Agenda Item 9.4

Report No. 96/13ts

TO: **TECHNICAL SERVICES COMMITTEE – MONDAY 11 MAY 2013**

SUBJECT: **UPDATED CARBON TAX REPORT**

AUTHOR: **DIRECTOR TECHNICAL SERVICES – GREG BUXTON**

EXECUTIVE SUMMARY

This report is to provide Council with clarification of Council's position on its carbon tax liability.

RECOMMENDATION
It is a recommendation to Council

That this report be received and noted.

REPORT

1. BACKGROUND

A report No: 83/13ts was presented to Council's Technical Services meeting on 15 April 2013. The report and attachments outlined Council's future carbon tax liabilities under the current National Greenhouse and Energy Reporting Act 2007 (the NGER Act) to report greenhouse gas (GHG) emissions (*refer attachment "A"*).

2. DISCUSSION

Discussions took place at the April 2013 Technical Services meeting where clarity was sought on three items, namely:-

a) Price Fluctuations
As of 1st July 2012, the Commonwealth Government has set the price of $24.15 per tonne for the next two years. It will rise by 2.5%pa to allow for inflation followed by a further rise to $25.40 per tonne on 2014/15. After that date the carbon price will be set by the International market (flexible period) and could fluctuate up or down.

Council cannot control the pricing of the GHG, only endeavour to reduce its liability through recycling or landfill diversion.

b) Sand extraction from the Todd River
Council has received grant funding from the Federal Attorney General's Department (through the NT Disaster Resilience Fund, which is administered by Northern Territory Emergency Service (NTES)), in the sum of $100k. These funds were granted to enable Council to re-channel the Todd River and assist in water flow down the Todd River during flow periods.

The extracted sand is being stock piled at the Waste Management Facility for future use. If mixed with clean fill, the sand can be used for cover fill. As an inert material, and a non-producing methane product, the extracted sand does not add to the GHG emissions.

c) Carbon Tax
The attached Tonkin report calculates that /Council may have a carbon tax liability of up to $80,000 based on the NGER Act 2007, as amended 1 July 2012. This equates to approximately $6.76 per bin service, per annum.

3. POLICY IMPACTS

Nil

4. FINANCIAL IMPACTS

The estimated carbon tax for the report period 2013/2014 is $80,000.00. General waste (household waste) or putrescible waste is the primary producer of CO2's.

It is proposed that the ratepayer has included in their kerbside rubbish collection an additional charge of $6.80pa. It would be collected within the payment of rates and deposited into Council's account for payment of the carbon tax.

5. SOCIAL IMPACTS

6. ENVIRONMENTAL IMPACTS

7. PUBLIC RELATIONS

Any carbon tax impositions will need to be recovered through the Waste Management Facility's fees and charges.

8. ATTACHMENTS

Tonkin Consultants -- ASTC Landfill – GHG Emissions and potential liability

Greg Buxton
DIRECTOR TECHNICAL SERVICES

Agenda Item 9.7

Report No. 83/13ts

TO: **TECHNICAL SERVICES COMMITTEE – MONDAY 15 APRIL 2013**

SUBJECT: **UPDATED CARBON TAX REPORT**

AUTHOR: **DIRECTOR TECHNICAL SERVICES – GREG BUXTON**

EXECUTIVE SUMMARY

This report is to provide Council with details of the updated report of Tonkin Consultants regarding ASTC Landfill – GHG Emissions and potential liability

RECOMMENDATION

It is a recommendation to Council

That this report be noted.

REPORT

1. BACKGROUND

Council requested Tonkin Consultants provide an updated report on the Alice Springs Town Council Landfill – GHG Emissions and potential liability

2. DISCUSSION

Gavin Reeves of Tonkin Consulting provided an updated report on the status of ASTC landfill GHGs relative to NGERS and CE Act.

The report update includes an Executive Summary up front as well as further information regarding reporting. Some reformatting to include tables and some discussion of Calculator input to attachment at back of the report. This should make it easier to read but maintains the information relative to site specific inputs into calculator.

Director Technical Services will review and advise budget ramifications.

3. POLICY IMPACTS

Nil

4. FINANCIAL IMPACTS

Possible carbon tax levy of $170,000 for 2013/14 has been revised to $80,000, based on the attached report and the Commonwealth Amended Clean Energy Act 2007.

5. SOCIAL IMPACTS

Provision of parks as per Councils Developers Guidelines.

6. ENVIRONMENTAL IMPACTS

As per report.

7. PUBLIC RELATIONS

Any carbon tax impositions will need to be recovered through the Waste Management Facility's fees and charges.

8. ATTACHMENTS

Tonkin Consultants -- ASTC Landfill – GHG Emissions and potential liability

Greg Buxton
DIRECTOR TECHNICAL SERVICES

20120658CL2A/GR/PL

9 April 2013

Alice Springs Town Council
PO Box 1071
Alice Springs, NT 0871

Attention: Reinier Laan

Dear Reinier

ASTC LANDFILL – GHG EMISSIONS AND POTENTIAL FUTURE LIABILITY

Executive Summary

Landfill operators may be liable under the National Greenhouse and Energy Reporting Act 2007 (the NGER Act) to report GHG emissions and the Clean Energy Act 2007 (the CE Act) carbon price if the landfill under their control creates direct emissions of 25,000 tonnes carbon dioxide equivalent (CO2-e) or more per year.

Tonkin has undertaken a review of NGER Regulations and the NGER (Measurement) Determination 2008 as amended (prepared 1 July 2012) (the Determination) and site specific parameters considered to assess estimated GHG emissions profile. The site emissions are compared to the NGER and CE Act reporting and liability thresholds and an estimate of the potential carbon price liability is summarised.

Liable entities must report under the NGERs on the extent of their emissions and satisfy their liability for each tonne of CO2-e they emit, either by surrendering emissions units or paying a unit shortfall charge (130% of calculated liability).

The price will start at $23 per tonne on 1 July 2012. In each of the next two years, it will rise by 2.5 per cent for inflation. The carbon price will be $24.15 per tonne in 2013-14 and $25.40 per tonne in 2014-15. After 2014/15 the carbon price will be set by the international market (flexible period) and could fluctuate significantly, up or down.

The LFG emissions were estimated using the NGER Method 1 for assessment. The details of the desktop NGER Method 1 for calculation of methane emissions from landfills are described in Chapter 5 of the Determination which is a part of the NGER Act. For the Method 1 calculations the CER provides an Excel based spreadsheet, the "NGER Solid waste calculator". The most recent version, Version 1.7 was used in this assessment. The Determination as amended (prepared 1 July 2011) was used for this assessment.

The result from the Method 1 assessment indicates that Alice Springs Landfill is estimated to release 1,955 tonnes of methane as a result of legacy waste at the end of the 2011/12 reporting period which equates to total emissions of **41,065 tonnes $CO_{2\text{-}e}$** (carbon dioxide equivalents). Based on the Determination 2012 and proposed changes to t he Calculator for the 12/13 reporting period, it is anticipated the site will have total emissions of **34,035 tonnes $CO_{2\text{-}e}$**.

Based on this assessment and information provided to date from Council and the CER, Council would trigger the 25,000 tonnes CO2-e threshold for emissions reporting under the NGER and CE Acts and would incur a carbon price liability.

Since emissions from landfilling will not occur until approximately 12 months after the waste is disposed of, liable emissions for the 2012/13 period will be zero. Emissions from waste disposed of during the 2012/13 period will start being emitted during the 2013/14 and therefore the first carbon price liability will be incurred at the end of the 2013/14 reporting period. However, where it is understood that a liability will be

incurred Council should take measures to recover this liability during the period waste is being deposited to cover this future liability.

Based on the results of this review the following liability for the fixed price period could be expected.

Table ES1 Potential Carbon Price Mechanism Liability for the Fixed Price Period

	Fixed Price Period		
	2012/13	**2013/14**	**2014/15**
Carbon price	$23.00 / tonne	$24.15 / tonne	$25.40 / tonne
Estimated Liability using 11/12 Calculator (soon to be superseded) (using state based Landfill Classification)	$ 0.00	$ 148,327	$270,486
Estimated Liability using 12/13 Calculator when released (using location/climate based Landfill Classification)	**$ 0.00**	**$ 38,730**	**$ 79,426**

It is impossible to tell at this stage what fluctuation path the carbon price will take during the flexible price period. Table ES2 below provides and indication of the potential future liability cost range based on the forecast post-legacy emissions estimated, emissions consistent with selecting the SA location as a close approximation to the k-value to be adopted in the updated Calculator (when released) as discussed on p6 and a potential carbon price range of between $5 - $30 as nominated by Council.

