



**ENVIRONMENTAL  
SCOPING REPORT FOR  
THE CHARLIE 1 LANDFILL  
OPTIMISATION AND  
STORMWATER MANAGEMENT  
PROJECT, SASOL SYNFUELS,  
SECUNDA, MPUMALANGA**

**DRAFT**

**AUGUST 2015**

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## *Document Description*

Client:

**Sasol South Africa (Pty) Ltd**

Project Name:

**Environmental Scoping Report for the Charlie 1 Landfill Optimisation and Storm Water Management Project, Sasol Synfuels, Secunda, Mpumalanga**

Royal HaskoningDHV Reference Number:

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**Signature**

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## Glossary

**Alternative:** Different means of meeting the general purpose and requirements of the activity, which may include site or location alternatives; alternatives to the type of activity being undertaken; the design or layout of the activity; the technology to be used in the activity and the operational aspects of the activity.

**Development:** Means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, including any associated post development monitoring, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and excluding the redevelopment of the same facility in the same location, with the same capacity and footprint.

**Cumulative Impact:** The impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

**Do-nothing Alternative:** The 'do-nothing' or 'No go' alternative is the option of not undertaking the proposed activity, that is, the maintenance of the status quo.

**Environmental Assessment Practitioner (EAP):** The individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

**Environmental Management Programme (EMPr):** A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. The EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

**Environmental Impact:** A change to the environment, whether adverse or beneficial, wholly or partially, resulting from an organisation's activities, products or services.

**Fatal Flaw:** Issue or conflict (real or perceived) that could result in a development being rejected or stopped. Such an issue or conflict would be considered to be a significant issue that mitigation could not address.

**Integrated Environmental Management:** A philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity - at local, national and international level - that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).

**Interested and Affected Party:** For the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v), and which includes - (a) any person, group of persons or organisation interested in or affected by such operation or activity; and (b) any organ of state that may have jurisdiction over any aspect of the operation or activity.

**Mitigate:** The implementation of practical measures designed to avoid, reduce or remedy adverse impacts, or to enhance beneficial impacts of an action.

**Piezometer:** A device used to measure groundwater levels, providing information essential to understanding site baseline information.

**Watercourse:** Means:

- a) a river or spring;
- b) a natural channel or depression in which water flows regularly or intermittently;
- c) a wetland, lake or dam into which, or from which, water flows; and
- d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

**Wetland:** Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

## *Abbreviations and Acronyms*

|          |   |
|----------|---|
| BID      | Background Information Document   |
| CLP      | Contaminated Leachate Pond  |
| CMA      | Catchment Management Agency   |
| CSP      | Contaminated Stormwater Pond  |
| DEA      | Department of Environmental Affairs   |
| DNAPL    | Dense Non-Aqueous Phase Liquid  |
| DWS      | Department of Water and Sanitation  |
| EA       | Environmental Authorisation   |
| ECA      | Environmental Conservation Act  |
| EIA      | Environmental Impact Assessment   |
| EMI      | Environmental Management Inspectorate   |
| EMPr     | Environmental Management Programme  |
| ESS      | Environmental Scoping Study   |
| ESR      | Environmental Scoping Report  |
| GMLM     | Govan Mbeki Local Municipality  |
| GSDM     | Gert Sibande District Municipality  |
| I&APs    | Interested and Affected Parties   |
| IGS      | Institute for Groundwater Studies   |
| mamsl    | meters above mean sea level   |
| MDARDLEA | Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs |
| NEMA     | National Environmental Management Act   |
| NEM:WA   | National Environmental Management: Waste Act  |
| NWA      | National Water Act  |
| PPP      | Public Participation Process  |
| S-Value  | Storativity   |
| SAWS     | South African Weather Services  |
| SEMA     | Specific National Environmental Management Act  |

|         |                               |
|---------|-------------------------------|
| T-Value | Transmissivity                |
| TCE     | Trichloroethylene             |
| WML     | Waste Management Licence      |
| WULA    | Water Use Licence Application |

# 1 INTRODUCTION

## 1.1 Project Background

The Sasol Synfuels, Secunda, Charlie 1 landfill site was authorised in 1993 as a Class II Site, in terms of the Environmental Conservation Act (ECA) (No 73 of 1989). The landfill has been in operation since 1993, receiving domestic waste, office waste and plant waste of a non-hazardous nature from the Synfuels plant.

Furthermore, with the promulgation of the National Environmental Management: Waste Act, 2008 [NEM:WA] (No 59 of 2008) and the Waste Classification and Management Regulations, 2013 (GN R.634) as well as GN R.635 of 2013 (National Norms and Standards for Assessment of Waste for Landfill Disposal) and GN R.636 of 2013 (National Norms and Standards for Disposal of Waste to Landfill), there is a need to improve waste and water management at waste disposal sites like the Charlie 1 landfill site.

Sasol South Africa Pty Ltd (Sasol) therefore propose to construct a contaminated leachate and stormwater pond within a pollution control pond area, adjacent to the western boundary of the existing landfill site on the farm Driehoek 275 IS, to ensure compliance with the existing permit requirements and ensure the effective management of leachate and stormwater at the Charlie 1 landfill site (Figure 1 – **Appendix A**).

The estimated size of the ponds is as follows:

- Contaminated leachate pond (CLP) – 1500 m<sup>3</sup>.
- Contaminated stormwater pond (CSP) – 15000 m<sup>3</sup>.

Sasol also proposes increasing the existing landfill height up to 20 m to achieve the required airspace for the remaining life of the landfill.

## 1.2 Key Objectives of the Study

The key objectives of the study are therefore to:

- Develop the contaminated groundwater interception system and stormwater management system to serve both the current site as well as any extension thereof within the permit boundaries, ensuring that the systems are within the applicable legislation, guidelines, regulations and standards, as a minimum requirement;
- Optimize the remaining airspace volume to maximize the life of the site; and
- Extend the life of the site within the bounds of the existing landfill permit requirements/conditions.



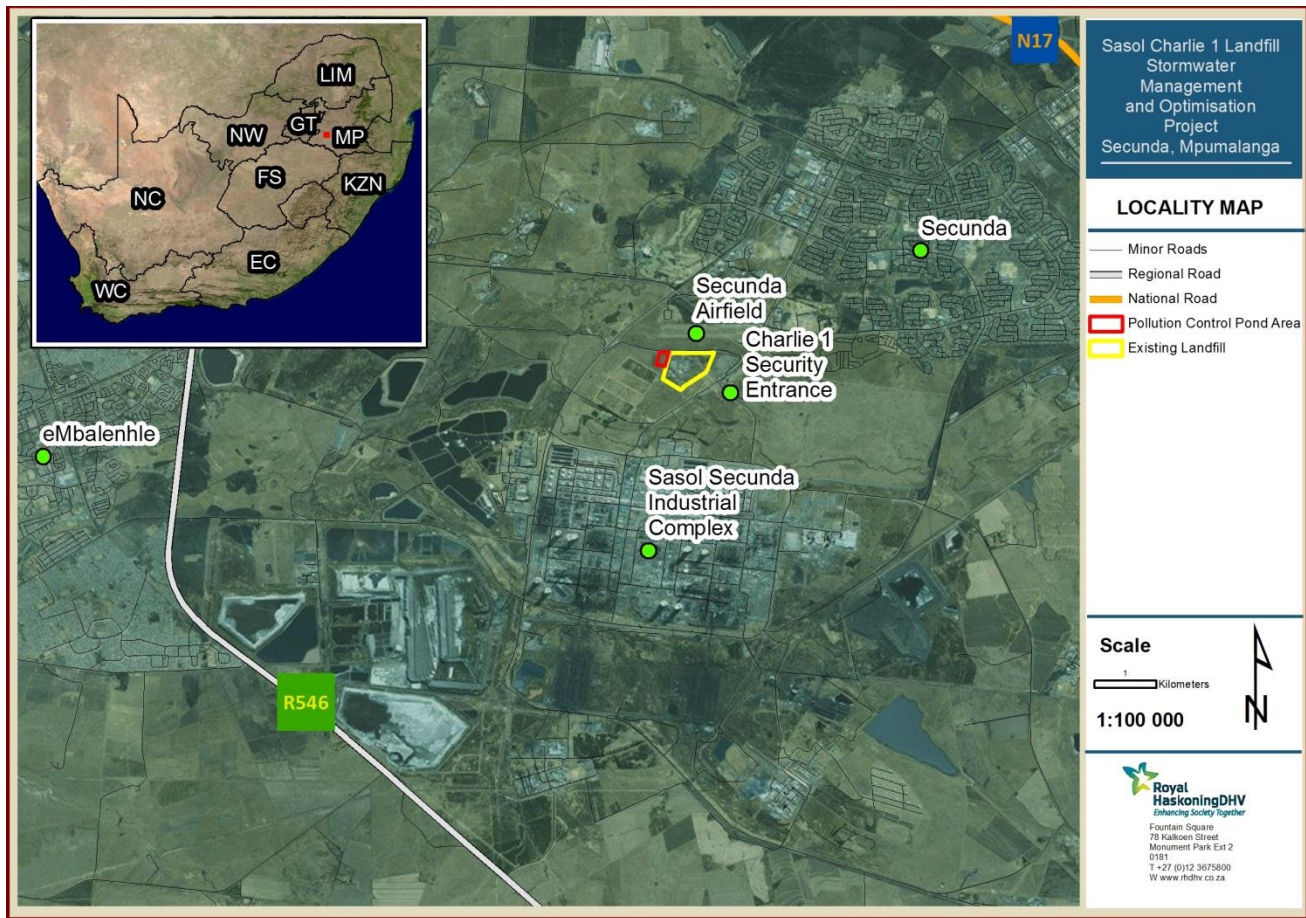


Figure 1: Locality map

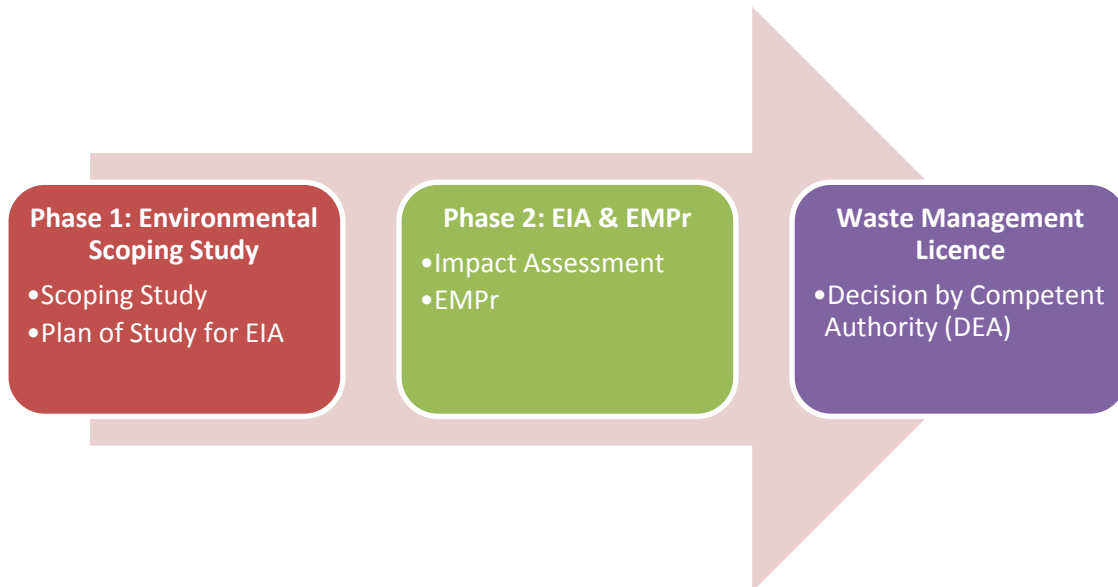
### 1.3 Approach to the Environmental Scoping Study

The environmental impacts associated with the proposed project require investigation in compliance with Government Notice No 921 of the NEM:WA (No 59 of 2008) and the EIA Regulations (2014) published in Government Notice No R.982 to No R.984 and read with Section 24 (5) of the National Environmental Management Act [NEMA] (Act No 107 of 1998) as amended. In addition, GN R.634 of 2013 (Waste Classification and Management Regulations) will also be considered in this study.

An application for a Waste Management Licence (WML) is being lodged with the Department of Environmental Affairs (DEA) for the proposed project and a Scoping and EIA study is being undertaken in support of the application. The EIA study is being undertaken in two phases (Figure 2) that will ultimately allow the DEA (Competent Authority) to make an informed decision:

- Phase 1 – Environmental Scoping Study (ESS) including and Plan of Study for EIA; and
- Phase 2 – Environmental Impact Assessment (EIA) and Environmental Management Programme (EMPr).





**Figure 2: Environmental studies flowchart**

The ESS provides a description of the receiving environment and how the environment may be affected by the development of the proposed project. The ESS will also identify alternatives and mitigation options to be evaluated and investigated during the EIA phase of the project. Desktop studies (making use of existing information) as well as specialist assessments will be used to highlight and assist in the identification of potential significant impacts (both social and biophysical) associated with the proposed project.

## 1.4 Specialist Studies

To ensure the scientific vigour of the EIA process as well as a robust assessment of impacts, Royal HaskoningDHV was assisted by various specialists and specialist assessments in order to comprehensively identify both potentially positive and negative environmental impacts (social and biophysical) associated with the project and where possible mitigate the potentially negative impacts and enhance the positive impacts.

The following specialist studies have been conducted for the proposed project from 2008 and 2013 (Table 1):

**Table 1: List of specialist studies undertaken from 2008 – 2013**

| Specialist Study  | Organisation                      |
|---|-----------------------------------|
| Charlie 1 Domestic Waste Site, Sasol Synfuels, Secunda: Quantification of Impacts, Assessment of Risk and Possibility of Expansion (August, 2008) | Institute for Groundwater Studies |
| Investigation into Remediation Options for the Charlie 1 Landfill Leachate (2009)   | SRK Consulting                    |
| Sasol Synfuels Co-disposal Waste Landfill Facility Pre-feasibility (2012)   | SRK Consulting                    |
| Pre-feasibility Assessment for Site Extension and Stormwater Management for Charlie 1 Landfill (2013)   | Golder Associates                 |

In addition to the above specialist studies, the following reports have been prepared in support of the EIA study (Table 2):

**Table 2: Specialist studies to be undertaken/ undertaken**

| Specialist Study   | Organisation                          |
|--|---------------------------------------|
| Pollution Control Dam Site Selection and Location  | Golder Associates                     |
| Feasibility Engineering Package (FEP) for the Stormwater and Leachate Management of Charlie 1 Landfill | Golder Associates                     |
| Wetland Verification Exercise  | Scientific Aquatic Services           |
| Ecological Assessment  | Clayton Cook & Leslie Brown (Private) |

## 1.5 Concurrent Licencing/Authorisation Processes

### 1.5.1 Water Use Licence (WUL)

In terms of Chapter 4 of the National Water Act [NWA], (No 36 of 1998), activities and processes associated with the proposed project are required to be licenced by the Department of Water and Sanitation (DWS).

The following water use as defined in Section 21 of the NWA, is applicable for the proposed project i.e. Section 21g – Disposing of waste in a manner which may detrimentally impact on a water resource.

### 1.5.2 Zoning

Sasol will submit a Land use Rights Application for Discretionary Land Use to the Govan Mbeki Municipality to change the existing land use from agricultural to agricultural industrial.

## 1.6 Details of the Environmental Assessment Practitioner

The environmental team from Royal HaskoningDHV have been appointed by Sasol as the independent Environmental Assessment Practitioner (EAP) to conduct the necessary studies to obtain a WML for the proposed project.

The professional team of Royal HaskoningDHV have considerable experience in the environmental management and EIA fields. Royal HaskoningDHV has been involved in and/or managed several of the largest Environmental Impact Assessments undertaken in South Africa to date. A specialist area of focus is on the assessment of multi-faceted projects, including the establishment of linear developments (national and provincial roads, and power lines), bulk infrastructure and supply (e.g. wastewater treatment works, pipelines, landfills), electricity generation and transmission, the mining industry, urban, rural and township developments, environmental aspects of Local Integrated Development Plans (LIDPs), as well as general environmental planning, development and management.

The details of the EAP are presented in Table 3 below. The project team CVs are attached as **Appendix B**.

**Table 3: Details of the EAP**

| Details          |  |
|------------------|--|
| Consultant:      | Royal HaskoningDHV   |
| Contact Persons: | Nicole Botham and Prashika Reddy   |
| Postal Address   | PO Box 25302, Monument Park, 0105  |
| Telephone:       | 012 367 5800   |
| Facsimile:       | 012 367 5878   |
| E-mail:          | nicole.botham@rhdhv.com / <a href="mailto:prashika.reddy@rhdhv.com">prashika.reddy@rhdhv.com</a> |

#### Details

|            |  |
|------------|--|
| Expertise: | <p>Ms Botham is an Environmental Consultant with seven years experience in the mining sector, having undertaken work in Africa, Europe, Middle East, USA and Fiji. She has focussed on management plan preparation, mine decommissioning (closure) and audits of mine investments. Areas of expertise include: Scoping Reports, Environmental Impact Assessment (EIA), Environmental Management Reports, Environmental Audits, and Baseline Studies. Key project experience includes: Sol Plaatje Municipality, Trekkopje Mine, Tshipi è ntle Mine, Bon Accord Mine, Wonderfontein Mine, Manganese mine in Burkina Faso, Vatukoula Gold Mine, Northland Mine, Antimony Process Plant in Oman, and a Biofuels project in Mozambique.</p> <p>Ms Reddy is a Principal Associate / Senior Environmental Scientist (<i>Pr Sci Nat</i> 400133/10) with a BSc Honours in Geography and Botany. Ms Reddy has the necessary experience in various environmental fields including: environmental impact assessments, environmental management plans/programmes, public participation and environmental monitoring and auditing. Ms Reddy has extensive experience in compiling environmental reports (Screening, Scoping, EIA and <i>Status Quo</i> Reports). Ms Reddy is/has been part of numerous multi-faceted large-scale projects, including the establishment of linear developments (roads, and power lines); industrial plants; electricity generation plants and mining-related projects.</p> |
|------------|--|

## 1.7 Structure of the Report

This ESR is being compiled according to the guidelines provided in Government Notice R.982, Section 21 – 22 as well as Appendix 2 of the EIA Regulations (2014) – refer to Table 4.

