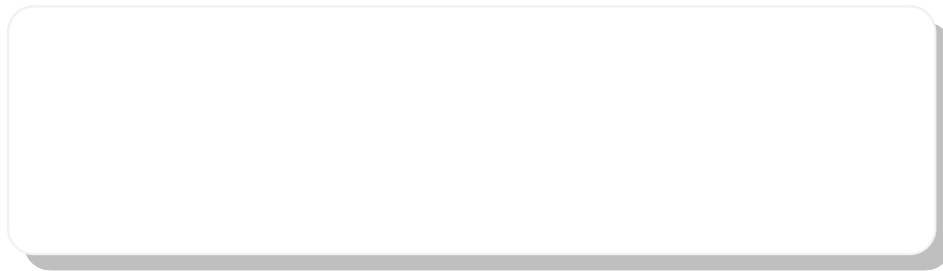


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PROJECT DETAILS

- GDARD Reference No.** : Gaut002/08-09/NO732
- Title** : Environmental Impact Assessment Process
Final Environmental Impact Assessment Report:
Proposed Upgrading of the Existing Welgedacht
Water Care Works, Gauteng Province
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PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

The East Rand Water Care Company (ERWAT) provides bulk wastewater management services to the Ekurhuleni Metro, which consists of previous municipalities of Kempton Park, Germiston, Alberton, Brakpan, Boksburg, Benoni and Springs. The existing **Welgedacht Water Care Works** (WCW) is currently under severe pressure from increasing wastewater volumes draining towards the plant due to new developments within the catchment. In order to adequately treat the wastewater volumes expected to drain towards the Welgedacht WCW in the short- and long-term, ERWAT are proposing the expansion of the Welgedacht WCW by approximately 100 MI/d over the next 30 years.

ERWAT has appointed Savannah Environmental, as independent environmental consultants, to undertake the EIA. The EIA process is being undertaken in accordance with the requirements of the National Environmental Management Act (NEMA; Act No. 107 of 1998).

The proposed upgrading of the existing Welgedacht Water Care Works is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations), Government Notice 28753 of 21 April 2006 published in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998)¹. In terms of sections 24 and 24D of NEMA, as read with GNs R385 (Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project.

This Final EIA Report represents the outcome of the Impact Assessment Phase of the EIA process and contains the following sections:

- » **Chapter 1** provides background to the proposed modification of the Welgedacht WCW and the environmental impact assessment process
- » **Chapter 2** outlines the process which was followed during the Scoping Phase and EIA Phase of the EIA process, including the consultation programme that was undertaken and input received from interested parties
- » **Chapter 3** describes the existing biophysical and socio-economic environment
- » **Chapter 4** provides an assessment of the potential issues associated with the proposed project
- » **Chapter 5** presents the conclusions and recommendations from the EIA evaluation
- » **Chapter 6** provides a reference list for the compilation of the final EIA report

¹ Note that these EIA Regulations were current at the time of submitting the Application for Authorisation and therefore this process has been completed in terms of these Regulations.

The Scoping Phase of the EIA process identified potential environmental issues associated with the proposed project, and defined the extent of the studies required within the EIA Phase. The EIA Phase addressed those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction and operation, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA report aims to provide sufficient information regarding the potential impacts and the acceptability of these impacts in order for the Competent Authority to make an informed decision regarding the proposed project.

The release of a draft EIA Report provided stakeholders with an opportunity to verify that the issues they have raised through the EIA process have been captured and adequately considered. The final EIA Report incorporates all issues and responses raised during the public review of the draft EIA Report prior to submission to the Gauteng Department of Agriculture and Rural Development (GDARD).

The EIA Phase aimed to achieve the following:

- » Provide an overall assessment of the social and biophysical environments affected by the proposed project
- » Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed modification to the WCW
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts
- » Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The conclusions and recommendations of this EIA are the result of the assessment of identified impacts by specialists, and the parallel process of public participation. The public consultation process has been extensive and every effort has been made to include representatives of all stakeholders in the study area.

INVITATION TO COMMENT ON THE DRAFT EIA REPORT

Members of the public, local communities and stakeholders were invited to comment on the Draft EIA Report which has been made available for public review and comment at the following locations between **14 March to 13 April 2011**.

- » Bakerton Library, Cnr First & Teabush Avenue, Bakerton (Mon-Fri 09:00-16:30)
- » Daveyton Library, Admin Building, Cnr Eiselen & Embusweni Street, Daveyton (Mon-Fri 08:00-16:30)
- » Springs Library, 55 Fifth Avenue, Springs (Mon-Fri 09:00-16:30; Sat 09:00-13:00)

EXECUTIVE SUMMARY

1. Background and Project Overview

The expansion of the Welgedacht WCW is proposed to be undertaken adjacent to the existing WCW within the ERWAT-owned property. The footprint of the proposed expansion will be approximately 66 588 m² in extent, and will be located to the south-west and adjacent to the existing WCW module 1 within the Farm Welgedacht 74IR Portion 82, which is owned by ERWAT (Refer to figure 1).

Due to the urgent need for the initial 50MI/d expansion due to the increasing demand on the WCW, construction of the additional infrastructure at the Welgedacht WCW is planned to begin as soon as possible (i.e. once all the necessary permits and approvals have been obtained). The construction phase is expected to extend for approximately 28 months. Construction on the second phase of the expansion is expected to begin in 2021.

2. Environmental Impact Assessment

The proposed project is subject to the requirements of the EIA Regulations published in GN 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). In terms of sections 24 and

24D of NEMA, as read with GNs R385 (Regulations 27–36) and R387, a Scoping and EIA are required to be undertaken for this proposed project.

The Gauteng Department of Agriculture and Rural Development (GDARD) is the competent authority for this project. An application for authorisation has been accepted by GDARD (under **EIA Reference number Gaut002/08-09/NO732**).

A comprehensive public participation process was undertaken in accordance with Regulation 56 of Government Notice No R385 of 2006 during the Scoping phase of this EIA process. This public participation process comprised the following:

- » **Notification of the EIA Process** in the printed media and on site, as well as through written notification to identified stakeholders affected landowners
- » **Identification and registration** of I&APs and key stakeholders.
- » Compilation and distribution of a **Background Information Document** (BID) to all identified I&APs and key stakeholders
- » **On-going consultation** with identified I&APs and stakeholders
- » **Focus Group Meetings and Public Meetings** throughout the EIA process
- » Compilation and maintenance of a **database** containing the names and addresses of all registered parties

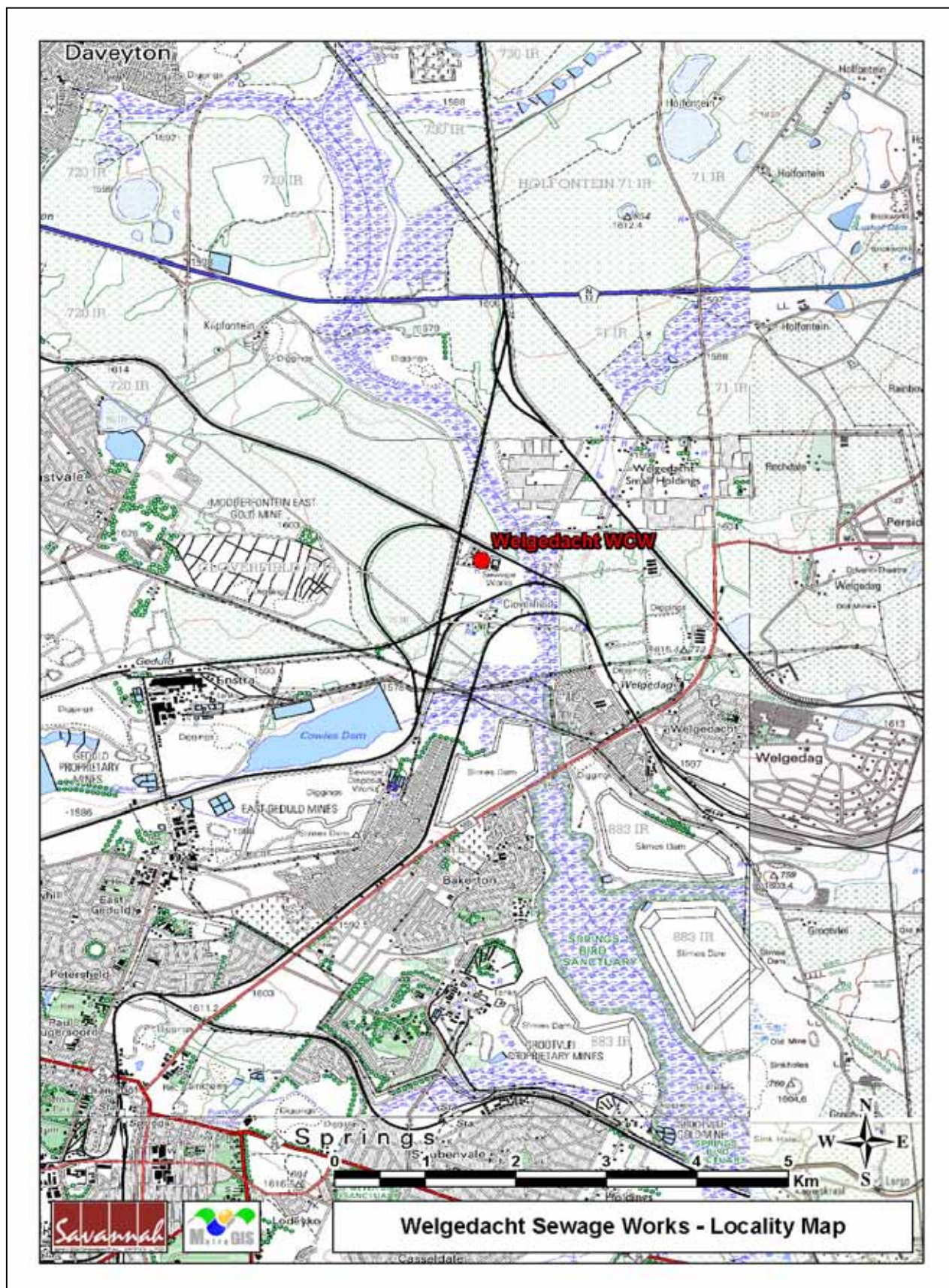


Figure 1: Locality map indicating the location of the proposed upgrade to the Welgedacht WCW

- » Preparation of a **Comments and Response Report** detailing key issues raised by I&APs as part of the EIA Process.
- » Providing opportunities for **review of EIA reporting documentation** throughout the process in accordance with the requirements of the EIA regulations

3. Evaluation of the Proposed Project

This report together with the specialist studies contained within appendices F-N provide a detailed assessment of the environmental impacts on the social and biophysical environment as a result of the proposed project.

From a technical and economic assessment of various options for the discharge of the additional effluent from the expanded WCW, it was concluded that the only feasible alternative is the discharge of the effluent at the current discharge position. This is largely due to the additional costs associated with the other options considered, which are considered to be prohibitive to the proposed development (refer to Appendix N for more details).

The assessment of impacts within this EIA Report therefore only considers the current discharge point as an option for the discharge of the additional effluent from the expanded WCW. In summary, the following impacts have been identified to be associated with the proposed project:

- » **Soils and Geology Impacts:** geotechnical studies associated with the expansion of the WCW indicate the low clay composition suggests that there is a moderate to high potential for erosion of the hillwash, but with good engineering it is possible to have expansion of the proposed WCW with the construction of a good foundation. Impacts associated with geology and soils (in terms of the risk of soil erosion) are expected to be **localised** and restricted to the site.
- » **Impacts on Terrestrial and wetland habitats:** rated as medium to high significance before mitigation due to the expansion of the WCW footprint and increased effluent discharge into the Blesbokspruit. Implementation of the recommended mitigation measures would reduce the significance of all the potential impacts to **medium - low**.
- » **Potential impacts on aquatic ecosystems** as a result of the additional effluent discharge ranged from medium to high before mitigation, with the implementation of the recommended mitigation measures, the significance of the potential impacts would be reduced to **medium and low**.
- » **Air quality impacts:** there is no indirect impact on air quality

expected from the operational or construction and decommissioning phases of the Welgedacht WCW. The only pollutant expected to exceed its standard or guideline is H₂S. This is however expected to occur 200 m away from the WCW, where there is currently no exposure to the general public. The significance of all impacts during the operational phase is **low**, while the significance of cumulative impacts during construction and decommissioning is **medium**.

- » **Noise impacts:** The noise generated by existing operations at the Welgedacht WCW as measured and perceived at the nearest noise sensitive receptor (900 metre offset) has negligible impact on the surrounding area. The addition of the new plant and equipment at the WCW will increase the noise level by about 5.7dBA. Although there are a number of noise sensitive receptors that lie within the area of potential noise impact, namely within the 35dBA contour, the impact is predicted to be **minor and of low significance** due to the already degraded noise climate in sections of these areas from road and railway traffic, and due to the character of the WCW noise. There will therefore be **no adverse noise impact** from the upgraded WCW.
- » **Impacts on heritage sites:** No sites, features or objects of

cultural heritage significance were identified in the study area, there would therefore be **no impact** from the proposed development.

- » **Visual impacts:** The construction and operation of the Welgedacht Water Care Works and its associated infrastructure will have a visual impact on the receiving environment. Although the region is strongly characterised by industrial and mining development, the immediate area surrounding the proposed WCW remains largely agricultural and / or undeveloped. The facility infrastructure is not particularly tall – the majority of the primary infrastructure will be approximately 5m tall, with the exception of the digesters, which are likely to be between 8 and 10m in height. The tallest structures will be the high mast lights, which due to their narrow form, are not expected to be apparent from significant distances. Potential visual impacts range from high to moderate before mitigation. With the implementation of the recommended mitigation measures, the significance of the potential impacts would be reduced to **moderate to low**.
- » **Social impacts:** no issues emerged that can be considered as fatal flaws from a social perspective in terms of the construction and operation of the expansion to the Welgedacht

WCW. It is furthermore not expected that the proposed project would have any significant social impacts on the receiving environment. Potential social impacts would only occur in the event that the proposed project is **not** implemented. It is therefore recommended that the construction and operation of the expansion to the Welgedacht WCW is approved from a social point of view

- » Implementation of the do nothing alternative would result in negative impacts on the environment as ERWAT would not have the capacity to adequately treat the additional effluent being directed towards the WCW. This alternative is therefore not preferred from an environmental perspective.

Impacts resulting from the modification are expected to be **POSITIVE** overall, as no environmental fatal flaws were identified during the EIA process. The recommended mitigation measures are required to be implemented to minimise all potentially significant adverse impacts identified during the specialist studies. An Environmental Management Plan (EMP) should be implemented and adhered to during construction and operation, to ensure the implementation of recommended mitigation measures and the minimisation of impacts.

4. Overall Conclusion (Impact Statement)

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that:

- » There are no environmental fatal flaws that should prevent the proposed project from proceeding on the identified site.
- » The significance levels of the majority of identified negative impacts can be minimised by implementing the recommended mitigation measures.
- » The implementation of the proposed project would enable ERWAT to ensure that the effluent being directed towards the Welgedacht WCW would be adequately treated to meet the DWA effluent standards for the catchment.
- » The consequences of not implementing the project (i.e. the do nothing alternative) are expected to be significantly higher than the option of expanding the existing WCW. This alternative is not preferred from an environmental perspective.

5. Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance predicted, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the

opinion of the EIA project team that the application for the proposed expansion of the Welgedacht Water Care Works be authorised by GDARD.

The following conditions of this recommendation must be included within the authorisation issued:

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices F-N must be implemented.
- » The draft Environmental Management Plan (EMP) as contained within Appendix O of this report should form part of the contract with the Contractors appointed to undertake the expansion of the Welgedacht Water Care Works and will be used to ensure compliance with environmental specifications and management measures.

- » Applications for all other relevant and required permits required to be obtained by ERWAT must be submitted to the relevant regulating authorities. This includes permits for disturbance to protected vegetation, disturbance to any riparian vegetation, update of the existing water use license, waste license (as appropriate), etc.
- » During construction, unnecessary disturbance to habitats should be strictly controlled and the footprint of the impact should be kept to a minimum.
- » The process of communication and consultation with the community representatives must be maintained after the closure of the EIA process, and, in particular, during the construction phase associated with the proposed project.

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Appendix N: Discharge options from the Welgedacht WCW

Appendix O: Draft Environmental Management Plan (EMP)

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DEFINITIONS AND TERMINOLOGY

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Environment: the surroundings within which humans exist and that are made up of:

- i. the land, water and atmosphere of the earth;
- ii. micro-organisms, plant and animal life;
- iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and

- iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment (EIA), as defined in the NEMA EIA Regulations and in relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management plan: An operational plan that organises and coordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its ongoing maintenance after implementation.

Indirect impacts: Indirect or induced changes that may occur as a result of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Interested and Affected Party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups and the general public.

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare".

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered,

vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment

ABBREVIATIONS AND ACRONYMS

BID	Background Information Document
CBD	Central Business District
DD5A	Drainage District 5A
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMM	Ekurhuleni Metropolitan Municipality
ERWAT	East Rand Water Care Company
GDARD	Gauteng Department of Agriculture and Rural development
GIS	Geographical Information Systems
GG	Government Gazette
GN	Government Notice
GP	Gauteng Province
H ₂ S	Hydrogen Sulphide
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
m ²	Square meters
m ³ /d	Cubic metres per day
MI/day	Mega litres per day
MW	Mega Watts
NEMA	National Environmental Management Act (Act No 107 of 1998)
NGOs	Non-Governmental Organisations
NWA	National Water Act (Act No 36 of 1998)
PES	Present Ecological State
SASS	South African Scoring System
SDF	Spatial Development Framework
SIA	Social Impact Assessment
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WCW	Water Care Works
WHO	World Health Organisation

INTRODUCTION AND PROJECT OVERVIEW

CHAPTER 1

The East Rand Water Care Company (ERWAT) provides bulk wastewater management services to the Ekurhuleni Metro, which consists of previous municipalities of Kempton Park, Germiston, Alberton, Brakpan, Boksburg, Benoni and Springs. The existing **Welgedacht Water Care Works** (WCW) is currently under severe pressure from increasing wastewater volumes draining towards the plant due to new developments within the catchment. In order to adequately treat the wastewater volumes expected to drain towards the Welgedacht WCW in the short- and long-term, ERWAT are proposing the expansion of the Welgedacht WCW by approximately 100 MI/d over the next 30 years.

The nature and extent of this proposed development is assessed within this EIA Report. The report consists of six sections:

- » **Chapter 1** provides background to the proposed modification of the Welgedacht WCW and the environmental impact assessment process
- » **Chapter 2** outlines the process which was followed during the Scoping Phase and EIA Phase of the EIA process, including the consultation programme that was undertaken and input received from interested parties
- » **Chapter 3** describes the existing biophysical and socio-economic environment
- » **Chapter 4** provides an assessment of the potential issues associated with the proposed project
- » **Chapter 5** presents the conclusions and recommendations from the EIA evaluation
- » **Chapter 6** provides a reference list for the compilation of the final EIA report

1.1. The Need for the Proposed Project

The existing **Welgedacht Water Care Works** (WCW) is located on the Farm Welgedacht 74IR Portion 82, near Springs within the Ekurhuleni Metropolitan Municipality of the Gauteng Province (refer to Figure 1.1). The WCW has been in operation since 2003, and is the DD5A (Drainage District 5A) regional plant. The plant has a design capacity of 35 megalitres per day (MI/d) but is presently receiving and treating 68 MI/d.