Table ES2 Potential Carbon Price Mechanism Liability for the Flexible Price Period

Date (end of period)	**Post-legacy emissions (SA)** CO_2-e tonnes	**Potential Future Annual Liability** based on $5 - $30 / CO_2-e tonne emitted
2016	4574.02	$ 22,870.11 - $ 137,220.64
2017	5948.75	$ 29,743.76 - $ 178,462.53
2018	7254.95	$ 36,274.74 - $ 217,648.47
2019	8496.17	$ 42,480.85 - $ 254,885.12
2020	9675.78	$ 48,378.91 - $ 290,273.47
2021	10796.97	$ 53,984.85 - $ 323,909.12
2022	11862.75	$ 59,313.76 - $ 355,882.57
2023	12875.98	$ 64,379.92 - $ 386,279.52
2024	13839.37	$ 69,196.85 - $ 415,181.10
2025	13151.75	$ 65,758.73 - $ 394,552.36
2026	12499.71	$ 62,498.56 - $ 374,991.38
2027	11881.38	$ 59,406.88 - $ 356,441.29
2028	11294.94	$ 56,474.71 - $ 338,848.28
2029	10738.72	$ 53,693.58 - $ 322,161.49
2030	10211.09	$ 51,055.47 - $ 306,332.80
2031	9710.56	$ 0.00 - $ 0.00
2032	9235.67	$ 0.00 - $ 0.00
2033	8785.09	$ 0.00 - $ 0.00

This review indicates Council will have legal obligations under the CE Act to:

- Register as a 'liable entity' in accordance with the procedure defined under the NGER Act and CE Act;
- Report on its assessment of GHG emissions and other relevant "Corporate" emissions if applicable using the OSCAR tool with emission estimates prepared in accordance with the latest version of the NGER (Measurement) Determination
- Account for and discharge of any liability under the CE Act by surrendering carbon units in accordance with the CE and NGER Acts and regulations.

Carbon units are financial products as a result of the NEGRS alignment with the Corporations Act. Therefore carbon units are also governed by other regulatory frameworks to prevent acts of fraud, theft and improper financial manipulation.

Council will need to understand and establish a registry account to manage carbon units, including purchasing, holding, trading and surrendering to the regulator to satisfy CE Act obligations. The account must be managed by at least one nominated person, the Regulator suggests two people should be nominated. The Regulator has an obligation to undertake a "fit and proper person" test and will undertake identification and criminal record checks among other checks. This could take some time to establish.

As a result of the legal and financial imperatives, Council should seek other professional input to managing their NGERS liability such as from well informed lawyers and accountants.

Council should position itself to be fully informed of the implications of the now introduced CPM. Council must understand and manage its reporting and liability discharge obligations under the NGERs and CE Acts.

Council should investigate options to maximise landfill diversion to reduce its CPM liability and seek to recover the liability through landfill gate pricing.

Council should strive to achieve this through developing reporting and compliance strategies and a carbon credits purchase strategy, review current waste management strategies to minimise waste to landfill and organic load disposed of, review and amend the landfill disposal fee structure and routinely monitor and review strategies to ensure efficient and effective management of GHG related issues and liabilities.

Background

Alice Springs Town Council (Council) engaged Tonkin Consulting (Tonkin) to undertake a review of issues associated with greenhouse gas (GHG) emissions from the Alice Springs Landfill site (the site) and the proposed National Greenhouse and Energy Reporting System (NGERS). This review is to include an assessment of potential GHG generation in accordance with NGERs regulations, the potential carbon price liability associated with the estimated GHG emissions and brief discussion of how the assessment is undertaken. Discussion was also requested to cover other implications to Council such as liability recovery at the landfill gate, emissions reporting requirements and how any potential liability may be mitigated or reduced.

Introduction

Landfill operators may be liable under the National Greenhouse and Energy Reporting Act 2007 (the NGER Act) to report GHG emissions and the Clean Energy Act 2007 (the CE Act) carbon price if the landfill under their control creates direct emissions of 25,000 tonnes carbon dioxide equivalent (CO2-e) or more per year.

Tonkin has undertaken a review of NGER Regulations and the NGER (Measurement) Determination 2008 as amended (prepared 1 July 2012) (the Determination) and site specific parameters considered to assess estimated GHG emissions profile. The site emissions are compared to the NGER and CE Act reporting and liability thresholds and an estimate of the potential carbon price liability is summarised.

This discussion highlights the issues and site parameters to consider in assessing the site's GHG emissions and the complexity and current uncertainties associated with GHG estimates. Discussion is provided herein around the carbon price mechanism and associated issues including:

- The results of our Method 1 assessment of the potential for a carbon price liability using the Solid Waste Emissions Calculator (the calculator);
- Carbon Price liabilities, NGER implications and uncertainties;
- Reporting alternatives (Method 2 and 3) and appropriateness for Council;
- Opportunities for mitigation and reduction of emissions to earn carbon credits;
- Conclusions and recommendations.

The Carbon Price Mechanism (CPM)

The CPM, introduced by the CE Act and the NGER Act, applies to liable entities that either operate facilities that meet an emissions threshold of at least 25,000 tonnes of carbon dioxide equivalent (CO2-e) or supply or use large amounts of natural gas. The mechanism covers approximately 60 per cent of Australia's carbon emissions and includes emissions from electricity generation, stationary energy, landfills, wastewater, industrial processes and fugitive emissions.

Liable entities must report under the NGERs on the extent of their emissions and satisfy their liability for each tonne of CO2-e they emit, either by surrendering emissions units or paying a unit shortfall charge of 130% of calculated liability.

You can be a liable entity if you are:

- a direct emitter, or
- supplying natural gas or using large quantities of natural gas, or
- both.

You are a direct emitter if:

- you have operational control of a facility that directly emits greenhouse gas (covered emissions) of 25,000 tonnes of CO_2-e or more annually and there is not a transfer of full liability to another person, or
- there is a transfer of liability to you in relation to a facility that directly emits greenhouse gas (covered emissions) of 25,000 tonnes of CO_2-e or more annually.

If you are a liable entity, you must:

- be registered under the NGER Scheme
- report your covered emissions to the Clean Energy Regulator (CER) under the NGER Scheme
- acquire and surrender enough eligible emission units to satisfy your liability for a financial year by 15 June in that financial year (if you have an interim emissions number) and by 1 February in the following year, and
- if, at the required time, you do not surrender enough units to satisfy your liability, pay a unit shortfall charge to account for the units you do not surrender.

The Determination provides three methods for determining emissions of methane in landfill gas generated from a landfill facility.

Method 1 uses the IPCC first-order decay model and provides the option for default waste composition and k-values (methane generation constants). Methods 2 and 3 are similar to Method 1 except that they require the calculation of a facility specific k-value and the gas capture efficiency limit of 75% under Method 1 is removed.

Methods 2 and 3 are not applicable to the site. This is discussed further on p11.

Method 1 Assessment and Results

This assessment is based on the latest available NGER Solid Waste Calculator (the Calculator), Version 1.7 provided for estimating emissions. The Calculator for the reporting period 11/12 has been used in this review. This Calculator is currently being updated and will be released for estimating reporting year 12/13 emissions prior to the first round of reporting due by 31 October 2013.

Therefore this assessment is based on the Calculator released for the 2011/12 reporting period. Solid Waste Calculator output is included for reference in Attachment 1. The amended Determination for the 12/13 reporting period (Determination 2012) has been released. Where possible we have identified and discussed where potential changes will occur to the Calculator as a result of the updated Determination for reporting period 12/13. Therefore this assessment should be used as a guide only for anticipated potential outcomes for the 2012/13 reporting period.

Method 1 Assessment

The LFG emissions were estimated using the NGER Method 1 for assessment. The details of the desktop NGER Method 1 for calculation of methane emissions from landfills are described in Chapter 5 of the Determination which is a part of the NGER Act. For the Method 1 calculations the CER provides an Excel based spreadsheet, the "NGER Solid waste calculator". The most recent version, Version 1.7 was used in this assessment. The Determination as amended (prepared 1 July 2011) was used for this assessment.

The method produces estimates of annual emissions of methane and is intended to be calculated using annual data for received solid waste material quantities at waste management facilities.

It should be noted that all data, estimates and assumptions used in determining inputs into the calculator and NGER reporting must be auditable and justifiable.

NGER Solid Waste Calculator inputs and assumptions are included in Attachment 2.

Method 1 Results

The result from the Method 1 assessment indicates that Alice Springs Landfill is estimated to release 1,955 tonnes of methane as a result of legacy waste at the end of the 2011/12 reporting period which equates to total emissions of **41,065 tonnes $CO_{2\text{-}e}$** (carbon dioxide equivalents). See Table 1. Based on the Determination 2012 and proposed changes to the Calculator for the 12/13 reporting period, it is anticipated the site will have total emissions of approximately **34,035 tonnes $CO_{2\text{-}e}$** as indicated in Table 2.

