THE MSUNDUZI MUNICIPALITY

SENIOR MANAGER: SUPPLY CHAIN MANAGEMENT
DR D. N. GAMBU

333 Church Street, Private Bag X205, Pietermaritzburg, 3200
Telephone No. 033 – 392 2597

CONTRACT No. SCM 1 OF 26/27

PROFESSIONAL ENVIRONMENTAL MANAGEMENT CONSULTANT COMPANY SPECIALIZING IN LANDFILL MONITORING AND DEVELOPMENT FOR A PERIOD OF THREE YEARS

DOCUMENT PART B

Tenderer's Name:	
Postal Address:	
Contact Person:	
Telephone No:	
Cellular No:	
E-Mail Address:	
CSD Supplier No:	B-BBEE Contributor Level:

Tenders contained in sealed envelopes and marked with **"CONTRACT No. SCM 1 OF 26/27"** and the **Contract Description** must be placed in the Msunduzi Municipality's Central Stores, 2 Abattoir Road (off Kershaw Street), Pietermaritzburg, 3201, not later than **12h00** on **Friday, 07 August 2026,** when they will be opened in public. **Only Tenders placed in the Tender Box before the closing time above will be accepted.**

THE MSUNDUZI MUNICIPALITY

CONTRACT No. SCM 1 OF 26/27

PROFESSIONAL ENVIRONMENTAL MANAGEMENT CONSULTANT COMPANY SPECIALIZING IN LANDFILL MONITORING AND DEVELOPMENT FOR A PERIOD OF THREE YEARS

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NOTE:

The tender documentation comprises of two (2) parts viz:

PART A: **Standard Conditions of Tender, Legislation, Definitions, Specification, Pricing Schedule, Data Sheets, Tender Form, and Annexures.**

PART B: **Waste Management Licence (WML), Site Aerial Map, and Decommissioning Plan, pertaining to the New England Road Landfill Site, Pietermaritzburg.**

Both parts above must be downloaded and submitted as your tender submission.

THE MSUNDUZI MUNICIPALITY

CONTRACT No. SCM 1 OF 26/27

PROFESSIONAL ENVIRONMENTAL MANAGEMENT CONSULTANT COMPANY SPECIALIZING IN LANDFILL MONITORING AND DEVELOPMENT FOR A PERIOD OF THREE YEARS

ANNEXURE "A": WASTE MANAGEMENT LICENCE

edtea
Department:
Economic Development, Tourism and Environmental Affairs
PROVINCE OF KWAZULU-NATAL

Enquiries: Ms. Kim van Heerden
Reference: DC22/WML/0061/2016
Date: 03 JULY 2017
Tel: (033) 264 2500
Physical Address: 270 Jabu Ndlovu Street
Pietermaritzburg 3200
www.kznded.gov.za

Msunduzi Municipality
Private Bag X321
PIETERMARITZBURG
3200

ATTENTION: Municipal Manager
Tel: (033) 392 2002 Fax: (033) 392 2397

cc. ATTENTION: Cyril Naidoo
Email Address: Cyril.naidoo@msunduzi.gov.za

cc. ATTENTION: Ettienne de Jager
Telephone Number: (011) 425 2810 Fax: 011 425 4731
Email: ettienne@envitech.co.za

Dear Sir/Madam

RE: DC22/WML/0061/2016: WASTE MANAGEMENT LICENCE FOR THE NEW ENGLAND ROAD LANDFILL SITE ON LOT NO. 1853 OF THE FARM DARVILL 15036 WITHIN MSUNDUZI MUNICIPALITY.

The **KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs hasissued a revised waste management licencefor** the above-mentioned project to accommodate variations to the conditions of the previous permit issued in terms of the Environment Conservation Act, 1989. The varied waste management licence and reasons for the decision are attached herewith.

ENQUIRIES

Please note that:

- All queries regarding this waste management licence (including the Department's decision) must be directed to the official of this Department with contact details provided on the letterhead above.
- Onlyqueries regarding appeals must be submitted to the Office of the MEC (details provided below).

NOTIFICATION OF DECISION ON APPLICATION

In accordance with regulation 4(2) of the EIA Regulations 2014, the applicant must in writing within 14 days of the date of this decision ensure that:

a. All registered interested and affected parties are provided with access to this decision and the reasons for the decision; and

b. The attention of all registered interested and affected parties is drawn to the fact that an appeal may be lodged against the decision in terms of the National Appeal Regulations 2014, if such appeal is available in the circumstances of the decision.

APPEALS

In accordance with regulation 4(1) of the National Appeal Regulations, 2014 an appellant must submit an appeal to the appeal administrator and a copy of the appeal to the applicant, any registered interested and affected party and organ of state with interest in the matter **within 20 days** from the date of notification of this decision.

An appellant must comply with regulation 4(2) and submit the appeal in writing and in the form obtainable from the appeal administrator by post, fax, and e-mail or hand delivery to the following address:

The Appeal Administrator,
Office of the KwaZulu-Natal MEC for Economic Development, Tourism and Environmental Affairs

POSTAL/ FAX/ E-MAIL:	PHYSICAL:
Private Bag X001 Bishopsgate 4008, Durban Tel: 031 310 5306 Mobile: 082 570 1966 Fax: 031 310 5416 E-Mail: Haresh.Inderlall@kznedtea.gov.za (Haresh Inderlall)	9th Floor, The Marine Building, 22 Dorothy Nyembe Street, Durban 4001

Yours sincerely

for: **Head of Department**
Department of Economic Development, Tourism and Environmental Affairs
Signed by: N.C ZUNGU
Designation: ACTING DIRECTOR: ENVIRONMENTAL SERVICES - SOUTH

UMNYANGO WEZOKUTHUTHUKISWA KOMNOTHO, EZOKUVAKASHA NOKONGIWA KWEMVELO KZN
Private Bag X9152, Pietermaritzburg, 3200
2017 -07- 03
270 Jabu Ndlovu Street, Pietermaritzburg, 3200
DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS

edtea

Department :
Economic Development, Tourism and Environmental Affairs
PROVINCE OF KWAZULU-NATAL

VARIATION OF WASTE MANAGEMENT LICENCE

Issued in terms of section 49(1) and 54(1) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

PROJECT TITLE: NEW ENGLAND ROAD LANDFILL SITE

DISTRICT MUNICIPALITY: UMGUNGUNDLOVU DISTRICT MUNICIPALITY KWAZULU-NATAL

Licence reference number:	DC22/WML/0061/2016
Date issued:	03 JULY 2017
Duration of licence:	10 (TEN) years
Licence holder:	Msunduzi Municipality
Location of activity:	Location of activity: Lot 1853 of the Farm Darvill15036 within Msunduzi Municipality, uMgungundlovu District Municipality

N.C

1. DECISION

Waste management licence holder details

Name:	Msunduzi Municipality
Contact person:	Municipal Manager
Alternate:	Mr Cyril Naidoo (Landfill Manager)
Telephone no:	033 392 2002
Fax no:	033 392 2397
E-mail address:	cyril.naidoo@msunduzi.gov.za
Postal address:	Private Bag X321 Pietermaritzburg 3200

Location

Name of property:	Lot 1853 of the Farm Darvill 15036
Physical address:	New England Road, Pietermaritzburg
Local municipality:	Msunduzi Local Municipality
District municipality:	uMgungundlovu District Municipality

The boundary of the site is represented by the following coordinates:

	Latitude (S)	Longitude (E)
Corner A	29° 36' 22.5	30° 24' 53.0
Corner B	29° 36' 27.2	30° 24' 56.1
Corner C	29° 36' 31.0	30° 25' 03.9
Corner D	29° 36' 30.1	30° 25' 06.1
Corner E	29° 36' 34.1	30° 25' 10.9
Corner F	29° 36' 25.2	30° 25' 24.2
Corner G	29° 36' 22.7	30° 25' 24.5
Corner H	29° 36' 19.3	30° 25' 20.2
Corner I	29° 36' 18.7	30° 25' 16.6
Corner J	29° 36' 11.4	30° 25' 07.3
Corner K	29° 36' 14.9	30° 25' 01.9
Corner L	29° 36' 13.4	30° 24' 59.2
Corner M	29° 36' 14.4	30° 24' 57.3

By virtue of the powers conferred by the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) and the Environmental Impact Assessment (EIA) Regulations, 2014, the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (hereinafter referred to as the "Department") hereby grants a revised waste management licence (hereinafter referred to as the "licence") to **Msunduzi Municipality** (hereinafter referred to as the "licence holder") **for the New England Road Landfill Site** (described in section 2 and hereinafter referred to as the "activity") at the abovementioned location (hereinafter referred to as the "site"), subject to the conditions specified herein. The reasons for the decision are described in **Annexure 1** attached to this licence.

N.C

2. DESCRIPTION OF ACTIVITY

The New England Road landfill site is an existing facility and is operational. It was authorised under the Permit Number **16/2/7U203/D3/Z1/P64** issued by the Department of Water Affairs dated 22 April 1998. The Msunduzi Municipality has requested that the existing Permit be varied and updated to ensure that it aligns with current legislation and is updated in accordance with the current operational procedures and best practice as outlined in the National Environmental Management: Waste Act, 58 of 2008 and associated Regulations, and Norms and Standards.

The site is owned by Msunduzi Municipality. It is located between Sobantu, Darvill Waste Water Treatment Works, and the Pietermaritzburg Golf Course, approximately 2km south of the N3 highway and is the primary landfill disposal site for the Msunduzi Municipality and greater Pietermaritzburg area.

The site is used for the disposal of general waste only which includes domestic waste; inert waste and garden waste..

The site is fenced with vehicle access control, a weighbridge, site security, site office and ancillary supporting infrastructure.

N.C

3. WASTE MANAGEMENT ACTIVITIES LICENSED

The applicant applied for activities listed in terms of Government Notice No. 921 of November 2013 of the National Environmental Management: Waste Act No. 59 of 2008. The licence therefore authorises the following waste management activities:

Activity number	**Activity description** *(as per the list of waste management activities)*	**Applicable activity with respect to this licence**
A (2)	*The sorting, shredding, grinding, crushing, screening or bailing of general waste at a facility that has an operational area in excess of 1000m².*	*The landfill site will have activities which will entail the sorting and bailing of general waste materials.*
B (8)	*The disposal of general waste to land covering an area in excess of 200m² and with a total capacity exceeding 25000 tons.*	*Disposal of municipal and commercial general waste to landfill.*

N.C

4. GENERAL INFORMATION

4.1 Compliance with the conditions of this licence

In terms of section 67(1)(h) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), contravening or failing to comply with a condition or requirement of a waste management licence constitutes an offence for which a convicted person may be liable to a fine not exceeding R10 million or to imprisonment for a period not exceeding 10 years, or to both such fine and such imprisonment. The licensing authority may also revoke or suspend this licence in terms of section 56 of the said Act if the licensing authority is of the opinion that the licence holder has contravened a condition of this licence and such contravention may have, or is having a significant effect on health or the environment.

4.2 Amendments to the waste management activities undertaken

Any changes to, or deviations from, the activity as described in section 2 of this licence must be approved, in writing, by the licensing authority before such changes or deviations may be implemented.

4.3 Variation of this licence

The licensing authority may vary this licence, or a condition of this licence, in terms of section 54 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

4.4 Transfer of this licence

If ownership of the activity is to be transferred, the licence holder must apply to the licensing authority, on a form required by the licensing authority, for permission to transfer the licence to the new owner in terms of section 52 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008). The licensing authority must take into account whether the person to whom the licence is to be transferred is a fit and proper person as contemplated in section 59 of the said Act.

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4.5 Renewal of this licence

This licence is valid for a certain time period as stipulated in section 5. If the licence holder wishes to continue with the activity, the licence holder must apply for a licence renewal to the relevant licensing authority at least six (6) months prior to the expiry of the licence.

4.6 Contact details of the licence holder

It is the responsibility of the licence holder to ensure that the licensing authority is made aware of any changes to the contact details of the licence holder as soon as is reasonably practicable.

4.7 Contact details for the Department

For the purposes of this licence, any correspondence with the Department must be forwarded to the District Manager: uMgungundlovu at the contact details below. Any correspondence must include the licence reference number. It is the responsibility of the licence holder to ensure the above details are correct at the time of submitting any documentation, and that the documentation reaches the relevant official.

The District Manager: uMgungundlovu
Attention: Pollution and Waste Component
Department of Economic Development,Tourism and Environmental Affairs
Private Bag X07
Cascades
3202
Fax Number: (033) 347 1826
Telephone Number: (033) 347 1820

4.8 Compliance with other legislation

This licence does not negate the licence holder's responsibility to comply with any other statutory requirements that may be applicable to the activity.

N.C

5. CONDITIONS

5.1 GENERAL

Scope of licence

5.1.1 The activity which is authorised by this licence may only be carried out at the site indicated in section 1 above, in accordance with the infrastructure plans indicated on **Annexures II and III**, attached to this licence.

5.1.2 The licence holder is responsible for ensuring compliance with the conditions by any person acting on his or her behalf, including but not limited to, an agent, sub-contractor, employee or person rendering a service to the licence holder.

5.1.3 A copy of this licence must be kept by the licence holder and made available to any authorised official of the Department on request.

Validity of licence

5.1.4 This licence is valid for a period of **ten (10) years** from the date of issue. If the licence holder wishes to continue with the activity, the licence holder must apply for a licence renewal to the relevant licensing authority at least six (6) months prior to the expiry of the licence.

Notification of interested and affected parties

5.1.5 The licence holder must notify every registered interested and affected party (including State departments identified during the application) in writing and within **14 (fourteen) days** of the date that this licence was issued.

5.1.6 The notification referred to in 5.1.5 must –

- indicate the decision of the Department;
- specify the date on which the licence was issued;
- advise the interested and affected party that a copy of the licence, including reasons for the decision, will be provided on request;
- inform the public where the decision can be accessed; and

N. C

- advise the interested and affected party that the prescribed appeal forms can be obtained from the Department, the licence holder, or the Environmental Assessment Practitioner.

5.1.7 The licence holder must publish a notice, within **14 (fourteen) days** of the date that this licence was issued, in the newspaper/s which were used for the placing of notices as part of the public participation process.

5.2 CONSTRUCTION

5.2.1 Continued or further development and construction of the landfill site must take place in accordance with the Plan entitled: General Existing Infrastructure Layout Plan: Plan No. 525-2015-003 and the Co-ordinated Infrastructure Layout Plan 525-2015-004 prepared by Envitech Solutions attached as **Annexures II and III.**

5.2.2 Further development at the site must be designed with an appropriate containment barrier or liner as described in the National Norms and Standards for Disposal of Waste to Landfill GNR 636 of 23 August 2013. This requirement is also applicable to the leachate collection dam.

5.2.3 The licence holder must notify this Department and the Engineering Section of the Department Water and Sanitation (DWS) in writing, should any further development within the site be proposed. The Department must confirm in writing that it is satisfied that the construction is in accordance with recognised civil engineering practice and requirements, prior to waste disposal commencing in the cell(s).

5.2.4 The site must be constructed in accordance with recognised civil engineering practice with special consideration to stability.

5.2.5 The slopes of the sides of the berms shall be constructed in consultation with a suitably qualified engineer in such a manner to ensure that little or no erosion occurs.

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5.2.6 The maximum height of the site must not exceed 654 metres above mean sea level.

5.2.7 Storm water berms and channels must be constructed to divert clean storm water away from contaminated water emanating from the site and to prevent gully erosion.

5.2.8 Works constructed in compliance with condition 5.2.1 must be properly maintained on a continuous basis.

5.2.9 The licence holder must construct works to:

(a) divert and drain all runoff water from the working face of the site, which could be expected as a result of the estimated maximum precipitation during a 24 hour period with an average frequency of once in 100 years (referred to as "estimated maximum precipitation"); and

(b) to cater for all expected leachate.

5.2.10 Such works must ensure that clean water runoff is prevented from coming into contact with leachate. The works constructed to accommodate the clean water runoff and leachate must each be of such a capacity as to maintain a freeboard of half a metre and must be lined to prevent pollution to groundwater.

5.3 OPERATION

Management

5.3.1 The site may be only be used for disposal of general waste as classified according to the applicable waste classification system, excluding those wastes listed in Annexure **IV** attached to this waste management licence.

5.3.2 No organic or inorganic element or compound which may have a definite acute or chronic negative effect on human health and/or the environmental, due to its toxic, physical, chemical or persistent characteristics may be disposed of on site.

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5.3.3 No medical waste may be disposed of on site.

5.3.4 No schedule pharmaceutical products registered in terms of the Medicines and Related Substances Control Act, 1965 (Act 101 of 1965) or associated containers, may be disposed of on the site in accordance with Annexure **IV.**

5.3.5 The licence holder must ensure that personnel operating the landfill are competent in waste disposal and landfill operation.

5.3.6 A dedicated accessible area must be established to receive waste during wet weather conditions when an operational cell cannot be accessed.

5.3.7 Waste disposed of at the site may be reclaimed. The sorting may take place at a designated area allocated by Landfill Site Management and must not interfere with the daily operation of the site. In this regard the licence holder must take measures to ensure that an appropriate area for reclamation is identified and implemented within **one (1) year** of the date of this licence.

5.3.8 The licence holder must keep records of the volume and types of waste materials reclaimed and report this to the licensing authority and into the national waste information system as required by the National Waste Information Regulations.

