	17.76
4.2.3	Material removal	Removal of recyclable waste materials: Removal of carbon materials (first cut spent pot lining and anodes) of greater	Excavators Scraper/ Dozer	2	Transport Diesel Transport Diesel	60.9			44	220	7040 5280	246.4	2721.69	670623.43	670.62
		than 500mm in size Removal of metals greater than 500mm		3								321.552		875163.58	875.16
		in size Transport material to cleaning/ storage	Water Cart Light Vehicles	1	Transport Diesel	27	15400	123200	44	220	1760	47.52	2721.69	129334.52	129.33
		shed. Removal of non-recyclable materials and	Light venicles	8	Transport Petrol	8	15400	123200			1760	14.08	2312.60	32561.46	32.56
L		transport to the sorting area.							l	l		l	l		i

Option 4 - Treatment of all material within the Containment cell

			Option 4 -	rea	itment of a	iii mater	ıaı witi	nın tne	Contai	nment	cell				
						Fuel			Estimated	Estimated	Total		Emission		
Actio n No.	Key Action	Key Steps	Equipment	#	Source Type	Consumption (L/hr)	Distance Travelled	Total Distance	Timeframe (weeks)	Timeframe (Days)	Operating Hours	Total Fuel Use (kL)	factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
		Removal of waste materials would cease in rain events and the temporary cover placed over the exposed waste.													
		Excavation of natural materials affected by wastes and contaminants. Investigations to be undertaken of stockpile footprint to determine soils to be removed.													
		Removal and transportation of stockpiled wet weather cover material to the containment cell.													
		Material tracking system implemented throughout the removal process.													
		Placement and compaction of suitable material for filling of capped waste stockpile excavation void													
4.2.4	Operate water treatment plant (installed as part of capped waste stockpile removal Key Task).	Leachate and captured stormwater from capped waste stockpile during material removal to be pumped to and treated at the treatment plant.	Diesel Pump	1	Stationary Diesel	6			64	320	2560	15.36	2709.72	41621.30	41.62
		Pumping and treatment of groundwater from below and surrounding the capped waste stockpile footprint.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Dam water treatment.	Light Vehicles	2	Transport Petrol	8	4480	8960	1		128	1.024	2312.60	2368.11	2.37
		Discharge of treated water to existing dam.	Light venicles		Transport read	Ü	4400	0700			120	1.024	2312.60	2368.11	2.37
	l cookete nend	Groundwater monitoring.													
4.2.5	Leachate pond removal at CWS	Excavation of deposited sediments and pond lining.	Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
		Placement of excavated material into the containment cell. Operation of temporary leachate collection	30T Articulated Truck	2	Transport Diesel	37.35			4	20	320	11.952	2721.69	32529.59	32.53
		facilities prior to complete closure of Containment Cell.	Heavy Vehicle Movements	3	Transport Diesel	18.75	70				3	0.05625	2721.69	153.09	0.15
			Light Vehicles	2	Transport Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
4.3	Haul Road Maintenance Maintain the Haul				1			1	1	1		•	T	T	ı
4.3.1	Road surface condition	Scraping and grading of the Haul Road surface	Excavators	1	Transport Diesel	35			82	410	3280	114.8	2721.69	312449.55	312.45
		Remove any major material spills along the haul road an transport the material to the Containment Cell for disposal	Scraper/ Dozer	1	Transport Diesel	60.9			82	410	3280	199.752	2721.69	543662.22	543.66
			Grader	1	Transport Diesel	21.1			82	410	3280		2721.69	188362.44	188.36
			30T Articulated Truck	1	Transport Diesel	37.35	205	205			2.9285714	0.1093821	2721.69	297.70	0.30
	O		Light Vehicles	1	Transport Petrol	8	205	205			2.9285714	0.0234286	2312.60	54.18	0.05
4.4.1	Cell Material Acceptance and	rial Placement and Capping Transportation of material to the cell			Transport Diesel	35			46	230	5520				
	Placement	Temporary material stockpiling	Excavators Compactors	3	Transport Diesel	20.8			46	230	3680	193.2 76.544	2721.69 2721.69	525829.74 208328.73	525.83 208.33
		Placement of materials in dedicated cell:	compactor 3									70.544	2721.07	200320.73	200.33
		demolition waste, contaminated soils and capped waste stockpile materials.	30T Articulated Truck	4	Transport Diesel	37.35			46	230	7360	274.896	2721.69	748180.59	748.18
		Cover placed material in the event of predicted rainfall and/ or strong winds. Material tracking and quantifying/ survey of	Light Vehicles	2	Transport Petrol	8			46	230	3680	29.44	2312.60	68083.06	68.08
4.4.2	Treatment Material	placed material. Filling of trucks	Scraper/ Dozer	-1	Transport Diesel	60.9			52	260	2080	126.672	2721.69	344761.41	344.76
	Delivery	Transport of 60,000 tonnes lime	Light Vehicles	1	Transport Petrol	8			52	260	2080	126.672		38481.73	38.48
		Delivery and stockpiling of lime	Water Cart	1	Transport Diesel	27			52	260	2080	56.16	2721.69	152849.89	152.85
			30T Articulated Truck	1	Transport Diesel	37.35			46	230				23380.64	23.38
4.4.3	Treatment Material	Treatment material (lime) added through	Heavy Vehicle Movements Excavators	2400	Transport Diesel Transport Diesel	18.75	305	732000	46	230	10457.143 5520	196.07143	2721.69	533644.86	533.64
4.4.3	Placement	placed waste material as part of the daily cover		3	·							193.2	2721.69	525829.74	525.83
			Scraper/ Dozer Water Cart	1	Transport Diesel Transport Diesel	60.9 27			46 46	230 230	1840 1840	112.056 49.68	2721.69 2721.69	304981.25 135213.36	304.98 135.21
4.4.4	Operate water treatment infrastructure at the	Installation of water treatment plant.	water Cart		Transport Diesel	21			46	230	1840	47.00	2/21.09	133213.30	133.21
l	Containment Cell		Hand held power tools and	1					l						l