Growth rates in the area feeding into the Welgedacht WCW averaged at approximately 8% per annum during the past four years, ranging from 2% to 29% during peak growth periods. This is placing increasing pressure on the existing infrastructure at the Welgedacht WCW. In addition, studies indicate that planned developments within the catchment area of the WCW will place additional

pressure on this works in the future. In order to adequately treat the wastewater volumes expected to drain towards the Welgedacht WCW, the additional capacity required at the WCW over the next 30 years is approximately 100 MI/d. This is planned to be implemented in a phased approach. The first extension of 50 MI/d is proposed to be commissioned as soon as possible, followed by a further 50 MI/d extension in 2021, assuming a growth rate of 3% per annum. It is estimated that this capacity will be fully utilised by the year 2034. The expansion of the existing Welgedacht WCW will ensure that the increasing wastewater volumes can be adequately treated while maintaining the quality of the effluent within the required standard.

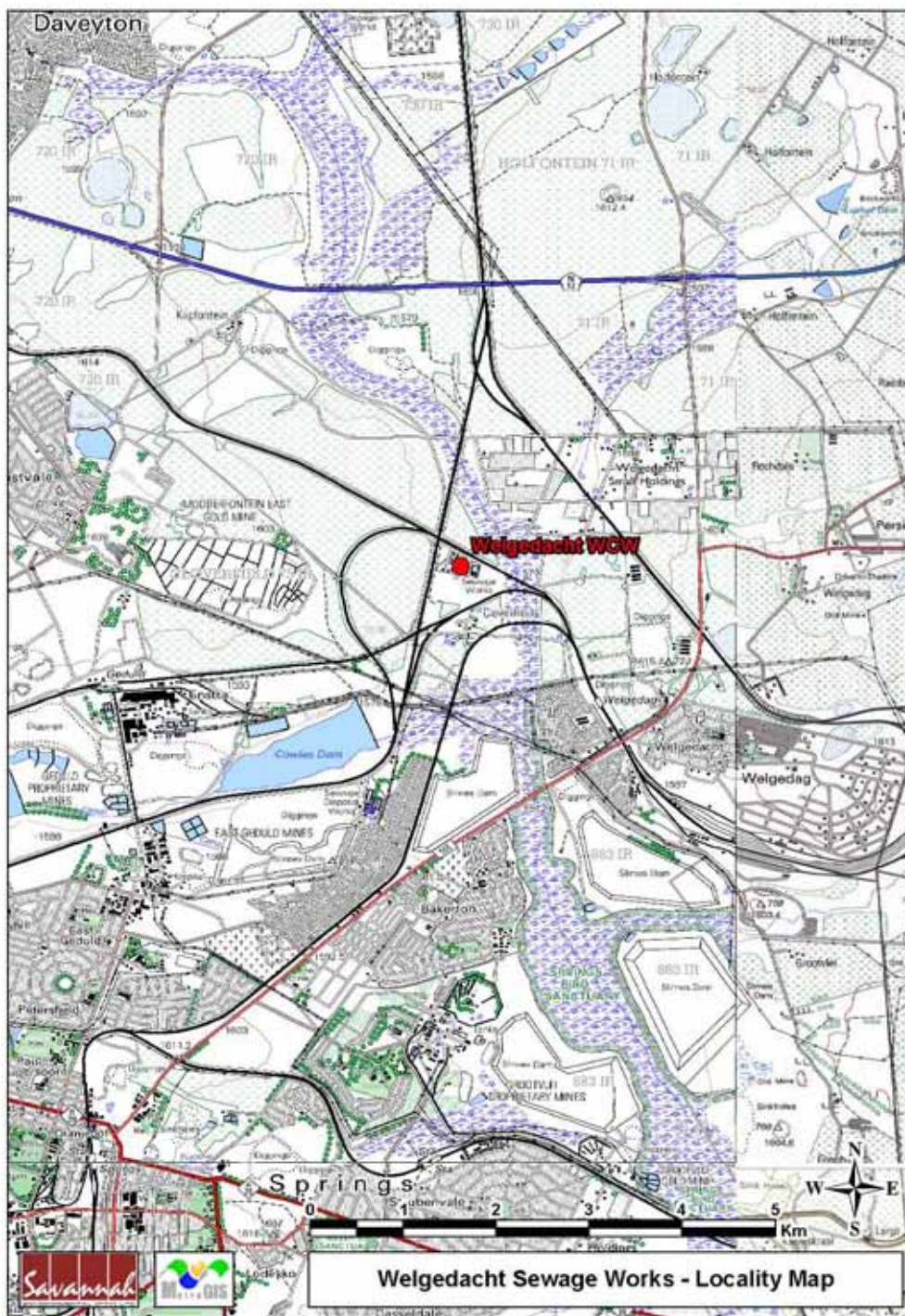


Figure 1.1: Locality map showing the study area for the proposed expansion of the Welgedacht WCW plant

1.2. Project Overview

The expansion of the Welgedacht WCW is proposed to be undertaken adjacent to the existing WCW within the ERWAT-owned property. The footprint of the proposed expansion will be approximately 66 588 m² in extent, and will be located to the south-west and adjacent to the existing WCW module 1 within the Farm Welgedacht 74IR Portion 82, which is owned by ERWAT (Refer to figure 1.3).

Due to the urgent need for the initial 50MI/d expansion due to the increasing demand on the WCW, construction of the additional infrastructure at the Welgedacht WCW is planned to begin as soon as possible (i.e. once all the necessary permits and approvals have been obtained). The construction phase is expected to extend for approximately 28 months. Construction on the second phase of the expansion is expected to begin in 2021.

The existing Welgedacht WCW consists of three sets of Archimedean screw pumps that are used to lift raw water into the inlet works. From there, rags are removed from the influent by means of two coarse screens followed by two automatic screens and a screw compactor. Effluent from the reactor flows into biological clarifiers where underflow is recycled back to an anaerobic zone. The clarifiers overflow to three chemical clarifiers where ferric chloride or polymers are used to remove phosphate and chlorine is used to disinfect the water.

The additional units associated with the expanded WCW are expected to operate slightly differently from the current situation due to the availability of newer technologies. Below is a simplified description of the planned process:

- » Raw sewage will be received approximately 11 m below ground level and lifted to the required level by screw pumps (as is currently the case).
- » Peak flows will be diverted to an emergency storage dam while the balance of the raw sewage will flow through a 50 MI/d inlet works with mechanical screens, followed by vortex degritters and flow measurement.
- » Screened and degrittled sewage will be treated in two 25 MI/d modules each consisting of:
 - * A flow balancing tank for the balancing of diurnal peak. The balanced flow will be lifted to allow gravitational flow through the subsequent process steps.
 - * Balanced flow will pass through a primary settling tank with elutriation capability. Screened waste primary sludge will be routed to anaerobic digesters and digested sludge will be dewatered for appropriate disposal.
 - * Settled wastewater from the primary settling tanks will gravitate to the biological nutrient removal activated sludge reactor consisting of

anaerobic, anoxic and aerobic zones with mixed liquor recycle facilities to suit various process options.

- * Waste activated sludge from the reactor will be thickened with dissolved air flotation thickeners, anaerobically digested together with the primary sludge before dewatering and disposal of dewatered sludge.
- * The reactor effluent will pass through a clarifier from where clear settled effluent will be disinfected with chlorine via a chlorine contact tank. Settled activated sludge will be recycled to the reactor.
- * Final effluent will be discharged to the environment as authorised by GDARD (Gauteng Department of Agriculture and Rural Development) and DWA (Department of Water Affairs).

A number of options were initially considered as part of the project for the discharge of the additional effluent from the Welgedacht WCW. These include:

- Discharge to the Blesbokspruit, as is currently the case.
- Discharge to the Blesbokspruit at a point below the RAMSAR site. This option will involve the construction of a conduit from the WCW to a point below the RAMSAR site.
- Transfer of the effluent to the Olifants or Crocodile catchment. This option will involve the construction of a pipeline from the WCW to a point within one of these catchment areas.
- Sale and re-use of this effluent by other users within the catchment (e.g. industries, mines, etc). This option may require additional treatment of the effluent, depending on the quality standards of the purchaser.

These options were considered from a technical and economic perspective during the scoping phase (refer to Chapter 2 and Appendix N for more details). The only technical and economically feasible option identified was that of the status quo (i.e. Discharge to the Blesbokspruit, as is currently the case). This is the option assessed within this report.

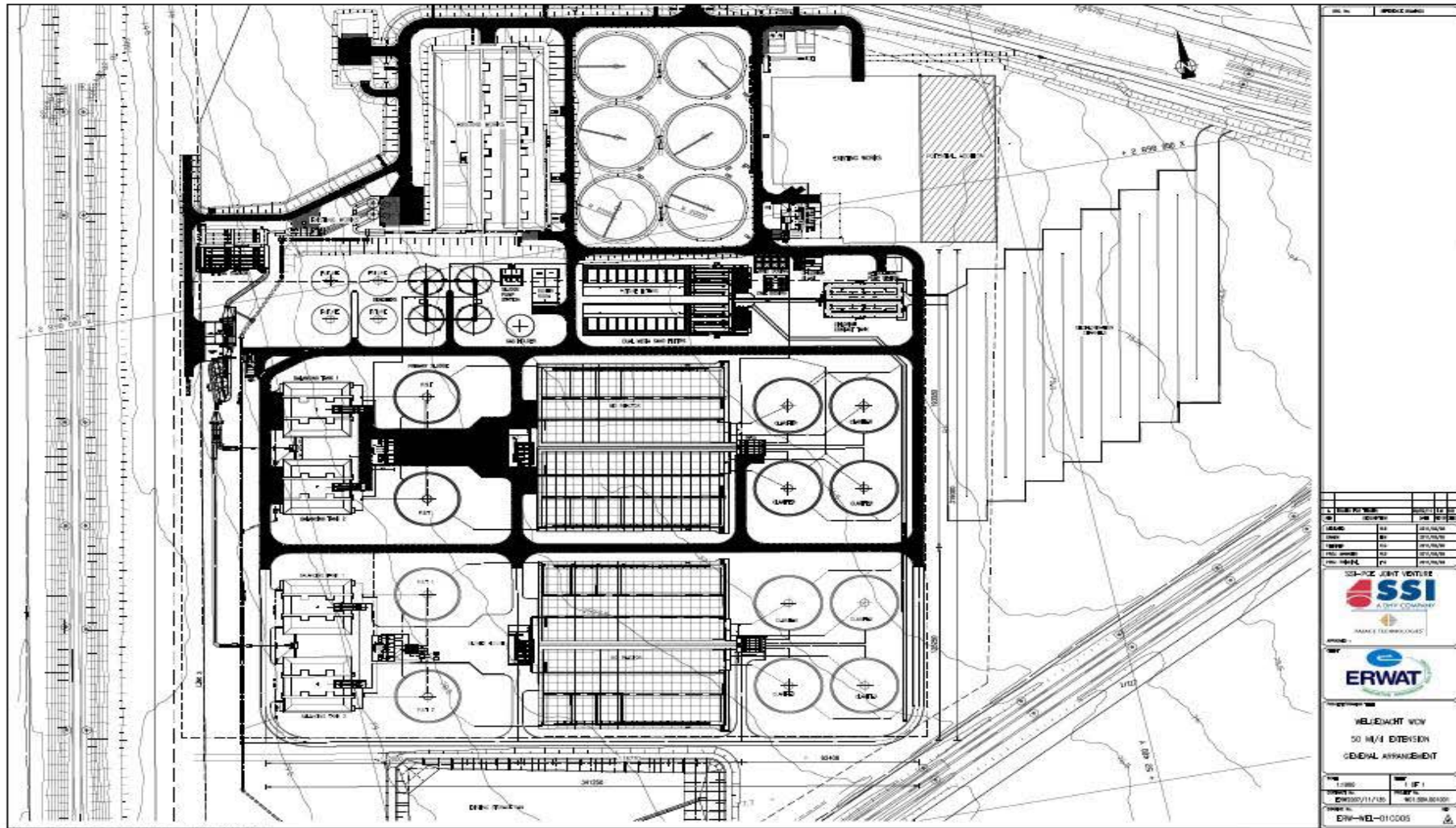


Figure 1.2: Layout of the existing Welgedacht WCW showing the planned position of the proposed upgrade (source: SSI Engineers and Environmental Consultants)

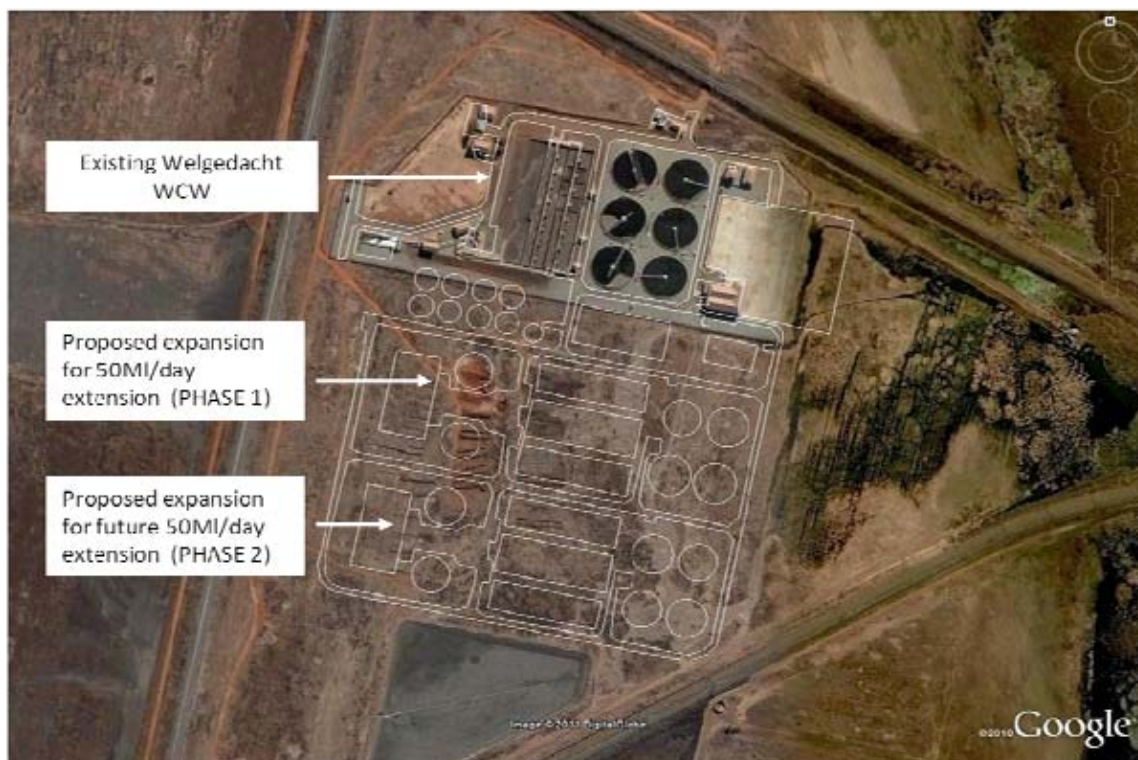


Figure 1.3: Aerial photograph of the Welgedacht Water Care Works indicating the proposed area for future extensions

1.3. Requirement for an Environmental Impact Assessment Process

In order to assess local level environmental and planning issues in sufficient detail, site-specific studies and assessments are required to be undertaken through the EIA process in order to delineate areas of sensitivity within the broader site and ultimately inform the design of the proposed expansion within the identified area.

The proposed project is subject to the requirements of the Environmental Impact Assessment Regulations (EIA Regulations) published in terms of Section 24(5) of the National Environmental Management Act (NEMA, No 107 of 1998). This section provides a brief overview of EIA Regulations and their application to this project.

NEMA is national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. The Gauteng Department of Agriculture and Rural Development (GDARD) is the competent authority for this project which was formerly known as the Gauteng Department of Agriculture, Conservation and Environment (GDACE). An application for authorisation

was accepted by GDACE (under Application Reference number: **Gaut 002/08-09/NO732**).

The need to comply with the requirements of the EIA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process, and assess if environmental impacts can be avoided, minimised or mitigated to acceptable levels. Comprehensive, independent environmental studies are required to be undertaken in accordance with the EIA Regulations to provide the competent authority with sufficient information in order for an informed decision to be taken regarding the project. ERWAT appointed Savannah Environmental (Pty) Ltd to conduct the independent Environmental Impact Assessment (EIA) process for the proposed project.

An EIA is also an effective planning and decision-making tool for the project proponent. It allows the environmental consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed. It provides the opportunity for the developer to be forewarned of potential environmental issues, and allows for resolution of the issue(s) reported on in the Scoping and EIA reports as well as dialogue with affected parties.

In terms of sections 24 and 24D of NEMA, as read with Government Notices R385 (Regulations 27–36) and R387², a Scoping and EIA are required to be undertaken for this proposed project as it includes the following activities listed in terms of GN R386 and R387 (GG No 28753 of 21 April 2006):

² The EIA process was initiated under the old Regulations and so is continuing in line with them.

No & date of relevant notice	Activity No (in terms of relevant Regulation/ notice)	Description of listed activity
Government Notice R387 (21 April 2006)	1(p)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the treatment of effluent, wastewater or sewage with an annual throughput capacity of 15 000 cubic metres or more
Government Notice R386 (21 April 2006)	25	The expansion of or changes to existing facilities for any process or activity, which requires an amendment of an existing permit or license or a new permit or license in terms of legislation governing the release of emissions, pollution, effluent.

This report documents the assessment of the potential environmental impacts of the proposed extension of the Welgedacht WCW. This assessment forms part of the EIA process and was conducted in accordance with the requirements of the EIA Regulations in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

1.4. Objectives of the EIA Phase

The Scoping Phase of the EIA process refers to the process of identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA Phase. This is achieved through an evaluation of the proposed project, involving the project proponent, specialists with experience in EIAs for similar projects, and a public consultation process with key stakeholders (including government authorities) and interested and affected parties (I&APs). This phase was completed in June 2009 with the acceptance of the Scoping report by GDARD. There has been a delay in the EIA process in regard the preparation of the EIA report due to discussions around the discharge points from the WCW.

The EIA Phase addresses those identified potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and recommends appropriate mitigation measures for potentially significant environmental impacts. The EIA phase aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The release of the draft EIA Report provided stakeholders with an opportunity to verify that the issues they have raised through the EIA process have been captured and adequately considered. This final EIA Report incorporates all issues and responses raised during the public review of the draft EIA Report.

1.5 Details of Environmental Assessment Practitioner and Expertise to conduct the Scoping and EIA

Savannah Environmental was contracted by ERWAT as an independent consultant to undertake an Environmental Impact Assessment (EIA) for the proposed project, as required by the NEMA EIA Regulations. Neither Savannah Environmental, nor any of its specialist sub-consultants on this project are subsidiaries of or affiliated to ERWAT. Furthermore, Savannah Environmental does not have any interests in secondary developments that may arise out of the authorisation of the proposed project.

Savannah Environmental is a specialist environmental consulting company providing a holistic environmental management service, including environmental assessment and planning to ensure compliance and evaluate the risk of development; and the development and implementation of environmental management tools. Savannah Environmental benefits from the pooled resources, diverse skills and experience in the environmental field held by its team.

The Savannah Environmental team has considerable experience in environmental assessment and environmental management, and have been actively involved in undertaking environmental studies for a wide variety of projects throughout South Africa. Strong competencies have been developed in project management of environmental EIA processes, as well as strategic environmental assessment and compliance advice, and the identification of environmental management solutions and mitigation/risk minimising measures.

Curricula vitae for the Savannah Environmental project team consultants are included in Appendix A. In order to adequately identify and assess potential environmental impacts associated with the proposed project, Savannah Environmental has appointed several specialist consultants to conduct the specialist studies and assessments, as required. The curricula vitae for the EIA specialist consultants are also included in Appendix A.