5.3.9 Waste disposed of must be compacted and covered at the end of each working day with a minimum of 150mm of soil or other material approved by the licensing authority.

5.3.10 Sufficient cover material, enough for at least two (2) **weeks,** must be stock piled within or in close proximity to the site at all times.

5.3.11 The site must be operated in such a manner that the height of the embankment or perimeter wall is at all times maintained at a higher elevation than the level of the operating floor.

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5.3.12 The licence holder may only accept waste on the active working area of the site between 07h00 and 16h00 during weekdays and between 07h00 and 15h00 on Saturdays.

5.3.13 The licence holder must ensure that all entrance gates are manned during the hours of operation and locked outside the hours of operation.

5.3.14 The licence holder must ensure that the site is fully fenced with an installed lockable gate, legible notice board written in at least **two (2)** appropriate languages and must include operation hours; contact and emergency details; types of wastes allowed, and tariffs. Appropriate warning signs must be displayed at the entrance on the notice board.

5.3.15 Notices prohibiting unauthorized persons from entering the site, as well as an internationally accepted sign indicating the risks involved in unauthorized entry must be displayed at 100 meter intervals along the boundary of the site.

5.3.16 The licence holder must take all reasonable steps to maintain service roads in a condition which ensures unimpeded access to the site for vehicles transporting waste and to keep the roads free of waste.

5.3.17 The licence holder must take all reasonable steps to ensure that the site is operated in such a manner that nuisance conditions or health hazards or the creation of nuisance conditions or health hazards including vermin and odour are prevented.

5.3.18 No smoking, burning of waste or naked flames are allowed on the site.

5.3.19 Litter scattered by wind must be collected on a daily basis and the licence holder must use movable fences to control wind-blown waste where practicable.

5.3.20 Sufficient dust control measures to prevent wind-blown dust from causing nuisance conditions or health hazards must be applied.

5.3.21 Indigenous trees must be established on the screening berm around the site to effectively screen the site from nearby roads and residential areas.

5.3.22 During the operative life of the site, the licence holder must take all reasonable steps, such as suitable zoning, written agreements with adjacent landowners, buying out land and/or obtaining a servitude to prevent the development of further residential and /or light industrial areas closer to the Site than –165 metres to the north-west, 180 metres to the North, and 800 metres to the east, south and west.

5.3.23 The licence holder must implement adequate measures to the satisfaction of the Department to:

5.3.23.1 ventilate methane gas generated in the waste area;

5.3.23.2 prevent the build-up of flammable gas inside buildings on the site; and,

5.3.23.3 prevent lateral migration of methane gas;

and monitor these measures in accordance with condition 5.3.42 in order to prevent the build-up of dangerous concentrations within the site. The licence holder must ensure that there is a contingency plan to be followed when measured levels of flammable gas reach the levels as referred to in condition 5.3.42.

5.3.24 The licence holder must maintain all infrastructure works on a continuous basis to prevent all runoff water from the working face coming into contact with the leachate from on the site.

5.3.25 Works constructed to accommodate surface runoff and leachate must be continuously monitored to ensure a freeboard of half a metre is maintained.

5.3.26 Runoff water must comply with quality requirements of the General and Special Standard prescribed by the Department of Water and Sanitation, as amended from time to time.

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5.3.27 Leachate is deemed to be treated when the quality thereof complies with the quality requirements of the General and Special Standard prescribed by the Department of Water and Sanitation, as amended from time to time.

5.3.28 All runoff water (storm water) arising as a result of precipitation-

(i) On land adjacent to the site; and

(ii) On the site;

must be prevented from coming into contact with any substance, whether such substance is a solid, liquid, vapour or gas or a combination thereof which is produced, used, stored, dumped or spilled on the premises, including leachate and must be diverted and drained-

(i) Around the site; and

(ii) From the working face of the site;

by means of works constructed by the licence holder in accordance with condition 5.2.9.

5.3.29 Uncontaminated runoff water as defined in condition 5.3.26 must be diverted away from the site to the Blackburrow Spruit and discharged into this Spruit at a point upstream of the site.

5.3.30 In the event that runoff water referred to in condition 5.3.26 becomes contaminated to the extent of not complying with the water quality requirements as referred to in condition 5.3.26, it must be regarded as untreated leachate and must be dealt with according to condition 5.3.33.

5.3.31 Runoff water arising from operational actions, for example the washing of vehicles and containers, must be regarded as contaminated runoff and must be treated according to condition 5.3.33.

5.3.32 Uncontaminated runoff must under no circumstances be used to dilute waste water resulting from any activities on the site, or actions relating to the operation of the site, or leachate emanating from the site, but must be dealt with according to condition 5.3.29.

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5.3.33 All leachate emanating from the site including contaminated runoff water shall:

5.3.33.1 be treated to comply with the aforementioned standard and discharged in a legal manner;

5.3.33.2 be evaporated in a lined dam and /or;

5.3.33.3 be discharged into a sewer if accepted by the authority in control of that sewer.

Monitoring and auditing

5.3.34 The licence holder must submit a detailed geo-hydrological report for the site to this Department and Department of Water and Sanitation within **one (1) year** from the date of issue of this licence.

5.3.35 The licence holder must establish and maintain the monitoring boreholes and water quality monitoring/sampling points as reflected on the Water Quality Monitoring Plan Ref. 525-2015-001 prepared by Envitech Solutions and attached as Annexure **V**.

5.3.36 Monitoring boreholes must be equipped with lockable caps. The Department reserves a right to take water samples at any time and to analyse these samples, or to have them taken and analysed.

5.3.37 Monitoring of the ground and surface water quality network must be conducted at the locations identified in the Water Quality Monitoring Plan and must monitor the variables listed in Annexure **VI** at the frequencies reflected therein.

5.3.38 If, in the opinion of this Department, the water quality variables referred to 5.3.37 and listed in Annexure **VI** shows an increasing trend, the licence holder shall initiate a monthly monitoring programme.

5.3.39 The licence holder must establish and maintain the landfill gas monitoring points as reflected on the Landfill Gas Monitoring Plan Ref. 525-2015-002 prepared by Envitech Solutions and attached as Annexure **VII**.

5.3.40 Monitoring of flammable gas must be conducted –

(a) Through a network of boreholes or any other monitoring devices approved by the licensing authority, which must be at least one metre deeper than the deepest point of the waste body; and

(b) In the atmosphere inside buildings on the Site;

for the quantitative detection of the volatile materials on the Site:

(i) Carbon Dioxide

(ii) Oxygen; and

(iii) Methane

5.3.41 Quarterly monitoring of the flammable gas variables must take place at the points identified on the Landfill Gas Monitoring Plan Ref. 525-2015-002 prepared by Envitech Solutions and attached as Annexure VII.

5.3.42 The atmospheric levels in the atmosphere of

(a) carbon dioxide must not exceed 0.5%; and

(b) methane must not exceed 1%,

by volume in air at the monitoring locations.

5.3.43 Should the atmospheric levels of flammable gas be between 0.1% and 1%, a higher frequency of monitoring must be instituted. Should levels above 1% be detected in buildings on the site, the buildings must be evacuated and the contingency plan implemented.

5.3.44 Should measurements of the gas monitoring network at any time exceed the limits specified, the licence holder must report this as an incident.

5.3.45 The measurements of flammable gases must be amended for Standard Temperature and Pressure.

5.3.46 The licence holder must within 60 (sixty days) from the date of issue of this licence, submit a proposal for a comprehensive air quality, gas and dust

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monitoring programme for approval by the licensing authority. Once approved the licence holder must implement this monitoring programme.

5.3.47 The licence holder shall carry out all tests in accordance with methods prescribed by and obtainable from the South African Bureau of Standards (SABS), referred to in the Standards Act, 2008 (Act of 2008), to analyse samples taken for monitoring.

5.3.48 The licence holder must submit quarterly environmental audit reports, prepared by the licence holder, to this Department, unless otherwise agreed to in writing by this Department.

5.3.49 This Department or any other state organ reserves the right to audit/or inspect the site at any time, and the licence holder must make any records or documentation regarding the site available upon request.

5.3.50 The licence holder must establish a landfill Monitoring Committee that will meet twice a year and not later than 30 days after the external audit report specified in condition 5.3.53 has been submitted. The monitoring committee must include interested and affected parties, this Department, the licence holder and Department of Water and Sanitation.

5.3.51 The licence holder must ensure that minutes of the Monitoring Committee meetings are kept and must ensure that these minutes are distributed to all members of the Monitoring Committee within **14 days** after a meeting.

5.3.52 The licence holder must appoint an independent, suitably qualified external auditor to audit the annually.

5.3.53 The external audit report referred to in 5.3.52 must include-

- An evaluation of the compliance with the conditions of this licence for the reporting period;
- Actions taken to rectify the non-compliances identified.

5.3.54 The external audit report referred to in 5.3.52 must be submitted to the Department within 90 (ninety) days of the audit being conducted.

Recording and reporting

5.3.55 The licence holder must, within 24 hours notify this Department of occurrence or detection of any incident on the site which has the potential to cause environmental impact or water pollution.

5.3.56 The licence holder must, within 14 days or shorter time if specified by this Department, from the occurrence or detection of any incident referred to condition 5.3.55, submit to this Department an action plan which must include a detailed time schedule of measures taken to:

5.3.56.1. correct the impact resulting from the incident;

5.3.56.2. prevent the incident from causing any further impacts; and

5.3.56.3. prevent the recurrence of a similar incident.

5.3.57 The licence holder must keep an incident report and complaints register, which must be made available to the external auditor and the licensing authority for purposes of their audits.

5.4 Site closure and decommissioning

5.4.1 The operation of the site must address rehabilitation processes as part of the operation by preventing erosion and the formation of pools due to rain through the re-establishment of vegetation and the final shaped covering of any disused portion of the site.

5.4.2 The Licence holder must rehabilitate the site or any portion thereof, in accordance with legislated closure requirements.

5.4.3 In the event of closure of the site, the licence holder must contact the Department for confirmation of relevant requirements.

N C

5.4.4 Water quality monitoring must be maintained for a period of 30 years or for such period, frequency and/or at locations as may be determined in writing with the licencing authority.

5.4.5 Air quality, gas and dust monitoring must continue for a period until the landfill gas peak concentration of methane and carbon dioxide has been detected, or for any longer period as may be determined in writing with the licencing authority.

Date of issue of Waste Management Licence: 03 / 07 / 2017.

***for:* Head of Department**
KZN Department of Economic Development, Tourism and Environmental Affairs

UMNYANGO WEZOKUTHUTHUKISWA KOMNOTHO, EZOKUVAKASHA NOKONGIWA KWEMVELO KZN
Private Bag X9152, Pietermaritzburg, 3200
2017 -07- 03
270 Jabu Ndlovu Street, Pietermaritzburg, 3200
DEPARTMENT OF ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS

ANNEXURE I: REASONS FOR DECISION

1. Information considered in making the decision

In reaching its decision, the Department took, *inter alia*, the following into consideration -

a) The application form for variation of a Waste Management Licence in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

b) The comments received from interested and affected parties and responses as included in the application document prepared by Envitech Solutions dated 01 June 2016.

2. Key factors considered in making the decision

a) Administrative process:

- The application for variation of the Waste Management Licence for licensing the existing waste disposal site for Msunduzi Municipality situated in KwaZulu-Natal was received by this Department on the 06 June 2016.
- Following receipt of the aforementioned documentation, the Department has confirmed that the requirements processes have been met.
- Whilst the Msunduzi Municipality made application for variation to bring the existing Permit in line with correct practices and improvement being undertaken at the site, the licensing authority, in terms of Section 53(1) of the Waste Act has determined that it is appropriate to issue the waste management licence to conform to current terminology and format. The Department consulted with the local authority who agreed that the existing permit be issued in the Waste Management Licence format.

b) Public Participation:

Public participation involved the placement of site notice boards in English and IsiZulu at the main entrance of the New England Road Landfill Site; the emailing of written notices to interested and Affected Parties and various identified and potential stakeholders; the placing of newspaper advertisement in the Edendale

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Eyethu newspaper dated 06 May 2016 and The Witness Newspaper dated 05 May 2016; and, the provision of reports and information to Interested and Affected Parties to satisfy the requirements of Chapter 6 of the NEMA EIA Regulations, 2014.

c) Need and desirability:

The variation application was initiated to comply with the Waste Act; to update the licensing authority details and to align with best practice in waste management principles and to mitigate negative impacts; to ensure compliance with Duty of Care as outlined in Section 28 of NEMA.

d) Objectives of integrated environmental management:

The Department is satisfied that, subject to compliance with the conditions contained in this variation Waste Management Licence, the general objectives of integrated environmental management in Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the National Environmental Management: Waste Act, 58 of 2008 and associated Regulations, and Norms and Standards, will be met.

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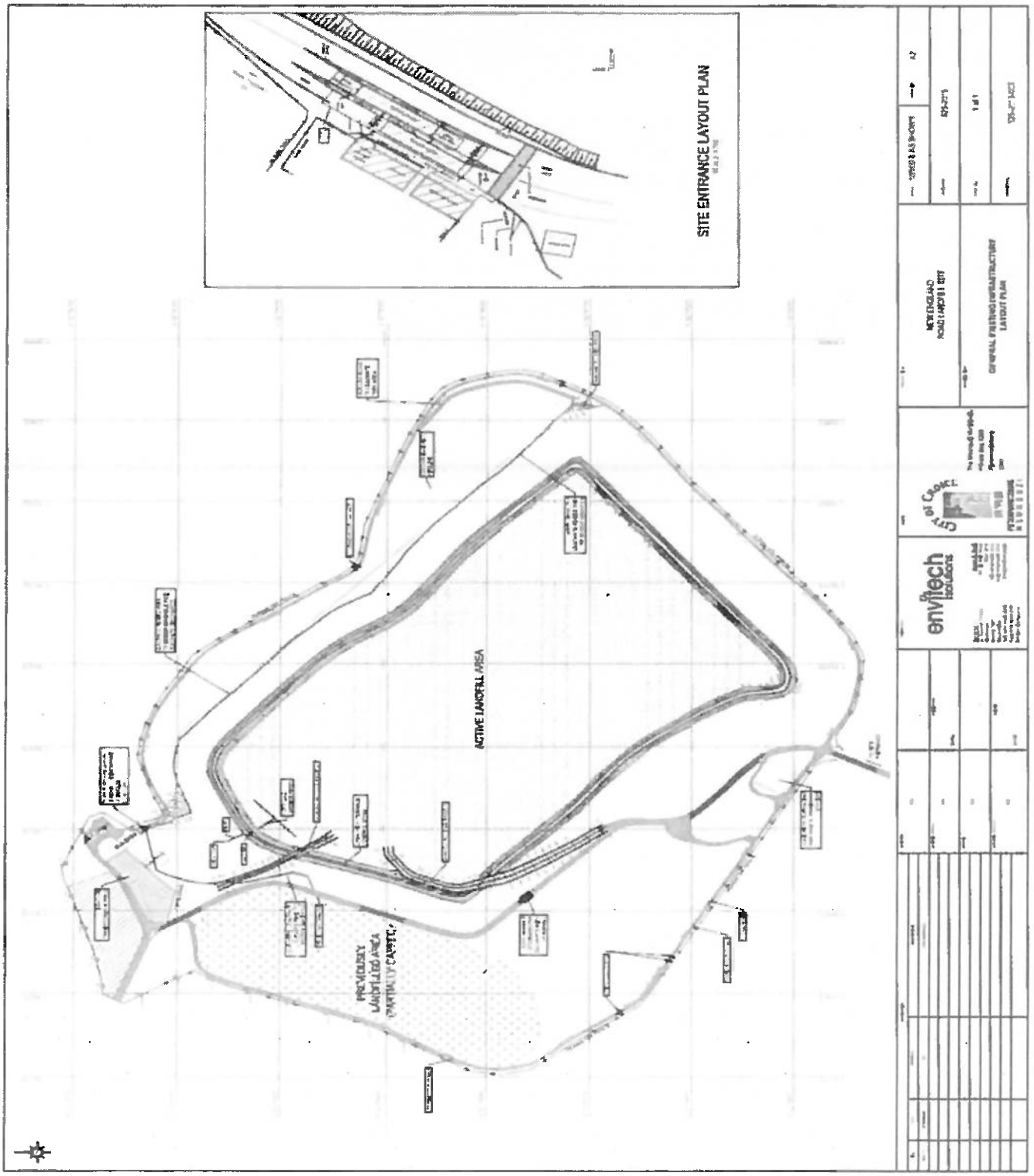
ANNEXURE II: GENERAL EXISTING INFRASTRUCTURE PLAN