Option 4 - Treatment of all material within the Containment cell

			Option 4 -	116	atment of a	an mater	ıaı vviti	าเก เทe	Contai	IIIIIEIIL	cen				
						Fuel			Estimated	Estimated	Total		Emission		
Actio	Kou Action	Vou Stone	Emiliament	#	Course Ture		Distance	Total	Timeframe			Total Fuel		Emissions	Emissions
n No.	Key Action	Key Steps	Equipment		Source Type	Consumption	Travelled	Distance		Timeframe	Operating	Use (kL)	factor	(kgCO2e/kL)	(tCO2e/kL)
						(L/hr)			(weeks)	(Days)	Hours		(kgCO2e/kL)		
		Operation and maintenance of water													
		collection/ sump system and water			Stationary Diesel	6			58	290	2320				
		treatment plant.	Diesel pump	1								13.92	2709.72	37719.30	37.72
		Captured water pumped to water treatment													
		plant.	Tanks and ancillary pipewor	k											
		piant.	Heavy Vehicle Movements		Transport Diesel	18.75	70	70			1	0.01875	2721.69	51.03	0.05
			Light Vehicles		Transport Petrol	8	560				16		2312.60	296.01	0.30
	Leachate pond		Light vehicles		Transport Fetror		300	1120			10	0.128	2312.00	270.01	0.30
4.4.5	removal at	Excavation of deposited sediments and			Transport Diesel	35			4	20	160				
4.4.5		pond lining.	F		Transport Diesei	35			4	20	160	5.6	2724 (0	15041 44	15.04
	Containment Cell	· -	Excavators									5.6	2721.69	15241.44	15.24
		Placement of excavated material into the		_	Transport Diesel	37.35			4	20	320				
		containment cell.	30T Articulated Truck									11.952	2721.69	32529.59	32.53
		Operation of temporary leachate collection													
		facilities prior to complete closure of			Transport Diesel	18.75	70	210			3				
		Containment Cell.	Heavy Vehicle Movements	3	3							0.05625	2721.69	153.09	0.15
			Light Vehicles		Transport Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
	Houl road confere	Coroning top of houl read for all and the													
4.4.6	Haul road surface	Scraping top of haul road for placement			Transport Diesel	60.9	l	l	4	20	320	l			
1	scrape	within the Containment Cell prior to closure	Scraper/ Dozer		1]	l	l]		1	19.488	2721.69	53040.22	53.04
		İ	30T Articulated Truck	1	Transport Diesel	37.35	1	1	1	20	160		2721.69	16264.80	16.26
—	İ		Water Cart	-	Transport Diesel	27	l	l	4	20	160	4.32	2721.69	11757.68	11.76
	 	ł	Heavy Vehicle Movements		Transport Diesel	18.75		210	4	20	160		2721.69	153.09	0.15
				- 3			/0	210							
	0		Light Vehicles	- 4	Transport Petrol	8			4	20	320	2.56	2312.60	5920.27	5.92
4.4.7	Containment Cell Cap	As described in the Concept Design	L .		Transport Diesel	35	l	l	52	135.2	2163.2	l			
	Construction	9"	Excavators	2				l				75.712	2721.69	206064.29	206.06
			Compactors		Transport Diesel	20.8			52	135.2	2163.2		2721.69	122461.06	122.46
			Scraper/ Dozer		Transport Diesel	60.9			52	135.2	2163.2		2721.69	358551.87	358.55
			Grader		Transport Diesel	21.1			52	130	1040		2721.69	59724.68	59.72
			30T Articulated Truck		Transport Diesel	37.35			52	135.2	2163.2	80.79552	2721.69	219900.04	219.90
			Water Cart		Transport Diesel	27		İ	52	130			2721.69	76424.94	76.42
		İ	Hand held tools and equipm	1		<u> </u>	1	1	02	700	.540				
	†		Diesel pump	-	Stationary Diesel	6			52	260	2080	12.48	2709.72	33817.31	33.82
—	İ		Bobcat		Transport Diesel	11.4	l	l	52	135.2	3244.8		2721.69	100677.12	100.68
	†	 	Heavy Vehicle Movements		Transport Diesel	18.75	120	99600	32	135.2	1422.8571		2721.69	72610.69	72.61
—	 	ł	Light Vehicles			16./5							2312.60	33671.51	33.67
	D4 10/ 0 -41141		Light venicies	14	Transport Petrol	1 8	9100	127400			1820	14.56	2312.60	336/1.51	33.67
4.5	Post Works Activities	I	1		1										
	Decommission water	Decommission Capped Waste Stockpile													
1	troatmont														
4.5.1	treatment	water treatment plant, pumping well			Transport Diesel	18.75	70	140			2				
4.5.1	infrastructure		Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
4.5.1		water treatment plant, pumping well network and dams.	Heavy Vehicle Movements	- 2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
4.5.1		water treatment plant, pumping well network and dams. Restoration of water treatment plant	Heavy Vehicle Movements	2	2	18.75					_		2721.69	102.06	0.10
4.5.1		water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface		2	Transport Diesel Transport Petrol	18.75	70 3500				100				
	infrastructure	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation).	Heavy Vehicle Movements Light Vehicles	- 2	2	18.75					_		2721.69	102.06 1850.08	0.10
	infrastructure Operation/ Post-Comp	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation).		2	2	18.75					_				
	infrastructure Operation/ Post-Comp	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities			2	18.75					_				
4.6	infrastructure Operation/ Post-Comp	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities			Transport Petrol	18.75					100	0.8			
	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as		2	2	18.75					_	0.8			
4.6	Infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities		2	Transport Petrol	18.75					100	0.8			
4.6	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required)	Light Vehicles	2	Transport Petrol	18.75					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly,	Light Vehicles	2	Transport Petrol	18.75					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). letion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and	Light Vehicles	2	Transport Petrol	18.75					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude	Light Vehicles	2	Transport Petrol	8					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). stabilisation). stabilisation). oletion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater).	Light Vehicles	2	Transport Petrol	18.75					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Iction Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following)	Light Vehicles	1	Transport Petrol	8 8					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). setion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following and storm event, and following and storm event, and following and storm event, and following an	Light Vehicles	1	Transport Petrol	8					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater).	Light Vehicles	1	Transport Petrol	8 8					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater).	Light Vehicles	1	Transport Petrol	8					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater) Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Gas monitoring (quarterly) for ammonia	Light Vehicles	1	Transport Petrol	8					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater).	Light Vehicles	1	Transport Petrol	8					100	0.8	2312.60	1850.08	1.85
4.6 4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Idetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater) Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Gas monitoring (quarterly) for ammonia and methane.	Light Vehicles	1	Transport Petrol	8 8					100	0.8	2312.60	1850.08	1.85
4.6 .4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Cas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and	Light Vehicles	3	Transport Petrol Transport Petrol	8					100	0.8	2312.60	1850.08	1.85
4.6 .4.6.1	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Idetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater) Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Gas monitoring (quarterly) for ammonia and methane.	Light Vehicles	1	Transport Petrol	8 8					100	0.8	2312.60	1850.08	1.85
4.6 .4.6.1	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Stabilisation). Stabilisation). Stabilisation). Stabilisation). Stabilisation). Stabilisation). Stabilisation). Stabilisation). Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal)	Light Vehicles	1	Transport Petrol Transport Petrol	8					100	0.64	2312.60	1850.08	1.85
4.6 .4.6.1	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Detion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater) Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/	Light Vehicles	1	Transport Petrol Transport Petrol	8 8					100	0.64	2312.60	1850.08	1.85
4.6 .1 4.6.2	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). lection Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or oreater). Leachate inspections (quarterly, following an earthquake event of magnitude five or orgater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/ maintenance (in accordance with	Light Vehicles Light Vehicles	1	Transport Petrol Transport Petrol Transport Petrol	8					100	0.64	2312.60	1850.08	1.85
4.6 .4.6.1	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or creater) Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or creater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/maintenance (in accordance with manufacturer's requirements)	Light Vehicles	1	Transport Petrol Transport Petrol Transport Petrol	8					100	0.64	2312.60	1850.08	1.85