SCOPE OF ENVIRONMENTAL INVESTIGATIONS

CHAPTER 2

The National Environmental Management Act (NEMA; No 107 of 1998) defines construction to include the expansion of a facility, structure or infrastructure that is necessary for the undertaking of an activity, which results in an increase in the production, storage or transportation capacity of that facility, structure or infrastructure. Construction of facilities such as a water care works have been identified as an activity which may have a detrimental impact on the environment, and therefore NEMA requires that an environmental assessment process be undertaken prior to the implementation of the activity. As a result of the extent of the proposed increase in design capacity of the Welgedacht Water Care Works (WCW) (i.e. being more than 15MI/annum), an Environmental Impact Assessment (EIA) is required to be undertaken.

An EIA process refers to that process (dictated by the EIA Regulations) which involves the identification and assessment of direct, indirect and cumulative environmental impacts associated with a proposed project. The EIA process comprises two phases: **Scoping Phase** and **EIA Phase**. The Scoping process culminated in the submission of a Scoping Report to the competent authority (GDARD in this case) for review and acceptance before proceeding onto the next phase of the process. The EIA process culminates in the submission of an EIA Report (including a draft Environmental Management Plan (EMP)) to the competent authority for decision-making. The EIA process is illustrated in the simplified flow diagram below:



The EIA Phase for the proposed Welgedacht WCW has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 24(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998). The environmental studies for this proposed project were undertaken in two phases, in accordance with the EIA Regulations.

2.1. Phase 1: Scoping Study

The Scoping Study, which commenced in November 2008, provided I&APs with the opportunity to receive information regarding the proposed project, participate in the process and raise issues of concern.

The Scoping Report aimed at identifying potential issues associated with the proposed project, and defining the extent of studies required within the EIA phase of the process. This was achieved through an evaluation of the proposed project involving specialists with expertise relevant to the nature of the project and the study area, the project proponent, as well as a consultation process with key stakeholders that included both relevant government authorities and interested and affected parties (I&APs). In accordance with the requirements of the EIA Regulations, feasible project-specific alternatives (including the Do Nothing option) were identified for consideration within the EIA process.

The draft Scoping Report compiled was made available at public places for I&AP review and comment. All comments, concerns and suggestions received during the Scoping Phase and the draft report review period were included in the Final Scoping Report and Plan of Study for EIA. The Final Scoping Report was submitted to GDARD on 28 April 2009 and accepted on 24 June 2009 (refer to correspondence included in Appendix B). In terms of this acceptance, an Environmental Impact Assessment was undertaken for the proposed project.

2.2. Phase 2: Environmental Impact Assessment

Through the Scoping Study, no environmental fatal flaws were identified to be associated with the modification of the proposed WCW facility. However a number of issues requiring further study for the modification of the proposed works were highlighted. These issues have been assessed in detail within the EIA phase of the process.

The EIA phase aimed to achieve the following:

- » Provide an overall assessment of the social and biophysical environments affected by the proposed project
- » Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed modification to the WCW
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts
- » Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

The EIA addresses potential environmental impacts and benefits (direct, indirect and cumulative impacts) associated with all phases of the project including design, construction, operation and decommissioning, and aims to provide the environmental authorities with sufficient information to make an informed decision regarding the proposed project.

The EIA process followed for this project is described below.

2.3. Overview of the EIA Phase

The EIA phase has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of NEMA. Key tasks undertaken within the EIA phase included:

- » Consultation with relevant decision-making and regulating authorities (at Provincial and Local levels).
- » Undertaking a public involvement process throughout the EIA process in accordance with Regulation 56 of Government Notice No R385 of 2006 in order to identify any additional issues and concerns associated with the proposed project.
- » Preparation of a Comments and Response Report detailing key issues raised by I&APs as part of the EIA Process (in accordance with Regulation 59 of Government Notice No R385 of 2006).
- » Undertaking independent specialist studies in accordance with Regulation 33 of Government Notice No R385 of 2006.
- » Preparation of a Final EIA Report in accordance with Regulation 32 Government Notice No 385 of 2006.
- » Preparation of a Draft Environmental Management Plan (EMP) in accordance with the requirements of a Regulation 34 Government Notice No 385 of 2006.
- » Make draft EIA and EMP available for public review in accordance with the requirements of Regulation 56 of Government Notice No 385 of 2006.

2.3.1. Regulating Authority Consultation

The Gauteng Department of Agriculture and Rural Development (GDARD) is the competent authority for this application. A record of all authority consultation undertaken prior to the commencement of the EIA Phase is included within the EIA Report. Consultation with the regulating authority (i.e. GDARD) has continued throughout the EIA process. On-going consultation included the following:

- » Submission of a Final Scoping Report (April 2009) following a 30-day public review period

The following will also be undertaken as part of this EIA process:

- » Submission of a Final Environmental Impact Assessment (EIA) Report following the 30-day public review period
- » Site visit with the regulating authorities during the review period for the final EIA Report.
- » A consultation meeting with GDARD in order to discuss the findings and conclusions of the EIA Report.

2.3.2. Consideration of Alternatives

As the proposed expansion to the Welgedacht will be located to the south-west and adjacent to the existing WCW module 1 within the Farm Welgedacht 741R Portion 82, which is owned by ERWAT, no site alternatives have been identified for consideration within the EIA process.

In accordance with the EIA Regulations, the do nothing alternative has been assessed within this EIA Report. The **'do nothing' alternative** is the option of ERWAT not adding the proposed capacity expansion of 100MI/d to the existing Welgedacht WCW facility (retain the status quo). This alternative is assessed within this report.

A number of options were considered as part of the project for the discharge of the additional effluent from the Welgedacht WCW. These included:

- Discharge to the Blesbokspruit, as is currently the case.
- Discharge to the Blesbokspruit at a point below the RAMSAR site. This option will involve the construction of a conduit from the WCW to a point below the RAMSAR site.
- Transfer of the effluent to the Olifants or Crocodile catchment. This option will involve the construction of a pipeline from the WCW to a point within one of these catchment areas.
- Sale and re-use of this effluent by other users within the catchment (e.g. industries, mines, etc). This option may require additional treatment of the effluent, depending on the quality standards of the purchaser.

A Welgedacht WCW alternative discharge desktop study (October 2009) was undertaken by SSI within which the technical and economic criteria of the various discharge options were assessed (Refer to Appendix N). It was concluded from the study that the discharge to the Blesbokspruit as is currently the case would be the only technically and economically feasible option for the proposed project, as the costs associated with the other options considered were prohibitively high. Key issues associated with the additional costs (i.e. who would finance the additional infrastructure required, and who will benefit from the reduction of water in the Blesbokspruit) were taken into consideration. It was concluded that the Welgedacht WCW receives and treats sewage received from an extensive low income area and the additional capital required for the infrastructure necessary to alleviate hydraulic loads on the Grootvlei mine and the

Blesbokspruit cannot be carried by way of tariff charges through the to the Ekurhuleni Metropolitan Municipality. This could severely affect and or suspend further development initiatives in this area. The negative economic impacts associated with the other options considered were therefore considered to outweigh the potential positive environmental impacts associated with an alternative discharge point.

2.3.3. Public Involvement and Consultation

A public participation process has been undertaken as part of this EIA process in accordance with the requirements of Regulation 56 of Government Notice No R385 of 2006. The aim of the public participation process was primarily to ensure that:

- » Information containing all relevant facts in respect of the proposed project was made available to potential stakeholders and I&AP's.
- » Participation by potential I&APs was facilitated in such a manner that all potential stakeholders and I&APs were provided with a reasonable opportunity to comment on the proposed project.
- » Comment received from stakeholders and I&APs was recorded and incorporated into the EIA process.

Through on-going consultation with key stakeholders and I&APs, issues raised through the Scoping Phase for inclusion within the EIA study were confirmed. All relevant stakeholder and I&AP information has been recorded within a database of affected parties (refer to Appendix C for a listing of recorded parties). While I&APs were encouraged to register their interest in the project from the onset of the process, the identification and registration of I&APs has been on-going for the duration of the EIA process and the project database has been updated on an on-going basis. 109 parties have registered their interest in the project to date.

The following variables were considered in the decision regarding the level of public participation required for the EIA Phase as well as the process to be followed:

- » *The scale of anticipated impacts of the proposed project:* the project is an ERWAT development.
- » *The public sensitivity and the degree of controversy of the project:* the project showed that no fatal flaws were expected.
- » *The characteristics of the potentially affected parties:* there are existing organisational structures that represent I&APs and their interests and good exposure/ information sharing of the project to the local communities took place during the EIA process (i.e. I&APs are well informed on the project).

In order to accommodate the varying needs of stakeholders and I&APs, as well as ensure the relevant interactions between stakeholders and the EIA specialist team, the

following opportunities were provided for I&APs issues to be recorded and verified through the EIA phase, including:

- » Focus Group Meetings
- » One-on-one **consultation meetings** and telephonic consultation sessions (consultation with various parties, for example with directly affected landowners, by the project participation consultant as well as specialist consultants)
- » Written, faxed or e-mail **correspondence**.

Records of all meetings held are included within Appendix F.

2.3.4. Identification and Recording of Issues and Comments

Issues and comments raised by I&APs over the duration of the EIA process have been synthesised into a Comments and Response Report (refer to Appendix F for the Comments and Response Reports compiled from both the Scoping and EIA Phases).

The Comments and Responses Report includes responses from members of the EIA project team and/ or the project proponent. Where issues are raised that the EIA team considers beyond the scope and purpose of this EIA process, clear reasoning for this view is provided.

2.3.5. Assessment of Issues Identified through the Scoping Process

Issues which required further investigation with the EIA phase, as well as the specialists involved in the assessment of these impacts are indicated in Table 2.1.

Table 2.1: Specialist studies undertaken within the EIA phase

Specialist	Specialist Study	Refer Appendix
Umoya-Nilu	Air Quality Impact	Appendix F
Golder Associates	Terrestrial and Aquatic Ecology	Appendix G
Master Q Research	Social Impact	Appendix H
Jongen Keets & Associates	Noise Impact	Appendix I
MetroGIS	Visual Impact	Appendix J
Johnny van Schalkwyk	Heritage Impact	Appendix K
Chris Herold	Hydrological Assessment	Appendix L
ARQ	Geotechnical Investigation	Appendix M
SSI	Discharge options from the Welgedacht WCW	Appendix N

A geotechnical study was also undertaken by ARQ Consulting Engineers as part of the engineering studies for the proposed project. The conclusions of this study are included within this EIA Report in order to assess the potential impact on geology. The geotechnical report is included within Appendix M.

In order to evaluate issues and assign an order of priority, it was necessary to identify the characteristics of each potential issue/ impact:

- » The **nature**, a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- » The **duration**, wherein it is indicated whether:
 - * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - * medium-term (5–15 years) – assigned a score of 3;
 - * long term (> 15 years) - assigned a score of 4; or
 - * permanent - assigned a score of 5.
- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment;
 - * 2 is minor and will not result in an impact on processes;
 - * 4 is low and will cause a slight impact on processes;
 - * 6 is moderate and will result in processes continuing but in a modified way;
 - * 8 is high (processes are altered to the extent that they temporarily cease); and
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The probability of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - * Assigned a score of 3 is probable (distinct possibility);
 - * Assigned a score of 4 is highly probable (most likely); and
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » The significance, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- » The **status**, which is described as either positive, negative or neutral.
- » The degree to which the impact can be reversed.
- » The degree to which the impact may cause irreplaceable loss of resources.
- » The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

$S=(E+D+M)P$; where

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- » **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- » **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- » **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

As ERWAT has the responsibility to avoid or minimise impacts and plan for their management (in terms of the EIA Regulations), the mitigation of significant impacts is discussed. Assessment of impacts with mitigation is made in order to demonstrate the effectiveness of the proposed mitigation measures. A draft Environmental Management Plan is included within Appendix N.

2.3.6. Public Review of Draft EIA Report and Feedback Meeting

This was the **previous stage** of the EIA Phase. Hard copies of the Draft Environmental Impact Assessment Report were made available for public review from **14 March to 13 April 2011** at the following locations:

- » Bakerton Library, Cnr First & Teabush Avenue, Bakerton (Mon-Fri 09:00-16:30)
- » Daveyton Library, Admin Building, Cnr Eiselen & Embusweni Street, Daveyton (Mon-Fri 08:00-16:30)
- » Springs Library, 55 Fifth Avenue, Springs (Mon-Fri 09:00-16:30; Sat 09:00-13:00)

The Draft EIA Report was also available for download from Savannah Environmental's website (www.savannahSA.com).

In order to facilitate comments on the Draft EIA Report, a public feedback meeting was held during the review period as follows:

- » **DATE:** Thursday **31 March 2011**

- » **TIME:** 18:00 for 18:30
- » **VENUE:** Hall of the Dutch Reformed Church, Springs North (Cnr. Botha Street & Milner Avenue, Geduld Extension).

The public review process and details of the public meeting were advertised in regional and local newspapers: Benoni City Times, the Beeld and the Springs Advertiser (refer to Appendix E).

In addition, all registered I&APs were notified of the availability of the report and public meeting in writing.

A focus group meeting was held with the Blesbokspruit Forum on the 20 April 2011 at the head office of ERWAT (minutes of all meetings are included in Appendix E2).

2.3.7. Final EIA Report

The final stage in the EIA Phase entailed the capturing of responses from I&APs on the Draft EIA Report in order to refine the Draft EIA report. It is this final report upon which the decision-making Environmental Authorities make a decision regarding the proposed project.

2.4 Regulatory and Legal Context

The regulatory hierarchy for a WCW expansion project of this nature consists of three tiers of authority who exercise control through both statutory and non-statutory instruments – that is National, Provincial and Local levels.

2.5 Regulatory Hierarchy

At National Level, the main regulatory agencies are:

- » *Department of Water Affairs (DWA)* – This is the authority that is responsible for the issuing of a water use license for the discharge of effluent from the water care works. This water use license will set the standards which the effluent is required to comply with.

At Provincial Level, the main regulatory agency is:

- » *Provincial Government of the Gauteng Province* – Gauteng Department of Agriculture and Rural Development (GDARD). This is the principal authority involved in the EIA process and determines many aspects of Provincial Environmental policy. The department is the competent authority for this project.

At Local Level, the local and municipal authorities are the principal regulatory authorities responsible for planning, land use and the environment. In Gauteng, the Ekurhuleni

Municipality Metropolitan plays a role as a commenting authority as they execute all the functions of a local government for a particular city.

- » In terms of the Municipal Systems Act (Act No 32 of 2000) it is compulsory for all municipalities to go through an Integrated Development Planning (IDP) process to prepare a five-year strategic development plan for the area under their control.
- » Bioregional planning involves the identification of priority areas for conservation and their placement within a planning framework of core, buffer and transition areas. These could include reference to visual and scenic resources and the identification of areas of special significance, together with visual guidelines for the area covered by these plans.
- » By-laws and policies have been formulated by local authorities to protect visual and aesthetic resources relating to urban edge lines, scenic drives, special areas, signage etc.

2.6 Legislation and Guidelines that have informed the preparation of this EIA Process

Those Acts, standards or guidelines which have informed the project process and the scope of issues evaluated in this EIA study are summarised in Table 2.2.

Table 2.2: Review of relevant policies, legislation, guidelines and standards applicable to the Welgedacht WCW Project EIA

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
<i>National Legislation</i>			
<p>National Environmental Management Act, 1998 (Act No. 107 of 1998)</p>	<p>EIA Regulations have been promulgated in terms of Chapter 5. Activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 387 of 21 April 2006, a scoping and EIA process is required to be undertaken for the proposed project</p>	<p>GDARD – lead authority.</p>	<p>This EIA report is to be submitted to GDARD in support of the application for authorisation submitted in October 2008.</p>
<p>National Environmental Management Act, 1998 (Act No. 107 of 1998)</p>	<p>In terms of the Duty of Care provision in S28(1) ERWAT as the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised.</p> <p>In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the</p>	<p>National Department of Water and Environmental Affairs (as regulator of NEMA).</p>	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section will find application during the EIA phase and will continue to apply throughout the life cycle of the project.</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</p>	<p>cumulative effect of a variety of impacts.</p> <ul style="list-style-type: none"> » The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. » The Minister may amend the list by— <ul style="list-style-type: none"> (a) adding other waste management activities to the list; (b) removing waste management activities from the list; or (c) making other changes to the particulars on the list. » Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that <ul style="list-style-type: none"> (a) the containers in which any waste is stored, are intact and not corroded or in any other way rendered unfit for the safe storage of waste; (b) adequate measures are taken to prevent accidental spillage or leaking; (c) the waste cannot be blown away; (d) nuisances such as odour, visual impacts and breeding of vectors do not arise; and (e) pollution of the environment and harm to health are prevented 	<p>National Department of Water and Environmental Affairs</p>	<p>A waste Licence will be required from DEA as this project deals with the discharge of effluent which is classified as the disposal of hazardous substances.</p> <p>Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of this Act, as detailed in the EMP (refer to Appendix N).</p>
<p>Environment Conservation Act, 1989 (Act No. 73 of 1989)</p>	<p>National Noise Control Regulations (GN R154 dated 10 January 1992).</p>	<p>National Department of Water and Environmental Affairs Local authorities</p>	<p>There is no requirement for a noise permit in terms of the legislation. Noise impacts are expected to be</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
			<p>associated with the construction phase of the project and are likely to present an intrusion impact to the local community. On-site activities should be limited to 6:00am to 6:00pm Monday – Saturday (excluding public holidays). Should activities need to be undertaken outside of these times, the surrounding communities will need to be notified and appropriate approval will be obtained from DEA and the Local Municipality.</p>
<p>National Water Act, 1998 (Act No. 36 of 1998)</p>	<p>Section 21 sets out the water uses for which a water use license is required.</p>	<p>National Department of Water and Environmental Affairs</p>	<p>Discharge of the effluent from the WCW is a water use in terms of Section 21 of the NWA. ERWAT have an existing water use license for the Welgedacht WCW. This will be required to be amended in order to include the additional volume of effluent to be discharged from the expanded WCW.</p>
<p>National Water Act, 1998 (Act No. 36 of 1998)</p>	<p>In terms of Section 19, ERWAT as the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to prevent and remedy the effects of pollution to water resources from occurring, continuing or recurring.</p>	<p>National Department of Water and Environmental Affairs (as regulator of NWA)</p>	<p>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section will find application during the EIA phase and will continue to apply throughout the life cycle of the project.</p>
<p>National Environmental</p>	<p>Section 9 – National standards</p>	<p>National Department of</p>	<p>A specialist air quality assessment has</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
Management: Air Quality Act, 2004 (Act No 39 of 2004)	Section 10 – Provincial standards Section 11 – Local standards Schedule 2 (to the Act) – Ambient air quality standards	Environmental Affairs - Chief Air Pollution Control Officer (CAPCO) GDARD	been undertaken as part of the EIA process (refer to Appendix F). No permit or license is required to be obtained for this activity.
National Heritage Resources Act (Act No 25 of 1999)	Section 38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including any development or other activity which will change the character of a site exceeding 5 000 m ² in extent. The relevant Heritage Resources Authority must be notified of developments such as linear developments (such as roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site exceeding 5 000 m ² ; or the re-zoning of a site exceeding 10 000 m ² in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided.	South African Heritage Resources Agency (SAHRA)	The area earmarked for the expansion of the WCW is 19ha in extent. Therefore an HIA was required to be undertaken for this proposed project (refer to Appendix K). As no heritage sites were identified within the development area, no permits will be required to be obtained.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	In terms of Section 57, the Minister of Environmental Affairs and Tourism has published a list of critically endangered, endangered, vulnerable and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657	National Department of Water and Environmental Affairs	As ERWAT will not carry on any restricted activity, as is defined in Section 1 of the Act, no permit is required to be obtained in this regard. A specialist ecological study has been undertaken for the proposed project (refer to Appendix G).