**Table 4: ESR requirements according to Section 21 – 22 and Appendix 2 of GN R. 982**

| ESR Requirements according to Section 21 – 22 & Appendix 2 of GN R. 982  | Section / Comment |
|--|-------------------|
| (a) details of (i) the EAP who prepared the report; and (ii) the expertise of the EAP including a curriculum vitae   | 1.6               |
| (b) the location of the activity, including (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties   | 2.2.1             |
| (c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken | Figure 1          |
| (d) a description of the scope of the proposed activity, including (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure  | 1.2; 2; 5.3; 5.4  |
| (e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process                               | 5                 |

| ESR Requirements according to Section 21 – 22 & Appendix 2 of GN R. 982   | Section / Comment |
|---|-------------------|
| (f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location  | 4                 |
| (g) a motivation for the preferred development footprint within the approved site   | 3.1               |
| <p>(h) a description of the process followed to reach the proposed preferred activity, site and location within the site, including:</p> <ul style="list-style-type: none"> <li>(i) details of all the alternatives considered;</li> <li>(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents inputs;</li> <li>(iii) a summary of issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;</li> <li>(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</li> <li>(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impact (aa) can be reserved; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;</li> <li>(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;</li> <li>(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</li> <li>(viii) the possible mitigation measures that could be applied and level of residual risk;</li> <li>(ix) the outcome of the site selection matrix;</li> <li>(x) if not alternatives, including alternative locations for the activities were investigated, the motivation for not considering such; and</li> <li>(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity</li> </ul> | 3; 6; 8; 9        |
| (i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with activity; (ii) a description of the aspects to be assessed as part of the environmental impact assessment process; (iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance; (vi) a indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; (viii) a description of the tasks that will be undertaken as part of the  | 10                |

| ESR Requirements according to Section 21 – 22 & Appendix 2 of GN R. 982  | Section / Comment  |
|--|--|
| environmental impact assessment process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored  |  |
| (j) an undertaking under oath or affirmation by the EAP in relation to (i) the correctness of the information in the report; (ii) the inclusion of the comments and inputs from stakeholders and interested and affected parties; and (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties | <p>All information provided in this report by the EAP as well as the Applicant was correct and valid at the time it was provided to stakeholders and I&amp;APs.</p> <p>The input from stakeholders and I&amp;APs will form part of the final Consultation ESR.</p> |
| (k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment   | All comments received from the I&APs and stakeholders for the EIA phase, will be addressed in the Plan of Study.   |
| (l) where applicable, any specific information required by the competent authority   | NA   |
| (m) any other matter required in terms of section 24(4)(a) and (b) of the Act  | NA   |

## 2 PROJECT DESCRIPTION

### 2.1 The Charlie 1 Landfill Site

#### 2.1.1 Landfill Size and Location

The footprint area of the landfill is approximately 31 ha, within the about 1611 ha owned by Sasol that is predominantly zoned as industrial. The site was originally a dolerite borrow area, presumably for aggregate required during the building of the plant and road network. Some informal disposal of rubble and coarse ash began as a means of filling the pits. In 1991, a formal permit application process for a disposal site was initiated. A Class II permit was issued in 1993.

Sasol Synfuels is situated on the Remainder Portion of the farm Driehoek 275 IS. The Charlie 1 landfill site is located 1.3 km north of the Sasol Synfuels main plant area. It is located within the secondary security fence of the plant, approximately 450 m west of the Charlie 1 security gate. Figure 3 shows the landfill boundary outlined in yellow. The Charlie 1 Security Entrance is immediately east of the landfill, with the main plant access road on the east and south. A secondary road runs east-west on the northern edge of the site, along the main plant security fence. All waste delivery vehicles approach the site on this road, from the west.

Entrance to the site is midway along the northern boundary. To the west and south, the site is surrounded by open fields. To the north, beyond the road and fence lies a buffer zone of open veld that is a light aircraft landing strip.

#### 2.1.2 Landfill Classification

The Charlie 1 landfill site was issued with a permit in 1993, which was prior to the publication of the Minimum Requirements series and GN R.636, resulting in it being classified as a Class 2 landfill, which does not produce significant leachate (GMB<sup>2</sup>).

#### 2.1.3 Current Operations

Since the early nineties, the Charlie 1 landfill site has been receiving general waste from the Sasol Synfuels plant. The waste streams currently received are scrap rubber, office waste, beverage tins, plastics, cardboard, wood, scrap metal, cables, building rubble, soil, insulation waste, spent catalyst, garden waste, general household and canteen waste. The average waste volume per month is approximately 16000 m<sup>3</sup>. No waste generated outside the Sasol boundary is disposed at the landfill. A contractor, Inter-waste, operates the site with a staff complement of 6 on-site, including a gate clerk, 3 spotters, plant operators and 1 supervisor (*ad hoc*).

The waste volumes are not large and therefore the waste is tipped into cells, pushed by bulldozer into the end of the cell, and covered with soil or rubble. The landfill site receives comparatively large volumes of builder's rubble and excavated soils from trenching and building works on the Sasol plant. The soil and rubble is stockpiled upslope of the cells, while the waste is pushed to the back of the cell at a lower level. At the end of the day, the bulldozer is used to push down some cover material to cover the waste below. This system is suitable for the size of the operation.

Waste is reclaimed and recycled and this includes cans, plastic, wooden pallets, etc.



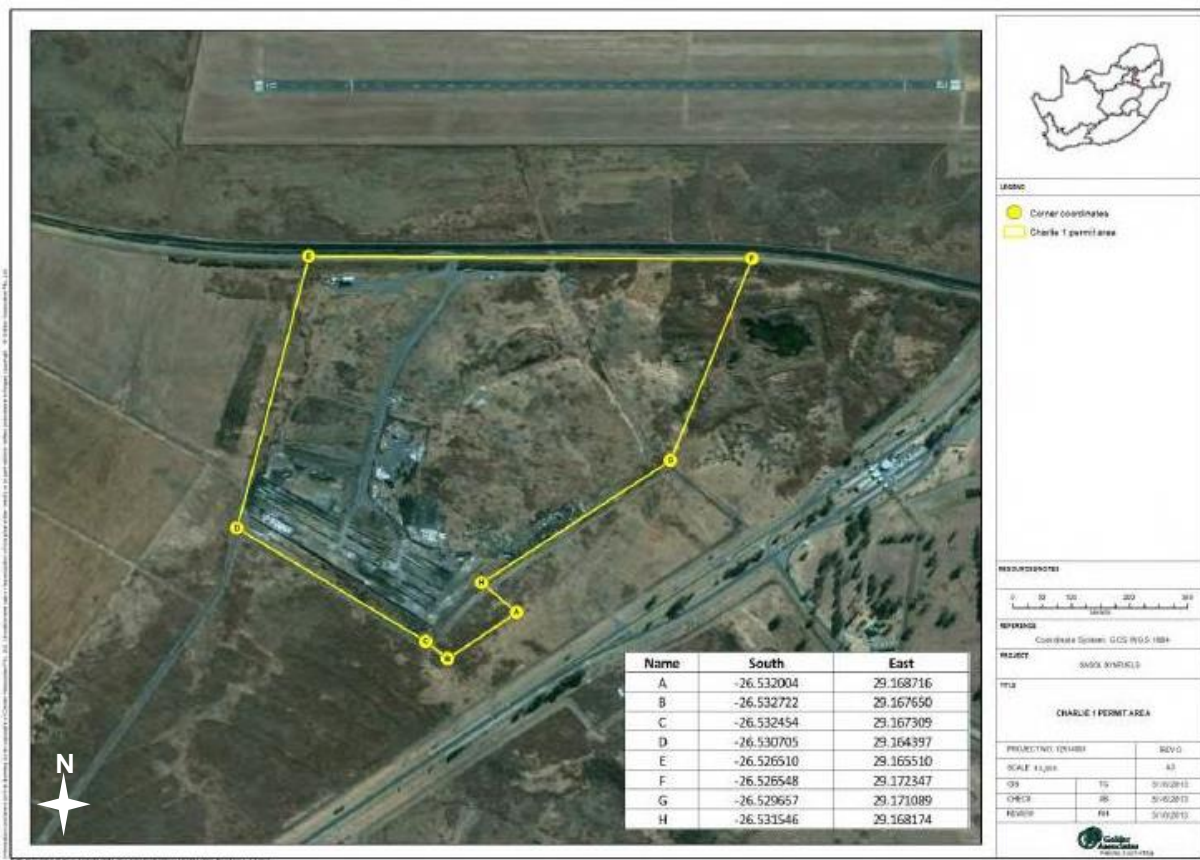


Figure 3: Charlie 1 landfill site<sup>1</sup>

## 2.2 Contaminated Leachate and Stormwater Management

### 2.2.1 Proposed Project Location

The contaminated leachate pond - CLP ( $\pm 1500 \text{ m}^3$ ) and the contaminated stormwater pond - CSP ( $\pm 15000 \text{ m}^3$ ) will be constructed in a pollution control pond area adjacent to the western boundary of the existing landfill site on the farm Driehoek 275 IS (Figure 4). The overall footprint of the pollution control pond area is approximately 2 ha. The site details as well as landowner information is presented in Table 5.

Table 5: Site details

| Pollution Control Pond Area  |                                   |
|------------------------------|-----------------------------------|
| Farm details:                | Driehoek 275 IS Portion 43        |
| Current Zoning               | Agricultural                      |
| SG 21 digit code             | T0IS00000000027500043             |
| Landowner details:           | Sasol Chemical Industries Pty Ltd |
| Co-ordinates (centre point): | 26° 31' 38.94" S; 29° 9' 52.66" E |

<sup>1</sup> Map courtesy of Golder Associates (2013) – Site extension and stormwater management for Charlie 1 landfill.





**Figure 4: Google Earth image of the Charlie 1 landfill as well as proposed pollution control pond area**

### *2.2.2 Leachate Interception and Management*

Leachate onsite is formed when stormwater recharge seeps through the waste. As the Charlie 1 landfill was not equipped with a bottom liner system, an effort must be made to intercept, collect and handle this leachate as effectively as possible to limit the potential contamination of local shallow groundwater. A dedicated leachate interception system is proposed by constructing interception “curtain” drains along the downslope boundaries (south-west and north) of the site (Figure 5).

The “curtain” drains along the southern, western and northern downslope boundaries of the landfill site will extend to depths varying from 2 to 5 m below surface level. The interception drain will collect leachate from the landfill into an HDPE pipe which directs flow to a sump located in the north-west corner of the site. This sump will be constructed with two sets of manhole rings with concrete infill to prevent leachate leakage and to ensure structural integrity at this critical point of the system. Leachate is then pumped from this sump into the CLP that is lined with a geosynthetic liner system meeting regulatory requirements.

### *2.2.3 Leachate Collection, Impoundment and Handling*

The CLP will have a capacity of  $\pm 1500 \text{ m}^3$ , designed to maintain a freeboard of at least 0.5 m. To limit the frequency of abstraction from the pond to maintain/manage the in-pond water levels, the pond will be equipped with a 12.5 m wide evaporative fringe. The numerical water balance modelling for the pond indicated that about  $10 \text{ m}^3/\text{d}$  of leachate on average (depending on climatic conditions) could be evaporated from this fringe. This will require periodic abstractions from the pond to maintain the in-pond water levels as well as to ensure that the impounded leachate salt concentrations are maintained within limits that will allow for reasonable ongoing evaporation rates.

To allow for the distribution of the impounded leachate onto the evaporative fringe and also to further enhance evaporation, a micro spray system will be installed.

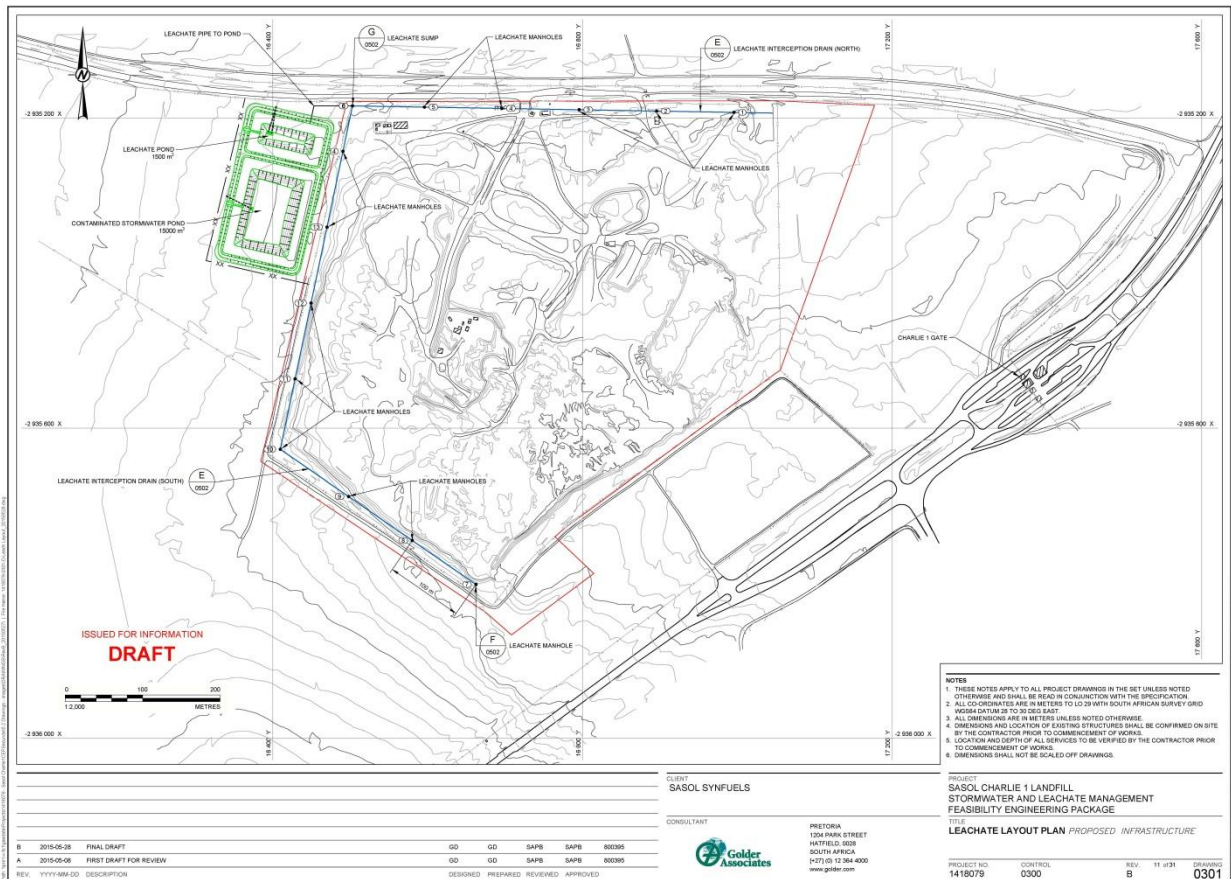


Figure 5: Leachate system general arrangement

### 2.2.4 Stormwater Interception and Management

Stormwater falling on the site is intercepted and prevented from leaving the site via a series of concrete v-drains along the boundary. Drains are proposed along the southern, western and northern site boundaries, while a diversion berm is to be constructed along the upslope eastern boundary of the site. This berm serves the purpose of preventing “clean” off-site run-off from entering the site and becoming contaminated (Figure 6).

The v-drains will be constructed from concrete filled geocells. This construction technique is proposed due to expected settlement associated with landfill ground conditions and the relative flexibility of the geocells. Two different sized v-drains are proposed, namely Type 1 and Type 2, based on expected flow rates in different areas:

- Type 1: 2.4 m wide, 0.6 m deep, 1:2 side slopes; and
- Type 2: 3.2 m wide, 0.8 m deep, 1:2 side slopes.

Type 1 drains will be used for the northern channel and the south-eastern channel while Type 2 will be used for the south-western drain.

### 2.2.5 Stormwater Collection, Routing and Impoundment

As described above, the stormwater will be collected by a series of concrete v-drains. These drains work on a gravity system which direct flow to a silt trap before spilling into the CSP. Stormwater diversion structures are to be constructed at strategic locations along these drains to allow for diverting of clean run-off from rehabilitated areas away from the site. The CSP, which is also lined with a geosynthetic liner system meeting regulatory requirements, has a capacity of 15000 m<sup>3</sup> while maintaining a freeboard of 0.5 m at all times.

As with the CLP, the CSP will be equipped with a 12.5 m wide evaporative fringe. The numerical water balance modelling for the pond indicated that about 30 m<sup>3</sup>/d of leachate on average (depending on climatic conditions) could be evaporated from this fringe. This will require periodic abstractions from the pond to maintain the in-pond water levels. To allow for the distribution of the impounded stormwater onto the evaporative fringe and also to further enhance evaporation, a micro spray system will be installed and operated on the fringe.