4.6 .4.6.1	infrastructure Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). lotetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or oreater). Leachate inspections (quarterly, following an earthquake event of magnitude five or orgeater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/ maintenance (in accordance with manufacturer's requirements). Captured leachate pumped to water	Light Vehicles Light Vehicles Light Vehicles Hand held power tools and e	1	Transport Petrol Transport Petrol Transport Petrol	8 8					100	0.64	2312.60	1850.08 1480.07	1.85
4.6.1 4.6.2 4.6.3	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as required)	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/ maintenance (in accordance with manufacturer's requirements). Captured leachate pumped to water treatment plant and treated: OR	Light Vehicles Light Vehicles	1	Transport Petrol Transport Petrol Transport Petrol	8 8 8					100	0.64	2312.60	1850.08	1.85
4.6.1 4.6.2 4.6.3	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as required)	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Josephane Stabilisation). Josephane Stabilisation of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or orgater). Leachate inspections (quarterly, following an earthquake event of magnitude five or orgater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/ maintenance (in accordance with manufacturer's requirements). Captured leachate pumped to water treatment plant and treated; OR Captured leachate pumped to ruck for off-captured leachate pumped to truck for off-	Light Vehicles Light Vehicles Light Vehicles Hand held power tools and of Light Vehicles	1 equipm	Transport Petrol Transport Petrol Transport Petrol Transport Petrol	8					100	0.64	2312.60	1850.08 1480.07	1.85
4.6.1 4.6.2 4.6.3	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as required)	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Jetion Phase Activities Ongoing groundwater monitoring (as required) Visual inspections of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Leachate inspections (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or greater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/ maintenance (in accordance with manufacturer's requirements). Captured leachate pumped to water treatment plant and treated: OR	Light Vehicles Light Vehicles Light Vehicles Hand held power tools and of Light Vehicles Hand held power tools and of Light Vehicles	1 equipm 1	Transport Petrol Transport Petrol Transport Petrol Transport Petrol Transport Petrol	8	3500				100 80 480	0.64 0.64 3.84	2312.60 2312.60 2312.60	1850.08 1480.07 8880.40	1.85
4.6.1 4.6.2 4.6.3	Operation/ Post-Comp Groundwater monitoring at Capped Waste Stockpile location Undertake monitoring of the Containment Cell Maintenance activities (as required)	water treatment plant, pumping well network and dams. Restoration of water treatment plant location (regrading and surface stabilisation). Josephane Stabilisation). Josephane Stabilisation of the cap (quarterly, following 5% AEP storm event, and following an earthquake event of magnitude five or orgater). Leachate inspections (quarterly, following an earthquake event of magnitude five or orgater). Gas monitoring (quarterly) for ammonia and methane. Vegetation cover maintenance (weed and tree/ deep rooted plant removal) Water treatment plant servicing/ maintenance (in accordance with manufacturer's requirements). Captured leachate pumped to water treatment plant and treated; OR Captured leachate pumped to ruck for off-captured leachate pumped to truck for off-	Light Vehicles Light Vehicles Light Vehicles Hand held power tools and of Light Vehicles	1 equipm 1	Transport Petrol Transport Petrol Transport Petrol Transport Petrol	8 8 8 8	3500				100	0.64 0.64 3.84	2312.60	1850.08 1480.07	1.85

Option 5 - Offsite Disposal to Licenced Waste Facility within NSW

			Option 5 - Onsite	ים	sposai i	Fuel	u waste	Facility	VVILIIII		Total		Emission		
	Key Action	Key Steps	Equipment	#	Source Type		Distance	Total			lotal Operating	Total Fuel	factor	Emissions	Emissions
						(L/hr)	Travelled	Distance	(weeks)	(Days)	Hours	Use (kL)	(kgCO2e/kL)	(kgCO2e/kL)	(tCO2e/kL)
5.1	Capped Waste Stockpil	le Removal		_	Ter .	1	1					ı			I
5.1.1	Site Establishment	Installation of water treatment plant.	Backhoes	1	Transport Diesel	21.9			10	50	400	8.76	2721.69	23841.97	23.84
		Installation of water collection, pipes and	Diesel Pump	1	Stationary	6			10	50	400				
-		pumping system. Establishment of capped waste stockpile			Diesel Transport				- 10			2.4	2709.72	6503.33	6.50
		area.	Heavy Vehicle Movements	2	Diesei	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Establishment of erosion and sediment	Light Vehicles	4	Transport	8	3500	14000			200	1.6	2312.60	3700.17	3.70
F 1 0	C	control measures.	E	1	Petrol Transport	25			16	00	1200				
5.1.2	Cap removal	Removal of grass cover	Excavators		Diesel	35			10	80	1280	44.8	2721.69	121931.53	121.93
		Removal and stockpiling of topsoil (to stockpile area).	Scraper/ Dozer	2	Transport Diesel	60.9			16	80	1280	77.952	2721.69	212160.87	212.16
		Removal and stockpiling of reusable clay	30T Articulated Truck	4	Transport	37.35			16	80	2560				
		layer for use at the containment cell.			Diesel Transport							95.616	2721.69	260236.73	260.24
		Removal of remaining capping layers:	Water Cart	1	Diesel	27			16	80	640	17.28	2721.69	47030.73	47.03
		Suitable material stockpiled for use as													
		wet weather cover. Remaining material transported for	Heavy Vehicle Movements	0	Transport	18.75	70	630			0				
		disposal at containment cell.	-	,	Diesel Transport	10.73					,	0.16875	2721.69	459.28	0.46
			Light Vehicles	12	Petrol	8	5600	67200			960	7.68	2312.60	17760.80	17.76
5.1.3	Material removal and	Removal of recyclable waste materials:	Excavators	4	Transport	35			66	165	5280	184.8	2721.69	502967.57	502.97
	sort	Removal of carbon materials (first cut			Diesel							104.0	2/21.09	302907.37	302.97
		spent pot lining and anodes) of greater	Scraper/ Dozer	3	Transport Diesel	60.9			66	198	4752		0704 (-	707/47/5	707.5
		than 500mm in size Removal of metals greater than 500mm			Transport							289.3968	2721.69	787647.22	787.65
		in size	Water Cart	1	Diesel	27			66	330	2640	71.28	2721.69	194001.78	194.00
		Transport material to cleaning/ storage shed.	Light Vehicles	8	Transport Petrol	8	35490	283920			4056	32.448	2312.60	75039.37	75.04
		Removal of non-recyclable materials and			Stationary	15			66	330	2640				
		transport to the sorting area.	Wash-down bay	1	Diesel	13				330	2040	39.6	2709.72	107304.91	107.30
		Removal of waste materials would cease in rain events and the temporary cover placed													
		over the exposed waste.													
		Excavation of natural materials affected by													
		wastes and contaminants. Investigations to													
		be undertaken of stockpile footprint to													
		determine soils to be removed.													
		Removal and transportation of stockpiled wet weather cover material to the													
		containment cell.													
		containment cell. Material tracking system implemented													
		throughout the removal process. Placement and compaction of suitable													
		material for filling of capped waste stockpile													
	Operate water	excavation void													
	treatment plant	Leachate and captured stormwater from													
5.1.4	(installed as part of capped waste	capped waste stockpile during material removal to be pumped to and treated at the	Diesel Pump	1	Stationary Diesel	6			86	430	3440				
	stockpile removal Key				Diesei										
-	Task)	·	1									20.64	2709.72	55928.62	55.93
		Pumping and treatment of groundwater from below and surrounding the capped	Heavy Vehicle Movements	٠,	Transport	18.75	70	140			2				
		waste stockpile footprint.	ricavy venicle wovernents	-	Diesel	18.75	/0	140			2	0.0375	2721.69	102.06	0.10
			Light Vohislos	-	Transport	8	4000	12040			172				
		Dam water treatment.	Light Vehicles		Petrol	8	6020	12040			1/2	1.376	2312.60	3182.14	3.18
		Discharge of treated water to existing dam.			1										
	lb-4d	Groundwater monitoring.			T										
5.1.5	Leachate pond removal at CWS	Excavation of deposited sediments and pond lining.	Excavators	1	Transport Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
		Placement of excavated material into the			Transport	37.35			Δ	20	320				
-		containment cell. Operation of temporary leachate collection	30T Articulated Truck	2	Diesel	57.55			"	20	520	11.952	2721.69	32529.59	32.53
		facilities prior to complete closure of			Transport Diesel	18.75	70	210			3				
		Containment Cell.	Heavy Vehicle Movements	3	Transport							0.05625	2721.69	153.09	0.15
			Light Vehicles	2	Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
5.2	Capped Waste Stockpil Decommission water	le Post Works Activities Decommission Capped Waste Stockpile			L	T	l e							T	
5.2.1	treatment	water treatment plant, pumping well			Transport Diesel	18.75	70	140			2				
	infrastructure	network and dams. Restoration of water treatment plant	Heavy Vehicle Movements	2								0.0375	2721.69	102.06	0.10
1		location (regrading and surface			Transport	8	3500	7000			100				
		stabilisation).	Light Vehicles	2	Petrol							0.8	2312.60	1850.08	1.85

