

Environmental and Social Impact Assessment



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Environmental and Social Impact Assessment for the Proposed Vaccine Manufacturing Facility, located in Pinelands, Western Cape

Final Environmental and Social Impact Assessment

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Making Sustainability Happen

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Acronyms and Abbreviations

AfDB	African Development Bank
Aol	Area of Influence
AQG	Air Quality Guidelines
BA	Basic Assessment
BFS	Blow-Fill-Seal
BSL	Biosafety Level
CA	Competent Authority
CCRA	Climate Change Risk Assessment
CFA	Cape Flats Aquifer
CID	City Improvement District
CIP	Clean-In-Place
CO	Carbon Monoxide
CPF	Community Policing Forum
CUB	Central Utility Building
CV	Curriculum Vitae
dB	Decibel
DEA&DP	Department of Environmental Affairs and Development Planning
DFFE	Department of Forestry, Fisheries and the Environment
DQ / IQ / OQ / PQ	Design, Installation, Operational and Performance Qualification
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
E&S	Environmental and Social
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FL	Fenceline
GA	General Authorisation
GIIP	Good International Industry Practice
GMP	Good Manufacturing Practice
GWP	Global Warming Potential
HDX	Human Development Accelerator
HEPA	High-Efficiency Particulate Air
HFO	Hydrofluoroolefins
HVAC	Heating, Ventilation, And Air Conditioning



HWC	Heritage Western Cape
I&AP	Interested and Affected Party
IFC	International Finance Corporation
ILO	International Labour Organization
ISO	International Organization for Standardization
LAeq	Equivalent Continuous Sound Level
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MGV	Maitland Garden Village
mRNA	Messenger Ribonucleic Acid
MV	Medium-Voltage
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:WA	National Environmental Management: Waste Act
NFEPA	National Freshwater Ecosystem Priority Areas
NH ₃	Ammonia
NHRA	National Heritage Resources Act
NID	Notice Of Intent to Develop
NO ₂	Nitrogen Dioxide
NSR	Noise Sensitive Receptor
NWA	National Water Act
OCV	Oral Cholera Vaccine
OHS	Occupational Health and Safety
PAPs	Project Affected Persons
PM _{2.5}	Particulate Matter ≤2.5 microns
PM ₁₀	Particulate Matter ≤10 microns
PS	Performance Standards
RAP	Resettlement Action Plan
SADC	Southern African Development Community
SAP	South African Police Services
SACNASP	South African Council for Natural Scientific Professions
SANAS	South African National Accreditation System
SANS	South African National Standards
SAAQIS	South African Air Quality Information System
SDP	Site Development Plan
SEP	Stakeholder Engagement Plan



SIP	Sterilise-In-Place
SMP	Site Master Plan
SO ₂	Sulphur Dioxide
ToR	Terms of Reference
TRUP	Two Rivers Urban Park
WBG	World Bank Group
WFI	Water-For-Injection
WHO	World Health Organisation
WMA	Water Management Area
WMP	Waste Management Plan
WUL	Water Use Licence
UPS	Uninterruptible Power Supply
VOCs	Volatile Organic Compounds
VSD	Variable Speed Drives



1.0 Introduction

This chapter briefly describes the project background, summarises the legislative authorisation requirements, describes the purpose and provides an overview of the structure of the report.

1.1 Project Background

The Biologicals and Vaccines Institute of Southern Africa (Pty) Ltd (Biovac) is a biopharmaceutical company which operates an existing vaccine manufacturing facility located in Pinelands, within the City of Cape Town Metropolitan Municipality.

Biovac are now proposing to develop a new vaccine manufacturing facility and associated infrastructure (hereafter referred to as the “proposed project”) on a site near its existing operations. The site for the proposed new facility is approximately 2.4 hectares in extent and comprises the following properties:

- Unregistered Erf 183467,
- Remainder Erven 118296, 103659, 24176, Cape Town; and
- Erf 1056, Pinelands.

The location of Biovac’s existing facility and the proposed project are illustrated in Figure 1-1 below.



Figure 1-1: Location of Biovac’s Existing Facility and Proposed Project Site.



1.2 Legislative Overview

The Environmental Impact Assessment (EIA) Regulations 2014 promulgated in terms of Chapter 5 of NEMA and published in Government Notice (GN) No. R982 (as amended by GN No. 326 of 7 April 2017) provide for the control of certain listed activities. Such activities are prohibited from commencing until written authorisation is obtained from the competent authority, which in this case is the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP).

In correspondence dated 28 August 2025, DEA&DP confirmed that the proposed project does not trigger any listed activities requiring an Environmental Authorisation (EA) in accordance with the EIA Regulations 2014 (See Appendix A). Thus, a formal EIA Process undertaken in accordance with the South African Regulatory Framework is not required prior to the undertaking of the proposed project.

However, Biovac has approached the International Finance Corporation (IFC), the European Investment Bank (EIB), the Human Development Accelerator (HDX) and the African Development Bank (AfDB) (hereafter referred to as “the lenders”) to support the development. As part of the associated funding requirements, Biovac has been requested to undertake an Environmental and Social Impact Assessment (ESIA) to identify the project’s potential environmental and social impacts and to ensure adequate risk mitigation for the proposed project. Accordingly, Biovac appointed SLR Consulting (South Africa) (Pty) Ltd (SLR) to compile this ESIA Report in alignment with the relevant international standards and guidelines (see Section 0).

1.3 Purpose of this Report

This report aims to identify, assess, and evaluate the potential environmental and social impacts associated with Biovac’s proposed vaccine manufacturing facility. In addition to outlining potential adverse impacts, the report proposes appropriate mitigation measures and management actions to avoid, minimise, or offset negative impacts, while enhancing potential positive outcomes associated with the project.

1.4 Structure of this Report

This report has been compiled in accordance with the Terms of Reference agreed to with the lenders and is structured into a series of chapters and appendices outlined in the table below.

Table 1-1: Structure of ESIA Report

Section	Contents
Chapter 1	Introduction Provides project background, a legislative and regulatory overview, a description of the purpose of this ESIA report, and an outline of the report structure.
Chapter 2	Legal Framework Sets out the applicable legislative framework for the ESIA process for the proposed project.
Chapter 3	International Standards and Guidelines Sets out the applicable international standards and guidelines informing this ESIA Report for the proposed project.



Section	Contents
Chapter 4	Environmental Impact Assessment Approach and Process Outlines the methodology applied for the ESIA assessment and stakeholder consultation process.
Chapter 5	Project description Presents general project information and a detailed description of the proposed project.
Chapter 6	Description of the Baseline Environment Characterises the baseline biophysical and social environment potentially affected by the proposed project.
Chapter 7	Impact Description and Assessment Describes key potential environmental and social impacts associated with the proposed project.
Chapter 8	Conclusion and Recommendations Provides conclusions to the ESIA process and summarises the project controls, mitigation and monitoring measures that would be implemented for the proposed project.
Chapter 9	References Provides a list of the references used in compiling this report.
Appendices	Appendix A Determination Letter from DEA&DP Appendix B DFFE Screening Tool Appendix C Notice of Intent to Develop Correspondence Appendix D Water Use Licence Approval Appendix E Curriculum Vitae of Project Team Appendix F Stakeholder Engagment Plan Appendix G Site Verification Report Appendix H High Level Meeting Notes From Quarterly Stakeholder Meeting Held On 5 December 2025 Appendix I Conceptual Design Appendix J Air Quality Baseline Assessment Report Appendix K Climate Change Risk Assessment Appendix L Noise Baseline Assessment Appendix M Terrestrial Plant Species and Terrestrial Biodiversity Compliance Statement Appendix N Land Use Motivation Report Appendix O Transport Impact Assessment Appendix P Impact Assessment Methodology



2.0 Legal Framework

This section provides an overview of the legal framework relevant to the ESIA Process for the proposed project.

2.1 National Environmental Management Act, 1998 (No. 107 of 1998)

The National Environmental Management Act (NEMA) (Act No. 107 of 1998) establishes the overarching framework for environmental governance in South Africa and provides principles to guide decision-making on matters affecting the environment. In terms of Section 2 of NEMA, all organs of state are required to apply environmental management principles when taking decisions that may significantly affect the environment. These principles promote socially, economically, and environmentally sustainable development, require that environmental management places people and their needs at the centre of decision-making, and emphasise equitable consideration of the interests, needs, and values of Interested and Affected Parties (I&APs), including the requirement for public participation.

Chapter 5 of NEMA provides the statutory framework for Integrated Environmental Management and regulates the assessment of activities that may have a detrimental effect on the environment. Section 24 establishes the requirement for EA for listed or specified activities and sets minimum procedural requirements for the investigation, assessment, management, and communication of environmental impacts. These listed or specified activities may only be commenced if EA is granted. Section 24(4) provides the minimum requirements for procedures for the investigation, assessment, management and communication of the potential impacts.

2.1.1 EIA Regulations, 2014

The EIA Regulations, 2014 (GN R. No 982 of 2014, as amended) promulgated in terms of Chapter 5 of NEMA provide for control over certain listed activities. These listed activities are detailed in EIA Regulation Listing Notice 1 (GN R. No 983 of 2014), Listing Notice 2 (GN R. No 984 of 2014) and Listing Notice 3 (GN R. No 985 of 2014)¹. The undertaking of activities specified in the EIA Regulation Listing Notices is prohibited until EA has been obtained from the CA. Such EA, which may be granted subject to conditions, will only be considered once there has been compliance with the EIA Regulations, 2014.

The EIA Regulations, 2014 set out the procedures and documentation that need to be complied with when applying for EA. A Basic Assessment (BA) process must be applied to an application if the EA applied for is in respect of an activity, or activities, in Listing Notices 1 and/or 3 and a Scoping and EIA process must be applied to an application if the EA applied for is in respect of an activity, or activities, in Listing Notice 2.

As noted in Section 1.2, the DEA&DP confirmed that the project does not trigger any listed activities requiring an EA. Accordingly, a statutory EIA process in terms of NEMA is not required prior to commencing with the proposed project.

2.1.2 Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes

The Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for EA (GN. R. 320 of 2020) prescribe

¹ The EIA Regulations and Listing Notices have all been variously amended.



the minimum report content requirements and protocols to be followed for the assessment of environmental impacts for activities requiring EA in respect of specific environmental themes. Each protocol applies exclusively to the environmental theme identified within its scope. Multiple themes may apply to a single application for EA, and assessments for these themes must be undertaken in accordance with the relevant protocol. When the requirements of a protocol apply, the requirements of Appendix 6 of the EIA Regulations, 2014 are replaced by the requirements of these protocols.

The Procedures set out the requirements for ground-truthing environmental themes identified by the national web based environmental screening tool (Screening Tool). The Screening Tool provides site specific information from a range of datasets and identifies specific EIA requirements including specialist studies deemed applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site.

A Screening Report was generated using the DFFE National Screening Tool for the proposed project (see Appendix B). Based on the Screening Tool, the following sensitivities were allocated for each environmental theme:

- Agriculture: High (as the site has land capability evaluation values of 10 - 8);
- Animal Species: Medium (due to historical records of *Sclerophrys pantherine*, *Conocephalus peringueyi* and *Bullacris obliqua*);
- Aquatic Biodiversity: Low (no mapped aquatic features located in the vicinity of the project site);
- Archaeological and Cultural Heritage: Very High (site is located within 5 km of a Grade I Heritage site and 2km of a Grade II Heritage site);
- Civil Aviation: High (within 15 km of a civil aviation radar and between 8 and 15 km from a major civil aviation aerodrome);
- Defence: Very High (surrounding area mapped a Military and Defence Site);
- Paleontology: Low (mapped features with a Low paleontological sensitivity);
- Plant Species: Low (no historical records of sensitive species);
- Terrestrial Biodiversity: Very High (mapped historical extent of the Cape Flats Sand Fynbos vegetation type).

The results of the ground-truthing and/or specialist assessment of the site in relation to the above-mentioned sensitivities is provided in Section 6.0.

2.2 National Heritage Resources Act, 1999

The National Heritage Resources Act, 1999 (No. 25 of 1999) (NHRA) provides for the identification, assessment and management of the heritage resources of South Africa. Section 38(1) of the NHRA lists development activities that would require authorisation by the responsible heritage resources authority.

A Notification of Intent to Develop (NID) was submitted to Heritage Western Cape (HWC) for the proposed project. The application was subsequently discussed with HWC officials at



their offices on 26 January 2026, during which it was concluded that the proposed consolidation of the five properties comprising the project site, to enable development of a vaccine manufacturing facility, would not impact heritage resources. Consequently, no further heritage assessment or authorisation under Section 38 of the National Heritage Resources Act (NHRA) is required. Confirmation of this determination is provided in the correspondence included in Appendix C.

2.3 National Environmental Management Waste Act, 2008

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) establishes the national framework for waste governance, with an emphasis on waste avoidance and minimisation, and imposes a general duty of care on all waste holders to reduce, re-use, recycle and recover waste where reasonably practicable; where disposal is unavoidable, to ensure environmentally sound treatment and disposal; to manage waste so as not to endanger health or the environment and not to cause nuisance (including noise, odour or visual impacts); to prevent contraventions by employees or supervised persons; and to prevent the unauthorised use of waste. NEM:WA also creates a system of listed waste management activities that, when triggered above prescribed thresholds, require a Waste Management Licence (WML) supported by an environmental assessment process.

For the proposed vaccine facility, no listed waste management activities are triggered and, accordingly, no WML is required. Notwithstanding the absence of licensing triggers, the project will comply with all applicable norms, standards and regulations under NEM:WA, and will implement the Environmental and Social Management Plan (ESMP) waste hierarchy measures (avoidance, reduction, re-use, recycling, recovery; and, where necessary, compliant treatment and disposal through authorised facilities).

2.4 National Water Act, 1998

The National Water Act (NWA) establishes South Africa's framework for the protection, use, development, conservation, management and control of water resources and promotes integrated water resources management with stakeholder participation. The Department of Water and Sanitation (DWS) is the competent authority. The Act provides national norms and standards and requires authorisation for water uses defined in Section 21. A water use may proceed only if it is: (i) permissible under Schedule 1; (ii) a continuation of an existing lawful use; (iii) permissible under a General Authorisation (GA) issued under Section 39; or (iv) authorised by a Water Use Licence (WUL) under Section 40-41.

Biovac currently holds a GA for a Section 21(a) water use ("taking water from a water resource") for groundwater abstraction from borehole on the site of their existing facility. The authorised maximum annual abstraction volume is 48,000 m³ for use in manufacturing activities associated with locally consumed and distributed vaccines. This GA was approved in 2022 with a validity period of 20 years as stipulated in the DWS decision in Appendix D.

Based on current design and operations, the proposed project does not trigger any additional Section 21 water uses and therefore does not require a new WUL. Process water, wastewater and stormwater are managed within closed systems and routed to authorised municipal or licensed third-party facilities; no direct discharge to a water resource is proposed. Should any future design change introduce a potential water use (e.g., dewatering, direct discharge, or infrastructure that could alter streamflow), the project will obtain the appropriate GA or WUL prior to implementation in consultation with DWS.

3.0 International Standards and Guidelines

This section provides an overview of the international standards and guidelines that inform the development of this ESIA. These standards were identified and agreed upon with the



lenders in the terms of reference for the study and collectively serve as the benchmark against which the assessment has been undertaken. The purpose of this overview is to ensure that the ESIA aligns with internationally recognised good practice and satisfies the environmental and social due-diligence requirements of the relevant financing institutions.

3.1 IFC Performance Standards on Environmental and Social Sustainability (2012)

The International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (2012) establish the benchmark requirements that private-sector projects must meet to ensure environmentally and socially responsible development. These Standards provide a risk-based framework that guides the identification, assessment, and management of environmental and social impacts throughout the project lifecycle. As the proposed development is seeking financing from international development finance institutions, the ESIA has been structured to align with the relevant IFC Performance Standards (PS). It should be noted that this proposed development is a Category B project as per the IFC's Policy on Environment and Social Sustainability (2012). The project will have limited adverse E&S impacts that are few, site specific, largely reversible and readily addressed through existing mitigation measures. The table below sets out the applicable Performance Standards and outlines their relevance to the project.

Table 3-1: Applicable IFC Performance Standards

Applicable Performance Standard		Relevance
1	Assessment and Management of Environmental and Social Risks and Impacts	The project presents environmental and social risks and impacts that must be identified, assessed, and addressed. The ESIA applies SLR's impact assessment methodology (see Appendix P) to ensure comprehensive evaluation and appropriate risk management.
2	Labour and Working Conditions	The project involves a workforce (including direct employees, contracted workers and supply-chain workers) whose rights must be protected throughout the project lifecycle. This includes maintaining a strong HR policy framework, ensuring fair working conditions and clear terms of employment, upholding non-discrimination and equal opportunity, complying with OHS requirements, providing an accessible grievance mechanism, and prohibiting all forms of forced labour and child labour.
3	Resource efficiency and Pollution Prevention	The project is expected to have impacts on air, water and land, and to consume finite resources in ways that may affect people and the environment. This ESIA identifies these potential impacts and outlines measures to avoid, minimise or mitigate them in line with good international industry practice.
4	Community Health, Safety and Security	The project is located near residential areas, which requires careful management of community risks during both construction and operation. The ESIA therefore considers potential impacts related to traffic, noise, air emissions, construction activities, and emergency preparedness, and outlines measures to safeguard surrounding communities. The project will implement appropriate safety procedures,



Applicable Performance Standard		Relevance
		security arrangements that respect human rights, and mechanisms for communication and grievance management to ensure that community health, safety and security are protected throughout the project lifecycle.
5	Land Acquisition and Involuntary Resettlement	The project site was previously occupied on an informal and itinerant basis by five individuals. This necessitated engagement with these individuals to confirm their status and ensure appropriate resettlement planning.

3.2 EIB Environmental and Social Standards (2022)

The EIB Environmental and Social Standards (2022) set out the requirements that projects financed by the EIB must meet to ensure sound environmental and social performance and sustainable development. The Standards provide a structured framework for identifying, assessing, and managing environmental and social risks and impacts across the full project lifecycle, promoting compliance with EU environmental principles and international good practice. As the proposed development is seeking support from international development finance institutions, the ESIA has been prepared in alignment with the applicable EIB Environmental and Social Standards. The table below sets out the applicable Environmental and Social Standards and outlines their relevance to the project.

Table 3-2: Applicable EIB Environmental and Social Standards

Applicable Standard		Relevance
1	Environmental and Social Impacts and Risks	This ESIA aligns with the requirements of EIB Environmental and Social Standard 1 by applying an integrated approach that jointly assesses environmental, social and human rights risks and impacts. The assessment follows the EIB mitigation hierarchy (avoid, minimise, mitigate) and considers cumulative impacts. This informs the ESMPs, ensuring clear responsibilities, monitoring requirements and evidence-based decision making throughout construction and operation.
2	Stakeholder Engagement	The project necessitates stakeholder engagement given its proximity to neighbouring residential areas, including Ndabeni and Pinelands. In addition, the presence of informal occupants on the site required targeted engagement to confirm their status and address resettlement related concerns. These factors collectively necessitated the development of a robust Stakeholder Engagement Plan and an accessible grievance mechanism to manage questions, concerns and feedback from the local community and adjacent neighbours.
3	Resource efficiency and Pollution Prevention	The project is expected to require energy and water resources for vaccine manufacturing and may generate emissions, effluents and wastes that could affect the surrounding environment. This ESIA identifies these resource demands and potential pollution pathways and



Applicable Standard		Relevance
		outlines measures to avoid, minimise and mitigate associated impacts.
5	Climate Change	The project is exposed to both acute and chronic climate related hazards, necessitating a Climate Change Risk Assessment to evaluate how extreme weather events and long-term climate trends may affect the facility's resilience. The ESIA also assesses the project's greenhouse gas emissions and confirms alignment with national and international climate commitments, including Paris Agreement objectives.
6	Involuntary Resettlement	The project requires the physical and economic displacement of informal occupants in order to construct the proposed facility. This necessitates the development of a Resettlement Action Plan (RAP) to ensure that the affected individuals' rights, entitlements and livelihoods are protected.
7	Vulnerable Groups, Indigenous people and gender	The project may affect vulnerable groups in the surrounding area, including low-income households, low skilled job seekers and individuals who previously occupied the site informally. This ESIA ensures that development is inclusive and avoids disproportionate impacts on marginalised populations.
8	Labour rights	The project involves a workforce (including direct employees, contracted workers and supply chain workers) whose rights must be protected throughout the project lifecycle. The project is required to ensure fair working conditions, non-discrimination, freedom of association, safe and healthy working environments, and access to an effective grievance mechanism for all workers
9	Health Safety and Security	The project is located near residential areas, which requires careful management of community risks during both construction and operation. The ESIA therefore considers potential impacts related to traffic, noise, air emissions, construction activities, and emergency preparedness, and outlines measures to safeguard surrounding communities. The project will implement appropriate safety procedures, security arrangements that respect human rights, and mechanisms for communication and grievance management to ensure that community health, safety and security are protected throughout the project lifecycle.

3.3 African Development Bank's Integrated Safeguards (2023)

The African Development Bank's Integrated Safeguards System (ISS) sets out the environmental and social requirements that projects financed by the AfDB must meet to promote sustainable development and prevent, minimise, or mitigate adverse environmental and social impacts. The ISS provides a comprehensive framework for identifying, assessing, and managing environmental and social risks across the full project lifecycle, while



strengthening country systems and aligning with international good practice. As the proposed development is seeking support from international development finance institutions, the ESIA has been prepared in alignment with the applicable African Development Bank Integrated Safeguards. The table below presents the relevant Safeguard Policies and outlines their applicability to the project.

Applicable Operational Safeguard		Relevance
1	Assessment and Management of Environmental and Social Risk and Impact	This ESIA aligns with the requirements of the African Development Bank's Operational Safeguard 1 by applying an integrated approach to the identification, assessment and management of environmental and social risks and impacts associated with the project. The assessment follows the AfDB mitigation hierarchy (avoid, minimise, mitigate, and where applicable compensate) and considers both direct and cumulative impacts across the project lifecycle. The outcomes of the assessment inform the development of the Environmental and Social Management Plans (ESMPs), ensuring clear allocation of responsibilities, defined monitoring measures, and effective, evidence-based environmental and social performance throughout construction and operation.
2	Labour and Working Conditions	The project involves a workforce comprising direct employees, contractors and supply chain workers whose rights and wellbeing must be protected throughout the project lifecycle. In alignment with the African Development Bank's Operational Safeguard 2, the project is required to ensure fair and equitable working conditions, non-discrimination, freedom of association, and the prohibition of forced and child labour. The ESIA further provides for the protection of worker health and safety through the implementation of appropriate occupational health and safety measures, as well as access to an effective and accessible worker grievance mechanism for all categories of workers.
3	Resources Efficiency and Pollution Prevention and Management	The project is expected to require energy and water resources for vaccine manufacturing and may generate emissions, effluents and wastes that could affect the surrounding environment. This ESIA identifies these resource demands and potential pollution pathways and outlines measures to avoid, minimise and mitigate associated impacts.
4	Community Health, Safety and Security	The project is located in proximity to surrounding residential areas and transport infrastructure, requiring careful management of community health, safety and security risks during both construction and operation. In alignment with the African Development Bank's Operational Safeguard 4, the ESIA identifies and assesses potential risks to neighbouring communities, including those related to traffic movements, noise, air emissions, construction activities, emergency preparedness, and site security arrangements. Appropriate mitigation and management measures are



Applicable Operational Safeguard		Relevance
		proposed to prevent or minimise risks to community health and safety, ensure security practices respect human rights, and provide clear communication and grievance mechanisms throughout the project lifecycle.
5	Land Acquisition, Restrictions on Access to Land and Land Use, and Involuntary Resettlement	The project necessitated the physical and economic displacement of informal occupants previously residing on the project site to enable construction of the proposed facility. In accordance with the African Development Bank's Operational Safeguard 5, the ESIA addresses risks and impacts associated with land acquisition and involuntary resettlement, with the objective of avoiding or minimising displacement where feasible and ensuring that affected persons are not left worse off as a result of the project. A RAP has been developed to safeguard the rights, entitlements and livelihoods of affected individuals, and to ensure that resettlement processes were conducted in a transparent, fair and consultative manner consistent with AfDB requirements.
7	Vulnerable Groups	The project may affect vulnerable groups in the surrounding area, including low-income households, low skilled job seekers and individuals who previously occupied the site informally. This ESIA ensures that development is inclusive and avoids disproportionate impacts on marginalised populations.
10	Stakeholder Engagement and Information Disclosure	The project requires ongoing engagement with a range of stakeholders due to its location near surrounding residential areas and its potential environmental and social impacts during construction and operation. In accordance with the African Development Bank's Operational Safeguard 10, the ESIA has been informed by a structured and inclusive stakeholder engagement process aimed at ensuring timely access to information, meaningful consultation, and transparent decision-making. A Stakeholder Engagement Plan (SEP) has been developed and implemented to guide engagement activities, disclosure of information, and the operation of accessible grievance mechanisms, ensuring that stakeholder concerns are identified, addressed, and incorporated throughout the project lifecycle.

3.4 World Bank Group General Environmental, Health, and Safety Guidelines (2007)

The WBG General EHS Guidelines (2007) represent internationally recognised technical reference standards for managing environmental, occupational health and safety, and community health and safety risks associated with industrial projects. The Guidelines outline performance levels and measures that are generally considered achievable using current Good International Industry Practice (GIIP), and they serve as a benchmark for environmental and social risk management in projects financed by development finance



institutions. The ESIA has been informed by the applicable provisions of the WBG General EHS Guidelines to ensure that project design, construction, and operation incorporate appropriate mitigation measures and management controls consistent with international best practice.

3.5 WBG EHS guidelines for Pharmaceuticals and Biotechnology Manufacturing (2007)

The WBG EHS Guidelines for Pharmaceuticals and Biotechnology Manufacturing (2007) provide sector-specific technical guidance on the management of environmental, occupational health and safety, and community risks associated with pharmaceutical and biotechnology production facilities. These Guidelines supplement the WBG General EHS Guidelines by addressing the unique process hazards, waste streams, emissions, and biohazard risks inherent to vaccine and pharmaceutical manufacturing. They define industry-specific GIIP for pollution prevention, resource efficiency, hazardous materials management, and worker protection. The ESIA has been undertaken with reference to these sector guidelines to ensure that the proposed facility aligns with internationally accepted performance standards for pharmaceutical and biotechnology operations.

3.6 ILO Convention

The International Labour Organization (ILO) Conventions establish internationally recognised principles and standards for the protection of workers' rights, fair labour practices, and safe working conditions. These conventions address key areas including occupational health and safety, non-discrimination, freedom of association, child and forced labour, and conditions of employment. In the context of this project, the relevant ILO Conventions provide an important normative framework for labour and working conditions, complementing national legislation and international lender requirements.