Table 1 Summary of Calculator Outputs

Date	Waste received at landfill tonnes	Total emissions (SA) CO2-equivalent tonnes	Legacy emissions (SA) CO2- equivalent tonnes	Post-legacy (SA) emissions equivalent tonnes
2003	53,013	37200.57 (30,692)	37200.57 (30,692)	0.00
2004	53,013	37303.27 (30972)	37303.27 (30972)	0.00
2005	53,013	37399.86 (31239)	37399.86 (31239)	0.00
2006	63,579	37490.74 (31495)	37490.74 (31495)	0.00
2007	64,966	38972.88 (32088)	38972.88 (32088)	0.00
2008	62,452	40262.51 (32698)	40262.51 (32698)	0.00
2009	55,995	40909.51 (33197)	40909.51 (33197)	0.00
2010	78,094	40573.43 (33460)	40573.43 (33460)	0.00
2011	82,905	40918.60 (33927)	40918.60 (33927)	0.00
2012	48,083	41064.23 (34317)	41064.23 (34317)	0.00

Note: an additional provision allowing landfill operators to select decay rate constants (k-values) based upon local temperature, rainfall and evaporation data is included in the current Determination 2012, however the updated Calculator including this functionality has not been released. On reviewing the k-values for which the site will in future be identified (tropical dry), these values are a close approximation to the k-values assigned for Adelaide (SA). The data in the Tables 4 and 5 within parenthesis demonstrates emissions under the SA site location identifier and reflect an estimate of the degree of reduction of total emissions for the period shown which could be expected when using the updated Calculator set to Tropical Dry when released.

Legacy Emissions - means waste deposited at a landfill before 1 July 2012

Post- Legacy Emissions - means waste deposited at a landfill after 1 July 2012

Total Emissions - means the sum of Legacy and Post-Legacy Emissions

These emissions are referred to as legacy waste emissions as they are a result of waste disposed of before July 2012. This emissions total is used to determine if the facility needs to register as a result of triggering the registration threshold. Therefore these are not liable emissions. Liable emissions will only relate to non legacy waste, being waste deposited after 1 July 2012. Legacy emission will count towards the total emissions, but any liability incurred will only be calculated on non-legacy emissions total as demonstrated in Table 2.

Based on this assessment and information provided to date from Council and the CER, Council would trigger the 25,000 tonnes CO2-e threshold for emissions reporting under the NGER and CE Acts and would incur a carbon price liability.

To provide some indication of any potential future emissions that would result in a carbon liability, the Calculator was used to forecast potential future emissions based on the data used for the above assessment. Based on our understanding of the emissions estimation process and the current Determination and Calculator, assuming waste intake and recycling/diversion was to continue for future years as it has for the 2011/2012 year, the emissions profile in the table could be expected. Note: in the absence of specific data, it has been assumed for the purposes of this review that the landfill has 10 years remaining airspace as reflected in second column.

Table 2 Potential Future Emissions Profile

Date (end of period)	Waste received at landfill tonnes	NT Total emissions (SA) CO2-equivalent tonnes	NT Legacy emissions (SA) CO2-equivalent tonnes	NT Post-legacy emissions (SA) CO2-equivalent tonnes
2009	55,995	40909.51 *(33197.13)*	40909.51 (33197.13)	0.00 (0.00)
2010	78,094	40573.43 *(33460.02)*	40573.43 (33460.02)	0.00 (0.00)
2011	82,905	40918.60 *(33927.47)*	40918.60 (33927.47)	0.00 (0.00)
2012	48,083	41064.23 *(34317.08)*	41064.23 (34317.08)	0.00 (0.00)
2013	48,083	38610.57 *(34034.93)*	38610.57 (34034.93)	0.00 (0.00)
2014	48,083	37554.53 *(34017.23)*	31412.63 (32413.50)	6141.90 (1603.73)
2015	48,083	36828.87 *(34000.69)*	26179.79 (30873.69)	10649.08 (3127.00)
2016	48,083	36323.33 *(33985.24)*	22300.27 (29411.22)	14023.07 (4574.02)
2017	48,083	35964.50 *(33970.81)*	19360.10 (28022.06)	16604.40 (5948.75)
2018	48,083	35703.54 *(33957.33)*	17078.40 (26702.38)	18625.13 (7254.95)
2019	48,083	35508.04 *(33944.75)*	15263.95 (25448.58)	20244.08 (8496.17)
2020	48,083	35356.51 *(33933.01)*	13785.94 (24257.22)	21570.56 (9675.78)
2021	48,083	35234.74 *(33922.05)*	12554.42 (23125.08)	22680.32 (10796.97)
2022	48,083	35133.36 *(33911.83)*	11507.06 (22049.08)	23626.30 (11862.75)
2023	48,083	35046.19 *(33902.31)*	10600.29 (21026.32)	24445.90 (12875.98)
2024	0	34969.18 *(33893.43)*	9803.35 (20054.06)	25165.84 (13839.37)
2025	0	28757.77 *(32281.44)*	9094.18 (19129.69)	19663.59 (13151.75)
2026	0	24186.84 *(30750.46)*	8456.76 (18250.75)	15730.08 (12499.71)
2027	0	20753.71 *(29296.28)*	7879.23 (17414.91)	12874.47 (11881.38)
2028	0	18117.08 *(27914.89)*	7352.64 (16619.95)	10764.44 (11294.94)
2029	0	16044.39 *(26602.50)*	6870.07 (15863.78)	9174.32 (10738.72)
2030	0	14376.48 *(25355.53)*	6426.10 (15144.43)	7950.37 (10211.09)
2031	0	13003.79 (24170.58)	6016.35 (14460.02)	6987.43 (9710.56)
2032	0	11850.38 (23044.44)	5637.23 (13808.76)	6213.15 (9235.67)
2033	0	10863.16 (21974.07)	5285.72 (13188.98)	5577.44 (8785.09)
2034	0	10004.63 (20956.59)	4959.27 (12599.07)	5045.35 (8357.51)

( ) SA Values for comparison in parenthesis
(240170.58) Total emissions triggering CPM Liability threshold
(10211.09) Liable emissions attracting carbon price liability

Carbon Price

Carbon Price Liability – Fixed Price Period

If the Facility threshold of 25,000 CO_2-e is triggered for Total Emissions, all emissions excluding legacy emissions (ie post legacy emissions) will count towards the carbon price liability. Since we can closely approximate emissions based on the Determination 2012 and SA Default values to reflect inception of t he 2012/13 Calculator, the NT Default values are indicated in the table above but ignored in the following discussion.

Since emissions from landfilling will not occur until approximately 12 months after the waste is disposed of, liable emissions for the 2012/13 period will be zero. Emissions from waste disposed of during the 2012/13 period will start being emitted during the 2013/14 and therefore the first carbon price liability will be incurred at the end of the 2013/14 reporting period. However, where it is understood that a liability will be incurred Council should take measures to recover this liability during the period waste is being deposited to cover this future liability.

When considering Total Emissions (using SA Default values) the CPM liability threshold is immediately triggered due to the volume of legacy waste at the site until approximately 2031 where emissions fall below the trigger threshold. The table above demonstrates where the trigger threshold is exceeded and the volume of Post-legacy emissions contributing to emissions liability.

The price will start at $23 per tonne on 1 July 2012. In each of the next two years, it will rise by 2.5 per cent for inflation. The carbon price will be $24.15 per tonne in 2013-14 and $25.40 per tonne in 2014-15. After 2014/15 the carbon price will be set by the international market (flexible period) and could fluctuate significantly, up or down.

Based on the results indicated in Table 2 the following liability for the fixed price period could be expected.

Table 3 Potential Carbon Price Mechanism Liability for the Fixed Price Period

	Fixed Price Period		
	2012/13	**2013/14**	**2014/15**
Carbon price	$23.00 / tonne	$24.15 / tonne	$25.40 / tonne
Estimated Liability using 11/12 Calculator (soon to be superseded) (using state based Landfill Classification)	$ 0.00	$ 148,327	$270,486
Estimated Liability using 12/13 Calculator when released (using location/climate based Landfill Classification)	**$ 0.00**	**$ 38,730**	**$ 79,426**

Carbon Price Future – Liability During Flexible Price Period

From July 1 2015 the carbon price will no longer be fixed, but will be determined by the market. Liable entities will compete to buy the number of carbon units they need to meet their obligations. Entities that value carbon units most highly will be willing to pay most for them. For some entities, it will be cheaper to reduce emissions than buy carbon units.

The Government will set a cap by issuing a fixed number of carbon permits each year. Each permit will represent one tonne of emissions, one unit. Before the start of the flexible price period, the Government will set out the caps for the first five years from 1 July 2015. Once the flexible price system is under way, the caps will be extended each year. This is so that businesses will have five years of certainty about the caps they face.

A price ceiling is proposed to be set $20 higher than the expected international carbon price at the start of the flexible price period and will rise in real terms at five per cent each year.

From the start of the flexible price, liable entities will be able to acquit their obligations with eligible international units. Eligible international units can be used for up to 50 per cent of an entity's annual liability, and eligible Kyoto units can be used for up to 12.5 per cent of an entity's overall liability.

It is impossible to tell at this stage what fluctuation path the carbon price will take during the flexible price period. Table 4 below provides and indication of the potential future liability cost range based on the forecast Post-legacy emissions as detailed in Table 3, emissions consistent with selecting the SA location

as a close approximation to the k-value to be adopted in the updated Calculator as discussed on p7 and a potential carbon price range of between $5 - $30 as nominated by Council.