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR No. 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA phase.</p>		<p>No protected plant species have been identified within the development footprint. Therefore, no permits are required to be obtained.</p>
<p>Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)</p>	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Weeds are described as Category 1 plants, while invader plants are described as Category 2 and Category 3 plants. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</p>	<p>Department of Agriculture</p>	<p>While no permitting or licensing requirements arise from this legislation, this Act will find application during the EIA phase and will continue to apply throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented. In addition, a weed control and management plan must be implemented.</p>
<p>Hazardous Substances Act, 1973 (Act No. 15 of 1973)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death by reason of their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain</p>	<p>Department of Health</p>	<p>It is necessary to identify and list all the Group I, II, III and IV hazardous substances that may be on the site of the WCW and in what operational context they are used, stored or</p>

Legislation	Applicable Requirements	Relevant Authority	Compliance requirements
	<p>instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared to be Group I or Group II hazardous substance;</p> <p>Group IV: any electronic product;</p> <p>Group V: any radioactive material.</p> <p>The use, conveyance or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p>		<p>handled. If applicable, a license is required to be obtained from the Department of Health.</p>

DESCRIPTION OF THE AFFECTED ENVIRONMENT

CHAPTER 3

This section of the EIA Report provides a description of the environment that may be affected by the proposed expansion of the existing Welgedacht Water Care Works. This information is provided in order to assist the reader in understanding the possible effects of the proposed project on the environment. Aspects of the biophysical, social and economic environment that could be affected by, or could affect, the proposed development have been described. This information has been sourced from both existing information available for the area as well as collected field data, and aims to provide the context within which this EIA is being conducted. A more detailed description of each aspect of the affected environment is included within the specialist reports contained within Appendices F-N.

3.1. Location of the Study Area

The existing **Welgedacht Water Care Works** (WCW) is situated in the Gauteng Province (GP), located in the DD5A sub-drainage district in the Brakpan, Boksburg, Benoni and Springs area. The site is located in the Upper Vaal Water Management Area (WMA 8), in quaternary catchment number C21D.

The proposed extension falls within the boundaries of the existing WCW. The extension is to be constructed adjacent (south-west) to the existing works, on a portion of the farm Welgedacht 741R in the Springs magisterial district of Gauteng Province. Refer to figure 3.1 for locality map.

3.2. Road Network

The existing main roads influencing the study include:

- » **National Road N12:** This is a major freeway aligned in an east-west direction approximately 3km north of the WCW.
- » **Welgedacht/Main Road (Route R555 South):** Main arterial route aligned in a north-south direction approximately 2.2 kilometers to the east of the WCW.
- » **Route R555 East (Stofberg Avenue):** Main provincial route eastwards to Delmas.
- » **Pansy Road:** Main route north from Welgedacht Road/Stofberg Avenue intersection.

3.3. Railway Network

Several railway lines converge on the area of the Welgedacht WCW site. On average 110 trains pass through this area every day.

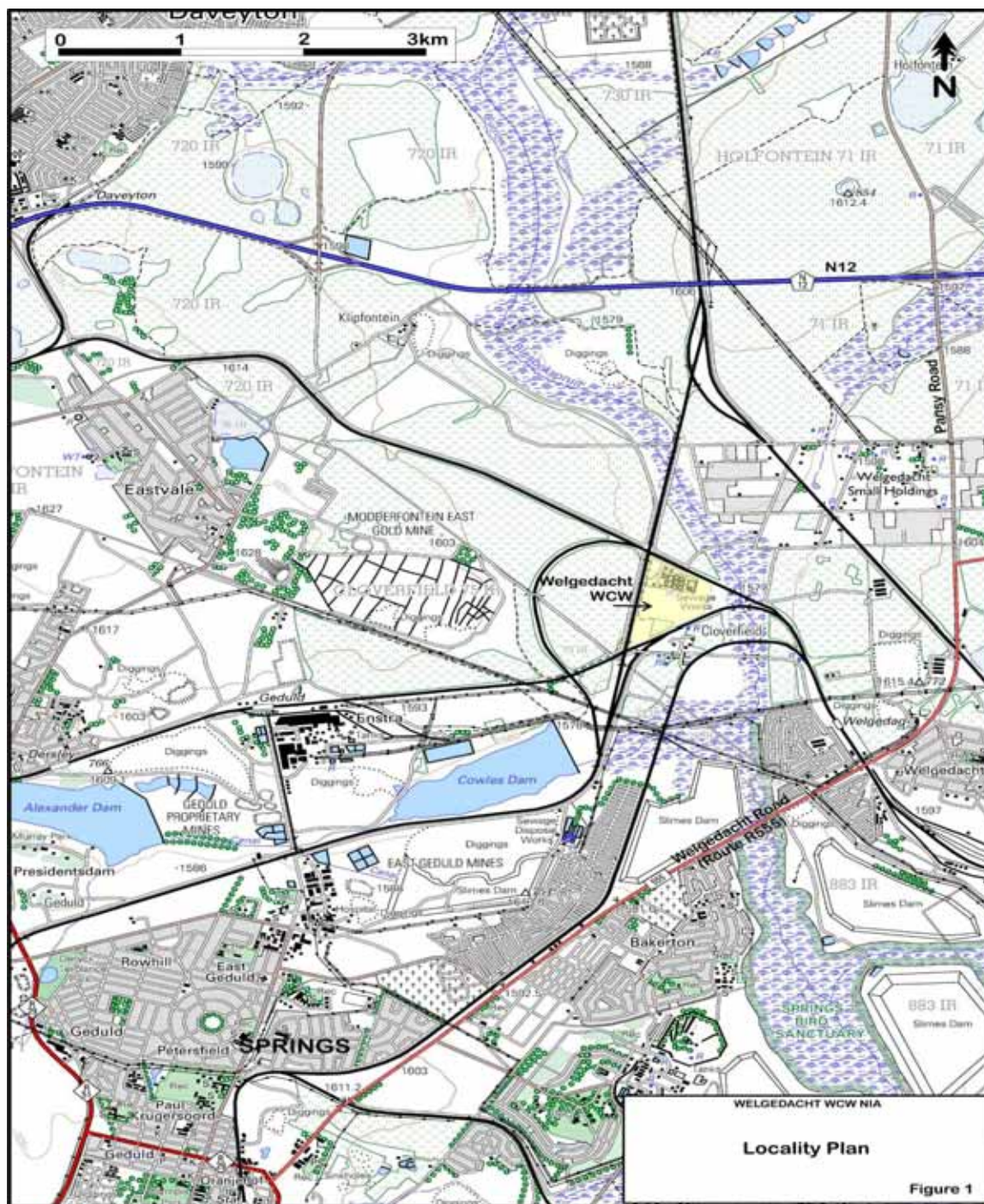


Figure 3.1: Locality map of the Welgedacht WCW

3.4. Regional Setting

The proposed site for development is situated in the east of the Ekurhuleni Metropolitan Municipality (EMM) in the Gauteng Province which falls within the Gauteng Province

(GP)³. The EMM lies on the eastern border of the GP, east of the City of Johannesburg. The municipal area covers a land surface area of approximately 1 924.4km² and includes towns such as Kempton Park in the northwest, Serfontein in the northeast, Benoni and Brakpan in the central parts, Springs to the east, Germiston to the west, Vosloorus to the southwest and Nigel in the southeast.

3.5. Topography

The terrain is gently undulating with the main fall of the land to the south. The WCW lies at a low point in the area with rising ground to the east, north and west. The Blesbokspruit which drains the area from north to south lies just to the east of the WCW.

3.6. Soils and Geology

The site is underlain by dolomites of the Chuniespoort Group, Transvaal Sequence. Syenite intrusions are also common and such an intrusion was encountered along the western boundary of the site and is shown on Figure 3.2). Hillwash that was encountered to an average depth of 1,0m was underlain by a layer of chert gravel to an approximate depth of 4,0m. A dolomite and chert residuum (wad) overlies dolomite bedrock that was encountered at an average depth of 10m.

³ A metropolitan municipality is defined as a municipal area that executes all the functions of a local government for a particular city and therefore does not form part of a bigger district area.

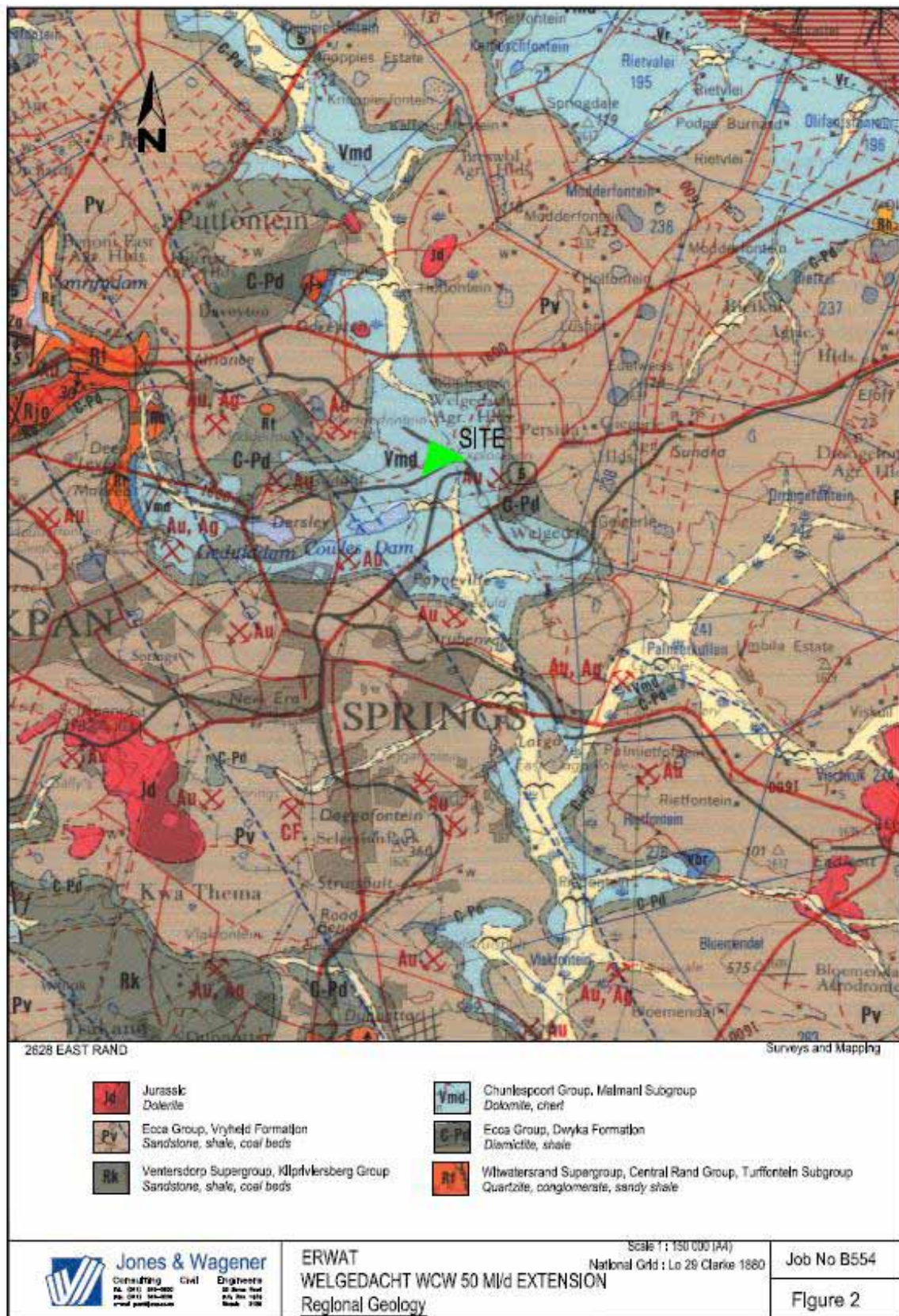


Figure 3.2: Map indicating regional geology of study area

3.7. Geographic Profile

The Welgedacht WCW lies at the interface of a noisy urban area (to the south) and a quieter rural (farming) area to the north. The area surrounding the proposed extension to the WCW includes a wide range of differing land uses, with predominantly agricultural land uses north and east of the WCW site, and mainly mining and industrial land uses to the west and south of the site.

The existing land uses in the area include:

- » **Residential:**
 - a) Residences in the Welgedacht smallholdings to the north-east of the WCW. There are small business venture company (industrial type) operations together with houses on several erven in the Welgedacht AH.
 - b) Gugulethu-Everest informal settlement to the south-east of the WCW.
 - c) The residential townships of Slovo Park, Welgedacht and Bakerton to the south-east of the WCW.
 - d) The residential township of Eastvale to the west of the WCW.
- » **Educational:** Several schools in the area.
- » **Industrial:**
 - a) Enstra Industrial Township.
 - b) Impala Platinum Refinery.
 - c) There are numerous small business type industrial works in the Welgedacht agricultural holdings.
- » **Agriculture:**
 - a) Farmland to the east and the west of the WCW site.
 - b) Chicken hatcheries to the east of the WCW.
- » **Nature reserve/recreational:** Springs Bird Sanctuary along the Blesbokspruit to the south of Welgedacht Road. There is a small wedge of the Sanctuary north of the road.

Figure 3.3 provides an overview of the current land use surrounding the Welgedacht WCW.

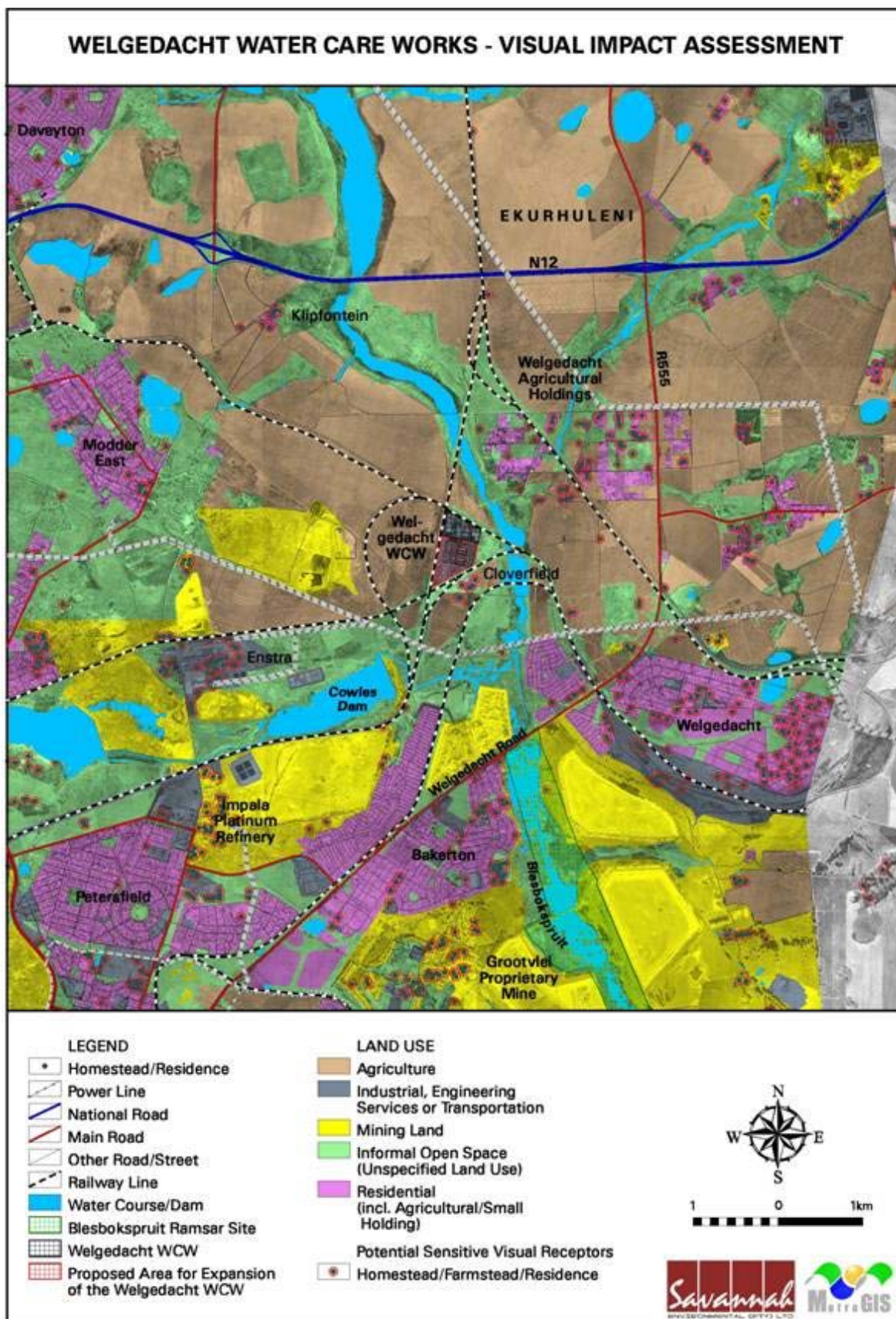


Figure 3.3: Overview of current land use surrounding the Welgedacht WCW

3.8. Social Characteristics of the Study Area and Surrounds

3.8.1. Demographic Profile⁴

In 2007, the EMM had a total population of 2,724,229 people, which represented a population growth rate of approximately 10% from 2001, when the total population stood at approximately 2,478,622 people. The population density within the EMM stood at approximately 1,416 people per km² in 2007. There is an almost equal split between males and females, with females dominating slightly at 50.1%.

The education profile of the study area indicated that the majority of the adult population have had some form of education, where the bulk of the population (not counting children under the age of 5) has either completed or is in the process of completing some level of education (ranging from primary to secondary to tertiary). It can therefore be concluded that, for the most part, the affected area is characterised by a predominantly semi-skilled to skilled population.

3.8.2 Economic Profile⁵

Overall, it appeared as if the economy of the study area is growing at a steady pace. As economic industries are growing, more employment opportunities are created thereby reducing the unemployment rate, creating sources of income which in turn leads to the creation of other opportunities such as further education, a need for housing (which in turn creates further employment opportunities, both directly and indirectly), etc.

3.8.3. Socio-Cultural Profile

According to the Spatial Development Framework (SDF North), the Tembisa complex, located in the north west of the Northern region, is one of the disadvantaged communities and requires service upgrading since backyard shacks are quite prominent.

The Southern region is made up of the areas of Germiston, Katlehong, Tokoza, Vosloorus and portions of the old Alberton, Boksburg, Brakpan and Eikenhof areas. The economic structure of the Southern region is focused on the established industrial nodes of Alrode and Wadeville.

⁴ Demographic processes relate to the number of people and composition of a community and include an overview of the population size and the education profile of the affected communities.

⁵ Economic processes relate to the way in which people make a living and the economic activities within that society. The employment status within a community gives an indication of the economic stability of such a community and serves as an indicator of such a community's general well-being.

3.9. Biophysical Characteristics

3.9.1. Terrestrial Environment

The vegetation type of the area is Soweto Highveld Grassland, with a distribution in the Gauteng and Mpumalanga Province. Furthermore it stretches in a small extent over the Gauteng borders to the Free State and the North West Province. This broad band of vegetation is delimited by the N17 road between Johannesburg and Ermelo in the north, the Vaal River in the south, Randfontein in the west and Perdekop in the southeast. The climate associated to this vegetation type is a Mean Annual Precipitation (MAP) of 662 mm, with cool-temperate climate with a range of a very high maximum in the summer and a very low minimum in the winter. The conservation status of the Soweto Highveld Grassland is endangered. Only a few areas of conservation exists and more than half of the vegetation type has been impacted upon and transformed due to cultivation, urbanization or the flooding of dams (Mucina & Rutherford, 2006). A list of important taxa to be found in this vegetation type is included in the ecological report (Refer to Appendix G).

