

REPORT N° 1

# PROPOSED SHONGWENI LANDFILL

EIA REPORT ADDENDUM

JANUARY 2016

# PROPOSED SHONGWENI LANDFILL

## EIA REPORT ADDENDUM

**eThekwini Cleansing and Solid Waste Unit**

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# 1 INTRODUCTION

The eThekweni Cleansing and Solid Waste Department, commonly known as Durban Solid Waste (DSW) is tasked with the responsibility of waste management for the eThekweni Municipality including the final disposal of solid waste, i.e. land filling. A landfill is a site for the final disposal of waste materials by burial. Historically, landfills have been the most common methods of organized waste disposal and remain so in many places around the world.

Due to the growing requirement for waste disposal within the eThekweni Municipality, in 1996 DSW initiated a process to secure suitable regional general waste landfill sites for to cater for future waste disposal requirements in the north, south and west zones of the municipality.

The Final Environmental Impact Assessment Report (EIR) for the proposed Shongweni Regional Landfill site was submitted in March 2010 to the competent authority, the KwaZulu-Natal (KZN) Department of Agriculture, Environmental Affairs and Rural Development (DAEARD). The DAEARD, now known as the KZN Department of Economic Development, Tourism and Environmental Affairs (DEDTEA), have experienced significant internal delays in respect of considering and taking a decision in respect of the proposed project.

In September 2014 the DEDTEA issued a letter to DSW requesting that additional information be provided to assist them to considering and take a decision in respect of the proposed Shongweni Regional Landfill site. An Addendum Report (this document) has been prepared to facilitate the provision of the necessary information to DEDTEA to allow them to expedite the decision making process.

## 1.1 TERMS OF REFERENCE

Due to the time that has lapsed from the date of the Final EIR submission and significant changes in environmental legislation, the DEDTEA issued a letter, dated 19 September 2014, advising DSW that additional information was required for their consideration of the application (**Appendix B**). In order for the DEDTEA to make an informed decision on the application, the following was requested:

1. Provision of information on any new developments in the surrounding area, including consideration of the proximity of the landfill to surrounding communities to the landfill (including the potential requirement for household relocation).
2. Preparation of a Traffic Impact Specialist Study utilising current data; and receipt of comments from the Department of Transport on this updated study.
3. Development of a draft Environmental Management Programme (EMPr).
  - Engagement with stakeholders:
  - Stakeholder communication (registered stakeholders and owners and occupiers of adjacent land) with regard to the application delays, and provision of an opportunity to comment on new information; and
  - Facilitation of comments from Ezemvelo KZN Wildlife (EKZNW) on the updated EIR.

It was agreed with DEDTEA that a succinct Addendum Report would be prepared to provide the project context, present the additional information requested, and provide the overall impact assessment associated with the proposed Shongweni Regional Landfill site.



The primary intent of the Addendum Report is to meet the DEDTEA information requirements. The intention is not to repeat the information presented in the Final EIR. The Addendum Report can be read in isolation of the Final EIR (2010), however should stakeholders require further detail on the project they are referred back to the Final EIR (2010) which remains relevant.

DEDTEA confirmed in a letter dated 13 November that the process is to follow the

## 1.2 PROJECT BACKGROUND

The history associated with the proposed Shongweni Regional Landfill site spans almost 20 years. A brief overview of the background to the landfill investigation, and specifically the timeline associated with the application for the Shongweni landfill, is provided below.

A process was undertaken to identify and select sites suitable for landfill development in the eThekweni Municipal Area. Within the west zone four broad “windows of opportunity” (areas potentially suitable for large general waste disposal site development) were identified. These four broad windows were known as Shongweni, Ferralloys/Radnor, Doornrug/Bonny Brae and Lion Park. The window areas were evaluated and specific sites within the broader areas were identified. Sites suitable for landfill development were taken forward for further investigation and subjected to an EIA process to obtain the necessary environmental approvals.

***Section 1 of the Final EIR (2010) provides a detailed description of the landfill site selection and evaluation process.***

In respect of the west zone, DSW have submitted two separate applications, one for the proposed Shongweni Regional Landfill site, and a second application for the proposed Cato Ridge Regional Landfill site. DSW have confirmed that they are currently seeking authorisation for both the Cato Ridge and Shongweni sites in order to secure waste disposal facilities for approximately 150 years. The Cato Ridge landfill is subject to a separate application and a separate Addendum Report will be prepared, provided to stakeholders for review and comment, and submitted to DEDTEA.

A brief summary of the EIA process undertaken for the proposed Shongweni landfill site is presented in **Table 1**.

**Table 1: Shongweni Landfill – Timeline associated with the EIA process**

Date	Description
<b>June 1996</b>	'Windows' process to identify suitable landfill sites
<b>1998 - 1999</b>	EIA Application was lodged with DAEA in terms of the Environment Conservation Act EIA regulations.
<b>2000</b>	Scoping phase: Scoping report described and assessed window areas, and identified the Assmang (Cato Ridge) site as the most suitable
<b>2000</b>	The EIA for Cato Ridge site was put on hold due to uncertainty surrounding the potential airport developments. Window areas were reconsidered, and Shongweni emerged as the only remaining potentially suitable alternative
<b>November 2002</b>	WSP was appointed to undertake the Scoping and EIA for Shongweni site
<b>May 2003</b>	Scoping Report submitted to DAEA
<b>June 2004</b>	Draft EIA Report circulated for public comment
<b>October 2004</b>	Additional specialist studies commissioned
<b>June 2006</b>	Amended Draft EIA Report issued for comment until 31 July 2006
<b>September 2006</b>	DAEA requested a comparative assessment between the Shongweni and Assmang/Cato Ridge sites
<b>March 2007</b>	DAEA agreed comparative assessment not appropriate as DSW required both sites to be secured. It was agreed that the Shongweni Final EIR was to be compiled, addressing comments received on Draft and then

	submitted (in terms of original Environmental Conservation Act (ECA) application)
<b>October 2009</b>	WSP considered the new Waste Management Licence (WML) requirements promulgated under the National Environmental Management Waste Act (2008). WML requirements were confirmed.
<b>March 2010</b>	The Final EIR was submitted to DAEARD accompanied by EIA and WML application forms
<b>19 September 2014</b>	Letter from DEDTEA requesting additional information be submitted to facilitate the decision making process on the Shongweni landfill site.
<b>April 2015</b>	WSP appointment to meet additional information requirements

## 2 PROJECT CONTEXT

### 2.1 PROJECT MOTIVATION

In the 1990's the eThekweni Municipality evaluated the capacity of the current waste disposal facilities within the municipal area. The Mariannhill Landfill currently services the general waste disposal needs within the western areas of the eThekweni Municipality. This landfill will reach capacity within the next few years. In order to avoid a waste disposal crisis, it necessary to secure new regional landfill sites for future waste disposal.

### 2.2 SITE OVERVIEW

***The site overview remains unchanged from the Final EIR (2010). The section below is a direct extract from Section 1.3 of the Final EIR (2010). An updated map has however been provided in Figure 1 of this Addendum Report.***

The proposed Shongweni Landfill site is located approximately 3 km south of the N3 highway, approximately 35 km west of Durban and approximately 45 km from Pietermaritzburg (**Figure 1**). The site is bounded by the main Johannesburg/Durban railway line to the north, secondary roads to the east and west and open veld to the south.

The site lies at around 400m AMSL, at approximately 30°45'30"E longitude and 29°50'30"S latitude. The topography comprises a wide valley with several smaller valleys running into the main valley, sloping southwards. The area is drained by the Mgoshongweni River which is a tributary of the Mlazi River.

The climate of the area is hot and humid. The site lies within a perennial rainfall region where the maximum rainfall falls from December to March and the estimated mean annual rainfall for the area is approximately 1000 mm. The mean annual evaporation is approximately 1200 mm (Surface Water Resources of South Africa, 1994).

The site is located on land which is owned by Tongaat-Hulett Properties Ltd. Approximately 35% of the area is under agricultural use and the remaining area is covered by indigenous grass and trees.