Table 4 Potential Carbon Price Mechanism Liability for the Flexible Price Period

Date (end of period)	Post-legacy emissions (SA) CO2-e tonnes	Potential Future Annual Liability based on $5 - $30 / CO2-e tonnes emitted
2016	4574.02	$ 22,870.11 - $ 137,220.64
2017	5948.75	$ 29,743.76 - $ 178,462.53
2018	7254.95	$ 36,274.74 - $ 217,648.47
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2029	10738.72	$ 53,693.58 - $ 322,161.49
2030	10211.09	$ 51,055.47 - $ 306,332.80
2031	9710.56	$ 0.00 - $ 0.00
2032	9235.67	$ 0.00 - $ 0.00
2033	8785.09	$ 0.00 - $ 0.00

Cost Recovery

As noted above, Council must take measures to recover any liability during the period waste is being deposited to cover the future liability (when due to be reported and surrendered). Waste placed during 2012/13 reporting period will not generate emissions for twelve months (starting mid 2013), then be reported by October 2013 and purchased credits must be surrendered by 1 February 2014. These liabilities due by 1 February 2014 should be recovered throughout 2012/13.

It is recognised throughout the industry that working out waste emissions and how to price them (recover costs) is uniquely complex because the emissions generated from each tonne of waste disposed of will continue for decades after the waste disposal and the price of carbon in the future (after commencement in mid 2015 of the flexible price period) is unknown. Cost recovery has emerged as a very difficult issue to address and there currently appears to be no standard method for Councils to accurately determine the most effective measure to recover costs. Cost recovery will need to be tailored to site specific circumstances

Mike Ritchie of Mike Ritchie Associates has described two charging options for landfill owners to pass on the emissions liability which somewhat demonstrates the complexity of cost recovery:

- 'One off' pricing; and
- 'Pay as you go' pricing

'One off' charging recognises that the landfill operator has only one opportunity to pass on the full life liability of methane emissions arising from a tonne of waste delivered today which could emit emissions for 40 years or more.

'Pay as you go' charging suggests that the landfill operator will charge only the premium required to cover the emissions liability arising for the landfill in the current year. It results in a lower gate fee premium being required because it defers the full life liabilities to later periods. However, it may also result in an under-funded liability arising from emissions occurring after the landfill stops receiving waste (assuming the landfill is still emitting above the 25,000 tonne threshold during the post closure phase). It therefore creates a risk that an unfunded liability occurs post-closure.

We note that the ACCC has been tasked with monitoring the industry to ensure operators are not taking advantage of customers by overcharging waste customers to "cover" emissions liabilities. The Clean Energy Regulator and the ACCC will be conducting audits to monitor compliance with the NGER, CE and Competition and Consumer Acts. ACCC provide guidance on transparency and documentation through the development of a Carbon Liability Financial Management Policy covering documentation of the process, methodologies and assumptions used in deriving a landfill carbon fee.

NGERS Emissions Reporting

Currently, an entity with operational control of a facility that includes landfill activities is operating after July 2012 and emits 25,000 tonnes of carbon dioxide equivalent (t CO2-e) or more of greenhouse gases is a liable entity. As it stands, it appears Council will have a carbon liability.

Liable entities, those triggering a "Facility" threshold not already registered and reporting under NGER will need to register before 31 August 2013 and report by 31 October 2013.

Reporting for landfill operators for 2008/09 to 2011/12 is done using the Online System for Comprehensive Activity Reporting (OSCAR) in conjunction with the Calculator. OSCAR is a web-based data collection tool that captures greenhouse gas emissions and energy data and must be used by controlling corporations that trigger facility or corporate level thresholds and are required to report under the NGER Act. A controlling corporation means a constitutional corporation that does not have a holding company incorporated in Australia.

Corporations are provided access to OSCAR for NGER reporting once they are registered under the NGER Act. The registration application deadline is 31 August following the reporting year that the controlling corporation first needs to report under NGER (e.g. 31 August 2012 for corporations meeting thresholds in the 2011/12 reporting year).

Once landfill emissions have been determined for a landfill facility using the Calculator, these results are entered into OSCAR for reporting.

Dates to note for entities required to register due to triggering the 25,000 tonne CO_2-e threshold:

1 July 2012	Carbon pricing mechanism begins
31 October 2012	2011/2012 Report in accord with NGER S19 (for registered facility owners)
1 April – 15 June 2013	Credit units available for purchase
15 June 2013	Liable entities report interim emissions number (75% estimate for 2012/13 period)
31 October 2013	NGER Report due. Liable entities must report on their provisional emissions numbers and emissions numbers for period 2012/13
1 February 2014	Final surrender based on Oct 2013 NGER Report. Units available for purchase until this date.

Council will need to consider whether they are also required to report other GHG emissions under the NGER Act as a result of "Corporate" thresholds.

The DCC recommendation for organisations not currently covered by the scheme is to consider keeping GHG emissions and energy records as appropriate. For landfills this would mean keeping records of received waste as per options given in the Section 5.5 of the Determination. Organisations not triggering the reporting and liability threshold may apply for registration under the NGER Act for reporting if a threshold has or is likely to be met in the future.

The CER has indicated that mandatory pre-submission audits will apply to all large emitters with their carbon liability reports.

Council should investigate to improve and maintain record keeping and keep an auditable trail of evidence whether liable under the carbon price or not.

Uncertainties

Some of these remaining uncertainties are:

- Issues with the accuracy and function of the Calculator – the Calculator is proposed to be updated in line with the updated Determination. The government have indicated the Calculator and Determination will be constantly reviewed and updated as necessary;
- No guarantee has been made that a drop in reporting and liability threshold will not occur ie. to something < 25,000 CO^2e tonnes;
- Implications of a change in government – the Coalition has indicated it will consider scrapping the carbon price scheme;
- Future carbon prices – at the end of the fixed price period (1 July 2015) the scheme will enter a flexible price period which means the price of carbon will be set by the market and may fluctuate. The Government had proposed to set floor and ceiling prices after the end of the fixed price period from 2015 but the floor price of $15/tonne of CO2-e has been removed and moved to operate within the European Union Emissions Trading Scheme;
- Recovering costs – most appropriate strategy and mechanism to recover cost will need to be developed.

Reporting Alternatives (Method 2 and 3)

Method 2 for solid waste disposal permits operators of landfills to make measurements of methane generation at their facility in order to determine a facility-specific estimate of the rate of decay, 'k', at the landfill. The facility-specific value of 'k' changes the profile of methane emissions over time but does not change the long term total amount of emissions from a site.

The Determination indicates that these methods may only be used if there is specific information available on the waste mix types at the landfill. Additionally, the selected representative zone for investigations must cover an area of at least 1 hectare and must contain a sufficient number of operating gas collection wells to enable accurate and representative estimates to be obtained of the methane being generated from the zone.

Therefore these methods for estimating a site specific k-value rather than using the default values would not be suitable for this facility.

Opportunities

CFI

- The government has established the Carbon Farming Initiative (CFI) which will give landfill operators an opportunity to generate income from taking action to reduce their emissions from legacy waste. The CFI is designed to provide incentives to reduce emissions from legacy waste by creating carbon credits. This opportunity will be open to any landfill with legacy waste irrespective of size. CFI credits can be used to meet obligations under the carbon price and can also be sold into voluntary and international carbon markets. Landfill operators will be able to meet up to 100

per cent of their carbon price liability using credits issued under the CFI during the fixed price years of the carbon pricing mechanism.

- Taking advantage of the CFI would require establishment of landfill gas extraction and destruction (or electricity generation) infrastructure. This would be at Council's cost. Methane generation realisation potential at this site is not currently known (discussed further below – see GHG Destruction).

Community Energy Efficiency Program

- May be an avenue to obtain grant funding to invest in energy efficiency measures to offset any NGERs liability.

Record keeping and weighbridge reporting

- Optimise data recording for most accurate reflection of waste intake reported.

Emissions Abatement Strategies

Waste Diversion

- Review kerbside bin systems and opportunities to reduce organic and recyclable volume to landfill (eg greenwaste and organics collections and recycle bin collection etc)
- Review waste intake systems such as recycling, resource recovery and transfer systems to optimise waste diversion from landfill.