3.9.2. Aquatic Environment

The study area falls within the Highveld Level 1 Ecoregion (Kleynhans, Thirion, & Moolman, 2005) in the Gauteng Province.

Most of the flow passing down the Blesbokspruit comprises of point discharges consisting of treated sewage effluent, underground water pumped from Grootvlei Gold Mine and Sappi's industrial effluent. Since resuming pumping, the Grootvlei Gold Mine has had to pump at a much higher rate than previously due to the cessation of dewatering by closed mines in the Rietspruit catchment and the migration of underground water entering adjacent mines towards the Grootvlei Gold Mine workings. Not only have the quantities increased dramatically (up to 120 MI/d), the salinity has also risen considerably to reflect the poorer quality of the water in the surrounding region. While the salinity of water pumped from Grootvlei Gold Mine has gradually improved (from an EC of 405 mS/m for the first year, 1996/7, to 244 mS/m for the last year, 2009) the salinity is still high and is of concern with regard to the RAMSAR wetland site and has a significant impact on Vaal Barrage and the downstream Vaal River. Growing treated sewage effluent discharges have an increasing beneficial effect on salinity concentrations in the Blesbokspruit wetland. The locations of the effluent sources are shown in Figure 3.4.

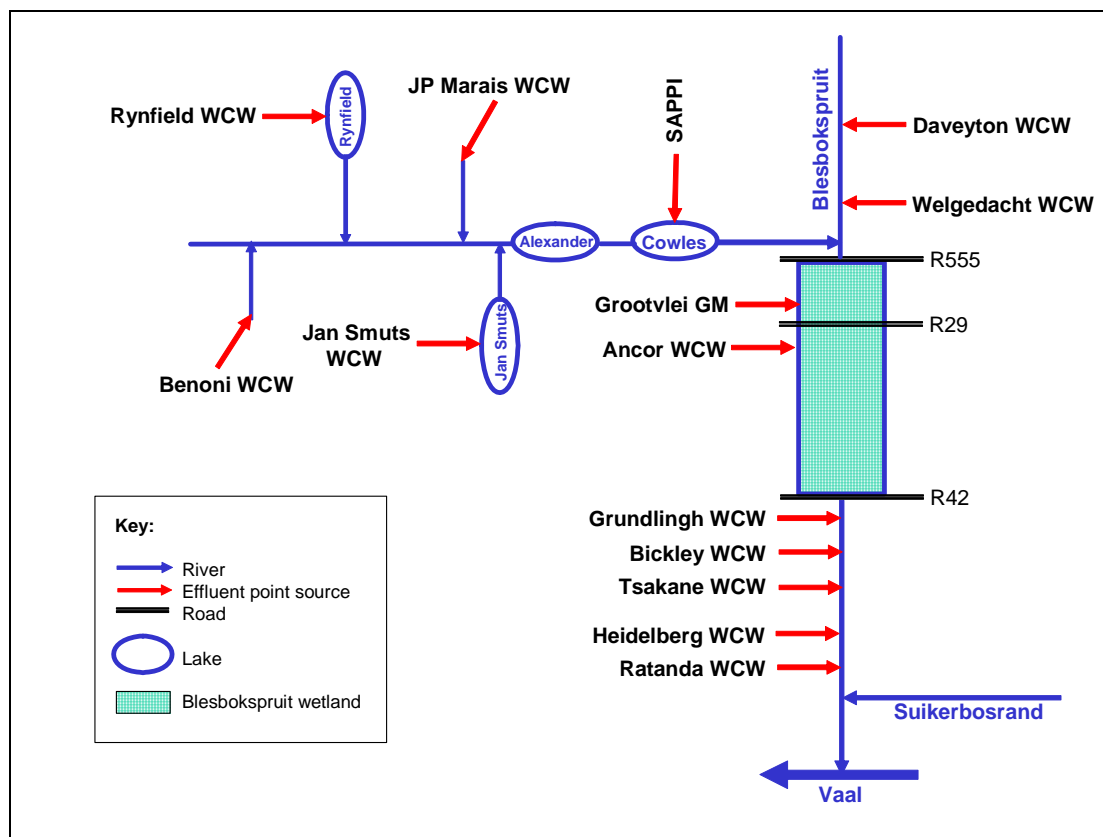


Figure 3.4: Locations of current effluent point sources (Source: Umfula Wempilo Consulting, November 2010 (Refer to Appendix L for full Report))

Most of the flow passing down the Blesbokspruit comprises of point discharges consisting of treated sewage effluent, underground water pumped from Grootvlei Gold Mine and Sappi's industrial effluent. Since resuming pumping, the Grootvlei Gold Mine has had to pump at a much higher rate than previously due to the cessation of dewatering by closed mines in the Rietspruit catchment and the migration of underground water entering adjacent mines towards the Grootvlei Gold Mine workings. Not only have the quantities increased dramatically (up to 120 MI/d), the salinity has also risen considerably to reflect the poorer quality of the water in the surrounding region. While the salinity of water pumped from Grootvlei Gold Mine has gradually improved (from an EC of 405 mS/m for the first year, 1996/7, to 244 mS/m for the last year, 2009) the salinity is still high and is of concern with regard to the RAMSAR wetland site and has a significant impact on Vaal Barrage and the downstream Vaal River. Growing treated sewage effluent discharges have an increasing beneficial effect on salinity concentrations in the Blesbokspruit wetland.

At present the high nutrient concentrations in various point discharges to the upper Blesbokspruit are improved by the wetland. There is concern that the assimilative capacity of the wetland may be nearing exhaustion with the subsequent break-through of phosphate. The main concern is a potential rise in the phosphate load entering the Vaal Barrage, leading to increased eutrophication problems. Elevated concentrations of

other pollutants could occur closer to the point of discharge, but high decay rates in the wetland should confine such impact to a relatively short reach of the Blesbokspruit.

3.10. Ambient Air Quality

The Ekurhuleni District Municipality continuously measures air quality using its ambient air quality monitoring network, which consists of six monitoring stations located throughout the municipality. The Etwata and Springs monitoring stations are located approximately 8.5 km to the north and 10.5 km to the south-west of the Welgedacht WCW, respectively. These distances are considered excessive to adequately represent the air quality in the vicinity of the Welgedacht WCW. The modelling of baseline air quality is thus necessary as no representative measurement data is available.

Baseline air quality was determined by using the USEPA's Screen3 air dispersion model. The Screen3 model is the USEPA's current regulatory screening model for new installations and other air permitting applications. The Screen3 model is based on steady-state Gaussian plume algorithms. It is applicable for estimating ambient impacts from point, area, and volume sources out to a distance of about 50 km.

The model is used to determine ground level concentrations of benzene, toluene, ethyl benzene, xylene and H₂S downwind of the WCW. The inputs to the model are baseline emission rates, estimated by using the method described in the Air Quality Assessment (Refer to Appendix F). Wind data, which was acquired from the South African Weather Service for the OR Tambo International Airport weather station was then used to determine the areas of maximum impact.

3.10.1. Climatology of Study Region

The dispersion of pollutants released into the atmosphere is dependant on wind characteristics like wind speed and wind direction in the near-surface layer, and atmospheric stability. The wind rose is a diagram that illustrates the frequency of wind speed and direction measurements in the 16 cardinal wind directions for a given period. Wind direction is indicated as from where the wind blows (e.g. easterly winds blow from the east); the dashed circles indicate the frequency of occurrence of hourly wind in bands of 4%; the coloured bars indicate the wind speed classes. The general wind patterns in the region of the Welgedacht WCW are illustrated in Figures 3.5 and 3.6 with the aid of wind roses for summer (January, February and December) and winter (June, July and August). A distinction is also made between day and night wind behaviour. The wind roses are based on meteorological data from the SAWS (South African Weather Service) weather station at Springs for 2004, 2005 and 2006.

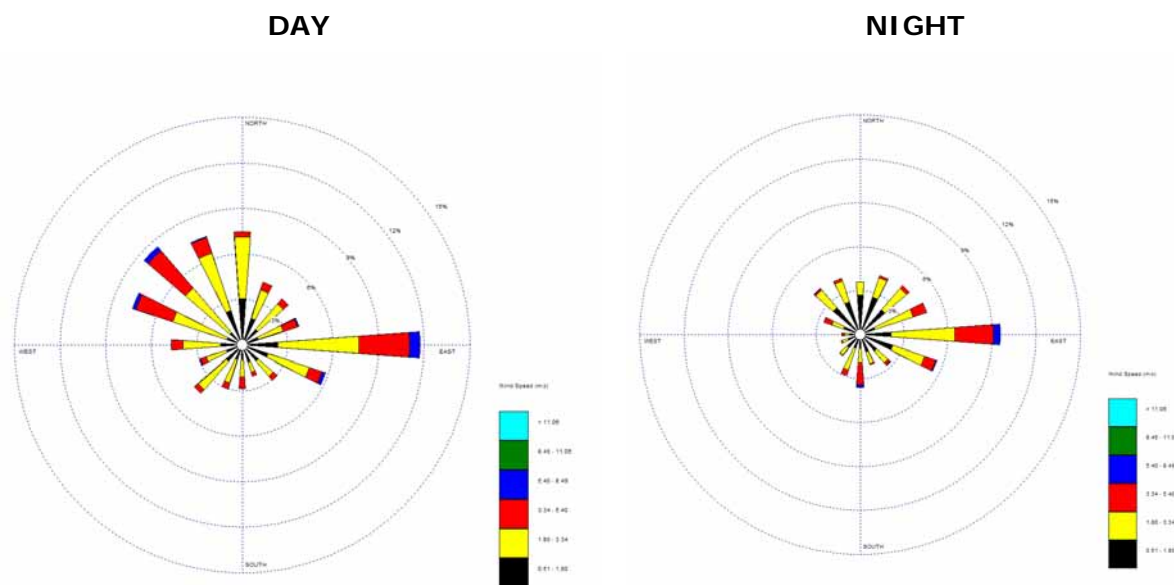


Figure 3.5 – Wind roses for summer

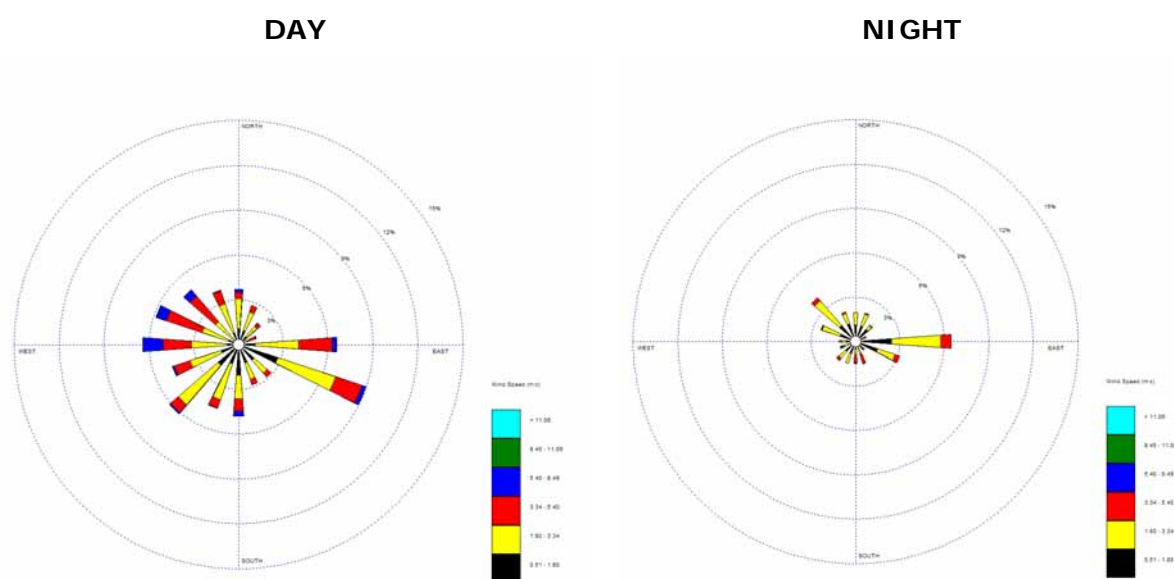


Figure 3.6 – Wind roses for winter

The area is characterised by winds of all directions with easterly and north-westerly winds being slightly more dominant in the summer months and south-easterly winds dominating slightly more in winter months. Easterly winds occur both during summer days at an overall frequency of 12% and summer nights at an overall frequency of 9%. The north-westerly winds however occur primarily during the day, with no distinct dominance at night. The winds from the various directions appear to be more evenly spread at night.

The pattern of wind directions during winter also shows a tendency of winds in all directions to be present. However, in the case of winter days, south-easterly winds dominate slightly at a frequency of 9%. This differs slightly from the summer months when easterly winds exhibit greater dominance. The day-time dominance of south-easterly winds subsides at night and is replaced by easterly winds.

Wind speeds drop markedly from the summer to winter months and from day to night. Wind speeds during summer are mostly light (1.8 to 3.34 m/s) to moderate (3.34 to 8.49 m/s). However, strong winds (>8.49 m/s) occur at a low frequency in the easterly and north-westerly directions during summer days. As expected, wind speeds exhibit a tendency of being lower at night during summer. During the days in winter, a higher frequency of strong winds occur than during the days in summer. However, these winds also subside quite notably at night. The winds at night are mostly calm.

3.10.2. Climatic conditions and implications for air quality

The diffusion of pollutants into the atmosphere is dependent on climatic conditions and local atmospheric stability, which may vary on a daily and seasonal basis. During winter, the Highveld is dominated by a high-pressure system, which is characterised by subsidence that results in clear skies, light winds, and temperature inversions. These conditions are unfavourable for pollution dispersion and diffusion. During summer, moist unstable conditions dominate, resulting in conditions that are conducive to rapid pollution dispersion and air mixing. The Highveld, and more specifically the Ekurhuleni Metropolitan Municipality, are slightly dominated by easterly and north-westerly winds in summer and south-easterly winds in winter. This is primarily due to the southerly migration of the high pressure cell, which also results in winds becoming more north-easterly and more north-westerly in spring and autumn respectively.

3.11. Heritage Profile

The study area for the HIA involves a vacant section of land, most of which have been cultivated in the past. Sand is currently being excavated from the site. The result is that any heritage feature that might have occurred here in the past was in all probability destroyed.

ASSESSMENTS OF ISSUES ASSOCIATED WITH THE PROPOSED PROJECT

CHAPTER 4

This section of the Environmental Impact Assessment Report assesses the identified potentially significant environmental impacts associated with the proposed extension of the Welgedacht WCW. Potential direct, indirect and cumulative impacts associated with the proposed modification of the water care works are assessed, and recommendations are made regarding the management of the impacts for inclusion in the draft Environmental Management Plan (Refer to Appendix O).

As the proposed extension is to be undertaken adjacent to the site of the existing WCW, no feasible site alternatives were identified for investigation.

In accordance with the requirements of the EIA Regulations, the '**do nothing**' **alternative** (i.e. ERWAT does not extend the existing WCW facility (maintain status quo)) has been assessed within this phase of the EIA process.

4.1. Potential Impacts Associated with Geology and Soils

Foundation indicators:

The grading analysis performed on the hillwash indicates that the material is silty sand with a low plasticity. The material exhibits a low heave potential. The low clay composition suggests that there is a moderate to high potential for erosion of the hillwash. The chert horizon comprises gravel in a silty sand matrix. The average PI of the chert gravel is 14% but the material has low swell potential according to Van der Merwe. A single dolomite residuum sample was tested and the results show that the material classifies as sandy clay with a PI of 18% but a low swell potential.

4.1.1. Implications for project implementation

- » The hillwash exhibits a high risk of a collapse of grain structure.
- » The chert gravel and dolomite residuum horizons are highly compressible
- » The geotechnical evaluation of the site has confirmed that the highly compressible soils and the shallow water table need to be addressed in the design of foundations.
- » The hillwash and wad horizons are not considered suitable for foundations due to their collapse and compressible properties.
- » The chert gravel could be considered as a founding stratum either for lightly loaded or flexible structures.
- » The variable thickness of this horizon and the compressible nature of the wad would have to be considered for in any foundations located on the chert residuum.
- » The dolomite would provide a suitable founding stratum but due to its depth, would require piling for most structures.

- » The compressible properties of the soil can be improved by densifying the in situ profile. This can be achieved either by:
 - * Dynamic replacement, or
 - * Preloading the profile.
- » The compressible profile can be improved by the use of a combination of stone columns driven to depth of approximately 10m and an engineered fill terrace near surface. The problems associated with the shallow water table will necessitate the use of cut off drains and dewatering during construction.

4.2. Potential Impacts on Ecology

Components of the proposed development that will affect the wetland habitats include the release of treated wastewater, pipelines, and water outlets.

Positive and negative impacts have been identified during the ecological assessment. Positive impacts associated with the expansion of the Welgedacht WCW include meeting discharge standards as well as an increase in the size of the wetland habitat at the Ramsar site.

Negative impacts relate to the increase in flow in the Blesbokspruit downstream of the effluent release point. Increased discharge rates associated with the increased capacity of the WCW will result in increased flow levels downstream of the effluent release point. This increase in flow levels could result in increased scouring of substrates and riverbanks and the further reduction of aquatic biodiversity, as well as inundation of terrestrial areas.

Modern WCW are able to reduce most of the nitrogen-containing compounds in organic waste to atmospheric nitrogen (Davies & Day, 1998). The existing WCW also has a phosphorous removal system. The current guideline value for Phosphorous concentrations in wastewater release is 0.6 mg/l P (DWAF, 2008). Assuming that the WCW complies with the 0.6 mg/l P guideline, this is still likely to have a negative impact on aquatic and wetland ecosystems. Phosphorous levels above 0.25mg/l lead to hypertrophic conditions with very low levels of species diversity (DWAF, 1996). Growth of aquatic plants and blooms of blue-green algae (often including species which are toxic to man, livestock and wildlife) occur under these conditions.

Faecal Coliforms concentration should currently comply with less than 300 units (FCU)/100ml (i.e. the maximum allowable concentration in terms of the effluent standards). This value has been exceeded several times over the period January 2009 to September 2009, possibly due to the increasing demand on the WCW. With the upgrade the target of 0 FCU/100ml will be maintained more readily. Faecal Coliform concentrations of between 0 and 130 FCU/100ml water are regarded as safe and won't contribute to the outbreak of disease. This is viewed as a positive impact.

Based on the in-field assessments and consideration of the proposed development, impacts identified to be associated with wetland, aquatic and terrestrial ecosystems include:

- » Loss of wetland and aquatic habitat during construction, due to vegetation removal;
- » Loss of terrestrial habitat during construction, due to vegetation removal;
- » Loss of terrestrial, aquatic and wetland species diversity during construction, due to habitat degradation and loss;
- » Further decrease in habitat integrity in the wetland and aquatic areas at the site and in the downstream Blesbokspruit Ramsar site, due to continued nutrient input causing algal and nuisance vegetation growth;
- » Further decrease in water quality at the site and in the downstream Blesbokspruit Ramsar site, due to continued phosphate and faecal coliform input;
- » Further decrease in species diversity at the site and in the downstream Blesbokspruit Ramsar site, due to ongoing eutrophication and poor water quality;
- » Modification of aquatic and wetland habitats at the site and in the downstream Ramsar site due to increased scouring of substrates, associated with increased effluent release rates and flow rates.
- » Loss of aquatic and wetland species diversity at the site and in the downstream Ramsar site due to increased flow rates contributing to scouring of substrates;
- » Loss of terrestrial habitats at the site and in the adjacent Ramsar site area due to increased inundation.