4.0 Environmental and Social Impact Assessment Approach and Process

This section describes the ESIA approach and methodology adopted for proposed project. It outlines the overall assessment framework, including the composition and roles of the project team and the independent specialist consultants, the scope of specialist studies, and the stakeholder engagement process undertaken to inform the assessment.

This section further explains the methods used to identify and evaluate environmental and social impacts, the criteria applied in determining impact significance, and the integration of specialist inputs into the overall ESIA. Assumptions, data limitations, and uncertainties encountered during the assessment are also documented to ensure transparency regarding the scope and reliability of the findings presented in this report.

4.1 Project Team

The details of the independent consultants involved in the preparation of this report are provided in Table 4-1 below. SLR has no vested interest in the proposed project other than fair payment for consulting services rendered as part of the ESIA process. The CV's of the SLR project team are attached in Appendix E.

Table 4-1: ESIA project team

General			
Organisation	SLR Consulting (South Africa) (Pty) Ltd		
Postal address	5 th Floor, Grove Exchange Grove Avenue Claremont 7706		
Tel No.	+27 (0)21 461 1118		
Name	Qualifications	Experience (Years)	Tasks and Roles
Stuart Heather Clark	M.Sc. Environmental Science B.Sc. Civil Engineering	25	Project Director
Nicholas Arnott	B.Sc. (Hons) Environmental and Geographical Sciences	18	Technical advisor - Report review and quality control
Lebogang Nkgudi	B.A. (Hons) Environmental Science and Geography BSocSci. Anthropology, Environmental Science and Geography	2	Project management of the ESIA process, including public participation, specialist management and report compilation

Stuart Heather Clarke is a highly experienced Environmental and Social Specialist with over 25 years of consulting experience across Africa. Having contributed to more than 140 development projects, he brings extensive expertise in identifying and managing ESG risks for major capital projects throughout all project phases, from concept to implementation. His



leadership in conducting Environmental and Social Impact Assessments, Screening Studies, and Due Diligence reviews across 13 African countries has equipped him with a deep understanding of the sustainability challenges influencing development in the region.

He has worked extensively with IFIs, DFIs, and private equity firms to align projects with the Equator Principles and IFC Performance Standards. Stuart's sector experience spans oil and gas, mining, infrastructure, and power, with a strong focus over the past decade on renewable energy projects such as wind, solar PV, hydropower, and gas-to-power developments.

Nicholas Arnott has over 18 years of experience as an environmental assessment practitioner, leading environmental assessment processes across a wide range of sectors including power, mining, oil & gas, road infrastructure, the built environment, and industrial developments. He has extensive experience managing environmental assessment applications, ensuring compliance with regulatory requirements and delivering robust assessment outcomes. He is a registered South African Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa, as well as a registered Professional Natural Scientist with South African Council for Natural Scientific Professions (SACNASP).

Lebogang Nkgudi is a skilled Environmental and Social Consultant within SLR Consulting's Planning and Assessment Team, holding an Honours degree in Environmental Sciences and Geography from Stellenbosch University. She has contributed to a wide range of projects across Mining, Oil and Gas, Renewable Energy, and Infrastructure, bringing practical experience and a strong understanding of sector-specific environmental challenges.

Lebogang excels in Project Management, Environmental and Social Impact Assessments ESIA's, and Stakeholder Engagement, ensuring robust environmental compliance and monitoring. Her multidisciplinary expertise enables her to deliver effective, practical solutions that support sustainable development outcomes for clients.

4.2 Details of the Specialist Team

Table 4-2 below provides a comprehensive list of the internal SLR specialists that have contributed technical expertise to this consolidated ESIA process.

Table 4-2: Details of the Independent Specialist Team

Specialist	Qualifications	Experience (Years)	Tasks and Roles
Loren Dyer	BSocSci. (Hons) Geography and Environmental Management BSocSci. Geographical Science	17	Compilation of Air Quality and Noise Baseline Assessment
Sheena Muttoo	M.S.c Medical Science, Occupational and Environmental Health B.Tech Environmental Health	16	Compilation of Air Quality and Noise Baseline Assessment



Specialist	Qualifications	Experience (Years)	Tasks and Roles
Nontethelelo Dlamini	BA (Hons) Economic History BA Geography and Environmental Management	4	Compilation of Social Site Verification Report
Robert Boreham	M.Sc. Environmental Engineering B.S.c (Hons) Earth Sciences B.S.c Earth Sciences, Geology and Earth Science	4	Compilation of Climate Change Risk Assessment

4.3 Specialist Studies

Biovac had previously commissioned a preliminary ESIA process undertaken by another consultancy. This work was informed by the collection of baseline data from other external specialists. Where relevant, the information from the previously compiled specialist reporting has been incorporated into this ESIA Report to inform the baseline description of the environment. The table below sets out the studies that were used to inform this ESIA.

Specialist	Company	Task and Roles
N/A	Trafficon	Compilation of Transport Impact Assessment
Andre Roux	ARoux Planning	Compilation of Land Use Planning Application and NID Application
N/A	Mthente Research and Consulting Services	Compilation of Stakeholder Engagement Plan and Resettlement Action Plan
Dr David McDonald	Bergwind Botanical Surveys & Tours CC	Terrestrial Plant Species and Terrestrial Biodiversity Compliance Statement

4.4 Stakeholder Engagement

Although the proposed development does not trigger a statutory Environmental Impact Assessment process in South Africa and therefore does not legally require a formal public participation process, stakeholder engagement forms an integral component of the project's funding requirements.

4.4.1 Stakeholder Engagement Plan

Mthente Research and Consulting Services (hereafter referred to as Mthente) was appointed to prepare a comprehensive SEP (see Appendix F), with a strong emphasis on community engagement, developed in alignment with the IFC Good Practice Handbook for Companies Doing Business in Emerging Markets. The SEP includes stakeholder identification and



mapping, a structured consultation strategy, defined stakeholder engagement activities to be implemented by Biovac, a proposed community grievance mechanism, and monitoring and reporting procedures.

4.4.2 Resettlement Action Plan

In addition to the SEP, Mthente has prepared a draft RAP outlining the processes for engaging affected individuals and managing potential resettlement in accordance with international standards. Despite reasonable efforts, Mthente was unable to trace all affected informal occupants; consequently, the RAP remains open and will only be finalised once all potentially affected informal occupants have been identified and engaged. On 25 November 2025, SLR was notified that the informal occupants previously residing on the site had voluntarily vacated. SLR's role was to review and verify the adequacy and effectiveness of the SEP and the associated draft RAP to assess alignment with international lender expectations. This review included a site verification undertaken on 8 December 2025 to confirm that the site had been voluntarily vacated (see Appendix G). Further details are provided in Section 6.12.8.

4.4.3 Quarterly Stakeholder Meeting

SLR was also responsible for participating in a quarterly stakeholder meeting held on 5 December 2025 to present the current ESIA approach to key stakeholders, including representatives of the Pinelands Ratepayers Association, Neighbourhood Watch structures, the South African Police Service, and the City Improvement District (CID) and to address stakeholder questions and concerns. High level meeting notes of this consultation have been included in Appendix H.

4.5 Assumptions and Limitations

The assumptions pertaining to this ESIA process are listed below:

- The assessment is based on the current project description, conceptual layout, and Site Development Plan for the proposed project which were available at the time of study. It is assumed that the overall project footprint, process type, and operational capacity will not materially change from what has been assessed.
- It is assumed that the facility will be designed and operated in compliance with applicable South African environmental legislation, municipal requirements, and international good practice standards.
- It is assumed that mitigation and management measures recommended in the ESIA and associated management plans will be implemented in full.
- Baseline environmental and social conditions observed during the study period are assumed to be representative of typical conditions in the area.
- Construction activities are assumed to follow standard industry practice and to be temporary and localised in nature.

The limitations pertaining to this ESIA process are listed below:

- Specialist studies rely on professional judgement, which inherently involve uncertainty.
- Future cumulative impacts depend partly on third-party developments that are outside the proponent's control and cannot be predicted with certainty.
- Regulatory or planning decisions that occur after the completion of this ESIA may influence implementation conditions.



5.0 Project description

This chapter provides an overview of the proposed vaccine manufacturing facility, its location and provides a detailed description of the various project components. The chapter has been informed by the Conceptual Design Report (See Appendix I) compiled by Calibre Engineering (Calibre Engineering, 2024).

5.1 Details of the Proponent

Biovac is a Cape Town-based biopharmaceutical company established in 2003 as a public-private partnership with the South African government to build and secure local vaccine manufacturing capability for national and regional health needs. The company's mandate is to strengthen South Africa's vaccine self-reliance by developing, producing, filling, packaging, and distributing vaccines for both public and private health systems. Biovac has grown into a leading African vaccine manufacturer, working with global research and development partners to transfer advanced technologies and manufacture essential vaccines, including paediatric formulations and, more recently, Africa's first end-to-end manufactured vaccines in over 50 years. Its operations include product development, drug substance and drug product manufacture, cold-chain distribution, and ongoing expansion into next-generation technologies such as mRNA. Biovac positions itself as a centre of excellence dedicated to improving continental health security and reducing Africa's dependence on imported vaccines.

Biovac currently operates a well-established vaccine development and manufacturing facility in Pinelands Cape Town, where it undertakes formulation, filling, packaging, cold chain distribution, and product development as part of its mandate to strengthen South Africa's self-reliance in vaccine supply. The company has been steadily expanding its capabilities over the past two decades through significant investment in infrastructure, technology transfers, and partnerships with international vaccine organisations, enabling it to manufacture essential paediatric vaccines and, more recently, to produce Africa's first end to end manufactured vaccine in over 50 years. Biovac is now proposing the development of a new, state of the art vaccine production facility to support its growing portfolio and to increase local manufacturing capacity, approximately 150m from their existing facility. This proposed facility forms part of the company's broader long-term strategy to scale domestic vaccine production, expand into new technologies such as mRNA, and reduce Africa's dependency on imported vaccines. The expansion aligns with recent milestones, including the commissioning of new manufacturing infrastructure in Cape Town and the initiation of clinical trials for a locally developed oral cholera vaccine, marking a significant step forward for regional health security and the strengthening of Africa's biotechnology manufacturing base.

5.2 Proposed project location

The proposed project site is located south of the N1 highway, east of the Black River Parkway (M5), and in proximity to Settlers Way (N2). It is directly adjacent to the Cape Town Metrorail line, providing significant regional connectivity. The nearest residential area is Pinelands, situated to the east of the proposed project site (on the opposite side of the railway line) as illustrated in Figure 1-1.

The surrounding area is characterised as a well-established industrial precinct, with industrial and light-industrial land uses predominant to the north, west, and south of the site. In addition, the Vincent Pallotti Hospital is approximately 1.2 kilometres away.

The proposed project site comprises several land parcels, namely Unregistered Erf 183467 and the remainder of Erven 118296, 103659, 24176, as well as Erf 1056, collectively covering an area of approximately 14,000 m² (see Figure 5-1).





Figure 5-1: Land Portions Comprising the Proposed Project Site

Source: ARoux Town Planners, 2025

5.3 Project Components

Biovac plans to build a modern, integrated facility for vaccine manufacturing that will support both emergency (pandemic) needs and ongoing commercial supply. The new facility will handle the formulation, filling, and finishing of vaccines under Biosafety Level 2 (BSL-2²) conditions. It will be designed in a modular way, allowing it to accommodate a range of current and future vaccine products.

The project aims to meet international Good Manufacturing Practice (GMP) standards, ensure a reliable regional supply of important vaccines, and apply strong sustainability measures, with the long-term aim of achieving net-zero carbon emissions over the entire lifecycle of the facility.

² A laboratory or manufacturing biosafety classification used to indicate the level of containment and safety controls required when working with moderate-risk biological agents.



The Site Master Plan (SMP) is provided Figure 5-2 and comprises a biological production building and supporting site infrastructure and utilities necessary for GMP-compliant operations.

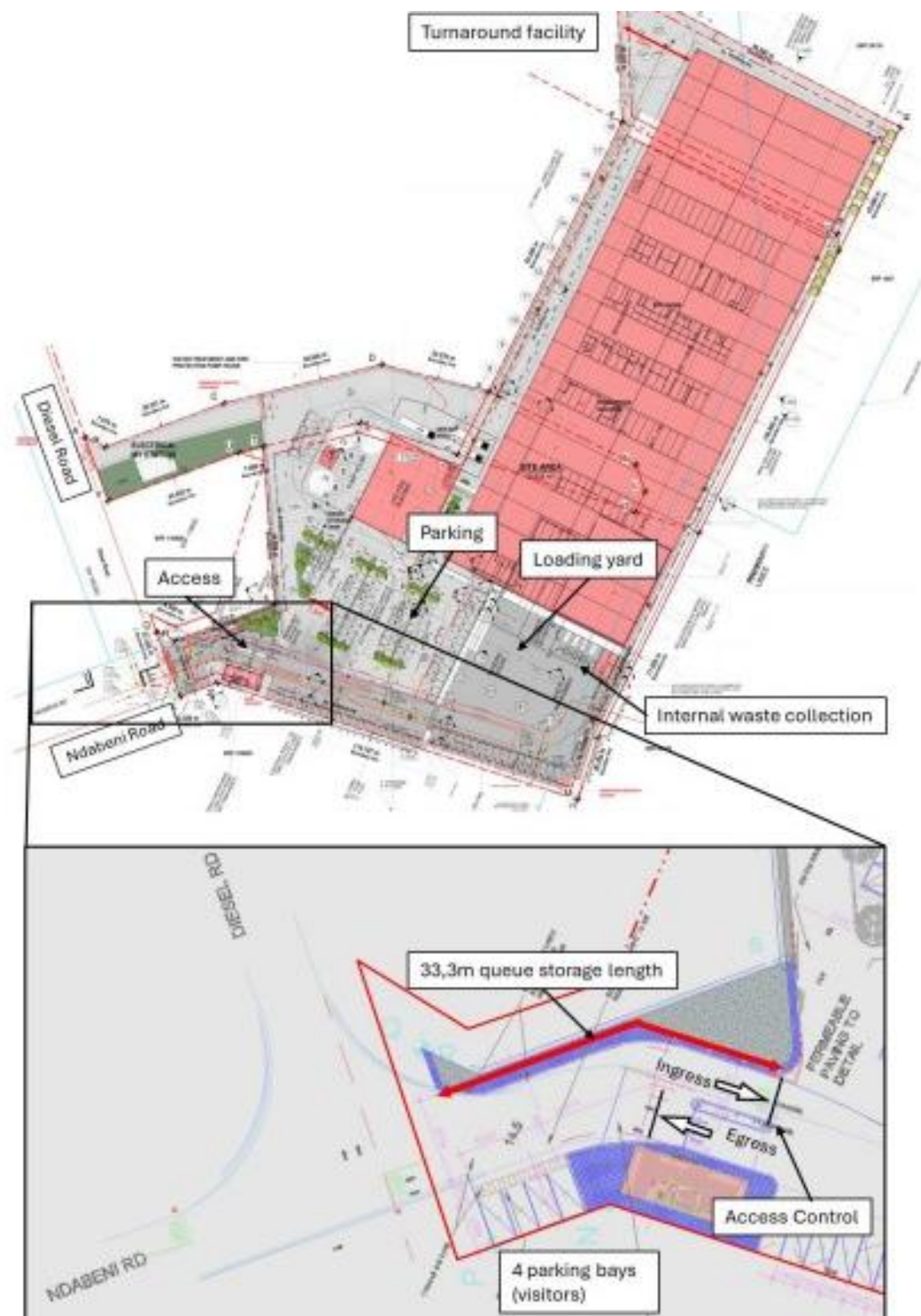


Figure 5-2: Site Master Plan

Source: Calibre Engineering, 2024



The core components of the new proposed facility include:

- A Biological Production Building, comprising:
 - Vial Filling Area (BSL-2), a controlled environment for preparing and filling liquid vaccines into vials which will contain:
 - Rooms for preparing vaccine solutions
 - Spaces for washing and sterilising equipment
 - Areas for treating stoppers and caps
 - Strict separation between “bio-negative³” and “bio-positive⁴” zones
 - Separation of filling, inspection, and packaging activities
 - Oral Cholera Vaccine (OCV) Production Area (BSL-2), facilities for both upstream and downstream processing of OCV, including:
 - Areas for producing and preparing the vaccine before inactivation
 - Filling of plastic tubes using Blow-Fill-Seal⁵ (BFS) technology
 - Equipment washing and sterilisation
 - Controlled movement of materials and staff to prevent contamination
 - Segregation between filling, container-closure testing⁶ and packaging
 - Future Rota Vaccine Area (BSL-2), a dedicated space for future production of the Rota vaccine that will:
 - Use shared BFS equipment with the OCV suite
 - Maintain strict separation between bio-negative and bio-positive operations
 - Include designated areas for filling, container-closure testing, and packaging
 - Warehouse and Logistics Areas, these areas will support:
 - Receiving materials and placing them in quarantine
 - Sampling and dispensing
 - Storage of raw materials and finished products
 - Personnel entry, including lockers and gowning rooms
 - Technical and Support Areas, which include:
 - Engineering workshops

³ A clean area of the facility where no biological materials are handled. Air pressure is kept slightly higher so air flows out of the room, preventing contaminants from entering.

⁴ A controlled area where biological materials are handled. Air pressure is kept lower so air flows into the room, ensuring that biological agents remain contained.

⁵ A fully automated process that forms, fills, and seals sterile containers in one step to minimise contamination risk.

⁶ Testing done to ensure that the container and its seal are tight, secure, and able to keep the sterile product protected from contamination.



- Plant rooms
- Maintenance facilities
- Other utility and support spaces serving all production areas

5.3.1 Additional Site Infrastructure

The proposed development will also include the following essential components:

- **Loading and Marshalling Areas:** For receiving raw materials and dispatching finished products.
- **Waste Handling Facilities:** Designed to manage hazardous and non-hazardous waste, with appropriate systems for biohazard waste in line with BSL-2 requirements.
- **Pipe-Rack and Exhaust Air Systems:** To safely route utilities and ensure controlled extraction and filtration of air from production areas.
- **Central Utility Building (CUB):** Housing systems that generate and distribute clean and standard (black) utilities.
- **Tank Farm:** A secure area for bulk storage of water-for-injection⁷ (WFI), buffers, clean utilities, and other liquids, including bunding and spill-containment features.
- **Electrical substation:** Provides power distribution, including uninterruptible power supply (UPS) for critical systems.
- **Gate House, Parking and Internal Roads:** Ensure controlled site access and efficient movement around the facility.

5.3.2 Utilities, Systems, and Infrastructure

To ensure GMP compliance, biosafety, and operational reliability, the facility will incorporate the following key systems:

- **Manufacturing Equipment:** Formulation vessels, vial and BFS filling lines, sterilisation units, inspection systems, packaging lines, and container-closure integrity testing equipment.
- **Heating, Ventilation, and Air Conditioning (HVAC) and Ventilation:** Cleanroom-grade air handling, High-Efficiency Particulate Air (HEPA) filtration, temperature and humidity control, and safe exhaust systems for bio-positive areas.
- **Building Automation:** Systems for monitoring environmental conditions, utility performance, and alarms (Building Management System/ Environmental Monitoring System).
- **Cleanroom Construction:** Modular walls, ceilings, and finishes designed for easy cleaning and GMP compliance.
- **Clean Utilities:** Systems for supplying WFI, Pure Steam⁸ and clean compressed air with built-in redundancy.
- **Black Utilities:** Conventional heating, cooling, potable water, and related distribution systems.

⁷ Ultra-pure, sterile water used in pharmaceutical and vaccine manufacturing

⁸ Sterile, high-purity steam made from WFI and used to sterilise pharmaceutical equipment



- **Electrical Systems:** Connection to the power grid with UPS support and capacity for backup/standby systems.
- **Wastewater Treatment:** Facilities for neutralising and treating process wastewater in compliance with local regulations.
- **Clean-in-place (CIP)/Sterilise-in-place (SIP) Systems:** Central or local clean-in-place and steam-in-place capabilities linked to process controls to maintain sterility and operator safety.
- **Fire Protection:** Fire detection and alarm systems, sprinklers, hydrants, and safety provisions appropriate for hazardous storage and safe evacuation.

5.3.3 Project Phases

The development of the facility will follow a defined phasing structure, with each phase carrying an established name that is used consistently throughout the Conceptual Design and project documentation. These phase names (e.g., Phase I, Phase If, Phase Ic, Phase Ig, Future A, Future B) represent specific technical scopes. Table 5-1 below presents these official phases in the order they will be implemented, using sequence numbers solely to indicate the chronological rollout.

Table 5-1: Planned Project Phases concerning suites inside the biological production building

Sequence	Phase	Suite	Description
1.	I	FFF	Formulation, fill, and finish for bio-negative formulation and filling, inclusive of all supportive functions.
2.	If	Cholera	OCV upstream and downstream processing, formulation, BFS filling and finish, and all supportive functions for OCV.
3.	Ic	Bio+	Bio-positive formulation and filling
4.	Ig	Rota	Formulation for Rota vaccine and bio-positive BFS filling (utilising the Phase Ig BFS line).
5.	Future A	Cholera Part 2	Downstream processing for future products, including chromatography, buffer preparation, and storage.
6.	Future B	Option 1: mRNA	mRNA-based vaccine drug substance production.
		Option 2: Lyo FF	Formulation, vial filling, lyophilization (two freeze dryers), and finish, including supportive functions.

Source: Calibre Engineering, 2024



5.3.4 Associated Services

5.3.4.1 Electricity supply

The total electrical supply required for the full project is approximately 2,301.8 kVA. To ensure a reliable and compliant power system, the facility's electrical load is separated into UPS and non-UPS categories. Non-UPS loads include systems such as HVAC, pumps, motors, and general lighting, which can tolerate brief power interruptions during changeover. UPS loads support equipment that must operate without interruption, including automation and control systems, environmental monitoring, security systems, critical IT servers, and essential production instruments.

The combined UPS and non-UPS demand determine the size of the transformers and the medium-voltage (MV) supply required. The utility provider has confirmed that sufficient MV capacity is available, and that N+1 redundancy can be requested to ensure a stable and resilient supply suitable for GMP-compliant operations.

To accommodate this connection, a new protected MV Switch Room must be constructed on the client's property. This room must comply with the utility provider's technical requirements and must have direct access from Ndabeni Road. Once commissioned, it will serve as the secure and compliant interface between the facility and the regional power network.

5.3.4.2 Water supply

The current Biovac operations rely on municipal potable water for a range of production and sanitation processes associated with vaccine manufacturing, making water security a critical operational requirement. As continuous availability of water is essential to maintain GMP-compliant production, utility performance, and hygiene standards, an existing borehole (see Section 2.4) has also been authorised for abstraction and use by Biovac to supplement supply where required.

For the proposed new facility, Biovac also intend to use municipal potable water. It has also been confirmed that use of borehole water from the existing borehole can be incorporated into the site's supply strategy (based on available data on sustainable yield, water quality, and treatment requirements).

Both the treated borehole water and municipal potable water will be stored on-site within a 300 m³ storage tank, providing approximately three days of buffer capacity based on the estimated site consumption of less than 100 m³/day. Roof run-off from the bio-building will be captured separately and conveyed to an 80 m³ on-site water reservoir located adjacent to the main potable water storage tank. This water will be reused on site as part of a greywater system, primarily for toilet flushing, with any overflow directed to the municipal stormwater system.

5.3.4.3 Solid Waste Management

Solid waste generated at the facility will be segregated at source into distinct waste streams to ensure safe handling, regulatory compliance, and efficient disposal. Medical waste, including any hazardous, infectious, or biomedical waste arising from vaccine production activities, will be managed exclusively by a certified private waste contractor. No municipal support will be required for this waste stream. General waste, such as packaging materials (plastic sheeting, shrink-wrap, cardboard, and similar disposable items), will be collected in skips and transported to the appropriate City of Cape Town waste disposal site. Food waste generated from the canteen will be stored separately from other waste streams and similarly transported to designated municipal waste facilities.



A comprehensive Waste Management Plan (WMP) will be updated by Biovac, prior to construction and updated for operations. The WMP will define waste classifications, storage protocols, handling procedures, contractor requirements, tracking mechanisms, spill response measures, and reporting obligations in alignment with national and municipal waste regulations.

5.3.4.4 Wastewater Management

To prevent uncontrolled releases to the environment, an integrated wastewater management strategy will be implemented, incorporating a combination of preventive, recovery, and treatment measures designed to minimise pollutant loads and protect downstream municipal infrastructure.

The wastewater management strategy will include:

- Process integrated techniques to prevent or reduce pollutant generation at source.
- Recovery mechanisms that enable the capture and separation of pollutants before discharge to the wastewater system.
- Pre-treatment steps to reduce pollutant concentrations prior to final treatment.
- Final wastewater treatment, where applicable, including preliminary and primary treatment, biological treatment processes, nutrient removal, and solids separation before discharge to a receiving water body.

This approach ensures the protection of the final municipal wastewater treatment works, facilitates the removal of compounds insufficiently treated during final processing (e.g., toxic substances), prevents the release of volatile pollutants to air, and reduces the risk of corrosive or otherwise harmful substances entering sewer infrastructure. Pre-treatment activities will occur as close as possible to the source, particularly in the case of metals or concentrated process waste streams, and certain wastewater types may be segregated to enable targeted combined pre-treatment.

Two categories of wastewater will be generated at the Biovac facility, namely:

- **Domestic Wastewater:** Domestic wastewater will arise from toilets, handwashing, general hygiene facilities, and other routine domestic activities within the building. This category also includes surplus manmade liquids arising from general building use. All domestic wastewater streams will be discharged to the municipal sewer system, apart from wastewater from the canteen, which will require grease separation prior to discharge to prevent blockages and reduce organic loading; and
- **Industrial Wastewater from Biological Facilities:** Industrial wastewater will arise from production processes, cleaning cycles, and other activities within the biological manufacturing suites. In line with the facility design, uncontaminated water streams will be kept separate from streams requiring treatment to minimise pollutant loading and prevent cross-contamination. Wastewater generated in bio-negative areas and standard process operations may be discharged directly into the industrial wastewater collection system. In contrast, wastewater from bio-positive areas must undergo on-site thermal decontamination within the production building before being transferred to the industrial wastewater sewer system.

The design documentation provides indicative volumes for these industrial wastewater streams, including process wastewater collection tanks (typically 13.0 m³/day) and bio-positive wastewater systems such as 3.0 m³ collection tanks and 53.0 m³ inactivation tanks required for thermal treatment. All industrial wastewater is routed to a centralised collection point where pre-treatment such as pH adjustment may be applied before final discharge to the municipal sewage network. This



approach ensures compliance with municipal acceptance criteria, protects sewer infrastructure, and supports adherence to environmental and public health requirements.