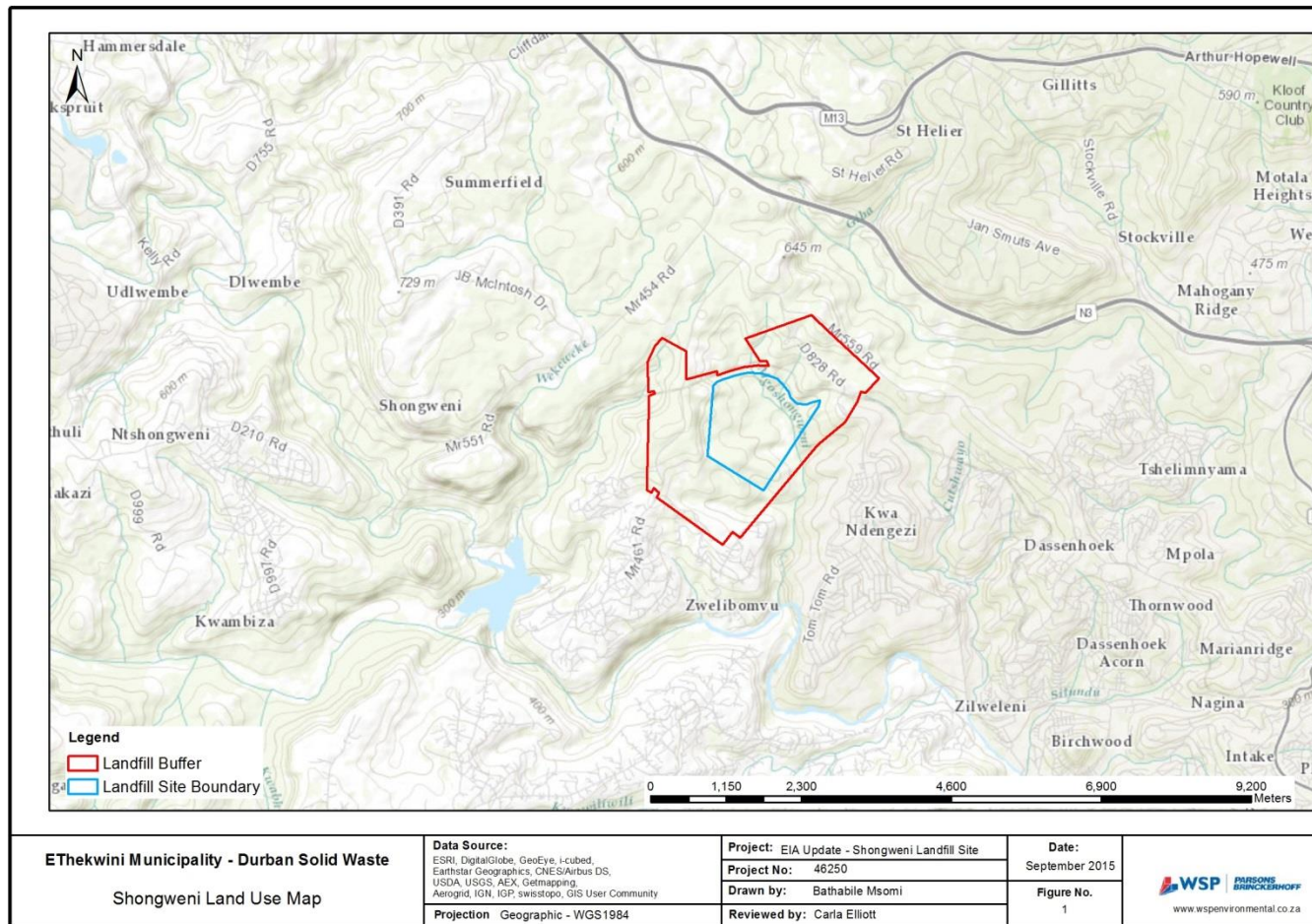


Figure 1: Site Locality (WSP GIS, 2015)

## 2.3 PROJECT OVERVIEW

***The project overview remains unchanged from the Final EIR (2010). The section below is a direct extract from Section 1.4 of the Final EIR (2010).***

Initially the portion of the property to be rezoned for waste disposal purposes was approximately 208ha. The revised boundary line results in an area of about 195ha to be rezoned. The change in property boundary line derived from the change in the required buffer zone of approximately 200m between the landfill operational footprint and an informal settlement situated directly east of the site. The total footprint of the proposed landfill development is 550.2 ha with the landfill footprint estimated at 176 ha and buffer zone for acquisition estimated at 374ha (**Appendix A1**). The buffer zones area will include stockpiling activities; borrow pit areas for the final closure layer, and areas for the site facilities and access roads.

The projected waste generation to be disposed of at the Shongweni Landfill is estimated to increase from 530 tons/day in 2018 to 3550 tons/day in 2095. Only general solid waste will be disposed of at the proposed facility. It is proposed that the valleys be filled and built up in levels of 10m in height with 2m high cell lifts. The cover material required for daily operation will increase from 80m<sup>3</sup>/day in 2018 to 425m<sup>3</sup>/day in 2095.

The estimated cover that can be generated on site is the limiting factor on the design life of the site. It is estimated that the site will have a life span of 78 years with the cover material ( $\pm 3.8 \times 10^6 \text{ m}^3$ ) available on site. It was assumed that 70% of the cover material required for daily cell operation will be generated on site and an additional 30% will be available from building rubble and other suitable cover material entering the site for disposal.

The  $3.8 \times 10^6 \text{ m}^3$  daily cell cover material required includes the 30% building rubble and other material entering the site. If more cover material is generated or imported, the site life span could be increased to 93 years with the available airspace. According to the Department of Water and Sanitation (DWS) Minimum Requirements, a final capping layer of 650mm is required to close the site at the end of its life. This volume is not included in the  $\pm 3.8 \times 10^6 \text{ m}^3$  required for daily operation and should be imported at the end of the site life.

Waste will be disposed and compacted into cells and covered daily. Similar compaction equipment to that used at other DSW landfill sites will be used to compact waste to a minimum of 1000 kg/m<sup>3</sup>. Certain stormwater and groundwater diversion and control measures have been proposed and are discussed in more detail in later sections of this report.

The Mgoshongweni River that runs through the valley and the production of leachate and landfill gas has been identified as potential critical factors. To address the first of these it is proposed that a culvert be built in the streambed and waste be landfilled over it. Secondly, collection and treatment systems for leachate and landfill gas have been fully integrated with site operations. These are also described in more detail in Sections 5.9 and 5.10 [of the Final EIR (2010)].

# 3

## PROJECT DESCRIPTION

***The project description remains unchanged from the Final EIR (2010). The section below is a direct extract from Section 4 of the Final EIR (2010).***

### 3.1 SITE CLASSIFICATION

Classifying the landfill is necessary as a basis for setting and applying the appropriately graded Minimum Requirements. The system recognises the inherent qualities and differences which

characterize any landfill operation, i.e. the types of waste involved, the magnitude of the waste stream and the potential for significant leachate generation.

### 3.1.1 WASTE TYPE AND GENERATION

The waste to be landfilled consists of domestic, commercial and general dry industrial waste, builders' rubble and garden waste, and as such can be classified as General Waste (G) in terms of Clause 3.2(i) of the Minimum Requirements.

A Waste Generation Model indicating predicted waste production and disposal at the landfill site is attached as **Appendix A** [in the *Final EIR (2010)*]. The density of the compacted waste is taken as 1 000 kg/m<sup>3</sup>, which should be achieved comfortably with the compaction equipment currently in use at other DSW Landfill sites.

The Initial Rate of Deposition (IRD) in 2018 is estimated at 530 tons/day and the Maximum Rate of Deposition (MRD) in 2095 is predicted to be 3550 tons/day. The landfill is designed for a 78 year life-span. The available cover material on site is the restricting factor on the life span of the site. Since the MRD exceeds 500 tons/day, the site must be classified as large (L) in terms of Clause 3.3.1 and Table 3 of the Second Edition, 1998 Minimum Requirements.

### 3.1.2 COVER MATERIAL, AIR SPACE REQUIREMENT AND SIZE OF SITE

The potential volume or airspace of a site is calculated by quantifying the volume available for disposal of solid waste. The Waste Generation Model gives an estimate of the required cover material for the life span of the landfill and estimated air space requirement (excluding closure material). The total amount of cover material required for daily operation throughout the 78 year lifetime of the site is estimated at 3.8 x 10<sup>6</sup>m<sup>3</sup>. The required cover material will increase from 80m<sup>3</sup>/day in 2018 to 425m<sup>3</sup>/day in 2095. Theoretically the site will be operated up to Level 10, using cover material generated on site.

It is estimated that 70% of the cover material will be generated on site. The other 30% will comprise building rubble and other suitable waste material disposed at the site. Therefore, the total cover material generated on site is 2.66 x 10<sup>6</sup>m<sup>3</sup> and the total volume generated from building rubble and other suitable material is 1.14 x 10<sup>6</sup>m<sup>3</sup>.

The available cover material on site was calculated conservatively (2.66 x 10<sup>6</sup>m<sup>3</sup>). Due to the nature of the excavations, which will follow the natural contours, and the depth of excavations, which will vary between 2m and 8m respectively along the valleys and hills, the cell cover material available may increase considerably. The estimated lifetime based on available airspace is 93 years. This means that an additional 2.0 million m<sup>3</sup> of cover material needs to be generated or imported to operate the landfill up to 93 years. The theoretical closure level for the 93 years site life is at Level 13. **Table 2** summarises all of the above figures.



**Table 2: Cover material, air space requirement and site life**

LANDFILL SITE LIFE	OPERATIONAL LEVEL	COVER MATERIAL (70%) IN SITU ( $m^3 \times 10^6$ )	COVER MATERIAL (30%) BUILDING RUBBLE ETC. ( $m^3 \times 10^6$ )	COVER MATERIAL IMPORT ( $m^3 \times 10^6$ )	TOTAL COVER MATERIAL REQUIRED ( $m^3 \times 10^6$ )	AIRSPACE VOLUME ( $m^3 \times 10^6$ )
78 years	10	2.66	1.14		3.80	35.9
93 years	13			2.00	2.00	54.8

Closure material is also required for the final closure of the landfill site. This material must be generated from excavating the areas or must be imported from an outside source. A total amount of 810 000m<sup>3</sup> is required for the final closure (650mm capping layer) of the site.