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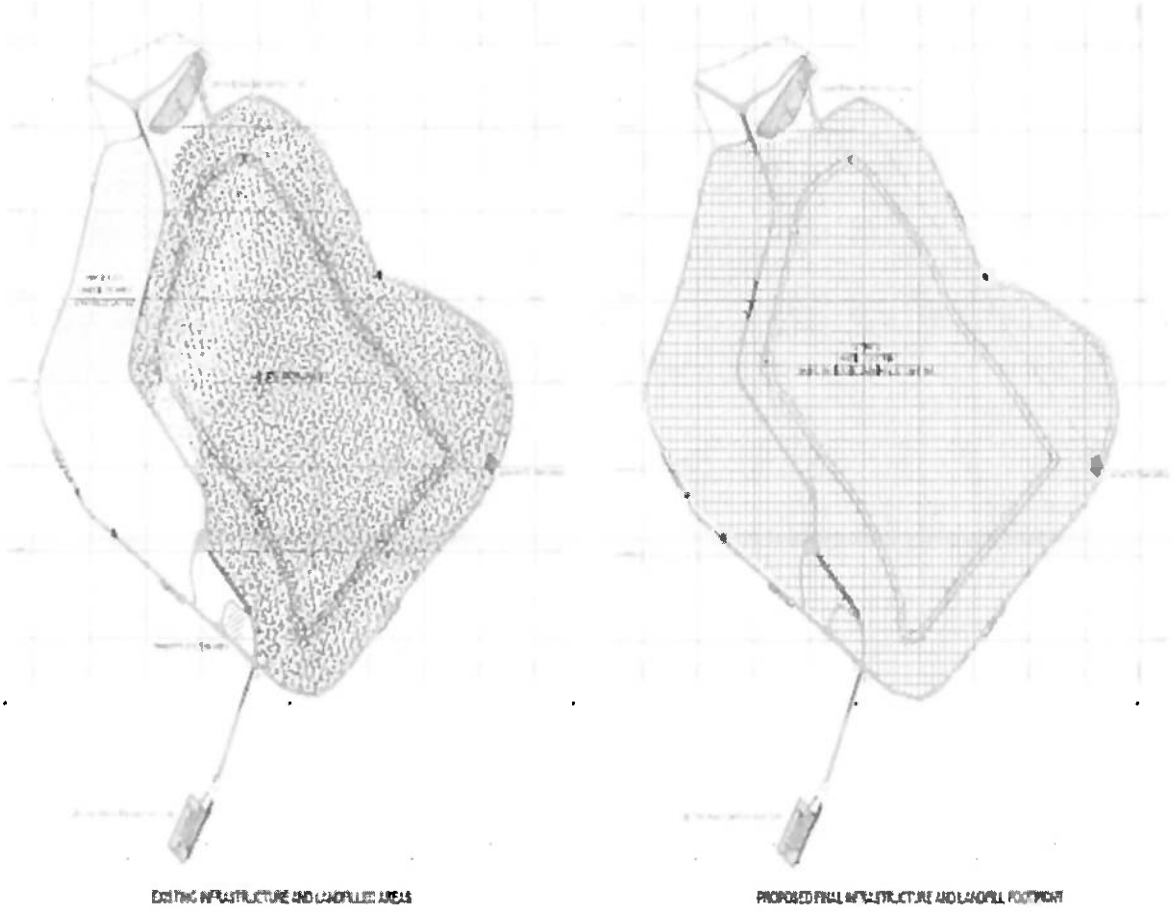
ANNEXURE III: CO-ORDINATED INFRASTRACTURE LAYOUT PLAN



EXISTING INFRASTRUCTURE AND LANDFILL AREAS

PROPOSED FINAL INFRASTRUCTURE AND LANDFILL FOOTPRINT

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ANNEXURE IV: HAZARDOUS OR TOXIC MATERIALS WHICH MAY NOT BE DISPOSED OF ON A GENERAL LANDFILL SITE

1. Waste where specific control has been established in terms of the Nuclear Energy Act, 1993 (Act 131 of 1993).
2. Waste types controlled in terms of the Minerals Act, 1991 (Act 50 of 1991) and the Electricity Act, 1987 (Act 41 of 1987), unless written permission has been obtained from the Responsible Authority.
3. Waste as described in the Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste (Second Edition 1998) as published by the Department of Water Affairs and Forestry and as amended from time to time (Minimum Requirements), as an extreme hazard or Hazard Group 1 (HG1); high hazard or Hazard Group 2 (HG2); moderate hazard or Hazard Group 3 (HG3) and low hazard or Hazard Group 4 (HG4).
4. Flammable wastes, with a closed cup flash point less than 61°C.
5. Corrosive substances, as described in the Minimum Requirements as Class 8 (1998 edition: page 6-8, Diagram III).
6. Oxidising substances and organic peroxides, as described in the Minimum Requirements as Class 5 (1998 edition: page 6-8, Diagram III).
7. Any waste with a substance which is a Group A and/or Group B carcinogen/mutagen. Group A carcinogens/mutagens have been proven in humans, both clinical and epidemiological. Group B carcinogens/mutagens have been proven without doubt in laboratory animals.
8. Any waste with a substance at a concentration greater than 1% where the substance is a Group C and/or Group D carcinogen/mutagen. Group C carcinogens/mutagens have shown limited evidence in animals. Group D carcinogen/mutagen - the available data is inadequate and doubtful.
9. Any infectious waste. Infectious waste is waste which is generated during the diagnosis, treatment or immunisation of humans or animals; in the research pertaining to this; in the manufacturing or testing of biological agents including blood, blood products and contaminated blood products, cultures, pathological wastes, sharps, human and animal anatomical wastes and isolation wastes that contain or may contain infectious substances.
10. All materials which falls in Class 1 (explosives), Class 2 (compressed gases) and Class 7 (radioactive materials), as described in the Minimum Requirements.
11. Any waste with a pH less than 6 or greater than 12.
12. Any waste which is difficult to analyse and classify.
13. Any complexes of heavy metal cations, paint and paint sludge, or laboratory chemicals.
14. Organic or inorganic materials which may have a definite acute or chronic negative effect on human health and/or the environment, due to its toxic, physical, chemical or persistent characteristics and which corresponds with the UNEP definition of hazardous waste.
15. Scheduled pharmaceutical products registered in terms of the Medicines and Related Substances Control Act, 1965 (Act 101 of 1965) or associated containers.

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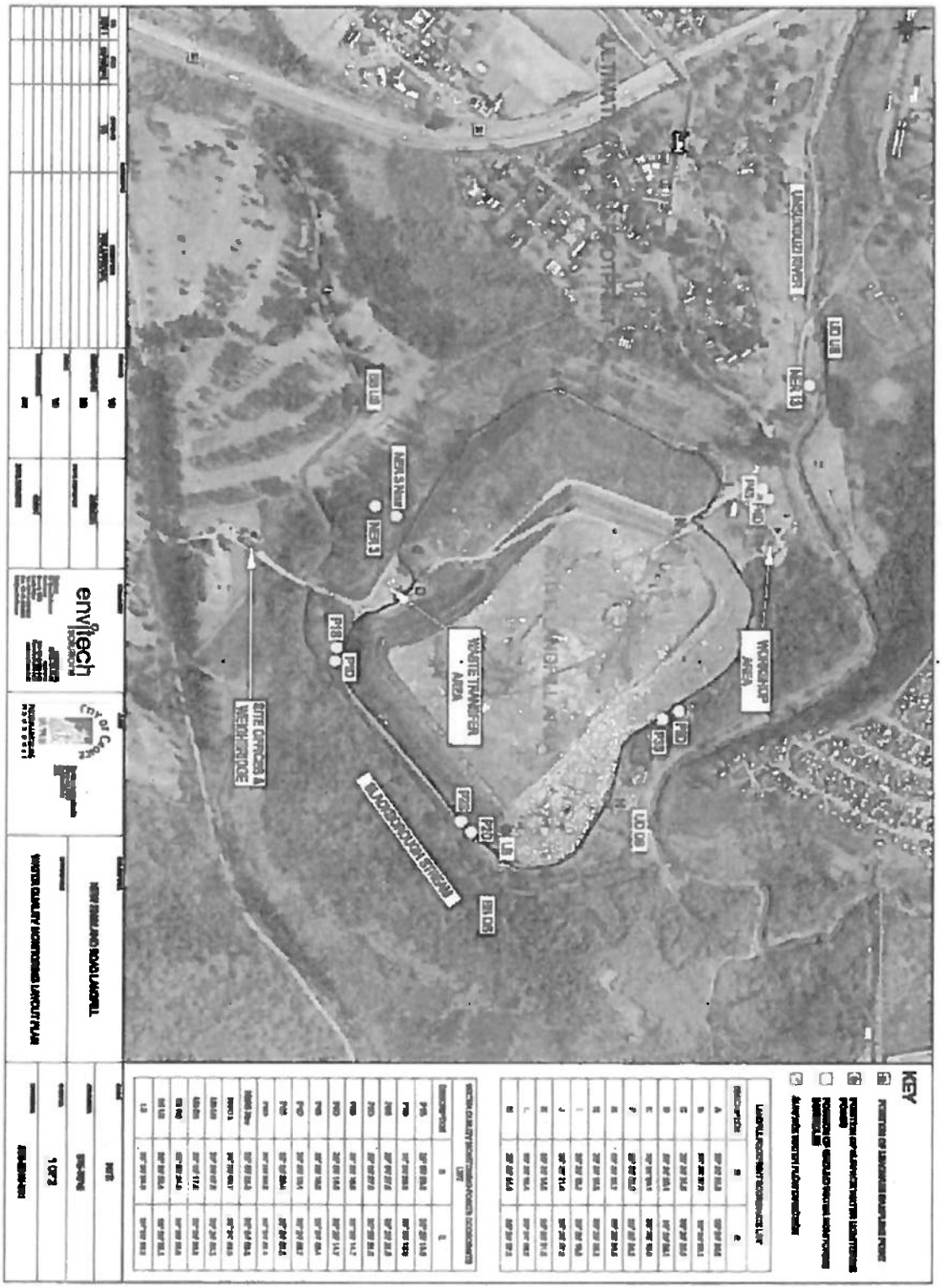
ANNEXURE V: WATER QUALITY MONITORING PLAN



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ANNEXURE VI: WATER QUALITY VARIABLES REQUIRED FOR DETECTION MONITORING AT BI-ANNUAL INTERVALS

Monitor for:

Alkalinity (P.Alk)
Ammonia (NH_3-N)
Calcium (Ca)
Chemical Oxygen Demand (COD)
Chlorides (Cl)
Electrical Conductivity (EC)
Fluoride (F)
Iron (Fe)
Magnesium (Mg)
Nitrate (NO_3-N)
pH
Potassium (K)
Sodium (Na)
Sulphate (SO_4)
Total Dissolved Solids (TDS)

WATER QUALITY VARIABLES REQUIRED FOR DETECTION MONITORING ANNUALLY

Monitor for:

Arsenic (As)
Cadmium (Cd)
Chromium (hexavalent and total)
Cyanide (free) (CN)
Dissolved organic carbon (DOC)
E. Coli (counts per 100ml)
Lead (Pb)
Manganese (Mn)
Mercury (Hg)
Poly Aromatic Hydrocarbon (PAH)
Poly Chlorinated Hydrocarbon (PCH)
Soluble orthophosphate (PO_4-P)
Total organic carbon (TOC)
Total phenol (Phen)
Uranium (U)
Vanadium (V)

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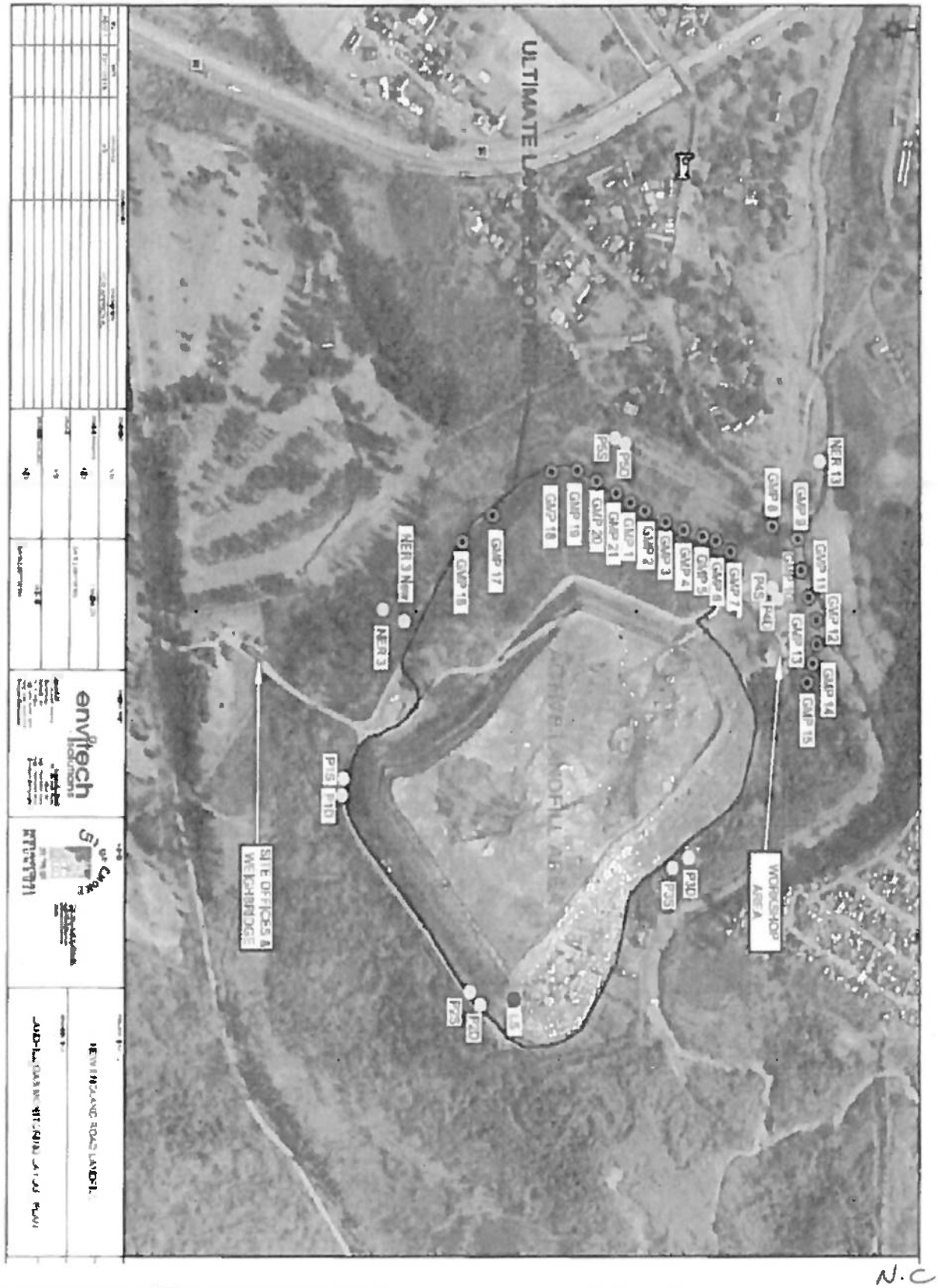
ANNEXURE VII: LANDFILL GAS MONITORING PLAN



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THE MSUNDUZI MUNICIPALITY

CONTRACT No. SCM 1 OF 26/27

PROFESSIONAL ENVIRONMENTAL MANAGEMENT CONSULTANT COMPANY SPECIALIZING IN LANDFILL MONITORING AND DEVELOPMENT FOR A PERIOD OF THREE YEARS

ANNEXURE "B": AERIAL SITE MAP

LEGEND

Boundary

Western Land Area

Current Workface

Eastern Berm

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NOT TO SCALE

THE MSUNDUZI MUNICIPALITY

CONTRACT No. SCM 1 OF 26/27

PROFESSIONAL ENVIRONMENTAL MANAGEMENT CONSULTANT COMPANY SPECIALIZING IN LANDFILL MONITORING AND DEVELOPMENT FOR A PERIOD OF THREE YEARS

ANNEXURE "C": DECOMMISSIONING PLAN

MSUNDUZI MUNICIPALITY

DECOMMISSIONING PLAN FOR THE NEW ENGLAND ROAD LANDFILL SITE

CLOSURE, REHABILITATION AND END-USE

SPECIALISED QUOTATION No. Q 12/651 OF 20/21

August 2021

[redacted]

Contact:

[redacted]

[redacted]

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APPENDIX C: DETAILED FINANCIAL DETERMINATION, INCLUDING THE SUPPORTING RATES

DECOMMISSIONING PLAN FOR THE NEW ENGLAND ROAD LANDFILL SITE

CLOSURE, REHABILITATION AND END USE

1. INTRODUCTION AND PROJECT OVERVIEW

1.1 Introduction

As part of the Tender for SPECIALISED QUOTATION No. Q 12/651 OF 20/21, [redacted] submitted a proposal to undertake the decommissioning plan for the New England Road Landfill Site (NERL) dated February 2021. In a letter dated 23 March 2021, [redacted] were advised that the Tender had been accepted by the Msunduzi Municipality. The official Purchase Order note dated 15 April 2021 and numbered 4520000356 was subsequently issue to [redacted]

Assessment reports compiled by [redacted] in 2007 and updated by Jeffares & Green in October 2011 together with the previous financial planning reports compiled by Envitech Solutions and ESS Environmental & Sustainability Solutions (ESS) indicate various airspace availability and various differing lifespan calculations. The updated financial planning report compiled by [redacted] in July 2021 was based on topographical survey, therefore providing a more accurate site lifespan.

In order to prepare for the decommissioning of the NERL and the financial implications of the decommissioning, the Msunduzi Municipality will be routinely undertaking the lifespan assessment and the assessment of costs for closure and rehabilitation for the proposed end use of the site. This will facilitate sound financial planning for the municipal treasury.

As the updated financial planning report was compiled by [redacted] as recent as July 2021, the updated financial planning report shall be used as the preempt to this report and shall inform various sections of this report, with various overlaps.