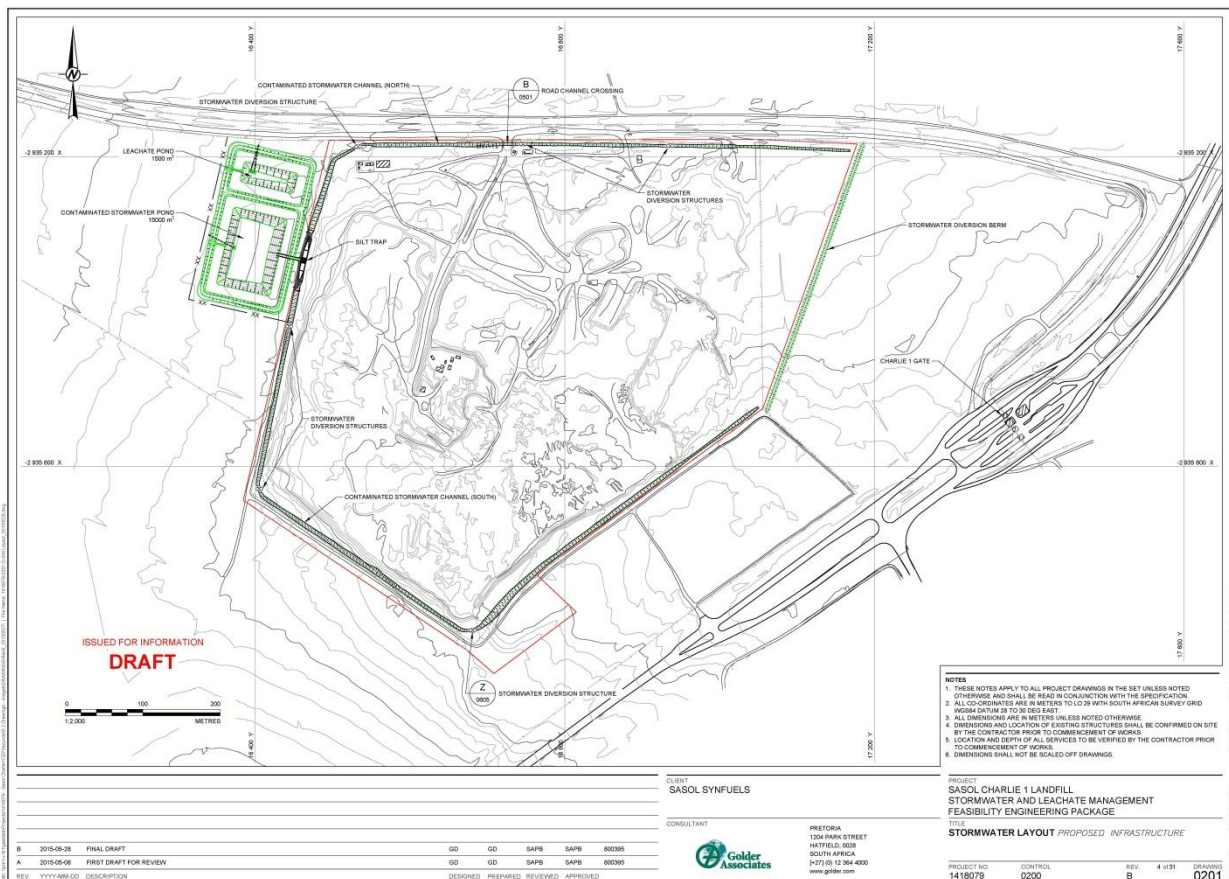


Figure 6: Stormwater system general arrangement



## 2.3 Proposed Extension of the Charlie 1 Landfill Height

The Charlie 1 waste permit (B33/2/310/28/P51 dated January 1993, **Appendix C**) states no height restriction for the landfill site but does specify the allowable landfill footprint (the permitted landfill footprint is shown in Figure 3).

Sasol proposes to increase the height of the Charlie 1 landfill by 20 m to achieve the required airspace for the remaining life of the landfill. The aesthetics of the landfill will be addressed, for stakeholders in general, but specifically for a number of key receptors:

- Charlie 1 Security Entrance;
- Graceland Casino and Hotel;
- Secunda Mall; and
- Secunda X66 light industrial development (under consideration).

## 3 PROJECT ALTERNATIVES

In terms of the EIA Regulations (2014) GN R.982, Appendix 2: Section 2 (h) (i) all alternatives are required to be considered as part of the environmental investigations. In addition, the obligation that alternatives are investigated is also a requirement of Section 24(4) of the National Environmental Management Act (No 107 of 1998) (as amended). An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity (as defined in GN R.982 of the EIA Regulations, 2014), which may include alternatives to:


- a) The property on which or location where it is proposed to undertake the activity – **Section 3.1**
- b) The type of activity to be undertaken – **not applicable to this study**
- c) The design or layout of the activity – **Section 3.2**
- d) The technology to be used in the activity – **not applicable to this study**
- e) The operational aspects of the activity – **not applicable to this study**
- f) The option of not implementing the activity – **Section 3.3**

### 3.1 Site Alternatives

A site selection analysis was conducted in the Pre-Feasibility and Feasibility Phases for the proposed project to determine the site location of the pollution control pond area. Table 6 provides a description of the various alternatives considered and associated advantages and disadvantages.


Option 1 is the preferred location for the ponds as it is located at the lowest point topographically, allowing for simpler and cost effective implementation of the ponds by minimising pumping and earthworks requirements. This alternative also allows for expansion of the landfill to the maximum footprint as authorised, increasing the available airspace and hence remaining operation life.



**Table 6: Site alternative options, advantages and disadvantages for the proposed project**


| Site Alternative Options   | Location   | Advantages  | Disadvantages   |
|--|--|---|---|
| <p><b>Option 1 (Preferred)</b></p> <p>The location of the ponds in Option 1 is outside the property of the landfill, immediately adjacent to the north-western boundary.</p> |  | <ul style="list-style-type: none"> <li>▪ Situated at the closest low point to the Charlie 1 landfill site.</li> <li>▪ All surface water drainage can gravitate to this point, therefore no pumping is needed.</li> <li>▪ Site capacity is maximised for landfilling.</li> <li>▪ The ponds are positioned in the corner of the adjacent property. Therefore the landfill space is used optimally by utilising the minimal footprint.</li> <li>▪ Easy access from the gravel road to the north of Charlie 1. New roads will not have to be developed.</li> <li>▪ Ground is relatively level and clear, making construction economical and simpler.</li> <li>▪ There is no undermining at this proposed location that may influence geotechnical stability.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Rezoning may be required.</li> </ul> |

| Site Alternative Options  | Location   | Advantages  | Disadvantages  |
|---|--|---|--|
| <p><b>Option 2</b></p> <p>The location of the ponds in Option 2 is within the property boundary of the Charlie 1 landfill. The ponds are located in the north-western corner of the landfill area. A large part of this location has already been landfilled, with some small structures also existing.</p> |  | <ul style="list-style-type: none"> <li>No rezoning required purely on the basis that it is located within the bounds of the existing Charlie 1 permitted landfill footprint.</li> </ul> | <ul style="list-style-type: none"> <li>Ponds are located on higher ground than the collection systems. This means that the stormwater will need to be collected and pumped upstream into the ponds, which will have cost implications. Pumping of stormwater run-off invariably poses challenges.</li> <li>The area is not level and will require additional earthworks. The process of levelling and clearing will also involve the moving and “re-landfilling” of waste. Thereby reducing the landfill capacity of Charlie 1.</li> <li>Airspace loss at the landfill.</li> <li>Although not expected to be of concern, the geotechnical stability will need to be confirmed due to undermining at the proposed location.</li> <li>Limited surface infrastructure e.g. shed will have to be removed and relocated to other portions of the landfill site which will have an influence on cost.</li> </ul> |



| Site Alternative Options   | Location   | Advantages  | Disadvantages  |
|--|--|---|--|
| <p><b>Option 3</b></p> <p>The location of the ponds in Option 3 is in the south east corner of the Charlie 1 landfill site, inside the landfill property. A large part of this location has already been landfilled, although a section of the eastern extent is currently open.</p> |  | <ul style="list-style-type: none"> <li>▪ No rezoning required purely on the basis that it is located within the bounds of the existing Charlie 1 permitted landfill footprint.</li> <li>▪ A large section of the proposed location is relatively level.</li> <li>▪ This option presents the lowest loss of landfill capacity while keeping the ponds on the landfill property.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Surface water will not gravitate to the pond location. Pumping, along with the construction of a collection sump will be required at a cost. The pumping requirements in this case, will be somewhat greater than those of Option 2.</li> <li>▪ The process of levelling and clearing a small section of this location will involve the moving and “re-landfilling” of waste. Thereby reducing the landfill capacity of Charlie 1.</li> <li>▪ Airspace loss at the landfill site.</li> <li>▪ New service roads would have to be constructed to the pond area.</li> <li>▪ Although not expected to be of concern, the geotechnical stability will need to be confirmed due to undermining at the proposed location.</li> </ul> |

| Site Alternative Options  | Location  | Advantages  | Disadvantages   |
|---|---|---|---|
| <p><b>Option 4</b></p> <p>The location of the ponds in Option 4 is in the north east corner of the site, within the boundary of the landfill property. A section of the ponds covers a currently landfilled area.</p>   |   | <ul style="list-style-type: none"> <li>No rezoning required purely on the basis that it is located within the bounds of the existing Charlie 1 permitted landfill footprint.</li> <li>A large section of the proposed location is relatively level.</li> <li>There is no undermining at this proposed location that may influence geotechnical stability.</li> </ul>                      | <ul style="list-style-type: none"> <li>Surface water will not gravitate to the pond location. Pumping, along with the construction of a collection sump will be required at a cost. The pumping requirements in this case, will be somewhat greater than those of Option 2.</li> <li>The process of levelling and clearing a small section of this location will involve the moving and “re-landfilling” of waste. Thereby reducing the landfill capacity of Charlie 1.</li> <li>Loss of airspace at the landfill.</li> </ul> |
| <p><b>Option 5</b></p> <p>Option 5 involves the pumping of surface water and leachate to Sasol’s sewage treatment plant.</p> <p>This is located approximately 2.5 km south-west of the facility and would include a pipeline with a minimum of two road crossings and a river crossing.</p> |  | <ul style="list-style-type: none"> <li>No rezoning required, (allowing for a quicker approval process).</li> <li>EIA and other relevant licencing for ponds are not required.</li> <li>Site capacity is maximised for landfilling (no airspace loss).</li> <li>All surface water drainage can gravitate to this point.</li> <li>Cost saving by not constructing the new ponds.</li> </ul> | <ul style="list-style-type: none"> <li>Pipeline with large pumps would need to be constructed at a cost.</li> <li>Relevant licencing would be required for the pipeline (which includes at least two road crossings and a river crossing). This could be mitigated by using a pipeline not exceeding 360 mm, constructed within the road servitude.</li> <li>Mixing of contaminated surface run-off with potentially highly contaminated wastewater.</li> </ul>   |

| Site Alternative Options  | Location   | Advantages   | Disadvantages   |
|---|--|--|---|
| <p><b>Option 6</b></p> <p>Option 6 is essentially a combination of Options 1 and 5. It includes a leachate sump, located at an appropriate location along the lower western boundary of the site, which will collect leachate.</p> <p>The leachate will then be pumped from this sump to the sewage treatment plant as in Option 5. The leachate will add a small additional waste load to the large sewage stream at the sewage treatment plant. A dedicated stormwater dam will collect the relatively clean run-off from the site, which will be located outside the property boundary, in the north-western corner, as in Option 1.</p> |  | <ul style="list-style-type: none"> <li>▪ Potentially no rezoning required, allowing for a quicker approval process.</li> <li>▪ EIA may not be required, if General Authorisation route may be taken for the dam. Sump does not constitute a “hazardous lagoon”.</li> <li>▪ Site capacity is maximised for landfilling (minimal airspace loss).</li> <li>▪ Situated at the closest low point to the Charlie 1 landfill, therefore all surface water drainage can gravitate to this point.</li> <li>▪ Liner requirements for the new stormwater pond are likely to be significantly reduced since no leachate will enter the pond.</li> <li>▪ Easy access from the gravel road to the north of Charlie 1. New roads will not have to be developed.</li> <li>▪ Ground is relatively level and clear, making construction economical and simpler.</li> <li>▪ There is no undermining at this proposed location that may influence geotechnical stability.</li> </ul> | <ul style="list-style-type: none"> <li>▪ Pipeline with pumps would need to be constructed at a cost for leachate routing, however much less than pumping stormwater.</li> <li>▪ Relevant licencing would be required for the pipeline (which includes at least two road crossings and a river crossing). This could be mitigated by using a pipeline not exceeding 360 mm, constructed within the road servitude. In all likelihood the pipeline will be less than 100 mm in diameter.</li> </ul> |

## 3.2 Design/Layout Alternatives

### 3.2.1 New Landfill

In 2012, SRK Consulting undertook a Pre-feasibility Study for a new co-disposal landfill for general and hazardous waste streams to be generated by the Synfuels over a 40 year operational life. Based on the results of the investigations undertaken, the following conclusions were drawn:

- A Class A (H:H) waste and Class C (G:L:B) disposal facility would be required in terms of legislation, waste streams, the size of the waste stream and the potential for leachate generation.
- Through a site selection matrix and a fatal flaw elimination assessment, the most preferred landfill site was identified to be next to Charlie 1. However, the waste load projections and conceptual design indicated that the single site footprint size available will not be large enough to accommodate waste for the expected 40 year period. This would indicate a preferred option of combining the development of a new site adjacent to Charlie 1 with the extension of the life of Charlie 1.
- To develop a co-disposal landfill would thus require approximately R364 million capital investment excluding operational costs.

### 3.2.2 Pollution Control Dam vs. Contaminated Leachate and Stormwater Ponds

During the Pre-feasibility Phase of the project, it was proposed that a Pollution Control Dam (PCD) of approximately 16000 m<sup>3</sup> would be constructed. The inflow to the PCD would mainly comprise of contaminated run-off from the active landfill cells as well as contaminated shallow seepage from the overall landfill footprint area which will then be controlled within the PCD by means of enhanced evaporation. It was further proposed that the PCD will have a separate cell which would house the leachate from the leachate system, ensuring that the contaminated stormwater and the leachate never mix in the PCD.

However, during the Feasibility Phase, it was concluded that the volume of leachate expected would require a separate pond. Hence, two separate ponds *viz.* CLP and CSP would be required for the storage of contaminated leachate and stormwater. The sizes of the ponds are as follows:

- CLP – ±1500 m<sup>3</sup>.
- CSP – ±15000 m<sup>3</sup>.

## 3.3 Do Nothing / No-Go Alternative

Currently, the water management system at the Charlie 1 landfill site is not in accordance with permit conditions. Due to the promulgation of the National Environmental Management: Waste Act, 2008 [NEM:WA] (No 59 of 2008) and the Waste Classification and Management Regulations, 2013 (GN R.634) as well as GN R.635 of 2013 (National Norms and Standards for Assessment of Waste for Landfill Disposal) and GN R.636 of 2013 (National Norms and Standards for Disposal of Waste to Landfill), there is a need to improve water management at the Charlie 1 landfill site.

Should the status quo remain then Sasol will not be able to comply with the applicable legislation, guidelines, regulations and standards and the current situation will continue which includes:

- Inadequate stormwater management around the landfill site;
- Inadequate leachate management around the landfill site; and
- Inability of the current site to meet the airspace requirements for the remaining life of the landfill.



## 4 PROJECT NEED AND DESIRABILITY

The subsequent section addresses the project's need and desirability according to the DEA's Guideline on Need and Desirability<sup>2</sup>. A number of questions are presented in the Guideline, which assists in the identification of the project's need and desirability. These key questions and answers are presented in Table 7 and further serve as confirmation that the proposed project is in line with the planning requirement of the Municipality and that reasonable measures have been taken to determine the best practicable environmental option for the proposed site.

**Table 7: Proposed project need and desirability**

| Need and Desirability  |  |
|--|--|
| <b>1. Is the activity permitted in terms of the property's existing land use rights? No</b>  |  |
|  | The contaminated leachate and stormwater ponds - will be constructed in a pollution control pond area adjacent to the western boundary of the existing landfill site on the farm Driehoek 275 IS, Portion 43. The overall footprint of the pollution control pond area is approximately 2 ha and the portion of the farm is currently zoned as agriculture. Whilst the activity is not permitted in terms of the property's current zoning, the proximity of the pollution control pond area to the existing Charlie 1 landfill site and a consolidation of impacts on the farm Driehoek, and a discretionary zoning application will be lodged with the Municipality. |
| <b>2. Will the activity be in line with the planning requirements (i.e. Integrated Development Plan – IDP and Spatial Development Framework - SDF) of the Local Municipality? Yes</b>  |  |
|  | According to the Govan Mbeki Local Municipality (GMLM) SDF (2014), the proposed project is located within an area that is earmarked for the expansion of Sasol and related uses. Furthermore, light industrial and/ or commercial development is ear-marked for the area along the perimeter fence to the north (current airport/airfield and surrounding areas) of the Charlie 1 landfill and pollution control pond area. The proposed activity is therefore in line with the GMLM planning requirements.  |
| <b>3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)? Yes</b> |  |
|  | According to the GMLM SDF (2014), the proposed project is located within an area that is earmarked for the expansion of Sasol and related uses. The proposed land use is therefore best suited to the area selected for the development of the pollution control pond area.  |
| <b>4. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations? No</b>  |  |
|  | There are no EMFs for the GMLM or the GSDM however, the proposed project is located in an area that has been earmarked for the expansion of Sasol and related uses (GMLM SDF) and therefore the existing environmental priorities for the area will not be compromised.  |
| <b>5. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.) No</b>   |  |
|  | The GMLM IDP indicates that there are eight landfill sites in the Municipality, however four have been decommissioned.<br>The general waste (scrap rubber, office waste, tins, plastics, cardboard, wood, scrap metals etc.) generated at Sasol Synfuels Plant is disposed of at the Charlie 1 landfill site which is located in the Sasol Synfuels Complex. The expansion of the Charlie 1 landfill height will ensure that the remaining life of the landfill is   |

<sup>2</sup> Department of Environmental Affairs. (2014). Guideline on Need and Desirability in terms of the Environmental Impact Assessment Regulations, 2010.

### Need and Desirability

extended and general waste generated at the plant will be disposed of within the complex and is not disposed of at the four remaining municipal landfill sites placing an additional burden on these landfills. The stormwater and leachate management system proposed for the project would further assist in increasing the life of the landfill.

Therefore, the community does not need this activity, however, indirectly, the proposed project will ensure that the existing Charlie 1 landfill site continues to service the Sasol Synfuels Plant for the disposal of general waste.

**6. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? Yes**

The necessary services (water, electrical etc.) and adequate capacity are currently available at the existing Charlie 1 landfill site. No additional services are needed.

**7. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)? No**

The proposed project is not specifically provided for in the IDP however, the proposed area for the project is indicated in the GMLM SDF as an area for the expansion of Sasol and related uses. The proposed project will be undertaken on Sasol property within the Sasol Synfuels Complex.