Option 5 - Offsite Disposal to Licenced Waste Facility within NSW

			Option 5 - Offsite	e Di	sposai t		ed waste	Facility							
5.0	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
5.3	Groundwater	e Post-Completion Phase Activities	T	_			1			1	Ι			1	
5.3.1	monitoring at Capped	Ongoing groundwater monitoring (as		1	Transport	8			260	4	16				
	Waste Stockpile	required)	Light Vehicles		Petrol	_						0.128	2312.60	296.01	0.30
5.4	location Recyclables Cleaning a	ind Storage	Light vehicles	1								0.120	2312.00	270.01	0.30
	Separation of Carbon				Transport										
5.4.1	from embedded metals	Physical removal of steel from carbon	Excavators	1	Diesel	35			66	330	2640	92.4	2721.69	251483.79	251.48
	metais		Excavator3		Stationary	15			66	330	2640				231.40
			Wash-down bay	1	Diesel	15			00	330	2640	39.6	2709.72	107304.91	107.30
5.4.2	Steel clean and store	Cleaning 5,000T of separated steel	Excavators	1	Transport Diesel	35			50	250	2000	70	2721.69	190518.02	190.52
		Cleaned metals to be transported for	Exceptions		Stationary								2721.07	170010.02	170.02
		storage adjacent to other stored metals.		_	Diesel	15			50	250	2000	30	0700 70	04004 (0	04.00
		Storage location to be recorded within the	Wash-down bay	1	Transport								2709.72	81291.60	81.29
		internal material tracking system.	Light Vehicles	4	Petrol	8	23100	92400			1320	10.56	2312.60	24421.10	24.42
			30T Articulated Truck	2	Transport	37.35			1	5	80	2.988	2721.69	8132.40	0.12
		Cleaned carbon to be transported for	301 Articulated Truck		Diesel Transport				_				2/21.09	8132.40	8.13
5.4.3	Carbon storage	appropriatestorage.	Excavators	2	Diesel	35			5	25	400	14	2721.69	38103.60	38.10
		Storage location to be recorded within the	20T Askin data d Tarrela	2	Transport	37.35			5	25	400	14.94	2721.69	40661.99	40.66
		internal material tracking system.	30T Articulated Truck		Diesel Transport									40001.77	40.00
			Light Vehicles	4	Petrol	8	1750	7000			100	0.8	2312.60	1850.08	1.85
5.5	Recyclable Material Tr	ansport					1							T	
	Load and Transport 5,000 tonnes of	Load 5000 tonnes of steel into 30 T			Transport										
	cleaned steel to steel	articulated trucks			Diesel	35			50	250	8000				
	processing facility	ar reducted tracks	Excavators	4	Diesei							280	2721.69	762072.08	762.07
		Truck 5,000 tonnes of steel to steel	Exceptions		Transport	15.3			50	250	2000				
		recycling facility	Loaders	1	Diesel	15.3			50	250	2000	30.6	2721.69	83283.59	83.28
			Light Vehicles	4	Transport Petrol	8	17500	70000			1000	8	2312.60	18500.83	18.50
					Transport	18.75	70	17500			250	Ü			
			Heavy Vehicle Movements	250	Diesel	18.75	70	17500			250	4.6875	2721.69	12757.90	12.76
	Recyclable Material Pr	ocessing													
	Processing of 5,000														
		Generally steel recycling involves breakdown													
E 4 1	tonnes of cleaned	of the steel into smaller blocks, melting in a		Emissio	ons from proces	ssing of scrap stee	el in an EAF = 1.	12 tCO2e/tonne	steel (direct a	and indirect e	missions) (se	e Factors tab	o)		5,600.00
5.6.1	tonnes of cleaned Steel at a steel	of the steel into smaller blocks, melting in a furnace, purification, solidifying and		Emissio	ons from proces	ssing of scrap stee	el in an EAF = 1.	12 tCO2e/tonne	steel (direct a	and indirect er	missions) (se	e Factors tab	o)		5,600.00
5.6.1	tonnes of cleaned	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material.		Emissio	ons from proces	ssing of scrap stee	el in an EAF = 1.	12 tCO2e/tonne	steel (direct a	and indirect e	missions) (se	ee Factors tab))		5,600.00
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation			·		el in an EAF = 1.	12 tCO2e/tonne		T)	T	5,600.00
5.6.1	tonnes of cleaned Steel at a steel processing facility	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material.			Transport	ssing of scrap ster	el in an EAF = 1.	12 tCO2e/tonne	steel (direct a	and indirect e				127172 07	
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockplling (including transport to long term stockpile area)			Transport		el in an EAF = 1.	12 tCO2e/tonne		T			2721.69	137172.97	5,600.00
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Tation Tation (including transport to long term stockpille area) Excavation of non-containment cell	Excavators	2	Transport Diesel	35	el in an EAF = 1.	12 tCO2e/tonne	18	90	1440	50.4		137172.97	
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockplling (including transport to long term stockpile area)		2	Transport		el in an EAF = 1.	12 tCO2e/tonne		90	1440	50.4		137172.97	
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpilling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpilling (including wet weather cover, and transport of remainder to long term stockpile area)	Excavators	2	Transport Diesel Transport	35	el in an EAF = 1.	12 tCO2e/tonne	18	90	1440	50.4	2721.69		137.17
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. Topsoil scraping and stockpilling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpilling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and	Excavators	2	Transport Diesel Transport Diesel	35	el in an EAF = 1.	12 tCO2e/tonne	18	90	1440	50.4		137172.97	
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material, ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water	Excavators	2	Transport Diesel Transport Diesel	35	el in an EAF = 1.	12 tCO2e/tonne	18	90	1440	50.4 87.696	2721.69		137.17
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) installation of initial drainage and environmental controls, including water collection's yamp system and water	Excavators Scraper/ Dozer	2	Transport Diesel Transport Diesel	35	el in an EAF = 1.	12 tCO2e/tonne	18	90	1440	50.4 87.696	2721.69		137.17
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) installation of initial drainage and environmental controls, including water collection's ump system and water treatment plant. Excavation and construction of perimeter	Excavators Scraper/ Dozer 30T Articulated Truck	2	Transport Diesel Transport Diesel Transport Diesel Transport Transport	35 60.9 37.35	el in an EAF = 1.	12 tCO2e/tonne	18	90	1440 1440	50.4 87.696 53.784	2721.69 2721.69 2721.69	238680.98	137.17 238.68 146.38
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) installation of initial drainage and environmental controls, including water collection's yamp system and water	Excavators Scraper / Dozer 30T Articulated Truck Water Cart	2	Transport Diesel Transport Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27			18 18 18	90	1440 1440 1440 720	50.4 87.696 53.784	2721.69	238680.98	137.17
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) installation of initial drainage and environmental controls, including water collection's ump system and water treatment plant. Excavation and construction of perimeter	Excavators Scraper/ Dozer 30T Articulated Truck	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport	35 60.9 37.35	el in an EAF = 1.	12 tCO2e/tonne	18 18 18	90	1440 1440	50.4 87.696 53.784	2721.69 2721.69 2721.69	238680.98	137.17 238.68 146.38
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) installation of initial drainage and environmental controls, including water collection's ump system and water treatment plant. Excavation and construction of perimeter	Excavators Scraper / Dozer 30T Articulated Truck Water Cart	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Transport	35 60.9 37.35 27			18 18 18	90	1440 1440 1440 720	50.4 87.696 53.784 19.44 0.13125	2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22	137.17 238.68 146.38 52.91 0.36
5.6.1	tonnes of cleaned Steel at a steel processing facility <u>Waste Material Transp</u> Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport	35 60.9 37.35 27 18.75 8	70	490	18 18 18	90 90 90	1440 1440 1440 720 7	50.4 87.696 53.784 19.44 0.13125	2721.69 2721.69 2721.69	238680.98 146383.16 52909.58	137.17 238.68 146.38 52.91
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) installation of initial drainage and environmental controls, including water collection's ump system and water treatment plant. Excavation and construction of perimeter	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Transport Diesel Transport Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75	70	490	18 18 18	90	1440 1440 1440 720	50.4 87.696 53.784 19.44 0.13125	2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22	137.17 238.68 146.38 52.91 0.36
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Petrol Transport Diesel Transport Transport Transport	35 60.9 37.35 27 18.75 8	70	490	18 18 18	90 90 90 90	1440 1440 1440 720 7 720 3120	50.4 87.696 53.784 19.44 0.13125 5.76	2721.69 2721.69 2721.69 2721.69 2721.69 2312.60 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11	137.17 238.68 146.38 52.91 0.36 13.32 297.21
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Transport Diesel Transport Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35	70	490	18 18 18 18 26	90 90 90 90	1440 1440 1440 720 7 720 3120	50.4 87.696 53.784 19.44 0.13125 5.76 109.2	2721.69 2721.69 2721.69 2721.69 2721.69 2312.60 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8	70	490	18 18 18 26 26 26	90 90 90 90 90 130 130	1440 1440 1440 720 7 720 3120	50.4 87.696 53.784 19.44 0.13125 5.76 109.2	2721.69 2721.69 2721.69 2721.69 2721.69 2312.60 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11	137.17 238.68 146.38 52.91 0.36 13.32 297.21
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35	70	490	18 18 18 18 26	90 90 90 90 90 130 130	1440 1440 1440 720 7 720 3120	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35 15.3 20.8	70	490	18 18 18 18 26 26 26 26	90 90 90 90 90 130 130	1440 1440 1440 720 7 720 3120 3120 1040 4160	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376	2721.69 2721.69 2721.69 2721.69 2721.69 2312.60 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422884.68	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper / Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors	2 2 1 1 7	Transport Diesel Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35	70	490	18 18 18 18 26 26 26 26 26 26	90 90 90 90 130 130 130	1440 1440 720 7 720 3120 3120 1040 4160 2080	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck	2 2 1 1 7	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Transport Transport Transport Transport Transport Transport Transport Transport Transport	35 60.9 37.35 27 18.75 8 35 15.3 20.8	70	490	18 18 18 18 26 26 26 26	90 90 90 90 130 130 130	1440 1440 1440 720 7 720 3120 3120 1040 4160	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376 56.16	2721.69 2721.69 2721.69 2721.69 2721.69 2312.60 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422844.68 152849.89	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck Water Cart Machinery Service Vehicle	2 2 1 1 7	Transport Diesel Diesel Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35	70	490	188 188 188 266 266 266 266 266 266 266 266	90 90 90 90 130 130 130 130	1440 1440 720 7 720 3120 3120 1040 4160 2080	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376 56.16 8.32	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422884.68 152849.89 19240.87	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85 19.24
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck Water Cart Machinery Service Vehicle Backhoes	2 2 2 2 1 1 7 7 8 8 3 3 3 1 1 4 4 2 2 1 1 4 4	Transport Diesel Diesel Transport Diesel Diesel Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35 27 8	70 6300	490 50400	188 188 188 266 266 266 266 266 266 266 266 266 2	90 90 90 90 130 130 130	1440 1440 1440 720 7 720 3120 3120 1040 4160 2080 1040 4160	50.4 87.696 53.784 0.13125 5.76 109.2 47.736 21.632 155.376 56.16 8.32 91.104	2721.69 2721.69 2721.69 2721.69 2721.69 2312.60 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422844.68 152849.89	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck Water Cart Machinery Service Vehicle	2 2 1 1 7	Transport Diesel Transport Transport Transport Diesel	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35	70	490	188 188 188 266 266 266 266 266 266 266 266 266 2	90 90 90 90 130 130 130 130	1440 1440 720 7 720 3120 3120 1040 4160 2080	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376 56.16 8.32 91.104	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422884.68 152849.89 19240.87 247956.48	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85 19.24 247.96
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck Water Cart Machinery Service Vehicle Backhoes Heavy Vehicle Movements	2 2 2 1 1 7 7 8 8 3 3 3 1 1 4 4 4 2 2 1 1 4 4 8 2 0	Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35 27 8	70 6300	490 50400 98400	188 18 18 18 26 26 26 26 26 26 26	90 90 90 90 130 130 130 130	1440 1440 720 7 720 3120 3120 1040 4160 2080 1040 4160	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376 8.32 91.104 26.357143	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422884.68 152849.89 19240.87 247956.48 71735.87	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85 19.24 247.96 71.74
5.6.1 5.7 5.7.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck Water Cart Machinery Service Vehicle Backhoes	2 2 2 2 1 1 7 7 8 8 3 3 3 1 1 4 4 2 2 1 1 4 4	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Diesel Transport Diesel Dies	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35 27 8	70 6300	490 50400	188 18 18 18 26 26 26 26 26 26 26	90 90 90 90 130 130 130 130	1440 1440 1440 720 7 720 3120 3120 1040 4160 2080 1040 4160	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376 8.32 91.104 26.357143	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422884.68 152849.89 19240.87 247956.48	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85 19.24 247.96
5.6.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works Cell Base liner Construction Waste transportation	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (Including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (Including wet weather cover, and transport of remainder to long term stockpile area) installation of initial drainage and environmental controls, including water collection/ sump system and water treatment plant. Excavation and construction of perimeter dish drain As described in the Concept Design	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck Water Cart Machinery Service Vehicle Backhoes Heavy Vehicle Movements Light Vehicles	2 2 2 1 1 7 7 8 8 3 3 3 1 1 4 4 4 2 2 1 1 4 4 8 2 0	Transport Diesel Transport Diesel	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35 27 8 21.9 18.75	70 6300 120 9100	490 50400 98400 145600	18 18 18 18 26 26 26 26 26 26 26	90 90 90 90 130 130 130 130	1440 1440 1440 720 7 720 3120 3120 1040 4160 1040 4160 1405.714	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376 56.16 8.32 91.104 26.357143 16.64	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422884.68 152849.89 19240.87 247956.48 71735.87	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85 19.24 247.96 71.74
5.6.1 5.7 5.7.1	tonnes of cleaned Steel at a steel processing facility Waste Material Transp Preparatory works	of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material. ortation Topsoil scraping and stockpiling (including transport to long term stockpile area) Excavation of non-containment cell subsurface materials and stockpiling (including wet weather cover, and transport of remainder to long term stockpile area) Installation of initial drainage and environmental controls, including water collection/ sump system and water treatment just. Excavation and construction of perimeter dish drain	Excavators Scraper/ Dozer 30T Articulated Truck Water Cart Heavy Vehicle Movements Light Vehicles Excavators Loaders Compactors 30T Articulated Truck Water Cart Machinery Service Vehicle Backhoes Heavy Vehicle Movements	2 2 2 1 1 7 7 8 8 3 3 3 1 1 4 4 4 2 2 1 1 4 4 8 2 0	Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Transport Transport Transport Transport Diesel Transport Transport Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport Diesel Transport	35 60.9 37.35 27 18.75 8 35 15.3 20.8 37.35 27 8	70 6300	490 50400 98400	18 18 18 18 26 26 26 26 26 26 26	90 90 90 90 130 130 130 130	1440 1440 720 7 720 3120 3120 1040 4160 2080 1040 4160	50.4 87.696 53.784 19.44 0.13125 5.76 109.2 47.736 21.632 155.376 56.16 8.32 91.104 26.357143 16.64	2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69 2721.69	238680.98 146383.16 52909.58 357.22 13320.60 297208.11 129922.40 58875.51 422884.68 152849.89 19240.87 247956.48 71735.87	137.17 238.68 146.38 52.91 0.36 13.32 297.21 129.92 58.88 422.88 152.85 19.24 247.96 71.74