General waste reduction strategies

- Public education, waste strategy review, waste policy review etc

GHG Destruction

- Larger metropolitan landfills are exploring the opportunity to claim carbon credits for the generation of electricity or through methane destruction (by flaring) to offset a carbon price liability. Generally in order to be able to claim carbon credits there is a need to demonstrate voluntary action not otherwise required or a direct action to reduce legacy emissions not previously contemplated. It must be noted that credits are only obtainable for GHG emissions reduction to the legacy waste component of the landfill.
- The feasibility of LFG collection at any landfill can be investigated by pump trials to establish the LFG generation rate and other site specific characteristics and determine whether the LFG production at the site can sustain the function of a LFG flare. The best collection and destruction efficiency is generally achieved at landfills with rapid waste decomposition generating high LFG generation rates over relatively short periods of time. This level of decomposition is generally associated with anaerobic and moist conditions which facilitate the decomposition process. The monitoring results from the last few annual rounds of monitoring of the LFG wells located in the waste would suggest that the LFG is present but the generation rate may not be particularly high which would be expected given the arid climate conditions and the estimated rates of LFG production. Practically, LFG (methane) recovery is likely to be negatively influenced by the significant volumes of soil cover materials used at the site over the years.
- The Calculator was used to estimate what level of LFG production would be required to reduce the site total emissions to a level below the liability threshold. The lowest methane production at a landfill site to successfully sustain an appropriate LFG flare is approximately 50m3/hr. It is estimated that a methane generation rate of approximately 100m3/hr would be required to drop total emissions below the liability threshold which may be unlikely for this site. This is demonstrated in the figure below.

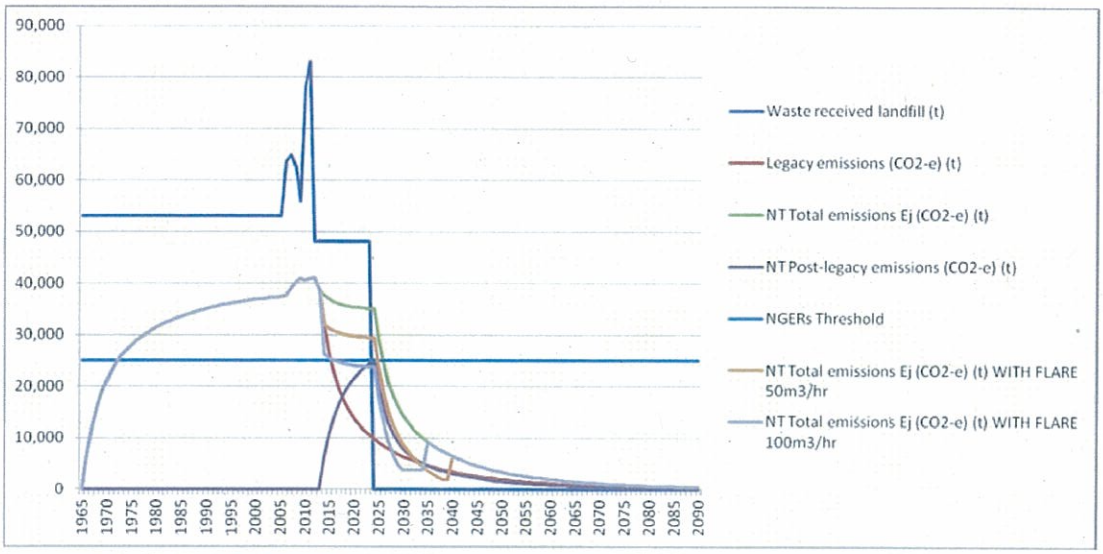

Figure 1 Emissions Profile and the Influence of a LFG Flare

- Carbon credits created through the flaring of LFG from legacy waste have the potential to provide a revenue source. However we anticipate several issues restrict their viability for this site:
    - The age of the legacy waste may limit remaining LFG generation potential;
    - The volume of soil disposed of historically and waste disposal practices may inhibit collection efficiency and effectiveness;
    - LFG flaring feasibility investigations likely to be in the order of $60K plus additional rigorous works in establishing and gaining approval as an eligible offsets project under the CPI;
    - The relatively high cost of establishing a flare plus maintenance on operational costs;
    - The Government had proposed to set floor and ceiling prices after the end of the fixed price period from 2015 (flexible price period). The removal of the carbon floor price of $15/tonne of CO2-e and move to operate within the European Union Emissions Trading Scheme has removed revenue certainty for carbon credits beyond 2015;
    - Collectively the business model to establish a LFG flare to reduce carbon liability may not stack up.

LFG Management Options – Managing LFG Risk

Common drivers for implementation of LFG management measures are risk situations such as minimising risk of LFG migration towards sensitive receptors or other environmental receptors, Licence conditions or economical cost situations associated with high methane generation rates such as energy generation etc.

In order to establish the appropriate level of LFG management at the landfill site, a risk assessment of LFG issues should be undertaken by Council to establish the level of risk presented by the site due to the presence of methane. This risk assessment should identify the potential hazards and receptors associated with the methane being generated at the site and the risks posed by their interactions whether present or potential. This review and assessment shall form the basis for the development of measures to control LFG (if required). This information will also assist in determining an appropriate capping system design, monitor the performance of the capping system once constructed and facilitate post closure monitoring and maintenance planning.

For sites with higher methane production rates, gas collection and destruction would be considered in order to minimise the risks LFG migration.

For many active landfills (whether covered by the NGER or CE Act or not), the most cost effective way to manage LFG is by precautionary perimeter monitoring of wells situated in locations selected after LFG migration risk considerations such as between the landfill and nearest sensitive receptors and also any structures on the landfill site. This in conjunction with measures to prevent infiltration of surface waters into the waste profile to minimise the potential for methane generation such as interim cover or final cover protection will assist in controlling LFG generation and emissions. In the event that monitoring does detect LFG migration at the boundary, further management and control measures can then be implemented based on results attained.

Conclusions

Carbon Price Mechanism

The LFG emissions estimated using the current Calculator and reflecting proposed changes to the Calculator (due for release prior to the 2012/13 reporting period) as indicated in the Determination 2012, Method 1 assessment indicates the facility will be above the reporting threshold as a result of the volume of legacy waste (Opening Stock) at the existing site and current waste volumes being received. This being the case, it appears a carbon price liability will be incurred.

Opportunities to earn carbon credits to offset emissions liabilities have been developed for landfill operators by the government through the CFI etc. If, with further work it appears a liability will be incurred, Council should consider these opportunities as well as the opportunity to review and refine waste management practices, strategies and policies to mitigate emissions generation and also seek to recover costs at the landfill gate.

This review indicates Council will have legal obligations under the CE Act to:

- Register as a 'liable entity' in accordance with the procedure defined under the NGER Act and CE Act;
- Report on its assessment of GHG emissions and other relevant "Corporate" emissions if applicable using the OSCAR tool with emission estimates prepared in accordance with the latest version of the NGER (Measurement) Determination
- Account for and discharge of any liability under the CE Act by surrendering carbon units in accordance with the CE and NGER Acts and regulations.

LFG Destruction and CFI's

Carbon credits created through the flaring of LFG from legacy waste have the potential to provide a revenue source. However the business model to establish a LFG flare to reduce carbon liability may not stack up.

Professional Inputs

Carbon units are financial products as a result of the NEGRS alignment with the Corporations Act. Therefore carbon units are also governed by other regulatory frameworks to prevent acts of fraud, theft and improper financial manipulation.

Council will need to understand and establish a registry account to manage carbon units, including purchasing, holding, trading and surrendering to the regulator to satisfy CE Act obligations. The account must be managed by at least one nominated person, the Regulator suggests two people should be nominated. The Regulator has an obligation to undertake a "fit and proper person" test and will undertake identification and criminal record checks among other checks. This could take some time.

As a result of the legal and financial imperatives, Council should seek other professional input to managing their NGERS liability such as from well informed lawyers and accountants.

NGERS Changes

The NGERS Determination and Calculator are proposed to be continually refined and improved to allow sites to better reflect site specific conditions, waste streams and volumes accepted and waste fraction percentages etc. This will facilitate more accurate carbon liability estimation and reporting.

It is anticipated for this site that these changes over time will facilitate improving liability assessment circumstances as the default values adopted currently to not necessarily accurately reflect site specific circumstances.

However, NGERS is not retrospective in the sense that reporting for previous unreported periods must be done so under the Determination and Calculator released for that period.

LFG Management

We note also potential LFG migration from the site towards sensitive receptors is not monitored. The current LFG monitoring does not provide any information in relation to potential LFG migration off site towards sensitive receptors. The Landfill Management Plan, 2000 (Maunsell) refers to installation and monitoring of perimeter wells but to date this has not been done. Installation of LFG monitoring wells should be considered, however a risk assessment should guide the need, establishment and location of such wells.

Council should consider undertaking a LFG risk assessment to assess the present or potential risks posed by the site with respect to LFG generation. Limited review of the site with the information available to us at this time would suggest:

- the landfill is producing LFG and a pressure gradient is likely to exist within the landfill which has the potential to drive migration offsite and towards sensitive receptors;
- as well as onsite sensitive receptors, there are offsite sensitive receptors in the vicinity of the site including the Little Sisters Camp, treatment lagoons infrastructure, surrounding established vegetation and the atmosphere; and
- potential migration pathways exist which could potentially allow methane to migrate off site.

A risk assessment should identify sensitive receptors, potential migration pathways, impacts and consequences of the occurrence of methane at the site. This will assist in determining what level of controls are necessary and the extent to which management is required.