5.3.4.5 Stormwater drainage

In accordance with the City of Cape Town's Stormwater Management Policy, all developments exceeding 4 000 m² are required to attenuate stormwater run-off to ensure post-development flows do not exceed pre-development conditions, and to treat run-off to the standards and objectives specified in the policy.

For this project, permeable paving has been identified as the preferred stormwater control measure and best-practice management option. Sufficient space is available within the site's internal roads and parking areas to accommodate the required permeable paving, which will receive run-off from most of the site before discharging to the existing stormwater reticulation network along the Ndabeni Road extension. The City has confirmed available stormwater infrastructure capacity, including a 375 mm main line within the Ndabeni Road extension, to which multiple connections from the development will be permitted, as indicated on the approved engineering drawings.

5.3.5 Resource efficiency

The project incorporates a comprehensive suite of resource-efficiency measures in alignment with IFC Performance Standard 3, EIB E&S Standard 3 and good international industry practice. To reduce dependency on grid electricity and associated Scope 2 emissions, Biovac has installed rooftop solar photovoltaic (PV) systems at the existing facility and will extend this renewable-energy infrastructure to the new facility. This initiative forms part of the company's broader commitment to reduce overall carbon emissions by 50% by 2030, supported by real-time electricity monitoring and active energy-performance management. Furthermore, the design of the new facility is being evaluated for EDGE Green Building certification, which promotes reduced energy demand through enhanced building envelope performance, efficient HVAC systems and optimized operational controls.

Water-efficiency measures implemented at the existing facility such as rainwater harvesting, condensate recovery from steam systems, and reuse of treated process water for grey-water applications will be integrated into the new facility's design to promote responsible water stewardship. Collectively, these measures are intended to minimize resource consumption, enhance operational efficiency, and ensure the facility is developed in a manner consistent with the principles of environmental sustainability.



5.4 Construction Phase activities

The construction phase activities encompass the full sequence of work required to develop the facility from initial site establishment through structural build, utilities commissioning, cleanroom qualification, and readiness for GMP manufacturing.

Construction access will be facilitated through designated routes (Ndabeni Road), with temporary power and water connections. Temporary site services will include secure perimeters, lay-down areas, site offices, and welfare facilities for contractors.

This phase begins with major civil works to prepare and shape the site, followed by construction of the building shell (greybox) and subsequent interior fit-out of specialised suites. It then progresses into the commissioning of power, plant utilities, and clean utilities ensuring all systems are installed, tested, and operational. Finally, the phase includes the qualification of all cleanrooms across upstream, downstream, BFS, formulation, filling, sampling/dispensing, warehouse, and support areas, verifying that each controlled environment meets GMP and ISO requirements for safe, compliant pharmaceutical production.

Table 5-2: Planned Construction Phase Timeline

Item	Activity	Description	Date
Construction			
1.	Civil Works Commencement	Site preparation, earthworks, foundations, concrete and structural construction, access roads, drainage systems, utility trenches, and associated infrastructure required to prepare a site for installation and operation.	20 January 2026
2.	Construction of Greybox	Building an external structural shell that is complete on the outside but unfinished inside, typically with concrete floors and basic services roughed in (no ceilings, finishes, or full utilities).	13 April 2026
3.	OCV fitout commencement	Completing the interior of the OCV suite, including installation of internal partitions, ceilings, lighting, HVAC, electrical and data cabling, plumbing, flooring, safety systems, and all finishes required to make the suite fully functional for its intended operational purpose.	4 December 2026
Utilities			
4.	Power commissioned	Electrical system has been fully installed, tested, and verified to meet operational and safety requirements.	27 May 2027
5.	Plant Utilities Commissioned	All plant utility systems (such as purified water, clean steam, HVAC, compressed air, chilled water, effluent treatment, and other support services) have been fully installed, tested, verified for correct performance, safety, and operational control, and placed into active service in accordance with commissioning requirements.	27 June 2027
6.	Clean Utilities Commissioned	All clean utility systems such as purified water (PW), water-for-injection (WFI), clean steam, clean compressed air, and other GMP critical utilities have been fully installed, functionally tested, verified for correct performance, operational control, and safety,	2 August 2027



Item	Activity	Description	Date
		and placed into active service in accordance with commissioning requirements.	
OCV Upstream			
7.	OCV US / DS cleanrooms qualified	The upstream (US) and downstream (DS) cleanrooms within the OCV suite have completed full cleanroom qualification and demonstrated compliance with GMP and ISO cleanroom standards, confirming they can operate consistently and safely for their intended pharmaceutical processes.	12 October 2027
8.	BFS cleanrooms qualified	The Blow-Fill-Seal (BFS) cleanrooms have undergone full GMP cleanroom qualification and demonstrated compliance with required aseptic processing standards, confirming they meet ISO/GMP environmental controls, HEPA filtration performance, and contamination-control requirements for BFS sterile manufacturing.	9 November 2027
9.	Washing cleanrooms qualified	The washing-area cleanrooms have completed full GMP qualification demonstrating that their design, installation, and operational performance meet required cleanroom standards for controlled washing operations, including air cleanliness, environmental control, and contamination-control requirements.	7 December 2027
10.	I&P Cleanrooms Qualified	The I&P (Inspection & Packaging) cleanrooms have successfully completed GMP cleanroom qualification, demonstrating that their design, installation, and operational performance meet required cleanroom standards for controlled processing, including air cleanliness, environmental control, and contamination-control requirements.	19 January 2028
FFF			
11.	Formulation / Washing cleanrooms qualified	The formulation and washing cleanrooms have completed full GMP qualification confirming that their design, installation, and operational performance meet required cleanroom standards for sterile formulation activities and controlled washing operations, including air cleanliness, environmental control, and contamination-control requirement.	8 March 2028
12.	Filling cleanrooms qualified	The filling cleanrooms have completed full GMP qualification, confirming that their design, installation, and operational performance meet required cleanroom standards for aseptic filling, including controlled air cleanliness, environmental stability, and contamination-control performance.	19 April 2028
13.	I&P Cleanrooms Qualified	The I&P cleanrooms have successfully completed GMP cleanroom qualification, demonstrating that their design, installation, and operational performance meet required cleanroom standards for controlled processing, including air cleanliness, environmental control, and contamination-control requirements.	3 May 2028
Sampling/Dispensary/Warehouses			



Item	Activity	Description	Date
14.	Sampling / dispensing cleanrooms qualified	The sampling and dispensing cleanrooms have completed full GMP qualification confirming that their design, installation, and operational performance meet required cleanroom standards for controlled sampling and dispensing of materials, including air cleanliness, environmental stability, and contamination-control performance.	31 May 2028
15.	FGH Qualified	The FGH cleanrooms have completed full GMP qualification (DQ, IQ, OQ, PQ), demonstrating that their design, installation, and operational performance meet all required cleanroom standards for controlled manufacturing operations, including compliance with air cleanliness, environmental control, and contamination-control requirements.	28 June 2028
16.	RMW Qualified	The RMW cleanrooms have completed full GMP qualification, confirming that their design, installation, and operational performance meet required cleanroom standards, including controlled air cleanliness, environmental stability, and contamination-control performance.	26 July 2028

Source: Calibre Life Science, 2025.

5.5 Operational Phase

5.5.1 Operating hours

To support consistent manufacturing and associated services, the facility will operate continuously, twenty-four hours a day, every day of the week for 40 weeks per annum.

5.5.2 Employment

Based on Table 5-3 below, the site will employ approximately 157 personnel across all shifts during steady-state operations. Day-shift activities will be supported by 61 employees, while Night Shift 1 and Night Shift 2 will be staffed by 57 and 39 employees, respectively. Staffing is distributed across multiple specialised suites including formulation, filling, packing, inspection, upstream and downstream processing for cholera and Rota vaccines, warehouse and sampling functions, material handling, engineering and maintenance, and future DSP and formulation suites. This distribution reflects the complexity of GMP manufacturing operations and the need for continuous oversight of critical production and utility processes.

Table 5-3: Potential Personnel numbers in the different suites

Phase	Suite	Dayshift	Nightshift 1	Nightshift 2
I	Wash	2	2	-
I	Formulation	6	6	-
I	Filling	6	6	6
I	Packing	5	5	5
I	Inspection	5	5	5
I	Warehouse/Sampling	2	-	-



Phase	Suite	Dayshift	Nightshift 1	Nightshift 2
I	Engineering/Maintenance	4	4	4
I	Material Handling	2	2	2
If	OCV	4	4	4
If	Filling/Packing OCV/ Rota	7	7	7
Ig	Rota	2	2	-
Future A	DSP, Buffer preparation and storage	2	2	-
Future B	Wash	4	4	-
Future B	Formulation	4	4	-
Future B	Filling	4	4	4
Future B	Packing	2	2	2
Total per shift		61	57	39
Total		157		

Source: Calibre Engineering, 2024.

5.5.3 Access control

Access control is a critical component of the facility's security architecture, ensuring that only authorised personnel can enter sensitive operational, GMP, and utility areas. The site will utilise Biovac's existing access-control management software to ensure seamless integration, centralised monitoring, and uniform security oversight across all buildings and controlled areas.

At the main vehicle and pedestrian entrance (via Ndabeni Road), access will be controlled through gates and turnstiles equipped with biometric readers linked to the time-and-attendance system, with a manual release capability housed in the security control room. All ground-floor building entrances will be secured using biometric access control linked to the same time-and-attendance platform to maintain consistent personnel tracking and security auditing. Within GMP-regulated zones, biometric access points will be paired with door interlock systems to maintain cascading pressure regimes and prevent cross-contamination, in alignment with biosafety and GMP requirements. Maintenance and plant areas will also be secured through biometric access control to limit entry to authorised technical personnel. Fire escapes will remain locked under normal conditions and will only unlock automatically in response to a fire alarm or upon activation of a green emergency break-glass unit, ensuring compliance with life-safety protocols while maintaining site security.

5.5.4 Parking areas

A total of 115 parking bays have been allocated within the site layout to meet operational and personnel parking requirements.



6.0 Description of the Baseline Environment

This chapter provides a description of the environmental and social features surrounding the proposed development, drawing on current knowledge and specialist studies from the previously undertaken ESIA.

6.1 Topography

The proposed project site is generally flat, with a gentle natural fall from east to south-west. Analysis using Google Earth Pro indicates that elevation along the site ranges from approximately 15 m to 17 m above sea level, representing a total elevation change of 2 m. The average slope is 1.2%, with a maximum slope of 3.1%, confirming the topography of the proposed project site is predominantly gentle and level (Mthente Research and Consulting Services, 2025)

6.2 Geology

6.2.1 Regional Geology

The project area is located on the Cape Flats, a broad, low-lying coastal plain made up mainly of wind-blown and shallow-marine sands deposited during the late Quaternary period. These surface sediments belong to the Sandveld Group, which includes quartz-rich sands, sandy silts, clay pockets, shell-rich sands, and calcareous (lime-rich) dune sands. This lithology is consistent with the natural dune-dominated and coastal environment of the Cape Flats (Schalke, 1973). Studies show that these sands are part of the Witzand, Springfontyn and Langebaan Formations, which together form the main Quaternary units in the area (Fouché, 2012).

These formations are known to be highly variable because of the different coastal and dune processes that formed them. A detailed study by Fouché (2021) also confirms that the Cape Flats sands have mixed origins, including wind-blown deposits and shallow-marine reworking, and can vary significantly in composition and density across short distances.

Below these young sands lies the Malmesbury Group, which consists of much older folded and metamorphosed rocks such as greywacke and shale. These basement rocks occur at depth beneath the Cape Flats, but they do not appear at the surface because they are covered by thick Quaternary deposits (Schalke, 1973).

The Sandveld Group's youngest unit the Witzand Formation has been described in stratigraphic studies as Holocene dune sands transported inland by strong coastal winds (Browning & Roberts, 2015)

6.2.2 Local Geology

At the site itself, mapping from Cape Farm Mapper shows that the area is directly underlain by Sandveld Group sediments. These consist mainly of quartz-rich sands, sandy silt, clayey layers, shell fragments, calcareous sands and calcarenite, light grey to reddish sandy soils.

These materials match what regional geological studies describe for the Cape Flats: unconsolidated coastal and dune sands with occasional clay or shell-rich lenses (Schalke, 1973). Geotechnical research shows that these sands are usually loose to medium-dense, highly permeable, and can change noticeably in texture and behaviour between different parts of the site. This is supported by several engineering studies, including Fouché & Day (2022:) who reported major variability in grading, density, and strength across the Cape Flats.



The earlier work by Fouché (2021) also emphasises the inconsistent nature of these sands and highlights that they contain both dune-derived and marine-influenced layers across the region. There are no known major faults affecting the surface geology in this area, and any deeper structural features in the Malmesbury Group do not impact the unconsolidated sands near ground level.

6.3 Agriculture and Soils

The proposed development site is underlain by Podzolic soils which are characterised by a sandy texture, leached profiles, and subsurface accumulation of organic matter, iron, and aluminium oxides. These soils typically develop either as deep sandy deposits or over hard or weathered rock, and at the proposed site they have an estimated depth of ≥ 750 mm (Figure 6-1). The clay fraction is low ($<15\%$), indicating limited nutrient-retention capacity and low natural fertility.

Given their predominantly sandy nature, the soils at the site exhibit low structural cohesion and provide limited agricultural potential. These characteristics align with the wider Cape Flats region, where unconsolidated sandy soils are generally unsuitable for intensive agriculture without substantial amendment and irrigation support.

Soil erodibility mapping indicates that the site is located within an area classified with a high K-Factor, meaning the soils have a high inherent susceptibility to erosion (Figure 6-2). This elevated erodibility risk is closely linked to the sandy texture, low clay content, and limited organic matter, all of which reduce the soil's ability to resist detachment under rainfall or surface runoff.



Figure 6-1: Soil characteristics map showing clay content and profile depth at the proposed site

Source: CapeFarm Mapper, 2026.



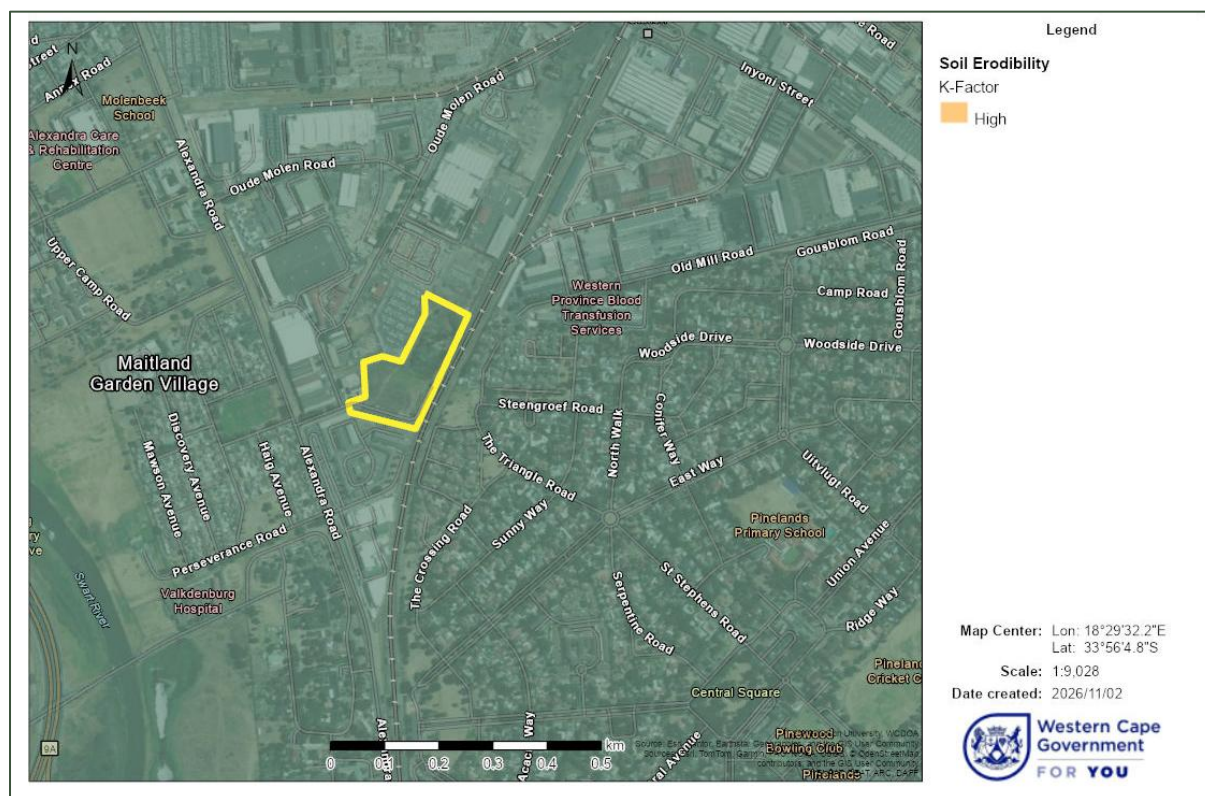


Figure 6-2: Soil erodibility at the proposed site

Source: CapeFarm Mapper, 2026.

The information above is not consistent with the outputs of the DFFE National Screening Tool which assessed the proposed project site as having a “High” sensitivity for the agriculture theme. However, the site itself has not historically been used for agricultural purposes and is located within an area comprising of industrial and light industrial properties with the Urban Edge of the City of Cape Town. This coupled with it’s relatively small extent means that the proposed project site is not inherently suitable for commercial agricultural land use.

6.4 Hydrogeology

6.4.1 Regional hydrogeology

The project area is situated on the Cape Flats Aquifer (CFA) which is a laterally extensive Quaternary sand aquifer formed by aeolian and marine-reworked sediments across the Cape Flats coastal plain between the Cape Peninsula and the mainland ranges; the aquifer is predominantly unconfined, with high primary porosity and permeability that make it responsive to rainfall but susceptible to surface-derived contamination (Adelana, 2010).

6.4.2 Local hydrogeology

Groundwater recharge at the site is mapped at 51-75 mm/a (Figure 6-3), which represents the annual volume of rainfall that infiltrates through the soil profile to replenish the aquifer. This recharge rate indicates a moderate degree of infiltration, consistent with the sandy soils of the Cape Flats, which allow effective percolation of water. Moderate recharge implies that



the aquifer is actively replenished and that infiltrating water can act as a transport medium for potential contaminants introduced at surface or near-surface levels.

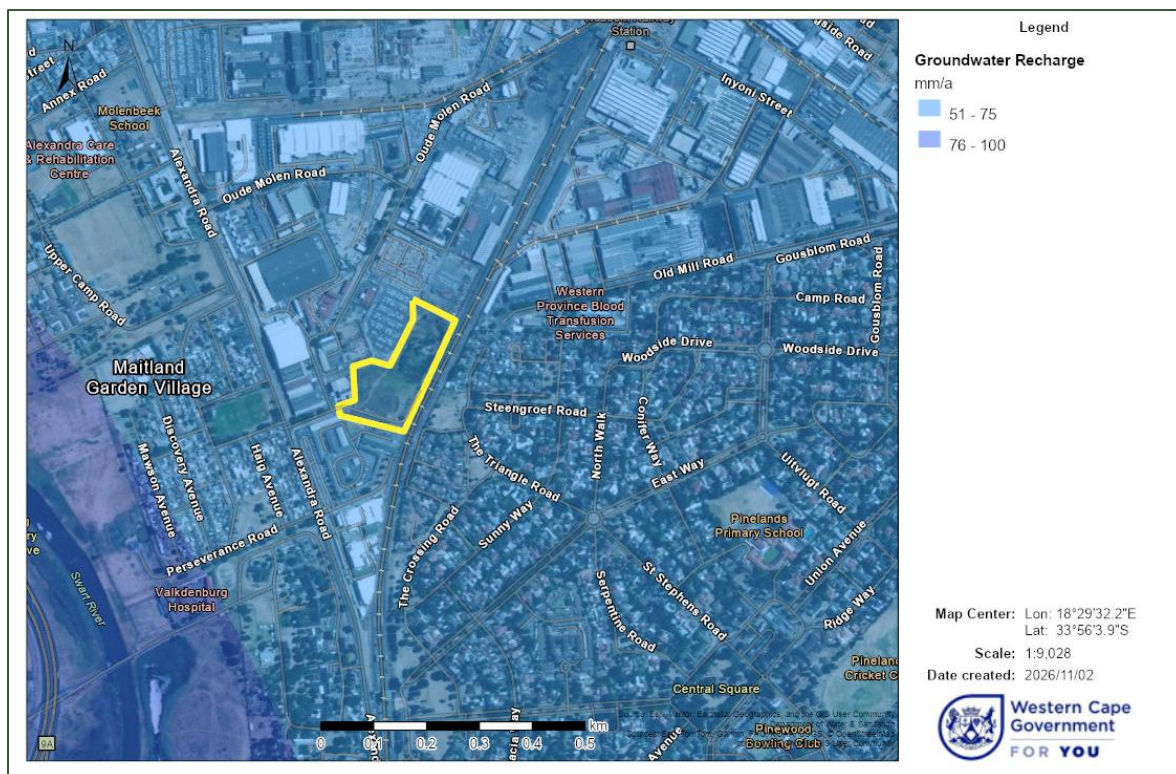


Figure 6-3: Groundwater Recharge

Source: CapeFarm Mapper, 2026.

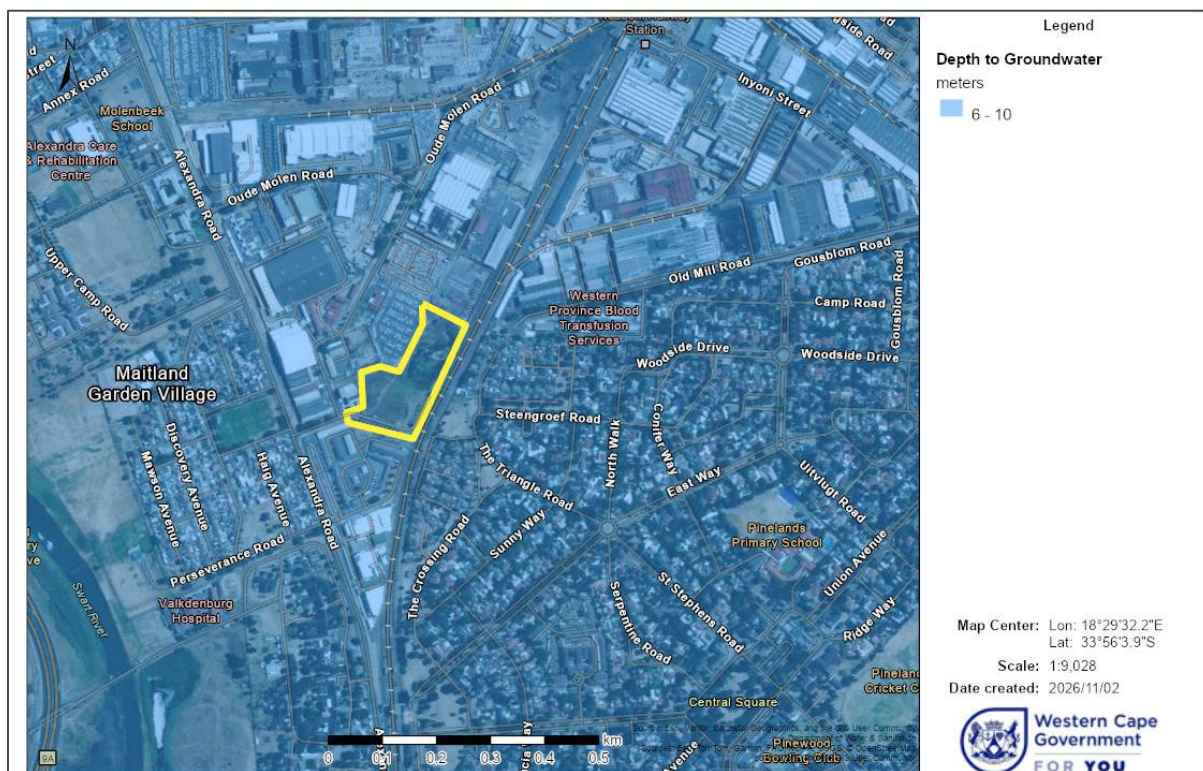


Figure 6-4: Depth to Groundwater

Source: CapeFarm Mapper, 2026.

The depth to groundwater at the site ranges between 6 and 10 metres below ground level as seen in. This reflects a shallow water table, typical of the CFA, where groundwater levels are generally close to the surface due to the flat topography and high permeability of the sandy substrate. A shallow water table reduces the vertical buffer between surface activities and groundwater, increasing the sensitivity of the aquifer to contamination. It also means that any downward migration of pollutants may reach groundwater relatively quickly, particularly in areas where the surface soils are highly permeable.

According to the vulnerability mapping included in Figure 6-5, the area surrounding the site is classified as “most vulnerable” in terms of the tendency or likelihood for contamination to reach groundwater after introduction at the surface. This classification reflects:

- the high permeability of the Cape Flats sands,
- the shallow depth to groundwater, and
- the limited natural attenuation capacity (e.g., limited clay layers or adsorption potential).

The vulnerability mapping shows that the aquifer in this area can receive contaminants rapidly under a wide range of pollution scenarios, with only strongly adsorbed or rapidly transformed pollutants experiencing reduced mobility. The site falls within a Major Aquifer Region, indicating a high-yielding system of good water quality as mapped under South Africa’s national aquifer classification system (Figure 6-6). This classification reflects both the importance of the aquifer for regional water supply and its hydrogeological significance. Major aquifers are typically prioritised for protection due to their strategic value and their role in supporting municipal and industrial water demand.

However, the mapping of the aquifer yield in the vicinity of the site are estimated at 0.1-0.5 l/s based on intergranular flow conditions. This range reflects the typical yields associated with unconsolidated sandy aquifers, where groundwater is stored and transmitted through pore spaces between grains. Such yields fall within the low to moderate category for South African aquifers, indicating that individual boreholes may supply small but reliable volumes of water suitable for limited industrial or backup use. The modest yield is characteristic of the fine- to medium-grained sands underlying the area.

Despite these moderate yields, the aquifer remains highly responsive to recharge and potential contamination due to its unconfined nature and high permeability, consistent with its classification as both highly vulnerable and part of a Major Aquifer Region.