A grand total of approximately 3.5 x 10<sup>6</sup>m<sup>3</sup> of material thus needs to be excavated on site to provide sufficient cover and closure material. Due to the nature of site operations, however, the full volume will never be excavated or stockpiled at any one time. Material will be excavated and stockpiled in the designated areas for later use during various phases of development.

The compacted volume of waste to be disposed of over 78 years is estimated at 32.1 x 10<sup>6</sup>m<sup>3</sup> from the Waste Generation Model. The total airspace requirement for the site (waste and cover material excluding final closure material) is estimated at 35.9 x 10<sup>6</sup>m<sup>3</sup>.

### 3.1.3 CLIMATIC WATER BALANCE

A Climatic Water Balance is required to determine the need for leachate management, as part of the landfill classification process. A preliminary Climatic Water Balance was calculated for the 2010 EIR. This indicated that the site is within a water surplus area (B+), therefore significant leachate might occur and a leachate management system is required.

The landfill is defined as a (B) landfill as per Waste Classification (GNR 634 of 2013) – see **Section 4.4**.

### 3.1.4 CLASSIFICATION

Further to the preceding sections, the Shongweni Landfill is classified as G:L:B+, where:

G = the proposed site will accept only general waste which includes household waste, builder's rubble, garden refuse and non-hazardous industrial waste.

L = the proposed site will accept more than 500 tons of general waste per day during the life of the expected lifespan of the landfill site.

## 3.2 SITE DESIGN

The conceptual design drawings were developed to comply with the Minimum Requirements for Landfill Design. The conceptual design was revised in 2012.

### 3.2.1 ACCESS

The proposed entrance is approximately 3 km from the N3 highway between Durban and Pietermaritzburg. Access is from the N3 and left onto Kassier Road to the JB Mcintosh Drive and Mr 559. Take left towards the intersection of Mr 559 (P559) and Mr 461 to access Mr 461. The landfill will be approximately 35 km from Central Durban and 45km from Pietermaritzburg.

A 2.1m high fence will be constructed around the site with vehicle access control, site security and site office.

### 3.2.2 SITE LAYOUT AND DEVELOPMENT

***The section below is a direct extract from Section 4 of the Final EIR (2010). Refer to Final EIR (2010) for drawings referenced in the text.***

The site layout has been designed taking the landfill's closure and end-use into consideration. The proposed end-use is open space, and the final shape and contours of the landfill have been determined to blend in with the naturally hilly topography of the area.

The layout and details of the design for the development and operation of the landfill site are shown on the conceptual design.

#### 3.2.2.1 The Development Plan

Level and Phase Development Plans have been included, illustrating how the valley will be filled and built up in levels of 10 m height with 2 m high cell lifts. The levels will be developed in phases to reduce the volume of potential contaminated runoff, thus reducing the size of the required evaporation pond. Contaminated and clean water will be separated using a system of drainage trenches.

The Level and Phase Development Plan are found in the 2010 EIR report.

#### 3.2.2.2 The Operation Plan

The Operation Plan is developed as part of the conceptual design. It describes the way in which the landfill is to be operated, commencing at the level and detail of daily cell construction and continuing through to the projected development of the landfill with time. This includes the phasing, the excavation sequence, site access, drainage, etc.

##### I. LANDFILL STABILITY

The stability of the front face of the landfill is dependent on the stability of the downstream toe (the first berm at the bottom of the site). Special attention will therefore be given to the toe design.

##### II. LANDFILL CELLS AND LEVELS

The landfill operation is based on the excavation of the slopes of the valley along contours to generate cover material and the disposal of waste in cells. The disposal area will be sub-divided into separate phases in each Level. The waste will be deposited in cells, spread, compacted and covered. This is called the Ramp Method (Clause 10.3.2 of the Minimum Requirements). The general layout will be in accordance with the Operation Plan.

The basic landfill unit is a cell of compacted waste which, when completed at the end of each day, is entirely contained by cover material. Operation will entail the disposal of waste against the excavated faces and berms constructed between phases.

##### III. LANDBUILDING

Later stages (above Level 13) will entail the disposal of waste above natural ground level, i.e. landbuilding. The sides of the cells will then be formed by berms constructed from soil or building rubble. Each phase is expected to take approximately 6 months from excavation to closure. The

final closure levels will be determined on site once exact cover material volumes have been determined.

#### **IV. WASTE VOLUMES**

The Waste Generation Model attached gives estimated waste generation figures for the site. The estimated waste production in 2018 is 530 tons/day and is predicted to increase to 3550 tons/day in 2095, 78 years later.

#### **V. COMPACTION DENSITY**

The compaction density is taken as 1 000 kg/m<sup>3</sup> as this can comfortably be achieved with the compaction equipment used by DSW at other sites in the Municipal area.

#### **VI. CELL SIZE**

The optimum cell sizes indicated in the Waste Generation Model are approximately 17 m x 16 m x 2.15 m high in 2018 and increase to approximately 46 m x 37 m x 2.15m high in 2095 for daily closure. Cover material of 150mm is included in above cell sizes.

#### **VII. COVER MATERIAL VOLUMES**

The Waste Generation Model calculated the ratio between compacted waste volumes and required cover material to be 7.57 in 2018. This is an economical ratio, due to the large amount of daily waste being disposed. However, this ratio will change over time, as the volume of daily cells gradually increases. Reference should constantly be made to the Waste Generation Model when determining the required cover material volumes over the development period of the site.

#### **VIII. DAILY COVERAGE**

Waste cells will be covered with a 150mm layer of material. The material to be used for cover may be on-site soil or sand, ash or other approved artificial covering. The required cover material could be generated from slope excavations and will be stockpiled on site. The estimated total amount of cell cover material required for a 78 year site life is 3.8 x 10<sup>6</sup>m<sup>3</sup>. The amount of cover material required will increase from 80m<sup>3</sup>/day in 2018 to 450m<sup>3</sup>/day in 2095. These figures are applicable to daily coverage.

#### **IX. FINAL CAPPING**

The material required for the final capping of the site (or parts thereof with time) is an additional 200 mm layer above the 450 mm cover and geotextile. It is estimated that 810 000m<sup>3</sup> closure material is required for final closure of the site. The excavated final capping material will be stockpiled in various positions.

The application of final capping will conform to the thickness and profile of the capping design. All the covered surfaces on the landfill will be graded to ensure runoff and to prevent ponding. Revegetation will commence as soon as practically possible after the final closure layer has been placed.

The above capping requirements described in the 2010 EIR have changed due to DWS's requirement for a site specific approach. Capping will take place over a period of 20-30 years – capping will be undertaken by DWS as directed by authority at the time of capping.



## X. WORKING FACE

The working face of the landfill site will be kept as small as possible for control and covering purposes as well as for containment of windblown litter. The width however is determined by the manoeuvring requirements and number of vehicles depositing waste.

Aspects included in the conceptual design and illustrated in the relevant drawings are:

- infrastructure;
- site access and drainage;
- excavation and stockpiling of cover;
- plans and sections indicating existing, excavated and final contours;
- cell construction;
- deposition sequence and phases;
- leachate and gas management;
- rehabilitation; and
- closure.

### 3.2.3 DRAINAGE SYSTEMS

In terms of Clause 8.2.3 of the Minimum Requirements, drainage systems associated with the landfill site will address three separate components:

- uncontaminated upstream runoff;
- contaminated runoff from the landfill itself; and,
- leachate generated within the landfill.

#### 3.2.3.1 Special Culvert for Uncontaminated Runoff

In order to separate the uncontaminated runoff (from the catchment area above the site) from the waste, it is proposed that a properly engineered concrete culvert be built in the streambed of the Mgoshongweni River and that waste is landfilled over it. The position and sizes of the culvert sections are shown on the conceptual design.

A sufficient isolation barrier will be created between the culvert and the landfilled waste.

Proper anchorage of the culvert will be taken into consideration. The flow rate in the culvert needs to be addressed to minimize scouring. A properly engineered concrete mix would also minimize scouring. The size of the culvert is such that inspections can be carried out during dry periods.

Stormwater will be diverted into the culvert and will be prevented from building up a head that could reach the landfilled waste. An upstream non-permeable berm ('dam wall') will be constructed above the entrance to the culvert for this purpose.

The Minimum Requirements (Clause 8.4.1) require that drainage systems be designed for the peak design storm of 50 years return period for the particular catchment area. Due to the nature of the proposed solution it was decided to design the culvert, associated head wall and 'dam wall' for a peak design storm of a 100 year return period. The flood capacity of the culvert is thus much higher than that required by the Minimum Requirements. The head wall height differs for

the three sections of the culvert from 1.4 m for Culvert Section 2 to 2.55 m for Culvert Section 3. This height includes a 0.5 m freeboard.

The first 2 m high berm for cell development will be built using impermeable clay material, thus creating a 2 m high 'dam wall' above the head wall (with 0.5 m freeboard). The additional 2 m high 'dam wall' would increase the capacity for peak design storm to a 200 year return period.

The velocity of the water in the culvert will be higher than would be the case in the natural stream. Construction of a stilling basin at the culvert exit will reduce the velocity sufficiently to prevent scouring of the natural streambed. The stilling basin will comprise wing walls built out at a suitable angle and a wide concrete slab. Concrete energy dissipaters will be cast into the slab to reduce the velocity of the water exiting the culvert.