We suspect that extraction and destruction of LFG using specialised established infrastructure is not warranted and a passive monitoring system (ie progressive capping system installation and establishment of perimeter wells to detect migration) may be sufficient. In this scenario, if LFG at trigger levels was detected in perimeter wells, further action would then need to be investigated. If established, monitoring wells should be monitored prior to installing any capping in the vicinity of the wells to monitor for changes and migration behaviour once the cap has been constructed.

Recommendations

Council should position itself to be fully informed of the implications of the now introduced CPM. Council must understand and manage its reporting and liability discharge obligations under the NGERs and CE Acts.

Council should investigate options to maximise landfill diversion to reduce its CPM liability and seek to recover the liability through landfill gate pricing.

Council should strive to achieve this through developing reporting and compliance strategies and a carbon credits purchase strategy, review current waste management strategies to minimise waste to landfill and organic load disposed of, review and amend the landfill disposal fee structure and routinely monitor and review strategies to ensure efficient and effective management of GHG related issues and liabilities.

Actions - Carbon Price Mechanism

In the immediate months Council should consider further refining emissions estimations in consultation with the CER, undertake life of site (including post-closure) emissions forecasting and understand the impacting issues associated with GHG emissions generation.

As it is probable that Council will be above the CPM threshold of 25,000CO_2-e tonnes, Council should consider the following actions:

- Shorter term (next 6 months)
  - Develop an emissions reporting and compliance strategy prior to reporting deadline through consultation with informed lawyers and accountants;
  - Develop a carbon credits (permits) purchase strategy;
  - Determine who the nominated responsible person will be and register as a 'liable entity' in accordance with the procedure defined under the NGER Act and CE Act prior to the 31 August 2013. Council will have to retrospectively report 2011/2012 emissions;
  - Report on its assessment of GHG emissions and other relevant "Corporate" emissions if applicable prior to 31 October 2013 and using the OSCAR tool with emission estimates prepared in accordance with the latest version of the NGER (Measurement) Determination;
  - Monitor waste intake and carbon emissions;
  - Review and consider need to amend waste management strategies and policies to minimise waste disposal to landfill and emissions generation;
  - Consider emissions mitigation and opportunities to acquire credits to offset liabilities (eg CFI);
  - Understand how this will/should impact waste customer pricing (waste charges, gate fees etc);
- Medium term (6-12 months)
  - Continue to monitor waste intake and carbon emissions;
  - Implement opportunities uncovered in the first 6 months to improve waste management and mitigate emissions;
  - Review emissions reporting and compliance strategy and carbon credits (permits) purchase strategy;
- Longer term (12 months – 2years - during fixed price period)
  - Monitor carbon emissions against forecasts;
  - Monitor waste intake against strategies and policies and update as required;
  - Monitor cost recovery measures and amend as required;
  - Refine and update strategies and policies prior to flexible period;
  - Meet the obligations of the NGER and CE Acts through reporting, credit acquisition and surrender as required.
  - Plan for transition to the flexible price period.

Actions – LFG Management

Undertake a LFG risk assessment to understand LFG risk profile of the facility and determine what level (if any) of controls are necessary and the extent to which LFG management is required.

Closure

We trust that the information provided within this letter provides Council with an overall picture of the current status of the site with respect to greenhouse gas emissions and potential liabilities as a result of the carbon pricing mechanism.

If there are any queries related to the content of this letter do not hesitate to contact Gavin Reeves on 0753 704272.

Yours faithfully
TONKIN CONSULTING

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Manager, Sunshine Coast

Enc Attachment 1 NGERS Solid Waste Calculator Spreadsheet Output

Attachment 2 NGERS Solid Waste Calculator Inputs and Assumptions

ATTACHMENT 1 NGERS SOLID WASTE CALCULATOR SPREADSHEET OUTPUT

Australian Government
Clean Energy Regulator

Read "Solid Waste Deposal on Land User Guide" for important information on:
the landfill facility activities that must be reported (energy emissions)
how to use this calculator
OSCAR reporting

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The Clean Energy Regulator and the Commonwealth of Australia are not responsible for the data input into the NGER Solid Waste Emissions Calculator by users, and will in no event be liable for