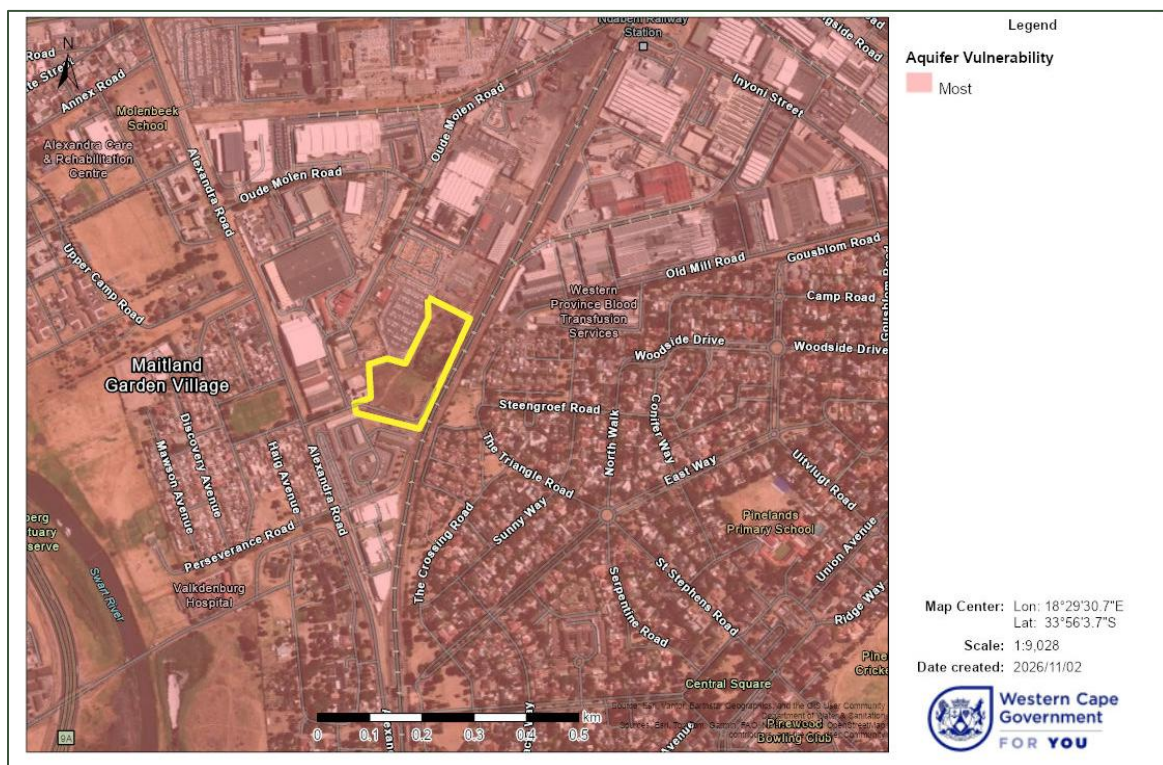


Figure 6-5: Aquifer vulnerability at proposed site

Source: CapeFarm Mapper, 2026.

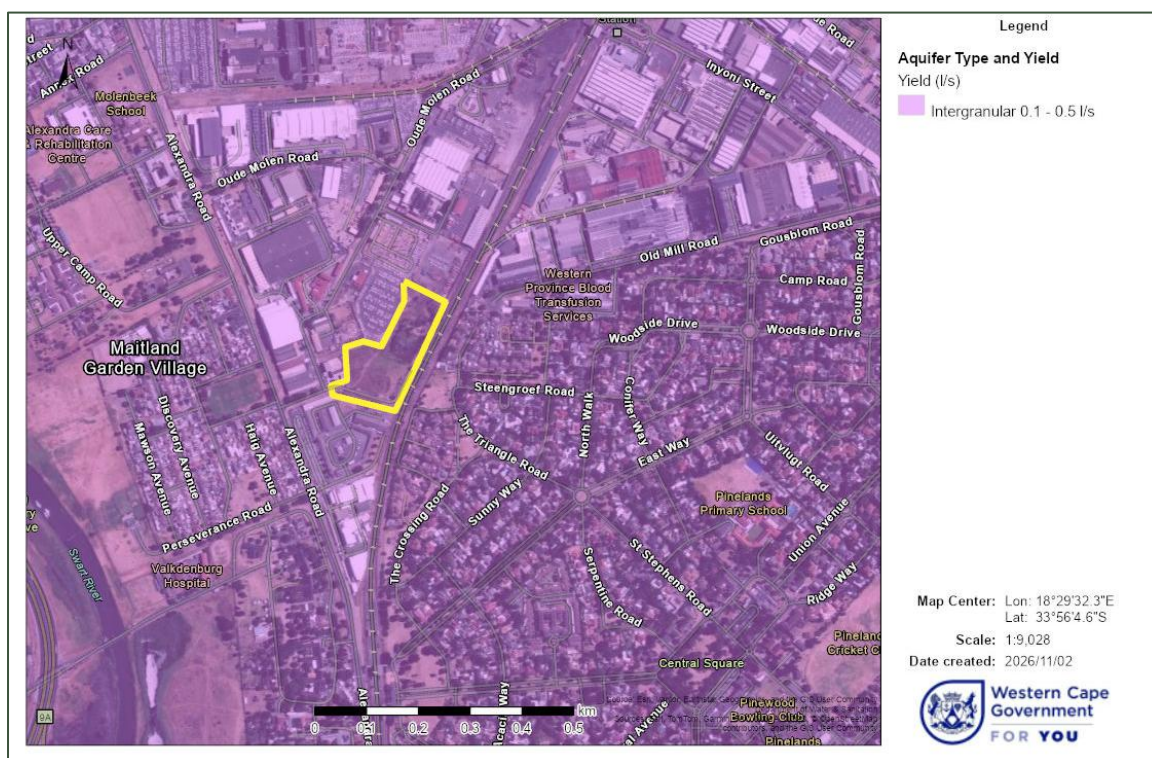


Figure 6-6: Groundwater yield

Source: CapeFarm Mapper, 2026.



6.5 Hydrology

The proposed development site is located within the Berg–Olifants Water Management Area (WMA), which includes the G1 and G2 secondary drainage regions. These regions encompass a range of surface and groundwater systems across the City of Cape Town, including the Cape Flats Aquifer, the Diep, Kuils, Eerste and Lourens Rivers, and associated sub-catchments. The closest surface-water feature to the proposed project site is the Black River, located approximately 700 m south-west of the project area. The Black River is a perennial urban river, maintaining flow throughout the year due to stormwater inputs and the Western Cape's winter-rainfall regime Figure 6-7.

The Mean Annual Runoff (MAR) at the site is estimated at 101-150 mm per year, indicating a relatively modest natural surface-water yield typical of Cape Town's low-lying urban catchments. Although the wider Berg-Olifants system includes estuaries and several natural wetlands identified as NFEPA freshwater priority areas, these features occur far from the proposed site and there is no direct hydrological connection to the project area. The area between the site and the Black River is fully built-up, consisting of light industrial, commercial and residential land uses, which limits natural drainage pathways and confines surface flows primarily to engineered stormwater systems.

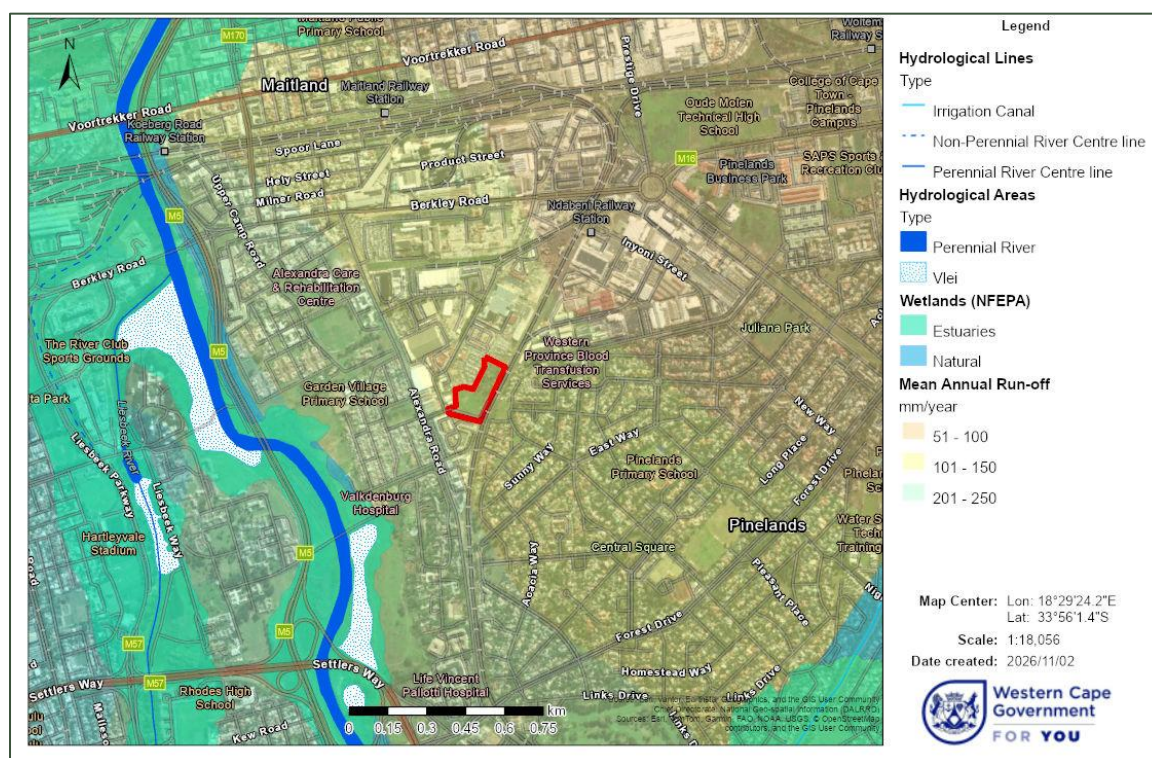


Figure 6-7: Map of Hydrological Features around the Proposed Site

Source: CapeFarm Mapper, 2026.

6.6 Air quality

An overview of the available air quality data for the proposed development is sourced primarily from the baseline monitoring undertaken by the Air Quality specialist from SLR Consulting (SLR Consulting , 2025a) and has been included below.



6.6.1 Regional Ambient Air Quality

Regional air quality was characterised using data from the Maitland and Athlone South African Air Quality Information System (SAAQIS) monitoring stations, located approximately 2.7 km northeast and 3.1 km southeast of the project site. Their proximity is shown in Figure 6-8 below.

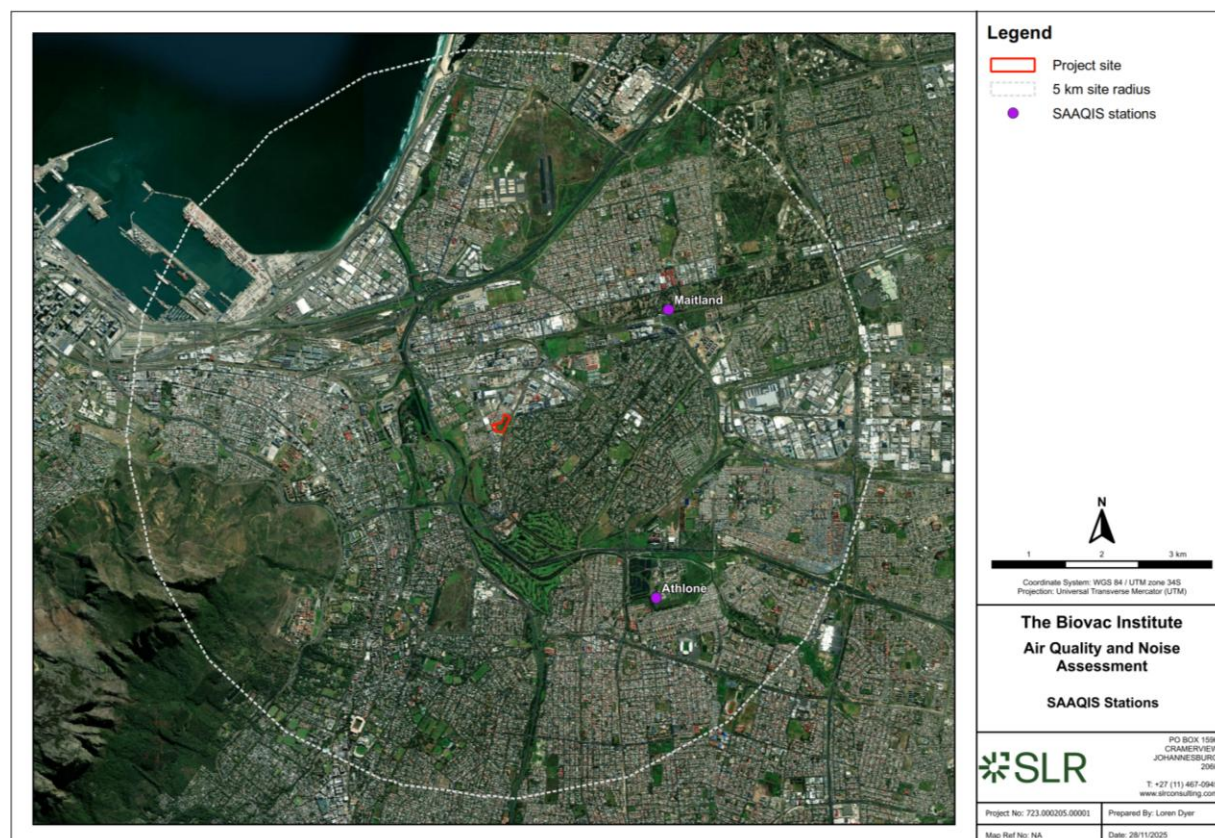


Figure 6-8: Proximity of SAAQIS reporting ambient air quality monitoring stations

A consolidated summary of data recovery, annual averages and exceedance counts for January 2022–December 2024 is provided in Table 6-1, with hourly and daily distributions illustrated in Figures 6-9 to 6-19. These datasets indicate that annual average concentrations of NO₂, SO₂ and CO complied with the National Ambient Air Quality Standards (NAAQS), whereas PM₁₀ and PM_{2.5} typically exceeded the more stringent WHO annual guidelines while remaining within NAAQS. Episodic short term WHO exceedances were observed- for NO₂ and SO₂; NAAQS short term limits were rarely exceeded.



Table 6-1: SAAQIS data recovery and NAAQS exceedance summary (2022 - 2024)

SAAQIS Station		Maitland			Athlone		
Managed by		Western Cape Province			City of Cape Town Municipality		
Latitude (°S)		-33.920444			-33.955861		
Longitude (°E)		18.515947			18.513111		
Distance from Project site (km)		2.7			3.1		
Direction from Project site		NE			SE		
Pollutant	Year	2022	2023	2024	2022	2023	2024
NO ₂	Data recovery	83.9%	76.9%	93.6%	Not measured		
	No. of 1-hour NAAQS / WHO AQG exceedances	0	0	0			
	No. of 24-hour WHO AQG exceedances	36	64	41			
	Annual average (µg/m³)	14.1	16.7	14.0			
	Graph	Figure 6-9 (1-hour) and Figure 6-10 (24-hour)					
SO ₂	Data recovery	69.8%	42.2%	64.3%	52.0%	31.6%	35.6%
	No. of 1-hour NAAQS exceedances	0	1	0	1	3	0
	No. of 24-hour NAAQS exceedances	0	1	0	0	7	0
	No. of 24-hour WHO AQG exceedances	4	3	0	0	18	0
	Annual average (µg/m³)	3.0	7.2	7.2	1.3	18.7	9.7
	Graph	Figure 6-11 (1-hour) and Figure 6-13 (24-hour)			Figure 6-12 (1-hour) and Figure 6-14 (24-hour)		
CO	Data recovery	64.7%	76.6%	92.5%	Not measured		
	No. of 1-hour NAAQS exceedances	0	0	0			
	No. of 1-hour WHO AQG exceedances	0	0	0			
	No. of 8-hour NAAQS / WHO AQG exceedances	0	0	0			
	No. of 24-hour WHO AQG exceedances	0	0	0			
	Graph	Figure 6-15 (1-hour), Figure 6-16 (8-hour) and Figure 6-17 (24-hour)					
PM ₁₀	Data recovery	76.7%	74.1%	86.3%	Not measured		
	No. of 24-hour NAAQS exceedances	0	0	0			
	No. of 24-hour WHO AQG exceedances	10	12	4			
	Annual average (µg/m³)	18.2	20.1	21.8			
	Graph	Figure 6-18 (24-hour)					
PM _{2.5}	Data recovery	78.8%	72.4%	88.1%	Not measured		
	No. of 24-hour NAAQS exceedances	0	0	0			
	No. of 24-hour WHO AQG exceedances	4	23	23			
	Annual average (µg/m³)	3.6	6.5	6.6			
	Graph	Figure 6-19 (24-hour)					
Notes: Orange - Below SANAS 90% data recovery requirement Red - Exceeds short-term NAAQS or WHO AQG permitted frequency of exceedance							



SAAQIS Station		Maitland			Athlone		
Managed by		Western Cape Province			City of Cape Town Municipality		
Latitude (°S)		-33.920444			-33.955861		
Longitude (°E)		18.515947			18.513111		
Distance from Project site (km)		2.7			3.1		
Direction from Project site		NE			SE		
Pollutant	Year	2022	2023	2024	2022	2023	2024
Red fill	- Exceeds annual NAAQS						
Orange	- Exceeds annual WHO AQG						

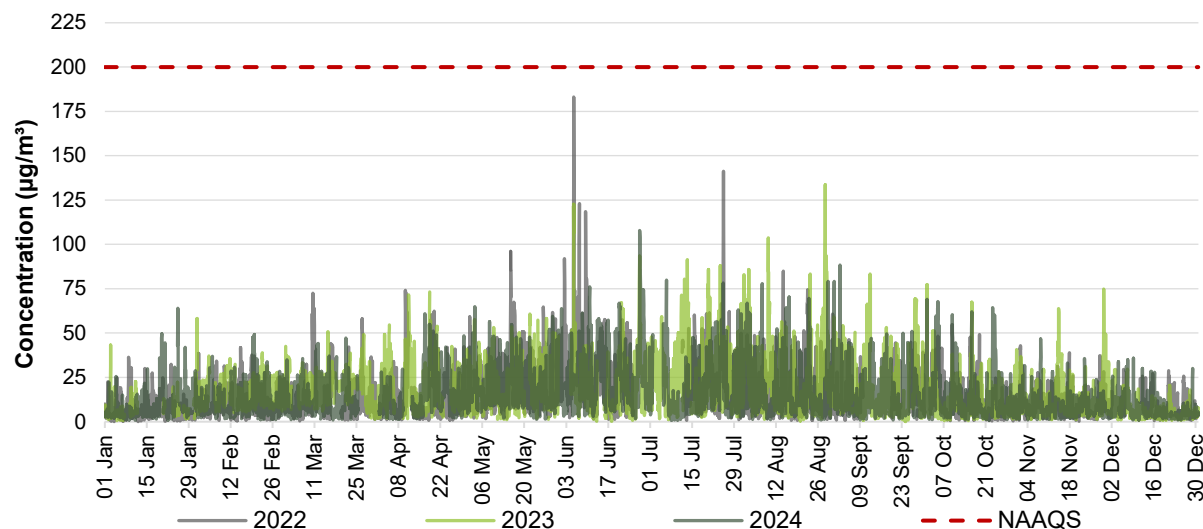


Figure 6-9: Maitland - 1-hour average NO₂ concentrations (Jan 2022 - Dec 2024)

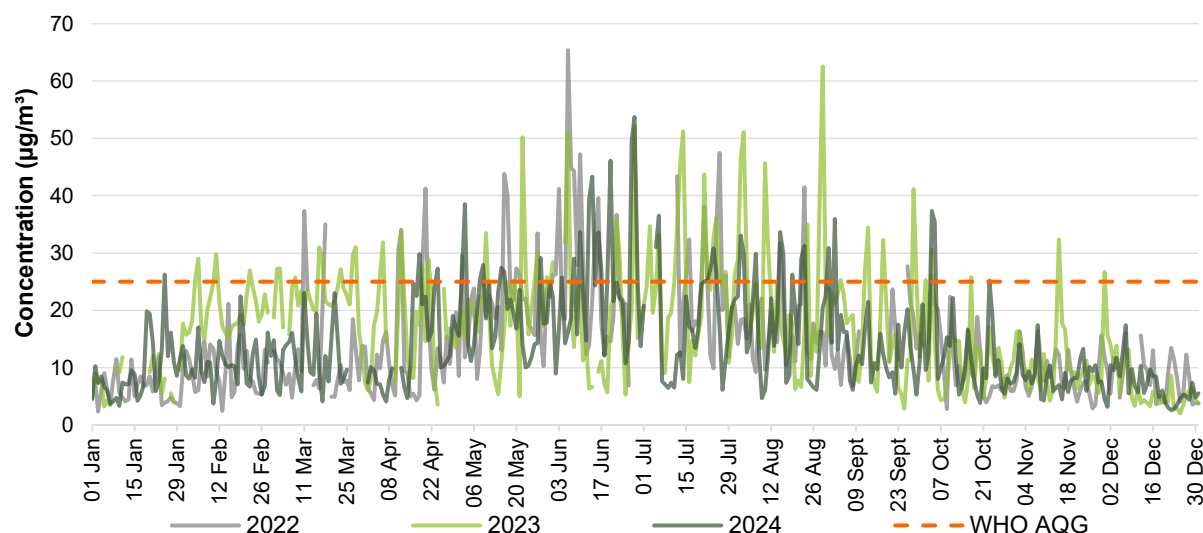


Figure 6-10: Maitland - 24-hour average NO₂ concentrations (Jan 2022 - Dec 2024)



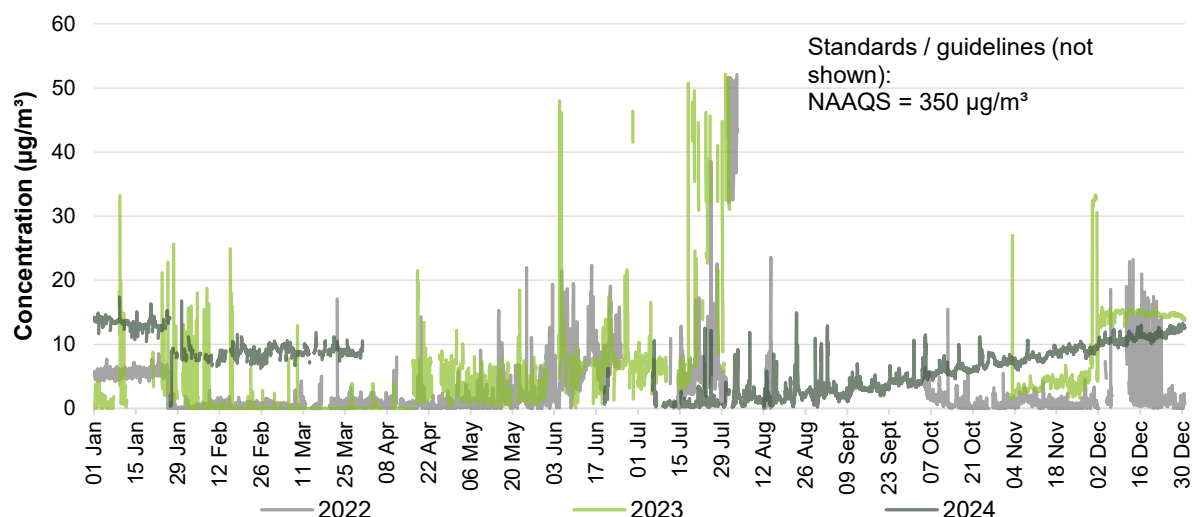


Figure 6-11: Maitland - 1-hour average SO₂ concentrations (Jan 2022 - Dec 2024)

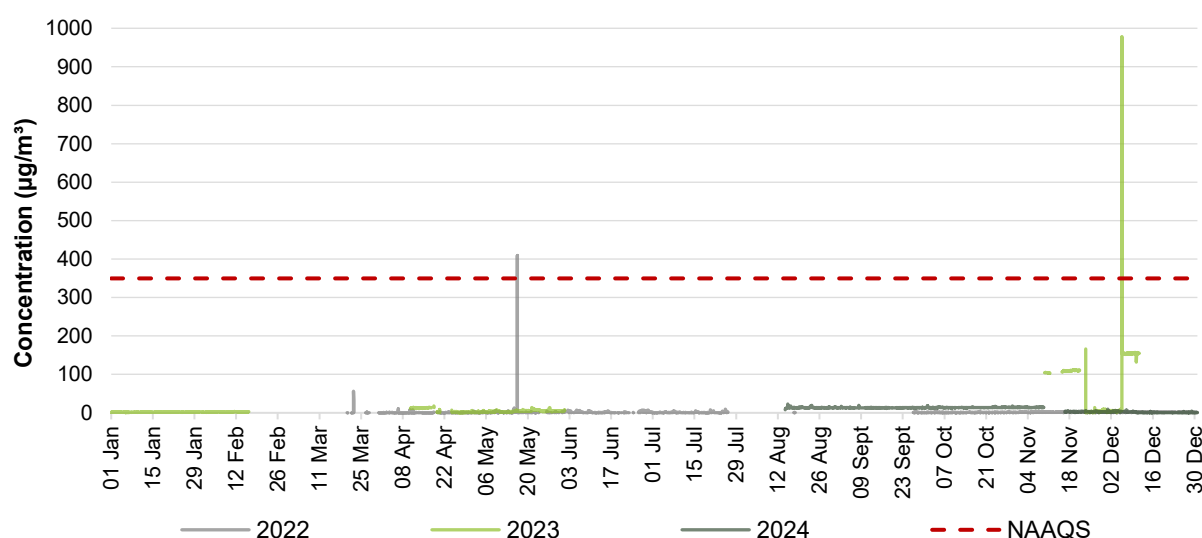


Figure 6-12: Athlone - 1-hour average SO₂ concentrations (Jan 2022 - Dec 2024)