### **3.2.3.2 Uncontaminated Runoff**

The site will be constructed in levels approximately 10 m high with 2 m cell lifts. At every 10 m interval, a locality stormwater cut-off trench will be constructed at the foot of the next level. The trench will divert external uncontaminated water around the waste work face. The trench will form part of the next level excavations for cover material.

The base of every lift is sloped towards the internal drainage system in the centre of the work area. Internal uncontaminated runoff will be diverted into the clean water trenches of the internal drainage system.

The runoff diverted around the landfill will discharge into the natural environment downstream of the landfill.

### **3.2.3.3 Contaminated Runoff**

Due to the site being classified G:L:B+, contaminated runoff needs to be contained. The internal drainage trench is sloped towards the south to drain contaminated water into the evaporation pond.

### **3.2.3.4 Leachate Drainage**

Due to the site being classified as G:L:B+, a leachate management system is required of the Minimum Requirements).

The leachate management system comprises a system of pipes, trenches and a leachate collection layer built into the liner. This system covers the waste footprint area to collect and drain under gravity any leachate or leakage to a leachate collection sump. The collected leachate will be treated on site or removed to a suitable treatment plant.

The following Minimum Requirements (Clause 10.4.2) will be adhered to during the operation of the landfill:

- Runoff and stormwater will always be diverted around one or both sides of the waste body by a system of berms and trenches.
- The bases of trenches and cells will allow water to drain away from the deposited waste.
- All temporary and final covered areas will be graded and maintained to ensure runoff without excessive scouring and to eliminate ponding.

### 3.2.4 REHABILITATION AND END-USE

The proposed final shape or closure plan of the landfill has been determined according to drainage and end-use requirements. The proposed end-use of the site is open space.

The site is to be filled with waste and cover material and shaped to the final contour levels as shown on the Closure Plan. This Closure Plan represents the theoretical land profile after land filling occurred on top of Level 13. The land will be shaped to allow for free drainage of stormwater from the site and will be undertaken in such a manner to prevent erosion.

On completion of a level, the final closure layer will be applied to the completed faces, where deposition of waste will no longer take place. The final closure layer will comprise material capable of supporting the vegetation required for the end-use plan.

The rehabilitation of landfills by means of the establishment of self-sustaining vegetation is a Minimum Requirement (Clause 10.4.6). In order to prevent erosion and improve aesthetics, revegetation should commence as soon as possible after applying the final closure layer.

In order to form a screen between the work face and the nearest settlement, which is approximately 1 km away, trees will be planted on the front face (berm) of every development level.

As the site approaches its final finish, more accurate levels will have to be established. This will ensure that the final gradients are correct and adequate drainage takes place.

On completion of the final level, a final closure layer (or capping) will be applied to the remaining areas of the landfill which have not been rehabilitated. This will be a minimum of 200mm topsoil in addition to the final cover material ( $\pm$  450 mm clayey material), and will be capable of sustaining the indigenous vegetative cover envisaged. Ongoing revegetation of completed areas will commence as soon as possible in the project lifespan. Suitable species for use in the revegetation programme will be specified by a rehabilitation ecologist or landscape architect in an attempt to re-establish the indigenous flora previously removed from the site.

### 3.2.5 MONITORING SYSTEMS

The general objective of operation monitoring is to verify that the landfill operation does in fact conform to the required standards and proposed planning procedures. It also serves as a performance indicator, and hence as a control or management tool, for the operator. The operation of the landfill site will need to comply with the relevant legislation.

#### 3.2.5.1 Operational Monitoring

All legal requirements applicable to landfill operation monitoring will be adhered to. These include:

- Landfill Monitoring Committee;
- Conduct Audits;
- Conduct external audits twice per annum;
- Appropriate records and data collection;
- Record deposition rate;
- Waste stream records;
- Landfill volume surveys;
- Collect climate statistics;

- Water quality monitoring;
- Gas monitoring and control;
- Air quality monitoring (Special Consideration);
- Monitoring of progressive rehabilitation;
- Ongoing maintenance.

In their capacity as the Responsible Person, DSW remains responsible for monitoring throughout the operational life of the landfill site.

### 3.2.5.2 Water Quality Monitoring

Water quality monitoring begins before the commissioning of a landfill site and continues throughout and beyond its operation. Monitoring water quality in the vicinity of a landfill is essential in order to indicate whether pollution of the surrounding or adjacent water regime is occurring.

The general objective of water quality monitoring is to serve as an early warning system to indicate any escape of contaminants into the water environment and to quantify any effect that the landfill has on the water regime.

As a G:L:B+ landfill site, water quality monitoring are required. Responsibilities include:

- Designate a Responsible Person;
- Pre-operation Monitoring;
- Surface water monitoring;
- Groundwater monitoring;
- Background results reported in Permit Application Report;
- Water analysed in accordance with parameters in Table 13.1;
- Sample analysis in accordance with SABS methodology or equivalent;
- Operation Monitoring;
- Surface water monitoring;
- Groundwater monitoring;
- Leachate monitoring;
- Report sporadic leachate;
- Post-Closure Monitoring;
- Post-closure surface water monitoring;
- Post-closure groundwater monitoring.

Water quality monitoring is the responsibility of the Permit Holder and thus the Responsible Person, (i.e. DSW), who will ensure that the level and extent of monitoring is commensurate with the class of site under consideration, and hence to the satisfaction of regulatory authority.

A long term pollution monitoring programme for the site will be implemented which covers the following:

## I. SURFACE WATER

As a G:L:B+ landfill, monitoring of surface water is a requirement. Sampling points have been established upstream and downstream of the landfill. Refer to Sections 5.8 and 6.8 of this report for further details.

## II. GROUNDWATER

As a G: L: B+ landfill, monitoring of groundwater is a Minimum Requirement. Monitoring boreholes will be used for sampling of groundwater during operational phases and after closure. Refer to Section 5.9 and 6.9 of this report for further details.

### 3.2.5.3 Landfill Gas

As a G:L:B+ landfill, monitoring and control of gas produced within the landfill is a Minimum Requirement [See *Minimum Requirements in Final EIR (2010)*]. The higher the moisture content, the greater the gas production. Due to the high rainfall in the region, high gas production is expected. Gas extraction wells will be incorporated into the landfill operation. Wells will be built up from the liner on a 50m X 50m grid as indicated on conceptual plan.

The extraction of gas will induce greater settlement, increasing the available airspace and thus the potential life of the landfill.

“Carbon credits” could be gained for the treatment of landfill gas. The eThekweni Municipality intend to pursue this, in the form of a Clean Development Mechanism (CDM) project (in terms of the Kyoto Protocol).

# 4 LEGAL FRAMEWORK

## 4.1 ENVIRONMENTAL AUTHORISATION

The EIA process for the Shongweni Regional Landfill site has spanned almost 20 years. There have been extensive changes in environmental legislation associated with the EIA process over this time. This section provides a progressive summary of the legal framework over the life of the EIA process.

The DEDTEA have confirmed whilst the application was lodged under the Environment Conservation Act (ECA) framework, it is necessary to identify the current legal framework associated with the proposed Shongweni Landfill site. This will allow DEDTEA to issue a decision in respect of the current 2014 EIA regulations (**Appendix B**).

### 4.1.1 ENVIRONMENT CONSERVATION ACT (ECA) (ACT NO. 73 OF 1989)

The Environment Conservation Act (ECA), which has subsequently been replaced by the National Environmental Management Act (NEMA), was the current legal framework at the time that the EIA process commenced.

In terms of the Environment Conservation Act (ECA, 73 of 1989), no person may undertake an activity identified in terms of Section 21 (1) without a written authorisation issued by the relevant authority. Activities which may have a substantial detrimental effect on the environment have, in terms of Section 21, been identified as listed activities by the Minister of Environmental Affairs

and Tourism. The activities in Regulation 1182 (5 September 2007) of the ECA applicable to the proposed Shongweni landfill site is included in **Table 3**.

**Table 3: Relevant EIA Listed Activities in terms of ECA (GN: R 1182)**

Reference	Listed Activity
Schedule 1 (2)	The change in land use from (c) agricultural or zoned undetermined use or an equivalent zoning, to any other land use.
Schedule 1 (8)	The disposal of waste as defined in section 20 of the Act, excluding domestic waste, but including the establishment, expansion, upgrading or closure of facilities for all waste, ashes and building rubble.

#### 4.1.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998) (NEMA)

EIA Regulations were published under Section 24 of the National Environmental Management Act (107 of 1998) (NEMA) for the environmental authorisation of listed activities in 2006. Activities contained within GN: R386 required a Basic Assessment process and activities contained within GN: R387 required a full Scoping and EIA process to see environmental authorisation from the competent authority. The activities in GN: R386 and GN: R387 applicable to the proposed Shongweni Landfill site are included in **Table 4**.

**Table 4: Relevant 2006 EIA Listed Activities**

Reference	Activity
GN: R 386 (1)(m)	The construction of facilities or infrastructure, including associated structures or infrastructure, for any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including – (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs.
GN: R 387(2)	Any development activity, including associated structures and infrastructure where the total area of the developed area is, or is intended to be, 20 hectares or more

The above was replaced by 2010 EIA Regulations (GNR 543) promulgated under the NEMA, containing three Listing Notices (GN: R 544, R545 and R 546) of activities that require environmental authorisation.