**8. Is this project part of a national programme to address an issue of national concern or importance? No**

The proposed project does not form part of a National programme. However, through the development of a pollution control pond area, the contaminated stormwater run-off and leachate will be intercepted, collected and treated in ponds to ensure an effective water management system at the Charlie 1 landfill site preventing risks of contamination to water resources as well as potential health risks.

**9. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.) Yes**

As indicated in Point 2 above, the proposed project is located within an area that is earmarked for the expansion of Sasol and related uses. Furthermore, the project will ensure the effective management of contaminated stormwater and leachate, generated at the Charlie 1 landfill site as well as increase the height of the landfill that will extend the life of the facility.

**10. Is the development the best practicable environmental option for this land/site? Yes**

A site selection analysis was conducted in the Pre-Feasibility and Feasibility Phases for the proposed project to determine the site location of the pollution control pond area. Having considered the advantages and disadvantages for the six site alternatives options as well as the option of creating a new co-disposal facility, the current site (Option 1) is the preferred location as it is located at the lowest point topographically, allowing for simpler and cost effective implementation of the contaminated stormwater and leachate ponds by minimising pumping and earthworks requirements. This site also allows for expansion of the landfill creating the required airspace for the its remaining operational life.

**11. Will the benefits of the proposed land use/development outweigh the negative impacts of it? Yes**

Should the Status Quo remain at the Charlie 1 landfill site, then Sasol will not be able to comply with the National Environmental Management: Waste Act (No. 59 of 2008) and Regulations (GN R.634-636) and the current situation will continue which includes: inadequate stormwater management around the landfill site; inadequate leachate management around the landfill site; and an inability of the current site to meet the airspace requirements for the remaining life of the landfill.

**12. Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)? No**

Not applicable.

**13. How does the project fit into the National Development Plan for 2030?**

According to the National Development Plan 2030, water is a strategic resource critical for social and economic development and there is growing concern about the potential impact of water-related risks. There is an urgent need for a coherent plan to ensure the protection of water resources and the environment in the

### Need and Desirability

Mpumalanga Highveld coalfields.

Management of South Africa's limited water resources must become more effective. This includes involving users so that they understand and can respond to emerging constraints; systematic monitoring to ensure effective water-supply planning, development and operation; and regulating water's various uses (including for disposal of wastewater) to ensure sustainability.

This proposed project is therefore in line with the objectives, presented above as it will ensure that potential impact to surface and groundwater resources are not contaminated by the Charlie 1 landfill site.

#### **14. Have the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account. Yes**

The Scoping study for the proposed project, had the following key objectives:

- A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic, heritage and cultural aspects of the environment may be affected by the proposed activity;
- A description of environmental risks and potential impacts, including cumulative impacts, that have been identified; and
- Details of the public participation process conducted to date.

All of these objectives have been met and results from the Environmental Scoping Study (ESS) have indicated that there are no fatal flaws associated with the project. The potential environmental impacts identified will be further investigated in the EIA phase.

#### **15. Describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.**

- Regulatory and statutory compliance: the objectives of the proposed project are to ensure compliance with applicable legislation, guidelines, regulations and standards. Should the status quo prevail, there will be inadequate stormwater management around the landfill; inadequate leachate management around the landfill site; and the inability of the current site to meet the airspace requirements for the remaining life of the landfill.
- Environmentally: The results of the scoping study indicate that the potential impacts as a result of the proposed project may include impacts on geohydrology, hydrology and the visual environment. The significance of these impacts will be investigated in the EIA phase of the project. Furthermore an EMPr will be developed during the EIA phase that will ensure that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied.
- Public Participation (PP) - One of the general objectives of integrated environmental management laid down in Section 23(2)(d) of NEMA is to "ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment". A comprehensive PP process will be undertaken for the project that was started during the Scoping Study and will be carried through to the EIA Study, to meet this objective.



## 5 LEGAL REQUIREMENTS

In order to protect the environment and ensure that this development is undertaken in an environmentally responsible manner, there are a number of significant pieces of environmental legislation that will need to be complied with. They include the following:

### 5.1 The Constitution of South Africa (No 108 of 1996)

The Bill of Rights, in the Constitution of South Africa (No 108 of 1996), states that everyone has a right to a non-threatening environment and requires that reasonable measures be applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in NEMA and given further expression.

### 5.2 National Environmental Management Act (No 107 of 1998)

The National Environmental Management Act (No 107 of 1998) [NEMA] as amended, provides the overarching legislative framework for environmental governance in South Africa. Several Specific National Environmental Management Acts (SEMAs) have now been promulgated, all of which fall under the overarching NEMA (discussed below). The point of departure of NEMA is a set of National Environmental Management Principles that inform any subsequent environmental legislation, implementation of that legislation and formulation and implementation of environmental management plans at all levels of government.

NEMA gives expression to the Bill of Rights, within the Constitution of South Africa (No 108 of 1996), which states that everyone has a right to a non-threatening (safe and healthy) environment and requires that reasonable measures are applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in NEMA and given further expression.

#### 5.2.1 EIA Regulations (2014)

In December 2014, the new EIA Regulations were promulgated in order to revise the procedure and criteria relating to environmental authorisations for the commencement of activities in order to avoid detrimental impacts on the environment or, where it cannot be avoided, to mitigate and effectively manage these impacts and optimise positive environmental impacts. These Regulations and a revised set of Listed Activities (Listing Notices 1, 2 and 3) came into force on 08 December 2014.

The proposed project does not trigger any EIA Regulation (2014) listed activities.

### 5.3 The National Environmental Management: Waste Act (No 59 of 2008)

On 03 July 2009, under section 19 (1) of the National Environmental Management: Waste Act (No 59 of 2008), a list of waste management activities (GN 921) which have, or are likely to have a detrimental effect on the environment were published in November 2013. No person may commence, undertake or conduct a waste management activity listed GN 921 unless a licence is issued in respect of that activity. This list of waste activities requiring a WML in terms of the NEM:WA as a result of the proposed project triggers the following listed activities (Table 8).

**Table 8: Listed activities according to Category A and B of NEM:WA GN 921**

| Category & Activity   | Description   | Applicability   |
|-----------------------|---|---|
| <b>Category A, 13</b> | The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of this Schedule. | The footprint of the landfill will be increased to allow for the construction of the contaminated leachate and contaminated stormwater ponds.   |
| <b>Category B, 1</b>  | The storage of hazardous waste in lagoons excluding storage of effluent, wastewater or sewage.  | The storage of hazardous waste i.e. contaminated leachate and contaminated stormwater generated from the Charlie 1 landfill, in ponds, adjacent to the existing landfill site. The proposed pond size is as follows: Contaminated leachate pond – 1500 m <sup>3</sup> and contaminated stormwater pond – 15000 m <sup>3</sup> . |
| <b>Category B, 5</b>  | The treatment of hazardous waste in lagoons, excluding the treatment of effluent, wastewater or sewage.   | The contaminated leachate and stormwater, would undergo enhanced evaporation in the ponds, the latter is considered a form of treatment.  |
| <b>Category B, 10</b> | The construction of a facility for a waste management activity listed in Category B of this schedule (not in isolation as associated waste management activity).                  | The construction of the contaminated leachate pond and contaminated stormwater pond to ensure effective management of leachate and stormwater generated from the Charlie 1 landfill site.   |

The project is also required to comply with the Waste Classification and Management Regulations, 2013 (GN R.634) as well as GN R.635 of 2013 (National Norms and Standards for Assessment of Waste for Landfill Disposal) and GN R.636 of 2013 (National Norms and Standards for Disposal of Waste to Landfill).

## 5.4 National Water Act (No 36 of 1998)

The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

The Department of Water and Sanitation (DWS) is responsible for ensuring the protection of South Africa's water resources. In order to ensure this, the NWA provides decision-making tools to achieve a balance between protecting and utilising water resources. Water Use in South Africa is managed through a water use authorisation process, which requires that every water use is authorised by the DWS or an established Catchment Management Agency (CMA), once the water requirements for the Reserve have been determined. A water use must be licenced unless it is listed in Schedule 1, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence.

The aim of this project is to obtain a Water Use Authorisation from the relevant competent authority (DWS). The NWA defines the identified potential water use under Section 21 as follows:

- Section 21g - disposing of waste in a manner which may detrimentally impact on a water resource.

The NWA defines a water resource to be a watercourse, surface water, estuary or groundwater (aquifer). Included under surface water are man-made water channels, estuaries and watercourses. As such, this proposal is for the undertaking of a Section 21 WUL Application (WULA). This will include all registration forms required by the DWS, as well as a technical report and Section 27 motivation.

## 5.5 Other Relevant Acts, Guidelines, Department Policies and Environmental Management Instruments

| Legislation   | Consideration   |
|---|---|
| <b>National Environmental Management: Air Quality Act (No 39 of 2004)</b>                 | Potential impacts on air quality during the project life-cycle.   |
| <b>National Heritage Resources Act (No 25 of 1999)</b>                                    | Protection of heritage and archaeological resources, artefacts and graves.  |
| <b>National Environmental Management Biodiversity Act (No 10 of 2004) and Regulations</b> | Potential impacts on indigenous vegetation and sensitive geographical areas triggering Listing Notice 3 activities. |
| Other Acts, Provincial Policies and Guidelines  |   |
| <b>Gert Sibande District Municipality Spatial Development Framework (2009)</b>            |   |
| <b>Gert Sibande District Municipality IDP (2012-13 – 2016-17)</b>                         |   |
| <b>Govan Mbeki Municipality Local Municipality IDP (2014-2015)</b>                        |   |
| <b>Govan Mbeki Municipality By-Laws</b>   |   |
| <b>Sasol Safety, Health and Environmental Policy</b>                                      |   |

## 6 PUBLIC PARTICIPATION

One of the general objectives of integrated environmental management laid down in Section 23(2)(d) of NEMA is to “ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment”. An inadequate and non-transparent Public Participation Process (PPP) has the potential to provide a negative decision and perception regarding the proposed project.

The EIA Regulations (2014) places a lot of emphasis on the public participation process and have been revised to contain comprehensive guidelines to involve the public in the EIA study.

The primary aims of the public participation process include:

- Meaningful and timeous participation of Interested and Affected Parties (I&APs);
- Identification of issues and concerns of key stakeholders and I&APs with regards to the proposed development, i.e. focus on important issues;
- Promotion of transparency and an understanding of the proposed project and its potential environmental (social and biophysical) impacts;
- Accountability for information used for decision-making;
- Serving as a structure for liaison and communication with I&APs;
- Assisting in identifying potential environmental (social and biophysical) impacts associated with the proposed development; and
- Inclusivity (the needs, interests and values of I&APs must be considered in the decision-making process).

The minimum requirements for public participation as contained in Chapter 6 of the EIA Regulations (2014) are contained hereunder and are discussed in detail in subsequent sections:

| Public Participation Requirements according to Section 40 - 44 of GN R.982   | Specific Actions to Ensure Compliance  |
|--|--|
| <p><b>Section 41 (2) (a) – Fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence of the site or any alternative site applicable to the application</b></p>  | <p>The notice board according must –</p> <ul style="list-style-type: none"> <li>(a) give details of the application subject to public participation</li> <li>(b) state –               <ul style="list-style-type: none"> <li>i. whether basic assessment or scoping procedures are being applied for</li> <li>ii. the nature and location of the activity to which the application relates</li> <li>iii. where further information on the application can be obtained</li> <li>iv. the manner in which and the person to whom representation in respect of the application may be made</li> </ul> </li> </ul> <p>The notice board must be –</p> <ul style="list-style-type: none"> <li>(c) of a size of at least 60cm by 42cm</li> <li>(d) (b) Display the required information in lettering and in a format as may be determined by the competent authority</li> </ul> |
| <p><b>Section 41 (2) (b) – The person conducting a public participation process must give written notice to the occupiers of the site and the owner or person in control of the site; owners and occupiers of land adjacent to the site; municipal councillor; municipality; municipality having</b></p> | <p>Compile introductory letters to adjacent landowners, municipal councilor/s, municipality and organs of state</p>  |

| Public Participation Requirements according to Section 40 - 44 of GN R.982   | Specific Actions to Ensure Compliance   |
|--|---|
| jurisdiction; and any organ of state having jurisdiction in respect of any aspect of the activity  |   |
| <b>Section 41 (2) (c) &amp; (d) – Place an advert in one local newspaper or official Gazette and or placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality</b>   | An advert will be placed in the local newspapers (the Echo and Ridge Times) to advertise the availability of the ESR and EIR for review and public meetings as well as advertising the waste management licence (once received) |
| <b>Section 42 (1) – A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of –</b><br><br><b>(a) All persons who as a consequence of the PPP have submitted written comments or attended meetings with proponent, applicant or EAP</b><br><b>(b) All persons who have requested the proponent or applicant in writing for their names to be placed on a register</b><br><b>(c) All organs of state which have jurisdiction in respect of the activity to which the application relates</b> | Comprehensive I&AP database/register will be opened and maintained  |
| <b>Section 43 (1) a registered I&amp;AP is entitled to comment, in writing, on all reports or plans submitted to such party during the PPP and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the I&amp;AP discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application</b>  | According to Section 40 (1) a period of 30 days is provided to I&APs to submit comments on the ESR as well as the report contemplated in regulation 32 if such reports or plans are submitted at different times                |
| <b>Section 43 (2) any State department that administers a law relating to a matter affecting the environment must be requested to comment within 30 days</b>   | According to Section 40 (1) a period of 30 days is provided to State Departments to submit comments on the ESR as well as the report contemplated in regulation 32 if such reports or plans are submitted at different times    |

## 6.1 Identification of Interested and Affected Parties

I&APs were identified primarily through an existing database as well as from responses received from the site notices and adverts placed for the project. Letters were sent to key stakeholders and other I&APs on the existing database, informing them of the application process and indicating how they could become involved in the project. The contact details of all identified I&APs are updated on the project database, which is included in **Appendix D1**.

This database will be updated on an on-going basis throughout the EIA process.

## 6.2 Briefing Paper

A briefing paper or Background Information Document (BID) for the project was compiled in English, Afrikaans and Zulu (refer to [Appendix D2](#)). The aim of this document is to provide a brief outline of the application and the nature of the development. It is also aimed at providing preliminary details regarding the EIA process, and explains how I&APs could become involved in the project. The briefing paper was distributed to all identified I&APs and stakeholders, together with a registration/comment sheet inviting I&APs to submit details of any issues, concerns or inputs they might have with regards to the project.

## 6.3 Consultation with Competent Authorities

The competent authorities issuing decisions regarding the project as well as consultation to date are presented in Table 9 below.

**Table 9: Competent authorities associated with the project**

| Authority  | Role  | Licence / Approval       | Consultation to date  |
|--|---|--------------------------|---|
| Department of Environmental Affairs (DEA)  | Competent Authority for waste licencing process         | Waste Management Licence | <ul style="list-style-type: none"> <li>Waste licence application form submitted on 14 August 2015</li> <li>Submission of the draft ESR on 14 August 2015</li> </ul> |
| Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA) | Commenting Authority for the waste licencing process    |                          | Submission of the draft ESR on 14 August 2015   |
| Department of Water and Sanitation   | Competent Authority for the water use licencing process | Water Use Licence        | <ul style="list-style-type: none"> <li>Discussion with Kevin Legge held on - 9 July 2015</li> </ul>   |

## 6.4 Consultation with Other Relevant Stakeholders

Consultation with other relevant key stakeholders will be undertaken through telephone calls and written correspondence in order to actively engage these stakeholders from the outset and to provide background information about the project during the ESS. A list of these stakeholders is provided in [Appendix D1](#).

## 6.5 Advertising

In compliance with the EIA Regulations (2014), notification of the commencement of the EIA process for the project will be advertised in English, Afrikaans and Zulu in the two local newspapers, namely the Ridge Times and Echo News on 31 July 2015 ([Appendix D3](#)). I&APs are requested to register their interest in the project and become involved in the EIA process. The primary aim of these advertisements is to ensure that the widest group of I&APs possible is informed and invited to provide input and questions and comments on the project.

In addition to advertisements, A2 size site notices in English, Afrikaans and Zulu will be placed at the following public places advertising the EIA process for the project:

- Charlie 1 landfill site
- Charlie 1 - Main gate to Sasol Secunda Complex;
- Secunda Municipal Library; and



- Sasol Club.

Photos of the site notices placed at the various places are included in **Appendix D4**.

## 6.6 Public and Authority Review of the Draft Scoping Report

An advert will be placed in the Ridge Times and Echo News informing I&APs of the availability of the ESR and Plan of Study for EIA for review and comment as well as the details of the public meeting. The Echo News and Ridge Times are free weekly community newspapers. The advert appeared in both newspapers between 13 and 14 August 2015 (**Appendix D3**). Additionally, all registered I&APs will be notified of the availability of the report in writing.

The ESR, together with the Plan of Study for EIA was made available for authority and public review for a total of 30 calendar days from **14 August 2015 to 14 September 2015**. In addition, the report will also made available at the following public locations (which are all readily accessible to I&APs) within the project area:

- Secunda Municipal Library;
- Embalenhle Municipal Library;
- Offices of Royal HaskoningDHV (78 Kalkoen Street, Monument Park, Pretoria); and
- Royal HaskoningDHV website (<http://www.rhdhv.co.za/pages/services/environmental/current-projects.php>).

The ESR will be submitted simultaneously to the DEA and MDARDLEA for comment.

## 6.7 Issues Trail

Issues and concerns raised in the public participation process during the EIA process will be compiled into an Issues Trail. The ESS-phase Issues Trail will be included into the final Consultation ESR, in which all comments and responses will be captured.

## 6.8 Submission of the Final Consultation Environmental Scoping Report for Decision-making

The submission of the final Consultation ESR and Plan of Study for EIA is the last stage of the Environmental Scoping Phase for the proposed project. The final Consultation ESR will be submitted to the DEA for review and decision-making.

## 7 DESCRIPTION OF THE PROJECT AREA

### 7.1 Topography and Land Use

The region is characterised by gently rolling hills that are broken by drainage lines, with an average elevation of 1520-1640 m above mean sea level (amsl). The pollution control pond area site is mostly flat with a slight 1° northern slope.