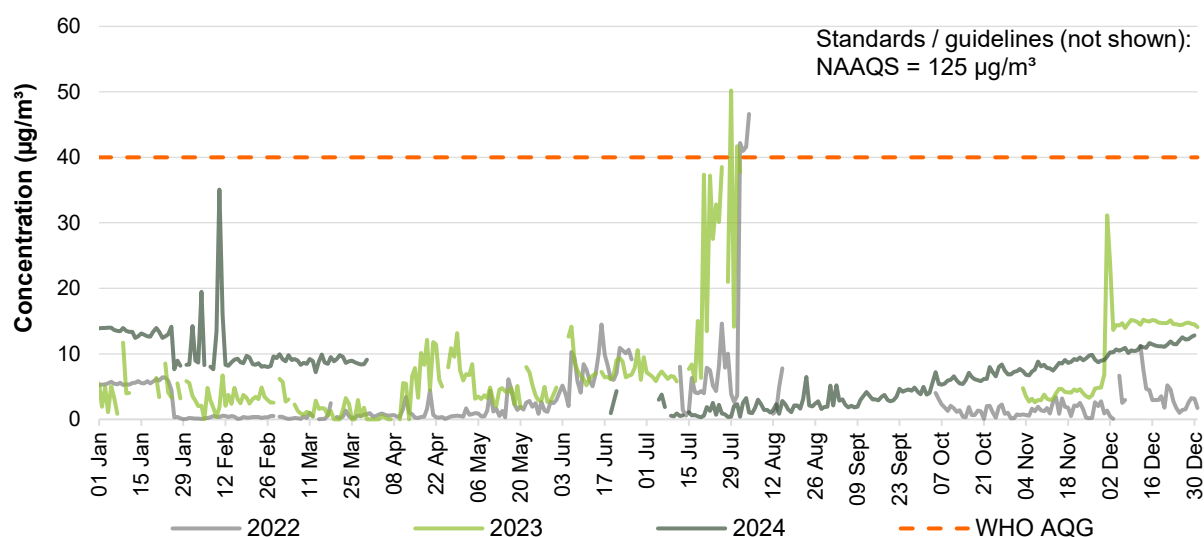


Figure 6-13: Maitland - 24-hour average SO₂ concentrations (Jan 2022 - Dec 2024)



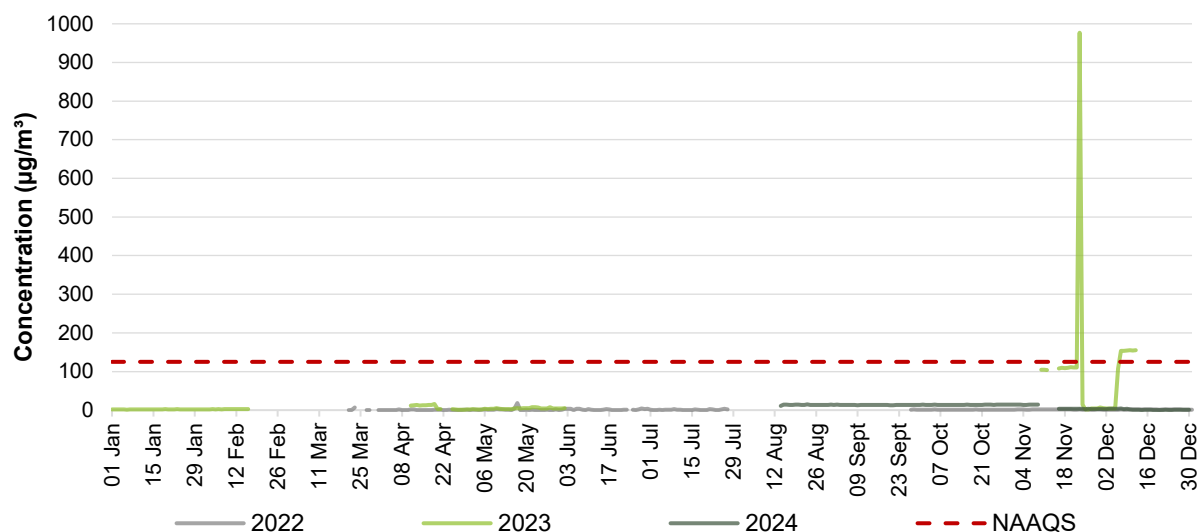


Figure 6-14: Athlone - 24-hour average SO₂ concentrations (Jan 2022 - Dec 2024)

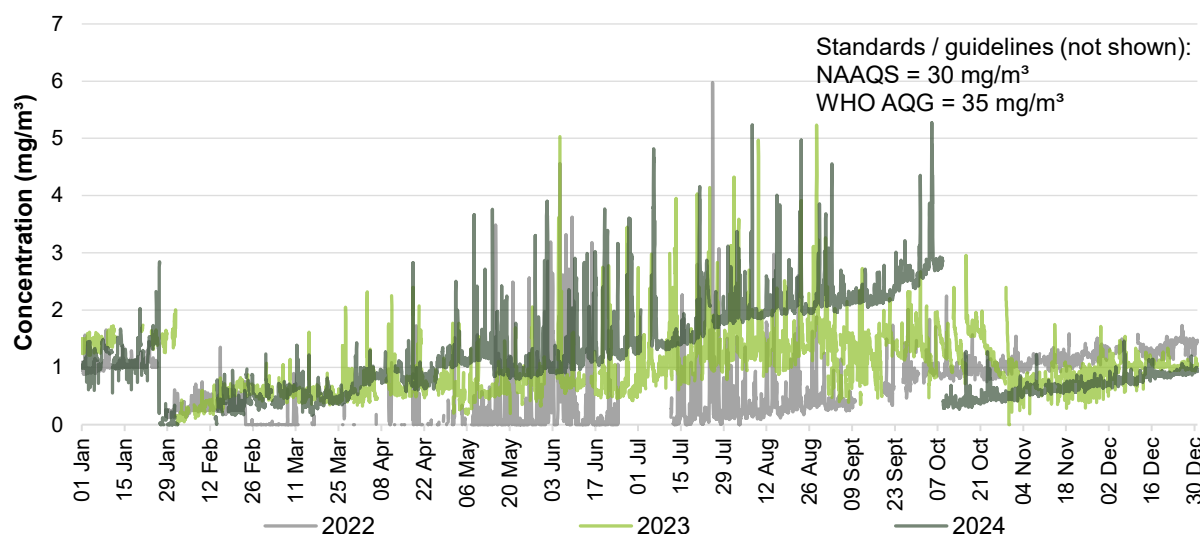


Figure 6-15: Maitland - 1-hour average CO concentrations (Jan 2022 - Dec 2024)

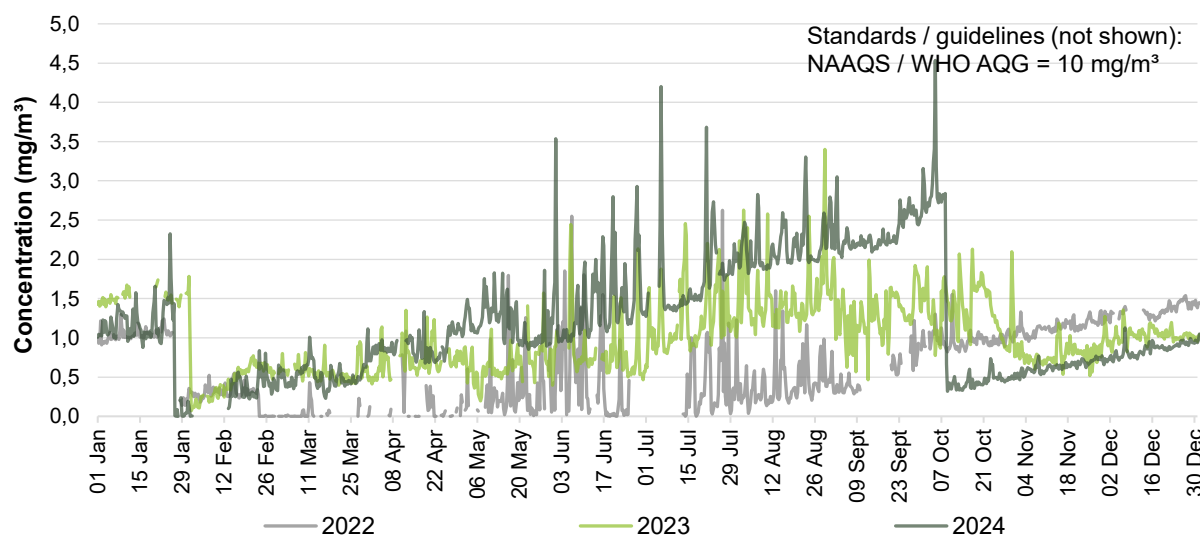


Figure 6-16: Maitland - 8-hour average CO concentrations (Jan 2022 - Dec 2024)

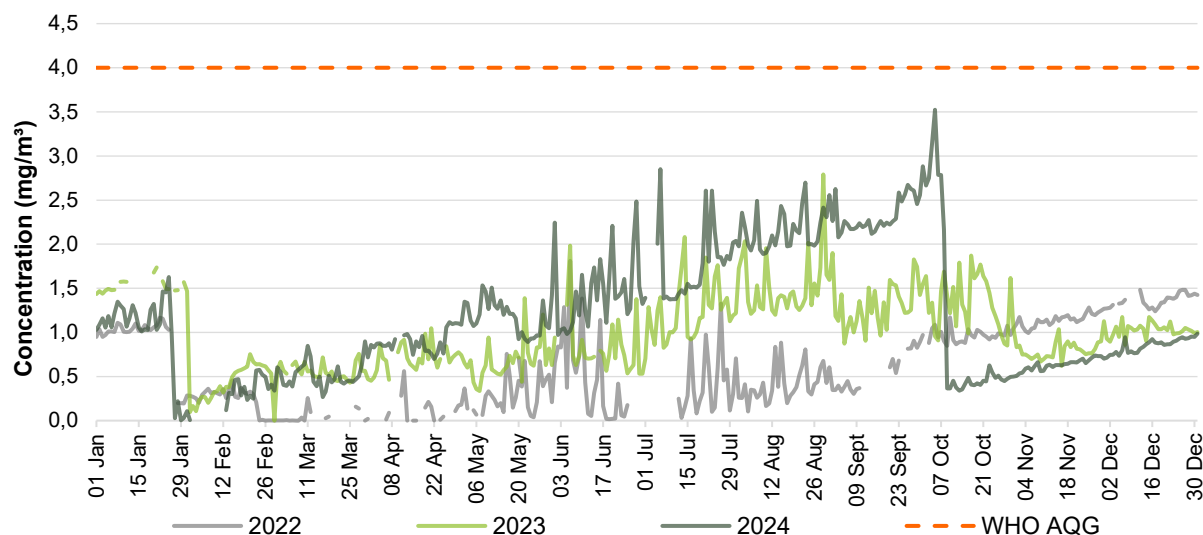


Figure 6-17: Maitland - 24-hour average CO concentrations (Jan 2022 - Dec 2024)

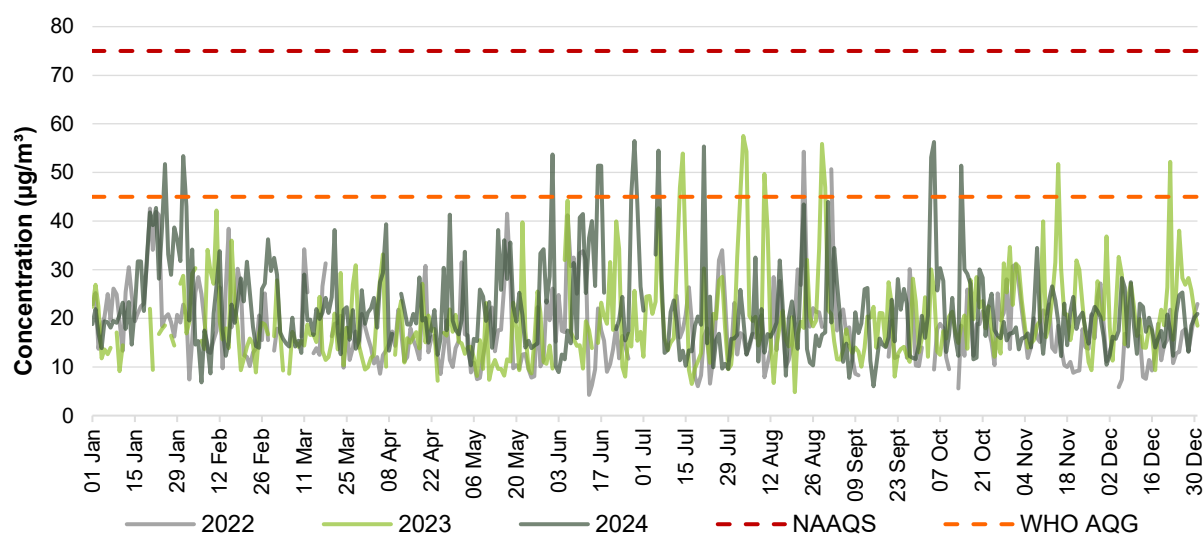


Figure 6-18: Maitland - 24-hour average PM₁₀ concentrations (Jan 2022 - Dec 2024)



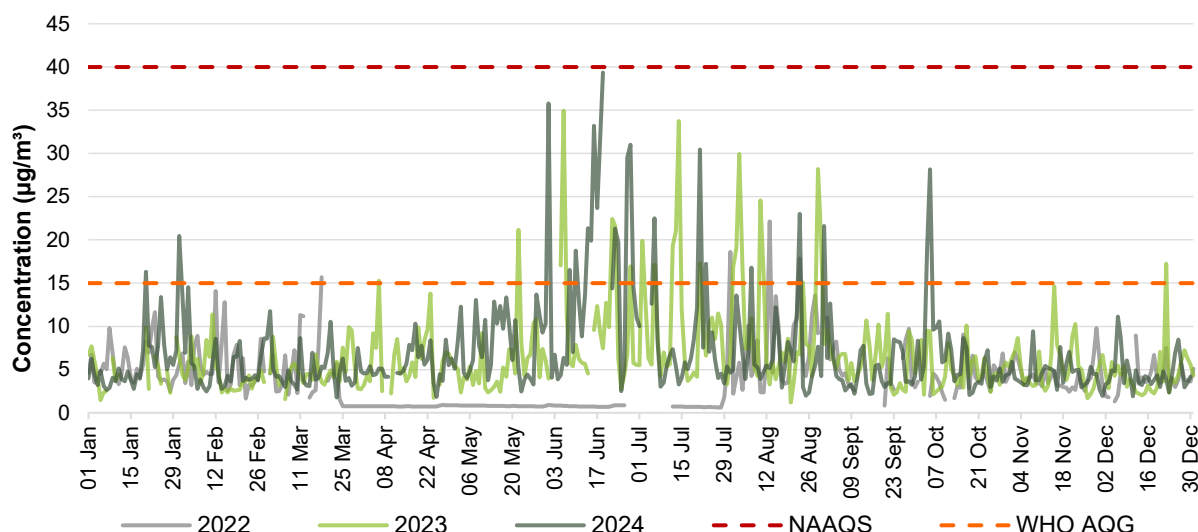


Figure 6-19: Maitland - 24-hour average PM_{2.5} concentrations (Jan 2022 - Dec 2024)

6.6.2 Sensitive Receptors and Emission Context

The site lies within an established urban–industrial corridor with nearby residential neighbourhoods and mixed commercial/industrial uses. Proximate receptors within 5 km include Pinelands and surrounding communities, as presented in Figure 6-20, with nearby emission sources such as transport corridors, industrial areas and municipal facilities. This setting is typical of the Cape Town metro and informs the interpretation of measured baseline concentrations and dispersion behaviour.



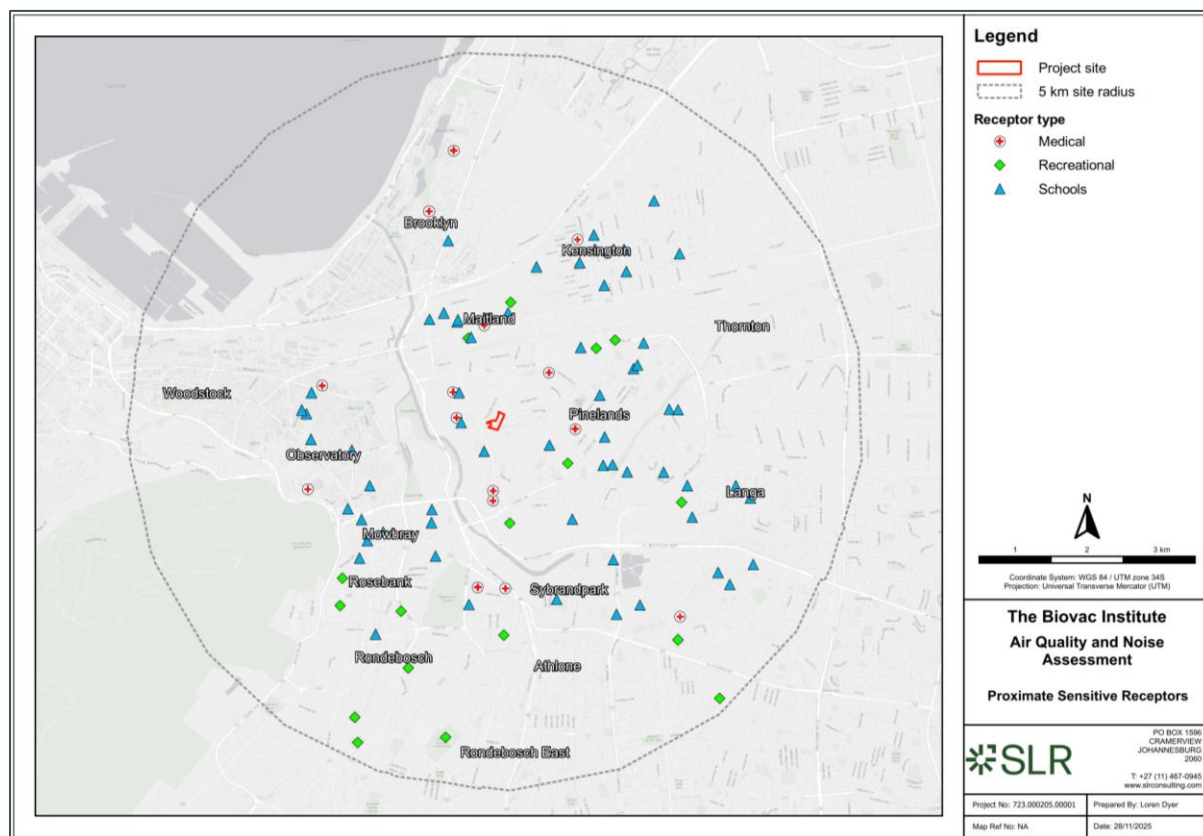


Figure 6-20: Proximity of Sensitive Receptors

6.6.3 Local Meteorology and Dispersion Potential

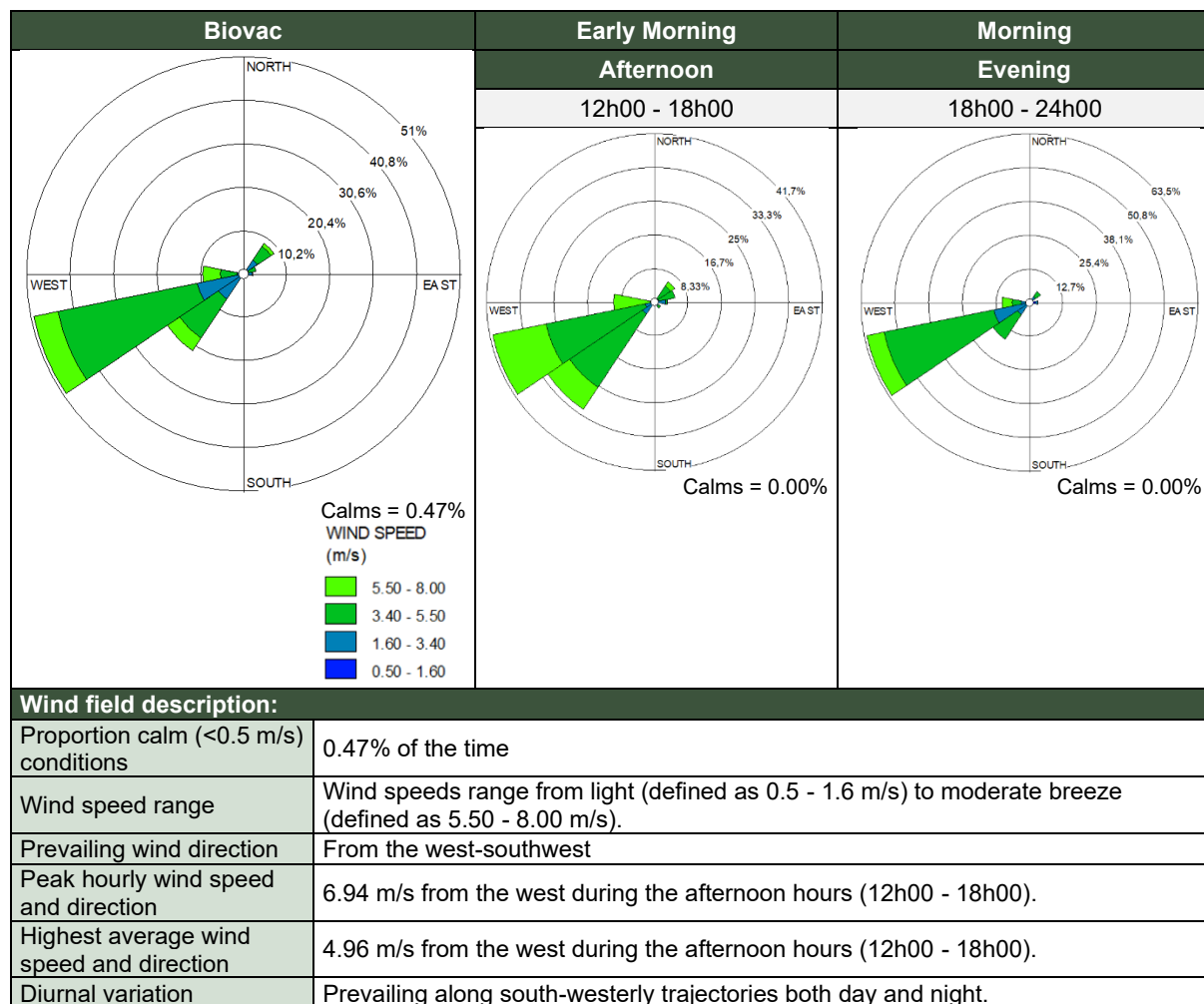
Meteorological conditions during the monitoring campaign (15 December 2025 to 15 January 2026) were characterised by predominantly west-southwesterly winds with speeds between 0.5 and 8 m/s, infrequent calm periods, no rainfall, and an average temperature of 23.4 °C.

Table 6-2 summarises the wind field and presents the diurnal wind roses for early morning, morning, afternoon and evening periods. These conditions are typical of summer in Cape Town and favour the dispersion and dilution of air pollutants, supporting the representativeness of the site measurements obtained during this period.

Table 6-2: Wind field description and wind rose chart for the monitoring period

Biovac	Early Morning	Morning
15/12/2025 - 15/01/2026	00h00 - 06h00	06h00 - 12h00
	Calms = 1.20%	Calms = 0.40%





6.6.4 Site Specific Monitoring Network

To characterise local conditions at the boundary, SLR deployed monitoring at two fenceline locations: FL1 (southern corner) and FL3 (northern fenceline), as shown in Figure 6-21. Passive samplers at FL1 and FL3 measured NO₂, SO₂, NH₃ and BTEX compounds over two consecutive ~14-day exposures (11 December 2025 - 7 January 2026). A Dustroid Pro analyser at FL3 continuously measured PM_{2.5} and PM₁₀ from 15 December 2025 to 15 January 2026, achieving 99% data recovery.



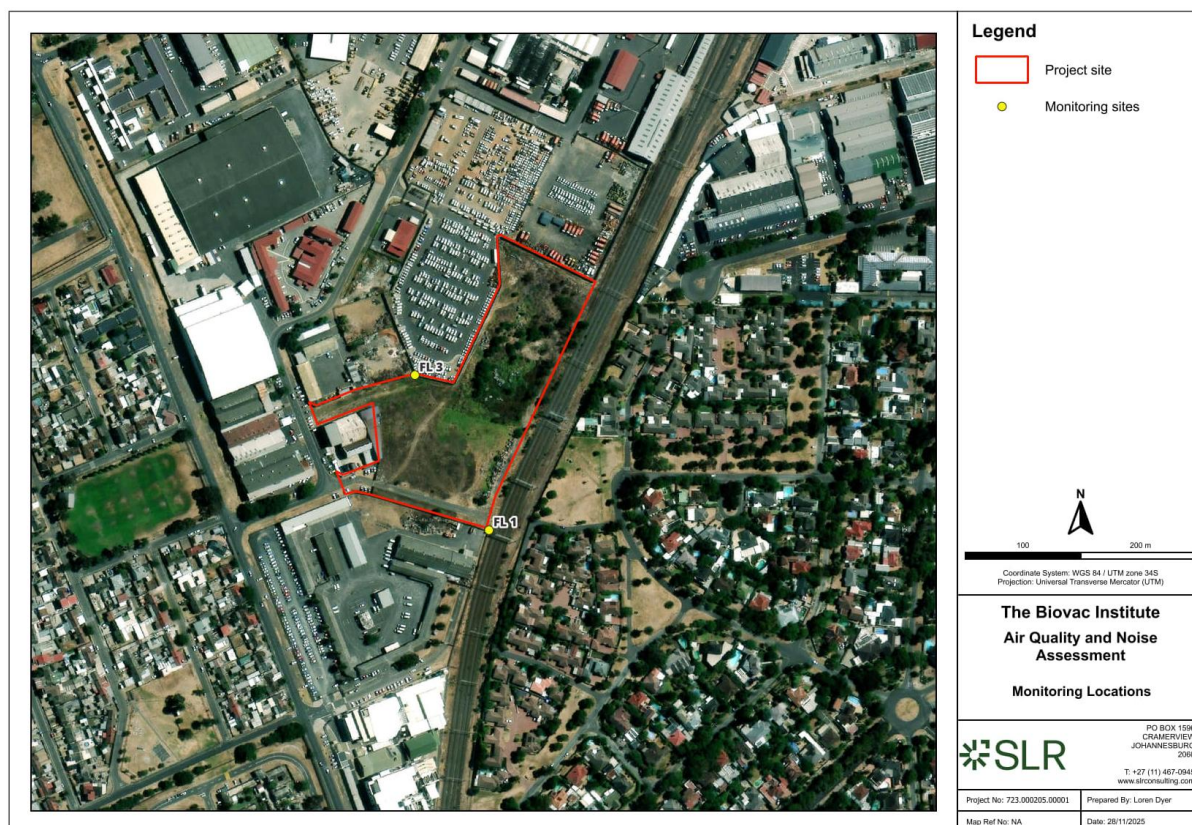


Figure 6-21: Monitoring Locations

6.6.5 Particulate Matter

Continuous particulate measurements indicate low to moderate concentrations consistent with urban background levels. As summarised in Table 6-3 and illustrated in Figure 6-22, no 24-hour NAAQS or WHO/IFC guideline exceedances were recorded during the monitoring period. Period-average concentrations complied with the national annual standards but were above the WHO annual guidelines; given that the WHO annual values are chronic exposure benchmarks, this outcome is conservative when assessed against a one-month summer dataset and does not indicate elevated particulate loading at the site.