This report documents the proposed decommissioning of the NERL and provides details on the financial provision and time provision required for the decommissioning.

The basis for this assessment is limited to information that was available at the time of completion of the report. Where information is not available, the worst case as far as the cost determination is concerned, is assumed.

1.2 Objectives

- To enable the Msunduzi Municipality to plan for the decommissioning of the NERL.
- To enable the Msunduzi Municipality to prepare financially for the site closure and rehabilitation.
- To present accurate *estimated* costs, calculations and timeframes for site closure and remediation for the proposed end use of the facility.
- To present a clear, defendable and repeatable methodology.

1.3 Scope of Work

The scope of work for the study is summarized below;

- The financial planning and programming for the decommissioning of the NERL.
- The decommissioning plan requires to be based on environmental, technical and social best practices, and needs to meet the satisfaction of the Regulatory Authority.
- Conducting a technical evaluation of the NERL, including the leachate management, the stormwater management and the landfill gas management.
- Conducting a review and update of the existing closure report and estimate costs for site closure and rehabilitation.
- Review and update estimated costs for the proposed end use of the site.
- Conduct a topographical survey of the area of the site being landfilled.
- Determine remaining airspace and life of landfill, including the landfill digital terrain modelling/profiling.
- Determine estimated capping and decommissioning costs, including for the fencing, security, landscaping, building and facilities.
- Determine Authorisation/s and monitoring costs.
- Submit updated preliminary drawings and the preliminary design of the end use plan.

2. METHODOLOGY

The methodology has been separated into the following stages:

2.1 Review of the Waste Management Licence (WML) and End of Use Plan

The WML conditions were reviewed to define the closure requirements for the facility.

No end use plan was available for review and thus the end use plan has been conceptualized.

2.2 Remaining Airspace Determination and End of Life Confirmation

The general approach to undertaking the work is a simple two stage process comprising the survey of the working face and assessing this against weighbridge data to determine compaction.

The site was surveyed by an engineering surveyor to produce accurate topographical data. This data was used to develop a conceptual final landfill form model and thereby providing an estimate of the available airspace available to final landfill height.

The airspace model is developed based on a scenario of typical compactions achieved and typical growth of the waste stream over time.

The airspace remaining within the footprint of the current waste body is to be referred to as **Option 1** for the remainder of this report.

As an alternative, and to maximize the available airspace at the site, the previously/historically landfilled area, that lies to the west of the current waste body, was further investigated and is detailed in the report below. This Western Extension option is to be referred to as **Option 2** for the remainder of the report.

2.3 Determine Decommissioning Costs

According to the Minimum Requirements for Waste Disposal by Landfill by the Department of Water Affairs and Forestry (referred to as *Minimum Requirements* hereafter), the site must be investigated and rehabilitated prior to closure. The investigation is undertaken with a view to determine the need to rehabilitate the site and to obtain environmental and public acceptability.

The rehabilitation costs are at best an estimate based on recent audits of the facility, recent monitoring data and professional experience.

The current Action Plan, to remediate the site in the short to medium term, was also considered whilst determining the decommissioning costs.

2.4 Determine Capping and Closure Costs

Closure costs were calculated based on Minimum Requirements for capping of a GLB+ facility, whilst the principles of the recent Technical Advisory Practice Note: Capping Closure of Waste Management Facilities and Pollution Point Sources, were also reviewed and applied, where applicable.

2.5 Determine the Containment Barrier Costs

As an alternative, and to maximize the available airspace at the site, the previously landfilled area, that lies to the west of the current waste body, was further investigated. However, to be able to dispose of waste in this area, the area would need to be engineered. The engineering, in summary, would entail the clearing, the shaping and the construction of a containment barrier system that complies with *Government Notice R. 636: Norms and Standards for Disposal of Waste to Landfill*. The applicable containment barrier system would be for a Class B Landfill. In addition, the leachate management, the stormwater management and the landfill gas management would also need to be considered for this area. This Option 2 is further detailed in the report below.

2.6 Closure Authorisations and Post Closure Costs

Authorization for closure under the National Environmental Management Waste Act (59 of 2008) is now required for the closure of a general waste landfill facility under General Notice 718 of 3rd July 2009 in Category A Section 20: "The decommissioning of activities listed in this Schedule".

3. FINDINGS

3.1 Review of the Waste Management Licence and the Available Documentation

The following documents were reviewed:

- DWAF Permit no.:16/2/7/U203/D3/Z1/P64 of 22 April 1998
- uMgungundlovu District Municipality: New England Road Landfill Site Status Quo Assessment Report and Recommendations (December 2010)
- Msunduzi Municipality: Water Quality and Landfill Gas Monitoring at the New England Road Landfill Site, Pietermaritzburg (August 2011)
- Msunduzi Municipality: Monitoring of Gas, Water Quality and Leachate at the New England Road Landfill Site, Pietermaritzburg (June 2012)

- Msunduzi Municipality: Monitoring of Gas, Water Quality and Leachate at the New England Road Landfill Site, Pietermaritzburg (March 2013)
- Msunduzi Municipality: Financial Planning Report – Closure, Rehabilitation and End Use, New England Road Landfill Site, Pietermaritzburg (April 2013)
- Msunduzi Municipality: Monitoring of Gas, Water Quality and Leachate at the New England Road Landfill Site, Pietermaritzburg (February 2014)
- Msunduzi Municipality: Financial Planning Report – Closure, Rehabilitation and End Use, New England Road Landfill Site, Pietermaritzburg (April 2014)
- Msunduzi Municipality: Financial Planning Report – Closure, Rehabilitation and End Use, New England Road Landfill Site, Pietermaritzburg (August 2014)
- Provision for the Final Rehabilitation and Closure Costs for the New England Road landfill, Annual Financial Statements for the period ending 30 June 2020
- Waste Management Licence - DC22/WML/0061/2016
- Msunduzi Municipality: Financial Planning for the New England Road Landfill Site – Closure, Rehabilitation and End Use, Revision 2 (July 2021)

Key observations, as noted during the technical evaluation of the NERL, were made and are tabled as Table 1.

Table 1: Key Findings from the review of available documents

Ref	Document	Observation	Comment
1		Large working face with disrupted waste deposition due to the presence of waste pickers.	Operational
2		Cover material available on site not adequate.	Operational impacts on airspace and closure date
3		Evidence of fire and wires burnt to recover metals from wire and tyres around the site.	Operational
4		Lack of rehabilitation of the completed areas.	Closure Related
5		Leachate Management system is not functioning correctly, due to theft, although it was upgraded recently.	Operational
6		Biological health of landfill considered to be good.	Operational
7		No formal stormwater management system is in place and poor maintenance of existing systems.	Remediation and Closure Related
8		Perimeter cut-off drains on eastern, northern and southern boundary of the site maintain clean/dirty water separation. An upgrade is required.	Remediation and Closure Related
9		Visual and hygiene issues were found to be present. Noise, dust and odour issues were noted.	Operational
10		Alien Species were evident along the site perimeter. Regular maintenance is required.	Remediation and Closure Related
11		Evidence of an impact on the shallow and deep groundwater quality.	Remediation and Closure Related
12		Evidence of contamination of the Blackborough Stream.	Remediation and Closure Related
13		Stormwater Management is not in place.	Remediation and Closure Related
14		Continuous operation and maintenance required to the leachate management facility, once repaired.	Operational
15		No methane (flammable gas) or carbon dioxide was recorded within the buildings and structures on site.	Operational and remediation costs

Ref	Document	Observation	Comment
16		Continuous gas management and monitoring required.	Operational
17		Lack of security and engulfment of pickers at the site.	Operational
18		Potential acceptance of non-permissible wastes.	Remediation and Closure Related
19		Weighbridge inaccuracies and downtime.	Operational impacts on airspace and closure
20		Low control of the working face.	Operational impacts on airspace and closure
21		Leachate system integrity improved and upgraded, however leachate found on waste surface and seepage through side slopes.	Operational, Remediation and Closure Related
22		No monitoring boreholes located on site.	Operating and post-closure maintenance costs
23		The shallow aquifer is being impacted upon by contamination from the landfill, from historic records. No recent results available.	Operational and remediation costs
24		The deep aquifer is being impacted upon by contamination from the landfill, from historic records. No recent results available.	Operational and remediation costs
25		Historic records show E.coli readings at P1S, P5S, NER3 New, P1D, P2D, P3D and P5D exceeds Class II of the SANS241:2006 limits.	Operational and remediation costs
26		Historic records show surface water quality in the Blackborough Stream is moderate quality showing impacts downstream of the site with respect to E. Coli and Ammonia. The Msunduzi River shows possible faecal contamination.	Operational and remediation costs
27		Historic landfill gas monitoring records shows evidence of landfill gas migration to the north and west of the site. Since there are no buildings or enclosed spaces in this area and the CH_4 levels are well below the low explosive limit of 5% v/v in air, the landfill gas migration in these areas pose no risk.	Operational and remediation costs

3.2 End of Use Plan

An end of use plan is typically drawn up in the WML application report and closure requirements are assessed based on the end of use plan, with the conditions set out thereafter in the WML for the site. In this case the WML does not provide any closure or end of use planning which suggest that closure is to be dealt with in consultation with the Department of Environmental Affairs (DEA) and stakeholders. Whilst this may take place during the authorisation for closure, closure planning should commence at least 12 months prior to closure. Since the end of use plan is not in place a rudimentary conceptual plan is developed below.

The site is located within a residential environment which is a primary driver in determining a potential end use. This is despite the closure requirements, which will be forced upon the site to manage environmental impacts. Settlement and drainage requirements will restrict the use of the site as a residential, commercial or industrial development. The setting amongst formal residence will also restrict the site in terms of commercial or industrial use. The presence of the informal residences result in further restrictions in the use of the site as encroachment will be a considerable risk. Please see Table 2 for the end of use considerations.

Table 2: End use restrictions and consequences

Restriction	Consequence	End use restriction
Subsidence	Structural damage due to subsidence.	Commercial, industrial and residential development
Landfill gas migration	Landfill gas management will be controlled through the proposed permanent well collection field which may have structural vulnerability to development.	Commercial, industrial and residential development
Locality – Adjacent to surface water	Control of run-off may limit development opportunities.	Commercial
Locality – adjacent to formal residence	End use must be in line with adjacent land use.	Commercial and industrial use
Locality – adjacent to informal residences	End use must take cognizance of potential social impacts, trespassing and waste mining.	Vacant land
Drainage requirements	The height of the landfill will result in high intensity run-off which will need to be controlled through drainage and shaping.	Commercial, industrial and residential development. Recreation restrictions where irrigation is required.
Topography	The site is set in an undulating setting. The final shaping will need to fit into this.	Commercial and industrial restrictions.

3.2.1 Opportunities

The following opportunities and possibilities for the end use are considered:

- **Recreation**

a) Parkland or managed open space in continuation of the golf course.

b) Sports and recreation centre such as children's playground, cycle/running tracks, skateboard arena, paint ball centre and a driving range.

- **Commercial**

a) Open air market

b) Events arena

- **Institutional use**

a) Educational facility for exhibitions, nature and conservation

b) Photovoltaic field

c) Rainwater harvesting

The end use of an undeveloped space is considered a risk due to the potential for encroachment of informal settlements and the potential for waste mining to occur. Given, the impoverished nature of the informal settlement, the need for the surrounding community to have value for the poverty needs to be managed. It is considered that unless this value can be achieved open space or recreational activities may be at risk as these will be negatively impacted upon and they require regular use which cannot be assessed within the scope of this project.

Consequently, the potential for a modular marketplace or education facility for the community or the use of the area for community projects is considered. This end use will require representation to be made to the leaders of the community to assess their needs and gain their will in supporting the initiative. A feasibility study will also need to be conducted to realize this use. Additionally, support for services such as power and rainwater harvesting which could be returned to the community for their benefit is a potential solution which will ease service delivery pressure on the municipality

The final end use is considered to involve a combination of marketplace, community centre and resource harvesting facility. Structures will need to be of low load and will need to be constructed to integrate with the environmental management of the site.

The following tasks need to be undertaken for the finalization of the end use plan:

a) Commercial feasibility study.
b) Stakeholder engagement.
c) Engineering feasibility designs.

3.3 Remaining Airspace Determination and End of Life Confirmation – Option 1

The landfill and working face were surveyed by engineering surveyors. The survey data was used as a basis for the airspace model. The landfill model was developed using Model Maker with a 3D analysis (Digital Terrain Modelling). Elevation models to final height of 653.2m above mean sea level (msl) at a slope of 1:3, which is the current slope used at the site, were constructed.

The model provided the volumes and surfaces areas as tabulated in Table 3 below:

Table 3: Volumes and areas generated by the landfill model

Elevation (m amsl)	Surface Area (m^2)	Volume (m^3)	Accumulative Airspace Volume (m^3)
Current – 653.2	168 926.00	1 725 082.81	1 725 082.81
653.2 - 654	46 101.00	36 880.80	1 761 963.61

The area and corresponding model calculated a volume of 1 761 963.61m^3 (Figure 1 and Figure 2 respectively below) from the current waste levels to the top level of the final landfill model (licenced height of landfill of 654m amsl). Of this volume, the final layer comprises the capping material, hence the volume available for waste deposition is 1 725 082.81m^3.

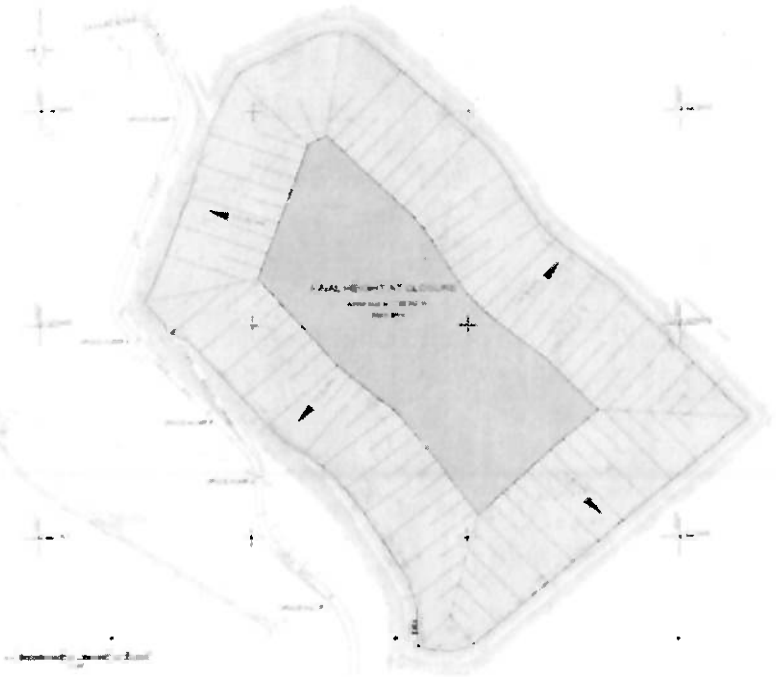


Figure 1: Final Landfill Area – Option 1

Figure 2: Final landfill 3-D Model – Facing North

Waste data, including waste composition and waste volumes, for the months of August 2020 to March 2021 were received and analysed. Due to the variation with waste volumes, and with the COVID-19 pandemic impacts noted, and in consultation with the Landfill Manager, a daily deposition of rate of 400tonnes/day will be used for this report. No accurate compaction data was available and therefore three (3) scenarios were developed with typical compaction ratios ranging from 700kg/m^3 – 1000kg/m^3, as shown by Tables 4, 5 and 6 below.

Table 4: Airspace Utilisation at 1% Growth Rate and Various Compaction Efforts

Final Landform at 1% Growth				
Compaction (Kg/m^3)	Landfilled Waste Volume (m^3/day)	Available Airspace for Final Landform @ 653.2m amsl (m^3)	Time Taken to Fill the Landfill (years)	Approximate Date
1000	400	1 725 082	11,8	Mar-33
900	444,44	1 725 082	10,6	Jan-32
800	500	1 725 082	9,5	Dec-30
700	571,4285714	1 725 082	8,3	Oct-29

Table 5: Airspace Utilisation at 3% Growth Rate and Various Compaction Efforts

Final Landform at 3% Growth				
Compaction (Kg/m^3)	Landfilled Waste Volume (m^3/day)	Available Airspace for Final Landform @ 653.2m amsl (m^3)	Time Taken to Fill the Landfill (years)	Approximate Date
1000	400	1 725 082	11,2	Sep-32
900	444,44	1 725 082	10,0	Aug-31
800	500	1 725 082	8,7	Feb-30
700	571,4285714	1 725 082	7,4	Nov-28

Table 6: Airspace Utilisation at 5% Growth Rate and Various Compaction Efforts

Final Landform at 5% Growth				
Compaction (Kg/m³)	Landfilled Waste Volume (m³/day)	Available Airspace for Final Landform @ 653.2m amsl (m³)	Time Taken to Fill the Landfill (years)	Approximate Date
1000	400	1 725 082	10,5	Dec-31
900	444,44	1 725 082	7,6	Jan-29
800	500	1 725 082	7,1	Aug-28
700	571,4285714	1 725 082	6,8	Mar-27

The review identified that waste deposition covers a wide area and the past problems associated with plant has resulted in reduced compaction efficiency. As a result, a compaction ratio of 700kg/m3 for the closure modeling has been selected as the appropriate compaction ratio.

Growth rates of 1%, 3% and 5% were analyzed, as based on Figures 3, 4 and 5 below however, a growth rate of 3% has been selected and is based on industry related growth figures.