References: NGER Determ., IPCC 2006 Gl'lines Vol. 5, Clean Energy Act, CFI Act	NGER Determ. Section 5.5	NGER Determ. Section 5.4						NGER Determ. Section 5.4; IPCC 2006 Equation 3.6	NGER Determ. Section 5.4; Clean Energy Act Section 23-25	Clean Energy Act Section 30 (3), 32; CFI Act Section 53 (1) (b)	Clean Energy Act Section 30	NGER Determ. Section 5.15-5.17E	NGER Determ. Section 5.10 (3), (4)	NGER Determ. Section 5.10		
2014	Input: (<---) reporting year, State/Terr., landfill open year (below), Waste (t), Qcap, Qflared, Qtr. Note: fin. year ending.	No input required in the fields below										Method 1: leave blank Method 2/3: enter value	Select from list to reflect licensing restrictions	Waste streams (proportions of total) Note: defaults can be overridden in accordance with NGER Determination		
NT	Waste received landfill (t)	Q_{cap} (CH_4 only) (m^3)	Q_{flared} (CH_4 only) (m^3)	Q_{tr} (CH_4 only) (m^3)	Total captured ($Q_{cap}+Q_{tr}+Q_{flared}$) (t CO_2-e)	Legacy capture ($Q_{cap}+Q_{tr}+Q_{flared}$) (t CO_2-e)	Post-legacy capture ($Q_{cap}+Q_{tr}+Q_{flared}$) (t CO_2-e)	CH_4^* (t CO_2-e)	$CH_{4,pos}$ (t CO_2-e)	Total emissions E_i (CO_2-e) (t)	Legacy emissions (CO_2-e) (t)	Post-legacy emissions (CO_2-e) (t)	Facility specific k value	Waste streams permitted at landfill (leave blank for "all")	Municipal Solid Waste	Commercial and Industrial	Construction and Demolition (calculated by deduction)
1965	53,013	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.430	0.140	0.430
1966	53,013	0	0	0	0.00	0.00	0.00	7785.78	7785.78	7007.20	7007.20	0.00			0.430	0.140	0.430
1967	53,013	0	0	0	0.00	0.00	0.00	13504.22	13504.22	12153.80	12153.80	0.00			0.430	0.140	0.430
1968	53,013	0	0	0	0.00	0.00	0.00	17790.00	17790.00	16011.00	16011.00	0.00			0.430	0.140	0.430
1969	53,013	0	0	0	0.00	0.00	0.00	21073.93	21073.93	18966.54	18966.54	0.00			0.430	0.140	0.430
1970	53,013	0	0	0	0.00	0.00	0.00	23649.44	23649.44	21284.49	21284.49	0.00			0.430	0.140	0.430
1971	53,013	0	0	0	0.00	0.00	0.00	25717.26	25717.26	23145.54	23145.54	0.00			0.430	0.140	0.430
1972	53,013	0	0	0	0.00	0.00	0.00	27415.48	27415.48	24673.94	24673.94	0.00			0.430	0.140	0.430
1973	53,013	0	0	0	0.00	0.00	0.00	28839.73	28839.73	25955.76	25955.76	0.00			0.430	0.140	0.430
1974	53,013	0	0	0	0.00	0.00	0.00	30056.81	30056.81	27051.13	27051.13	0.00			0.430	0.140	0.430
1975	53,013	0	0	0	0.00	0.00	0.00	31113.86	31113.86	28002.47	28002.47	0.00			0.430	0.140	0.430
1976	53,013	0	0	0	0.00	0.00	0.00	32044.55	32044.55	28840.09	28840.09	0.00			0.430	0.140	0.430
1977	53,013	0	0	0	0.00	0.00	0.00	32873.29	32873.29	29585.96	29585.96	0.00			0.430	0.140	0.430
1978	53,013	0	0	0	0.00	0.00	0.00	33618.06	33618.06	30256.25	30256.25	0.00			0.430	0.140	0.430
1979	53,013	0	0	0	0.00	0.00	0.00	34292.35	34292.35	30863.11	30863.11	0.00			0.430	0.140	0.430
1980	53,013	0	0	0	0.00	0.00	0.00	34906.48	34906.48	31415.83	31415.83	0.00			0.430	0.140	0.430
1981	53,013	0	0	0	0.00	0.00	0.00	35468.50	35468.50	31921.65	31921.65	0.00			0.430	0.140	0.430
1982	53,013	0	0	0	0.00	0.00	0.00	35984.82	35984.82	32386.34	32386.34	0.00			0.430	0.140	0.430
1983	53,013	0	0	0	0.00	0.00	0.00	36460.66	36460.66	32814.60	32814.60	0.00			0.430	0.140	0.430
1984	53,013	0	0	0	0.00	0.00	0.00	36900.33	36900.33	33210.29	33210.29	0.00			0.430	0.140	0.430
1985	53,013	0	0	0	0.00	0.00	0.00	37307.44	37307.44	33576.69	33576.69	0.00			0.430	0.140	0.430
1986	53,013	0	0	0	0.00	0.00	0.00	37685.08	37685.08	33916.57	33916.57	0.00			0.430	0.140	0.430
1987	53,013	0	0	0	0.00	0.00	0.00	38035.94	38035.94	34232.35	34232.35	0.00			0.430	0.140	0.430
1988	53,013	0	0	0	0.00	0.00	0.00	38362.34	38362.34	34526.11	34526.11	0.00			0.430	0.140	0.430
1989	53,013	0	0	0	0.00	0.00	0.00	38666.35	38666.35	34799.71	34799.71	0.00			0.430	0.140	0.430
1990	53,013	0	0	0	0.00	0.00	0.00	38949.78	38949.78	35054.80	35054.80	0.00			0.430	0.140	0.430
1991	53,013	0	0	0	0.00	0.00	0.00	39214.29	39214.29	35292.86	35292.86	0.00			0.430	0.140	0.430
1992	53,013	0	0	0	0.00	0.00	0.00	39461.33	39461.33	35515.20	35515.20	0.00			0.430	0.140	0.430
1993	53,013	0	0	0	0.00	0.00	0.00	39692.25	39692.25	35723.02	35723.02	0.00			0.430	0.140	0.430
1994	53,013	0	0	0	0.00	0.00	0.00	39908.24	39908.24	35917.41	35917.41	0.00			0.430	0.140	0.430
1995	53,013	0	0	0	0.00	0.00	0.00	40110.39	40110.39	36099.35	36099.35	0.00			0.430	0.140	0.430
1996	53,013	0	0	0	0.00	0.00	0.00	40299.72	40299.72	36269.75	36269.75	0.00			0.430	0.140	0.430
1997	53,013	0	0	0	0.00	0.00	0.00	40477.14	40477.14	36429.42	36429.42	0.00			0.430	0.140	0.430
1998	53,013	0	0	0	0.00	0.00	0.00	40643.47	40643.47	36579.13	36579.13	0.00			0.430	0.140	0.430
1999	53,013	0	0	0	0.00	0.00	0.00	40799.51	40799.51	36719.56	36719.56	0.00			0.430	0.140	0.430
2000	53,013	0	0	0	0.00	0.00	0.00	40945.94	40945.94	36851.35	36851.35	0.00			0.430	0.140	0.430
2001	53,013	0	0	0	0.00	0.00	0.00	41083.44	41083.44	36975.10	36975.10	0.00			0.430	0.140	0.430
2002	53,013	0	0	0	0.00	0.00	0.00	41212.60	41212.60	37091.34	37091.34	0.00			0.430	0.140	0.430
2003	53,013	0	0	0	0.00	0.00	0.00	41333.97	41333.97	37200.57	37200.57	0.00			0.430	0.140	0.430
2004	53,013	0	0	0	0.00	0.00	0.00	41448.08	41448.08	37303.27	37303.27	0.00			0.430	0.140	0.430
2005	53,013	0	0	0	0.00	0.00	0.00	41555.40	41555.40	37399.86	37399.86	0.00			0.430	0.140	0.430
2006	63,579	0	0	0	0.00	0.00	0.00	41656.37	41656.37	37490.74	37490.74	0.00			0.430	0.140	0.430
2007	64,966	0	0	0	0.00	0.00	0.00	43303.20	43303.20	38972.88	38972.88	0.00			0.430	0.140	0.430
2008	62,452	0	0	0	0.00	0.00	0.00	44736.13	44736.13	40262.51	40262.51	0.00			0.430	0.140	0.430
2009	56,995	0	0	0	0.00	0.00	0.00	45455.01	45455.01	40909.51	40909.51	0.00			0.430	0.140	0.430
2010	78,094	0	0	0	0.00	0.00	0.00	45081.59	45081.59	40573.43	40573.43	0.00			0.400	0.040	0.560
2011	82,905	0	0	0	0.00	0.00	0.00	45465.12	45465.12	40918.60	40918.60	0.00			0.390	0.050	0.560
2012	48,083	0	0	0	0.00	0.00	0.00	45626.92	45626.92	41064.23	41064.23	0.00			0.450	0.080	0.470
2013	48,083	0	0	0	0.00	0.00	0.00	42900.63	42900.63	38610.57	38610.57	0.00			0.450	0.080	0.470
2014	48,083	0	0	0	0.00	0.00	0.00	41727.26	41727.26	37554.53	31412.63	6141.90			0.450	0.080	0.470
2015	48,083	0	0	0	0.00	0.00	0.00	40920.97	40920.97	36828.87	26179.79	10649.08			0.450	0.080	0.470
2016	48,083	0	0	0	0.00	0.00	0.00	40359.26	40359.26	36323.33	22300.27	14023.07			0.450	0.080	0.470
2017	48,083	0	0	0	0.00	0.00	0.00	39960.55	39960.55	35964.50	19360.10	16604.40			0.450	0.080	0.470
2018	48,083	0	0	0	0.00	0.00	0.00	39670.60	39670.60	35703.54	17078.40	18625.13			0.450	0.080	0.470
2019	48,083	0	0	0	0.00	0.00	0.00	39453.37	39453.37	35508.04	15263.95	20244.08			0.450	0.080	0.470
2020	48,083	0	0	0	0.00	0.00	0.00	39285.01	39285.01	35356.51	13785.94	21570.56			0.450	0.080	0.470
2021	48,083	0	0	0	0.00	0.00	0.00	39149.71	39149.71	35234.74	12554.42	22680.32			0.450	0.080	0.470
2022	48,083	0	0	0	0.00	0.00	0.00	39037.07	39037.07	35133.36	11507.06	23626.30			0.450	0.080	0.470
2023	48,083	0	0	0	0.00	0.00	0.00	38940.21	38940.21	35046.19	10600.29	24445.90			0.450	0.080	0.470
2024	0	0	0	0	0.00	0.00	0.00	38854.65	38854.65	34969.18	9803.35	25165.84			0.450	0.080	0.470
2025	0	0	0	0	0.00	0.00	0.00	31953.08	31953.08	28757.77	9094.18	19663.59			0.450	0.080	0.470
2026	0	0	0	0	0.00	0.00	0.00	26874.26	26874.26	24186.84	8456.76	15730.08			0.450	0.080	0.470
2027	0	0	0	0	0.00	0.00	0.00	23059.67	23059.67	20753.71	7879.23	12874.47			0.450	0.080	0.470
2028	0	0	0	0	0.00	0.00	0.00	20130.08	20130.08	18117.08	7352.64	10764.44			0.450	0.080	0.470
2029	0	0	0	0	0.00	0.00	0.00	17827.10	17827.10	16044.39	6870.07	9174.32			0.450	0.080	0.470
2030	0	0	0	0	0.00	0.00	0.00	15973.87	15973.87	14376.48	6426.10	7950.37			0.450	0.080	0.470

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ATTACHMENT 2 NGERS SOLID WASTE CALCULATOR INPUTS AND ASSUMPTIONS

NGER Solid Waste Calculator Inputs

Location

In the Calculator, the state location of the landfill has to be given. In this assessment NT (Northern Territory) has been nominated. Methane generation constants (k-value) which are dependent on climatic conditions are tied to the state location nominated. For Method 1 assessment, there is no scope to adjust the k-values to better reflect site conditions other than to use the default values. Likewise, the methane correction factor (MCR) cannot be adjusted for a more site specific assessment. The Calculator indicates that the MCR can be over-ridden "with robust evidence in accordance with IPCC 2006 Guidelines Vol.D". However there is no supporting detail in the Determination to suggest this is allowable. A representative of the CER indicated that this should not be changed and they are not aware of any content in the Determination which allows this to be modified.

*Note: k-values are relative for the state/territory capital of the nominated state. In this case k-values are relative to Darwin. Significant variation will exist for k-values between Darwin and Alice Springs. This is demonstrated by changing the state selector to SA (still not an ideal comparison but closer to reality) and the significant drop in estimated emissions for the 2011/12 period. This issue has been addressed somewhat in the latest Determination 2012 with a move to more specific data input and regional facility selection options using climate data. However this appears limited to four new categories: tropical dry; tropical wet; temperate dry and temperate wet. This site falls into the tropical dry landfill classification. Since the calculator has not yet been updated to reflect k-values for the Tropical/Temperate Landfill Classifications, Tables 1, 2 and 3 in the reporting compare the NT derived emissions estimates with SA emissions estimates since the SA k-values are a close approximation of the Tropical Dry Landfill Classification as shown in Tables A2-2 below. This will give Council an indication of the emissions profile estimate that could be expected when using the updated Calculator.

Landfill Opening Year

The start date for the site nominated in the Calculator was 1965 in accordance with investigations undertaken for the 2010 Review.

Opening Stock

Several methods for determining the "Opening stock of degradable carbon" or pre-existing disposed waste volume are nominated in the Determination. For this assessment a combination of allowable methods has been used. For years 2005 (end FY) to 24 May 2012 weighbridge reported tonnage data as provided by Council was used in accordance with S 5.13 (2)(a). The years prior, 1965 – 2005 have been estimated based on volumetric review undertaken by ground-based survey undertaken by a qualified surveyor in accordance with S 5.13 (3) and of the Determination which was also assessed for the 2010 Review. A summary the input values are presented in Table A2-3 below.