The Secunda area is surrounded by a number of different land uses i.e. industrial, residential, commercial and agricultural. The Sasol Synfuels plant is 1.3 km south of the proposed project area. The middle to high-income residential area of Secunda is located approximately 3 km north east of the site and includes a variety of commercial activities. In turn, the low cost housing development of Embalenhle is located 8 km north-west of the project area. Due to the highly industrialised nature of the area there is extensive infrastructural development including an extensive road and rail network.

The proposed project area is located on transformed agricultural land which is currently being used for pasture cultivation. The area surrounding the site has a mixed land use (industrial, mining and agriculture) and includes:

- Charlie 1 landfill site;
- Open veld and light aircraft landing strip to the north;
- Old quarries and borrow pit areas to the east; and
- Agricultural areas to the west and south.

### 7.2 Geology

The geology of the Sasol Secunda plant area comprises sandstones, siltstones and shales of the Vryheid Formation of the Karoo Super Group sequence, which comprises a succession of alternating layers of sandstone and siltstones, intruded by dolerite sills and dykes. The Vryheid Formation consists of the following sedimentary sequences from the surface downwards<sup>3</sup>:

- A highly weathered zone of sandstone and/or siltstone extending to depths ranging between 4 and 30 m deep below the surface;
- A 20 m thick laminated to fine bedded siltstone/shale layer, underlying alternating layers of sandstone and siltstone - referred to as the siltstone layer;
- Of the various dolerite sills and dykes intruding the Vryheid Formation, one sill forms a prominent E-W striking feature and has a thickness varying between 5 and 25 m. This sill outcrops in the central part of the project area, and occurs approximately 24 m below the surface elsewhere. Besides this main dolerite sill the area is intruded by other dykes and sills of which the geometries and thickness vary greatly;
- A prominent geological feature in the area is a 350 m wide, E-W striking graben (trough-fault) structure which is situated in the southern part of the Secunda Complex area; and
- A coal seam is present at a depth of approximately 100 m below surface.

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<sup>3</sup> SRK Consulting (2012). Sasol Synfuels Co-disposal Waste Landfill Facility Pre-feasibility.

### 7.2.1 Shallow Geology

The shallow geology information is based on observations during test pitting procedures carried out as part of this Feasibility Study<sup>4</sup>. A total of 9 test pits were excavated at various points along the southern and western (downslope) boundaries of the landfill (Figure 7).



**Figure 7: Test pit locations**

The following is a summary of the shallow geology observed in the test pits along the western boundary of the site (Test Pits 1 to 5):

- The upper layer (varying from 0.3 m to 1.3 m depth) generally consists of loose fill such as ash or waste;
- This overlies a moist clayey silt layer (in some areas a transported back clay) approximately 1 m thick;
- Very moist or wet silty sand which varies between pits as residual/weathered sandstone/dolerite is then encountered until refusal on weather dolerite or sandstone;
- Refusal depth varies from 4.9 m in the north to 3.2 m in the south-west corner; and
- The observed seepage depth varies from 3.9 m to 0.4 m – it should also be noted that seepage assumed to be from the slopes of the landfill is present in areas on the surface.

The shallow geology observed in the test pits along the southern boundary is as follows (Test Pits 6 to 9):

- The upper layer (varying in depth from 0.6 m to 1 m) consists of moist fill or transported black clay;
- This overlies a soft, silty clay or residual clay in some areas of 1 to 2 m;
- Weathered sandstone or dolerite is encountered underneath this layer to depths of approximately 3 m;
- Refusal is encountered at depths varying from 2.2 m (Test Pit 9) to 3.2 m (Test Pit 6) on residual sandstone or hard rock dolerite (Test Pit 6); and
- Seepage depths in Test Pits 6 and 7 varied from 1.5 to 1.7 m below ground level, while no seepage was encountered in Test Pits 8 and 9.

It should be noted that caving was encountered in Test Pit 1 (located in the upper north-west corner of the site) and Test Pit 6 (south-west corner) from about 1 m depth.

<sup>4</sup> Golder Associates (2015) Feasibility Engineering Package (FEP) for the Stormwater and Leachate Management of Charlie 1 Landfill.

## 7.3 Soils

Most of the soils on the Charlie site are clays, sandy clays, sand clay loams and sandy loams. Water content from the soils in the area ranges from 28 – 47% and the average Soil Horizontal Hydraulic conductivity (K) was established as 0.0128 m/d.

During the design or assessment of any existing landfill, the hydraulic properties of soil are very important to determine the rate at which contaminated water or leachate will move downward or be retarded in the subsurface, thus quantifying the threat of groundwater contamination. The data from the soil analysis indicate that soils in the vicinity of the Charlie I landfill site have a high clay content, high porosity values (associated with clays) and low horizontal hydraulic conductivity values. These factors indicate that the transport of contaminants from the site will be retarded.

## 7.4 Geohydrology (Groundwater) Baseline

There are two aquifer systems (upper weathered Ecca aquifer system and lower fractured rock Ecca aquifer system) on and in the surrounding area of the project site.

The upper weathered Ecca aquifer system is associated with the uppermost weathered horizon, mainly comprising weathered Ecca sediments and quaternary deposits. This aquifer is directly recharged by rainfall infiltrating through the weathered zone until it reaches the underlying impermeable solid rock. Thereafter groundwater movement occurs on the contact zone between the weathered part and the underlying consolidated sediments following their slope. Where barriers exist (dykes, sill, etc.), obstructing the flow, this water is discharged on surface as fountains or springs. The aquifer has low yields (+/- 0.1 l/s) with shallow water tables. Most of the groundwater from this aquifer is discharged into surrounding rivers and streams.

Immediately below the upper weathered horizon is the lower fractured Ecca aquifer system, which is mainly composed of well-cemented sediments with little or no groundwater movement. All groundwater movement is associated with secondary structures (fractures, faults, dykes, etc.). Borehole yields in Karoo aquifers are generally low (+/- 1 l/s), with regional flow resembling flow in the porous medium. This implies that formations contain large quantities of water that cannot be released readily on a small scale.

### 7.4.1 Quaternary Catchment and Groundwater Flow

The Sasol Secunda area falls within quaternary catchment C12D in the Upper Vaal River catchment area, which forms a border with the Olifants River catchment. The landscape is characterised by low-gradient streams meandering over small alluvial plains.

Since groundwater elevation follows topography, groundwater flows along the site drainage pattern (i.e. north-west in the north of the site and south-west in the west and south of the site).

### 7.4.2 Magnetic Traverses

A magnetic survey was conducted to identify structures that leachate from the site, could potentially use as conduits or pathways. The results of the magnetic survey in the immediate western and southern regions of the Charlie I landfill site indicate that no major structural features were encountered in those regions.

### 7.4.3 Resistivity

The resistivity method is widely used for groundwater exploration, but also used in groundwater pollution studies to determine the presence of zones saturated with highly conducting leachate. The result of the resistivity survey indicates that a contamination plume emanates from the landfill site, and it is mostly concentrated on the upper weathered soil and/or clay zone. The depth of the plume can be estimated to be

deeper closer to the landfill site and shallow moving away from the site. The contaminant plume is primarily located within the immediate vicinity of the site.

#### 7.4.4 Water Levels

Water levels from all boreholes around the Charlie 1 landfill site were measured as part of a groundwater monitoring programme. The positions of the boreholes monitored are shown in Figure 8. Borehole REGM 98 is located upgradient from the landfill site. REGM 213D and REGM 229D have deeper water levels (4 - 5 mbgl), (Figure 8) compared to the rest of the boreholes nearby. Boreholes REGM 214D, 215D, 216D, 228D, 228S and 229S show higher water levels (1 mbgl) in the vicinity of the landfill site.

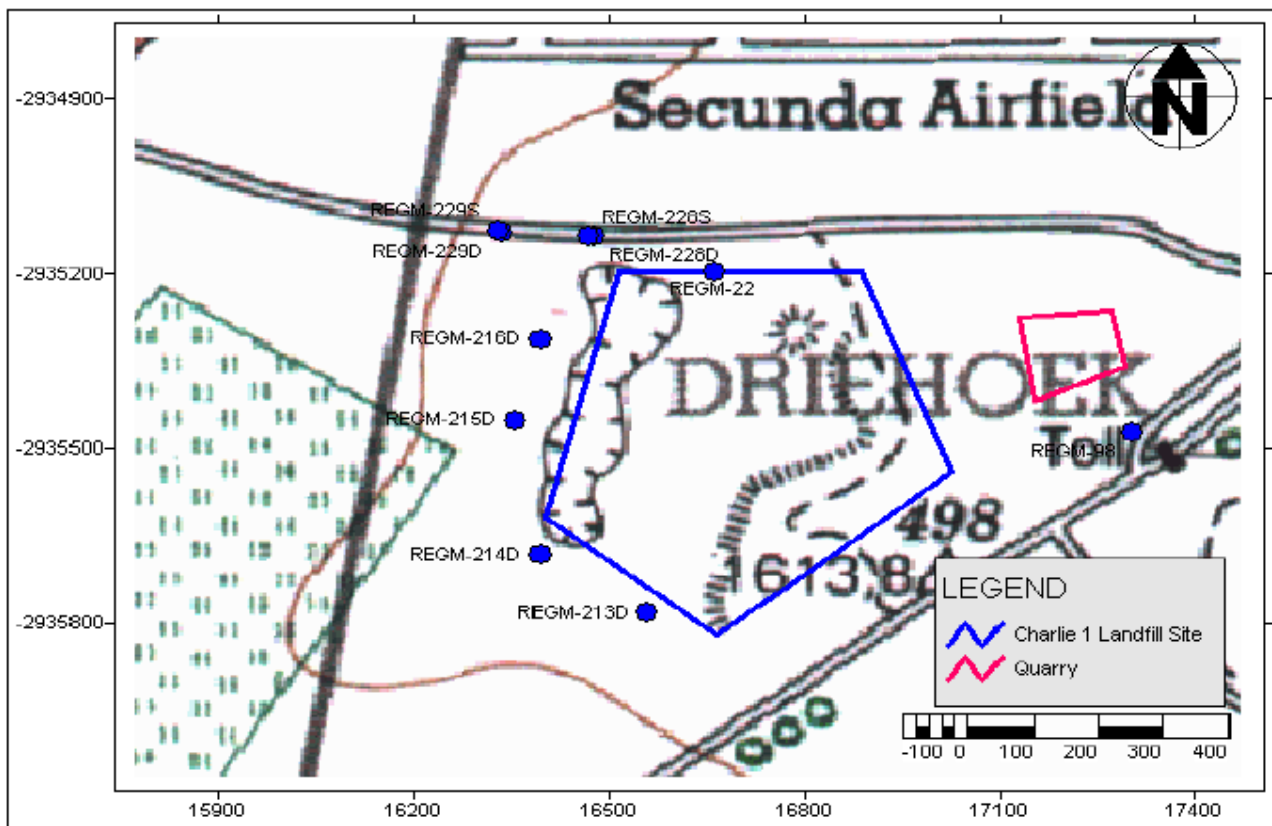


Figure 8: Position of the boreholes around the Charlie 1 landfill site

#### 7.4.5 Water Quality

##### 7.4.5.1 Groundwater Quality

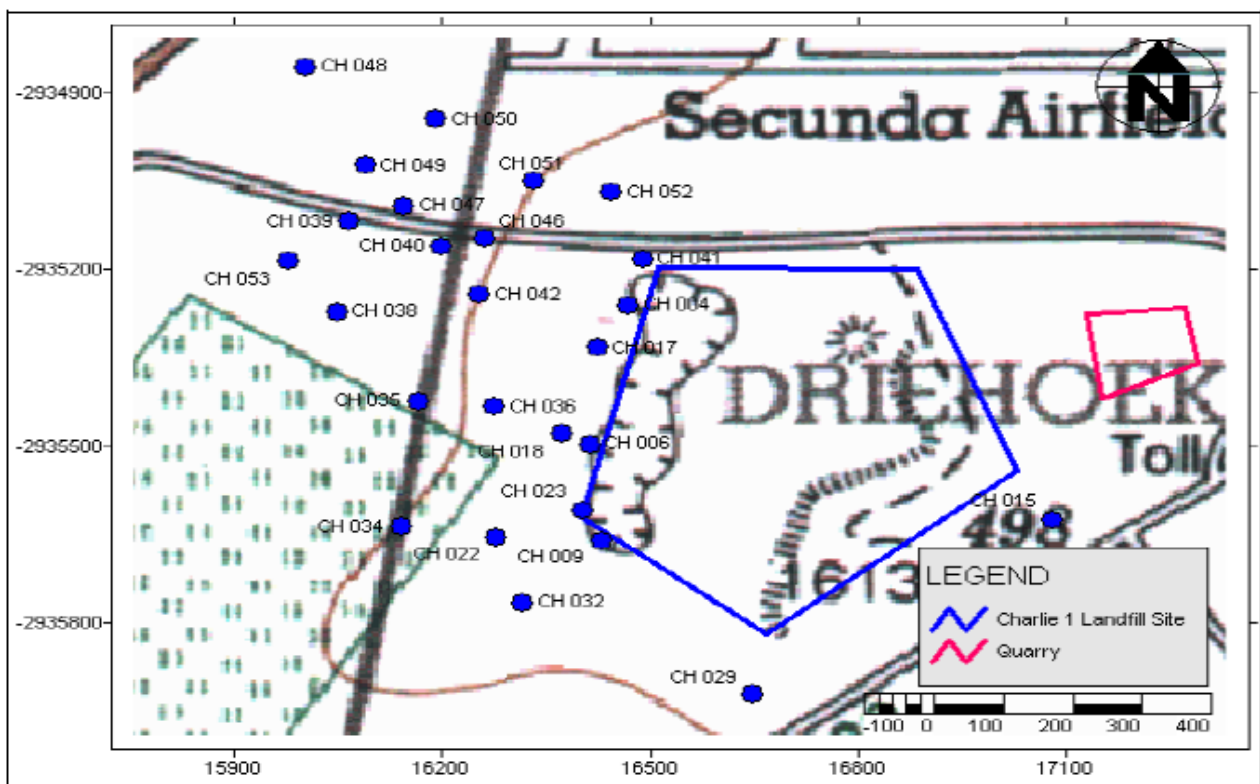
Of the ten boreholes analysed, two boreholes, REGM 98 and REGM 22 have been monitored since 1990. (Figure 8). The other boreholes have been monitored since 2006/2007.

These results show that there is a contaminant plume emanating from the Charlie 1 Landfill site. However it is mostly concentrated within the upper weathered soil and/or clay zone, with shallow water levels within this zone compared to levels at a distance from the landfill site. Currently the waste site has no influence on the groundwater to the west, north-west and the south as yet. REGM 22 shows elevated conductivity, magnesium, and chloride when compared to the other boreholes, indicating movement in that direction. Leachate produced by the landfill site does not infiltrate into the groundwater system, but is discharged as seepage water (i.e. leachate springs) on the sides of the landfill.



#### 7.4.5.2 Piezometer Water Quality

Twenty (20) water samples were collected from shallow piezometers at different locations down gradient of the Charlie 1 landfill site (Figure 9) and analysed. All samples taken in piezometers in a close proximity of the landfill site indicate high electrical conductivity values in contrast to the piezometers sampled further away from the site. The high electrical conductivity values indicate the presence of contaminants in the upper part of the soil horizon. The level of contamination differs due to each piezometer's locality to the landfill site. Most of the piezometers that are located along the surface water run-off paths from the landfill are reflecting high concentrations of EC, Ca, Mg, Cl and SO<sub>4</sub>. The water quality analysis indicates that the quality (pollution) in each piezometer is influenced by the degree of surface run-off; the piezometers located outside these flow zones show low concentration levels of contamination.



**Figure 9: Position of auger holes installed with piezometer at the Charlie 1 landfill site**

Low levels of trace metals were detected in the piezometer (within the World Health Organisation water quality standards, 2006) with exception to high Mercury (Hg) concentration at CH023 (which is situated on the immediate boundary of the Charlie 1 landfill site).

## 7.5 Hydrology

The project area is located between two tributaries, the Klipspruit in the south and Trichardspruit in the north-west (Figure 10). The general flow trend of these tributaries is towards the south-west which converge into the Grootspruit Stream and flows into the Waterval River, the major tributary of the Vaal River in the region. Surface run-off from the Charlie 1 landfill site flows north and north-west toward the tributary of the Trichardtspruit.