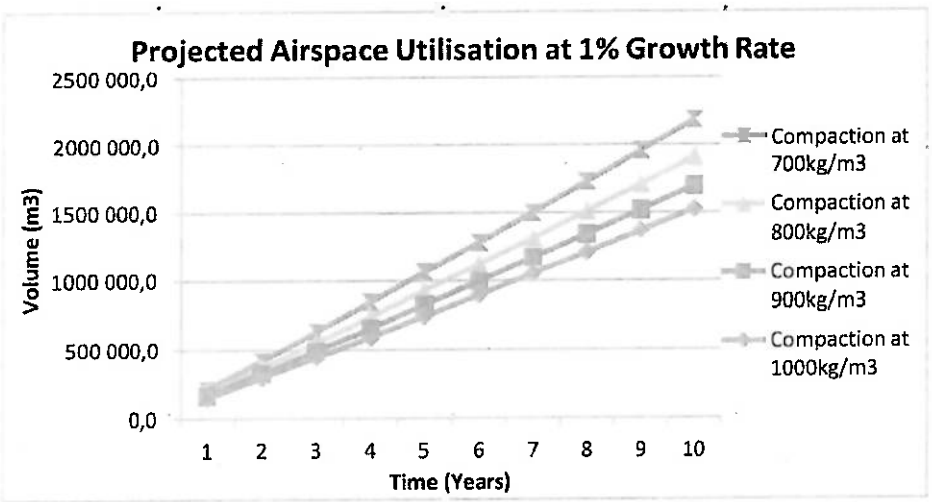


Figure 3: Projected Airspace utilization at 1% Growth Rate

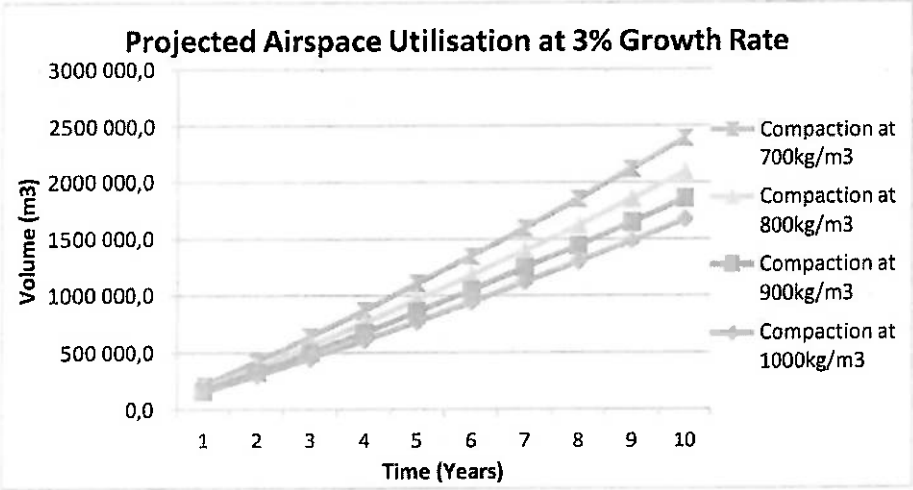


Figure 4: Projected Airspace utilization at 3% Growth Rate

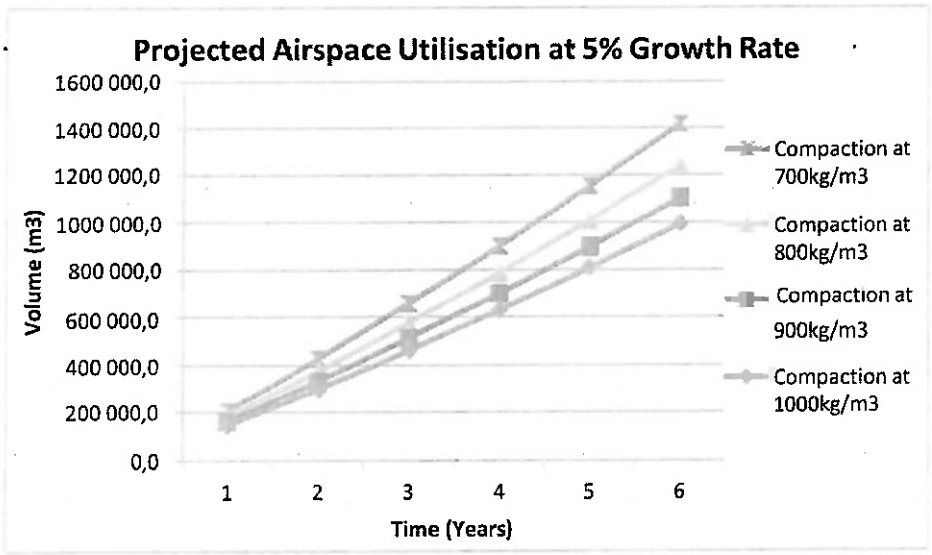


Figure 5: Projected Airspace utilization at 5% Growth Rate

The model found that airspace would be depleted by **November 2028** based on 700kg/m³ and 3% growth rate for Option 1.

Diversion of waste would increase the lifespan of the landfill and should be considered. If a 10% waste diversion were achieved starting in August 2021, the extension of the landfill lifespan would be approximately six months (May 2029) based on 700kg/m^3 compaction and 3% growth. A 20% diversion of waste would achieve a 15-month extension of lifespan (February 2030) based on the same criteria as above.

3.4 Remaining Airspace Determination, End of Life Confirmation and Financial Determination – Option 2

As shown for Option 1 above, the airspace would be depleted by **November 2028** based on 700kg/m^3 and 3% growth rate however, the Waste Management Licence - DC22/WML/0061/2016, makes provision for the landfill footprint to be extended to the west (western extension). Please refer to Figure 6 below showing the western extension area.

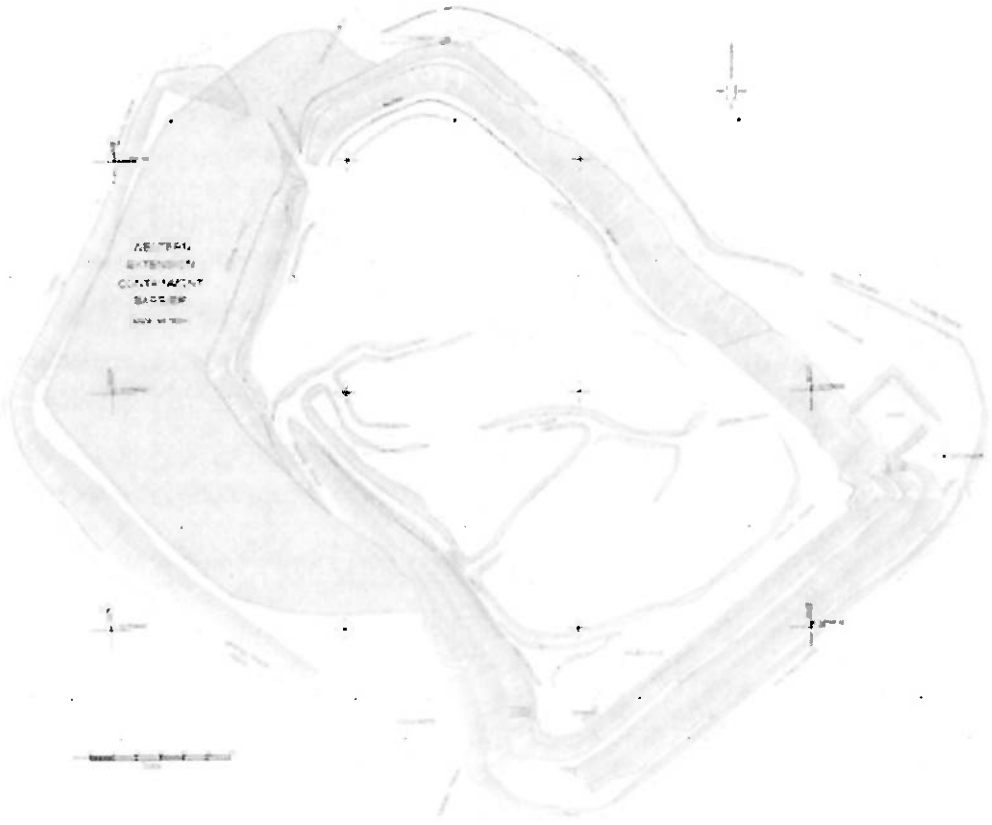


Figure 6: Western Extension Area Shown (shown in colour magenta)

For the western extension to be considered by the Regulatory Authority/ies, the area would need to be engineered accordingly. In summary the engineering, and the construction thereof, would include, but is not limited to the area clearing, the shaping of potentially historic waste (bulk earthworks) and the construction of a containment barrier system that complies with *Government Notice R. 636: Norms and Standards for Disposal of Waste to Landfill.* The applicable containment barrier system would be for a Class B Landfill, as amended, and is shown in Table 7 and Figure 7 below. In addition, the leachate management, the stormwater management and the landfill gas management for the western extension would also need to be considered.

Table 7: Proposed Class B Landfill Containment Barrier System, as amended (Top-Down)

Description	Service Provider
SELECTED WASTE BODY	Landfill operator
SEPARATION GEOTEXTILE	National supplier
75mm SINGLE-SIZE CRUSHED ROCK AGGREGATE (200mm THICK)	Local contractor
100mm THICK STABILSED PROTECTION LAYER / PROTECTION GEOTEXTILE .	Local contractor/National supplier
1.5mm HDPE GEOMEMBRANE	National supplier
GEOSYNTHETIC CLAY LINER	Local contractor
300mm THICK CLAYEY MATERIAL CONSTRUCTED IN LAYERS NOT EXCEEDING 150mm THICK	Local contractor
CUSPATED SHEET FOR LEACHATE DETECTION	National/International supplier
200mm THICK FREE DRAINING GRAVELLY SOIL LAYER	Local contractor
EXISTING WASTE BODY RESHAPED AND COMPACTED TO A DENSITY OF 1t/m3 (BULK EARTHWORKS)	Local contractor

Figure 7: Proposed Class B Landfill Containment Barrier System, as amended

The additional airspace determination is assessed below whilst the financial implications are determined thereafter.

Airspace Determination – Option 2

Similarly for Option 1, the survey data was used as a basis for the airspace model for Option 2. The landfill model was developed using Model Maker with a 3D analysis (Digital Terrain Modelling). Elevation models to final height of 653.2m above mean sea level (msl) at a slope of 1:3, which is the current slope used at the site, were constructed.

The model provided the volumes and surfaces areas as tabulated in Table 8 below:

Table 8: Volumes and areas generated by the landfill model – Option 2

Elevation (m amsl)	Surface Area (m^2)	Volume (m^3)	Accumulative Airspace Volume (m^3)
Current – 653.2	156 992.00	3 373 060.60	3 373 060.60
653.2 - 654	86 283.00	69 026.40	3 442 087.00

The area for Option 2 (Figure 8 below) and the corresponding model calculated a volume of 3 442 087.00m^3 from the current waste levels to the top level of the final landfill model (licenced

height of landfill of 654m amsl). Of this volume, the final layer comprises the capping material, hence the volume available for waste deposition is 3 373 060.60m³.

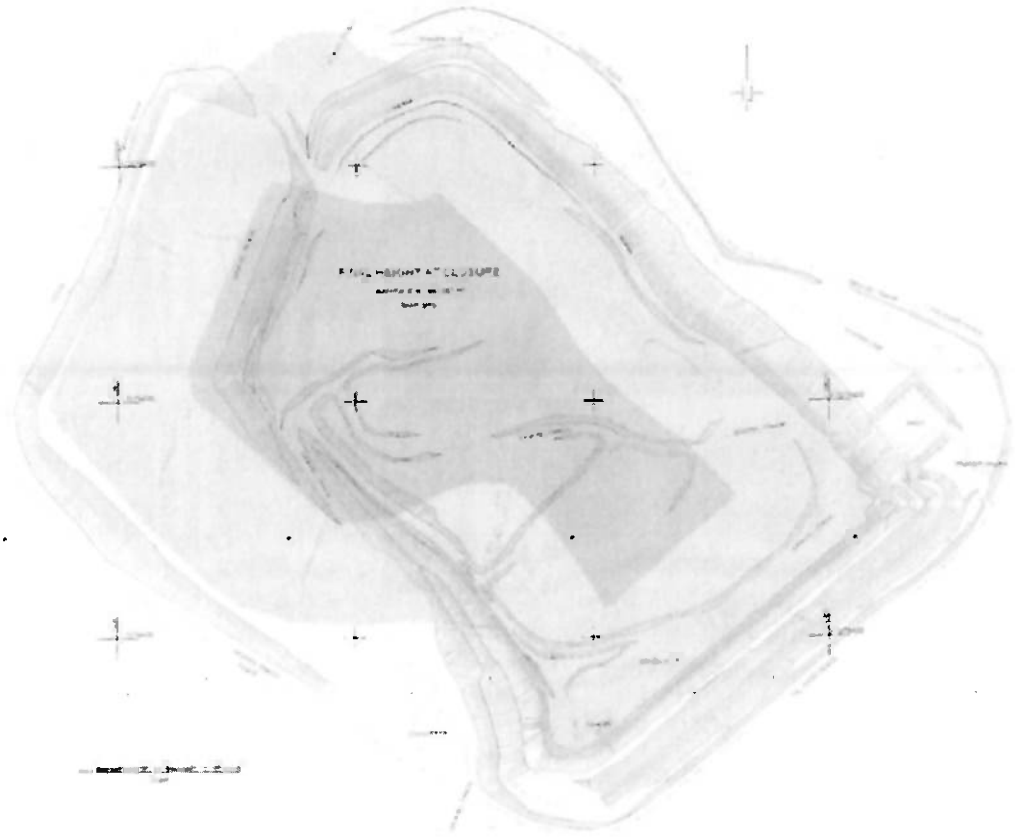


Figure 8: Final Landfill Area – Option 2

As per Option 1, waste data, including waste composition and waste volumes, for the months of August 2020 to March 2021 were received and analysed. Due to the variation with waste volumes, and with the COVID-19 pandemic impacts noted, and in consultation with the Landfill Manager, a daily deposition of rate of 400tonnes/day will be used for this report. No accurate compaction data was available and therefore three (3) scenarios were developed with typical compaction ratios ranging from 700kg/m³ – 1000kg/m³, as shown by Tables 9, 10 and 11 below.

Table 9: Airspace Utilisation at 1% Growth Rate and Various Compaction Efforts

Final Landform at 1% Growth				
Compaction (Kg/m³)	Landfilled Waste Volume (m³/day)	Available Airspace for Final Landform @ 653.2m amsl (m³)	Time Taken to Fill the Landfill (years)	Approximate Date
1000	400	3 373 060.60	> 20 years	Beyond Sep-41
900	444,44	3 373 060.60	> 20 years	Beyond Sep-41
800	500	3 373 060.60	17	Dec-38
700	571,4285714	3 373 060.60	15,2	Oct-36

Table 10: Airspace Utilisation at 3% Growth Rate and Various Compaction Efforts

Final Landform at 3% Growth				
Compaction (Kg/m³)	Landfilled Waste Volume (m³/day)	Available Airspace for Final Landform @ 653.2m amsl (m³)	Time Taken to Fill the Landfill (years)	Approximate Date
1000	400	3 373 060.60	17,2	Oct-33
900	444,44	3 373 060.60	15,8	Mar-37
800	500	3 373 060.60	14,0	Sep-35
700	571,4285714	3 373 060.60	13,1	Oct-34

Table 11: Airspace Utilisation at 5% Growth Rate and Various Compaction Efforts

Final Landform at 5% Growth				
Compaction (Kg/m³)	Landfilled Waste Volume (m³/day)	Available Airspace for Final Landform @ 653.2m amsl (m³)	Time Taken to Fill the Landfill (years)	Approximate Date
1000	400	3 373 060.60	15,5	Jan-37
900	444,44	3 373 060.60	14,1	Oct-35
800	500	3 373 060.60	13,0	Aug-34
700	571,4285714	3 373 060.60	12,2	Oct-33

The review identified that waste deposition covers a wide area and the past problems associated with plant has resulted in reduced compaction efficiency. As a result, a compaction ratio of 700kg/m³ for the closure modeling has been selected as the appropriate compaction ratio.

Growth rates of 1%, 3% and 5% were analyzed, as based on Figures 9, 10 and 11 below however, a growth rate of 3% has been selected and is based on industry related growth figures.