*Issue: when assessing "Opening Stock", S 5.13 (4)(b) of the Determination specifies a Volume-to Mass conversion factor. This has been fixed at 1.1 t/m^3. Therefore, once the volume of airspace has been determined by volumetric survey, applying the assumed 1.1 t/m^3 density will give the assumed tonnage of material landfilled since the start of the site. This may result in an over estimate of legacy waste for this site. The CER has indicated they assume this is for waste and soil (ie total density). Our estimate based on historical practices of crude wheel tracked compaction and with settlement/consolidation over time is likely to be between 0.7 – 1.0 t/m^3. At this stage there is no proposed mechanism to adjust these following site specific investigations.

*Issue: Column B of the calculator requires input of the "Waste received to landfill (t)". The CER has indicated that where soil is used in site operations for daily / interim cover, this is usually accounted for in the waste stream mix type since the default allowance for Inert waste is 28%, 37.5% and 89% for MSW, C&C and C&D respectively. However this is not going to be the case where significant additional soil material is used, on top of the waste received at the gate for the use of cover. It is known at this site that significant volumes of soil have been used for cover over a long period of time however there is not

sufficient data available to support modifying the default values to account for the additional soil usage. Our assessment of gatehouse weighbridge data for the periods between 2009 and 2012 indicates that approximately 49% of material disposed of (waste and cover) was soil fill material.

The CER have indicated they acknowledge this is a grey area and will go as far as to allow facilities who borrow soil material from within site for the use as cover to exclude the soil from the waste totals. Sites that take soil materials via the front gate and weighbridge must account for this material as waste assuming it is a waste product and landfilled (but utilised beneficially for the use as cover). We have reviewed the default waste percentages for years 2009 - 2012 and adjusted them in the model in accordance with S5.10 of the Determination for the recent years for which data exists to better reflect the high historical use of soil, but this is only limited to recent years.

*Action: Council should consider how soil or other inert material imported for use as cover material is identified at the weighbridge and accounted for it in waste data recording. This material should be clearly defined to reduce uncertainty about its type and intended use. However it appears even if soil for cover usage waste recorded at the weighbridge as "soil for cover usage only" the CER will still view this as waste. This will allow accurate waste soil estimation to be made and reflected into the Calculator, both in the Waste Streams area of the Calculator (Columns P-R) and the inert materials area (Column CD).

Emissions Calculator Assumptions

Adjustments for percentages of the waste streams received and waste mix types for each waste stream are allowed if there is sufficient data available collected in accordance with certain requirements set out in S5.11(2)(a)-(c) of the Determination.

The Method 1 default waste stream percentages and site adjusted values for municipal solid waste (MSW), commercial & industrial waste (C&I) and construction & demolition waste (C&D) are listed in Table A2-1. Default values have been used in the Calculator where no adequate weighbridge data was available. Where weighbridge data was provided, site adjusted values have been adopted based on our interpretation of the breakdown of weighbridge data into the three waste streams, MSW, C&I and C&D. Data supplied by Council for the 09/10 – 11/12 periods was assessed. These are preliminary as the assessment is based on an interpretation of measures allowed by the Determination and assumed categorisation of weighbridge waste data. For reporting in the first reporting period being 2012/13, Council will need to review and clarify the assignment of the line items reported in the weighbridge data to confirm the correct categorisation of these wastes. The opportunity may exist to further refine this input data and also include weighbridge data for earlier years.

The default composition of the waste streams is further broken to default waste mix types based on waste content and variations in degradable organic carbon values. The waste mix types for the waste streams and the state based methane generation constants are presented in Table A2-2.

Table A2-1 Default waste stream percentages and adjusted percentages

Waste stream	NT Default %	Adjusted percentages based on data		
		09/10 %	10/11 %	11/12 %
MSW	43	40	39	45
C&I	14	4	5	8
C&D	43	56	56	47

Table A2-2 **Default waste mix types and state based methane generation constants (k values)**

Waste mix type	Waste mix types			Methane generation constants (k values)	
	MSW %	C&I %	C&D %	Determination 2011 NT, QLD % (SA %)	Determination 2012 Tropical, Dry %
Food	35	21.5	0	0.4 (0.06)	0.085
Paper & paper board	13	15.5	3	0.07 (0.04)	0.045
Garden & park	16.5	4	2	0.17 (0.05)	0.065
Wood & wood waste	1	12.5	6	0.035 (0.02)	0.025
Textiles	1.5	4	0	0.07 (0.04)	0.045
Sludge	0	1.5	0	0.4 (0.06)	0.085
Nappies	4	0	0	0.07 (0.06)	0.045
Rubber & leather	1	3.5	0	0.07 (0.04)	0.045
Concrete, metal, plastic & glass	28	37.5	89	-	-

Note: Whilst the default waste stream percentages have been modified based on weighbridge data as presented in Table A2-1, the default waste mix types have been adopted for this assessment. To modify the waste mix type defaults more specific information will need to be provided by Council to assist and justify a modified position. For example as we understand it, Council would be required to report each load by waste stream (MSW, C&I and C&D) and then if for example if it was a C&I load of pallets indicate waste mix type and tonnage. With this data, for the reporting assessment the total C&I waste stream can be assessed and the component of "wood and wood waste" modified accordingly on a percentage basis. Alternatively the Determination allows for an audit to be undertaken on waste to justify modification of the default values. It is not understood how often audits would have to occur.

The following data input and estimation scenario has been adopted based on interpretation of the Determination, discussions with the CER and industry understanding/discussion:

- The default waste stream and waste mix values as nominated by the Determination adopted where specific weighbridge data is not available;
- All material presented to site assumed as waste and going to landfill except where weighbridge data indicated recovered material being removed from landfill and site;
- Waste diverted from landfill through recycling, reuse or reprocessing recorded in the appropriate columns in the calculator (See "Waste Transferred" Table A2-3);
- Cover soil borrowed offsite and presenting to site via the weighbridge therefore in accordance with the CER treated as waste and counted towards waste total;
- Soil used as cover material recorded in the appropriate columns in the calculator (See Table 3);
- Existing waste (Opening Stock S 5.13 of the Determination) measured by volumetric survey and converted to tonnes assuming a density of 1.1 t/m^3. Tonnages are summarised in Table A2-3. No delineation of soil within the existing waste mass is permitted. The default density of 1.1 t/m^3 for "Opening Stock" is mandated in S 5.13 of the Determination;
- Waste received between the period 1965 – 2009 was estimated by averaging the "Opening stock" after being converted to tonnes over the period resulting in 53,013 tonnes each year between 1965 – 2009. Waste received for the years 2006 – 2012 was taken from weighbridge data supplied by Council.

For the Method 1 assessment the data in Table A2-3 was entered in the "NGER Solid waste calculator" spreadsheet along with all other settings as default. The spreadsheet has been attached in Attachment 1.

Table A2-3 Summary of information, calculations and Method 1 input data

Opening stock (volume of landfill 1965-2009):	2,166,000 m^3
Conversion to tonnes (1.1 t/m3 in accordance with the Determination)	2,382,600 tonnes
Volume of waste to landfill 2009 – 2012 (Weighbridge data)	246,992 tonnes
Total waste to landfill (1965 – 2012)	2,629,592 tonnes

Financial Year Ending	**1965-05**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012***
Waste Received								
Total waste landfill (Column B)	53,013	63579	64966	62452	55995	78094	82905	48083
Cover used (Column CD)	0	35604	36381	34973	30797	39228	39641	15326
Waste Streams (NT Default)								
MSW (0.43)	0.43	0.43	0.43	0.43	0.43	0.4	0.39	0.45
C&I (0.14)	0.14	0.14	0.14	0.14	0.14	0.04	0.05	0.08
C&D (0.43)	0.43	0.43	0.43	0.43	0.43	0.56	0.56	0.47
Waste Transferred (tonnes)	Waste transferred internally or externally through diversionary measures such as recycling or reuse							
Food	-	-	-	-	-	-	-	
Paper & paper board (external)	-	-	-	-	-	52.18	69.99	72.83
Garden & Park (internal)	-	-	-	-	-	3447.75	6143.21	3892.48
Wood & wood waste (internal)	-	-	-	-	-	-	26.5	282.12
Textiles (external)	-	-	-	-	-	-	-	16.3
Sludge	-	-	-	-	-	-	-	-
Nappies	-	-	-	-	-	-	-	-
Rubber & Leather (external)	-	-	-	-	-	2.78	258.24	113.65
Concrete, metal, plastic & glass (external)	-	-	-	-	-	229.7	156.15	529.07
Total	**-**	**-**	**-**	**-**	**-**	**3732.41**	**6654.09**	**4906.45**

* For financial year 11/12 up to 24 May 2012

- No data or not applicable