Table 6-3: Ambient PM summary for the period 15th December 2025 - 15th January 2026

PM size fraction	Data recovery (%)	Period average concentration ($\mu\text{g}/\text{m}^3$)	99 th percentile 24-hour average ($\mu\text{g}/\text{m}^3$)	No. of 24-hour NAAQS exceedances	No. of 24-hour IFC/WHO AQG exceedances
PM _{2.5}	99%	5.41	12.48	0	0
PM ₁₀	99%	11.10	23.92	0	0
Notes:					
Orange - Below SANAS 90% data recovery requirement					
Red - Exceeds NAAQS permitted number of exceedances					



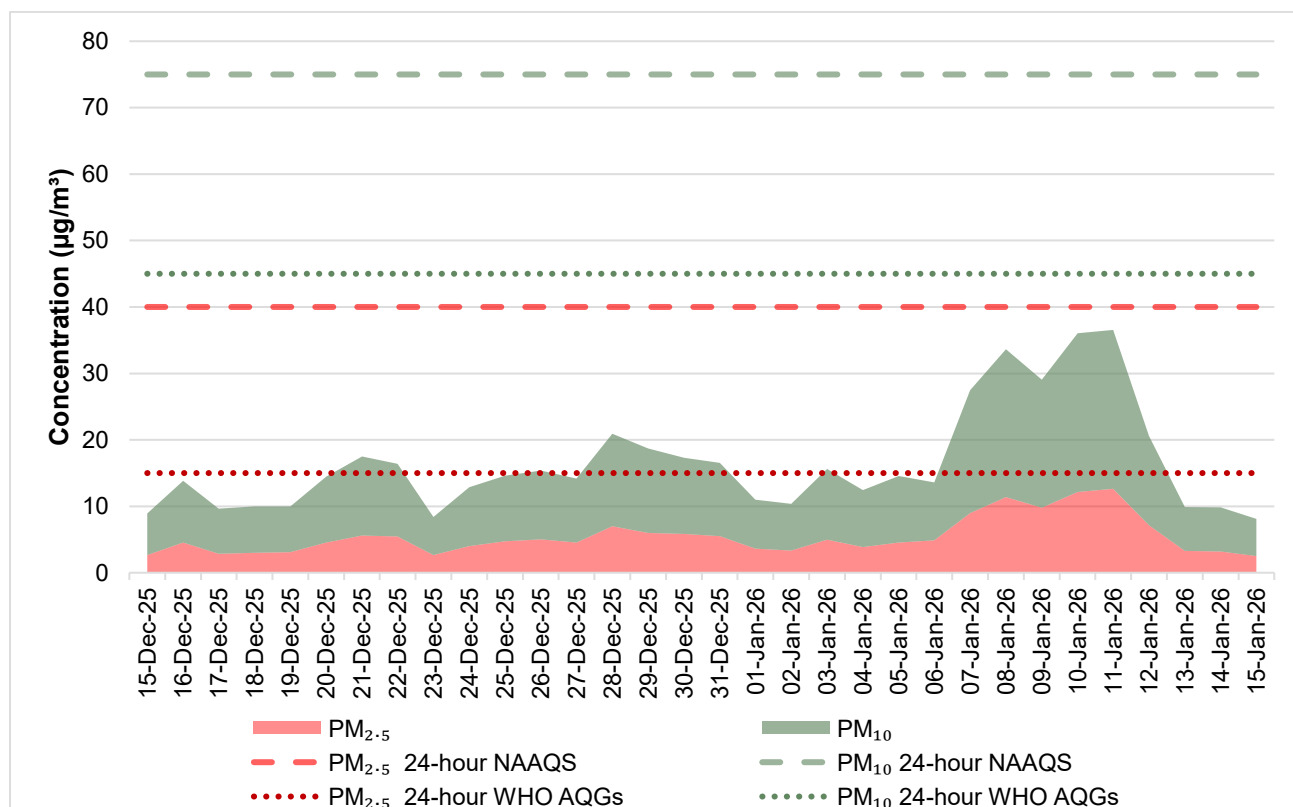


Figure 6-22: Measured PM2.5 and PM10 concentrations (µg/m³)

6.6.6 Gaseous Pollutants and VOCs

Passive monitoring results at the fenceline confirm very low gaseous concentrations. SO₂ levels were well below the annual NAAQS (see Table 6-4 and Figure 6-23) and NO₂ concentrations at both locations remained well below the annual NAAQS of 40 µg/m³ and under the WHO annual guideline (see Table 6-5 and Figure 6-24). NH₃ concentrations were minimal and substantially below international long-term screening levels, as summarised in Table 6-6 and Figure 6-25.

Benzene was measured well within the 5 µg/m³ annual NAAQS (Table 6-7 and Figure 6-26). Other VOCs (toluene, ethylbenzene and xylenes) were consistently recorded at very low concentrations, far below recognised health-based screening thresholds with results provided in Table 6-8, Figure 6-27 and Figure 6-28. Slightly higher values at FL3 are consistent with prevailing winds; absolute concentrations nevertheless remained low.

Table 6-4: Measured SO₂ concentrations (µg/m³)

		Phase 1	Phase 2	Survey Average
Period		11/12/2025 - 23/12/2025	23/12/2025 - 07/01/2025	11/12/2025 - 07/01/2025
Site ID	FL1	0.31	0.66	0.49
	FL3	<0.02	0.63	0.63



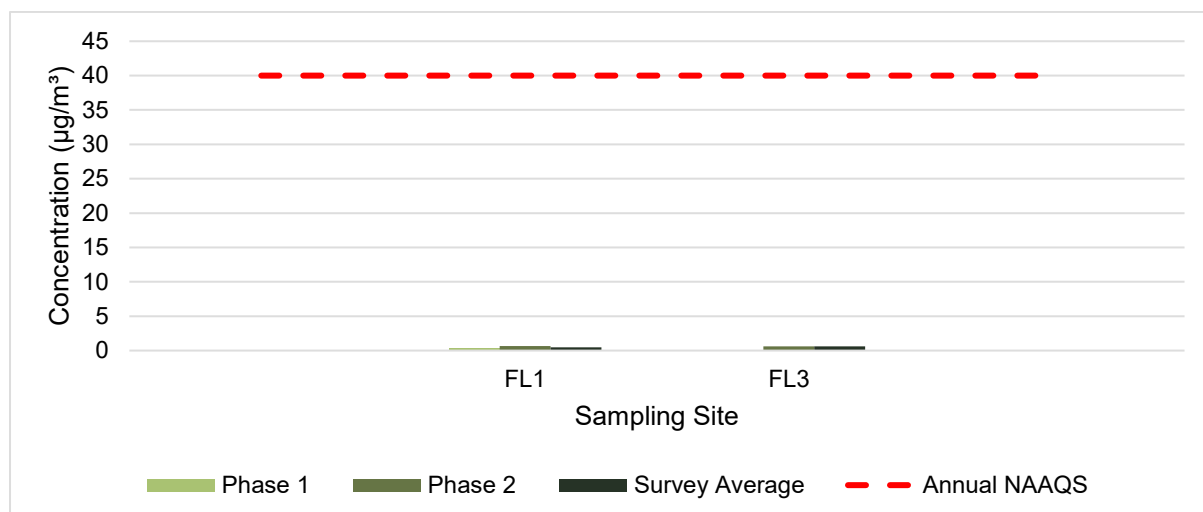


Figure 6-23: Measured SO₂ concentrations (µg/m³)

Table 6-5: Measured NO₂ concentrations (µg/m³)

		Phase 1	Phase 2	Survey Average
Period		11/12/2025 - 23/12/2025	23/12/2025 - 07/01/2025	11/12/2025 - 07/01/2025
Site ID	FL1	4.24	4.38	4.31
	FL3	3.96	6.11	5.04

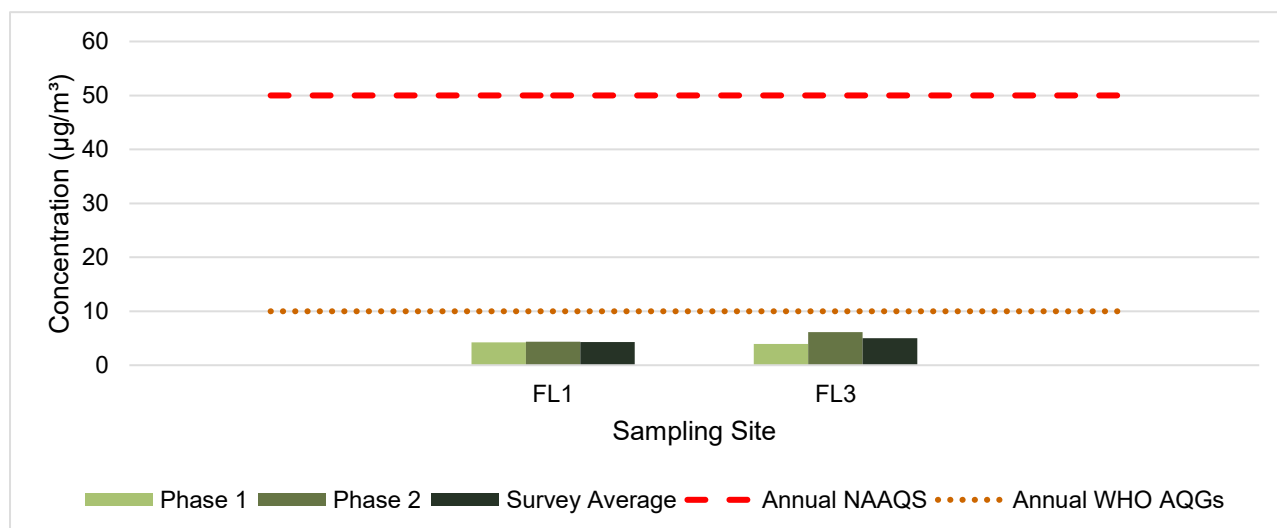


Figure 6-24: Measured NO₂ concentrations (µg/m³)

Table 6-6: Measured NH₃ concentrations (µg/m³)

		Phase 1	Phase 2	Survey Average
Period		11/12/2025 - 23/12/2025	23/12/2025 - 07/01/2025	11/12/2025 - 07/01/2025
Site ID	FL1	0.18	0.38	0.28
	FL3	0.18	0.41	0.30



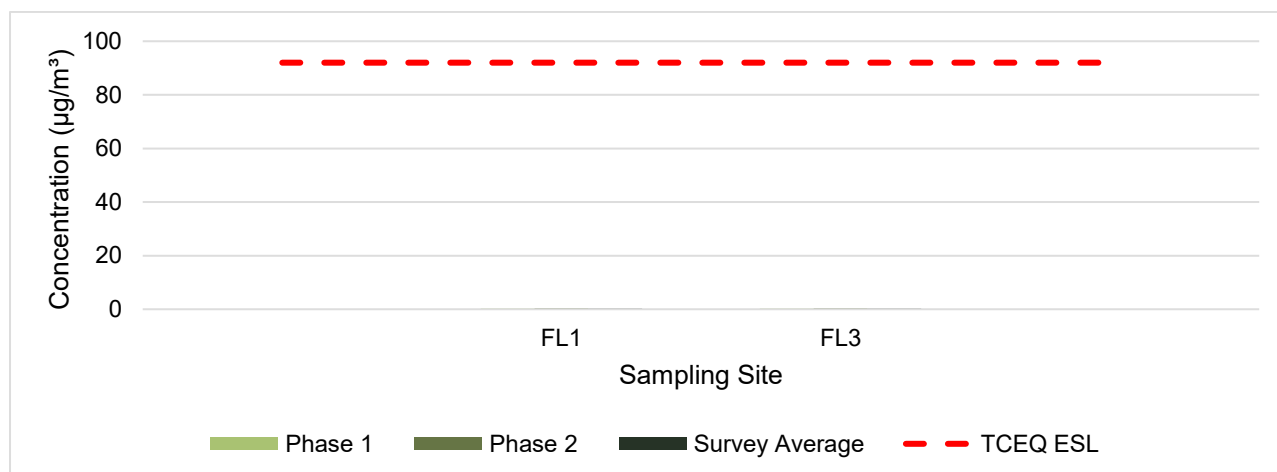


Figure 6-25: Measured NH₃ concentrations (µg/m³)

Table 6-7: Measured C₆H₆ concentrations (µg/m³)

		Phase 1	Phase 2	Survey Average
Period		11/12/2025 - 23/12/2025	23/12/2025 - 07/01/2025	11/12/2025 - 07/01/2025
Site ID	FL1	0.33	0.61	0.47
	FL3	0.41	0.64	0.53

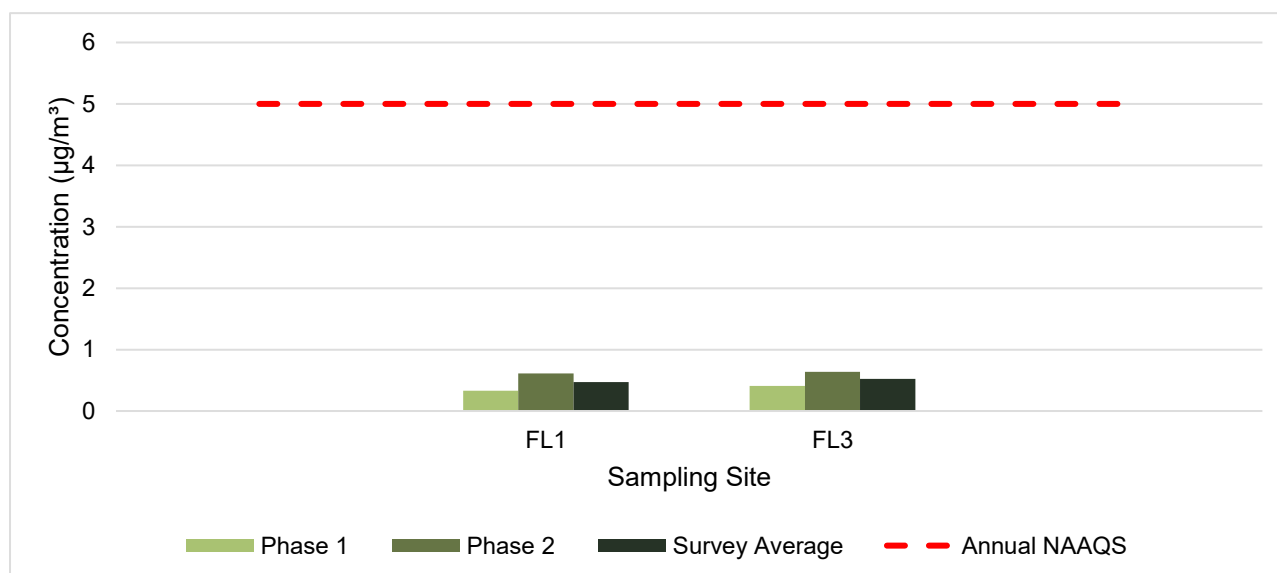


Figure 6-26: Measured C₆H₆ concentrations (µg/m³)

Table 6-8: Measured toluene, ethylbenzene, and xylene concentrations (µg/m³)

Site ID	Phase 1			Phase 2			Survey average		
	11/12/2025 - 23/12/2025			23/12/2025 - 07/01/2025			11/12/2025 - 07/01/2025		
	Toluene	Ethyl-benzene	Xylenes	Toluene	Ethyl-benzene	Xylenes	Toluene	Ethyl-benzene	Xylenes
FL1	0.68	<0.28	0.65	0.92	0.28	0.81	0.80	<0.28	0.73
FL3	0.63	<0.28	0.65	1	0.28	0.83	0.82	<0.28	0.74

Notes:



Site ID	Phase 1			Phase 2			Survey average		
	11/12/2025 - 23/12/2025			23/12/2025 - 07/01/2025			11/12/2025 - 07/01/2025		
	Toluene	Ethyl-benzene	Xylenes	Toluene	Ethyl-benzene	Xylenes	Toluene	Ethyl-benzene	Xylenes
For conservative health risk screening of xylenes, concentrations reported below the laboratory detection limit were assumed to be equal to the detection limit when calculating total compound concentrations.									

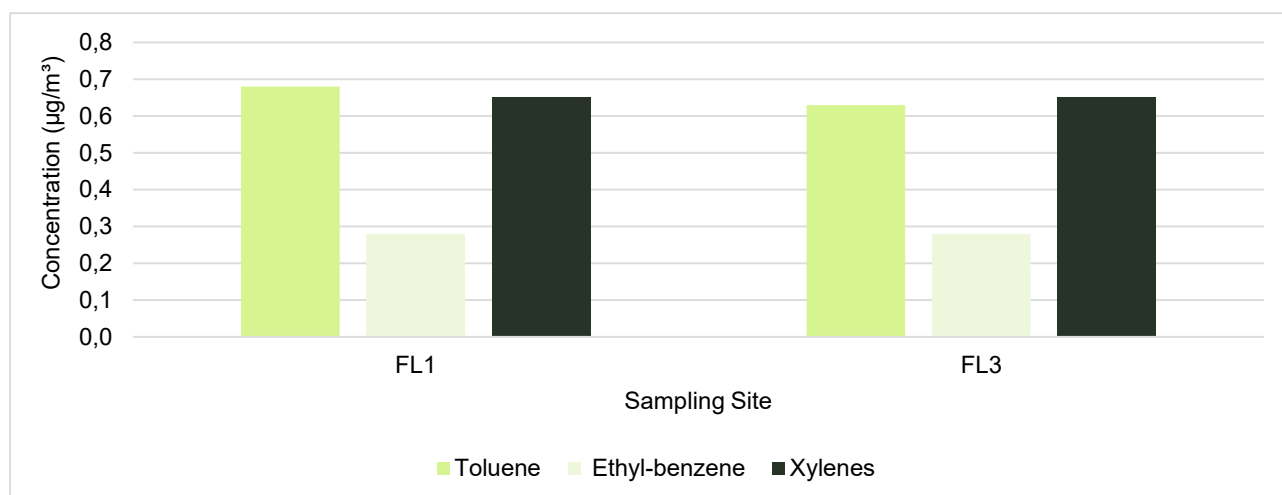


Figure 6-27: Measured toluene, ethylbenzene, and xylene concentrations (µg/m³) – phase one (11/12/2025 - 23/12/2025)

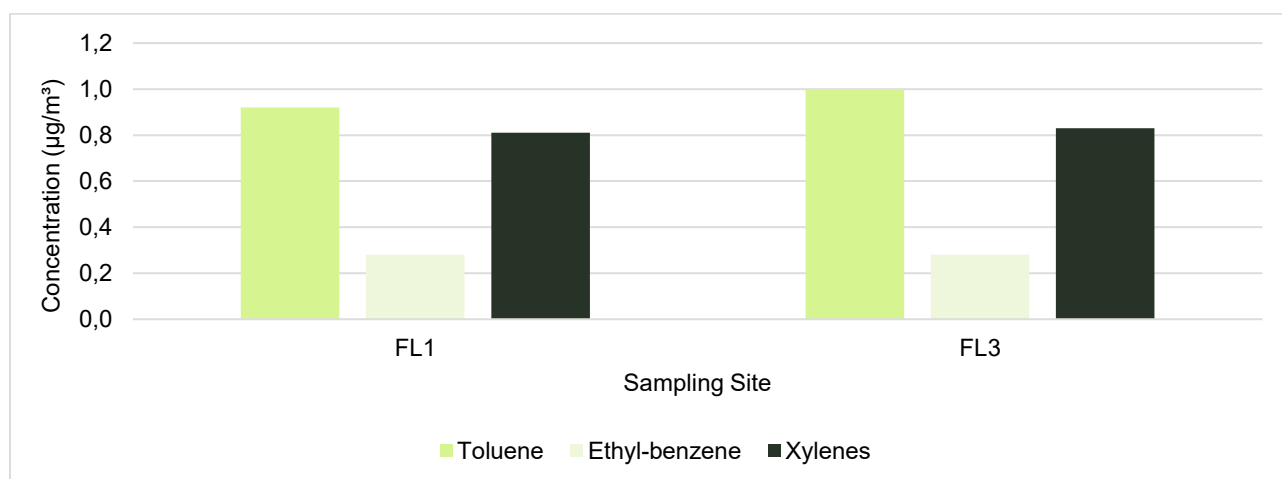


Figure 6-28: Measured toluene, ethylbenzene, and xylene concentrations (µg/m³) - phase two (23/12/2025 - 07/01/2025)

Based on the combined regional and site-specific datasets, the existing ambient air quality within the project area is of a generally acceptable standard. Regional monitoring indicates that particulate matter concentrations periodically exceed the WHO annual guidelines yet remain within the applicable South African National Ambient Air Quality Standards, a trend characteristic of the broader Cape Town metropolitan airshed. Site-specific measurements at the project boundary confirm that particulate matter, regulated gaseous pollutants and volatile organic compounds occur at low concentrations and are well within relevant national and international guideline values. No evidence of localised pollutant accumulation or elevated emission sources was observed during the monitoring period. Collectively, these findings demonstrate that the airshed exhibits adequate dispersion capacity under current conditions and provide a robust and representative baseline against which potential project-related emissions can be assessed.



6.7 Climate

The general climate of the Western Cape is categorised as a warm-summer Mediterranean climate ('Csb' according to the Köppen-Geiger climate classification system) (Rubel, 2026). Consequently, the region experiences low annual precipitation, warm, dry summers and mild, wet winters, and seasonal rainfall, which tends to be concentrated during the winter months. An overview of baseline climatic data for the broader area, primarily derived from the Climate Change Risk Assessment (CCRA) prepared by SLR (SLR Consulting, 2025b) is provided below. The CCRA highlights that a high-level assessment of this nature only made use of the

6.7.1 Temperature and Precipitation

Temperature data for the Western Cape Province indicate that the warmest temperatures are experienced from December to March (averages above 20 °C) while the coldest temperatures occur in June and July (averages below 13 °C).

Table 6-9: Monthly temperature summary (1991-2020), CCKP

Minimum, average and maximum average temperatures for the Western Cape, South Africa (1991-2020 dataset)												
Statistic	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Minimum	15.08	15.37	13.78	11.02	8.26	5.86	5.07	5.64	7.26	9.92	11.85	13.86
Average	22.28	22.52	20.83	17.79	14.68	12.02	11.43	12.13	14.14	17.01	18.95	21.03
Maximum	29.52	29.71	27.92	24.61	21.14	18.23	17.84	18.68	21.07	24.14	26.11	28.24

Rainfall data for the Western Cape Province records a Mean Annual Precipitation (MAP) value of 360.20 mm, 396.01 mm, and 393.98 mm for the 1991-2020, 1961-1990, and 1931-1960 periods respectively. The province receives most of its annual rainfall during the winter months spanning May-August. Mean annual precipitation appears to be declining with each successive historical period.

Table 6-10: Monthly rainfall totals for the 1931-1960; 1961-1990 and 1991-2020 periods

Monthly average precipitation (mm) for the Western Cape, South Africa (1931-1960;1961-1990;1991-2020 datasets)													
Period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
1931-1960	18.96	25.4	30.15	31.44	47.23	38.24	43.97	41.15	34.81	30.06	29.95	22.62	393.98
1961-1990	22.56	26.11	32.42	37.41	39.03	45.03	39.81	45.89	28.98	29.27	26.88	22.62	396.01
1991-2020	20.38	21.64	25.68	29.74	35.36	41.84	42.32	39.82	26.69	26.58	28.5	21.65	360.2

Figure 6-29 presents the average monthly temperature and rainfall for the Western Cape province for the most recent historical period spanning 1991 to 2020:



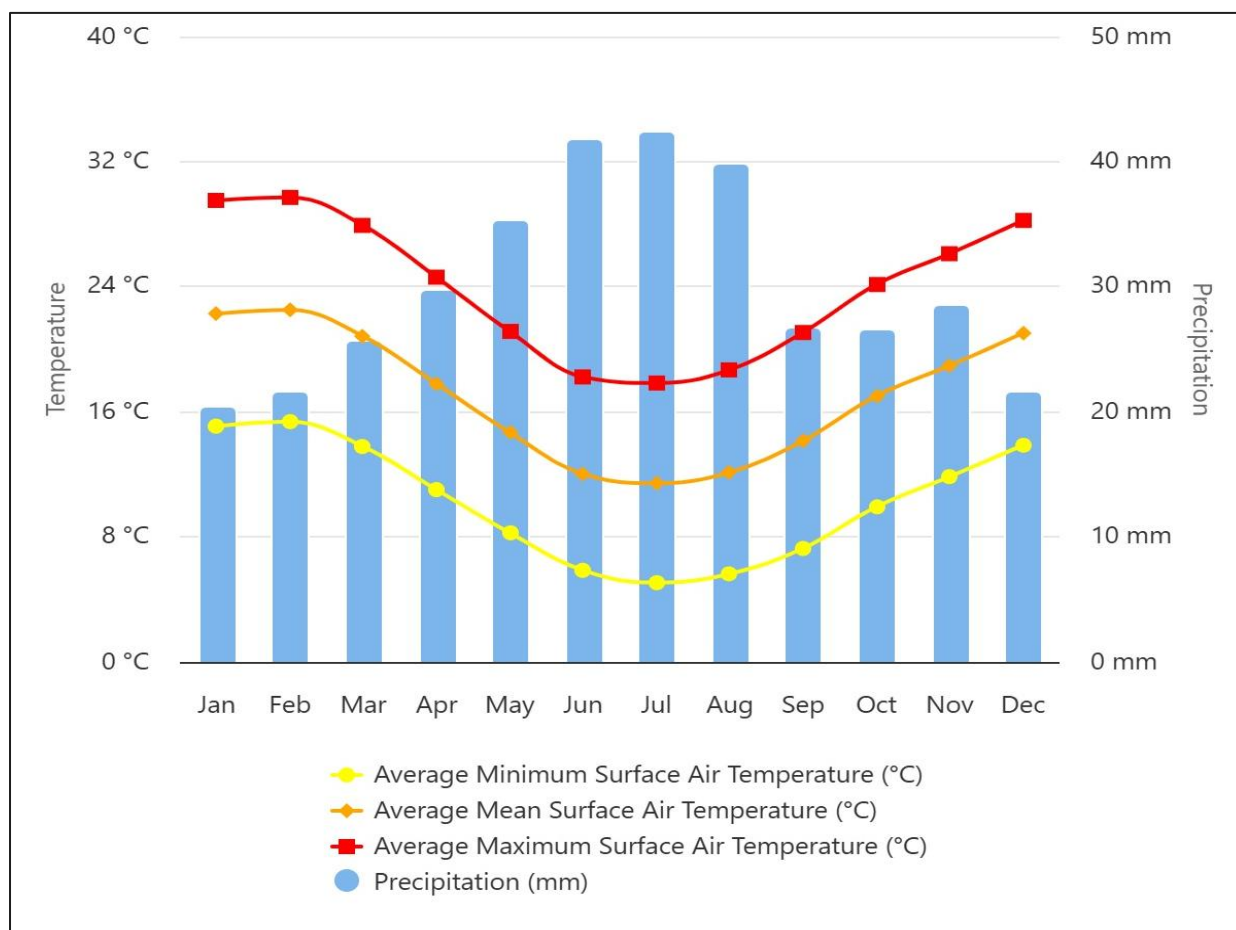


Figure 6-29: Monthly average temperature and rainfall (1991 - 2020 historical period) for the Western Cape Province

6.7.2 Climate Change

For the project location, average mean monthly temperature is projected to increase by an average of 0.59°C to 0.68°C (3.5% to 4%) relative to the average for the respective baseline period.