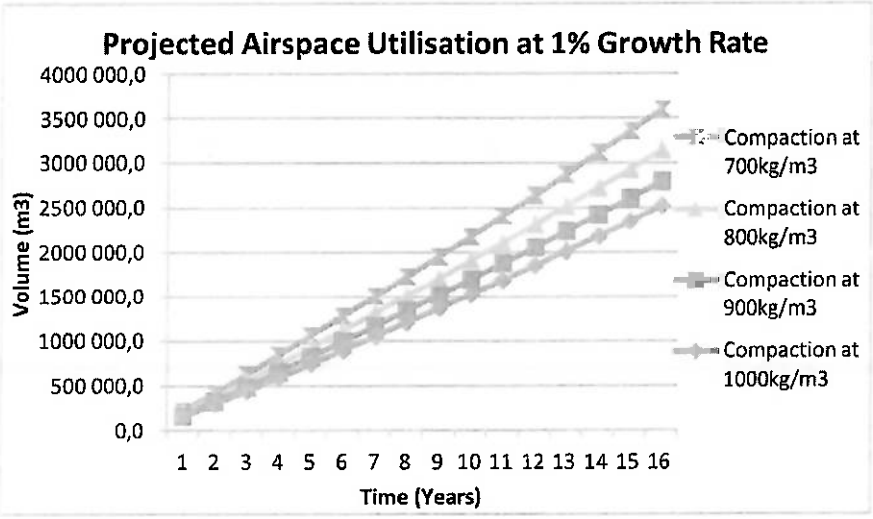


Figure 9: Projected Airspace utilization at 1% Growth Rate

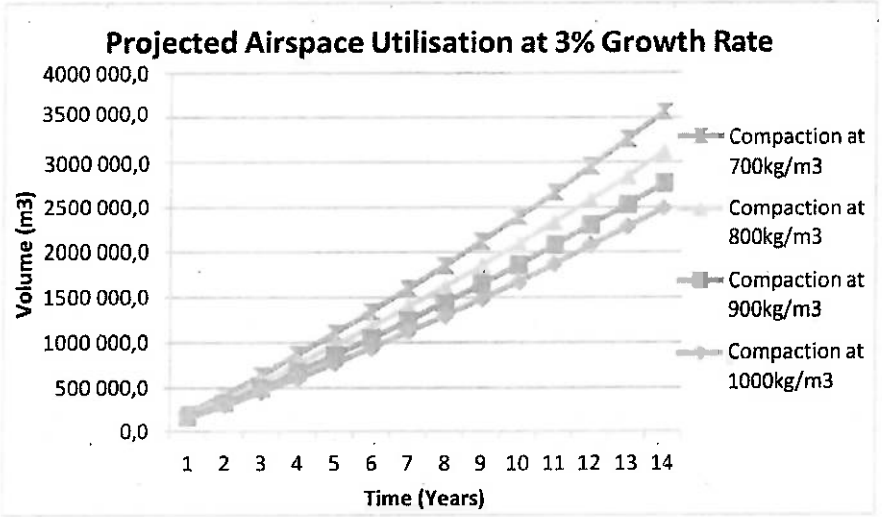


Figure 10: Projected Airspace utilization at 3% Growth Rate

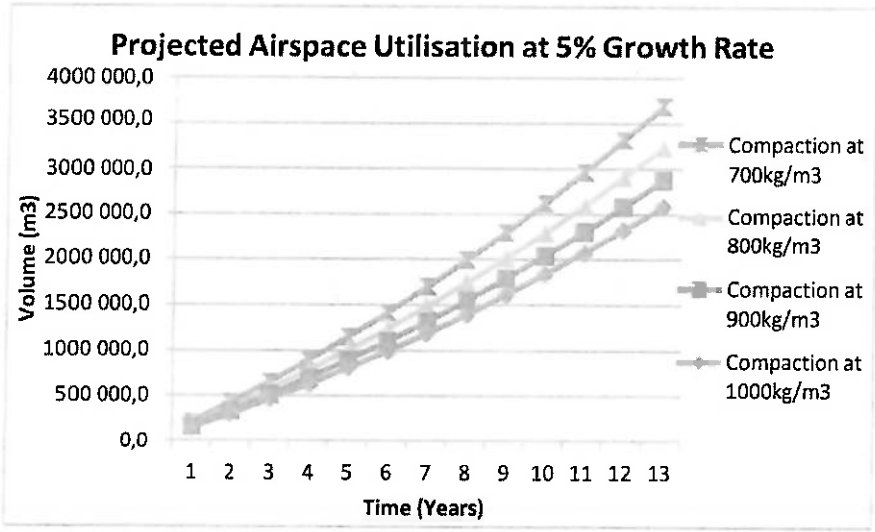


Figure 11: Projected Airspace utilization at 5% Growth Rate

The model found that airspace would be depleted by **October 2034** based on 700kg/m^3 and 3% growth rate for Option 2.

Similarly, as undertaken for Option 1, diversion of waste would increase the lifespan of the landfill and should be considered. If a 10% waste diversion were achieved starting in September 2021, the extension of the landfill lifespan would be approximately 15 months (February 2036) based on 700kg/m^3 compaction and 3% growth. A 20% diversion of waste would achieve a 28-month extension of lifespan (February 2037) based on the same criteria as above.

Therefore, when comparing Option 1 to Option 2, it is shown that the western extension will increase the lifespan of the site by approximately **6 years** based on 700kg/m^3 compaction and 3% growth.

Financial Determination – Option 2

The financial determination for the Western Extension is shown in Table 12 below.

The detailed financial determination, including the supporting rates, is attached in Appendix C.

Table 12: Financial Determination (Western Extension)

ESTIMATE COSTING FOR WESTERN EXTENSION - OPTION 2

DATE OF ESTIMATE:	July 2021
NAME OF ESTIMATOR:	ND
NAME OF DISPOSAL SITE :	New England Road LFS
LOCATION:	Pietermaritzburg

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	DIRECT COSTS				
1	Containment Barrier System (Please refer to the supporting rates)	m^2	66 780	R 565,00	R 37 730 700,00
	Sub-Total				**R 37 730 700,00**
	ANCILLARY ITEMS				
2	Leachate Management	m	980	R 600,00	R 588 000,00
3	Stormwater Management	m	715	R 187,50	R 134 062,50
4	Landfill Gas Management	m	200	R 450,00	R 90 000,00
5	Contractor's P&G's	%	R 38 542 762,50	15%	R 5 781 414,38
	Sub-Total				**R 6 593 476,88**
	EXTRAS				
	No Extra's are included				
	INDIRECT COSTS				
11	Professional Engineering fees	%	R 38 542 762,50	10,5%	R 4 046 990,06
12	EIA/Basic Assessment & Approval application	Sum	0	R 140 000,00	R 0,00
13	Geotechnical investigation	Sum	1	R 150 000,00	R 150 000,00
14	Topographical survey	Sum	1	R 60 000,00	R 60 000,00
15	Construction Monitoring	Monthly	12	R 85 000,00	R 1 020 000,00
16	Act as OH&S agent for Employer	Monthly	12	R 25 000,00	R 300 000,00
17	ECO for construction phase of project	Monthly	12	R 10 000,00	R 120 000,00
18	Recoverable expenses (printing, copying, travelling, other.)	Sum	1	R 60 000,00	R 60 000,00
	Sub-Total				**R 5 756 990,06**
	SUMMARY:				
	DIRECT COSTS				R 37 730 700,00
	ANCILLARY ITEMS				R 6 593 476,88
	EXTRAS				R 0,00
	INDIRECT COSTS				R 5 756 990,06
	SUB-TOTAL 1				**R 50 081 166,94**
	CONTINGENCY	%	R 50 081 166,94	10%	R 5 008 116,69
	SUB-TOTAL 2				**R 55 089 283,63**
	VAT	%	R 55 089 283,63	15%	R 8 263 392,54
	GRAND TOTAL				**R 63 352 676,18**

The total financial determination to undertake the Western Extension amounts to approximately **R55 089 283.63** (including contingencies and excluding VAT). When considering the time impacts and financial impacts for the development of a new waste management/disposal facility, the Western Extension at the New England Road landfill site appears to be a feasible option and is one that the Msunduzi Municipality may consider.

3.5 Determination of the Overall Decommissioning Costs (Option 1 and Option 2)

3.5.1. Surface Water and Groundwater

The minimum requirements for the closure of a landfill require that an assessment of rehabilitation is undertaken. At this stage, a review of the historic monitoring documentation provided shows that the shallow aquifer was clearly being impacted upon by contamination from landfill leachate from the eastern side of the landfill. The degree of contamination appeared to vary, and the majority of the contamination was occurring on the east and south of the site. The deep aquifer was also being impacted upon by contamination of the landfill leachate in the vicinity of boreholes P2D and NER13. The past high *E. coli* level in the vicinity of boreholes P5S and P3D suggested faecal contamination of the shallow and deep aquifer in this area; and may have been the result of the overflowing sewer manholes in the vicinity of these boreholes.

There was evidence to suggest that the Blackborough Stream was being impacted on by contamination of the landfill leachate. This was indicated by the high Ammonia level in the downstream sample from the Blackborough Stream.

Further continuous monitoring will need to be undertaken in order to ascertain remediation requirements at the time of closure.

A provision is made for a geohydrological investigation and for the installation of further monitoring boreholes.

3.5.2 Landfill Gas Management

The historic monitoring events commissioned by the landfill operators indicated that the Methane (CH4) levels of 7.3% v/v, 38.3% v/v and 1.8% v/v in boreholes P1S, P1D and P2S respectively indicate the presence of landfill gas. The levels in P1D had historically increased significantly from previous monitoring events which indicated a CH4 level of 1.8% v/v. This was to be expected, as previous reports revealed that the upper portions of these boreholes were drilled through waste material. Based on further historical data and the elevated carbon dioxide (CO2) levels in gas monitoring probes (GMP) 1, 2, 3, 5, 13, 14 and 15, the historic landfill gas monitoring showed evidence of landfill gas migration to the north and west of the site. There are no buildings in the area of GMP1, GMP2, GMP3 and GMP5 and although there are buildings and enclosed spaces in the area of monitoring probes GMP13, GMP14 and GMP15, the CH4 levels are well below the low explosive limit of 5% v/v in air, therefore the landfill gas migration in these areas pose no risk. The historic monitoring also showed that no methane (flammable gas) or carbon dioxide

was recorded within the buildings and structures on site and therefore there was no evidence of landfill gas migration within these areas.

Historically, GMP6 and GMP7 could not be located and GMP4 was damaged by a fire. These gas monitoring probes were previously replaced with new probes.

Consistent monitoring is required in order to fully assess the scope and costs for remediation and rehabilitation at time of closure.

3.6 Determination of Capping and Closure Costs

A closure costing model was developed for Option 1 and Option 2 and is attached in Appendix B. The model assesses the costs incurred as:

- Direct Costs – capital costs for capping and ancillary items;
- Indirect Costs – professional fees, investigations, disbursements and construction monitoring, inter alia.

The closure costs for Option 1 and Option 2 are summarized in Table 15 and Table 16 respectively.

3.6.1 Direct Costs

Determination of Capping Costs

Factors considered in the capping costs include the design, sourcing of the capping materials, gas management, stormwater management and re-vegetation.

3.6.1.1 Capping Design and Cost

The general capping design follows that of the Minimum Requirements for a G.L.B+ facility, whilst the Technical Advisory Practice Note: Capping Closure of Waste Management Facilities and Pollution Point Sources, was also reviewed and applied, where applicable, with the exception of the gas drainage layer. The development of the previously proposed landfill gas recovery system will provide a preferential flow path for the landfill gas and will facilitate the removal of landfill gas. The gas drainage layer would also promote the ingress of oxygen and would not be favourable to the proposed landfill gas recovery system. Therefore, the gas drainage layer is not recommended and further costed.

The general capping design will be applied to the final surface area, i.e., elevation 653.2m above msl, at the top of the waste body only due to the ongoing construction of the operational landfill containment berms. The landfill containment berms serve as a partial capping to the side slopes of the landfill. The specification for the general capping is provided in Table 13 below:

Table 13: General Capping Design

Layer (MR)	Description	Service Provider
U Layer	200mm Topsoil	Local contractor
V Layer	150mm Compacted Clay Layer	Local contractor
V Layer	150mm Compacted Clay Layer	Local contractor
V Layer	150mm Compacted Clay Layer	Local contractor
Z Layer	Geotextile layer	National supplier
W Layer	Compacted Waste Body	Local contractor

In review of the historic upgrades to the New England Road Landfill site and the current operational issues, various additional capping options were considered for the landfill side slopes. Also, the previous topsoiling and grassing of the side slopes proved unsuccessful as the required grass coverage was not achieved due to theft of the soilsaver, human traffic, rolling of waste material down the slope, uncontrolled waste disposal and operational issues. It is also anticipated that at the time of the closure of the site the grass coverage will be insufficient and erosion from the natural elements and traffic on site will be evident. It is therefore recommended that additional capping, over the landfill containment berms, be carried out. The specification for the capping of the side slopes is provided in Table 14 below:

Table 14: Side Slope Capping Design

Layer (MR)	Description	Service Provider
U Layer	200mm Topsoil	Local contractor
	Medium Shear Geosynthetic Clay Liner	National supplier
	Leveling Course	Local contractor

The construction of the landfill containment berms is not included in the capping costs as it is assumed that this becomes an operational expense as the containment berms approach the closure height.

3.6.1.2 Capping material costs

Costs were sourced from a local contractor on an excavate, load, haul, place basis and compact.

The geotextile and geosynthetic clay liner costs were supplied by a national supplier.

3.6.1.3 Re-vegetation/Rehabilitation

Re-vegetation is based on the provision of topsoil, placement and anchoring thereof, grassing with runners of indigenous grasses.

3.6.1.4 Gas Management

Typically, gas monitoring probes are placed during the operational phase. However, a cost provision is made for the closure phase in case of repairs or additions to the system. 10No. and 20No. for Option 1 and Option 2 respectively gas monitoring probes installation is provided for at current industry rates, although more may be required.

3.6.1.5 Groundwater Monitoring Wells

Typically, groundwater monitoring wells are placed during the operational phase. However, a cost provision is made for the closure phase in case of repairs or additions to the system. An amount of 210m for Option 1 and 50m for Option 2 of well installation is provided for with reference to a costing.

A post closure analytical and monitoring cost by an external supplier is provided on an annual cost basis. Costs are determined as per the WML requirements of Annexure VI. Analytical costs are those which [redacted] use in monitoring contracts and using the local laboratory supplier, Talbot and Talbot Laboratories. The professional fees are calculated based on a field worker and professional environmental scientist market rates.

The WML requires a 30-year monitoring period; however, there may be a case for this to be reduced based on continued post closure monitoring.

3.6.1.6 Clean Stormwater Diversion

Historical plans show berms in place. Although, the surface water monitoring results show a lack of impact to surface waters, there is no precipitation at the time of the monitoring and thus run-off impacts are not ascertained. These will need to be undertaken to confirm the integrity of the clean/dirty surface water diversion structures. No provision is made for this.

3.6.1.7 Security Management

It is anticipated that a security fence will be in place however maintenance and replacement may be a continuing factor. The closure of the facility will require fencing and, in all likelihood, require access for the community. This is envisaged to reduce the need for community reclamation of the fence if a low value product is used such as concrete palisade fencing. A provision is made for this.

3.6.1.8 Contractor P&G's

An industry standard of 15% is applied to the direct capital costs as per the SAICE guidelines.

3.6.2 Indirect Closure Costs

3.6.2.1 Professional Engineering Fees

NOTICE 151 OF 2014, The Engineering Council of South Africa, Guideline for Services and Processes for Estimating Fees for Persons Registered in terms of the Engineering Profession Act, 2000. (Act No. 46 of 2000) provides for a range of fees based on the cost of the scope of works. The range is 8-13% and for this costing exercise the middle range is selected; namely 10.5%.

3.6.2.2 EIA/ Basic Assessment & Closure Permit Application

The provision for a waste management license is made for closure of the site. This will involve a basic assessment as contemplated under the National Environmental Management Act

(NEMA) Environmental Impact Assessment Regulations (EIA) regulations and an application form submitted to the Department of Environmental Affairs (DEA) under current NEMWA legislation. The BA excludes any specialist studies which may be required and is based on current market conditions.

3.6.2.3 Geotechnical Investigation

A standard geotechnical investigation is provided for under the Minimum Requirements. The geotechnical investigation comprises of eight test pits and soil analyses. In addition, a geotechnical assessment of the capping material will be required should structures need to be placed on the closed landfill. This assessment will need to be assessed and detailed closer to the time of closure.

3.6.2.4 Topographical Survey

A topographical survey by an engineering surveyor is required and an estimate is included. The survey includes baseline survey of waste body, final shaped waste body, capping layers (3) and final shaped top soiled and rehabilitated layer.

3.6.2.5 Construction Monitoring

Construction monitoring by a local engineer is provided on a six monthly and twelve-monthly basis. The engineer requirements are Level 3: Full-time Construction Monitoring in accordance with the gazette standard for tariffs and rates. In addition to this, it is recommended that the engineer should have a minimum of 5 years of experience in construction monitoring for project of a similar nature.

3.6.2.6 Act as OH&S Agent for Employer

Typically, an agent is provided in order to ensure compliance to the Occupational Health and Safety Act regulations. An industry standard is provided for.

3.6.2.7 ECO for Construction Phase of Closure

Waste management licenses will typically have conditions attached to the authorization. An independent Environmental Control Officer is appointed by the employer to monitor, record and report on environmental performance of the closure.

3.6.2.8 Recoverable expenses (printing, copying, travelling, other.)

Typical expenses for the engineering closure are estimated in the closure model with a view to cover disbursements for engineers, agents and consultants.

3.6.2.9 Site Closure Plan by Professional Engineer

The waste management license will require the engineering of the capping and closure be designed and signed off by a professional engineer. An industry standard is applied to the closure costing as per the Gazetted tariffs.

3.6.2.10 End-use Feasibility costs

An estimate for conducting a feasibility assessment and stakeholder engagement study is provided.

3.6.2.11 Contingency

A contingency is prudent to include in the budgeting of the closure. The current contingency is the current conservative market norm of 10% of the total direct and indirect costs.