2010 EIA Regulations were subsequently replaced by 2014 EIA Regulations containing three Listing Notices (GN: R 983, R 984 and R 985). The activities in GN: R 983, R 984 and R 985 applicable to the proposed Shongweni Landfill site are included in **Table 5**.

**Table 5: Relevant 2014 EIA Listed Activities**

Reference	Activity
GN: R 983 (12)	The development of- i) canals exceeding 100 square metres in size; iv) dams, where the dam, including infrastructure and water surface area, exceeds 100square metres in size; v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; vi) bulk storm water outlet structures exceeding 100 square metres in size; x) buildings exceeding 100 square metres in size; xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse
GN: R 983 (19)	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- xiii) a watercourse.
GN: R 983 (27)	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- the undertaking of a linear activity; or maintenance purposes undertaken in accordance with a maintenance management plan.

## 4.2 WASTE MANAGEMENT LICENCE

### 4.2.1 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (ACT NO. 59 OF 2008)

The National Environmental Management: Waste Act (105 of 2008) (NEMWA) is subsidiary and supporting legislation to the NEMA. The Act is a framework legislation that provides the basis for the regulation of waste management. The Final EIA Reports for the landfill projects were submitted in March 2010 at which time GNR: 718 (July 2009) was in place. This comprised a list of waste management activities that have or are likely to have a detrimental effect on the environment, was relevant. Activities listed in GN: R718 require a Waste Management License (WML) and in turn an environmental authorisation process to be followed in terms of the NEMA EIA Regulations.

The following Category B (requiring Scoping and EIA) listed activities applied to the proposed Shongweni Landfill site project (**Table 6**) at the time of submission. The competent authority, DAEA (now DEDTEA) required that the WML application be submitted with the Final EIR.

**Table 6: Relevant 2009 WML (GN: R 718) Listed Activities**

Reference	Activity
Category B (10)	Disposal of general waste to land covering an area in excess of 200m <sup>2</sup>
Category B (11)	Construction of facilities or activities listed in Category B of this schedule.

GN: R 718 was replaced by GN: R 921 (2013) promulgated under the NEMWA, containing Category A and B activities that require authorisation. The following Category B (requiring Scoping and EIA) listed activities apply to the proposed Shongweni Landfill site project (**Table 7**).



**Table 7: Relevant 2013 WML (GN: R 921) Listed Activities**

Reference	Activity
Category B (8)	Disposal of general waste to land covering an area in excess of 200m <sup>2</sup> .
Category B (9)	Disposal of inert waste to land in excess of 25 000 tons.
Category B (10)	Construction of a facility for a waste management activity listed in Category B of this schedule.

## 4.3 SUMMARY OF STATUS OF APPLICATION PROCESS

### 4.3.1 APPLICATION FOR ENVIRONMENTAL AUTHORISATION

WSP has prepared and submitted a NEMA application form containing 2014 EIA Regulation listed activities. The purpose for the submission of the 2014 form is (i) to allow a current EIA number to be issued, and (ii) to facilitate consideration of 2014 EIA listed activities to allow DEDTEA to issue a decision in respect of the current legal framework.

WSP has agreed with DEDTEA that:

- DSW will not be required to follow the environmental authorisation as per 2014 EIA Regulations. The 2014 application form has been submitted to merely facilitate approval of the project in respect of the current legal framework. The procedure will be followed as set by the ECA legal framework.
- Consideration of the 2014 application form and the final addendum by DEDTEA (following stakeholder review and comment) will be sufficient to issue a decision.

### 4.3.2 APPLICATION FOR WASTE MANAGEMENT LICENCE

DEDTEA have confirmed that DSW is not required to submit a new application form in terms of 2013 WML Regulations (GN: R921) as the application commenced under GN: R 718. The WML, is approved, will be issued in terms of Category B activities contained within GN: R 921 following consideration of the WML application form submitted in 2010 and the final addendum (following stakeholder review and comment).

## 4.4 NATIONAL NORMS & STANDARDS FOR DISPOSAL OF WASTE TO LANDFILL (GNR 636 OF 2013)

The norms and standards for Disposal of Landfill determine the requirements for the disposal of waste to a landfill. The Shongweni landfill will be responsible for waste management of the eThekweni Municipality and will receive general waste. The Norms and Standards for disposal of waste to landfill defines 4 classes of landfill. These are Class A, Class B, Class C and Class D. Waste must be assessed and in terms of the norms and standards and disposed to a licensed landfill as follows:

- Disposal of Type 0 waste is not allowed.
- Type 1 waste → Class A landfill designed in accordance with the requirements for a Hh/HH landfill.
- Type 2 waste → Class B landfill designed in accordance with the requirements for a GLB+ landfill.
- Type 3 waste → Class C landfill designed in accordance with the requirements for a GLB+ landfill.



- Type 4 waste → Class D landfill designed in accordance with the requirements for a GLB-landfill.

According to the new regulations (GNR 636 OF 2013) the Shongweni landfill is a Class B landfill and must be designed in accordance with the requirements for a GLB+ landfill.

GNR 636 also provides:

- Landfill disposal requirements for listed wastes e.g. domestic waste, building waste, asbestos containing waste.
- Lead time of 3 years before the disposal requirements must be implemented.
- List of prohibited wastes which may not be disposed to landfill (timeframes range from immediate to 8 years).

#### 4.5 NATIONAL STANDARDS FOR THE EXTRACTION, FLARING OR RECOVERY OF GAS (2013)

The proposed project will involve the capture of methane from waste body and burn (flare) to convert to CO<sub>2</sub>.

The standards aim at controlling the extraction, flaring and recovery of landfill gas at new or upgraded landfills in order to prevent or minimise potential negative impacts on the bio-physical and socio-economic environments.

Requirements outlined within the standards for the planning, construction and operation phase have been included in the EMPr (**Appendix D**).

## 5 ADDITIONAL INFORMATION

In order for the DEDTEA to make an informed decision on the application, the following was requested:

1. Provision of information on any new developments in the surrounding area, including consideration of the proximity of the landfill to surrounding communities to the landfill (including the potential requirement for household relocation).
2. Preparation of a Traffic Impact Specialist Study utilising current data; and receipt of comments from the Department of Transport on this updated study.

The above requirements have been addressed in the sections below.

### 5.1 SURROUNDING LAND USE

A site visit to determine change in land use was undertaken by WSP on 13 July 2015. The site of the proposed Shongweni Landfill site is currently owned by Tongaat-Hulett Properties Ltd. It is primarily covered by grasslands with forests pockets concentrated along the drainage lines and 35% of the area is under sugar cane.

Chef Mushrooms have a large factory which is situated 1.7km to the north of the site. Summerveld Racing Academy lies 3.5km to the north west of the proposed site. The academy undertakes both jockey and racehorse training. There is accommodation in this area associated with the academy. The area to the north west of the academy (4-5km from the proposed site) comprises mainly recreational equestrian establishments. The Shongweni Club lies 3.5km to the

North North West of the site. The Club is predominantly used for equestrian activities (competition, stabling, hacking and polo).

Tongatt Hulett siding is situated on the north western boundary of the site. Enviroserve landfill is situated approximately 620m north of the site. Dense informal settlement is situated on the south and eastern boundary of the landfill site. The closest settlement is less than 100 metres from the boundary of the designated landfill buffer. There is a school situated on the south of the landfill buffer zone boundary.

The eDamini settlement is located approximately 1 km south and south-east of the site. KwaNdengezi housing development lies about 1.2km east and south-west of the proposed site's western boundary. The residential area of Winston Park lies 2.5kms to the north east of the site (**Figure 2**).

The land extending downslope of the hilltops (including portions of the proposed landfill site buffers) is used for a combination of less dense informal settlement and grazing land for goats and cattle. Some limited subsistence cropping (mainly maize) is practiced as well. It was noted during the 2015 site visit that limited additional encroachment has occurred particularly on the eastern bank.

It can be concluded that, other than limited additional encroachment of informal households, there have been no significant changes in the land uses in the area surrounding the proposed landfill site since the Final EIR was written in 2010.



## 5.2 PROPOSED NEW DEVELOPMENTS

### 5.2.1 TONGAAT HULETT DEVELOPMENT

Tongaat Hulett Developments (THD) holds extensive landholdings in the Ntshongweni area in the Outer West District of the eThekweni Metro. THD are proposing the construction of retail and mixed use development (**Figure 2 above**) which is in line with eThekweni Municipality Strategic Development Plan for the Outer West District and the Shongweni Local Area Plan. THD has lodged an application for environmental authorisation with the DEDTEA for the proposed development. The proposed development is approximately 4.2 km away from the proposed Shongweni Landfill site. Access to the proposed development will be off Kassier Road which is remote from the road networks designated for the landfill site. It is unlikely that the proposed retail development will be impacted upon by the proposed Shongweni Landfill site as the two developments do not share primary access routes.

### 5.2.2 INTEGRATED RAPID PUBLIC TRANSPORT NETWORK

eThekweni Municipality is currently developing an Integrated Rapid Public Transport Network (IRPTN) for the metro area. The IRPTN will fundamentally restructure movement and development patterns in eThekweni and Mpumalanga. An IRPTN trunk route is planned for Mpumalanga in 2027. This trunk route is planned along MR385/N3/M13 but there is the possibility that it may be located along Sibisi Road/D210 through Ntshongweni. A primary proposal relating to movement is the reinforcement of a southern corridor linking Mpumalanga, Ntshongweni, through to the N2 interchange. This system with its continuations, firstly east, running parallel to Clifton Canyon along Milky Way to Pinetown, and secondly north along Kassier Road to Old Main Road, serves a vital role in restructuring of the district and the integration of the peripheral shadow corridor (Shongweni LAP, 2010).