These potential impacts are assessed below.

4.2.1. Impact table summarising impacts on terrestrial ecosystems

Nature: Loss of terrestrial habitat and species diversity during construction.		
There will be a loss of terrestrial habitat due to vegetation removal, and a loss of terrestrial species diversity due to habitat degradation and loss of habitat during the construction phase.		
	Without mitigation	With mitigation
Extent	Local (1- 2)	Local (1)
Duration	Short – Medium term - (2- 3)	Very short- short duration(1- 2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	Medium (44- 52)	Low (24- 27)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
Mitigation:		
<ul style="list-style-type: none"> » A 60m buffer zone around the wetland should be maintained and construction activities should be limited within the wetland and its buffer zone to avoid habitat degradation. » Leftover stock from construction should be removed after completion of construction. » Preventative measures such as cut-off berms should be put in place to avoid spillage of any kind onto the wetlands. » Construction activities should be monitored by an environmental officer according to a monitoring program. » Any impacts due to construction activities should be rectified immediately. » Great care should be taken as to what is released into the system. » All the cumulative impacts flow into the Blesbokspruit RAMSAR site. Wetlands within the RAMSAR convention should be conserved. 		
Cumulative impacts:		
<u>Causes of impacts upstream:</u>		
» High density housing, intensive agriculture, brickworks, low density housing, runoff, illegal dumping of waste.		
<u>Causes of impacts downstream:</u>		
» High density housing, Gold and Platinum mining, Agriculture.		
Residual impacts:		
None		

Nature: Loss of terrestrial habitat and species due to increased inundation.		
There will be a loss of terrestrial habitat and species at site and the adjacent Ramsar site area due to increased inundation.		
	Without	With mitigation

	mitigation	
Extent	Local (2)	Cannot be effectively mitigated
Duration	Long term - (4)	
Magnitude	Moderate (6)	
Probability	Definite (5)	
Significance	Medium (60)	
Status	Negative	
Reversibility	Yes	
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	No	
Mitigation:		
» None		
Cumulative impacts:		
» High density housing, intensive agriculture, low density housing, runoff, illegal dumping of waste.		
Residual impacts:		
None		

4.2.2. Impact table summarising impacts on wetland and aquatic ecosystems

Nature: Degradation of habitats and loss of species diversity during construction		
The degradation of aquatic and wetland ecosystems and species will result due to increased sedimentation, spills, runoff, habitat degradation and loss during the construction phase.		
	Without mitigation	With mitigation
Extent	Local – regional (2- 3)	Local (1)
Duration	Short – Medium term - (2- 3)	Very short- short duration(1- 2)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Probable (3)
Significance	Medium (52)	Low (24- 27)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
Mitigation:		
» A 60m buffer zone should be maintained around the wetland and construction activities should be limited within the wetland and its buffer zone to avoid habitat degradation.		
» Movement within the wetland should be limited to avoid habitat destruction		

- » Leftover stock from construction should be removed after completion of construction.
- » Preventative measures such as cut-off berms should be put in place to avoid spillage of any kind onto the wetlands.
- » Construction activities should be monitored by an environmental officer according to a monitoring program.
- » Any impacts due to construction activities should be rectified immediately.
- » Habitat rehabilitation.
- » Great care should be taken as to what is released into the system.
- » All the cumulative impacts flow into the Blesbokspruit RAMSAR site. Wetlands within the RAMSAR convention should be conserved.

Cumulative impacts:

Causes of impacts upstream:

- » High density housing, intensive agriculture, brickworks, low density housing, more WCW.

Causes of impacts downstream:

- » Sappi, High density housing, Gold and Platinum mining, Agriculture, WCW.

Residual impacts: None

Nature: Decrease in habitat integrity due to continued nutrient input; further decrease in water quality due to continued phosphate and faecal coliform input; and decrease in species diversity due to ongoing eutrophication and poor water quality.

Further decrease in habitat integrity in the wetland and aquatic areas will result at the site and in the downstream Blesbokspruit Ramsar site, due to continued nutrient input, causing nuisance plant growth and algal growth. There will be a decrease in water quality at the site and in the downstream Blesbokspruit Ramsar site, due to continued phosphate and faecal coliform input, and further decrease in species diversity in the wetland and aquatic ecosystems areas and the adjacent Blesbokspruit Ramsar site will be the resultant due to decreased water quality and increased eutrophication.

	Without mitigation	With mitigation
Extent	Regional (3)	Regional (3)
Duration	Permanent (5)	Long term(4)
Magnitude	High (8)	Moderate – High (6-8)
Probability	Definite (5)	Probable (3)
Significance	High (80)	Medium (52- 60)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	

Mitigation:

- » Compliance with the guideline value of 0.6mgP/l is likely to contribute to significant levels of eutrophication. The WCW should aim to release effluents with phosphate

<p>concentrations of 0.025mg P/l or less.</p> <ul style="list-style-type: none"> » Improved treatment procedures should be investigated. » The maximum faecal coliform compliance is 300 FCU/100ml although this level still poses a threat to downstream users. The WCW should always aim to release zero faecal coliforms. » Nuisance vegetation should be managed to maintain habitat diversity.
<p>Cumulative impacts: <u>Causes of impacts upstream:</u></p> <ul style="list-style-type: none"> » High density housing, intensive agriculture, brickworks, low density housing, more WCW. <p><u>Causes of impacts downstream:</u></p> <ul style="list-style-type: none"> » Sappi, High density housing, Gold and Platinum mining, Agriculture, WCW.
<p>Residual impacts: None</p>

<p><i>Nature: Modification of habitats and loss of species diversity due to increased flow rates</i></p> <p>There will be a modification of aquatic and wetland habitats as well as a loss of aquatic and wetland species diversity at the site and in the downstream, adjacent Ramsar site, due to increased scouring of substrates, associated with increased effluent release rates and flow rates.</p>		
	Without mitigation	With mitigation
Extent	Regional (3)	Regional (3)
Duration	Permanent (5)	Long term(4)
Magnitude	High (8)	Moderate(6)
Probability	Highly probable (4)	Probable- Highly probable (3-4)
Significance	High (64)	Medium (39- 52)
Status	Negative	Negative
Reversibility	Yes	Yes
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
<p>Mitigation:</p> <ul style="list-style-type: none"> » Areas of high erosion potential should be identified downstream of the effluent release point, and stabilised by means of structures such as Reno mattresses, gabion baskets and geo-fibers. 		
<p>Cumulative impacts: <u>Causes of impacts upstream:</u></p> <ul style="list-style-type: none"> » High density housing, intensive agriculture, brickworks, low density housing, more WCW. <p><u>Causes of impacts downstream:</u></p> <ul style="list-style-type: none"> » Sappi, High density housing, Gold and Platinum mining, Agriculture, WCW. 		
<p>Residual impacts: None</p>		

<i>Nature: Increase in wetland and open water habitat due to increased inundation.</i>		
There will be an increase in wetland and open water habitat in the Ramsar site due to increased inundation of the downstream area.		
	Without mitigation	With mitigation
Extent	Regional (2)	Positive impact - no mitigation needed
Duration	Long term (4)	
Magnitude	High (8)	
Probability	Definite (5)	
Significance	High (70)	
Status	Positive	
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be mitigated	N/A	
Mitigation:		
» N/A		
Cumulative impacts:		
<u><i>Causes of impacts upstream:</i></u>		
» High density housing, intensive agriculture, brickworks, low density housing, more WCW.		
<u><i>Causes of impacts downstream:</i></u>		
» Sappi, High density housing, Gold and Platinum mining, Agriculture, WCW.		
Residual impacts: Increased habitat diversity and possible subsequent species diversity		

4.2.3. Implications for project implementation

- » Most of the **potential impacts on the terrestrial and wetland** habitats were rated as having a medium to high significant. Implementation of the recommended mitigation will reduce the significance of most of impacts to **medium - low**.
- » Based on the results of the aquatic survey it was concluded that **current** activities and discharges from the Welgedacht WCW have a negative impact on the biotic integrity of the Blesbokspruit. The potential impacts of the expansion of the Welgedacht WCW on aquatic ecosystems were rated as high, and medium – low after implementation of mitigation measures. This can be attributed primarily to the quality of the water released into the system.
- » When complying with the effluent release standards the amount of phosphates released will cause continued eutrophication. The increased amount being released will result in substrate scouring and loss of sensitive species. The Blesbokspruit Ramsar site will be impacted by increased inundation in some areas.

- » It is recommended that sampling continues on a bi-annual (summer/winter) cycle in order to detect changes in wetland, terrestrial and aquatic ecosystem function associated with the proposed development.
- » The Whole Effluent Toxicity tests results showed toxicity units of <1, indicating that the effluent discharge point falls into the category of limited to not acutely toxic.

4.3. Potential Air Quality Impacts

Direct impacts on air quality as a result of the proposed project will result from the inhalation of H₂S, benzene, toluene, ethyl benzene and xylene emitted during the operational life of the WCW. Direct impacts will also result from exposure to dust generated by construction and decommissioning activities. No indirect impacts on air quality from the operation, commissioning and decommissioning of the WCW are envisaged.

With respect to cumulative impacts, the gold mine, tailings dams and domestic fuel burning are identified as sources of dust in the surrounding area. There will thus be a cumulative impact with dust generated during construction and decommissioning of the WCW. The Welgedacht WCW is located in an area where there are no notable sources of H₂S, benzene, toluene, ethyl benzene and xylene. There will thus be no compounding of effects and hence no cumulative impacts during operation of the WCW.

Impact table summarising air quality impacts

<i>Nature: Impacts on air quality during the construction and decommissioning phase of the WCW</i>		
Cumulative air quality impacts are caused by exposure to dust generated during construction and decommissioning of the WCW and by other existing sources in the vicinity of the WCW. Dust has a nuisance impact and negatively affects quality of life by causing soiling, contamination, structural corrosion and damage to precision equipment, machinery and computers.		
	Without mitigation	With mitigation
Extent	Limited to site and immediate surroundings (1)	Limited to site and immediate surroundings (1)
Duration	Immediate (1)	Immediate (1)
Magnitude	Moderate (6)	Moderate (4)
Probability	High (4)	High (4)
Significance	Medium (32)	Low (24)
Status	Negative	Negative
Reversibility	No	No
Irreplaceable loss of resources?	No	No

Can impacts be mitigated	Yes
Mitigation:	
» Develop and implement a dust management plan during construction, including the following measures. <ul style="list-style-type: none"> * Removal of vegetation must be limited to only what is necessary to accommodate construction activities. * Traffic control measures must be implemented to limit vehicle-entrained dust from unpaved roads e.g. by limiting vehicle speeds and by restricting traffic volumes. * Re-vegetation of the construction terraces once all the construction is completed, and when the laydown area is vacated. * Spray unpaved site roads with water routinely throughout construction to contain dust. Water can be used as a wetting or binding agent on the unpaved roads and terraces. 	
Cumulative impacts: <i>None</i>	
» Gold mine, tailings dams and domestic fuel burning.	
Residual impacts:	
None	

Nature: Impacts on air quality during the operational phase of the WCW

Air quality impacts are caused by the inhalation of benzene, toluene, ethyl benzene, xylene (BTEX) and hydrogen sulphide, which are contained in trace amounts in the influent to the WCW. The inhalation of the benzene, toluene, ethyl benzene and xylene at concentrations exceeding health-based air quality standards, will result in negative health impacts. The inhalation of hydrogen sulphide and toluene at concentrations exceeding odour-based air quality thresholds, will result in negative quality of life or nuisance impacts.

	Without mitigation	With mitigation
Extent	Limited to site and immediate surroundings (1)	N/A
Duration	Long-term (4)	
Magnitude	Minor (2)	
Probability	Low (2)	
Significance	Low (14)	
Status	Negative	
Reversibility	No	
Irreplaceable loss of resources?	No	
Can impacts be mitigated	N/A	
Mitigation:		
» None		

» Since the significance of impacts during the operational phase is low, mitigation is not considered necessary.

Cumulative impacts:

None

Residual impacts:

None

4.3.1. Implications for project implementation

- » Since the significance of impacts during construction and decommissioning is medium, a very basic dust management plan is considered adequate.
- » The key pollutants emitted during the operational phase of the Welgedacht WCW, currently and once expanded, are benzene, toluene, ethyl benzene, xylene and H₂S.
- » The pollutant emitted during the construction and decommissioning phases of the Welgedacht WCW is dust.
- » Emission rates of all pollutants will increase on average by 143% from the baseline to future scenarios as a result of the increased influent load and increase in the number of emission sources.
- » The area is characterised by winds of all directions with easterly and north-westerly winds being slightly more dominant in the summer months and south-easterly winds dominating slightly more in winter months.
- » Wind speeds during summer are mostly light (1.8 to 3.34 m/s) to moderate (3.34 to 8.49 m/s). Winds at night are mostly calm.
- » The Welgedacht WCW is located in the summer rainfall region of South Africa and therefore receives most of its rainfall during this period.
- » Predicted maximum ambient concentrations of the pollutants occur at a distance of 200 m to 250 m from the fence line of the WCW, during worst-case meteorological conditions.
- » The only pollutant expected to exceed its standard or guideline is H₂S. The maximum predicted concentration of H₂S of 8.5 µg/m³ is greater than the WHO odour threshold of 7 µg/m³. However, this is only expected to occur 200 m away from the WCW, where there is currently no exposure to the general public.
- » No indirect impacts are expected from the operational or construction and decommissioning phases of the WCW.
- » The significance of all impacts during the operational phase is low, while the significance of cumulative impacts during construction and decommissioning is medium.

4.4. Potential Noise Impacts

The additional noise from the expansion of the Welgedacht WCW will increase the noise climate around the WCW by about 5.7dBA. The character of the cumulative noise from the expanded works will be of a uniform, continuous nature, that is, there will little variation in the equivalent continuous sound pressure level of the generated noise with the passage of time. Sounds with this characteristic generally will be less of an annoyance than those with a more varying noise signature.

The existing noise sensitive receptors which are likely or could possibly be impacted by all aspects of the operations at the upgraded WCW and the predicted noise impact in these areas are as follows (refer also to Figure 4.1):

- » *Residences in the Welgedacht smallholdings to the north-east of the WCW:* The noise impact is predicted to be **minor and of low significance** due to the already degraded noise climate in a large section of this area from road and railway traffic, noise from the various small business venture company operations in the Welgedacht AH and due to the character of the WCW noise.
- » *Gugulethu-Everest informal settlement and the residential townships of Slovo Park, Welgedacht and Bakerton to the south-east of the WCW:* The noise impact is predicted to be **minor and of low significance** due to the already degraded noise climate in sections of these areas from road and railway traffic, and the character of the WCW noise.
- » *The residential township of Eastvale to the west of the WCW:* There will be **no impact**.
- » *Chicken hatcheries to the east of the WCW:* There will be **no impact**.
- » *Schools in the area:* There will be **no impact** from the WCW at any of the schools.
- » *Springs Bird Sanctuary:* There will be **no impact**.

Impact tables summarising impacts on noise sensitive receptors

Nature: Generation of noise as a result of construction activities		
General construction noise will not significantly affect any noise sensitive receptors in the area.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Very short (1)	Very short (1)
Magnitude	Moderate (3)	Moderate (3)
Probability	Probable (3)	Probable (3)
Significance	Low (15)	Low (15)
Status	Neutral	Neutral
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	None	None

Can impacts be mitigated	Yes
Mitigation:	
<ul style="list-style-type: none"> » Construction site yards and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites. » All construction vehicles and equipment are to be kept in good repair. » Construction activities, and particularly the noisy ones, are to be contained to reasonable hours during the day and early evening. » With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the contractor should liaise with local residents on how best to minimise the impact. » In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993). » Construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment. 	
Cumulative impacts:	
<ul style="list-style-type: none"> » Negligible with Road traffic and rail traffic noise. 	
Residual impacts:	
Insignificant.	

Nature: Generation of noise as a result of operational phase

Operational noise of the WCW will increase by 5.7dBA due to the upgrading. This increase will be perceptible but is unlikely to adversely affect any noise sensitive receptors in the area as the noise climate of the area is already degraded by road and rail traffic noise, and due to the character of the noise. Impact will be minor.

	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Moderate (3)	Moderate (3)
Probability	Probable (3)	Probable (3)
Significance	Low (24)	Low (24)
Status	Neutral	Neutral
Reversibility	Reversible	Reversible
Irreplaceable loss of resources?	None	None
Can impacts be mitigated	Yes	
Mitigation:		
<ul style="list-style-type: none"> » The design of the proposed new equipment is to incorporate all the necessary acoustic design aspects required in order that the overall generated noise level from the upgraded WCW installation does not exceed a maximum equivalent continuous day/night rating level (LRdn), namely a noise level of 70dBA (just inside the property projection plane, namely the property boundary of the WCW) as specified for industrial districts in SANS 10103. Refer to noise specialist study (Appendix I). Notwithstanding this provision, the design is also to take into account the maximum 		

allowable equivalent continuous day/night rating level of the potentially impacted noise sensitive sites outside the new WCW property. Where the LRdn for the external site is presently lower than the maximum allowed, the maximum shall not be exceeded. Where the LRdn for the external site is presently at or exceeds the maximum level allowed, the existing level shall not be increased by more than indicated as acceptable in SANS 10103 (refer noise specialist study- Appendix I).

- » The latest technology incorporating maximum noise mitigating measures for the new plant and equipment components should be designed into the system. (The contract specifications should indicate that the contractor shall achieve a sound pressure level not exceeding 85dBA at a 1 metre offset from all plant and equipment.)
- » The design process is to consider, inter alia, the following aspects:
 - The position and orientation of buildings on the site, if relevant.
 - The design of the buildings is to minimise the transmission of noise from the inside to the outdoors.
 - The insulation of particularly noisy new plant and equipment. (The contract specifications for the proposed upgraded WCW indicate that the contractor shall achieve a sound pressure level not exceeding 85dBA at a 1 metre offset from all plant and equipment).
 - Specifically, consideration should be given to having the new RAS pump-stations inside a building.
- » It should be noted that any measures taken at the WCW will limit the impacts in the specific areas designed for, and will not necessarily contribute to improving the degraded noise climates in adjacent areas where there is already a problem.

Cumulative impacts:

- » Negligible with Road traffic and rail traffic noise.

Residual impacts:

Insignificant.

4.4.1. Implications for project implementation

- » The Welgedacht Water Care Works lies at the interface of a number of land use type areas, namely rural (farms and agricultural holdings), residential, mining and industry.
- » The noise climate in many sectors of the area around the WCW is degraded by road traffic and rail traffic noise.
- » The noise generated by existing operations at the Welgedacht WCW as measured and perceived at the nearest noise sensitive receptor (900 metre offset) is not very loud and has negligible impact on the surrounding area.
- » The addition of the new plant and equipment at the WCW will increase the noise level by about 5.7dBA. Although there are a number of noise sensitive receptors that lie within the area of potential noise impact, namely within the 35dBA contour, the impact is predicted to be minor and of low significance due to the already degraded

noise climate in sections of these areas from road and railway traffic, and due to the character of the WCW noise.