The use and maintenance of the facility is currently excluded from all costs as the end-use Plan must still be developed.

Table 15: Closure Estimate Costing Model for the New England Road Landfill Site – OPTION 1

ESTIMATE COSTING FOR LANDFILL CLOSURE - OPTION 1

DATE OF ESTIMATE:	July 2021
NAME OF ESTIMATOR:	ND
NAME OF DISPOSAL SITE :	New England Road LFS
LOCATION:	Pietermaritzburg

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	DIRECT COSTS				
1	Shaping, preparation of waste body for S,M,L&H site's capping	m^2	46 105	R 65,00	R 2 996 825,00
2	Capping system, minor pipework, etc. a) General Waste received only iv) Large site (Receives >500 tonnes per day) = Possibly leachate producing (B+)				
2,1	Side Slopes	m^2	124 688	R 164,00	R 20 448 832,00
2,2	Top of Landfill	m^2	46 105	R 254,00	R 11 710 670,00
3	Stormwater provisions	m	630	R 430,00	R 270 900,00
4	Re-vegetation of the capped surface	m^2	170 793	R 114,00	R 19 470 402,00
5	Vegetation Maintenance	Monthly	3	R 60 000,00	R 180 000,00
6	Gas management and monitoring system	No.	10	R 2 500,00	R 25 000,00
	Sub-Total				**R 55 102 629,00**
	ANCILLARY ITEMS				
7	Security fence on perimeter of site	m	1 000	R 1 300,00	R 1 300 000,00
8	Monitoring boreholes/ Water Quality Monitoring System	m	210	R 2 200,00	R 462 000,00
9	Post Closure Water Monitoring	annual	1	R 712 277,36	R 712 277,36
10	Contractor's P&G's	%	R 55 102 629,00	15%	R 8 265 394,35
	Sub-Total				**R 10 739 671,71**
	EXTRAS				
	No Extra's are included				
	INDIRECT COSTS				
11	Professional Engineering fees	%	R 55 102 629,00	10,5%	R 5 785 776,05
12	EIA/ Basic Assessment & Closure Permit application	Sum	1	R 140 000,00	R 140 000,00
13	Geotechnical investigation	Sum	1	R 65 000,00	R 65 000,00
14	Topographical survey	Sum	2	R 60 000,00	R 120 000,00
15	Construction Monitoring	Monthly	6	R 75 000,00	R 450 000,00
16	Act as OH&S agent for Employer	Monthly	6	R 40 000,00	R 240 000,00
17	ECO for construction phase of project	Monthly	6	R 10 000,00	R 60 000,00
18	Recoverable expenses (printing, copying, travelling, other.)	Sum	1	R 65 000,00	R 65 000,00
19	Site Closure Plan by Professional Engineer	Sum	1	R 110 000,00	R 110 000,00
20	End-Use Feasibility Assessments	Sum	3	R 70 000,00	R 210 000,00
	Sub-Total				**R 7 245 776,05**
	SUMMARY:				
	DIRECT COSTS				R 55 102 629,00
	ANCILLARY ITEMS				R 10 739 671,71
	EXTRAS				R 0,00
	INDIRECT COSTS				R 7 245 776,05
	SUB-TOTAL 1				**R 73 088 076,76**
	CONTINGENCY	%	R 73 088 076,76	10%	R 7 308 807,68
	SUB-TOTAL 2				**R 80 396 884,43**
	VAT	%	R 80 396 884,43	15%	R 12 059 532,66
	GRAND TOTAL				**R 92 456 417,10**

Table 16: Closure Estimate Costing Model for the New England Road Landfill Site – OPTION 2

ESTIMATE COSTING FOR LANDFILL CLOSURE - OPTION 2

DATE OF ESTIMATE:	July 2021
NAME OF ESTIMATOR:	ND
NAME OF DISPOSAL SITE :	New England Road LFS
LOCATION:	Pietermaritzburg

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	DIRECT COSTS				
1	Shaping, preparation of waste body for S,M,L&H site's capping	m^2	86 283	R 65,00	R 5 608 395,00
2	Capping system, minor pipework, etc.				
	a) General Waste received only				
	iv) Large site (Receives >500 tonnes per day)				
	= Possibly leachate producing (B+)				
2,1	Side Slopes	m^2	156 992	R 164,00	R 25 746 688,00
2,2	Top of Landfill	m^2	86 283	R 254,00	R 21 915 882,00
3	Stormwater provisions	m	2 520	R 430,00	R 1 083 600,00
4	Re-vegetation of the capped surface	m^2	243 275	R 114,00	R 27 733 350,00
5	Vegetation Maintenance	Monthly	6	R 60 000,00	R 360 000,00
6	Gas management and monitoring system	No.	20	R 2 500,00	R 50 000,00
	Sub-Total				**R 82 497 915,00**
	ANCILLARY ITEMS				
7	Security fence on perimeter of site	m	1 000	R 1 300,00	R 1 300 000,00
8	Monitoring boreholes/ Water Quality Monitoring System	m	50	R 2 200,00	R 110 000,00
9	Post Closure Water Monitoring	annual	1	R 712 277,36	R 712 277,36
10	Contractor's P&G's	%	R 82 497 915,00	15%	R 12 374 687,25
	Sub-Total				**R 14 496 964,61**
	EXTRAS				
	No Extra's are included				
	INDIRECT COSTS				
11	Professional Engineering fees	%	R 82 497 915,00	10,5%	R 8 662 281,08
12	EIA/ Basic Assessment & Closure Permit application	Sum	1	R 140 000,00	R 140 000,00
13	Geotechnical investigation	Sum	1	R 65 000,00	R 65 000,00
14	Topographical survey	Sum	2	R 60 000,00	R 120 000,00
15	Construction Monitoring	Monthly	12	R 75 000,00	R 900 000,00
16	Act as OH&S agent for Employer	Monthly	12	R 40 000,00	R 480 000,00
17	ECO for construction phase of project	Monthly	12	R 10 000,00	R 120 000,00
18	Recoverable expenses (printing, copying, travelling, other.)	Sum	1	R 65 000,00	R 65 000,00
19	Site Closure Plan by Professional Engineer	Sum	1	R 110 000,00	R 110 000,00
20	End-Use Feasibility Assessments	Sum	3	R 70 000,00	R 210 000,00
	Sub-Total				**R 10 872 281,08**
	SUMMARY:				
	DIRECT COSTS				R 82 497 915,00
	ANCILLARY ITEMS				R 14 496 964,61
	EXTRAS				R 0,00
	INDIRECT COSTS				R 10 872 281,08
	SUB-TOTAL 1				**R 107 867 160,69**
	CONTINGENCY	%	R 107 867 160,69	10%	R 10 786 716,07
	SUB-TOTAL 2				**R 118 653 876,75**
	VAT	%	R 118 653 876,75	15%	R 17 798 081,51
	GRAND TOTAL				**R 136 451 958,27**

4. CONCLUSIONS

- Monitoring requirements for surface water, groundwater and gas migration need to commence and budget needs to be made available for continued monitoring, operations and for closure cost assessments. This is likely to be undertaken during the planned emergency contract, and this Plan is to be updated accordingly thereafter.
- It is concluded that the end use of the facility may be vulnerable to trespassing and mining if left as an unmanaged open space.
- A managed end-use with the community buy in may be achieved.
- Capping is considered as detailed above, however the gas drainage layer was omitted due to the proposed active gas extraction system.
- Lifespan, assuming 700 kg/m^3 and 3% growth, is 7.4 years (Option 1).
- A closure cost estimate of R R80 396 884,43 (excluding VAT) for closure at 2021 prices for Option 1 is calculated.
- The lifespan of the site may be extended by considering the Western Extension (Option 2). However, the Western Extension has a total financial determination of approximately R55 089 283.63 (including contingencies and excluding VAT). When considering the time impacts and financial impacts for the development of a new waste management/disposal facility, the Western Extension at the New England Road landfill site appears to be a feasible option and is one that the Msunduzi Municipality may consider.
- Lifespan, assuming 700 kg/m^3 and 3% growth, is 13,1 years (Option 2). The Western Extension increases the current lifespan by approximately 6 years.
- For Option 1, a 10% diversion of waste will extend the lifespan of the facility to May 2029 and a 20% diversion of waste will extend the lifespan of the facility to February 2030.
- For Option 2, a 10% diversion of waste will extend the lifespan of the facility to February 2036 and a 20% diversion of waste will extend the lifespan of the facility to February 2037.

- Increased compaction ability is good practice however, the increased compaction will not be a significant factor in increasing lifespan of the facility unless 1000kg/m^3 can be achieved. This may incur additional capital expenditure.

5. RECOMMENDATIONS

The following recommendations are made:

- Operational environmental monitoring must recommence and continuously be undertaken to fulfill environmental stewardship and the WML compliance obligations.
- End use feasibility studies need to be undertaken, which would include community development or managed recreational open space.
- Feasibility of extension of the life of the landfill should be assessed against the development of alternative disposal options.
- Depending on the selection of Option 1 or Option 2, Msunduzi Municipality is to plan accordingly for the decommissioning of the landfill site.
- A phased approach should be adopted for the closure of the landfill site to avoid high closure costs at the end of the site life of the landfill and to make the closure of the site more feasible.
- Current landfill operations need to be addressed to ensure that the operations are in line with the future closure requirements.
- Current landfill operations are also to ensure that any interim landfill upgrades or works that are carried out towards final closure are protected and maintained accordingly.

[redacted]

Date: August 2021
Job No.: 001-2021

APPENDIX A

CLOSURE COSTING MODEL (OPTION 1 AND OPTION 2)

ESTIMATE COSTING FOR LANDFILL CLOSURE - OPTION 1

DATE OF ESTIMATE:	July 2021
NAME OF ESTIMATOR:	ND
NAME OF DISPOSAL SITE :	New England Road LFS
LOCATION:	Pietermaritzburg

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	DIRECT COSTS				
1	Shaping, preparation of waste body for S,M,L&H site's capping	m^2	46 105	R 65,00	R 2 996 825,00
2	Capping system, minor pipework, etc. a) General Waste received only iv) Large site (Receives >500 tonnes per day) = Possibly leachate producing (B+)				
2,1	Side Slopes	m^2	124 688	R 164,00	R 20 448 832,00
2,2	Top of Landfill	m^2	46 105	R 254,00	R 11 710 670,00
3	Stormwater provisions	m	630	R 430,00	R 270 900,00
4	Re-vegetation of the capped surface	m^2	170 793	R 114,00	R 19 470 402,00
5	Vegetation Maintenance	Monthly	3	R 60 000,00	R 180 000,00
6	Gas management and monitoring system	No.	10	R 2 500,00	R 25 000,00
	Sub-Total				**R 55 102 629,00**
	ANCILLARY ITEMS				
7	Security fence on perimeter of site	m	1 000	R 1 300,00	R 1 300 000,00
8	Monitoring boreholes/ Water Quality Monitoring System	m	210	R 2 200,00	R 462 000,00
9	Post Closure Water Monitoring	annual	1	R 712 277,36	R 712 277,36
10	Contractor's P&G's	%	R 55 102 629,00	15%	R 8 265 394,35
	Sub-Total				**R 10 739 671,71**
	EXTRAS				
	No Extra's are included				
	INDIRECT COSTS				
11	Professional Engineering fees	%	R 55 102 629,00	10,5%	R 5 785 776,05
12	EIA/ Basic Assessment & Closure Permit application	Sum	1	R 140 000,00	R 140 000,00
13	Geotechnical investigation	Sum	1	R 65 000,00	R 65 000,00
14	Topographical survey	Sum	2	R 60 000,00	R 120 000,00
15	Construction Monitoring	Monthly	6	R 75 000,00	R 450 000,00
16	Act as OH&S agent for Employer	Monthly	6	R 40 000,00	R 240 000,00
17	ECO for construction phase of project	Monthly	6	R 10 000,00	R 60 000,00
18	Recoverable expenses (printing, copying, travelling, other.)	Sum	1	R 65 000,00	R 65 000,00
19	Site Closure Plan by Professional Engineer	Sum	1	R 110 000,00	R 110 000,00
20	End-Use Feasibility Assessments	Sum	3	R 70 000,00	R 210 000,00
	Sub-Total				**R 7 245 776,05**
	SUMMARY:				
	DIRECT COSTS				R 55 102 629,00
	ANCILLARY ITEMS				R 10 739 671,71
	EXTRAS				R 0,00
	INDIRECT COSTS				R 7 245 776,05
	SUB-TOTAL 1				**R 73 088 076,76**
	CONTINGENCY	%	R 73 088 076,76	10%	R 7 308 807,68
	SUB-TOTAL 2				**R 80 396 884,43**
	VAT	%	R 80 396 884,43	15%	R 12 059 532,66
	GRAND TOTAL				**R 92 456 417,10**

SUPPORTING RATES - OPTION 1

(Based on market related rates)

Side Slopes (124 688m²)				
Item				
1	Clearing	=	45 /m²	Removal of waste
2	Levelling Course	=	12 /m²	50mm thick for existing erosion gullies
3	Geosynthetic Clay Liner	=	85 /m²	Medium Shear
4	Biodegradable Jute	=	22 /m²	Erosion control
	Subtotal side slope liner	=	**164 /m²**	

Top of Landfill (46 105m²)				
Item				
1	Shaping of waste	=	65 /m²	Including compaction
2	Geotextile separation layer	=	24 /m²	Minimum 210g/m²
3	Compacted Clay Layer	=	165 /m²	450mm thick
	Subtotal top liner	=	**254 /m²**	

Stormwater Provisions				
Item				
1	Lattice tape structure for Multi cell downchute	=	65 /m²	100mm depth
2	Concrete infill	=	350 /m²	Grade 20/19
3	Excavation for drains	=	15 /m²	2m wide x 0.1m deep
	Subtotal stormwater	=	**430 /m²**	

Re-vegetation of the Capped Surface				
Item				
1	Topsoil	=	105 /m²	200mm thick
2	Grassing	=	9 /m²	Hydroseed mixture
	Subtotal re-vegetation	=	**114 /m²**	

ESTIMATE COSTING FOR LANDFILL CLOSURE - OPTION 2

DATE OF ESTIMATE:	July 2021
NAME OF ESTIMATOR:	ND
NAME OF DISPOSAL SITE :	New England Road LFS
LOCATION:	Pietermaritzburg

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	DIRECT COSTS				
1	Shaping, preparation of waste body for S,M,L&H site's capping	m^2	86 283	R 65,00	R 5 608 395,00
2	Capping system, minor pipework, etc.				
	a) General Waste received only				
	iv) Large site (Receives >500 tonnes per day)				
	= Possibly leachate producing (B+)				
2,1	Side Slopes	m^2	156 992	R 164,00	R 25 746 688,00
2,2	Top of Landfill	m^2	86 283	R 254,00	R 21 915 882,00
3	Stormwater provisions	m	2 520	R 430,00	R 1 083 600,00
4	Re-vegetation of the capped surface	m^2	243 275	R 114,00	R 27 733 350,00
5	Vegetation Maintenance	Monthly	6	R 60 000,00	R 360 000,00
6	Gas management and monitoring system	No.	20	R 2 500,00	R 50 000,00
	Sub-Total				**R 82 497 915,00**
	ANCILLARY ITEMS				
7	Security fence on perimeter of site	m	1 000	R 1 300,00	R 1 300 000,00
8	Monitoring boreholes/ Water Quality Monitoring System	m	50	R 2 200,00	R 110 000,00
9	Post Closure Water Monitoring	annual	1	R 712 277,36	R 712 277,36
10	Contractor's P&G's	%	R 82 497 915,00	15%	R 12 374 687,25
	Sub-Total				**R 14 496 964,61**
	EXTRAS				
	No Extra's are included				-
	INDIRECT COSTS				
11	Professional Engineering fees	%	R 82 497 915,00	10,5%	R 8 662 281,08
12	EIA/ Basic Assessment & Closure Permit application	Sum	1	R 140 000,00	R 140 000,00
13	Geotechnical investigation	Sum	1	R 65 000,00	R 65 000,00
14	Topographical survey	Sum	2	R 60 000,00	R 120 000,00
15	Construction Monitoring	Monthly	12	R 75 000,00	R 900 000,00
16	Act as OH&S agent for Employer	Monthly	12	R 40 000,00	R 480 000,00
17	ECO for construction phase of project	Monthly	12	R 10 000,00	R 120 000,00
18	Recoverable expenses (printing, copying, travelling, other.)	Sum	1	R 65 000,00	R 65 000,00
19	Site Closure Plan by Professional Engineer	Sum	1	R 110 000,00	R 110 000,00
20	End-Use Feasibility Assessments	Sum	3	R 70 000,00	R 210 000,00
	Sub-Total				**R 10 872 281,08**
	SUMMARY:				
	DIRECT COSTS				R 82 497 915,00
	ANCILLARY ITEMS				R 14 496 964,61
	EXTRAS				R 0,00
	INDIRECT COSTS				R 10 872 281,08
	SUB-TOTAL 1				**R 107 867 160,69**
	CONTINGENCY	%	R 107 867 160,69	10%	R 10 786 716,07
	SUB-TOTAL 2				**R 118 653 876,75**
	VAT	%	R 118 653 876,75	15%	R 17 798 081,51
	GRAND TOTAL				**R 136 451 958,27**

SUPPORTING RATES

(Based on market related rates)