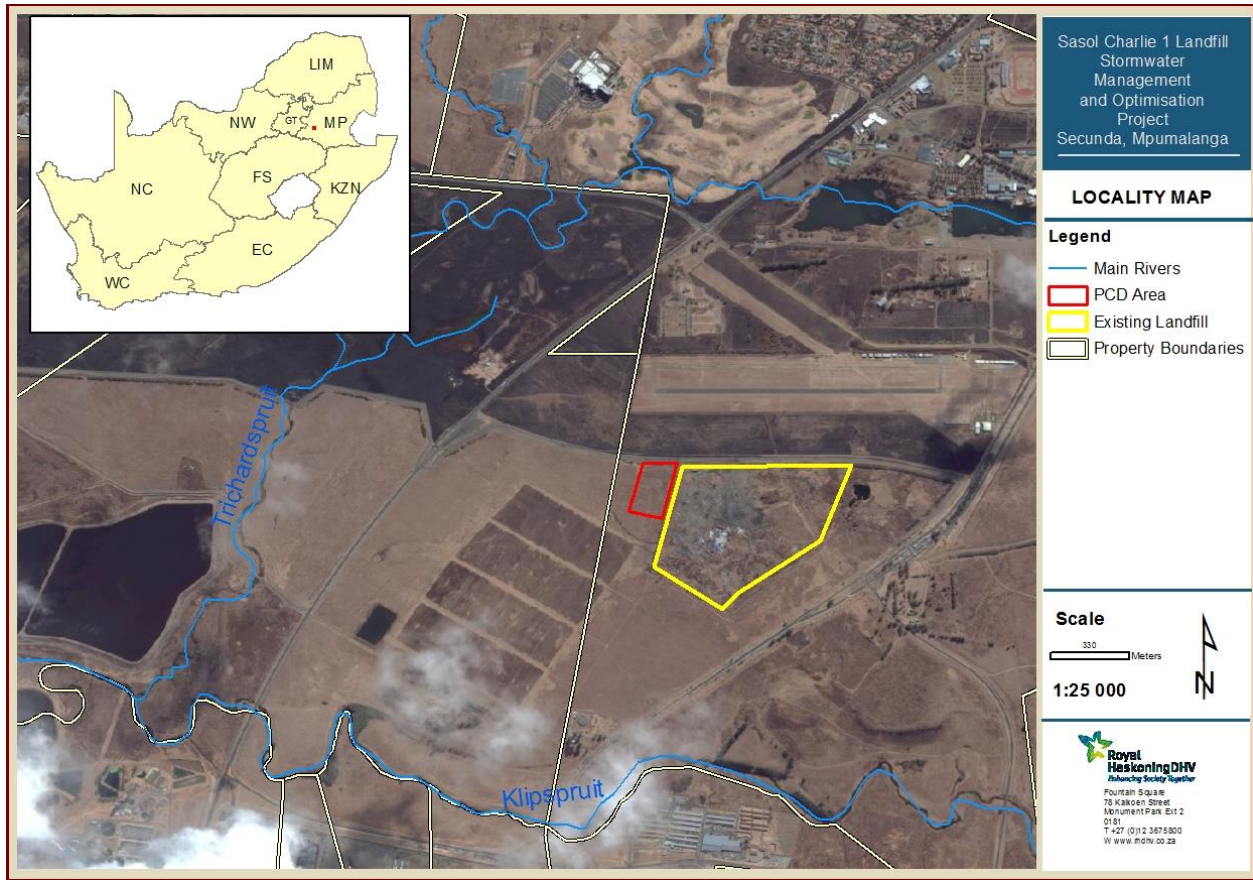


Figure 10: Tributaries in the project area

### 7.5.1 Surface Water Quality

The precipitation that falls or seepage water that flows into a landfill, collectively with any disposed liquid waste, results in the extraction of the water-soluble compounds of the waste, and the subsequent formation of leachate. The leachate that is formed at the site seeps out as leachate springs on the south-western edges of the site (Figure 11). This runs off in a contaminated canal and the rate of production is dependent on rainfall. During dry winter months, less leachate is discharged by the site, thus salt precipitation takes place on the perimeter of the site. However, the smaller contaminated canal that is more observable during rainfall months continues flowing at a lower rate (Figure 11).



Figure 11: Seepage water (contaminated canal) from leachate springs west of the Charlie 1 landfill site

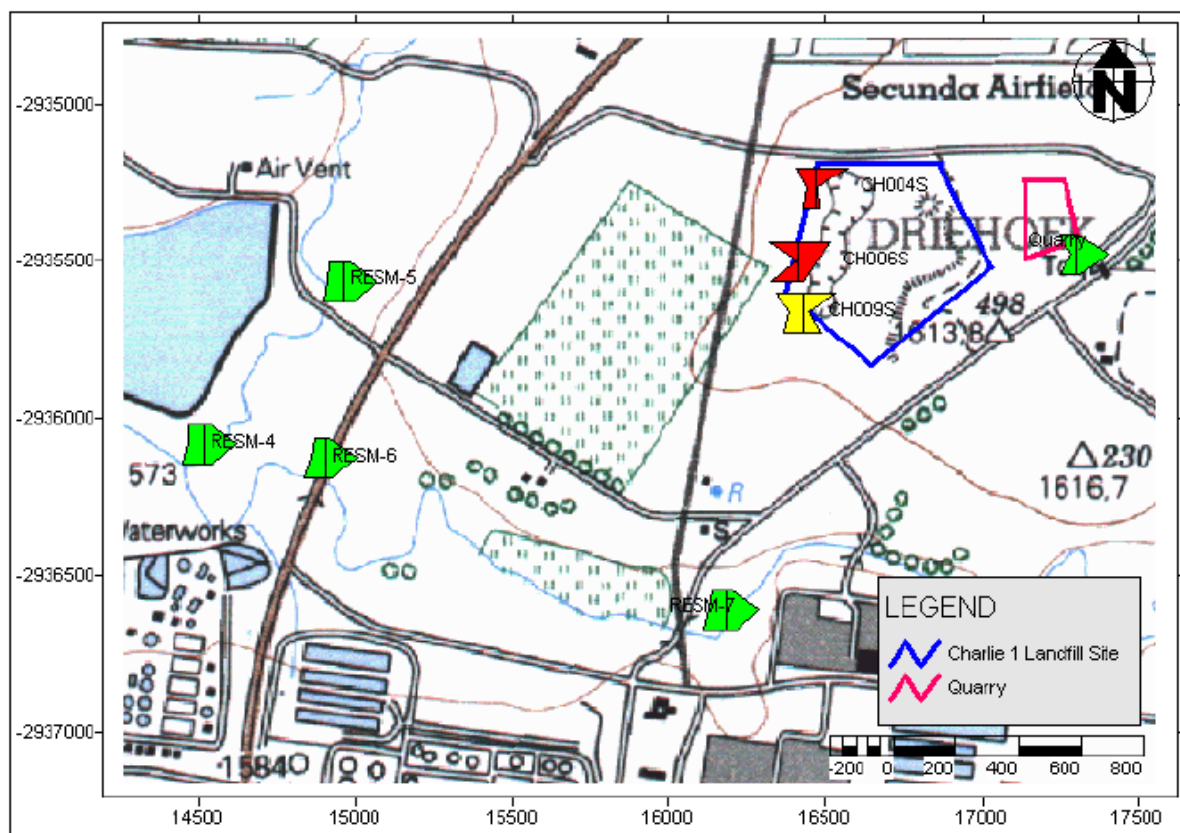


Figure 12: Surface water and leachate sampling points



In 2008, IGS collected surface water and leachate samples from the following locations to determine the surface water quality of the project area (Figure 12):

- Three (3) samples along the western boundary of the Charlie 1 landfill site;
- One sample for the quarry and further; and
- Four (4) samples from the rivers down-gradient.

The three (3) leachate samples show higher concentrations for electrical conductivity (EC), Mg, Na, F, Cl, and  $\text{SO}_4$  compared to the background surface water concentrations obtained from the quarry which was located next to the site (Note: that the quarry used as background was rehabilitated since and is no longer present). The leachate quality does however show low levels of  $\text{NO}_3^-$ ,  $\text{NH}_4$ , Mn, Fe and higher levels  $\text{SO}_4^{2-}$ .

The water quality of the stream samples is compliant with SANS241:2005 and indicate normal levels of all major ions. Low concentrations of trace metals were found in the water samples taken.

Low concentrations (USEPA Water Quality Standards) of organic contaminants were detected on leachate samples.

The routine groundwater quality monitoring also indicates that there is no direct influence from the Charlie 1 site on the streams.

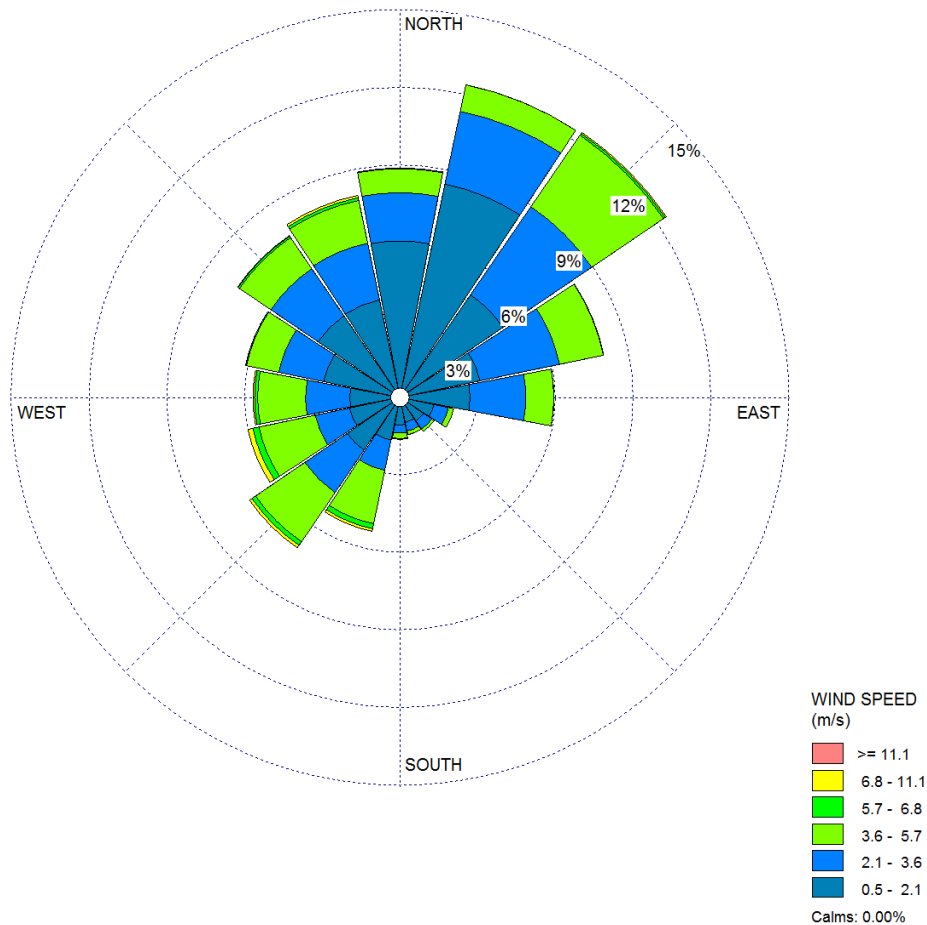
## 7.6 Climate

Local meteorological data was obtained from the South African Weather Services (SAWS) in Secunda for the period January 2010 – December 2013 to determine the atmospheric dispersion potential of the area. Wind roses from the SAWS station were compared to the Sasol monitoring stations; Langverwacht and Club monitoring stations for the January 2010 – December 2013 monitoring period.

### 7.6.1 Wind

Wind roses comprise of 16 spokes which represents the direction from which the winds blew during the period under review. The colours reflect the different categories of wind speeds. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. Based on an evaluation of the site specific meteorological data obtained from the SAWS in Secunda, Mpumalanga, the following deductions regarding the prevailing wind direction and wind frequency can be presented.

Based on Figure 13 below, the predominant wind direction for the area under review is multidirectional, with primary winds originating from the north-north east (13% of the time) and north-north west regions (9% of the time). Secondary winds were noted mainly from the south west region, which occurred for 7% of the time.



**Figure 13: Period wind rose from the Secunda monitoring station for the Jan 2010 – Dec 2013 monitoring period**

The wind class frequency distribution for the period under review. 48.5% of the total wind speeds fell within the 0.5 – 2.1 m/s wind class, while 28.1% of the total winds experienced, fell within 2.1 – 3.6 m/s. The site is characteristic of moderate to low winds.

### 7.6.2 Temperature and Humidity

The average monthly temperature and relative humidity for the period Jan 2010 – Dec 2013 is presented in Figure 14 below with the average humidity indicated with the blue line. Daily average summer temperatures ranged between 19 - 21°C while the average winter temperatures ranged between 9 - 12°C. Relative humidity for the period Jan 2009 – Dec 2013 was highest during the summer months and lowest during the winter months.



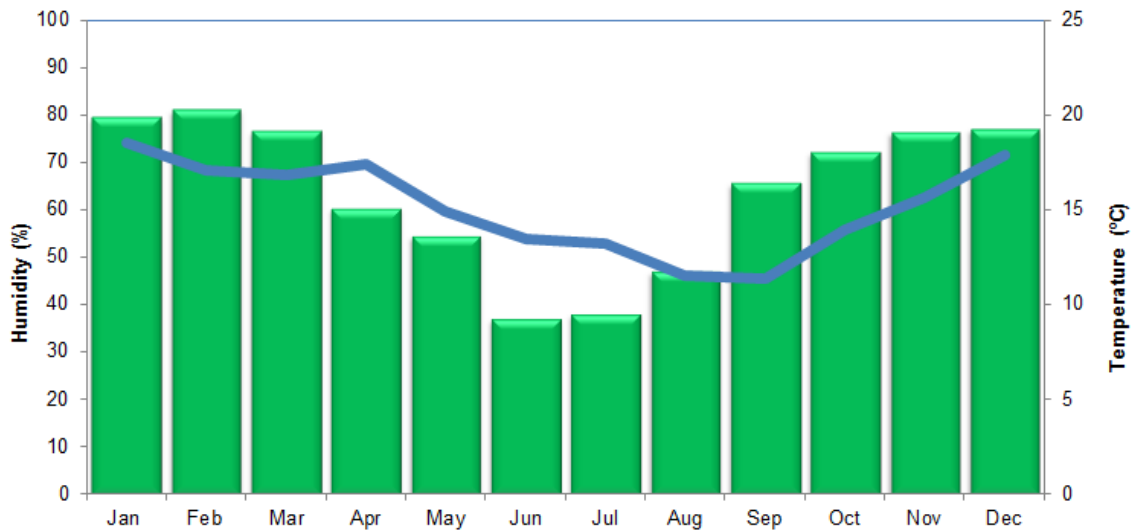


Figure 14: Average monthly temperature and relative humidity for the Jan 2010 – Dec 2013 monitoring period

### 7.6.3 Precipitation

Rainfall data for the project area was sourced through the Design Rainfall Estimation Program<sup>5</sup> and the Daily Rainfall Data Extraction Utility<sup>6</sup>. Station 0412875W (Goedgevonden) was selected for use in the study. The rainfall gauge metadata is presented in Table 3. The selection is based on the station being the closest station to the site with a reasonably long and reliable record.

Table 10: Metadata for the Goedgevonden rain gauge

| Station Name | Station No | Distance (km) | Lat    | Long   | Record | Reliable | MAP | Altitude |
|--------------|------------|---------------|--------|--------|--------|----------|-----|----------|
| Goedgevonden | 0412875W   | 10.5          | 27°00' | 29°09' | 103    | 59       | 605 | 1542     |

The cumulative distribution function of annual rainfall is presented in Figure 15. The analysis of annual rainfall shows that:

- The Mean Annual Precipitation (MAP) for the selected portion of data is 630 mm/annum. 50% of the years receive between 545 mm/annum and 720 mm/annum; and
- The annual rainfall on record varies significantly year to year. The annual rainfall varies between 343 mm/annum and 1139 mm/annum. A dry year (defined as the 5th percentile) will receive 427 mm/annum. A wet year (defined as the 95th percentile) can receive 920 mm/annum.

<sup>5</sup> Smithers, J.C. and Schulze, R.E. (2002). Design rainfall and flood estimation in South Africa. WRC Project No. K5/1060. Draft final report (Project K5/1060) to Water Research Commission, Pretoria, RSA. 155 pp.

<sup>6</sup> Kunz, R.P. (2004). Daily Rainfall Data Extraction Utility: User Manual v 1.0. Institute for Commercial Forestry Research, Pietermaritzburg, RSA.

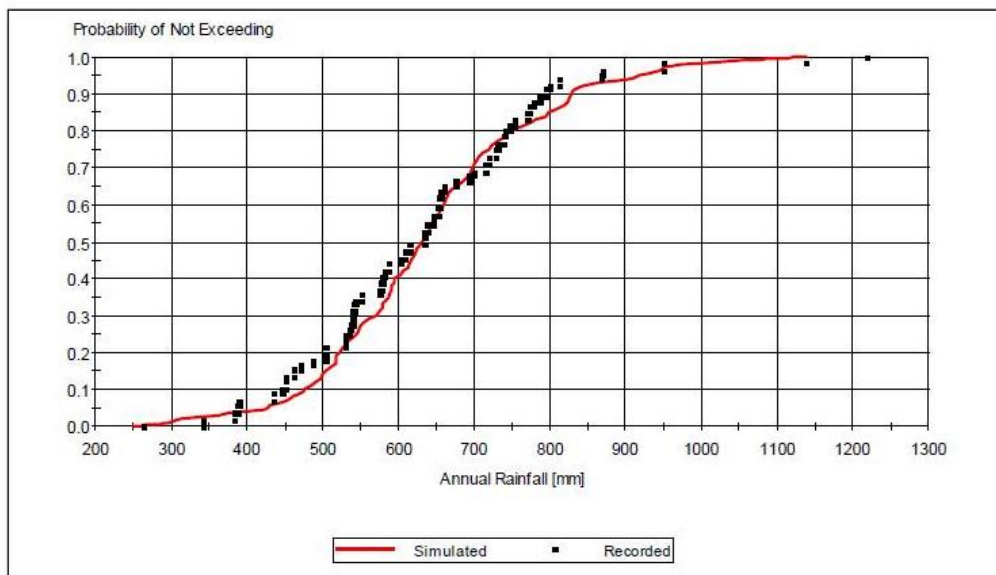


Figure 15: Cumulative distribution function of annual rainfall recorded at the Goedgevonden station<sup>7</sup>

#### 7.6.4 Evaporation

The project area has a Mean Annual Symons S-Pan evaporation of 1360 mm/year and a corresponding average potential lake evaporation of 1140 mm/year. The average monthly evaporation rates are indicated in Figure 16.

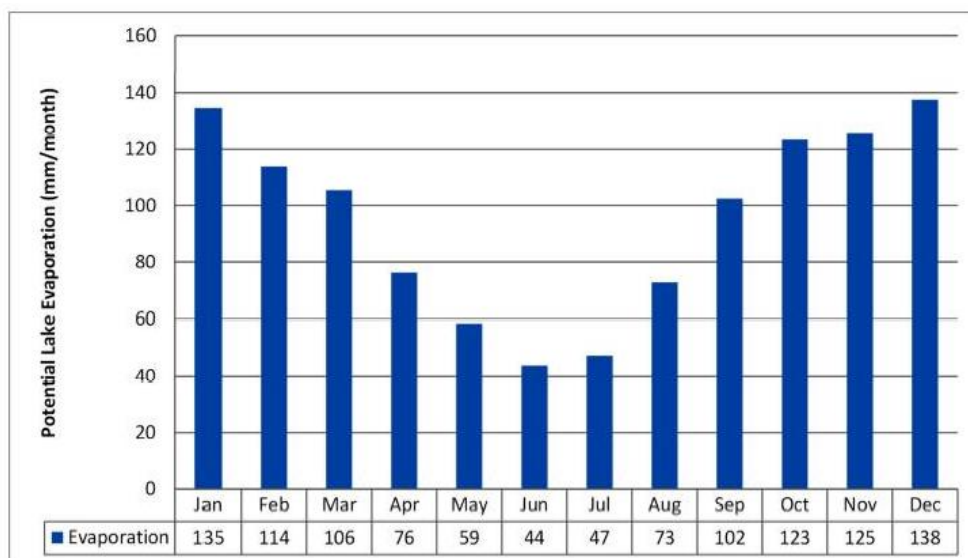


Figure 16: Mean monthly potential lake evaporation for the site

<sup>7</sup> Ibid Footnote 4.