- » The character of the cumulative noise from the expanded works will be of a uniform, continuous nature, that is, there will be little variation in the equivalent continuous sound pressure level of the generated noise with the passage of time. Sounds with this characteristic generally will be less of an annoyance (noise nuisance) than those with a more varying noise signature.
- » There will therefore in general, be no adverse noise impact from the upgraded WCW.
- » There are some noise mitigation measures that should be considered even though the impact of the upgraded WCW is not very high.
- » The Gauteng Provincial Noise Control Regulations and SANS 10103:2008 should be used as the main guidelines for addressing the potential noise impact on this project.
- » Various measures to reduce the potential noise impact from the WCW are possible, and the mitigating measures listed above need to be considered.
- » The noise mitigation measures will need to be checked by an acoustical engineer in order to optimise the design parameters and ensure that the cost/benefit of the measure is optimised.
- » At commissioning of the upgraded WCW, the noise footprint of the plant and ancillary works should be established by measurement and calculation in accordance with the relevant standards, namely SANS ISO 8297:1994, SANS 10103:2008 and SANS 10357:2004. The character of the noise (qualitative aspect) should also be checked to ascertain whether there is any annoyance (nuisance) factor associated with the operations.

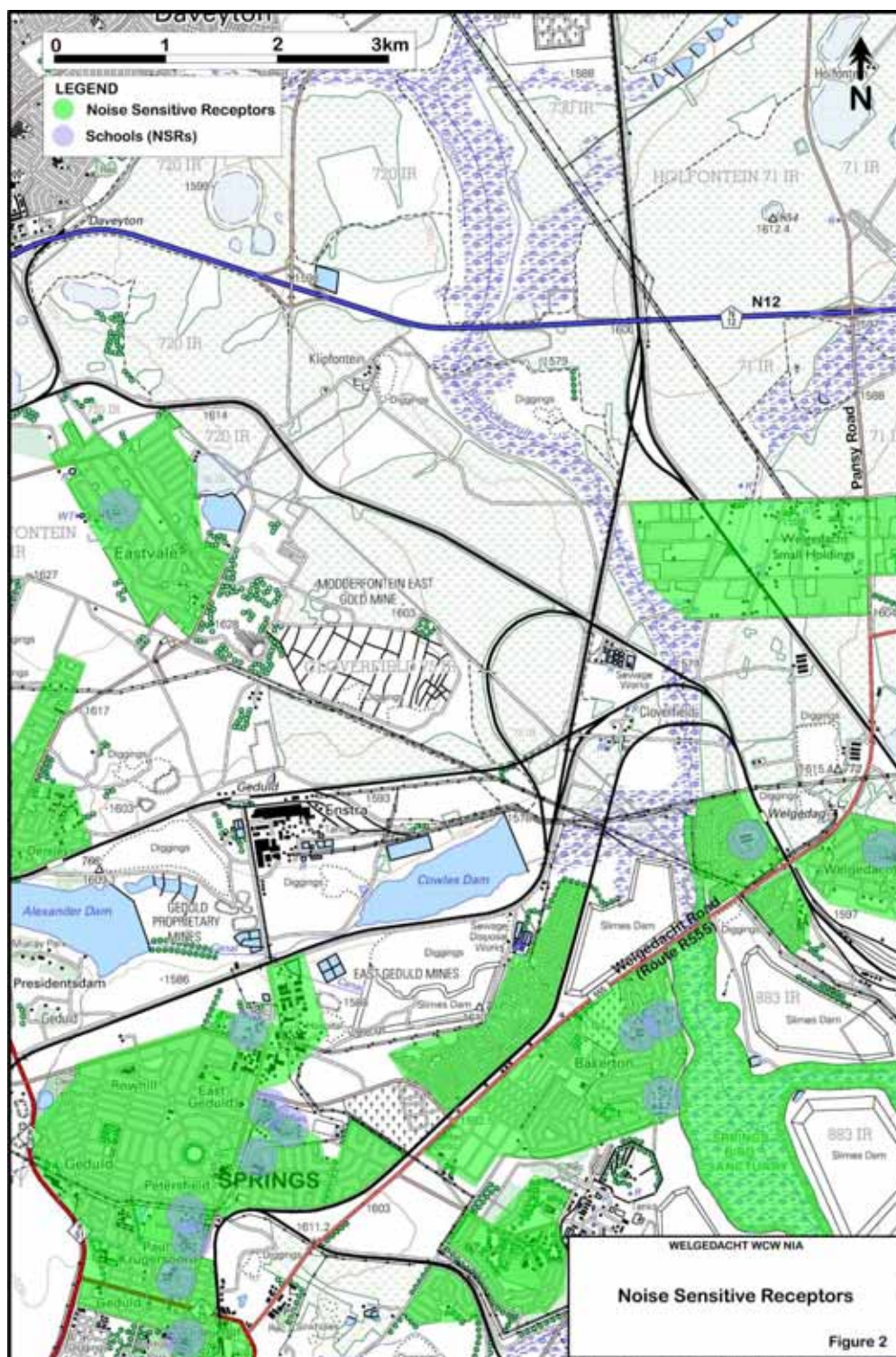


Figure 4.1: Locality Map indicating noise sensitive areas around the Welgedacht Water Care Works

4.5. Potential Impacts on the Heritage

No sites, features or objects of cultural heritage significance were identified in the study area, there would therefore be no impact from the proposed development.

TABLE 4.1: Summary of identified heritage resources in the study area

Identified heritage resources	
<i>Category, according to NHRA</i>	<i>Identification/Description</i>
Formal protections (NHRA)	
National heritage site (Section 27)	None
Provincial heritage site (Section 27)	None
Provisional protection (Section 29)	None
Place listed in heritage register (Section 30)	None
General protections (NHRA)	
structures older than 60 years (Section 34)	None
archaeological site or material (Section 35)	None
palaeontological site or material (Section 35)	None
graves or burial grounds (Section 36)	None
public monuments or memorials (Section 37)	None
Other	
Any other heritage resources (describe)	None

Impact table summarising impacts on heritage sites

Nature: Impact on heritage resources due to the proposed development		
Impact analysis of cultural heritage resources under threat of the proposed development, was based on the present understanding of the development.		
	Without mitigation	With mitigation
Extent	No impact (0)	N/A
Duration	No impact (0)	
Magnitude	No impact (0)	
Probability	No impact (0)	
Significance	Low (0)	
Status	None	
Reversibility	N/A	

Irreplaceable loss of resources?	N/A	
Can impacts be mitigated	N/A	
Mitigation: » None Required		
Cumulative impacts: None		
Residual impacts: None		

4.5.1. Implications for project implementation

- » As no sites, features or objects of cultural heritage significance were identified in the study area, there would be no impact from the proposed development.
- » Therefore, from a heritage point of view it is recommended that the proposed development be allowed to continue. It is however requested that should archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

4.6. Potential Impacts on Visual Receptors

The receiving environment will be transformed for the entire operational lifespan of the facility. However, most of the anticipated visual impacts may be mitigated to some extent. In this respect, the following is a summary of the anticipated impacts, assuming these have been mitigated as recommended:

- » The potential visual impact on **users of major and secondary roads** in close proximity to the proposed WCW will be of **moderate** significance, while that on users of railway lines will be of **low** significance.
- » The anticipated visual impact on **residents of nearby suburbs** will be of **low** significance, while the visual impact on **residents of smallholdings** and agricultural land is likely to be of **moderate** significance.
- » Users of **open space and natural features** in close proximity will experience potential visual impact of **moderate** significance.
- » Within the region, the potential visual impact on **sensitive visual receptors**, including users of the Blesbokspruit Ramsar Site, will be of **low** significance.
- » The **high mast lighting** structures are expected to result in visual impacts of **high** significance, which cannot be mitigated.
- » Secondary visual impacts related to **lighting** are expected to be of **high** significance, while visual impacts of **transportation trucks and construction** will be of **low** significance.

The anticipated visual impacts listed above are not, however, considered to be a fatal flaw from a visual perspective, considering the contained area of potential visual exposure and the mitigation potential of the visual impacts.

It is therefore recommended that the development of the facility as proposed be supported, subject to the implementation of the recommended mitigation measures and management actions (Refer to figure 4.2 for map indicating potential visual exposure).

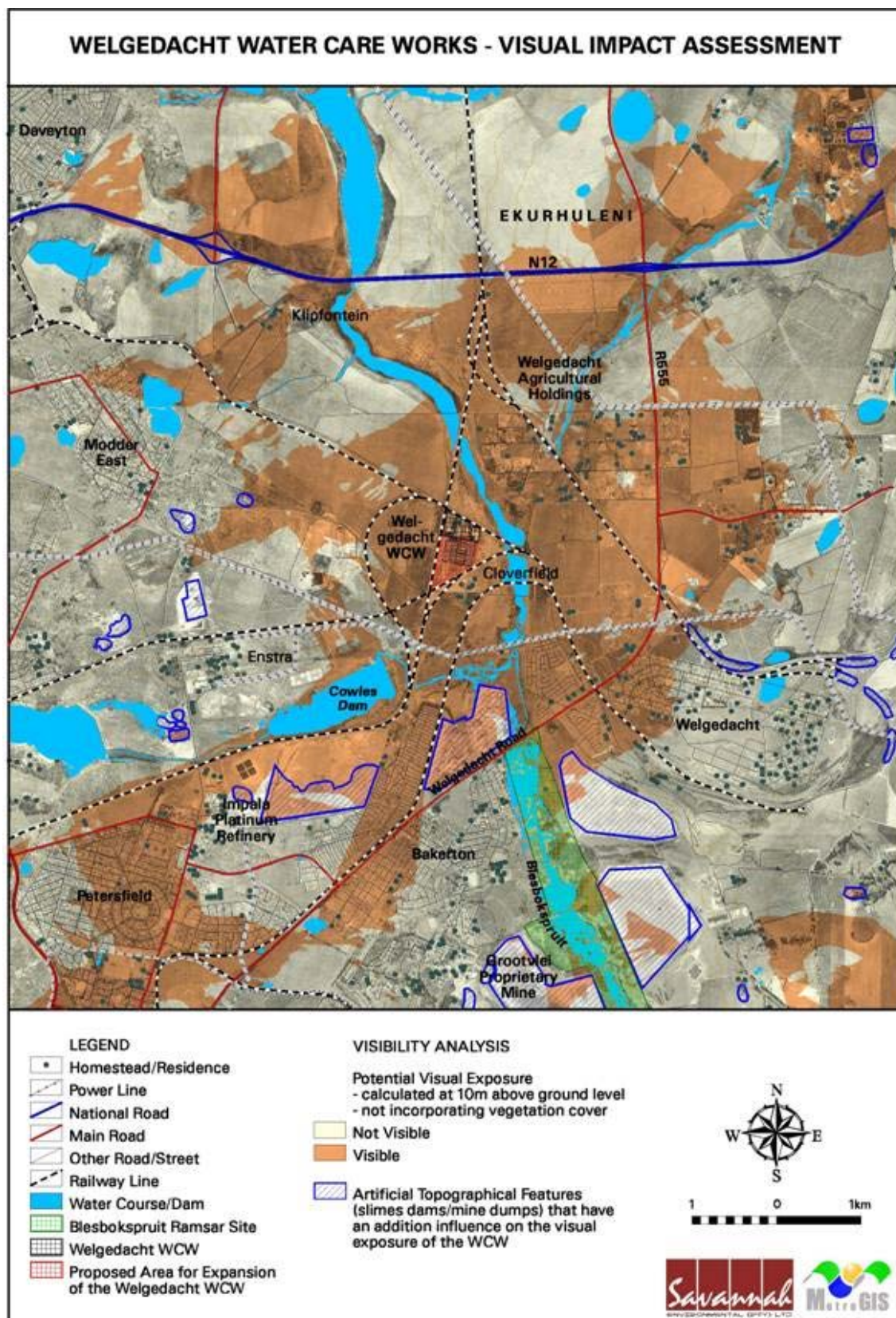


Figure 4.2: Potential visual exposure of the proposed WCW.

4.6.1. Ancillary infrastructure

The ancillary infrastructure (i.e. the pump stations, substations, boiler room, gas holder, roads, drainage infrastructure and fencing), could represent a visual impact in close proximity to the proposed WCW. However, this infrastructure is all located within the development site footprint, and will be overshadowed by (and included within) the impact of the primary infrastructure.

In this respect, this impact has not been assessed, and is deemed to be included in the assessment(s) and recommended mitigation for the primary WCW infrastructure.

Impact tables summarising visual impacts

PRIMARY IMPACTS:

Nature: Potential visual impact on users of major and secondary routes, and railway lines in close proximity to the proposed WCW

No major routes occur within 2km of the proposed WCW, but secondary roads within this radius are expected to be of **high** significance, which may be mitigated to **moderate**.

The railway lines which occur within 2km of the site appear to be mostly freight lines, and it is uncertain whether any of these lines carry passengers. In the event that they do, then passengers making use of trains will be exposed to visual impacts of **moderate** significance, which may be mitigated to **low**.

It should be noted that although these impacts would be of high magnitude due to the elevated vantage point (i.e. the raised railway line platform), it is unlikely that these passengers will have a negative perception of the proposed WCW. This is especially in light of the overall industrial character of the region, within which they are most likely daily commuters.

	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	High - Very high (8- 10)	High - Very high (8- 10)
Probability	Improbable - Definite (2-5)	Very improbable - Probable (1- 3)
Significance	Moderate – High (32-90)	Low - Moderate (16-54)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No

Can impacts be mitigated	Yes
Mitigation:	
<ul style="list-style-type: none"> » Design and installation of internal landscape planting » Design and installation of screen planting outside perimeter fence and around digesters. 	
Cumulative impacts:	
<ul style="list-style-type: none"> » The construction of the water care works and associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works. 	
Residual impacts:	
None	

Nature: Potential visual impact on residents in close proximity to the proposed WCW

The visual impact on the residential suburbs within a radius of 2km of the proposed facility (i.e. parts of Bakerton and Welgedacht) is expected to be of **moderate** significance, which may be mitigated to **low**.

It should be noted that visual clutter within a more urban context will offer some absorption of the visual impact. Within these more built up areas, the WCW structures will be less noticeable, and sometimes hidden, due to the presence of buildings and structures in higher densities.

The visual impact on residents of smallholdings and agricultural land within a radius of 2km of the proposed facility is expected to be of **high** significance, which may be mitigated to **moderate**.

Possible mitigation of this impact includes the design and installation of landscape planting to achieve an overall aesthetically pleasing effect within the facility itself, as well screen planting outside of the perimeter fence and adjacent to the digesters.

	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	High - Very high (6- 10)	High - Very high (6- 10)
Probability	Highly Probable - Definite (4 -5)	Improbable - Probable (2- 3)
Significance	Moderate – High (56- 90)	Low - Moderate (28- 54)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of	No	No

resources?	
Can impacts be mitigated	Yes
Mitigation:	
<ul style="list-style-type: none"> » Design and installation of internal landscape planting » Design and installation of screen planting outside perimeter fence and around digesters. 	
Cumulative impacts:	
<ul style="list-style-type: none"> » The construction of the water care works and associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works. 	
Residual impacts:	
None	

Nature: Potential visual impact on users of conservation areas, open space and natural features in close proximity to the proposed WCW.

The Blesbokspruit Ramsar Site lies more than 2km from the site. Visual impacts on users of the open space network and on the drainage lines and dams within a 2km radius of the proposed facility are expected to be of **high** significance, which may be mitigated to **moderate**.

	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Improbable (2)
Significance	High (64)	Moderate (32)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Design and installation of internal landscape planting » Design and installation of screen planting outside perimeter fence and around digesters. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of the water care works and associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works. 		
Residual impacts:		
None		

Nature: Potential visual impact on sensitive visual receptors within the region.

Potentially sensitive visual receptors within the region (i.e. beyond the 2km radius from the facility include:

- » Sections of the N12;
- » The R555;
- » A number of secondary roads;
- » Large parts of the suburb of Bakerton;
- » The north western part of Welgedacht;
- » The eastern part the Welgedacht Agricultural Holdings;
- » The Klipfontein settlement;
- » Open space, drainage lines and dams and
- » The Blesbokspruit Ramsar Site.

Visual impacts on these receptors are expected to be of **moderate** significance, which may be mitigated to **low**.

	Without mitigation	With mitigation
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Probable (3)	Improbable (2)
Significance	Moderate (39)	Low (26)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Design and installation of internal landscape planting » Design and installation of screen planting outside perimeter fence and around digesters. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of the water care works and associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works. 		
Residual impacts:		
None		

Nature: Potential visual impact of high mast light structure on observers in close proximity to the proposed WCW.

The high mast lights required for the proposed facility are expected to be in excess of

10m in height. Notwithstanding their height, these structures do not have any bulk (i.e. they are tall and very narrow), and as such, visual impact will diminish quickly with increased distance from the facility.

In this respect, the anticipated visual impacts of the high mast lighting structures on receptors in close proximity (i.e. within 2km) of the proposed WCW are expected to be of **high** significance. There is no mitigation for this impact.

	Without mitigation	With mitigation
Extent	Local (4)	N/A
Duration	Long term (4)	
Magnitude	High (8)	
Probability	Highly probable (4)	
Significance	High (64)	
Status	Negative	
Reversibility	Recoverable (3)	
Irreplaceable loss of resources?	No	
Can impacts be mitigated	No	
Mitigation: » N/A		
Cumulative impacts: » The construction of the water care works and associated infrastructure will increase the cumulative visual impact of industrial type infrastructure within the region. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works.		
Residual impacts: None		

SECONDARY IMPACTS:

Nature: Potential visual impact on of lighting on visual receptors in close proximity of the proposed WCW.

The immediate area surrounding the WCW (i.e. within 2km), has a moderate incidence of populated places (suburbs). In addition, agricultural areas, smallholdings and open space areas are considered to be visual receptors potentially sensitivity to lighting intrusions.

In this respect, the direct glare and light trespass from the high mast lights for the facility could result in a visual impact on observers in close proximity.

Another potential impact is *sky glow*, which is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the amount of light sources.

Although the existing WCW and surrounding industrial and mining land uses already make use of high mast lighting, the additional lights will contribute to the number of light sources (direct glare) as well as to sky glow. This impact cannot be mitigated.

Notwithstanding, the correct design, planning and specification of other lighting and light fixtures will help to contain rather than spread additional light impacts.

The table below illustrates the assessment of this anticipated impact, which is likely to be of **high** significance, both before and after mitigation.

	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Definite (5)	Definite (5)
Significance	High (80)	High (80)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
Mitigation:		
» Proactive design, planning and specification of the facility lighting.		
Cumulative impacts:		
» The construction of additional high mast and other facility lights will contribute to the number of light sources (direct glare) as well as to sky glow. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works.		
Residual impacts:		
None		

Nature: Potential visual impact of transportation trucks on observers in the region.

A potential secondary impact resulting from the expansion of the WCW, and the resultant elevated treatment capacity, is that additional trucks will be employed to transport the additional dewatered sludge to nearby agricultural lands. The presence of these additional trucks could result in a visual disturbance within the region.

As an alternative, the sludge can be irrigated directly to nearby agricultural lands (i.e. without drying). This would negate the need to truck the dewatered sludge from the WCW.

The significance of transportation trucks on observers in the region is likely to be of **low**

significance. Through the implementation of the recommended mitigation measure, this impact will be removed.		
	Without mitigation	With mitigation
Extent	Regional (3)	None
Duration	Long term (4)	
Magnitude	Low (4)	
Probability	Improbable (2)	
Significance	Low (22)	
Status	Negative	N/A
Reversibility	Recoverable (3)	
Irreplaceable loss of resources?	No	
Can impacts be mitigated	Yes	
Mitigation:		
» Irrigate sludge directly into neighbouring agricultural lands		
Cumulative impacts:		
» The construction of additional high mast and other facility lights will contribute to the number of light sources (direct glare) as well as to sky glow. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works.		
Residual impacts:		
None		

Nature: Potential visual impact on of construction on visual receptors in close proximity of the proposed WCW.