Side Slopes (124 688m²)				
Item				
1	Clearing	=	45 /m²	Removal of waste
2	Levelling Course	=	12 /m²	50mm thick for existing erosion gullies
3	Geosynthetic Clay Liner	=	85 /m²	Medium Shear
4	Biodegradable Jute	=	22 /m²	Erosion control
	Subtotal side slope liner	=	**164 /m²**	

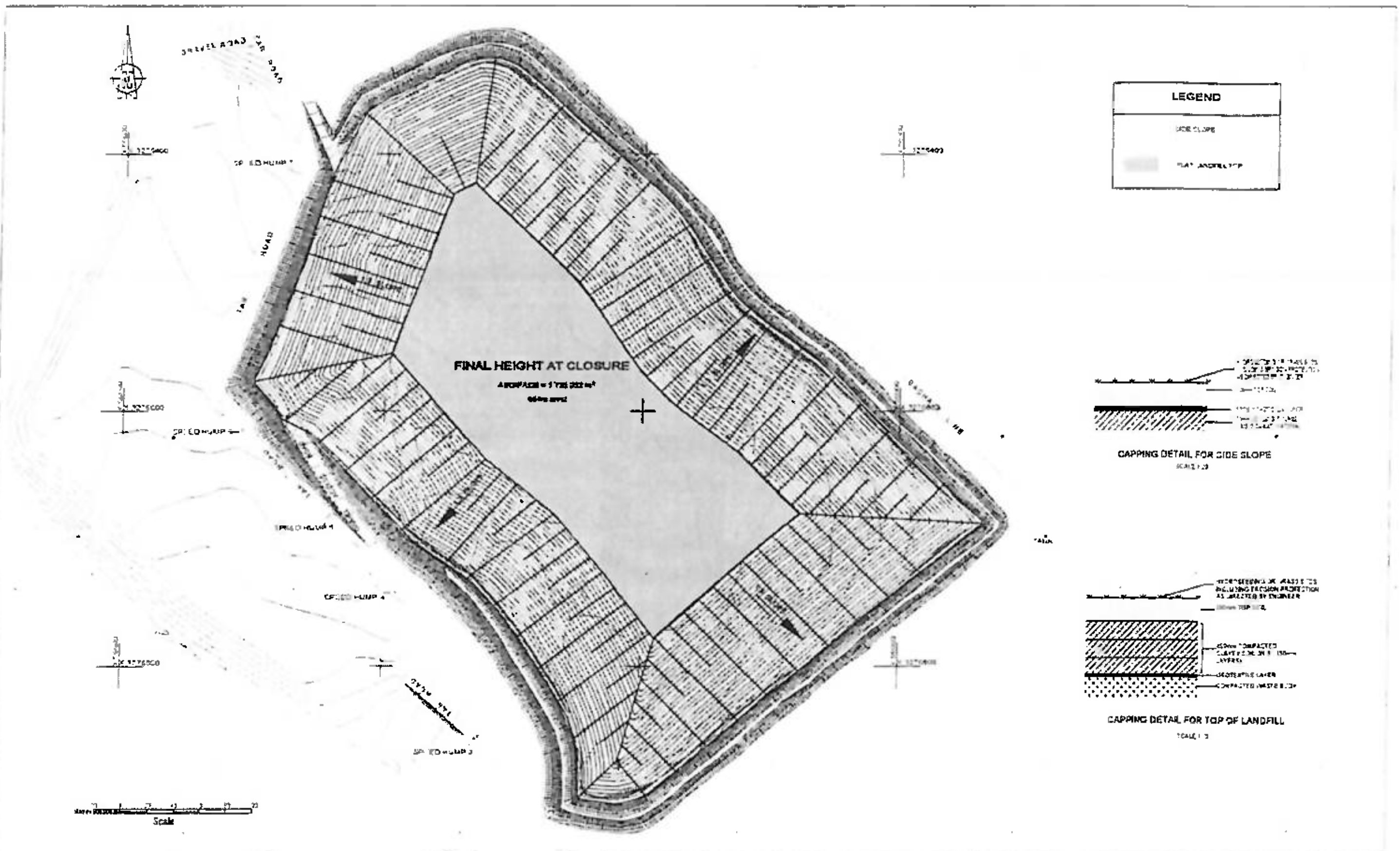
Top of Landfill (46 105m²)				
Item				
1	Shaping of waste	=	65 /m²	Including compaction
2	Geotextile separation layer	=	24 /m²	Minimum 210g/m²
3	Compacted Clay Layer	=	165 /m²	450mm thick
	Subtotal top liner	=	**254 /m²**	

Stormwater Provisions				
Item				
1	Lattice tape structure for Multi cell downchute	=	65 /m²	100mm depth
2	Concrete infill	=	350 /m²	Grade 20/19
3	Excavation for drains	=	15 /m²	2m wide x 0.1m deep
	Subtotal stormwater	=	**430 /m²**	

Re-vegetation of the Capped Surface				
Item				
1	Topsoil	=	105 /m²	200mm thick
2	Grassing	=	9 /m²	Hydroseed mixture
	Subtotal re-vegetation	=	**114 /m²**	

APPENDIX B

DRAWINGS (OPTION 1 AND OPTION 2)



AMENDMENTS

DESIGNED ID
DESIGN CHECKED JP
DRAWN ID
DRAWING CHECKED JP

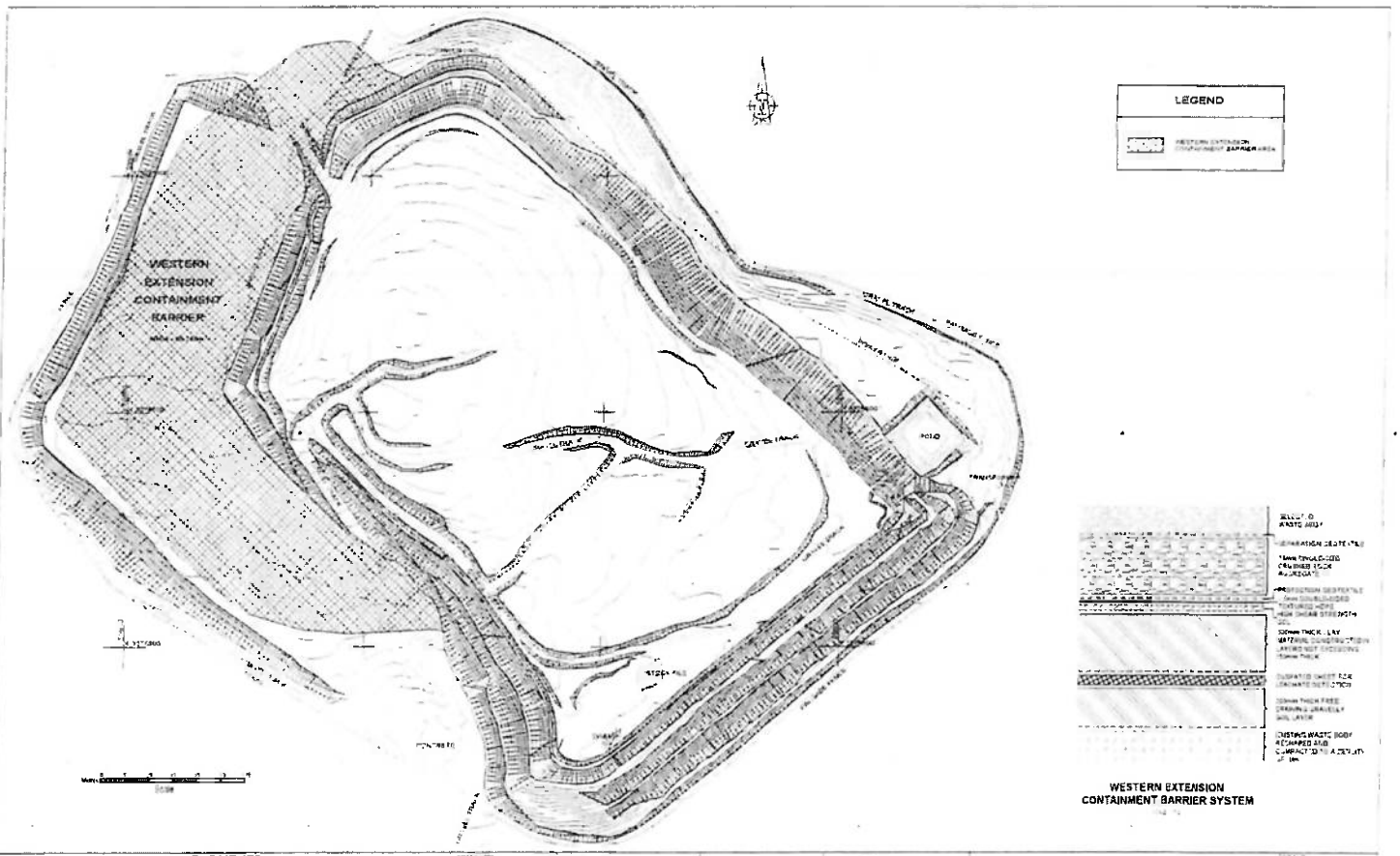
CITY OF CHOICE
PIETERMARITZBURG

[redacted]

DECOMMISSIONING PLAN
NEW ENGLAND ROAD LANDFILL SITE

OPTION 1
CLOSURE, REHABILITATION AND END USE

AS SHOWN
001-2021
001-2021/001-0

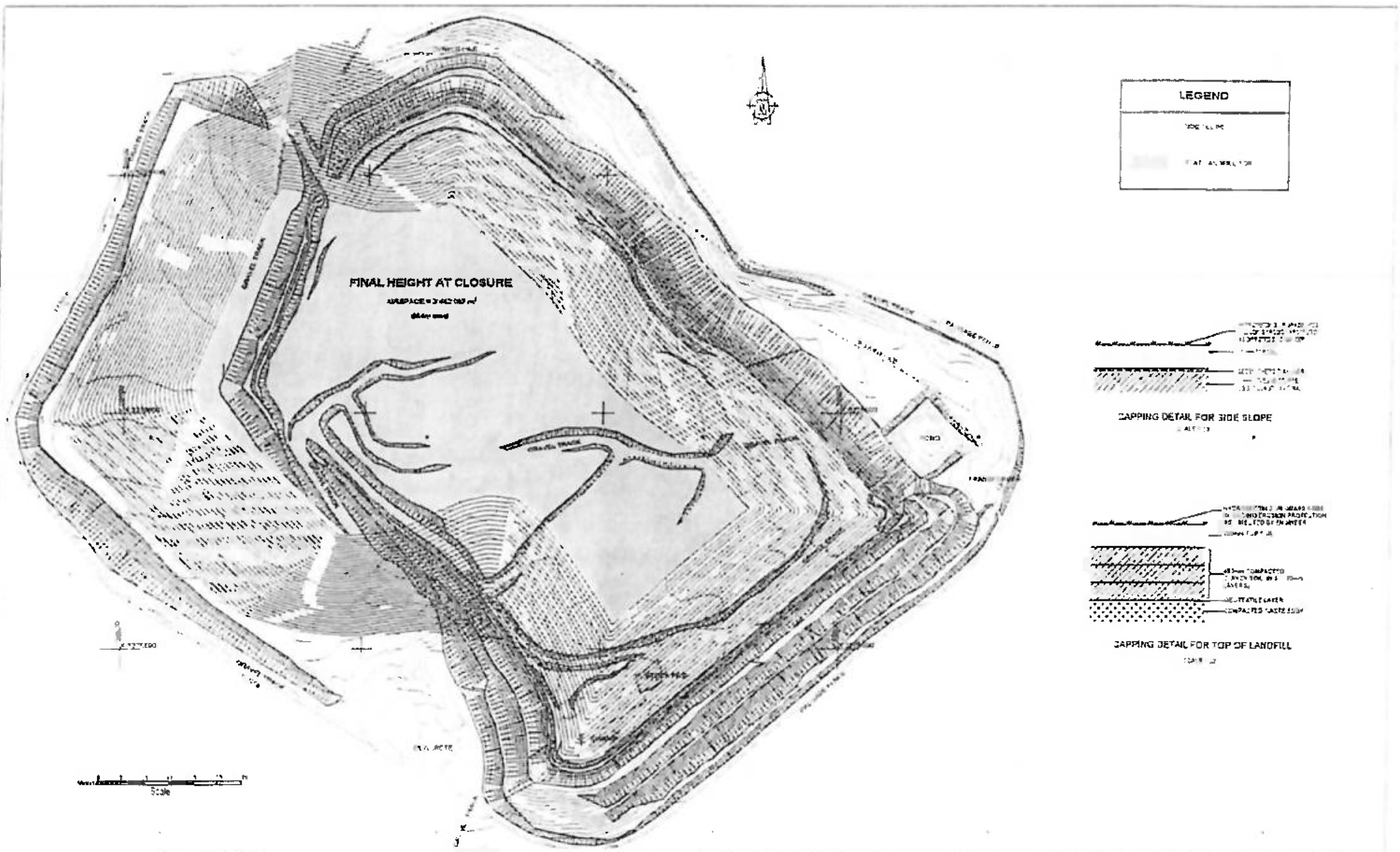


AMENDMENTS

DECOMMISSIONING PLAN
NEW ENGLAND ROAD LANDFILL SITE

OPTION 2a
WESTERN EXTENSION

001-2021



AMENDMENTS

CITY OF CHOICE

[redacted]

DECOMMISSIONING PLAN
NEW ENGLAND ROAD LANDFILL SITE

OPTION 2b
CLOSURE REHABILITATION AND END USE

301-2021

APPENDIX C

DETAILED FINANCIAL DETERMINATION, INCLUDING THE SUPPORTING RATES

ESTIMATE COSTING FOR WESTERN EXTENSION - OPTION 2

DATE OF ESTIMATE:	July 2021
NAME OF ESTIMATOR:	ND
NAME OF DISPOSAL SITE	New England Road LFS
LOCATION:	Pietermaritzburg

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
	DIRECT COSTS				
1	Containment Barrier System (Please refer to the supporting rates)	m^2	66 780	R 565,00	R 37 730 700,00
	Sub-Total				**R 37 730 700,00**
	ANCILLARY ITEMS				
2	Leachate Management	m	980	R 600,00	R 588 000,00
3	Stormwater Management	m	715	R 187,50	R 134 062,50
4	Landfill Gas Management	m	200	R 450,00	R 90 000,00
5	Contractor's P&G's	%	R 38 542 762,50	15%	R 5 781 414,38
	Sub-Total				**R 6 593 476,88**
	EXTRAS				
	No Extra's are included				
	INDIRECT COSTS				
11	Professional Engineering fees	%	R 38 542 762,50	10,5%	R 4 046 990,06
12	EIA/Basic Assessment & Approval application	Sum	0	R 140 000,00	R 0,00
13	Geotechnical investigation	Sum	1	R 150 000,00	R 150 000,00
14	Topographical survey	Sum	1	R 60 000,00	R 60 000,00
15	Construction Monitoring	Monthly	12	R 85 000,00	R 1 020 000,00
16	Act as OH&S agent for Employer	Monthly	12	R 25 000,00	R 300 000,00
17	ECO for construction phase of project	Monthly	12	R 10 000,00	R 120 000,00
18	Recoverable expenses (printing, copying, travelling, other.)	Sum	1	R 60 000,00	R 60 000,00
	Sub-Total				**R 5 756 990,06**
	SUMMARY:				
	DIRECT COSTS				R 37 730 700,00
	ANCILLARY ITEMS				R 6 593 476,88
	EXTRAS				R 0,00
	INDIRECT COSTS				R 5 756 990,06
	SUB-TOTAL 1				**R 50 081 166,94**
	CONTINGENCY	%	R 50 081 166,94	10%	R 5 008 116,69
	SUB-TOTAL 2				**R 55 089 283,63**
	VAT	%	R 55 089 283,63	15%	R 8 263 392,54
	GRAND TOTAL				**R 63 352 676,18**

SUPPORTING RATES - OPTION 2

(Based on market related rates)

Western Extension (65 780m²) - PIGGY BACK LINER SYSTEM				
Item				
1	SELECTED WASTE BODY	=		Operations
2	SEPARATION GEOTEXTILE	=	15 /m²	
3	75mm SINGLE-SIZE CRUSHED ROCK AGGREGATE	=	80 /m²	200mm thick (waste height approximate 32m)
4	STABILSED PROTECTION LAYER	=	30 /m²	100mm thick
5	1.5mm HDPE GEOMEMBRANE	=	70 /m²	
6	GEOSYNTHETIC CLAY LINER	=	65 /m²	
7	CLAYEY MATERIAL CONSTRUCTED IN LAYERS NOT EXCEEDING 150mm THICK	=	90 /m²	300mm thick
8	CUSPATED SHEET FOR LEACHATE DETECTION (including delivery)	=	100 /m²	
9	FREE DRAINING GRAVELLY SOIL LAYER	=	70 /m²	200mm thick
10	EXISTING WASTE BODY RESHAPED AND COMPACTED TO A DENSITY OF 1t/m3 (BULK EARTHWORKS)	=	45 /m²	Cut-to-fill
	Containment Barrier System	=	**565 /m²**	

Ancillary Provisions				
Item				
1	Leachate Management	=	600 /m	Approximately 980m
2	Stormwater Management	=	187,5 /m	Approximately 715m of concrete lined drains
3	Landfill Gas Management	=	450 /m	Allowable estimate (200m)