## 7.7 Wetlands

The NFEPA database indicates that no wetland resources are present within the project area (Figure 17) as well as the 500 m buffer. In addition, the Mpumalanga Biodiversity Sector Plan (MBSP) database was consulted in order to determine site-specific issues and areas within the project area considered sensitive with regards to any wetland resources which may be present. This database indicates that a portion of the project area is located within a heavily or moderately modified area and no wetlands are indicated by the MBSP database. The Wetland Verification exercise is attached as [Appendix E](#).



**Figure 17: Study area (pollution control pond area) for the wetland verification study**

No vegetation associated with wetlands was encountered within the site or within 32 m thereof, indicating that insufficient water is present to support vegetation typically adapted to life in saturated soil as per the definition of a wetland according to the National Water Act (NWA) (Act 36 of 1998) and the National Environmental Management Act (NEMA) (Act No. 107 of 1998).

Two areas were identified using digital satellite imagery which may potentially have been wetlands. One is located in the northern portion and the second is located approximately 200 m south of the project area (i.e. west of the Charlie 1 landfill site). Upon investigation however, neither of these areas displayed any wetland characteristics as described by DWAF (2005). The area in the northern section contained only terrestrial floral species. In addition the soil samples taken in this area did not show any gleying or mottling which would indicate that this could be considered as wetland resources.

The channel-like feature identified to the south of the project area was found to be un-vegetated, and soil samples taken within this area did not display gleying or mottling which would be indicative of wetland conditions. The channel-like formation is deemed likely to have been formed as a result of seepage originating from the Charlie 1 landfill. It is also possible that the area has been cleared of vegetation for agricultural purposes. Representative photographs of this channel-like formation are presented in Figure 6.



**Figure 18: Photograph of an area resembling a constructed channel, situated approximately 200m south of the project area**

Wetlands within 500 m of the area proposed for the pollution control ponds were investigated, and approximately 100 m north-east of the project area, a poorly defined mosaic patch of temporary wetland and moist grassland was identified. This area showed minimal wetland characteristics and the boundary was not clearly discernible and difficult to delineate (Figure 19). Vegetation indicators were also minimal and vegetation such as *Helichrysum kraussii* and *Haplocarpha scaposa* were observed.





Figure 19: A mosaic of temporary wetland and moist grassland located north-east of the project area

## 7.8 Ecology

### 7.8.1 Vegetation

The vegetation of the project site consists entirely of Soweto Highveld Grassland (Gm8). Soweto Highveld grasslands are considered to be Endangered. The conservation target is 24%.

Large areas of the vegetation on the site have been transformed during previous and current agricultural activities. The majority of the site has been annually ploughed and planted with planted *Setaria pallide-fusca* pastures. The dumped soil piles and disturbed areas are dominated by pioneer weedy plant species such as *Rumex crispus*, *Lepidium bonariense*, *Cosmos bipinnatus*, *Chenopodium album*, *Tagetes minuta*, *Gomphocarpus fruticosus*, *Conyza bonariensis* and *Flaveria bidentis*, *Cyperus esculentus*, *Verbena bonariensis*, *Cirsium vulgare* and weedy grasses such as *Hyparrhenia hirta*, *Eragrostis curvula*, *Cynodon dactylon*, *Polypogon monspeliensis*, *Echinochloa pyramidalis*. The highly invasive Kikuyu (*Pennisetum clandestinum*) is also present on old soil dumps and disturbed areas.

Two vegetation units were identified during the ecological survey namely: 1) Pasture field; and 2) Degraded area. Refer to **Appendix F** for the Ecological Study.

- Pasture Fields

Pasture fields is the most predominant vegetation unit in the southern section of the project site (Figure 20). The vegetation is dominated by the grass, *Setaria pallide-fusca* which is harvested for pasture purposes. The pioneer forb, *Solanum panduriforme* is prominent in some areas where few grasses grow. Other species present include the grasses: *Hyparrhenia hirta*, *Cynodon dactylon*, *Eragrostis curvula* and the forbs: *Amaranthus hybridus*, *Tagetes minuta*, *Plantago lanceolata* and *Oenothera rosea*.

The alien invasive grass *Pennisetum clandestinum* is sporadically disbursed within this unit while large numbers of the declared Category 1 weed, *Cirsium vulgare*, is present throughout this unit.

No Red Data plant species or suitable habitat for such species was observed in this vegetation unit.





**Figure 20: Pasture fields present on site**

- Degraded Area

The degraded area unit is located in the northern and eastern side of the proposed area for pollution control ponds (Figure 21). The unit has a patchy vegetation cover comprising of grasses, forbs, and open or barren soils (Figure 21). The forb layer is the most conspicuous with the forb *Rumex crispus* and the alien invasive weed (Category 1) *Cirsium vulgare* is dominant. Other species present include the grasses: *Eragrostis curvula*, *Cynodon dactylon*, *Polypogon monspeliensis*, *Echinochloa pyramidalis* and the forbs: *Lepidium bonariense*, *Cosmos bipinnatus*, *Chenopodium album*, *Tagetes minuta*, *Gomphocarpus fruticosus*, *Conyza bonariensis*, and *Flaveria bidentis*. Alien invasive species include declared Category 2 invader tree, *Casuarina cunninghamiana*, the grass, *Pennisetum clandestinum* and the forbs: *Cirsium vulgare* and *Datura stramonium*.

Two medicinal plant species were found to be present in this vegetation unit namely the forbs *Datura stramonium* and *Gomphocarpus fruticosus*. Both species are pioneer weeds with *Datura stramonium* declared as a Category 1 invasive weed.

No Red Data plant species or suitable habitat for such species was observed in this vegetation unit.



**Figure 21: Degraded area present on site**

### 7.8.2 Protected Tree Species

In terms of the National Forests Act 1998 (Act No 84 of 1998) certain tree species can be identified and declared as protected. The Department of Agriculture (now Department of Agriculture, Forestry and Fisheries) developed a list of protected tree species. In terms of Section 15 (1) of the National Forests Act, 1998, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Trees are protected for a variety of reasons, and some species require strict protection while others require control over harvesting and utilization. No protected tree species or indigenous tree species were observed or occur on the proposed site.

### 7.8.3 Red Data/Endemic Species

No red listed or endemic plant species have been listed for the 2629 CB Quarter Degree area of the study site. Three red listed Declining plant species have been observed within the adjacent Secunda-Evander areas during previous surveys. These include the Cape Poison Bulb (*Boophone disticha*), African Potato (*Hypoxis hemerocallidea*) and River Lily (*Crinum macowanii*).

### 7.8.4 Alien Vegetation

A single individual of the declared alien invasive tree *Casuarina cunninghamiana* was found to be present on the site (vegetation unit 2), together with the declared Category 1 weeds *Cirsium vulgare* (vegetation units 1 & 2) and *Datura stramonium* (vegetation unit 2). The highly invasive alien grass *Pennisetum clandestinum* (kikuyu) was present in both vegetation units on the site.

### 7.8.5 Land Degradation

The Sasol Secunda is an area where soil erosion is regarded as insignificant with large areas used for mining and agricultural activities. Cattle grazing has also had a significant effect on large areas with heavy and mild overgrazing leading to degradation of the natural land.



### 7.8.6 Vegetation and Faunal Habitat Availability

Large areas around the proposed site consists of transformed grassland due to previous and current agricultural activities as well as heavily degraded especially adjacent to the landfill site outside the eastern boundary of the site.

The following faunal micro-habitats were identified in the project area during the field investigation:

- Moist Soweto Highveld Grassland



**Figure 22: Patches of moist grassland adjacent to the wetland approximately 1km to the north of the project site**

Remnant patches of moist grasslands occur adjacent to the channelled valley bottom wetland approximately 1 km to the north of the proposed site. The moist grasslands are in various stages of degradation. The moist grasslands in the Secunda area represent important habitat for a variety of grassland dependant Red Data faunal species such as, Southern Bald Ibis, Secretarybird, South African Hedgehog and African Grass Owl. No suitable habitat remains on the proposed site due to the high levels of habitat and vegetation transformation and degradation.

- Transformed Agricultural Lands

The current and historic agricultural lands represents suitable foraging areas for certain rodent species such as African Molerat, Highveld Gerbil and Multimammate Mouse through the tilling opening up the soil surface, making many insects, seeds, bulbs and other food sources suddenly accessible. Rodents construct burrows in the sandier soils and attract other predators such as the Slender Mongoose. Certain threatened species such as Southern Bald Ibis are often located foraging in transformed secondary grasslands (especially after burning) and Blue Cranes and Secretarybirds foraging on grasshoppers in old maize lands. The planted *Setaria pallide-fusca* pastures offer suitable foraging areas for several granivorous bird species.

### 7.8.7 Mammals

Limited animal burrows (Highveld Gerbil, Multimammate Mouse) and African Molerat were observed within the grasslands adjacent to the site. A single Scrub Hare was flushed from an uncut patch of *Setaria pallide-fusca*

planted pastures. A scat of a Slender Mongoose was observed on the dumped soil piles on the northern portion of the site. Species likely to occur include urban exploiters such as Feral cats, House rat and House mouse.

No sensitive or endangered mammals were recorded within the project site or are likely to occur on the site and in the adjacent areas.

### 7.8.8 Avifauna

Fifteen bird species were recorded on the site during the field survey. Species recorded were all common and widespread species indicative of transformed agricultural lands and degraded grasslands. All species recorded were granivorous species feeding of the *Setaria pallide-fusca* seeds.

Table 11: Red Data List bird species previously recorded from the 2630\_2905 pentad presents the Red Data List bird species previously recorded from the 2630\_2910 pentad during the South African Bird Atlas Project 1 and 2 within which the project site is situated, and that occur or could possibly within or in the vicinity of the site.

**Table 11: Red Data List bird species previously recorded from the 2630\_2905 pentad**

| Robert's Nr. | Common Name           | Scientific Name                | Regional Red List Status (2014) | Habitat Requirements   |
|--------------|-----------------------|--------------------------------|---------------------------------|--|
| 92           | Southern Bald Ibis    | <i>Geronticus calvus</i>       | Vulnerable                      | High altitudinal short grassland and cultivated lands. Forages in recently burned grasslands.  |
| 96           | Greater Flamingo      | <i>Phoenicopterus ruber</i>    | Near-Threatened                 | Highly nomadic and partially migratory and favours saline or brackish shallow waterbodies such as salt pans, large dams and coastal mudflats.  |
| 165          | African Marsh Harrier | <i>Circus ranivorus</i>        | Endangered                      | Inland and coastal freshwater wetlands and adjacent moist grassland. Require large (>100 ha) wetlands in which to breed.   |
| 208          | Blue Crane            | <i>Anthropoides paradiseus</i> | Near-Threatened                 | Mostly found in natural grasslands but also in freshwater wetlands, cultivated pastures and croplands.   |
| 393          | African Grass Owl     | <i>Tyto capensis</i>           | Vulnerable                      | African Grass Owls are found exclusively in rank grass, typically, although not only, at fair altitudes. African Grass Owls are secretive and nomadic breeding in permanent and seasonal vleis, which it vacates while hunting or post-breeding, although it will breed in any area of long grass and it is not necessarily associated |

| Robert's Nr. | Common Name   | Scientific Name                 | Regional Red List Status (2014) | Habitat Requirements  |
|--------------|---------------|---------------------------------|---------------------------------|---|
|              |               |                                 |                                 | with wetlands.  |
| 118          | Secretarybird | <i>Sagittarius serpentarius</i> | Vulnerable                      | Favours open grassland with scattered trees or shrubs. They are territorial with home ranges of 20-230 km <sup>2</sup> around the nest, usually an area of between 50-60 km <sup>2</sup> , is defended against other Secretarybirds. Nests are usually placed on top of a thorny tree, frequently in Black Thorn <i>Acacia melifera</i> , Umbrella Thorn <i>Acacia tortilis</i> , Sweet Thorn <i>Acacia karroo</i> , Common Hook Thorn <i>Acacia caffra</i> . They may also nest in exotic species such as Black Wattle <i>Acacia mearnsii</i> or Pine ( <i>Pinus</i> sp.). |

No threatened bird species were observed on site. The project site does not provide a suitable habitat for the threatened bird species due to high levels of habitat transformation as well as anthropogenic activities in the adjacent landfill site.

#### 7.8.9 Reptiles

Due to human presence in the adjacent landfill and dumping site; coupled with increased habitat destruction and disturbances around the site are all causal factors in the alteration of reptile species occurring on the site and surrounding areas. There is a lack of arboreal reptiles (chameleons, snakes, agamas, geckos and monitors) on site.

No threatened reptile species were recorded in the project site which is attributed to the transformed and degraded habitat on site.

#### 7.8.10 Amphibians

No frog species were recorded in the project site. Four frog species were recorded from the channelled valley bottom wetland approximately 1 km to the north of the Charlie 1 landfill site during a previous study. Species recorded included Drakensberg River Frog (*Amietia quecketi*); Cape River Frog (*Amietia (Afrana) fuscigula*), Guttural Toad (*Amietophrynus (Bufo) gutturalis*) and several calling Common Caco males (*Cacosternum boettgeri*).

No threatened species have been recorded on site due to anthropogenic activities and the adjacent Charlie 1 landfill site.



## 7.9 Social

The Sasol Secunda area falls within the Govan Mbeki Local Municipality (GMLM) which is located in the north-west of the Gert Sibande District Municipality (GSDM). The GMLM has the most diversified economy within the GSDM, dominated by the petrochemical industry (Sasol II and III complexes) and coal and gold mining. Secunda and Embalenhle are the closest town / communities to the project area.

From a social perspective, the Govan Mbeki Municipality consists of Secunda, Embalenhle, Kinross, Evander, Trichardt, Charl Cilliers, Leslie / Leandra, Lebohang, Eendracht, Bethal and eMzinoni. The Govan Mbeki Local Municipality has the largest number of people (24.6% or 221 745) and highest level of employment within the District. This could be attributed to the fact that the GMLM is one of two local municipalities that hosts the majority of all the mining, manufacturing and agricultural activity taking place within the District.

## 7.10 Visual

A landfill height of 5, 10, 15 and 20 m will be modelled to determine that visual impacts are associated with increasing the height of the Charlie 1 landfill site. During the EIA phase, a detailed visual assessment and viewshed analysis will be conducted to determine the impact on receptors that may be affected by the proposed height increase.

## 7.11 Noise

The noise generated from vehicles depositing waste on to the Charlie 1 landfill site is the main source of noise near the project site. The Sasol Synfuels Complex is located 1.3 km from the project site and is an existing source of noise as a result of current industrial processes that are taking place.

## 7.12 Health and Safety

The nature of Sasol's business brings with it substantial inherent safety, health and environmental (SH&E) risks. Sasol's Safety and Health Essential Requirements are compulsory and applicable to all new projects such as the proposed project.

## 7.13 Heritage

The project site is located within the Sasol Synfuels Complex property boundary which is a highly developed industrial area that has been in operation for more than 50 years. The landscape has been changed by the development as well as mining activities in the area. None of the structures have aesthetic, historic, research or historical significance. There are no sites of archaeological or cultural significance known on the proposed site.

Sasol will ensure that all requirements of Chapter II, Section 38 of the National Heritage Resources Act, Act 25 of 1999, are complied with should any sites of heritage or archaeological significance are unearthed during construction. This will be considered in more detail during the EIA phase.

## 7.14 Road Network

The Charlie 1 Security Entrance is immediately east of the project site, with the Primary Sasol Plant access road on the east and south. A secondary road runs east to west on the northern edge of the site, along the main plant security fence. All waste delivery vehicles enter the Charlie 1 landfill site on this road, from the west.

## 8 POTENTIAL IMPACTS ASSOCIATED WITH THE PROJECT

This Environmental Scoping Study (ESS) aims to identify the potential positive and negative impacts (both biophysical and social) associated with the proposed project. These impacts are only “potential” identified for construction at this early stage of the project, and may or may not materialise. However, all of these potential impacts will be assessed and adequately managed and mitigated.