Option 5 - Offsite Disposal to Licenced Waste Facility within NSW

			Option 5 - Offsite	וטי	ispusai ι		eu waste	Facility							
	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
		Loaded trucks to exit Smelter and travel on public roads by licensed operators. 17 km one way to Cessnock Waste Facility: 189kn Kemps Creek Waste Facility.	Excavators	2	Transport Diesel	35			234	1170	18720	655.2	2721.69	1783248.67	1783.25
		Waste tracking as per EPA requirements.	Loaders	2	Transport Diesel	15.3			234	1170	18720	286.416	2721.69	779534.42	779.53
5.7.4	Unload and stockpile material at receiving facility	Unload and stockpile material at receiving facility	Loaders	2	Transport Diesel	15.3			234	1170	18720		2721.69	779534.42	779.53
			Compactors	2	Transport Diesel	20.8			234	1170	18720	389.376	2721.69	1059759.21	1059.76
5.7.5	Sorting non- recyclable material	sorting carbon, fines and crushables from non-crushable waste	Excavators	4	Transport Diesel	35			169	169	5408	189.28	2721.69	515160.73	515.16
	recyclable material	Hori-ci danable waste	Scraper/ Dozer	3	Transport Diesel	60.9			169	169	4056	247.0104	2721.69	672284.75	672.28
			Water Cart	1	Transport Diesel	27			169	169	1352	36.504	2721.69	99352.43	99.35
			Light Vehicles	8	Transport Petrol	8	11830	94640			1352	10.816	2312.60	25013.12	25.01
			Wash-down bay	1	Stationary Diesel	15			169	845	6760		2709.72	274765.61	274.77
5.7.6	Transport untreated non-crushable/ non- recyclable material to the Containment	Transportation of removed materials would include:			Transport Diesel	35			169	169	2704		2721.69		257.58
	Cell	All truck loads are to be covered.	Excavators		Transport	37.35			169	169	2704			257580.36	
		Trucks transporting capped waste stockpile materials to have priority on	30T Articulated Truck	2	Z Diesel Transport Petrol	8	59150	236600		107	3380	100.9944	2721.69	274875.04	274.88
		haul road.	Light Vehicles	4	1 Petroi							27.04	2312.60	62532.81	62.53
5.7.7	Treatment Material (lime) Transportation and Stockpiling	Loading of approximately 50,000 tonnes of treatment material	Loaders	3	Transport Diesel	15.3			52	260	6240	95.472	2721.69	259844.81	259.84
		Transportation of treatment material	Compactors	1	Transport Diesel	20.8			52	260	2080	43.264	2721.69	117751.02	117.75
		Stockpiling of treatment material adjacent to the containment cell.	Scraper/ Dozer	1	Transport Diesel	60.9			52	260	2080	126.672	2721.69	344761.41	344.76
		dajacent to the containment con.	Water Cart	1	Transport Diesel	27			52	260	2080	56.16	2721.69	152849.89	152.85
			Heavy Vehicle Movements	2000	Transport	18.75	141	282000			4028.571		2721.69	205584.50	205.58
5.7.8	Crushing of all material	Jaw crushing/screening – to size fraction required for mixing (50-100T/hr)	Excavators	2	Transport Diesel	35			206	1030	16480	576.8	2721.69	1569868.48	1569.87
			Impact Crusher	1	Stationary Diesel	35			206	1030	8240	288.4	2709.72	781483.25	781.48
			Tracked Stockpiler	1	Stationary Diesel	9			206	1030	8240	74.16	2709.72	200952.84	200.95
		Pulverising to minus 200mm (5-10T/hr)	Wash-down bay	1	Stationary Diesel	15			206	1030	8240		2709.72	334921.39	334.92
			Heavy Vehicle Movements	6	Transport Diesel	18.75	60	360			5.142857	0.0964286	2721.69	262.45	0.26
			Light Vehicles	я	Transport Petrol	8	72100	576800			8240	65.92	2312.60	152446.86	152.45
5.8.9	Calcium treating of fines and crushables	Crushed material will be mixed with lime slurry in pug mill and transported directly for disposal in the containment cell. Batch process	Excavators	1	Transport Diesel	35			171	342	2736		2721.69	260628.65	260.63
		IN ORDES.	Pug mill	1	Stationary Diesel	29			171	342	2736	79.344	2709.72	215000.02	215.00
			Wash-down bay	-	Stationary Diesel	15			171	342	2736	41.04	2709.72	111206.91	111.21
		Transport of pug mill componenets to the offsite containment cell facility	Heavy Vehicle Movements		Transport	18.75	60	360			5.142857	0.0964286	2709.72	262.45	0.26
		onsite containment cell facility	Light Vehicles		Diesel Transport Petrol	8	59850	478800			6840	54.72	2312.60	126545.69	126.55
5.8.10	Transport crushed material to landfill	Transport crushed material to landfill	30T Articulated Truck	2	Transport Diesel	37.35			171	222.3	3556.8		2721.69	361566.40	361.57
		Placement of material in landfill	Excavators	2	Transport Diesel	35			171	222.3	3556.8		2721.69	338817.25	338.82

		Option 5 - Onsite	ועש	sposai i	Fuel	Ju Waste	racinty	Estimated		Total		Emission		
Key Action	Key Steps	Equipment	#	Source Type		Distance	Total		Timeframe	Operating	Total Fuel	factor	Emissions	Emissions
					(L/hr)	Travelled	Distance		(Days)	Hours	Use (kL)	(kgCO2e/kL)	(kgCO2e/kL)	(tCO2e/kL)
5.9 Containment Cell Mater Cell Material	ial Placement and Capping		_							ı		1	_	T
	Transportation of material to the cell			Transport	35	,		222	222	5328				
Placement		Excavators	3	Diesel							186.48	2721.69	507540.01	507.54
	Temporary material stockpiling	Compactors	2	Transport Diesel	20.8			222	222	3552	73.8816	2721.69	201082.52	201.08
F	Placement of materials in dedicated cell:	oompactor 5			+	-		-			70.0010	2721.07	201002.02	201.00
	demolition waste, contaminated soils and	'		Transport	37.35			222	222	7104	.			
	capped waste stockpile materials.	30T Articulated Truck	4	Diesel							265.3344	2721.69	722156.92	722.16
	Cover placed material in the event of			Transport	8	2220	4440			63.42857				
Ę	predicted rainfall and/ or strong winds. Material tracking and quantifying/ survey of	Light Vehicles	2	Petrol			4440			03.42037	0.5074286	2312.60	1173.48	1.17
	placed material.	Water Cart	2	Transport Diesel	27	,		222	1110	17760	479.52	2721.69	1305102.87	1305.10
Operate water														
5.9.2 treatment infrastructure at the	Installation of water treatment plant.					,								
Containment Cell		Hand held power tools and equi	i 1			,								
	Operation and maintenance of water			Stationary		1								
C.	collection/ sump system and water treatment plant.	Diesel pump	1	Diesel	6			222	1110	8880	53.28	2709.72	144373.88	144.37
Ċ	Captured water pumped to water treatment		<u> </u>		+	-		-			00.20	2707.72	144070.00	144.07
	plant.	Tanks and ancillary pipework	├	Transport	+	 		+	ļ		 	-	+	
		Heavy Vehicle Movements	1	Transport Diesel	18.75	70	70	נ		1	0.01875	2721.69	51.03	0.05
				Transport	8	2220	4440	a		63.42857				
Leachate pond		Light Vehicles	2	Petrol		LLLO		1	-	00.42007	0.5074286	2312.60	1173.48	1.17
5.9.3 removal at	Excavation of deposited sediments and pond	l '	1	Transport	35	'	1	4	20	160		1		
Containment Cell	lining.	Excavators	1	Diesel						ļ	5.6	2721.69	15241.44	15.24
	Placement of excavated material into the containment cell.	30T Articulated Truck	2	Transport Diesel	37.35	'		4	20	320	11.952	2721.69	32529.59	32.53
	Operation of temporary leachate collection			Transport							1			
	facilities prior to complete closure of	Heavy Vehicle Movements	2	Diesel	18.75	70	210)		3	0.05625	2721.69	153.09	0.15
	Containment Cell.	neavy verticle Movements	3	Transport	8	1400	2800	_		40		2/21.09	155.09	
		Light Vehicles	2	Petrol	8	1400	2800	,		40	0.32	2312.60	740.03	0.74
5 0 4 Haul road surface	Scraping top xx mm of haul road for placement within the Containment Cell prior	'		Transport	60.9			4	20	320	.l			
	to closure	Scraper/ Dozer	2	Diesel	00.7				20	020	19.488	2721.69	53040.22	53.04
		laar	_	Transport	37.35	,		4	20	160		0704 (0	4/0/400	4.0.
		30T Articulated Truck		Diesel Transport							5.976	2721.69	16264.80	16.26
		Water Cart	1	Diesel	27			4	20	160	4.32	2721.69	11757.68	11.76
		Heavy Vehicle Movements	2	Transport Diesel	18.75	70	210	3		3	0.05625	2721.69	153.09	0.15
		rieavy veriicie wovernents		Transport	8			-	20	320				
Containment Call Con		Light Vehicles	2	Petrol				4		320	2.56	2312.60	5920.27	5.92
5.9.5 Containment Cell Cap Construction	As described in the Concept Design	Excavators	2	Transport Diesel	35	,		26	130	2080	72.8	2721.69	198138.74	198.14
				Transport	20.8			26	130	2080				
		Compactors	2	Diesel							43.204	2721.69	117751.02	117.75
		Scraper/ Dozer	2	Transport Diesel	60.9	<u> </u>		26	130	2080	126.672	2721.69	344761.41	344.76
				Transport	21.1			26	130	1040				
		Grader	 1	Diesel Transport							21.944	2721.69	59724.68	59.72
		30T Articulated Truck	2	Diesel	37.35			26	130	2080	77.688	2721.69	211442.34	211.44
		Water Cart		Transport	27	'	1	26	130	1040	28.08	2721.69	76424.94	76.42
		Hand held tools and equipment	1	Diesel	†			1			20.00	2/21.09	70424.74	70.42
				Stationary	6			26	130	1040		2700 72	14000 / 5	14.01
		Diesel pump	\vdash	Diesel Transport							0.24	2709.72	16908.65	16.91
		Bobcat	3	Diesel	11.4			26	130	3120	35.568	2721.69	96804.93	96.80
		Heavy Vehicle Movements	920	Transport Diesel	18.75	120	99600	o C	1	1422.857	26.678571	2721.69	72610.69	72.61
				Transport	8	9100	127400	0		1820				
5.10 Post Works Activities		Light Vehicles	14	Petrol	- 8	7100	127400	1		1020	14.56	2312.60	33671.51	33.67
Decommission water	Decommission Capped Waste Stockpile			Transport	T			T					1	T T
5.10.1 treatment v	water treatment plant, pumping well	l		Transport Diesel	18.75	70	140)	1	2		0704 / -	100.07	0.40
infrastructure r	network and dams. Restoration of water treatment plant	Heavy Vehicle Movements	2	-	+	 	 	+	<u> </u>		0.0375	2721.69	102.06	0.10
le le	location (regrading and surface			Transport	8	3500	7000	3		100		1		
s	stabilisation).	Light Vehicles	2	Petrol	+			+	<u> </u>		0.8	2312.60	1850.08	1.85
Carbon Benefits													1	
Processing of 5,000														
tonnes of cleaned	Lifecycle benefit associated with using s	scrap steel - Estimation of the b	et bene	afit of recycling			and industrial (C&I) and cons	truction and d	demolition (C	:&D) sources	in New South W	ales (0.44	
Steel at a steel					tCO26	e/tonne)								1
processing facility						s/ torine)								-2200.00

27046.53

Option 6 - Offsite Disposal of all Material to Salt Mine in the Northern Territory