## 5.3 TRAFFIC IMPACT ASSESSMENT

The DEDTEA requested that a Traffic Impact Assessment (TIA) be carried out in order to update the information presented in the Final EIR (2010). A TIA for the Proposed Shongweni Landfill was conducted by WSP Civils and Structural Engineers (Pty) Ltd in June 2015 (**Appendix C**). The study addresses the traffic impact of the proposed landfill site on capacity and access of the surrounding road networks.

### 5.3.1 FINDINGS

Existing roads and intersections include:

- **N3** – The N3 is a National Highway that carries traffic between the major cities of Durban and Johannesburg. This is a high mobility route with interchanges at regular intervals to provide access to areas along this road. This road exists as a dual carriageway with three lanes per direction and is under SANRAL's jurisdiction.
- **JB McIntosh Dr (P454)** - JB McIntosh Drive or P454 is a provincial road and forms an interchange with the N3 further north of the site and therefore accessibility to the Shongweni area.
- **MR 518 (D828)** – the MR 518 (D828) road is a provincial district road and exists as a single carriageway road.
- **MR 461 (P461)** – The MR 461 or P461 road is a provincial road and carries traffic between the MR 559 (P559) and Dassenhoek to the south.

The TIA proposes site access for the Shongweni landfill to be off MR 461 (P461). Trip generation was calculated based on tonnage. It is expected that 31 and 36 two way trips will be generated in the AM and PM peak hour respectively.

No additional upgrades in terms of capacity are required for the following intersections:

- JB McIntosh (P454) and M559 (P559) - This junction performs well below capacity with minimal delays expected. The worst performance is Level of Service (LOS) C at the M559 approach in the morning peak due to a large volume of right turners. The LOS C performance is still acceptable and no further upgrades are required.
- MR 559 (P559) and MR 461 (P461) – this T-junction performs well below capacity and no further upgrades are required.
- MR 559 (P559) and MR 518 (P518) – this T-junction performs well below capacity and no further upgrades are required. Access and MR 461 (P461) – the proposed junction performs adequately and no further improvements are required. In terms of pedestrian facilities, the warrant as per the ETA guidelines were used and it was found that pedestrian footpaths or sidewalks are not warranted for this site.

The following upgrade recommendations are made based on the previous 2010 TIA and due to the low volumes expected through these roads, which should be investigated further by the council:

- The hairpin bend on Mr 518 road required widening
- The sight distance at the Mr 518 (D828) and Mr 559 (P559) is not adequate and road widening was recommended.

### 5.3.2 RECOMMENDATIONS

The following recommendations were suggested by the specialist during the current investigation:

- The access should be at least 300m spaced from other access roads and should preferably be directly opposite any other access roads in the vicinity.
- The minimum access width into the site is to be 8.7m to accommodate heavy vehicles and pedestrians entering and exiting the site.
- The maximum grade allowed for the access is 1:10 to cater for heavy vehicles that will use this access.
- The ingress and egress throat length should be at least 30m to allow for a queue of a “Hooklift” vehicle with a trailer (type of vehicle advised by DSW) entering or leaving the site.

## 6

## UPDATED IMPACT DESCRIPTION AND ASSESSMENT RATING

The project information and impact assessment contained within the Final EIR (2010) remains largely unchanged. In consideration of the additional information available, both the traffic impacts and social impacts have been revisited and reassessed in the sections below.

The Impact Assessment presented in the Final EIR (2010) has been presented within the Addendum Report, indicating relevant updates based on new information.

## 6.1 TRAFFIC IMPACTS

Solid waste disposal trucks moving in and out of the site have the potential to impact on the volume of local traffic. The increase in trucks may increase the risk of road accidents and lead to congestion. The TIA states that the expected trip generation is 3 trips in the AM peak hours (2 inbound and 1 outbound) and in the PM peak, 1 inbound and 2 outbound trips are expected. Therefore traffic volumes are expected to be very low because of the type of development in the area. There are no vehicles moving in and out of the proposed site to result in congestion. Road upgrades (**Appendix C**) such as additional turning lanes and a bypass lane have been recommended to eliminate the risks of accidents.

An increase in traffic in the area has the potential to impact on the pedestrians. However, the TIA indicates that the pedestrian volumes are low based on the development within the area. The number of pedestrians per day is assumed to be in the 250-1000 range. The point score is therefore 12 based on this number. Therefore traffic will have minimal impacts on pedestrians.

Access to the site needs to be to Provincial Road standards and must have separate auxiliary lanes as well as deceleration and acceleration lanes for vehicles entering and exiting the site. Access is proposed off the MR 461 and is considered a safer option than the D828 road proposed in the previous TIA.

## 6.2 IMPACTS TO RESIDENTS WITHIN HEALTH BUFFER ZONE

An assessment conducted in 2015 shows that there are no significant changes in the surrounding land use from that presented in the Final EIR (2010). It was noted in 2010 that the proposed health buffer zone infringed on an informal residential settlement and a school along the southern periphery of the landfill buffer zone. Encroachment on the eastern boundary post-2010 has also resulted in the location of informal residential settlements within the health buffer zone. The following social impacts are anticipated:

- Health (Air Pollutants) - The development of the landfill and location of informal housing within the health buffer zone as demarcated in the 2010 Air Quality Impact Assessment (AQIA) may impact on the health of these communities due to reduced ambient air quality and increased exposure to key pollutants. The health buffer zone was established by plotting the 0.65 µg/m<sup>3</sup> average benzene isopleth which corresponds to a 1:200 000 cancer risk.
- Nuisance (Dust) – Residents of the informal settlement to the south east fall into the dust zone management zone – the site is required to be well operated to avoid impacts associated with dust fall out during construction and operation phases.
- Nuisance (Noise) - Properties to the east and south-east of the site could experience noise levels of up to 13 dB and 8 dB respectively above the adopted noise limits as assessed in the 2010 EIR. This has the potential to result in a nuisance factor to adjacent informal resident and result in reduced quality of life.
- Nuisance (Odour) - Residents of the informal settlement to the south east fall into the odour zone management zone – the site is required to be well operated to avoid detection of odours in this area.

It is recommended within the Final EIR (2010) that communities potentially affected by the above health and nuisance impacts be relocated to an area outside the health buffer zone. In the 2015 assessment relocation is not deemed necessary unless exceedences of the National Ambient Air Quality Standards (2015) (NAAQS) are recorded in the community once the site is operational. It is recommended that the monitoring of dust, benzene and odour occurs before any community relocations are considered in line with regulatory changes subsequent to the original AQIA.



Health monitoring and mitigation is preferred to the relocation of communities to avoid the following potential impacts associated with relocation:

- Lack of suitable land available for resettlement of both homes and cattle grazing practices has the potential to impact livelihoods of the relocated group.
- Increased pressure on resources and services in the new settlement area.
- Increased travelling distance to workplaces and schools will have negative financial impacts on the relocated group.
- Disruption of school-age children with the likely need for school transfers.
- Psychological impacts relating to changes in the living environment and loss of emotional attachment to a particular neighbourhood. Poor communities' usually have a strong cohesive relationship. Relocating households has the potential to reduce the social support, reducing the cohesiveness of the communities and resulting in the feeling of displacement.
- Interference with access to important services such schools, child care, churches and health care centres.
- Reduction in local business activities. Businesses such as spaza shops that rely on locals will be impacted negatively by relocation.

### 6.3 MITIGATION MEASURES

The Air Quality Study (2002) recommended that the residents in the informal settlement to the south-east of the proposed site are relocated. This was on the basis of the AERMOD benzene model outputs and the application of a 1:200,000 cancer risk (0.65 µg/m<sup>3</sup>). In line with the current NAAQS, a standard of 5 µg/m<sup>3</sup> should be applied. This would result in a significant contraction of the health buffer proposed in the original Air Quality Study (2002). The relocation of residents out of the health buffer zone mapped in initial Air Quality Study (based on benzene emissions) will result in a residual impact of medium significance. It is proposed in the Air Quality Management Plan (Appended to EMP<sub>r</sub> - **Appendix D**) that an alternative approach to mitigation be adopted to avoid disruption to communities. In light of this, relocation is not deemed necessary unless exceedences of the NAAQS are recorded in the community once the site is operational.

- Community Engagement

Consultation with communities located near the proposed landfill site will be required before the project commences. This will allow information sharing and early identification of issues by affected groups.

- Relocation Plan

An exceedance of the NAAQS will require the relocation of communities nearest to the health buffer zone. The development of a Relocation Plan would be required which sets out strategies to mitigate potential impacts. The plan must also include measures to: restore the economic and social livelihoods of the communities; provide assistance required during the relocation; and provide support after displacement for successful implementation.

### 6.4 IMPACT ASSESSMENT

The impact assessment matrix contained within the Final EIR (2010), containing changes as a result of the additional findings of the addendum phase (red text) is presented in **Table 8**.