### 8.1 Construction Phase

**Table 12: Potential construction phase impacts**

| Affected Environment   | Potential Impact  |
|--|---|
| <b>Soils</b>   | <ul style="list-style-type: none"> <li>Removal and compaction of soil during construction activities.</li> <li>Erosion, degradation and loss of topsoil due to construction activities as well as surface and stormwater run-off.</li> <li>Potential contamination of soils due to spillage, leakage, incorrect handling of fuel and other hazardous materials.</li> </ul>  |
| <b>Geohydrology (groundwater)</b>                            | <ul style="list-style-type: none"> <li>Contamination of groundwater due to spillage, leakage, and incorrect handling of fuel and other hazardous materials.</li> </ul>  |
| <b>Hydrology (surface water features including wetlands)</b> | <ul style="list-style-type: none"> <li>Poor stormwater management could lead to the silting of surface water features.</li> <li>Decreased infiltration and increased surface water run-off due to soil compaction by heavy machinery.</li> <li>Increased siltation of surface water resources due to soil erosion during flooding.</li> </ul>   |
| <b>Ecology</b>   | <ul style="list-style-type: none"> <li>Impact on the remaining (albeit limited) faunal component, residing in or utilising the transformed agricultural lands on the site.</li> <li>Alteration of the transformed agricultural lands will directly, and indirectly, impact on the smaller sedentary species (insects, arachnids, reptiles, amphibian and mammals) adapted to their ground dwelling habitats.</li> <li>Disruption of natural faunal cycles, such as the reproductive cycle and foraging behaviour due to artificial lighting.</li> </ul> |
| <b>Social</b>  | <ul style="list-style-type: none"> <li>Contractors and Labour will be sourced locally as far as possible for the proposed project.</li> </ul>   |
| <b>Air Quality</b>   | <ul style="list-style-type: none"> <li>Potential air pollution due to vehicle movement within the project area.</li> <li>Dust generation due to set up and removal of construction equipment; and truck transport.</li> </ul>   |
| <b>Noise</b>   | <ul style="list-style-type: none"> <li>Noise generation during the construction phase at the proposed site.</li> </ul>  |
| <b>Traffic</b>   | <ul style="list-style-type: none"> <li>Increase in traffic due to construction activities.</li> </ul>   |
| <b>Waste</b>   | <ul style="list-style-type: none"> <li>General waste generated includes domestic waste and small amounts of building rubble.</li> <li>Hazardous waste generated through the spillage of oil/diesel/chemicals used during construction.</li> </ul>   |
| <b>Health and Safety</b>                                     | <ul style="list-style-type: none"> <li>Potential health and safety impacts during construction which may include exposure to dust during windy periods.</li> </ul>  |

## 8.2 Operational Phase

**Table 13: Potential operational phase impacts**

| Affected Environment                                 | Potential Impact   |
|--|--|
| <p><b>Soils</b></p>                                  | <ul style="list-style-type: none"> <li>▪ Improper management of the leachate and stormwater run-off from the Charlie 1 landfill site could potentially contaminate soils.</li> <li>▪ Potential contamination of soils during operations and maintenance due to:               <ul style="list-style-type: none"> <li>– accidental release of the leachate and stormwater from the ponds;</li> <li>– damage of the ponds lining system;</li> <li>– lack of maintenance of stormwater and leachate drains; and</li> <li>– silt traps that are not desilted regularly.</li> </ul> </li> </ul>   |
| <p><b>Geohydrology (groundwater)</b></p>             | <ul style="list-style-type: none"> <li>▪ Improper management of the leachate and stormwater run-off from the Charlie 1 landfill site allows rainwater to pond in areas on the surface and side areas of the landfill. These ponds allow for artificial hydraulic heads to form which force water into the body of the landfill, to percolate through, and contribute to the potential for leachate generation that could potentially contaminate groundwater resources.</li> <li>▪ Improper design of the lining system for the ponds could provide a pathway for the contamination of the groundwater resources.</li> <li>▪ Potential contamination of groundwater during operations and maintenance due to:               <ul style="list-style-type: none"> <li>– accidental release of the leachate and stormwater from the ponds;</li> <li>– damage of the ponds lining system;</li> <li>– lack of maintenance of stormwater and leachate drains; and</li> <li>– silt traps that are not desilted regularly.</li> </ul> </li> </ul> |
| <p><b>Hydrology (surface water and wetlands)</b></p> | <ul style="list-style-type: none"> <li>▪ Improper management of the leachate and stormwater run-off from the Charlie 1 landfill site due to an absence of clean and dirty water segregation exacerbating the magnitude of contaminated run-off potential, rather than effective diversion of clean run-off from the landfill surface.</li> <li>▪ Improper surface water management arising from rainfall falling on the landfill so as to prevent all such surface water becoming contaminated, and/or contributing to leachate potential by infiltrating through the landfill due to ponding on the surface of the landfill rather than freely draining.</li> </ul>   |
| <p><b>Waste placement/deposition</b></p>             | <ul style="list-style-type: none"> <li>▪ Incorrect/improper waste placement/deposition strategy resulting in:               <ul style="list-style-type: none"> <li>– reduced airspace and life of the landfill site;</li> <li>– wastes remain exposed to rain events rather than be covered with topsoil on a daily basis, encouraging contaminated leachate formation;</li> <li>– exposure of the landfill to rainfall or surface water run-off; and</li> <li>– erosion flow paths to develop on the landfill, and particularly the side slopes of the landfill, exacerbating contaminated run-off potential.</li> </ul> </li> </ul>  |
| <p><b>Visual</b></p>                                 | <ul style="list-style-type: none"> <li>▪ Aesthetics of the landfill (due to the expansion of the height) for stakeholders in general, but specifically for a number of key receptors:               <ul style="list-style-type: none"> <li>– Charlie 1 Security Entrance;</li> </ul> </li> </ul>   |

| Affected Environment         | Potential Impact  |
|------------------------------|---|
|                              | <ul style="list-style-type: none"> <li>- Graceland Casino and Hotel;</li> <li>- Secunda Mall; and</li> <li>- Secunda X66 light industrial development (under consideration).</li> </ul> |
| <b>Health and Human Risk</b> | <ul style="list-style-type: none"> <li>▪ Potential contamination of groundwater resource affecting human health.</li> </ul>   |

### 8.3 Decommissioning Phase

At this point of the project planning process, the necessity for and timing of decommissioning of the proposed project is not known. However, like construction impacts, decommissioning impacts are inherently temporary in duration. Impacts relating to decommissioning and rehabilitation activities (demolition, landscaping, compaction etc.) will be addressed within the EIA phase and in the EMPr.

### 8.4 Cumulative Impacts

Cumulative impacts associated with the project will be further investigated in detail during the EIA study.

## 9 CONCLUSIONS AND RECOMMENDATIONS

This ESS has been undertaken in accordance with the Environmental Impact Assessment Regulations (2014) published in Government Notices R.982 of 8 December 2014 read with Section 44, of the National Environmental Management Act, 1998 (No 107 of 1998).

In accordance with Appendix 2 (Section 2) of the EIA Regulations (2014), this issues-based ESS aimed to identify and provide:

- A description of the scope of the proposed activity;
- The identification of all legislation and guidelines applicable to the development;
- A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic, heritage and cultural aspects of the environment may be affected by the proposed activity;
- A description of environmental risks and potential impacts, including cumulative impacts, that have been identified;
- Details of the public participation process conducted to date; and
- A Plan of Study for Environmental Impact Assessment (Chapter 10) including the methodology that will be adopted in assessing the potential impacts that have been identified, including specialist studies or specialised processes that will be undertaken.

Based on the ESS undertaken, it can be concluded that there are no fatal flaws associated with the project. Potential environmental impacts have been identified and will be further investigated in the EIA phase. The methodology that will be used for assessment of potential significant impacts is contained in Chapter 10 (Plan of Study for EIA).

The Option 1 site alternative will be further assessed in the EIA phase.



## 10 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

Potential environmental impacts (biophysical and social) associated with the proposed project have been identified in the ESS. No fatal flaws have been identified to date. All potentially significant and cumulative impacts will be further investigated and assessed within the EIA phase of the project. Mitigation measures will be contained in the EMPr to be compiled during the EIA phase.

The EIA phase will aim to adequately assess and address all potentially significant environmental issues in order to provide the Department of Environmental Affairs (DEA) with sufficient information to make an informed decision regarding the proposed project.

### 10.1 Approach to Undertake the EIA Phase of the Project

The following points below outline the proposed approach to undertaking the EIA phase of the project. It is believed that the proposed approach will adequately fulfil the Competent Authority's requirements, the requirements of the EIA Regulations (2014) and the objectives of environmental best practice, so as to ensure transparency and to allow an informed decision regarding the project to be made.

#### 10.1.1 Authority Consultation

Ongoing consultation with DEA, MDARDLEA, the Govan Mbeki Local Municipality, Ward Councillors, and all other authorities identified during the ESS phase of the project (and further ones that may be identified during the EIA phase) will continue throughout the duration of the project. Authority consultation is therefore seen as a continuous process that takes place until completion of the environmental investigations.

#### 10.1.2 Aims of the Environmental Impact Assessment

The EIA will aim to achieve the following:

- To supplement, where necessary, the assessment of the social and biophysical environments affected by the development;
- To assess impacts on the study area in terms of environmental criteria;
- To identify and recommend appropriate mitigation measures for potentially significant environmental impacts;
- To complete an EMPr for the inclusion of proposed mitigation measures; and
- To undertake a fully inclusive public participation process to ensure that I&AP issues and concerns are recorded and addressed.

#### 10.1.3 Detailed Studies to be undertaken in the EIA Phase – Specialist Studies

The following specialist assessments will be conducted in the EIA Phase:

- Visual and viewshed assessment.

The need for a Heritage Impact Assessment (HIA) will be determined after consultation with the relevant stakeholders. Should a HIA be required, this will be undertaken during the EIA Phase.

The EIA Phase of the study will rely on the extensive studies already conducted for the proposed project i.e.

- Charlie 1 Domestic Waste Site, Sasol Synfuels, Secunda: Quantification of Impacts, Assessment of Risk and Possibility of Expansion;
- Investigation into Remediation Options for the Charlie 1 Landfill Leachate;
- Pre-feasibility Assessment for Site Extension and Stormwater Management for Charlie 1 Landfill; and
- Feasibility Engineering Package for the Stormwater and Leachate Management of Charlie 1 Landfill.

#### *10.1.4 Impact Assessment Methodology*

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- **Nature:** An overview of the impact and defines it as being beneficial, neutral or detrimental in its impact on the environment;
- **Spatial Extent:** Defines physical extent or range of the impact. It will be indicated whether the impact will be limited to the site of the development activity specifically, limited to the immediate surroundings (local), the regional area, and/or the national area;
- **Duration:** Indicates the lifetime of the impact as a result of the proposed activity;
- **Probability:** Describes the likelihood of an impact actually occurring;
- **Cumulative:** Describes the cumulative effect of the impacts on the environmental and social parameter; and
- **Severity:** Scientifically evaluates how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system or a particular affected party.

**Table 14: Criteria to be used for the rating of impacts**

| Criteria                  | Description   |   |  |  |
|---------------------------|---|---|--|--|
| Spatial Extent            | <b>National (4)</b><br>The whole of South Africa  | <b>Regional (3)</b><br>Provincial and parts of neighbouring provinces   | <b>Local (2)</b><br>Within a radius of 2 km of the construction site   | <b>Site (1)</b><br>Within the construction site  |
|                           | <b>Permanent (4)</b><br>Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient | <b>Long-term (3)</b><br>The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory | <b>Medium-term (2)</b><br>The impact will last for the period of the construction phase, where after it will be entirely negated               | <b>Short-term (1)</b><br>The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase |
| Duration                  | <b>Definite (4)</b><br>Impact will certainly occur  | <b>Highly Probable (3)</b><br>Most likely that the impact will occur  | <b>Possible (2)</b><br>The impact may occur  | <b>Improbable (1)</b><br>Likelihood of the impact materialising is very low  |
|                           | <b>Very Severe (4)</b><br>Irreversible and permanent change to the environment which cannot be mitigated  | <b>Severe (3)</b><br>Long-term impacts on the environment that could be mitigated   | <b>Average (2)</b><br>Medium impacts on the environment. Mitigation is easy, cheap, less time consuming as the impact is partially reversible. | <b>Negligible (1)</b><br>Environment is marginally affected by the proposed development. Completely reversible with implementation of minor mitigation measures      |
| Probability Of Occurrence |   |   |  |  |
| Severity                  |   |   |  |  |
| Cumulative                | <b>High (4)</b><br>Impact will result in significant cumulative impacts   | <b>Medium (3)</b><br>Impacts will result in medium significant cumulative impacts   | <b>Low (2)</b><br>Impact will result in Low cumulative impacts   | <b>Negligible (1)</b><br>Impact will result in negligible to no cumulative impacts   |

Significance is determined through a synthesis of the various impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the social parameter.

The calculation of the significance of an impact uses the following formula:

$$\text{(Extent + Duration + Probability + Cumulative effect) x Severity}$$

The status of the impact determines whether the value is positive (beneficial) or negative (detrimental).

The summation of the different criteria produces a non-weighted value. By multiplying this value with the severity rating, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

The impact is rated in terms of the criteria presented in the table below.

**Table 15: Significance rating of classified impacts**

| Impact            | Rating            | Description   | Quantitative Rating |
|-------------------|-------------------|---|---------------------|
| Positive          | High              | Of the highest positive order possible within the bounds of impacts that could occur.   | +46 to +64          |
|                   | Medium            | Positive impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. Other means of achieving this benefit are approximately equal in time, cost and effort.   | +21 to +45          |
|                   | Low               | Positive impacts are of a low order and therefore likely to have a limited effect. Alternative means of achieving this benefit are likely to be easier, cheaper, more effective and less time-consuming.  | +5 to +20           |
| Negligible impact | Negligible impact | Zero (or effective neutral) impact.   | +4 to -4            |
| Negative          | Low               | Impact is of a low negative order and therefore likely to have little real effect. In the case of adverse impacts, mitigation will be required, or both. Social, cultural, and economic activities of communities can continue unchanged.   | -5 to -20           |
|                   | Medium            | A negative impact is real, but not substantial in relation to other impacts that might take effect within the bounds of those that could occur. In the case of adverse impacts, mitigation is both feasible and fairly possible. Social cultural and economic activities of communities are changed but can be continued (albeit in a different form). Modification of the project design or alternative action(s) may be required to avoid or minimise such impacts. | -21 to -45          |
|                   | High              | Of the highest negative order possible within the bounds of impacts that could occur. In the case of adverse impacts, there is no possible mitigation that could offset the impact, or mitigation is difficult, expensive, time-consuming, or a combination of these. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt or modified beyond recognition.   | -46 to -64          |

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will be included in an EMP. The EMP will form part of the Environmental Impact Report (EIR).

### *10.1.5 Environmental Impact Assessment Report*

The EIAR will contain the following:

- Details of the EAP who compiled the report and their expertise to carry out an EIA;
- Location of the activity;
- Detailed description of the scope of the activity/ies;
- Detailed description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;
- Motivation of the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location;
- Motivation for the preferred development footprint within the approved site;
- A description of the environment that might be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;
- Details of the public participation process conducted during the Scoping Phase and the ongoing consultation during the EIA phase;
- An indication of the methodology used in determining the significance of potential environmental impacts;
- A summary of the findings and recommendations of any specialist report or report on a specialised process;
- A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- An assessment of each identified potentially significant impact, including cumulative impacts, the nature of the impact, the extent and duration of the impact, the probability of the impact occurring, the degree to which the impact can be reversed, the degree to which the impact may cause irreplaceable loss of resources and the degree to which the impact can be mitigated;
- An environmental impact statement which contains a summary of the key findings of the environmental impact assessment; and a comparative assessment of the positive and negative implications of the activity;
- Recommendations from specialist reports, the recording of proposed impact management objectives and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;
- The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;
- Aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;
- A description of any assumptions, uncertainties and gaps in knowledge;
- An opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
- A draft Environmental Management Programme (EMPr); and
- Copies of any specialist reports and reports on specialised processes.

### *10.1.6 Draft Environmental Management Programme*

During the compilation of the EIAR, a draft EMPr will be compiled in accordance with the EIA Regulations (2014). The draft EMPr will provide the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/or eliminate the anticipated negative environmental impacts. The draft EMPr will provide strategies to be used to



address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.

The EMPr will include the following:

- Details of the person who prepared the EMPr and the expertise of the person to prepare an EMPr;
- Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in the EIAR, including environmental impacts or objectives in respect of operation or undertaking of the activities, rehabilitation of the environment and closure where relevant;
- A detailed description of the aspects of the activity that are covered by the draft EMPr;
- An identification of the persons who will be responsible for the implementation of the measures;
- Where appropriate, time periods within which the measures contemplated in the draft EMPr must be implemented;
- Proposed mechanisms for monitoring compliance with the EMPr and reporting thereon;
- An environmental awareness plan; and
- Procedures for managing incidents which have occurred as a result of undertaking the activity and rehabilitation measures.

## 10.2 Public Participation Process

The primary aims for the public participation process include the following:

- Meaningful and timeous participation of I&APs;
- Promoting transparency and an understanding of the proposed project and its potential environmental (social and biophysical) impacts;
- Accountability for information used for decision-making;
- Serving as a structure for liaison and communication with I&APs;
- Assisting in identifying potential environmental (social and biophysical) impacts associated with the development; and
- The needs, interests and values of I&APs must be considered in the decision-making process.

### 10.2.1 Advertising

The primary aim of adverts in the EIA phase is to provide information regarding the availability of reports for public review, as well as, if necessary, the advertisement of dates of public meeting/s.

### 10.2.2 Identification of and Consultation with Key Stakeholders

The identification of I&APs and key stakeholders will continue into the EIA phase of the project as the public participation process is a continuous process that runs throughout the duration of an environmental study.

### 10.2.3 I&AP Database

All I&AP information (including contact details), together with dates and details of consultations and a record of all issues raised is recorded within a comprehensive database of I&APs. This database will be updated on an on-going basis throughout the project, and will act as a record of the communication/involvement process.

### 10.2.4 Consultation and Public Involvement

Consultation with I&APs is considered to be critical to the success of any EIA process. Therefore, one-on-one consultation (via telephone calls, fax and emails) and a public meeting during the EIA phase will be undertaken. The aim of this process will be to provide I&APs with details regarding the process and to obtain

further comments regarding the project. Minutes of all meetings held will be compiled and forwarded to all attendees. These minutes will also be included in the EIR.

#### *10.2.5 Issues Trail*

All issues, comments and concerns raised during the public participation process of the EIA study will be compiled into an Issues Trail. This Issues Trail will be incorporated as part of the EIR.

#### *10.2.6 Public and Authority Review of the Environmental Impact Report*

The EIR will be made available at public places for review and comment. The EIR will also be submitted to DEA and MDARDLEA and simultaneously. A 30-calendar day period will be allowed for this review process. An advertisement indicating the availability of this report for public scrutiny will be placed in the local newspapers (Echo News and Ridge Times). I&APs registered on the project database will be notified of the availability of this report by correspondence.

#### *10.2.7 Authority Review of the final Consultation Environmental Impact Report*

After the public review period, all relevant comments received from the public will be considered and included into the final Consultation EIR. This final document will be submitted to DEA for decision-making.

#### *10.2.8 Waste Management Licence*

On receipt of the waste management licence for the project, I&APs registered on the project database will be informed and its associated terms and conditions by correspondence.



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