6.1	Key Action Capped Waste Stockpile Remo	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
	Site Establishment	Installation of water treatment plant.	Backhoes		1 Transport	21.9			10	50	400	8.76	2721.69	23841.97	23.84
		Installation of water collection, pipes and	Diesel Pump	١.	Diesel Stationary	6			10	50	400				
		pumping system. Establishment of capped waste stockpile	Heavy Vehicle Movements	١.	Diesel Transport	18.75	70	140				2.4	2709.72	6503.33	6.50
		area. Establishment of erosion and sediment		ļ .	Diesel Transport							0.0375	2721.69	102.06	0.10
		control measures.	Light Vehicles	,	Petrol Transport	8	3500	14000			200	1.6	2312.60	3700.17	3.70
6.1.2	Cap removal	Removal of grass cover	Excavators	:	2 Diesel	35			16	80	1280	44.8	2721.69	121931.53	121.93
		Removal and stockpiling of topsoil (to stockpile area).	Scraper/ Dozer		2 Transport Diesel	60.9			16	80	1280	77.952	2721.69	212160.87	212.16
		Removal and stockpiling of reusable clay layer for use at the containment cell.	30T Articulated Truck		4 Transport Diesel	37.35			16	80	2560	95.616	2721.69	260236.73	260.24
		Removal of remaining capping layers:	Water Cart		1 Transport Diesel	27			16	80	640	17.28	2721.69	47030.73	47.03
		Suitable material stockpiled for use as	Hand held power tools and		1							17.20	2721.07	47030.70	47.00
		wet weather cover. Remaining material transported for	equipment Heavy Vehicle Movements		Transport	18.75	70	630			0				
		disposal at containment cell.		1:	Diesel Transport	16.75					7	0.16875	2721.69	459.28	0.46
			Light Vehicles	1.	Petrol Transport	8	5600	67200			960	7.68	2312.60	17760.80	17.76
6.1.3	Material removal and sort	Removal of recyclable waste materials:	Excavators		⁴ Diesel	35			206	206	6592	230.72	2721.69	627947.39	627.95
		Removal of carbon materials (first cut spent pot lining and anodes) of greater	Scraper/ Dozer	:	3 Transport Diesel	60.9			206	206	4944	301.0896	2721.69	819471.35	819.47
		Removal of metals greater than 500mm in size	Water Cart		1 Transport Diesel	27			206	1030	8240	222.48	2721.69	605520.70	605.52
		Transport material to cleaning/ storage shed.	Light Vehicles	1	8 Transport Petrol	8	14420	115360			1648	13.184	2312.60	30489.37	30.49
		Removal of non-recyclable materials and		١	Stationary	15			206	206	1648	24.72			66.98
		transport to the sorting area. Removal of waste materials would cease in	Wash-down bay		1 Diesel							24.12	2709.72	66984.28	66.98
		rain events and the temporary cover placed over the exposed waste.													
		Excavation of natural materials affected by wastes and contaminants. Investigations to be undertaken of stockpile footprint to determine soils to be removed. Removal and transportation of stockpiled wet weather cover material to the containment cell. Material tracking system implemented													
		throughout the removal process.													
		Placement and compaction of suitable material for filling of capped waste stockpile excavation void													
6.1.4	Operate water treatment plant (installed as part of capped waste stockpile removal Key Task).	Leachate and captured stormwater from capped waste stockpile during material removal to be pumped to and treated at the treatment plant.	Diesel Pump		Stationary Diesel	6			226	1130	9040	54.24	2709.72	146975.21	146.98
		Pumping and treatment of groundwater from below and surrounding the capped waste stockpile footprint.	Heavy Vehicle Movements		2 Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Dam water treatment.	Light Vehicles		2 Transport Petrol	8	15820	31640			452	3.616	2312.60	8362.38	8.36
		Discharge of treated water to existing dam.		1	o ctroi							5.510	2512.00	0002.00	0.00
		Groundwater monitoring.													
6.1.5	Leachate pond removal at CWS	Excavation of deposited sediments and pond lining.	Excavators	-	Transport 1 Diesel	35			4	20	160	5.6	2721.69	15241.44	15.24
		Placement of excavated material into the containment cell.	30T Articulated Truck		Transport 2 Diesel	37.35			4	20	320	11.952	2721.69	32529.59	32.53
		Operation of temporary leachate collection	and the state of t		Transport	18.75	70	210			-	11.752	2/21.07	52527.57	52.55
		facilities prior to complete closure of Containment Cell.	Heavy Vehicle Movements		3 Diesel	18.75	/0	210			3	0.05625	2721.69	153.09	0.15
			Light Vehicles	L :	Transport 2 Petrol	8	1400	2800			40	0.32	2312.60	740.03	0.74
	Recyclables Cleaning and Stora Separation of Carbon from				Transport			1							
6.2.1	embedded metals	Physical removal of steel from carbon	Excavators	<u> </u>	1 Diesel Stationary	35			66		2640	92.4	2721.69	251483.79	251.48
			Wash-down bay	ļ ·	1 Diesel	15			66		2640	39.6	2709.72	107304.91	107.30
6.2.2	Steel clean	Cleaning as above, 5,000T of separated steel	Excavators		Transport 1 Diesel	35			50	250	2000	70	2721.69	190518.02	190.52
			Wash-down bay	<u> </u>	Stationary 1 Diesel	15			50	250	2000	30	2709.72	81291.60	81.29
	· · · · · · · · · · · · · · · · · · ·		Light Vehicles	Ι	Transport 4 Petrol	8	23100	92400			1320	10.56	2312.60	24421.10	24.42

		0	ption 6 - Offsite	Disp	osal of	all Materia	al to Salt	Mine in the	he Northe	ern Territ	ory				
		Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
6.2.3	Carbon storage	Cleaned carbon to be transported for appropriatestorage.	Excavators	2	Transport Diesel	35			5	25	400	14	2721.69	38103.60	38.10
		appropriatestorage. Storage location to be recorded within the internal material tracking system.	30T Articulated Truck	2	Transport Diesel	37.35			5	25	400	14.94	2721.69	40661.99	40.66
		meria nateria racking system.	Light Vehicles	4	Transport Petrol	8	1750	7000			100	0.8	2312.60	1850.08	1.85
624	Metals storage	Cleaned metals to be transported for storage	Light venices	·	Transport	35			1	-	80	0.0	2312.00	1000.00	1.00
0.2.4	metals storage	adjacent to other stored metals. Storage location to be recorded within the	Excavators	2	Diesel Transport							2.8	2721.69	7620.72	7.62
		internal material tracking system.	30T Articulated Truck	2	Diesel	37.35			1	5	- 00	2.988	2721.69	8132.40	8.13
	Material Treatment		Light Vehicles	4	Transport Petrol	8	350	1400			20	0.16	2312.60	370.02	0.37
6.3.1	Crushing of all crushable	Jaw crushing/screening – to size fraction	Excavators		Transport	35			206	1030	16480				
0.3.1	materials plus fines	required for mixing (50-100T/hr)	EXCAVATORS		Diesel Stationary	35						576.8	2721.69	1569868.48	1569.87
		Pulverising to minus 10mm (5-10T/hr)	Diesel Pump	1	Diesel	6			206	1030	8240	49.44	2709.72	133968.56	133.97
			Impact Crusher	1	Stationary Diesel	35			206	1030	8240	288.4	2709.72	781483.25	781.48
			Tracked Stockpiler	1	Stationary Diesel Stationary	9			206	1030	8240	74.16	2709.72	200952.84	200.95
			Container Loader	1	Diesel	6.3			206	1030	8240	51.912	2709.72	140666.98	140.67
			Light Vehicles	3	Transport Petrol	8	72100	216300			3090	24.72	2312.60	57167.57	57.17
			Wash-down bay	1	Stationary Diesel	15			206	1030	8240	123.6	2709.72	334921.39	334.92
6.3.2	Construction of a Heat Treatment Facility	Construction of the heat treatment facility			Transport Diesel	18.75	300	3000			42.85714				
	Treatment racinty		Heavy Vehicle Movements Mobile Crane/Telehandler (Above	10	Stationary	6.3				30	480	0.8035714	2721.69	2187.07	2.19
-					Diesel Stationary							3.024	2709.72	8194.19	8.19
			Stationary crane	1	Diesel Stationary	23			6	30		5.52	2709.72	14957.65	14.96
			Forklift 8t	2	Diesel Transport	4.6			6	30		2.208	2709.72	5983.06	5.98
			Light vehicles	4	Petrol	8	70	280			4	0.032	2312.60	74.00	0.07
6.3.3	Treat at 600 degrees celcius	Kiln with loading and unloading	Loaders	1	Based on	a factor of 0.2 t CO2e	tonne quoted by	y Regain for SPL pro	ocessing, which in	cludes all recover	y, crushing e	tc. 308,500 to	onnes of material pr	ocessed.	61,700.00
		Treated product allowed to cool Power supply	Rotary kiln Genset									,			
6.3.4	Decommision and disammebly of heat treatment facility	Decomission heat treatment facility			Transport Diesel	18.75	300	3000			42.85714				
	•	Transport heat treatment facility components	Heavy Vehicle Movements Mobile Crane/Telehandler (Above	10	Stationary	6.3			6	30	480	0.8035714	2721.69	2187.07	2.19
		offsite	Stationary crane	1	Diesel Stationary	23			6	30		3.024	2709.72	8194.19	8.19
			Forklift 8t		Diesel Stationary	4.6			-	30		5.52	2709.72	14957.65	14.96
			Light vehicles		Diesel Transport	4.0	70	280		30	400	2.208	2709.72	5983.06	5.98
	Delivery of containers and		Light vehicles	4	Petrol		,,,	280			,	0.032	2312.60	74.00	0.07
6.3.5	bagging and containing	Delivery of containers (2 per truck)	Heavy Vehicle Movements	5000	Transport Diesel	18.75	70	350000			5000				
	material				Transport							93.75	2721.69	255158.06	255.16
		Bagged in bulk bags	Light Vehicles	4	Petrol Transport	8	299950	1199800			17140	137.12	2312.60	317104.26	317.10
4 A	Posyclable Material Transport		Excavators	2	Diesel	35			857	2571	41136	1439.76	2721.69	3918574.64	3918.57
	Recyclable Material Transport Load and Transport 5,000 tonnes of cleaned steel to	Load 5000 tonnes of steel into 20 T			Transport	35			50	250	8000				
0.4.1	steel processing facility	articulated trucks	Excavators	4	Diesel							280	2721.69	762072.08	762.07
		Truck 5,000 tonnes of steel to steel recycling facility	Loaders	1	Transport Diesel	15.3			50	250		30.6	2721.69	83283.59	83.28
			Light Vehicles	4	Transport Petrol	8	17500	70000			1000	8	2312.60	18500.83	18.50
			Heavy Vehicle Movements	250	Transport Diesel	18.75	70	17500			250	4.6875	2721.69	12757.90	12.76
6.5.1	processing facility	Generally steel recycling involves breakdown of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material.			Emissions	from processing of so	crap steel in an E	AF = 1.12 tCO2e/to	onne steel (direct a	and indirect emiss	ions) (see Fa	ctors tab)			5,600.00
6.6	Material Transport Transport from Smelter to rail	Load treated material into shipping	Forklift 8t		Stationary	4.6			72	360	5760			T	
U.O. I	terminal	containers	Forklift 8t Mobile Crane/Telehandler (Abov		Diesel Stationary							26.496	2709.72	71796.74	71.80
		Transport of sealed shipping containers on road to rail terminal (2 per truck)	(1	Diesel	6.3			72	360	2880	18.144	2709.72	49165.16	49.17
			Heavy Vehicle Movements	5000	Transport Diesel	18.75	70	350000			5000	93.75	2721.69	255158.06	255.16
			Light Vehicles	7	Transport Petrol	8	21350	149450			2135	17.08	2312.60	39499.28	39.50
6.6.2	Transport from rail terminal to	Landabianian anatologia atau	Mobile Crane/Telehandler (Abov		Stationary				67	335	F9/0	17.08	2312.00	37477.20	37.30
0.6.2	Tellus Rail Terminal	Load shipping containers onto train		2	Diesel	6.3			67	335	5360	33.768	2709.72	91501.82	91.50
		Trains travel from terminal to Tellus Rail Terminal	Train	334			6000	2,004,000							3,341,670
		Unload containers at receiving facility	l .	1	l	1	1	l	1	l	1	l	1	1	1