The construction of the proposed extension of the WCW is expected to take approximately 1 year to complete (a conservative estimation not taking natural weather conditions etc. into account).

During this time, the construction site itself will be a source of visual disturbance. In addition, there will be a noticeable increase in heavy vehicles utilising the roads to the development site that may cause, at the very least, a visual nuisance to other road users and land owners in the area. This nuisance will be as a result of the vehicles themselves, as well as dust.

The impact significance is likely to be of **moderate** significance, and may be mitigated to **low**.

	Without mitigation	With mitigation
Extent	Local (4)	Local (4)
Duration	Very short term (1)	Very short term (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)

Significance	Moderate (44)	Low (27)
Status	Negative	Negative
Reversibility	Recoverable (3)	Recoverable (3)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated	Yes	
Mitigation:		
<ul style="list-style-type: none"> » Proper programming of the construction process. » Proper management of the construction site. » Rehabilitation of all construction areas. 		
Cumulative impacts:		
<ul style="list-style-type: none"> » The construction of additional high mast and other facility lights will contribute to the number of light sources (direct glare) as well as to sky glow. This is relevant in light of the existing mining and industry to the south, as well as the existing Welgedacht Water Care Works. 		
Residual impacts:		
None		

4.6.2. Implications for project implementation

- » The construction and operation of the Welgedacht Water Care Works and its associated infrastructure will have a visual impact on the receiving environment. Although the region is strongly characterised by industrial and mining development, the immediate area surrounding the proposed WCW remains largely agricultural and / or undeveloped.
- » The facility infrastructure is not particularly tall – the majority of the primary infrastructure will be approximately 5m tall, with the exception of the digesters, which are likely to be between 8 and 10m in height. The tallest structures will be the high mast lights, which due to their narrow form, are not expected to be apparent from significant distances.
- » In addition, the facility is surrounded by railway lines, which are all built on elevated platforms of up to 4m high in places. These embankments will offer some localised screening to immediately adjacent areas.
- » Notwithstanding the above, the facility will certainly be visible for a large area that incorporates various sensitive visual receptors, including but not limited to local residents, commuters and users of the open space.
- » In addition, the Blesbokspruit Ramsar Site is an open space system of significant importance, primarily from a conservation and ecological perspective, but also from a social and recreational standpoint.
- » There are a number of recommended measures for mitigating the anticipated visual impact. These are aimed at breaking up the visual bulk of the facility, and softening the visual contrast between the facility and the rural and agricultural natural of the receiving environment:

- * Landscape planting should be designed and installed within the development site (i.e. along roads and in open spaces) as well as immediately outside of the perimeter fence. The latter should ideally take the form of vertical plants or trees with a height of 8-10m. Similarly tall screen planting should be installed to directly screen the digesters.
- * A lighting engineer should be consulted to assist in the planning, placement and specification of facility lighting in order to reduce visual impacts associated with glare and light trespass. . Specifically, measures such as physical shielding, low mounting heights, low wattage and motion activated options should be investigated.
- * The option of irrigating dewatered sludge directly onto adjacent agricultural lands should be investigated, and favoured if possible. This will reduce the need for transportation truck to transport dewatered sludge for commercial use.
- * The construction phase of the facility should be sensitive to potential observers in the vicinity of the construction site through careful programming and effective site management. Construction personnel, vehicles, dust and waste must be managed to reduce visual impacts. In addition all construction areas are to appropriately rehabilitated after construction.
- * All planting and rehabilitation must also be monitored and maintained during operation.

4.7. Potential Impacts on the Social Environment

4.7.1. Demographic Change Processes

Demographic processes relate to the number of people and composition of a community and include an overview of the population size and the educational profile of the affected communities. It is expected that the construction and operation of the proposed expansion works will lead to a temporary change in the number and composition of the local population during the construction period, which in turn could lead to economic, land use, and socio-cultural change processes. The following demographic change processes are expected:

- » A temporary in-migration of construction workers; and
- » A possible influx of unemployment job seekers.

4.7.2. Economic Change Processes

Economic change processes relate to the changes brought about to the employment and general economic profile of the area because of the introduction of any development. The following economic change process is expected:

- » The enhancement of local economic opportunities through the creation of employment opportunities

4.7.3. Institutional and Legal Change Processes

Institutional and Legal Change Processes assesses the way in which a development of this nature could change the face of service delivery in the affected area and how this change in turn could affect the quality of life of local residents. The following institutional and legal change process is expected:

- » Change in Community Infrastructure

4.7.4. Socio-Cultural Processes

Socio-cultural processes relate to the way in which humans behave, interact and relate to each other and their environment, as well as the belief and value systems that guide these interactions. The following socio-cultural change process is expected:

- » Dissimilarity in social practices

Impact tables summarising social impacts

Nature: Economic		
Local economic opportunities can be enhanced by the proposed expansion of the WCW through the creation of employment opportunities.		
Impact Assessment	Pre-Mitigation/ Enhancement	Post-Mitigation/ Enhancement
Extent	Local (2)	Local (2)
Duration	Very Short (1)	Short (2)
Magnitude	Minor (2)	Low (4)
Probability	Probable (3)	Highly probable (4)
Significance	Low (15)	Medium (32)
Status (positive / negative)	Positive	Positive
Reversibility	Not Required	N/A
Irreplaceable loss of resources	No	
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none"> » The expected long term social impacts (i.e. change in community infrastructure) can only be successfully mitigated with the actual implementation of the proposed project. » Ensure that ERWAT's relevant policies and commitments apply to contractors 		

<p>delivering services during the pre-construction and construction phases of the project.</p> <ul style="list-style-type: none"> » Ensure that control standards for social management during the pre-construction and construction phases of the project have been derived from the following sources: <ul style="list-style-type: none"> * National legislation; * Relevant international policies and guidelines; * Terms and conditions stipulated in construction contracts between the contractor and the project proponent (ERWAT). » Manage the impact that the influx of job seekers might have on composition and functioning of the local community, with particular concern for the impact that these job seekers might have on the local residents' sense of safety and security. » Establish an employment strategy that is known and communicated to potential job seekers. » Prevent loitering of individuals at the construction site or within nearby residential areas. » Establish clearly identifiable features between actual construction workers and job seekers, such as overalls, ID cards, etc. » Prevent the formation of informal settlements in or close to the construction site or within or close to established residential areas. » Ensure that method statements are received from all contractors and adhered to.
<p>Cumulative impacts: None</p>
<p>Residual impacts:</p> <ul style="list-style-type: none"> » Contribution towards the UIF ensures that contributors can claim benefits, causing a continuous positive economic impact on the individual over a period extending beyond the construction phase.

<p><i>Nature: Institutional</i></p> <p>Health impacts on areas immediately surrounding the WCW as well as on downstream water users can cause a change in community infrastructure.</p>		
Impact Assessment	Pre-Mitigation/ Enhancement	Post-Mitigation/ Enhancement
Extent	National (4)	Local (2)
Duration	Long term (4)	Very Short (1)
Magnitude	High (8)	Minor (2)
Probability	Highly (4)	Improbable (2)
Significance	High (64)	Low (10)
Status (positive / negative)	Negative	Negative
Reversibility	Reversible	N/A
Irreplaceable loss of resources	Yes	No

Can impacts be mitigated?	Yes
Mitigation:	
» The only mitigation is the implementation of the proposed extensions at the Welgedacht WCW	
Cumulative impacts:	
» The quality of wastewater that is discharged into the Blesbokspruit by other water users and industries along its course could expedite health impacts.	
Residual impacts:	
» Polluted Blesbokspruit and resultant health impacts on downstream water users (only applicable in the event of non-implementation of the proposed project) .	

<i>Nature: Dissimilarity in social practices</i>		
Conflict is the most common result of dissimilarity in social practices. Conflict situations can become violent, which in turn would impact on people's sense of safety in the area. Constant conflict situations can also impact on people's quality of life as they feel inhibited to move around freely as before.		
Impact Assessment	PRE-MITIGATION/ ENHANCEMENT	POST-MITIGATION/ ENHANCEMENT
Extent	Local (2)	Site (1)
Duration	Short (2)	Very Short (1)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Medium (30)	Low (12)
Status (positive / negative)	Negative	Negative to Neutral
Reversibility	Completely Reversible	N/A
Irreplaceable loss of resources	No	No
Can impacts be mitigated?	Yes	
Mitigation:		
» The expected long term social impacts (i.e. change in community infrastructure) can only be successfully mitigated with the actual implementation of the proposed project .		
» Ensure that ERWAT's relevant policies and commitments apply to contractors delivering services during the pre-construction and construction phases of the project.		
» Ensure that control standards for social management during the pre-construction and construction phases of the project have been derived from the following sources:		
* National legislation;		
* Relevant international policies and guidelines;		
* Terms and conditions stipulated in construction contracts between the		

contractor and the project proponent (ERWAT). » Devise a plan for fast and effective remediation of conflict situations to minimise the potential for conflict to occur between local residents and construction workers. » Ensure that method statements are received from all contractors and adhered to.
Cumulative impacts: » Influx of unemployed job seekers can intensify potential conflict situations.
Residual impacts: » None expected.

4.7.5. Implications for project implementation

- » No issues emerged that can be considered as fatal flaws from a social perspective in terms of the construction and operation of the proposed extensions at the Welgedacht WCW.
- » The impacts that have been identified will, for the most part, be over the short term, i.e. during the construction period. All of the expected impacts during this phase of the project can be successfully mitigated.
- » The probability of the only long-term impact, which would have a number of significant social impacts, increases significantly in the event that the proposed project is not implemented. **Non-implementation of the proposed extensions at the Welgedacht WCW would not only impact on the immediate area in the form of severe pollution (and resultant bad odours) of the Blesbokspruit, but also on downstream water users who extract water from the Blesbokspruit as their only source of potable water. Effluent of a substandard quality that finds its way to these water users can severely impact on their health and wellbeing.**
- » To further prevent such a situation arising, it is preferable, from a social point of view, to sell the discharge effluent to other water users in the catchment area, where practical. However, during the course of the social study, it was unclear how these other water users would utilise and dispose of the water and therefore this study did not take the issue of downstream disposal into consideration when considering the discharge options. As was indicated at a focus group meeting with the Blesbokspruit Forum during September 2010, ERWAT's mandate is to ensure the quality of effluent from its own plants and not for the treatment and purification of water to potable water standards. However, ERWAT still has to treat its effluent to the quality standards required by the Department of Water and in order to this; they have to increase the capacity at their Welgedacht WCW. To prevent substandard effluent and increased costs in water purification downstream, **it is recommended that the project is implemented** as it will minimise the potential for negative social impacts and increased costs on downstream water users.
- » Even though all of the identified social impacts can be mitigated or enhanced successfully, it can only be done if ERWAT, or its appointed contractor(s), commit to the responsibility of ensuring that the level of disturbance brought about to the social

environment by the more negative aspects of the project, is minimised as far as possible. In this regard, the social specialist strongly recommends the following:

- * Ensure that social issues identified during the EIA phase are addressed during construction. This could be done by engaging social specialists where necessary or by ensuring that ECOs used during construction have the necessary knowledge and skills to identify social problems and address these when necessary. Guidelines on managing possible social changes and impacts could be developed for this purpose.
- * Always inform neighbouring landowners beforehand of any construction activity that is going to take place in close proximity to their property. Prepare them on the number of people that will be on site and on the activities they will engage in.
- * Ensure that ERWAT and/or contractor employees (especially temporary construction workers) are aware of their responsibility in terms of ERWAT's relationship with landowners and communities surrounding their plants. Implement an awareness drive to focus on respect, adequate communication and the 'good neighbour principle.'
- * Incorporate all mitigation measures in the SIA that are relevant to the construction phase in the EMP to ensure these are adhered to by ERWAT and the contractor.

CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 5

The East Rand Water Care Company (ERWAT) provides bulk wastewater management services to the Ekurhuleni Metro, which consists of previous municipalities of Kempton Park, Germiston, Alberton, Brakpan, Boksburg, Benoni and Springs. The existing **Welgedacht Water Care Works** (WCW) is currently under severe pressure from increasing wastewater volumes draining towards the plant due to new developments within the catchment. In order to adequately treat the wastewater volumes expected to drain towards the Welgedacht WCW in the short- and long-term, ERWAT are proposing the expansion of the Welgedacht WCW by approximately 100 MI/d over the next 30 years.

The Final EIA report for the proposed expansion of the Welgedacht WCW in the Gauteng Province has been undertaken in accordance with the EIA Regulations published in Government Notice 28753 of 21 April 2006, in terms of Section 25(5) of the National Environmental Management Act (NEMA; Act No 107 of 1998).

The EIA Phase aimed to achieve the following:

- » Provide an overall assessment of the social and biophysical environments affected by the proposed alternatives put forward as part of the project.
- » Assess potentially significant impacts (direct, indirect and cumulative, where required) associated with the proposed project.
- » Comparatively assess identified feasible alternatives put forward as part of the project (including the do nothing option).
- » Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- » Undertake a fully inclusive public involvement process to ensure that I&APs are afforded the opportunity to participate, and that their issues and concerns are recorded.

5.1. Evaluation of the Proposed Project

The preceding chapters of this report together with the specialist studies contained within appendices F-N provide a detailed assessment of the environmental impacts on the social and biophysical environment as a result of the proposed project. This chapter concludes the EIA process by providing a summary of the conclusions of the assessment of the proposed expansion of the Welgedacht Water Care Works. In so doing it draws on the information gathered as part of the EIA process and the knowledge gained by the environmental consultants during the course of the EIA and presents an informed opinion of the environmental impacts associated the proposed project.

From a technical and economic assessment of various options for the discharge of the additional effluent from the expanded WCW, it was concluded that the only feasible alternative is the discharge of the effluent at the current discharge position. This is largely due to the additional costs associated with the other options considered, which are considered to be prohibitive to the proposed development (refer to Appendix N for more details).

The assessment of impacts within this EIA Report therefore only considers the current discharge point as an option for the discharge of the additional effluent from the expanded WCW. In summary, the following impacts have been identified to be associated with the proposed project:

- » **Soils and Geology Impacts:** geotechnical studies associated with the expansion of the WCW indicate the low clay composition suggests that there is a moderate to high potential for erosion of the hillwash, but with good engineering it is possible to have expansion of the proposed WCW with the construction of a good foundation. Impacts associated with geology and soils (in terms of the risk of soil erosion) are expected to be **localised** and restricted to the site.
- » **Impacts on Terrestrial and wetland habitats:** rated as medium to high significance before mitigation due to the expansion of the WCW footprint and increased effluent discharge into the Blesbokspruit. Implementation of the recommended mitigation measures would reduce the significance of all the potential impacts to **medium - low**.
- » **Potential impacts on aquatic ecosystems** as a result of the additional effluent discharge ranged from medium to high before mitigation, with the implementation of the recommended mitigation measures, the significance of the potential impacts would be reduced to **medium and low**.
- » **Air quality impacts:** there is no indirect impact on air quality expected from the operational or construction and decommissioning phases of the Welgedacht WCW. The only pollutant expected to exceed its standard or guideline is H₂S. This is however expected to occur 200 m away from the WCW, where there is currently no exposure to the general public. The significance of all impacts during the operational phase is **low**, while the significance of cumulative impacts during construction and decommissioning is **medium**.
- » **Noise impacts:** The noise generated by existing operations at the Welgedacht WCW as measured and perceived at the nearest noise sensitive receptor (900 metre offset) has negligible impact on the surrounding area. The addition of the new plant and equipment at the WCW will increase the noise level by about 5.7dBA. Although there are a number of noise sensitive receptors that lie within the area of potential noise impact, namely within the 35dBA contour, the impact is predicted to be **minor**

and of low significance due to the already degraded noise climate in sections of these areas from road and railway traffic, and due to the character of the WCW noise. There will therefore be **no adverse noise impact** from the upgraded WCW.

- » **Impacts on heritage sites:** No sites, features or objects of cultural heritage significance were identified in the study area, there would therefore be **no impact** from the proposed development.
- » **Visual impacts:** The construction and operation of the Welgedacht Water Care Works and its associated infrastructure will have a visual impact on the receiving environment. Although the region is strongly characterised by industrial and mining development, the immediate area surrounding the proposed WCW remains largely agricultural and / or undeveloped. The facility infrastructure is not particularly tall – the majority of the primary infrastructure will be approximately 5m tall, with the exception of the digesters, which are likely to be between 8 and 10m in height. The tallest structures will be the high mast lights, which due to their narrow form, are not expected to be apparent from significant distances. Potential visual impacts range from high to moderate before mitigation. With the implementation of the recommended mitigation measures, the significance of the potential impacts would be reduced to **moderate to low**.
- » **Social impacts:** no issues emerged that can be considered as fatal flaws from a social perspective in terms of the construction and operation of the expansion to the Welgedacht WCW. It is furthermore not expected that the proposed project would have any significant social impacts on the receiving environment. Potential social impacts would only occur in the event that the proposed project is **not** implemented. It is therefore recommended that the construction and operation of the expansion to the Welgedacht WCW is approved from a social point of view
- » Implementation of the do nothing alternative would result in negative impacts on the environment as ERWAT would not have the capacity to adequately treat the additional effluent being directed towards the WCW. This alternative is therefore not preferred from an environmental perspective.

Impacts resulting from the modification are expected to be **POSITIVE** overall, as no environmental fatal flaws were identified during the EIA process. The recommended mitigation measures are required to be implemented to minimise all potentially significant adverse impacts identified during the specialist studies. An Environmental Management Plan (EMP) should be implemented and adhered to during construction and operation, to ensure the implementation of recommended mitigation measures and the minimisation of impacts.

5.2. Overall Conclusion (Impact Statement)

The findings of the specialist studies undertaken within this EIA to assess both the benefits and potential negative impacts anticipated as a result of the proposed project conclude that:

- » There are no environmental fatal flaws that should prevent the proposed project from proceeding on the identified site.
- » The significance levels of the majority of identified negative impacts can be minimised by implementing the recommended mitigation measures.
- » The implementation of the proposed project would enable ERWAT to ensure that the effluent being directed towards the Welgedacht WCW would be adequately treated to meet the DWA effluent standards for the catchment.
- » The consequences of not implementing the project (i.e. the do nothing alternative) are expected to be significantly higher than the option of expanding the existing WCW. This alternative is not preferred from an environmental perspective.

5.3. Overall Recommendation

Based on the nature and extent of the proposed project, the local level of disturbance predicted, the findings of the EIA, and the understanding of the significance level of potential environmental impacts, it is the opinion of the EIA project team that the application for the proposed expansion of the Welgedacht Water Care Works be authorised by GDARD.

The following conditions of this recommendation must be included within the authorisation issued:

- » All mitigation measures detailed within this report and the specialist reports contained within Appendices F-N must be implemented.
- » The draft Environmental Management Plan (EMP) as contained within Appendix O of this report should form part of the contract with the Contractors appointed to undertake the expansion of the Welgedacht Water Care Works and will be used to ensure compliance with environmental specifications and management measures.
- » Applications for all other relevant and required permits required to be obtained by ERWAT must be submitted to the relevant regulating authorities. This includes permits for disturbance to protected vegetation, disturbance to any riparian vegetation, update of the existing water use license, waste license (as appropriate), etc.
- » During construction, unnecessary disturbance to habitats should be strictly controlled and the footprint of the impact should be kept to a minimum.
- » The process of communication and consultation with the community representatives must be maintained after the closure of the EIA process, and, in particular, during the construction phase associated with the proposed project.

REFERENCES

CHAPTER 6

6.1. References for Air Quality Impact Assessment

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