The average maximum surface air temperature is projected to increase by 0.63°C to 0.76°C (2.7% to 3.3%) relative to the average for the baseline period. Similarly, the number of very hot days, where the maximum temperature exceeds 35°C, are projected to increase by 3.21 days to 3.83 days (48.1% to 57.3%) relative to the maximum number of very hot days for the baseline period.

Mean monthly precipitation is projected to decrease by an average of 10.65 mm to 10.85 mm (-2.9% to -3.0%) per annum relative to the average for the baseline period. Cumulative precipitation over a 5-day period is projected to either increase by an average of 0.20 mm (+0.4%) under the SSP2-4.5 scenario or decrease by an average of 0.24 mm (-0.5%) under the SSP5-8.5 scenario, relative to the baseline period.

6.8 Noise

An overview of the available acoustics data for the proposed development is sourced primarily from the baseline monitoring undertaken by the Noise specialist from SLR Consulting (SLR Consulting, 2025c), is provided below.



6.8.1 Acoustic Setting

The acoustic environment surrounding the proposed project site is shaped predominantly by transport-related sources, industrial activities, and general suburban activity patterns. Rail movements along the Pinelands railway line, situated along the eastern boundary of the site, represent a consistent intermittent influence on ambient noise levels. These events were clearly audible during monitoring and form part of the characteristic sound profile of the area.

Road traffic associated with local arterial and residential streets contributes continuous background noise typical of an urban district with mixed residential and industrial land uses. This context is consistent with the district types defined in SANS 10103:2008, presented in Table 6-11, where urban areas with workshops and business premises exhibit typical daytime rating levels up to 60 dB(A).

Table 6-11: Typical district noise rating levels (SANS10103:2008, Table 2)

Type of district	Equivalent continuous rating level for noise ($L_{Req,T}$) (dBA)					
	Outdoors			Indoors with open windows		
	Day-night ($L_{Req,dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)	Day-night ($L_{R,Dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)
a) Rural districts	45	45	35	35	35	25
b) Suburban districts (little road traffic)	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts (with workshops, business premises and main roads)	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50
Notes:						
Daytime hours are defined as 06h00-22h00 and night-time as 22h00-06h00						

Industrial noise sources also contribute to the prevailing baseline. These include mechanical ventilation systems, compressors, and general operational activity from surrounding industrial units. Continuous mechanical noise was particularly notable at Fenceline 3, where ventilation-related emissions influenced recorded levels during daytime observations. The existing Biovac facility further contributes a low-level continuous mechanical hum that was perceptible at the residential receptor during daytime measurements. In addition to anthropogenic sources, natural sounds such as bird calls, wind movement through vegetation, and occasional environmental disturbances were recorded.

Baseline noise monitoring was undertaken in two phases based on site layout, prevailing meteorology, accessibility and safety considerations. Two phases of noise monitoring were undertaken. The first phase, conducted between 9-10 December 2025 consisted of baseline noise measurements at selected receptors and boundary locations. Following review of the initial results, additional monitoring was requested and subsequently undertaken between 23 - 28 February 2026, to ensure a robust baseline noise assessment. The selected monitoring locations are depicted in Table 6-12 and Figure 6-30. Measurements were conducted during one-hour intervals in both daytime (07:00–18:00) and nighttime (22:00-06:00) periods in accordance with SANS 10103:2008 and the IFC/WHO Environmental, Health and Safety Guidelines. All sound level measurements were completed using Class 1 instrumentation calibrated before and after use.



Table 6-12: Monitoring locations⁹

Unit Name / Site ID		Site Description
Phase 1 & 2	Fenceline 1 (FL 1)	Southern corner of property
	Fenceline 2 (FL 2)	Eastern corner of property
	Fenceline 3 (FL3)	Northern fenceline
	Noise sensitive receptor 1 (NSR 1)	Nearby residential receptor
Phase 3	Noise sensitive receptor 2 (NSR 2)	Nearby residential receptor
	Noise sensitive receptor 3 (NSR 3)	Nearby residential receptor



Figure 6-30: Map showcasing the Noise Monitoring Locations

6.8.1.1 Phase 1 Monitoring Results

Daytime fenceline

During Phase 1 monitoring, the highest daytime noise level at the site fenceline was 58.83 dB(A), recorded at Monitoring Location FL3. Noise levels measured at all fenceline locations were compliant with the applicable daytime limits prescribed by SANS 10103 and the IFC/WHO guidelines.

⁹ Details of residential noise-sensitive receptors have been generalised and exact locations withheld to protect personal privacy, in accordance with applicable lender requirements public disclosure requirements.



Nighttime fenceline

The maximum nighttime noise level recorded at the fenceline during Phase 1 was 54.55dB(A), also measured at FL3. All fenceline monitoring locations complied with the recommended nighttime noise limits in terms of SANS and IFC/WHO guidelines.

Daytime residential

At NSR1, daytime noise levels approached but remained below the applicable guideline limit, with a measured level of 53.63 dB(A) compared to the SANS and IFC/WHO limit of 55 dB(A). A low-level humming noise attributable to the existing Biovac facility was perceptible at this location during daytime monitoring.

Nighttime residential

Nighttime noise levels at NSR1 were recorded at 49.49 dB(A), exceeding the applicable SANS and IFC/WHO guideline value of 45 dB(A). Distant industrial activity was audible at this location during nighttime monitoring. Elevated wind speeds at the time of measurement are considered likely to have contributed to increased background noise levels, potentially influencing the recorded exceedance.

Table 6-13: Measured daytime and nighttime noise levels (dB(A))

Site ID	Site Type	1-hour LA _{eq} (dB(A))		SANS		IFC/WHO	
		Day	Night	Day	Night	Day	Night
Phase 1: 09/12/2025 – 10/12/2025							
FL 1	Industrial	54.07	50.09	70	60	70	70
FL 2	Industrial	55.53	51.45	70	60	70	70
FL 3	Industrial	58.83	54.55	70	60	70	70
NSR 1	Residential	53.63	49.49	55	45	55	45
Phase 2: 23/02/2026 – 28/02/2026							
FL 1	Industrial	59.40	47.70	70	60	70	70
FL 2	Industrial	52.00	36.40	70	60	70	70
FL 3	Industrial	52.10	38.30	70	60	70	70
NSR 1 ^(a)	Residential	51.71	46.05	55	45	55	45
NSR 2	Residential	54.50	44.20	55	45	55	45
NSR 3	Residential	52.30	63.20	55	45	55	45
Notes:							
(a)	- 1-hour LA _{eq} values were calculated from the 24-hour continuous measurement dataset and averaged over the applicable daytime and nighttime periods in accordance with SANS and IFC.						
Red	- Exceeds SANS day / night limits						
Orange	- Exceeds IFC/WHO day / night limits						

6.8.1.2 Phase 2 Monitoring Results

Daytime fenceline



During Phase 2 monitoring, the highest daytime noise level recorded along the site fenceline was 59.40 dB(A) at Monitoring Location FL1. Noise levels measured at all fenceline locations remained within the applicable daytime limits prescribed by SANS 10103 and the IFC/WHO noise guidelines.

Nighttime fenceline

The maximum nighttime noise level at the fenceline was 47.7 dB(A), also recorded at FL1. All fenceline monitoring locations were compliant with the recommended nighttime noise limits in terms of SANS and IFC/WHO guideline values.

Daytime residential receptors

Daytime noise measurements at all monitored NSRs complied with the recommended limits set out in SANS and the IFC/WHO guidelines.

Nighttime residential receptors

The highest nighttime noise level was measured at NSR3 at 63.20 dB(A). NSR3 is located approximately 140m north-north-east of the existing Biovac facility and approximately 60m east of the Metro Emergency Medical Centre. This was followed by NSR1, located approximately 110 m east of the existing Biovac facility, where a maximum nighttime noise level of 46.05 dB(A) was recorded. Noise levels at both NSR3 and NSR1 exceeded the applicable SANS and IFC/WHO nighttime guideline value of 45 dB(A). Traffic noise and background industrial noise were audible at these locations during the monitoring period. Wind speeds during monitoring were generally low and are not considered to have materially influenced the recorded measurements.

6.8.1.3 Interpretation of baseline Noise Monitoring

Baseline noise monitoring was undertaken in two phases to characterise existing noise conditions at representative fenceline and noise-sensitive receptor (NSR) locations. Phase 2 monitoring was conducted following review of the Phase 1 results to supplement the dataset and strengthen the overall baseline characterisation. Monitoring was undertaken under typical operating conditions and captured a range of ambient urban influences present at the time of measurement.

The baseline noise environment is characteristic of a moderately active urban-industrial setting within a mixed-use metropolitan area. Daytime noise levels are generally stable and influenced by continuous road traffic, surrounding industrial activities, and general human presence. Nighttime noise levels are lower overall but remain influenced by intermittent transport movements, background industrial sources, and local urban activity. No abnormal industrial operations, atypical nighttime plant activity, or unusual traffic conditions were observed during either monitoring phase.

Monitoring results from both phases indicate that daytime noise levels at all fenceline and NSR locations complied with applicable SANS 10103:2008 and IFC/WHO guideline limits. Nighttime exceedances were recorded against the IFC/WHO residential guideline values only, reflecting the more stringent nighttime criteria applied within a mixed-use urban environment and do not indicate non-compliance with South African legislative limits. These exceedances were observed at NSR1 (approximately 110 m east of the existing Biovac facility) during both monitoring phases, with limited variability between phases. The highest nighttime exceedance was recorded at NSR3 (approximately 140 m north-northeast of the existing Biovac facility and approximately 60 m east of the Metro Emergency Medical Centre).

Apart from NSR3 during Phase 2, all monitoring locations recorded lower nighttime than daytime noise levels. The elevated measurement at NSR3 during Phase 2 is not considered



representative of worst-case industrial operating conditions and is attributed to short-term, localised influences, including increased Friday night traffic activity and intermittent human voices documented during the monitoring period. Importantly, no corresponding increase was observed at fenceline locations, and no increase in noise attributable to existing Biovac operations was identified. The measured levels are therefore considered reflective of prevailing ambient urban background conditions rather than site-specific noise emissions.

Overall, the baseline assessment indicates that industrial receptors surrounding the proposed development are exposed to noise levels well within applicable guideline thresholds, while nearby residential receptors demonstrate sensitivity to the more stringent IFC/WHO nighttime criteria. Given that only limited and marginal nighttime exceedances were identified, and that these are attributable to ambient urban noise sources rather than existing site operations, the assessment is considered sufficient at a screening level.

6.8.1.4 Historical Noise Complaints and Mitigation Measures

In the past, a noise complaint was received in relation to operational noise from the existing Biovac facility. Biovac subsequently commissioned baseline noise monitoring to investigate the reported disturbance. As part of its response, Biovac implemented a suite of structural noise-mitigation measures at the facility, including noise-attenuation structures, material substitution, and improved segregation of noise-generating equipment. These measures were followed by an estimated reduction in operational noise levels of approximately 8 dB(A) at source.

6.9 Terrestrial Biodiversity

An overview of the Terrestrial Biodiversity for the proposed development is sourced primarily from the Terrestrial Plant Species and Terrestrial Biodiversity Compliance Statement compiled for the previous ESIA by Dr. David McDonald (Bergwind Botanical Surveys & Tours CC, 2023).

6.9.1 Vegetation Types

Regional vegetation mapping indicates that the property historically supported the Cape Flats Fynbos vegetation type, which has undergone extensive loss and is listed as Critically Endangered under Section 52(1)(a) of the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA). However, field verification undertaken for this ESIA confirms that no representative patches of the original vegetation persist on the site. The area is heavily disturbed and lacks the structural and floristic attributes of Cape Flats Fynbos, and there is no functional ecological process evident at the scale of the site. In practical terms, the current condition precludes rehabilitation to a functional state representative of the historical ecosystem.

A site walkdown by a qualified botanical specialist was undertaken to ground-truth the desktop conservation planning layers, confirm the present ecological condition, and identify any potential biodiversity constraints. The specialist assessment found no sensitive habitats within the project footprint and recorded no plant species of conservation concern (Bergwind Botanical Surveys & Tours CC, 2023). The survey corroborated that the site is severely degraded and that neither constituent species nor assemblages associated with the historical Cape Flats Fynbos occur within the footprint. The specialist concluded that the site does not support biodiversity features of conservation significance and that restoration to the original vegetation type is not feasible given the degree of transformation.



6.9.2 Conservation Status

Within the City of Cape Town, biodiversity priority setting is guided by the municipal BioNet, which screens terrestrial areas against criteria such as threatened vegetation types, the occurrence of species of conservation concern, and other ecological indicators. According to the BioNet mapping there are no protected areas or mapped Critical Biodiversity Areas in proximity to the proposed project site. The nearest mapped conservation features occur along the Black River corridor to the south-west approximately 600m west (Figure 6-31). This mapping is consistent with the location of the proposed project site within a transformed urban landscape and thus does not overlap any formally identified conservation priorities or residual natural habitat of high significance.

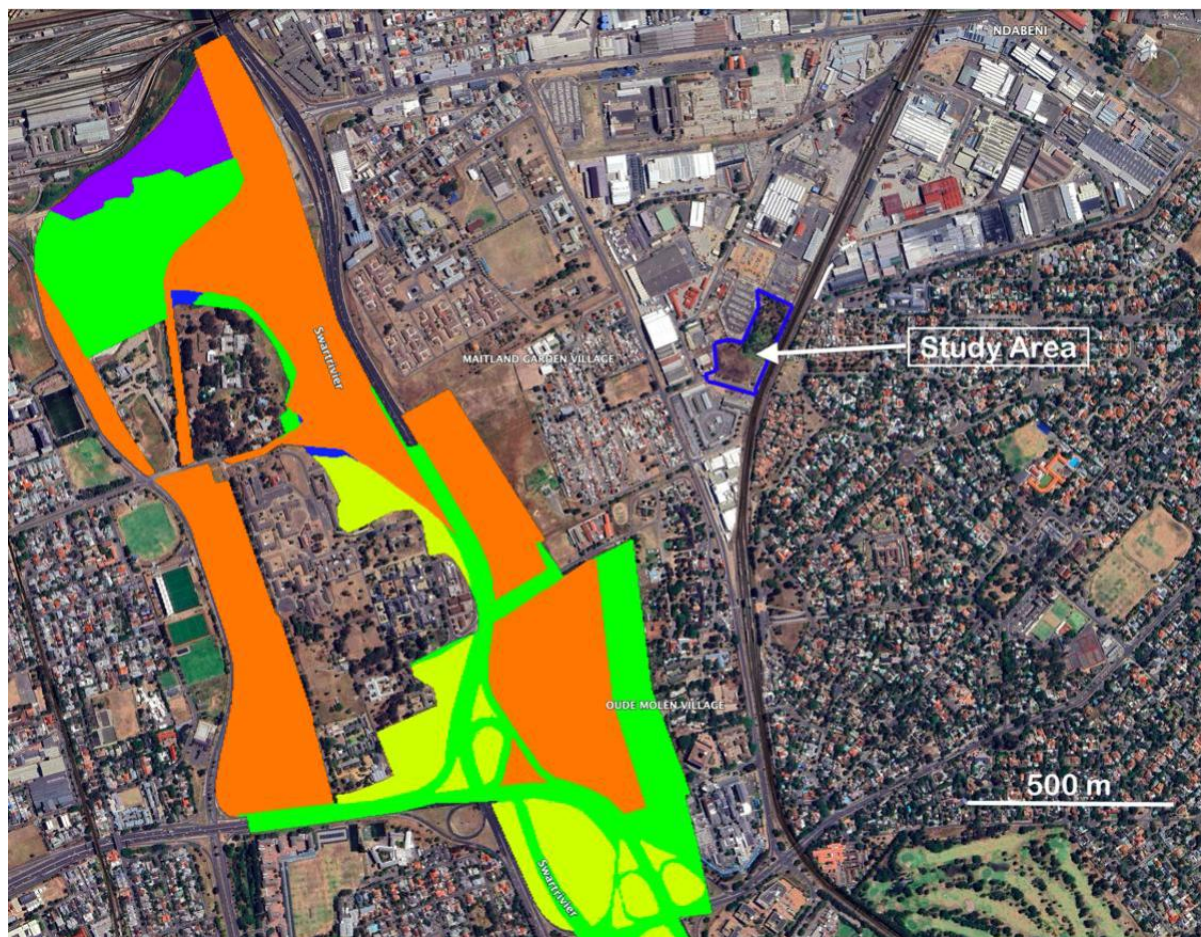


Figure 6-31: BIONET Map of Proposed Site

Source: (Bergwind Botanical Surveys & Tours CC, 2023)

6.9.3 Faunal Context

Given the absence of natural vegetation and the highly transformed urban character of the property and its immediate surroundings, faunal habitat is extremely limited. The potential for the site to sustain specialist or habitat-dependent fauna is considered negligible. This finding aligns with the conservation planning outputs and the botanical field observations, which together indicate a lack of residual ecological structure and function at the site.



6.10 Freshwater Ecology

No natural watercourses or wetlands occur on the property. The Black River is located approximately 700 m south-west of the site. The intervening area between the site and the river is largely developed with light industrial, commercial, and residential infrastructure.

The proposed project site is prone to temporary ponding following heavy rainfall. Any standing water occurring on-site after heavy rainfall does not have a hydrological connection to the Black River and is not classified as seasonal wetlands. The presence of the railway line along the north-eastern boundary may contribute to localised water accumulation, as the structure attenuates surface flow in this area which results in ponding (see Figure 6-32).



Figure 6-32: Aerial photo of temporary ponding on proposed site (white circle)

Source: Mthente Research and Consulting Services, 2025a

6.11 Archaeology and Cultural Heritage

The proposed project site forms part of the broader Cape Flats cultural landscape, an area characterised by a long sequence of human occupation. The region historically supported indigenous Khoi pastoralist groups and San hunter-gatherer communities prior to the colonial expansion along the Liesbeek and Black River systems. The Ndabeni area, located adjacent to the site, holds historical significance as the location of South Africa's first formally established segregated settlement in the early 20th century. Similarly, the neighbouring suburb of Pinelands is recognised for its Garden City planning legacy and is protected by a Heritage Protection Overlay Zone. Although the proposed project site does not fall within any formally designated heritage zone, its proximity to these historically layered areas forms an important component of the broader contextual understanding of the landscape, as is evidenced through its designation of "Very High" sensitivity from the National Screening Tool (see Section 2.1.2).

No permanent or semi-permanent structures of historical value exist within the boundaries of the site. No surface indicators of archaeological or palaeontological resources such as stone



tools, pottery fragments, shell middens, building remnants, or fossilised material were observed during site inspections or in the available documentation. The extent and persistence of previous disturbance substantially diminish the likelihood that intact heritage resources remain on the surface.

A desktop review of heritage inventories, municipal records, and publicly available databases confirms that there are no declared heritage sites, graded buildings, archaeological occurrences, palaeontological sites, or cultural landscapes formally recorded within the project footprint. The site lies outside the Pinelands Heritage Protection Overlay Zone and the City of Cape Town's formally protected heritage precincts. Although the adjacent Two Rivers Urban Park (TRUP) precinct has been subject to extensive heritage study because of its environmental and historical significance, none of the findings from these studies identify the Biovac project even as containing heritage resources. No formal heritage protections or restrictions currently apply to the site.

A NID was submitted to HWC for the proposed project on 25 August 2025. The application was discussed at the HWC Offices on 26 January 2026, where it was concluded that the proposed consolidation of the five properties comprising the proposed project site to allow development of a vaccine production facility would not impact heritage resources. Therefore, no further heritage assessment or authorisation under Section 38 of the NHRA is required.

6.12 Socio-Economic Profile

This socio-economic baseline provides a detailed assessment of the human, social, and economic context relevant to the proposed development. The content of this chapter is informed by the stakeholder engagement conducted by Mthente Consulting and Research Services, including insights from their SEP and Draft RAP developed for the earlier ESIA process (Mthente Research and Consulting Services, 2025b) (Mthente Research and Consulting Services, 2025c).

6.12.1 Area of Influence

The Area of Influence (Aoi) comprises of Pinelands, Maitland Garden Village, Ndabeni Industrial Area, Thornton and Langa the secondary Aoi is the greater Cape Town Metropolitan Region, with a tertiary Aoi at Western Cape/Southern African Development Community (SADC) scale given the project's role in vaccine security. The project site is zoned industrial, adjacent to residential streets in Pinelands and near rail and industrial corridors that shape mobility and perceived safety. The site itself is vacant land without permanent structures but has historically experienced intermittent unlawful occupation and illegal dumping (see Figure 6-33).





Figure 6-33: Illegal dumping witnessed on site

Source: Mthente Research and Consulting Services, 2025c

6.12.2 Demographic Profile of Aol

As depicted in Table 6-14, the demographic profile of the Aol reflects clear socio-economic contrasts between the neighbouring communities of Pinelands, Maitland Garden Village and Langa. Pinelands is a relatively affluent, predominantly formal suburb with smaller households and high levels of educational attainment, suggesting lower socio-economic vulnerability. Maitland Garden Village, although also formal, is characterised by significantly larger household sizes and much lower levels of completed secondary education, indicating higher levels of overcrowding and socio-economic pressure. Langa, the largest of the three communities, comprises a mix of formal and informal housing, moderate educational attainment and larger household structures typical of dense township environments. These differences indicate varying levels of vulnerability.

Table 6-14: Demographic profile of Aol

Indicator	Pinelands	Maitland Garden Village	Langa
Population	14 198	~2,000	~52,000
Average Household size	2.89	5.05	3.8
Education (Grade 12+)	88%	26%	42%



Indicator	Pinelands	Maitland Garden Village	Langa
Housing formality	~99.5% formal	~100% formal (higher overcrowding)	Mixed formal/informal
Predominant race group	White (62%)	Coloured (88%)	Black African (>95%)

Source: Mthente Research and Consulting Services, 2025c

6.12.3 Employment

Unemployment levels vary substantially across the area of interest, with Pinelands exhibiting comparatively low unemployment of approximately 4%, while significantly higher rates are observed in Maitland Garden Village (around 22%) and Langa (exceeding 30%). A notable proportion of households in both Maitland Garden Village and Langa subsist on monthly incomes below R3,200, indicating heightened socio-economic vulnerability characterised by income seasonality and limited financial resilience. Although the surrounding Ndabeni–Epping industrial area provides accessible employment opportunities in logistics, warehousing and light manufacturing, persistent skills mismatches continue to limit residents' participation in formal employment. These conditions contribute to elevated expectations regarding local hiring and typically intensify competition for entry-level opportunities associated with new developments in the area.

6.12.4 Poverty, Inequality and Affordability Pressures

Socio-economic inequality within the area of interest is pronounced, with larger household sizes and lower levels of secondary and tertiary educational attainment in Maitland Garden Village and Langa contributing to heightened poverty risk. Local rental markets for entry-level flats or rooms commonly fall within the range of R5,000 to R7,500 per month, underscoring substantial affordability constraints and supporting the rationale for the Resettlement Action Plan's housing-first approach and rental-support measures for displaced occupants. These affordability pressures intersect with transport expenses and ongoing volatility in food and fuel prices, thereby increasing household sensitivity to socio-economic disruptions and reducing overall resilience.

6.12.5 Housing, Tenure and Services

Pinelands is characterised by predominantly formal tenure and high levels of municipal service coverage. While Maitland Garden Village also comprises formal housing stock, it exhibits higher occupancy ratios and lower household incomes, indicating more constrained living conditions. Langa presents a mixed-tenure environment that includes both formal dwellings and informal structures.

Conditions on the project site reflected severe deprivation, informal occupants had been residing in large concrete pipes without access to water, sanitation or electricity, and possessed minimal personal assets as depicted in Figure 6-34 and Figure 6-35. This context illustrates chronic exposure to health and safety risks and underscores the extreme vulnerability of the displaced individuals.





Figure 6-34: Makeshift dwellings of informal occupants

Source: Mthente Research and Consulting Services, 2025c



Figure 6-35: Assets belonging to informal occupants

Source: Mthente Research and Consulting Services, 2025c



6.12.6 Mobility, Access and Transport Safety

The site is well connected to major arterial routes and the adjacent rail corridor, which supports workforce mobility but also results in localised traffic conflict points and heightened night-time safety concerns identified by community stakeholders. In response to these issues, the Stakeholder Engagement Plan provides for quarterly coordination with the local safety cluster, including the Neighbourhood Watch, SAPS, Community Policing Forum (CPF) and the City Improvement District (CID) to align on surveillance measures, lighting requirements and incident-response protocols during the construction phase. This coordinated approach is intended to reduce both perceived and actual safety risks along surrounding streets and rail interfaces.

6.12.7 Community Health, Safety and Wellbeing

Baseline engagements conducted by Mthente Research and Consulting Services highlight community concerns regarding petty crime, copper theft, and unsafe pedestrian movement along the rail and industrial interfaces. For vulnerable individuals previously residing in precarious shelters, risks included exposure to unsanitary conditions, vulnerability to exploitation, and broader social harm.

6.12.8 Vulnerable Individuals

A formal census undertaken by Mthente Research and Consulting Services between 15 and 24 September 2025 identified five individuals with intermittent presence on the project site. Two individuals were consistently present during the census period and at the agreed cut-off date of 24 September 2025 and therefore met the eligibility criteria. These two individuals had been residing for approximately two years within large concrete pipes on the site, without access to water, sanitation, or electricity, and with minimal personal belongings, reflecting conditions of extreme socio-economic vulnerability and prolonged exposure to health and safety risks.

The remaining three individuals were not present on site at the cut-off date or at the times of survey administration. Mthente undertook multiple site visits at different times of day during the census period in an effort to identify and engage these individuals; however, they did not present themselves during consultant visits and could therefore not be surveyed. As a result, only the two consistently present individuals were formally assessed at the time. A RAP has therefore been prepared in draft form and remains open. The RAP will be finalised only once all five identified informal occupants have been traced and engaged, to ensure that any potentially affected individuals are afforded the opportunity to participate in the process in accordance with international standards.

SLR was notified by Biovac that all informal occupants voluntarily vacated the site in November 2025. A subsequent site visit undertaken by SLR's social specialist confirmed that all previously identified informal occupants were no longer present on site, following which a site verification report was prepared to document these observations (see Appendix G).