О	ption 6 - Offsite	Disp	osal of	all Materia	ıl to Salt	Mine in the	he Northe	ern Territ	ory

	Option 6 - Orisite disposal of all material to Salt mille in the Northern Territory														
	Key Action	Key Steps	Equipment		Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
6.7	Receiving Facility Treated Mate	rial Disposal													•
6.7.1	Facility Material Acceptance and Placement	Facility, one container per truck	Heavy Vehicle Movements	5000	Diesel	18.75	60	300000			4285.714	80.357143	2721.69	218706.91	218.71
		operation would involve:	Mobile Crane/Telehandler (Below ground)	1	Stationary Diesel	5.1			39	195	1560	7.956	2709.72	21558.53	21.56
		Application of the Waste Acceptance Criteria.	Salt Mine Haul truck	2	Transport Diesel	37.35			39	195	3120	116.532	2721.69	317163.51	317.16
		Moving waste underground (dry packaged waste backfill or hydraulic backfill).	Mobile Crane/Telehandler (Abov	2	Stationary Diesel	6.3			39	195	3120	19.656	2709.72	53262.26	53.26
		Arranging waste into compatible zones within emplacement rooms. Backfilling and room closure.													
/ 0	Facility and Deposited Material	Management and Menitoring													1
6.8.1	Post Clasura manitaring from	The principal focus of monitoring in the post closure phase would be on groundwater monitoring	Light Vehicles	1	Transport Petrol	8			260	4	16	0.128	2312.60	296.01	0.30
		The performance of revegetation programs would also be monitored.	Hand held tools and equipment	1											
6.9	Capped Waste Stockpile Post W	Vorks Activities													
6.9.1		Decommission Capped Waste Stockpile water treatment plant, pumping well network and dams.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Restoration of water treatment plant location (regrading and surface stabilisation).	Light Vehicles	2	Transport Petrol	8	3500	7000			100	0.8	2312.60	1850.08	1.85
6.10	Capped Waste Stockpile Post-C	ompletion Phase Activities													
	Groundwater monitoring at	Ongoing groundwater monitoring (as required)	Light Vehicles	1	Transport Petrol	8					80	0.64	2312.60	1480.07	1.48
	Carbon Benefits				•	•		•					•		*
	Processing of 5,000 tonnes of cleaned Steel at a steel Lifecycle benefit associated with using scrap steel - Estimation of the bet benefit of recycling 1 tonne of steel from commercial and industrial (C&I) and construction and demolition (C&D) sources in New South Wales (0.44 tCO2e/tonne) -2200.00													-2200.00	

3,420,340.82

Option 7 - Onsite Destruction of All Material using Plasma Gasification

			otion / - orisite	J OST I		Fuel				Estimated	Total	Total Food	Emission	Feetening	Footballens
	Key Action	Key Steps	Equipment	#	Source Type	Consumption (L/hr)	Distance Travelled	Total Distance		Timeframe (Days)	Operating	Total Fuel Use (kL)	factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
7.1	Capped Waste Stockpil	e Removal				(=/111/			(Weeks)	(Days)	riours		(RGCCZC/ RE)		
7.1.1	Site Establishment	Installation of water treatment plant.	Backhoes	1	Transport Diesel	21.9	1		10	50	400	8.76	2721.69	23841.97	23.84
		Installation of water collection, pipes and pumping system.	Diesel Pump	1	Stationary Diesel	6			10	50	400	2.4	2709.72	6503.33	6.50
		Establishment of capped waste stockpile area.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Establishment of erosion and sediment control measures.	Light Vehicles	4	Transport Petrol	8	3500	14000			200	1.6	2312.60	3700.17	3.70
7.1.2	Cap removal	Removal of grass cover	Excavators	2	Transport Diesel	35			16	80	1280	44.8	2721.69	121931.53	121.93
		Removal and stockpiling of topsoil (to stockpile area).	Scraper/ Dozer	2	Transport Diesel	60.9			16	80	1280	77.952	2721.69	212160.87	212.16
		Removal and stockpiling of reusable clay layer for use at the containment cell.	30T Articulated Truck	4	Transport Diesel	37.35			16	80	2560	95.616	2721.69	260236.73	260.24
		Removal of remaining capping layers:	Water Cart	1	Transport Diesel	27			16	80	640	17.28	2721.69	47030.73	47.03
		Suitable material stockpiled for use as wet weather cover.	Hand held power tools and equipment												
		Remaining material transported for disposal at containment cell.	Heavy Vehicle Movements	9	Transport Diesel	18.75	70	630			9	0.16875	2721.69	459.28	0.46
			Light Vehicles	12	Transport Petrol	8	5600	67200			960	7.68	2312.60	17760.80	17.76
7.1.3	Material removal and sort	Removal of recyclable waste materials:	Excavators	4	Transport Diesel	35			206	206	6592	230.72	2721.69	627947.39	627.95
		Removal of carbon materials (first cut spent pot lining and anodes) of greater	Scraper/ Dozer	3	Transport Diesel	60.9			206	206	4944	301.0896	2721.69	819471.35	819.47
		Removal of metals greater than 500mm in size	Water Cart	1	Transport Diesel	27			206	1030	8240	222.48	2721.69	605520.70	605.52
		Transport material to cleaning/ storage shed.	Light Vehicles	8	Transport Petrol	8	59150	473200			6760	54.08	2312.60	125065.62	125.07
		Removal of non-recyclable materials and transport to the sorting area.	Wash-down bay	2	Stationary Diesel	15			206	206	3296	49.44	2709.72	133968.56	133.97
		Removal of waste materials would cease in rain events and the temporary cover placed over the exposed waste.													
		Excavation of natural materials affected by wastes and contaminants. Investigations to be undertaken of stockpile footprint to determine soils to be removed.													
		Removal and transportation of stockpiled wet weather cover material to the containment cell. Material tracking system implemented throughout the removal process.													
	Operate water	Placement and compaction of suitable material for filling of capped waste stockpile excavation void													
7.1.4	treatment plant (installed as part of capped waste stockpile removal Key Task).	Leachate and captured stormwater from capped waste stockpile during material removal to be pumped to and treated at the treatment plant.	Diesel Pump	1	Stationary Diesel	6			226	1130	9040	54.24	2709.72	146975.21	146.98
		Pumping and treatment of groundwater from below and surrounding the capped waste stockpile footprint.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
		Dam water treatment.	Light Vehicles	2	Transport Petrol	8	12950	25900			370	2.96	2312.60	6845.31	6.85
		Discharge of treated water to existing dam.						_	_			_			_
	Leachate pond	Groundwater monitoring. Excavation of deposited sediments and			Transport										
7.1.5	removal at CWS	pond lining. Placement of excavated material into the	Excavators	1	Diesel Transport	35			4	20	160	5.6	2721.69	15241.44	15.24
		containment cell. Operation of temporary leachate collection	30T Articulated Truck	2	Diesel	37.35	1		4	20	320	11.952	2721.69	32529.59	32.53
		facilities prior to complete closure of Containment Cell.	Heavy Vehicle Movements	3	Transport Diesel	18.75	70	210			3	0.05625	2721.69	153.09	0.15
			Light Vehicles	2	Transport Petrol	8	280	560			8	0.064	2312.60	148.01	0.15
7.2	Recyclables Cleaning a Separation of Carbon	nd Storage	T		ı	· 1	· 1	· I	I	· I			· · · · · · · · · · · · · · · · · · ·		
7.2.1	from embedded	Physical removal of steel from carbon	Excavators	1	Transport Diesel	35			66	330	2640	92.4	2721.69	251483.79	251.48
	metais		Wash-down bay	1	Stationary Diesel	15			66	330	2640	39.6	2709.72	107304.91	107.30
7.2.2	Steel clean	Cleaning as above, 5,000T of separated steel	Excavators	1	Transport Diesel	35			50	250	2000	70	2721.69	190518.02	190.52
		3.00			1000			1	•			/0	2,21.07	1,0010.02	1,75.52