The 2015 TIA shows that there are no significant changes between the findings of the 2010 traffic assessment. Recommendations made in the previous TIA are similar to those of the recent 2015 study. The 2010 TIA showed low traffic flows and that there was an opportunity to increase the

capacity on the existing road networks. Equally to the 2015 study which indicates no major traffic impacts on the existing road networks and surrounding land users.



**Table 8: Summary of implications, mitigations & assessment of impact significance**

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
<b>Climate</b>	<ul style="list-style-type: none"> <li>■ High intensity or long duration rainfall events could result in erosion.</li> <li>■ Overtopping of surface water diversion structures could occur in extreme events.</li> <li>■ Extreme temperatures may affect the success of revegetation.</li> <li>■ High winds could result in erosion of denuded surfaces.</li> <li>■ North easterly winds will carry noise, dust and odours towards the eDamini community.</li> <li>■ The positive water balance in wet years and during the wet season could result in water pollution.</li> </ul>	<ul style="list-style-type: none"> <li>■ Project planning should take cognisance of seasonal weather variations.</li> <li>■ During windy periods, emphasis should be placed on dust control.</li> <li>■ Undertake appropriate dust management at all times.</li> <li>■ During wet periods, additional efforts must be put into monitoring and managing erosion and surface water structures and quality.</li> <li>■ Limit the surface area which is cleared of vegetation.</li> <li>■ Undertake continuous re-vegetation.</li> <li>■ Vegetate long term stockpiles, berms etc.</li> <li>■ Monitor and repair erosion as necessary.</li> <li>■ Use indigenous species for rehabilitation.</li> <li>■ Avoid seeding in high temperatures.</li> <li>■ Use sods for rehab wherever possible.</li> <li>■ Plan rehabilitation in conjunction with landfill</li> </ul>	Medium  Possible	Local	Medium term	Full	Without mitigation: <b>High</b>  With mitigation: <b>Low</b>

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
		<p>development.</p> <ul style="list-style-type: none"> <li>All stormwater controls and dams will be designed to accommodate a 1:50 yr flood and the culvert should accommodate the 1:100yr flood.</li> </ul>					
<b>Geology and Geotechnical</b>	<ul style="list-style-type: none"> <li>Low risk of small seismic event.</li> <li>Soils suitable for lining the landfill are present on the site, but not in sufficient quantity.</li> <li>Suitable cover material is present on the site.</li> <li>There is no significant perched water table on the site.</li> <li>The site is inherently stable.</li> <li>The potential stability of the waste body will be considered in the landfill design.</li> <li>Crushed stone will have to be imported onto the site.</li> <li>Some blasting will be necessary on the site.</li> </ul>	<ul style="list-style-type: none"> <li>Landfill design will allow for seismic risks.</li> <li>Appropriate liners will be used to reduce permeability of landfill base.</li> <li>Any off site borrow areas will comply with required environmental permitting.</li> <li>Stability issues will be incorporated into landfill design.</li> </ul>	<p>Low</p> <p>Possible</p>	Local	Long Term	Full	<p>Without mitigation: <b>Medium</b></p> <p>With mitigation: <b>Low</b></p>
<b>Topography</b>	<ul style="list-style-type: none"> <li>Topography will be affected by excavation and fill activities.</li> </ul>	<ul style="list-style-type: none"> <li>The change in topography will be progressive.</li> <li>The final closure levels will</li> </ul>	<p>Medium</p> <p>Definite</p>	Local	Long Term	Partial	Without mitigation: <b>High</b>

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
	<ul style="list-style-type: none"> <li>The drainage pattern of the site will be affected.</li> <li>Differential settling may occur in the long term.</li> <li>Microtopographical changes will occur as a result of development of surface water diversion structures, evaporation pond, culvert and toe berm construction etc.</li> </ul>	<ul style="list-style-type: none"> <li>attempt to emulate pre-landfill contours where possible.</li> <li>Topographic changes are confined to the valley, reducing visual impacts.</li> <li>A surface water management system has been incorporated into the landfill design.</li> <li>Mounds and hollows will be evened out during rehabilitation (progressive).</li> <li>Surface water diversion structures will be placed immediately upslope of active and previously landfilled areas to minimise area of disturbance.</li> </ul>					With mitigation: <b>Medium</b>
<b>Soils</b>	<ul style="list-style-type: none"> <li>Handling, stripping and stockpiling of soils may result in compaction, clodding, crusting, leaching, loss of structure, sodicity.</li> <li>There is a high risk of erosion due to activities on site.</li> <li>Soils may be contaminated during site operations.</li> <li>Inadequate soil available</li> </ul>	<ul style="list-style-type: none"> <li>General guidelines for stripping, stockpiling and replacement of soils will be included in the EMP.</li> <li>Erosion will be controlled by ongoing rehabilitation with appropriate species and careful monitoring and management of erosion or potential erosion sites.</li> <li>Access roads must be carefully planned and constructed to reduce</li> </ul>	Medium  Definite	Site	Long Term	Full	Without mitigation: <b>Medium</b>  With mitigation: <b>Low</b>

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
	for rehabilitation and final capping.	<p>erosion risks.</p> <ul style="list-style-type: none"> <li>Soil contamination will be controlled by careful operation (see EMP).</li> <li>Soils imported for use in rehabilitation must be suitable in terms of composition and quality.</li> </ul>					
<b>Land Use</b>	<ul style="list-style-type: none"> <li>Impacts on surrounding area in terms of aesthetics, air quality, loss of access and general disturbance.</li> <li>Loss of agricultural land.</li> <li>Specific effects of air quality on the horseracing industry, mushroom farming activities and hydroponics operation.</li> <li>Loss of access to/through the area.</li> <li>Effects on tourism.</li> <li>Impacts on the condition of and safety on roads.</li> <li>Impacts on surrounding property prices (appreciation or devaluation depending on the type of development proposed).</li> <li>Issues relating to health within the local</li> </ul>	<ul style="list-style-type: none"> <li>A buffer zone has been defined around the operational area.</li> <li>A landfill monitoring committee will be established.</li> <li>The use of resources on the site and access through the site will be determined closer to the time of project commencement and negotiations undertaken with regard to alternatives.</li> <li>The site will be appropriately secured to reduce risk to the local community.</li> <li>Careful management of the site will reduce the risks relating to air quality, noise and visual impacts.</li> <li>Impacts on tourism will be reduced if the landfill and the transportation activities</li> </ul>	<p>Medium</p> <p>Possible</p>	Local	Medium Term	Partial	<p>Without mitigation: <b>High</b></p> <p>With mitigation: <b>Low/medium</b></p>

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
	<p>community.</p> <ul style="list-style-type: none"> <li>Potential for informal settlement on the site.</li> </ul>	<p>are correctly managed.</p> <ul style="list-style-type: none"> <li>Traffic management issues will be addressed in the EMP.</li> <li>Careful planning with regard the type of landuse in the surrounding area. Consideration should be given to the potential positive impacts on property value (in the case of commercial/industrial development) and potential negative impacts in the case of high income residential development.</li> </ul>					
<b>Flora</b>	<ul style="list-style-type: none"> <li>Loss or disturbance of vegetation.</li> <li>Possible loss of important taxa.</li> <li>Reduction in species diversity.</li> <li>Invasion by alien invader species.</li> <li>Reduction of value of the site as an ecological corridor.</li> </ul>	<ul style="list-style-type: none"> <li>Detailed vegetation management procedures are presented in S 6.6.2 of the report and will be expanded in the EMP.</li> <li>Topsoil removed from the construction site should be suitably stored and used in post-construction rehabilitation.</li> <li>Exposed areas should be revegetated immediately following construction.</li> <li>Ongoing long-term alien removal to be carried out.</li> </ul>	High Definite	Local	Medium Term	Full	Without mitigation: <b>Medium</b>  With mitigation: <b>Low</b>
<b>Fauna</b>	<ul style="list-style-type: none"> <li>Loss of habitat.</li> </ul>	<ul style="list-style-type: none"> <li>There is very little</li> </ul>	Medium	Site	Medium	Full	Without

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
	<ul style="list-style-type: none"> <li>■ Potential for poaching.</li> <li>■ Loss of areas used for informal grazing.</li> <li>■ Impacts of pests on the operation.</li> </ul>	<p>indigenous fauna present on the site.</p> <ul style="list-style-type: none"> <li>■ Development of the site will be incremental, reducing the total impact on fauna.</li> <li>■ Natural habitat will be retained in the buffer zones (a conservancy should be developed).</li> <li>■ Plan and undertake revegetation to optimise use for natural fauna.</li> <li>■ A detailed faunal study will be undertaken closer to the time of site development and any recommendations (relocation etc) will be carried out.</li> <li>■ Liaison will be undertaken with the local community with regard to use of the site for grazing purposes.</li> <li>■ No poaching of animals will be permitted and the workforce will be educated with regard to fauna on the site.</li> <li>■ Careful site management will reduce the impact of pests on the operation.</li> </ul>	Definite		Term		<p>mitigation: <b>Medium</b></p> <p>With mitigation: <b>Low</b></p>
<b>Surface Water Resources</b>	<ul style="list-style-type: none"> <li>■ Surface water contamination.</li> </ul>	<ul style="list-style-type: none"> <li>■ The surface water management system will</li> </ul>	High	Local	Long Term	Full	Without mitigation:

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
	<ul style="list-style-type: none"> <li>Changes in surface water quantities.</li> <li>Impacts on surface water use.</li> </ul>	<p>form an integral part of the landfill design. It will involve separation of clean and dirty water on the site and management of any leachate produced.</p> <ul style="list-style-type: none"> <li>Surface water monitoring will continue through site development and operation.</li> </ul>	Possible				<p><b>High</b></p> <p>With mitigation: <b>Low</b></p>
<b>Ground Water Resources</b>	<ul style="list-style-type: none"> <li>Contamination of groundwater resources.</li> <li>Risk posed to site by groundwater.</li> </ul>	<ul style="list-style-type: none"> <li>Landfill design will consider risks to groundwater.</li> <li>Liners and drainage systems will be appropriate to manage the groundwater conditions on the site in order to reduce the likelihood and significance of impacts.</li> <li>Groundwater monitoring will be undertaken once site development commences.</li> </ul>	<p>High</p> <p>Possible</p>	Local	Long Term	Full	<p>Without mitigation: <b>High</b></p> <p>With mitigation: <b>Low</b></p>
<b>Air Quality</b>	<ul style="list-style-type: none"> <li>Risk of odours/dust in surrounding areas.</li> <li>Health risks to informal community within the health buffer.</li> <li>Methane explosion risks.</li> </ul>	<ul style="list-style-type: none"> <li>Odour monitoring will be undertaken once the site commences operation.</li> <li>Careful site management will reduce the risk of dust production; the EMP will make specific recommendations for dust control.</li> <li>Dust monitoring will be</li> </ul>	<p>High</p> <p>Possible</p>	Local	Medium Term	Partial	<p>Without mitigation: <b>Medium</b></p> <p>With mitigation: <b>Low</b></p>

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
		<p>undertaken.</p> <ul style="list-style-type: none"> <li>■ Gas extraction will be undertaken on the site to reduce the risks of odour and explosion.</li> <li>■ The buffer zone has been defined based on the results of the air dispersion modelling exercise.</li> <li>■ Relocation of residents that reside in the health buffer zone (section of an informal settlement to the south east of the site) to an area outside the health buffer zone.</li> <li>■ AQMP be compiled including Air Quality Monitoring Plan.</li> <li>■ A baseline study should be conducted prior to construction of the site, to determine background concentrations of flagged pollutants known to be found in landfill gas and leachate.</li> <li>■ Implementation of design and operational phase mitigation measures as recommended in Sections 6.10.2.3/4 of the EIR.</li> </ul>					



Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
		<ul style="list-style-type: none"> <li>■ Continuous (12 months per annum) dust fallout monitoring at four fenceline and at four community receptor locations.</li> <li>■ The EMP will make specific recommendations for dust and odour control during the construction, operational and closure phase.</li> <li>■ Seasonal benzene and hydrogen sulphide (H<sub>2</sub>S) monitoring (one week sampling period, four times annually) at four fenceline and at four community receptor locations</li> <li>■ In line with Government Notice 924 of 2013, fenceline monitoring should take place during a landfill gas flaring event to assess the ambient impacts of flaring.</li> <li>■ Installation of an onsite weather station.</li> </ul>					

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
		<ul style="list-style-type: none"> <li>■ Dust fallout modelling is recommended to delineate a nuisance dust buffer.</li> <li>■ Effective landfill gas management (including collection and combustion)</li> </ul>					

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
<b>Noise</b>	<ul style="list-style-type: none"> <li>Noise impacts on surrounding land users (particularly to the east and south east of the site).</li> </ul>	<ul style="list-style-type: none"> <li>Acoustic screening (esp to the east and south east).</li> <li>Equipment will be maintained in good condition to reduce noise output.</li> <li>Operational hours on site should be restricted to 6am to 6pm.</li> <li>Where appropriate, acoustic treatment of machinery should be undertaken.</li> <li>Monitoring of noise and complaints will be undertaken once the site is operational.</li> </ul>	<p>Medium</p> <p>Probable</p>	Local	Medium Term	Partial	<p>Without mitigation: <b>Medium</b></p> <p>With mitigation: <b>Low</b></p>
<b>Visual and Aesthetic Aspects</b>	<ul style="list-style-type: none"> <li>There are likely to be visual impacts associated with site operation from the north east and south east of the site.</li> </ul>	<ul style="list-style-type: none"> <li>Minimise vegetation and soil removal.</li> <li>Ensure that structures are designed and coloured to blend with the environment.</li> <li>Undertake concurrent rehabilitation with natural species.</li> <li>Ensure that lighting does not create a visual impact from surrounding areas.</li> <li>Manage the landfill well to ensure that visual impacts are minimised (dust, litter etc).</li> </ul>	<p>Low</p> <p>Definite</p>	Local	Medium Term	Partial	<p>Without mitigation: <b>Medium</b></p> <p>With mitigation: <b>Low</b></p>

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
<b>Traffic</b>	<ul style="list-style-type: none"> <li>■ Risks associated with additional heavy traffic on the roads (road safety, pedestrians etc.).</li> <li>■ Congestion.</li> <li>■ Noise from trucks on the roads.</li> </ul>	<ul style="list-style-type: none"> <li>■ Certain modifications to the existing road infrastructure will be undertaken (see traffic report).</li> <li>■ Road signage must be amended.</li> <li>■ Truck drivers and the community will be educated with regard to the risks.</li> <li>■ The access into the site will need to be to Provincial Road standards</li> <li>■ Access to site must have auxiliary lanes as well as deceleration and acceleration lanes for vehicles entering and exiting the site</li> <li>■ Widening of the Mr 461 at the access to the site to include additional turning lanes with acceleration and deceleration lanes (Appendix C).</li> <li>■ A bypass lane is recommended the MR 559</li> </ul>	Medium Probable	Local	Medium Term	Partial	<p>Without mitigation: <b>Medium</b></p> <p>With mitigation: <b>Low</b></p>

Environmental Aspect	Summary of Implications and Mitigation		Assessment of Environmental Impacts				
	Nature of Impact	Mitigation	Intensity and probability	Extent	Duration	Mitigation	Significance
		<p>and MR 461 intersection.</p> <ul style="list-style-type: none"> <li>Public transport drop off must be provided.</li> </ul>					
<b>Impacts of poor relocation planning</b>	<ul style="list-style-type: none"> <li>Disruption to livelihoods of the relocated group.</li> <li>Increased pressure on resources and services in the new settlement area.</li> <li>Negative financial impacts on the relocated group due to increased travelling distance to workplaces and schools.</li> <li>Disruption of school-age children with the likely need for school transfers.</li> <li>Psychological impacts due to displacement.</li> <li>Interference with access to social services</li> <li>Reduction in local business activities (spaza shops)</li> </ul>	<ul style="list-style-type: none"> <li>Community engagement and consultation during the planning phase.</li> <li>Development of well-planned and transparent Relocation Action Plan.</li> <li>Monitoring and evaluation during and post-resettlement.</li> </ul>	High Probable	Local	Long Term	Partial	<p>Without mitigation: <b>High</b></p> <p>With mitigation: <b>Medium</b></p>

## 7 ENVIRONMENTAL MANAGEMENT PROGRAMME

The DEDTEA have requested the preparation and submission of an Environmental Management Programme (EMPr) in support of the EIA and WML application. The EMPr is attached in **Appendix D**.

## 8 PUBLIC PARTICIPATION

The DEDTEA requested that stakeholder be afforded the opportunity to review and comment on additional information collated in respect of the proposed Shongweni Landfill site project.

In their letter (September 2014) the DEDTEA requires the following in respect of engagement with stakeholders:

- Stakeholder communication (registered stakeholders and owners and occupiers of adjacent land) with regard to the application delays, and provision of an opportunity to comment on new information; and
- Facilitation of comments from Ezemvelo KZN Wildlife (EKZNV) on the updated EIR.

The following is therefore proposed:

- The existing stakeholder database will be updated to allow for notification of the availability of the Addendum Report.
- All stakeholders on the database will be notified of the availability of the Addendum Report for a comment period of 30 days. An electronic copy of the report will be available online: WSP <http://www.wspgroup.com/en/WSP-Africa/What-we-do/Services/All-Services-A-Z/Technical-Reports/>
- Hardcopies of the Addendum Report will be distributed to the following authorities for comment:
  - Ezemvelo KZN Wildlife;
  - Local and Provincial Authorities

Comments received from stakeholder will be responded to within a Comment and Response Report which will be appended to the Final Addendum Report and submitted to DEDTEA for consideration.

## CONCLUSION

WSP can conclude that the information presented in the Final EIR (2010) remains relevant to the proposed EIA and WML applications. This addendum provides additional information in respect of traffic and social (relocation) impacts and the provision of an EMPr which in support of the decision making process.

## REFERENCES

- IYER, 2010. Shongweni LAP: A Framework For Sustainable Urban Development for EThekweni Municipality, Framework Planning- Development Planning, Durban.



# Appendix A

**DESIGNS / LAYOUTS/ MAPS**



APPENDIX A-1

**ORTHOPHOTO**

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APPENDIX A-2

**SHONGWENI HAND PLAN**

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# Appendix B

**DEDEA CORRESPONDANCE**

# Appendix C

**TRAFFIC IMPACT ASSESSMENT 2015**

# Appendix D

**ENVIRONMENTAL MANAGEMENT PROGRAMME**