Option 7 - Onsite Destruction of All Material using Plasma Gasification

	Option 7 - Onsite Destruction of All Material using Plasma Gasification Fuel Estimated Estimated Total Emission Emission														
	Key Action	Key Steps	Equipment	#	Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
			Wash-down bay	1	Stationary Diesel	15			50	250	2000	30	2709.72	81291.60	81.29
			Light Vehicles		Transport Petrol	8	17500	70000			1000	0	2312.60	18500.83	18.50
7.2.3	Carbon storage	Cleaned carbon to be transported for			Transport	35			5	25	400	14	2721.69	38103.60	
	_	appropriatestorage. Storage location to be recorded within the	Excavators		Diesel Transport	37.35			5	25	400				38.10
		internal material tracking system.	30T Articulated Truck	2	Diesel Transport	37.33	1750	7000		23	100	14.94		40661.99	40.66
			Light Vehicles	4	Petrol	8	1750	7000			100	0.8	2312.60	1850.08	1.85
7.2.4	Metals storage	Cleaned metals to be transported for storage adjacent to other stored metals. Storage location to be recorded within the	Excavators	2	Transport Diesel Transport	35			1	5	80	2.8	2721.69	7620.72	7.62
		internal material tracking system.	30T Articulated Truck	2	Diesel	37.35			1	5	80	2.988	2721.69	8132.40	8.13
			Light Vehicles	4	Transport Petrol	8	350	1400			20	0.16	2312.60	370.02	0.37
7.3	Recyclable Material Tr	ansport I	1	ı		ı	1				1			1	
7.3.1	Load and Transport 5,000 tonnes of cleaned steel to steel	Load 5000 tonnes of steel into 20 T articulated trucks			Transport Diesel	35			50	250	8000				
	processing facility	Truck 5,000 tonnes of steel to steel	Excavators	4	Transport							280	2721.69	762072.08	762.07
		recycling facility	Loaders	1	Diesel	15.3			50	250	2000	30.6	2721.69	83283.59	83.28
			Light Vehicles	4	Transport Petrol	8	17500	70000			1000	8	2312.60	18500.83	18.50
			Heavy Vehicle Movements	250	Transport Diesel	18.75	70	17500			250	4.6875	2721.69	12757.90	12.76
7.4	Recyclable Material Pr	ocessing Teenerally steel recycling involves	1		Biosoi						•				
7.4.1	Processing of 5,000 tonnes of cleaned Steel at a steel processing facility	breakdown of the steel into smaller blocks, melting in a furnace, purification, solidifying and transport of bars for use as raw material.		Emission	s from processi	ng of scrap steel	in an EAF = 1.1	2 tCO2e/tonne st	eel (direct ar	nd indirect em	issions) (see	Factors tab)		5,600.00
7.5	Non-Recyclable and no	on-crushable material			•		•	•			1				
7.5.1	Transport untreated non-crushable/ non-recyclable material to the Cessnock waste	Transportation of removed materials would include:			Transport Diesel	35			9	45	720				
	management facility		Excavators	2	Transport							25.2	2721.69	68586.49	68.59
			Loaders	1	Diesel	15.3			50	250	2000	30.6	2721.69	83283.59	83.28
		All truck loads are to be covered.	Heavy Vehicle Movements	1250	Transport Diesel	18.75	32	40000			571.4286	10.714286	2721.69	29160.92	29.16
			Light Vehicles	4	Transport Petrol	8	3150	12600			180	1.44	2312.60	3330.15	3.33
7.6 7.6.1	Material Treatment Crushing of all crushable materials	Jaw crushing/screening – to size fraction required for mixing (50-100T/hr)	Excavators	2	Transport Diesel	35			206	1030	16480				
	plus fines	Pulverising to minus 10mm (5-10T/hr)	Diesel Pump	-	Stationary	4			206	1030	8240	576.8	2721.69	1569868.48	1569.87
		ruiverising to minus Tomin (3-101711)	· ·		Diesel Stationary							49.44	2709.72	133968.56	133.97
			Impact Crusher	1	Diesel Stationary	35			206	1030	8240	288.4	2709.72	781483.25	781.48
			Jaw Crusher	2	Diesel	27			206	1030	16480	444.96	2709.72	1205717.01	1205.72
			Tracked Stockpiler	2	Stationary Diesel	9			206	1030	16480	148.32	2709.72	401905.67	401.91
			Container Loader	1	Stationary Diesel	6.3			206	1030	8240	51.912	2709.72	140666.98	140.67
			Light Vehicles	3	Transport Petrol	8	72100	216300			3090	24.72	2312.60	57167.57	57.17
			Wash dave have		Stationary	15			175	875	7000				
7.6.2	Construction of a Plasma Gasification	Earthworks for foundations	Wash-down bay	1	Diesel Transport Diesel	35			12			105	2709.72	284520.60	284.52
	Facility		Excavators		Transport	72.418	10	571			8.157143	33.6	2721.69	91448.65	91.45
		Transport of heat treatment facility	Concrete trucks Equipment delivery trucks	50	Diesel Transport	37.35			10	50	20000	0.590724	2721.69	1607.77	1.61
		components to site Construction of the heat treatment facility	Mobile Crane/Telehandler (Abo	-	Diesel Stationary	6.3			10	-		747	2721.69	2033099.44	2033.10
		construction of the heat treatment facility	·		Diesel Stationary							5.04	2709.72	13656.99	13.66
			Stationary crane	1	Diesel Stationary	23			10	50	400	9.2	2709.72	24929.42	24.93
			Forklift 8t	2	Diesel	4.6			10	50		3.68	2709.72	9971.77	9.97
			Light vehicles	2	Transport Petrol	8	3500	7000			100	0.8	2312.60	1850.08	1.85

Option 7 - Onsite Destruction of All Material using Plasma Gasification

			ption 7 - Unsite i	Je3111	uction o		cital usi	ig Flasili							
	Key Action	Key Steps	Equipment		Source Type	Fuel Consumption (L/hr)	Distance Travelled	Total Distance	Estimated Timeframe (weeks)	Estimated Timeframe (Days)	Total Operating Hours	Total Fuel Use (kL)	Emission factor (kgCO2e/kL)	Emissions (kgCO2e/kL)	Emissions (tCO2e/kL)
	Transport treated fines and crushables to the plasma gasification plant	Load stockpiled material into trucks	Excavators	2	Transport Diesel	35			32	160	2560	89.6	2721.69	243863.07	243.86
		Transport treated fines and crushables to the plasma gasification plant	30T Articulated Truck	4	Transport Diesel	37.35			32	160	5120	191.232	2721.69	520473.46	520.47
			Water Cart	1	Transport Diesel	27			32	160	1280	34.56	2721.69	94061.47	94.06
			Light Vehicles	7	Transport Petrol	8	11200	78400			1120	8.96	2312.60	20720.93	20.72
7.6.4	Decommision and disammebly of Plasma Gasification Facility	Decomission heat treatment facility	Mobile Crane/Telehandler (Abo	2	Stationary Diesel	6.3			10	50	800	5.04	2709.72	13656.99	13.66
			Stationary crane	1	Stationary Diesel	23			10	50	400	9.2	2709.72	24929.42	24.93
			Forklift 8t	2	Stationary Diesel	4.6			10	50	800	3.68	2709.72	9971.77	9.97
			Light vehicles	2	Transport Petrol	8	3500	7000			100	0.8	2312.60	1850.08	1.85
		Transport heat treatment facility components offsite	Equipment delivery trucks	50	Transport Diesel	37.35			10	50	20000	747	2721.69	2033099.44	2033.10
7.7	Plasma Gasification														
7.7.1	Treatment of crushed materials in the plasma gasification	Place crushed materials into the chamber	Excavators	1	Transport Diesel	35			103	515	4120	144.2	2721.69	392467.12	392.47
		Preheat chamber with electricity	Loaders	1	Transport Diesel	15.3			103	515	4120	63.036	2721.69	171564.20	171.56
		Preheat crushed waste to xxx°C									0				
		Inject crushed waste into heated chamber	Plasma Plant - Electricity	1	Electricity	7MW			103	515	4120	Se	e Factors Tab fo	r calc.	2,910.10
		Collect, cool and scrub syngas													
7.8	By-Product Stockpiling	Store syngas in bottles for sale													
7.8.1	Transfer of by- product to stockpile	and Disposal	Excavators	1	Transport Diesel	35			8	40	320	11.2	2721.69	30482.88	30.48
	product to stockpiic		30T Articulated Truck	1	Transport Diesel	37.35			8	40	320		2721.69	32529.59	32.53
			Light Vehicles	2	Transport Petrol	8			8	40	640	5.12	2312.60	11840.53	11.84
702	Transfer of by- product to Cessnock waste management		Heavy Vehicle Movements	3856	Transport Diesel	18.75	16.4	63238.4			903.4057				
7.0	facility. Capped Waste Stockpil	le Dest Marke Activities			l					l	l	16.938857	2721.69	46102.25	46.10
7.9		Decommission Capped Waste Stockpile			I ₊ .	I				T T			l		
7.9.1	treatment infrastructure	water treatment plant, pumping well network and dams.	Heavy Vehicle Movements	2	Transport Diesel	18.75	70	140			2	0.0375	2721.69	102.06	0.10
	im ustruoturo	Restoration of water treatment plant location (regrading and surface	,		Transport	8	3500	7000			100				
		stabilisation).	Light Vehicles	2	Petrol							0.8	2312.60	1850.08	1.85
7.10		e Post-Completion Phase Activities													
		Ongoing groundwater monitoring (as		1	Transport	8					80				
	Waste Stockpile location	required)	Light Vehicles		Petrol							0.64	2312.60	1480.07	1.48
	Carbon Benefits							l .	l	L	l	l			
	Processing of 5,000 tonnes of cleaned Steel at a steel processing facility	Lifecycle benefit associated with usin	g scrap steel - Estimation of the	bet benefi	t of recycling 1	tonne of steel fro tCO2e/t		and industrial (C8	&I) and const	ruction and de	emolition (C	&D) sources	in New South Wal	es (0.44	-2200.00