As a precautionary measure, Biovac confirmed that procedures have been implemented should any of the former informal occupants return to the site. Security personnel have been instructed to notify a designated Biovac contact immediately in such circumstances, and information posters have been placed at the site entrance providing relevant contact details. As illustrated in Figure 6-36, several of the concrete pipes previously used as makeshift shelters have been retained on site on a temporary basis for a period of up to six months, to ensure that individuals would not be left without temporary cover should they return. These pipes will be removed thereafter to allow construction activities to proceed.





Figure 6-36: Retained concrete pipes on proposed site

Source: (SLR Consulting, 2025d)

6.12.9 Stakeholder Expectations

Focus group discussions and broader SEP consultations conducted by Mthente Research and Consulting Services indicate elevated expectations for accessible employment and procurement opportunities, particularly among stakeholders in Maitland Garden Village and Langa. In the absence of proactive disclosure regarding available job categories, required skill levels, contractor recruitment processes and indicative timelines, there is a risk of unrealistic expectations emerging, which may contribute to community frustration or tension. To mitigate this, the SEP provides for regular, structured disclosure and establishes a formal, multi-channel grievance mechanism including email, a hotline/whistle-blower channel and in-person options with defined acknowledgement and resolution timeframes, as well as escalation to independent oversight where required.

6.13 Landscape and visual

The proposed project site area is situated within a predominantly industrial zone, characterised by large-scale built structures and associated infrastructure (see Section 6.14.2) with limited relative scenic quality when compared with the nearest residential area (Pinelands) located to the east. Pinelands is a well-established residential area with large, thatched houses interspersed with green spaces and thus has higher relative scenic value.

However, Pinelands is physically and visually separated from the site by a continuous boundary wall and an intervening railway corridor (see Figure 6-37). These act as effective screening elements substantially limiting direct views between the residential receptors and the project footprint. The existing visual environment on the residential side is already influenced by the presence of transport infrastructure and adjacent industrial activity as seen in Figure 6-37, resulting in the project site having a landscape of with limited aesthetic value. Figure 6-38 demonstrates that the outlook from the residential area is dominated by hard infrastructure and does not provide high-quality visual amenity. While a limited glimpse of the



tip of Devil's Peak is visible in the background, this feature does not constitute a prominent element of the residential visual environment.



Figure 6-37: Aerial view of adjacent industrial activity

Source: Mthente Research and Consulting Services, 2025a



Figure 6-38: View from residential area towards proposed site

Source: Google Maps



6.14 Land Uses

This baseline was informed by the Land Use Application prepared by ARoux Planning for the subdivision, consolidation, amendment of conditions of approval, approval of the proposed SDP, and departures relating to Unregistered Erf 183467, Cape Town; Erven RE/118296, RE/103659 and RE/24176, Cape Town; and Erf 1056, Pinelands (ARoux Town Planning, 2025).

6.14.1 Subject property

The proposed project site area was selected as it is near the existing Biovac operations. As the site was previously owned by the City of Cape Town, a statutory process was required to approve the sale of the land portions which make up the project site area. Table 6-15 sets out the relevant statutory details of the properties which make up the project development site. The full extent of the proposed project development site is currently undeveloped.

Table 6-15: Statutory details of the properties

Property description	Unreg. Erf 183467, Cape Town	Rem. Erf 118296, Cape Town	Rem. Erf 103659, Cape Town	Rem. Erf 24176, Cape Town	Erf 1056, Pinelands
Registered Owner	City of Cape Town (to be transferred to Biovac)	City of Cape Town	City of Cape Town	City of Cape Town	City of Cape Town
Title Deed No.	Not yet available	T25156/1996	T29990/1970	G28/1942	T3422/1948
Restrictive Conditions	None	None	None	None	None
Property Size	1,9787 ha	3,0174ha	25,0977 ha	±6,2329 ha	332m ²
SG Diagram No.	2423/2024	5893/85	03679/69	1094/41	3612/42
Servitudes	None	None	None	None	None
Zoning	General Industry 2	Utility	General Industry 2	General Industry 2	General Industry 2

Source: ARoux Town Planning, 2025

6.14.2 Surrounding land uses

The surrounding area is a well-established industrial precinct, with industrial uses dominating the properties to the north, west, and south of the site. Notable neighbouring facilities include the One Day Only warehouse and the City of Cape Town's Mowbray Electrical Depot to the north, as well as the TFC warehouse to the west.

Several adjacent properties are owned by the City of Cape Town and accommodate municipal light-industrial operations. These include the Metro Emergency Medical Services Depot to the south and the City's Auction Yard directly to the north. The zonings of the surrounding properties demonstrate the industrial and municipal-use character of the area, with most properties zoned Industrial Zoning 2 and Utility Zoning (see Figure 6-39).





Figure 6-39: Land Use Zones of surrounding properties

Source: (ARoux Planning, 2025)

6.15 Traffic

An overview of the regional road network is provided below and is informed by the Transport Impact Assessment prepared by Trafficon (Trafficon CC, 2025).

6.15.1 Regional Road Network

According to (Committee of Transport Officials, 2012), roads in South Africa are classified into six classes within the rural and urban road classification system (see Table 6-16).

Table 6-16: South African Road Classification System

Class Number	Function	Description
1	Mobility	Principal Arterial
2	Mobility	Major Arterial
3	Mobility	Minor Arterial
4	Access	Collector Street
5	Access	Local Street
6	Access	Walkway



As illustrated in Figure 6-40, the regional road network in the vicinity of the subject property contains:

- Alexandra Road, a Class 3 (Minor Arterial Road);
- Rappenberg Road, a Class 3 (Minor Arterial Road);
- Berkley Road, a Class 2 (Major Arterial Road).



Figure 6-40: Regional Road Network

Source: Google Earth Pro

6.15.2 Key Intersections and associated Traffic Counts

The key intersections in the vicinity of the proposed site are:

- Alexandra Road and Ndabeni Road;
- Alexandra Road and Berkley Road; and
- Alexandra Road and Raapenberg Road.

The traffic specialist, Trafficon, conducted traffic counts on 27 September 2022 to establish the existing movement flows and traffic patterns in the vicinity of the proposed project site. A summary of the findings for the above-mentioned intersections is presented below:

- **Alexandra Road and Ndabeni Road intersection:**

The morning peak hour was determined to be between 07h00 and 08h00. During this period, 221 vehicles travelled northbound along Alexandra Road toward Berkley Road, with 47 vehicles turning right into Ndabeni Road. In the southbound direction along Alexandra Road, 461 vehicles travelled toward Raapenberg Road, of which 47 turned



left into Ndabeni Road The overall Level of Service (LOS) for the intersection during the morning peak was LOS B, indicating that traffic conditions were reasonably free-flowing (Figure 6-41).

The evening peak hour was recorded between 16h00 and 17h00, during which 410 vehicles were observed travelling northbound, with an additional 4 vehicles turning left from Alexandra Road into Ndabeni Road. Southbound movements totalled 90 vehicles, including 6 vehicles making a left turn into Ndabeni Road. The overall level of service (LOS) for this intersection during the AM peak was assessed as LOS B, which is considered to reflect reasonably free-flowing operating conditions (see Figure 6-42).

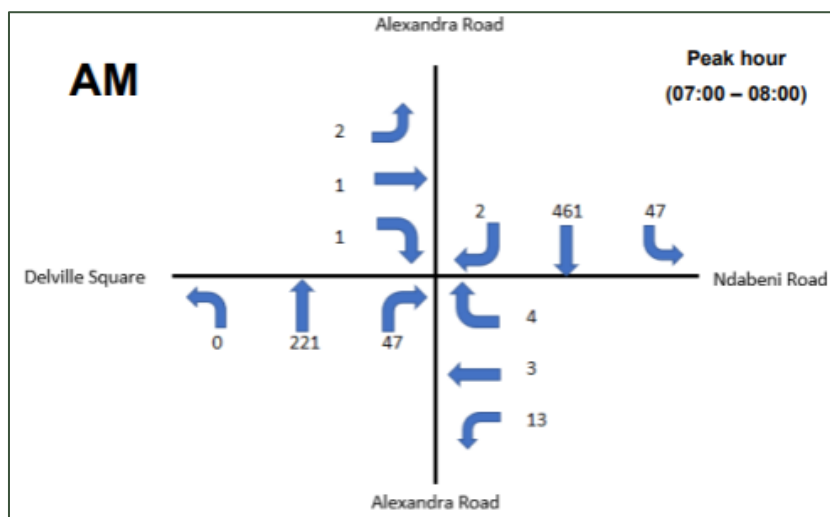


Figure 6-41: Traffic Count at Alexandra Road/ Ndabeni Road at AM Peak

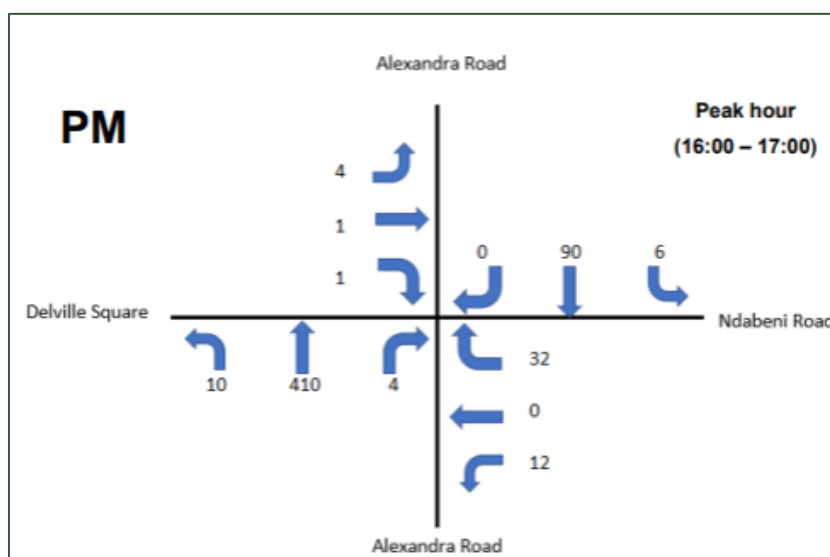


Figure 6-42: Traffic Count at Alexandra Road/ Ndabeni Road at PM Peak

- **Alexandra Road and Berkley Road**

The morning peak hour was identified as occurring between 07h00 and 08h00. During this period, 709 vehicles were recorded travelling eastbound along Berkley Road, of



which 233 executed a right-turn movement towards Alexandra Road. In the westbound direction, 863 vehicles were observed along Berkley Road, with 209 vehicles turning left onto Alexandra Road. Along Alexandra Road itself, 229 vehicles turned right onto Berkley Road, while a further 487 vehicles turned left onto Berkley Road. The overall LOS for the intersection during the morning peak was assessed as LOS C, which is indicative of stable operating conditions (Figure 6-43).

The afternoon peak hour was identified as occurring between 16h00 and 17h00. During this period, 837 vehicles travelled eastbound along Berkley Road, of which 474 vehicles turned right into Alexandra Road. In the westbound direction, 762 vehicles were recorded on Berkley Road, with 291 vehicles executing a left-turn movement into Alexandra Road. Along Alexandra Road itself, 176 vehicles turned right onto Berkley Road in the eastbound direction, while a further 641 vehicles turned right towards the westbound direction on Berkley Road. The overall LOS for the intersection during the afternoon peak was assessed as LOS C. However, the right-turn movement from Alexandra Road onto Berkley Road in the eastbound direction operated at LOS E, indicating that there were high delays and the road is at its capacity (Figure 6-44).

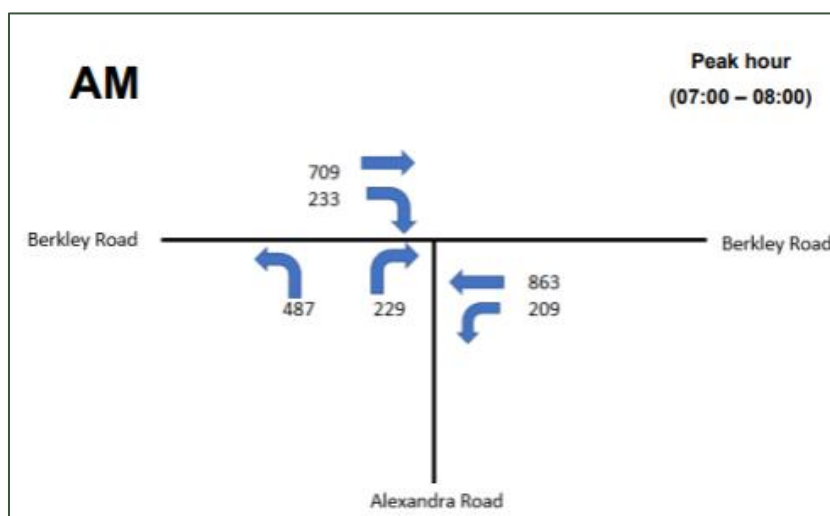


Figure 6-43: Traffic Count at Alexandra Road/ Berkley Road at AM Peak



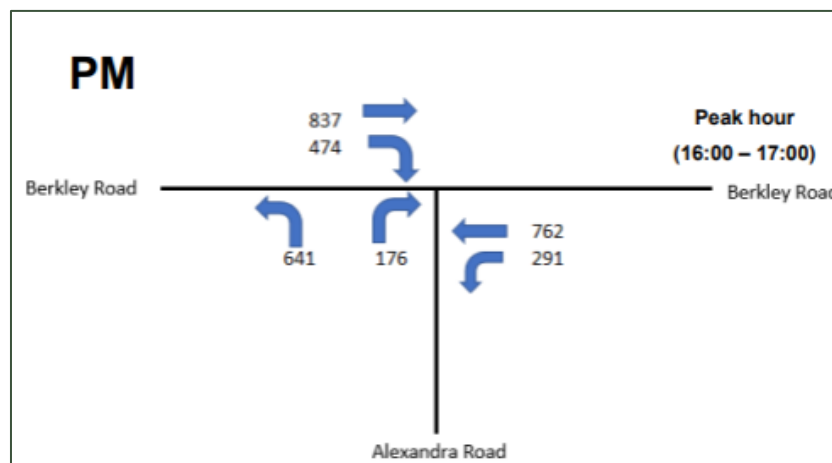


Figure 6-44: Traffic Count at Alexandra Road/ Berkley Road at PM Peak

- Alexandra Road and Raapenberg Road**

The morning peak period, occurring between 07h00 and 08h00, showed substantial traffic activity along Raapenberg Road (Figure 6-45). A total of 1 092 vehicles moved eastbound, with 279 vehicles diverting towards Golf Park Road and the remaining 829 continuing northward into Alexandra Road. Westbound flows were even higher, amounting to 1 607 vehicles. Of these, 354 vehicles turned right into Alexandra Road, while 47 vehicles diverted left into Golf Park Road. Additional southbound movements from Alexandra Road towards Golf Park Road were also recorded, comprising 24 through-movements, accompanied by 101 vehicles turning left and 279 vehicles completing a right-turn back onto Raapenberg Road. The overall LOS and LOS (Worst Movement) for the morning peak hour was determined to be a level F, reflecting stop and go traffic where the demand of the road exceeds the total capacity.

During the afternoon peak period, between 16h00 and 17h00, traffic volumes along Raapenberg Road remained substantial (Figure 6-46). Eastbound movements amounted to 1 005 vehicles, with 71 vehicles diverting into Golf Park Road and a further 346 vehicles continuing left into Alexandra Road in the northbound direction. Westbound activity was even more pronounced, with 1 360 vehicles recorded, of these, 60 vehicles turned right into Alexandra Road, while 17 vehicles proceeded left into Golf Park Road. Additional southbound activity from Alexandra Road towards Golf Park Road comprised 5 through-vehicles, accompanied by 140 left-turning vehicles and 937 vehicles completing a right-turn movement back onto Raapenberg Road. The overall LOS, including the worst-performing movement, was rated Level F during the morning peak hour, indicating stop-and-go conditions in which traffic demand exceeds the available road capacity.



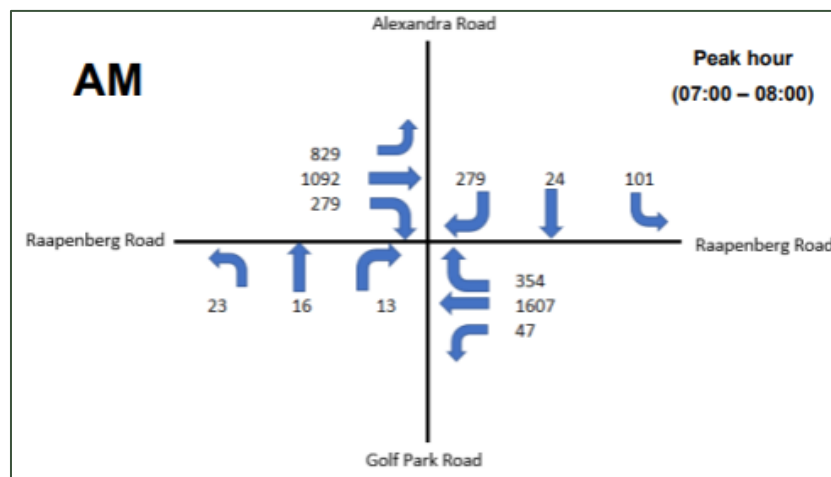


Figure 6-45: Traffic Count at Alexandra Road/ Raapenberg Road at AM Peak

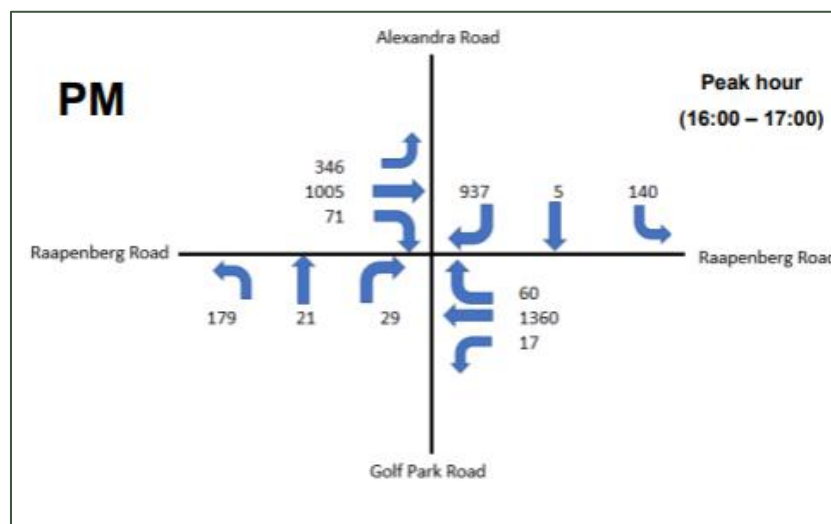


Figure 6-46: Traffic Count at Alexandra Road/ Raapenberg Road at PM Peak



7.0 Impact description and Assessment

This chapter describes and assesses the significance of potential impacts related to the proposed vaccine manufacturing facility. All impacts are systematically assessed and presented according to predefined rating scales (see Appendix P). Mitigation or optimisation measures are proposed which could ameliorate the negative impacts or enhance potential benefits, respectively. The status of all impacts should be negative unless otherwise indicated. The significance of impacts with and without mitigation is also assessed.

The project is assessed in terms of the following potential biophysical and socio-economic impacts:

- Air Quality;
- Noise
- Vegetation.
- Socio-economic;
- Visual;
- Heritage; and
- Traffic.

7.1 Air Quality

7.1.1 Increase in Particulate Matter and Dustfall Emissions During Construction

7.1.1.1 Impact description

Construction activities will generate both dustfall (settling coarse particles) and airborne particulate matter (PM_{10} and $PM_{2.5}$) because of vegetation clearance, ground-breaking, earthmoving, material handling, and the movement of heavy-duty vehicles delivering construction materials to the site. Disturbance of exposed soils and unpaved areas creates fugitive dust plumes, particularly during dry and windy conditions, while loading, off-loading, and stockpile management contribute additional fine particulate emissions. These emissions can reduce local air quality, increase nuisance dust deposition on nearby receptors, and may temporarily obscure visibility along construction routes.

7.1.1.2 Assessment

The generation of dustfall and fine particulate matter (PM_{10} and $PM_{2.5}$) during construction is expected to result in short-term, localised reductions in ambient air quality. Emissions will occur intermittently and are directly linked to active construction tasks such as earthworks, material handling, and movement of heavy-duty vehicles.

From the specialist baseline monitoring (see Section 6.6.5), PM_{10} and $PM_{2.5}$ annual averages complied with NAAQS but exceeded the most stringent WHO/IFC annual AQG, reflecting metropolitan “brown haze” tendencies rather than project-specific effects. Given the generally low baseline concentrations of PM_{10} and $PM_{2.5}$ measured at the site and the absence of sensitive receptors within proximity to major earthmoving areas, the potential for exceedances of national standards is considered low. However, nuisance dust and temporary visibility reduction may occur at receptors immediately adjacent to the construction footprint, particularly under dry and windy conditions, when fugitive dust generation is highest.

The impact is partially reversible as once construction activities are completed the ambient air quality naturally recovers and would not result in any long-term degradation of



atmospheric resources. Standard construction-phase controls (e.g., water suppression, covering stockpiles, speed management, housekeeping) are expected to significantly reduce the probability/frequency of fugitive dust emissions, bringing residual impacts to low levels.

Overall, the impact of construction-related dust and particulate emissions is assessed to be of **low** significance before mitigation. With the implementation of the recommended mitigation measures, the probability of impacts would reduce, with effects limited to being of short-term nuisance in the immediate vicinity of the property boundary. Thus, the significance of the impact reduces to **Very Low** with mitigation.

Table 7-1: Assessment of Increase in Particulate Matter and Dustfall Emissions During Construction

Increase In Particulate Matter and Dustfall Emissions		
Type	Direct	
Nature	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change (Low)	Negligible change (Very low)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Beyond site	Beyond site
Consequence	Low	Low
Probability	Definite / Continuous (Very high)	Possible / frequent (Medium)
Significance	Low -	Very Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Partially reversible – emissions stop once construction ends and ambient air quality naturally recovers, but the short-term nuisance effects that occur during construction such as temporary dust deposition and visibility reduction cannot be undone after they have occurred.	
Degree to which impact may cause irreplaceable loss of resources	Low – the impact affects common, non-sensitive resources mainly air quality and surface conditions that recover naturally and do not undergo permanent damage or loss.	
Degree to which impact can be avoided	Medium – standard preventative measures can substantially reduce dust generation but cannot eliminate emissions entirely during active construction.	
Degree to which impact can be mitigated	High – well-established dust-control measures, such as water suppression, speed regulation, and proper material handling, can be readily implemented and are effective in significantly reducing the magnitude of emissions.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Construction activities will introduce temporary increases in dust and particulate matter; however, these emissions are short-term, localised to the construction footprint, and readily managed through standard dust suppression measures. As a result, they do not materially elevate long-term ambient particulate levels within the airshed.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Very low -	Very low -



7.1.1.3 Mitigation Measures

Mitigation measures are proposed for the management of air quality during the construction phase and include the following:

- Use water sprays (subject to any water use restrictions that may be in place at the time of construction) and dust suppression during the construction phase.
- Limit speed of construction vehicles on unsurfaced roads to reduce dust.
- Cover materials and chemicals during transport.
- Schedule deliveries outside peak traffic hours.
- Maintain construction equipment to minimise diesel exhaust emissions.

7.1.1.4 Monitoring

The following monitoring measures are recommended:

- Record incidents, deviations, and corrective actions for emissions or complaints.
- Keep maintenance logs for construction equipment to ensure engines are not producing unnecessary exhaust emissions.

7.1.2 Increase In Atmospheric Emissions During Operations

7.1.2.1 Impact description

Operation of the proposed vaccine manufacturing facility will generate limited atmospheric emissions associated primarily with enclosed process activities, HVAC systems, standby generators, boiler use (if applicable), chemical/solvent handling, and minor traffic movements. Vaccine manufacturing processes are largely contained within controlled cleanroom environments, meaning routine operations are not expected to release significant quantities of particulate matter, combustion gases or VOCs to the atmosphere.

Potential emissions include small quantities of NO₂, SO₂, CO and PM from backup power generation during load-shedding or maintenance events, as well as low-level VOCs from solvent storage, formulation processes, and laboratory-scale activities. Fugitive emissions may occur only during abnormal operational events or during maintenance of ventilation and filtration systems.

7.1.2.2 Assessment

The site-representative baseline measured at fenceline locations and regional SAAQIS stations shows that ambient SO₂, NO₂, NH₃, CO and BTEX were very low and within South African NAAQS (see Section 6.6.6.) Across 2022–2024, the Maitland SAAQIS station recorded the following:

- No exceedances of the 200 µg/m³ NAAQS/WHO value for 1-hour NO₂;
- The 24-hour WHO NO₂ (25 µg/m³; 4 exceedances allowed) was exceeded 36, 64 and 41 times respectively;
- SO₂ showed occasional short-term exceedances (e.g., 24-hour WHO and NAAQS at Maitland/Athlone with low data recovery); and
- CO remained below limits.



Operational emissions are expected to be small due to the enclosed and HEPA-filtered nature of production processes, the intermittent and short-duration profile of standby generator use, and the favourable dispersion regime created by prevailing southerly to south-easterly winds, very low calm periods, and an open fetch around the site. These characteristics collectively indicate that project-related emissions will be minor in magnitude, localised within the immediate airshed, and episodic rather than continuous. For this reason, the intensity of the impact is rated as a minor change (Low), the extent remains local, and the duration is considered permanent as it spans the operational lifespan of the facility rather than denoting permanent pollutant loading. The probability is rated as possible/frequent, recognising that some emission events such as mechanical ventilation and generator testing will occur periodically over time. When these criteria are combined, the overall pre-mitigation significance of operational air-quality impacts is assessed as **Low**.

With the implementation of the recommended mitigation measures, the magnitude and frequency of emissions are further reduced. Enhanced HVAC efficiency and maintenance, sealed cleanroom operations, appropriately designed ventilation systems, disciplined generator testing schedules, and improved logistical efficiency collectively lower the contribution of operational emissions. These measures reduce the intensity from Low to Very Low and the probability from Medium to Low, as emission-generating events become less frequent and shorter in duration. The extent and duration remain unchanged because these characteristics are inherent to the nature and lifespan of the facility. Following mitigation, the overall post-mitigation significance is therefore reduced to **Very Low**, with impacts limited to short, infrequent episodes during backup generator operation or abnormal conditions.

Table 7-2: Assessment of Increase in Air Emissions During Operation

Increase in Air Emissions During Operation		
Type	Direct	
Nature	Negative	
Phases	Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change (Low)	Negligible change (Very low)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Local	Local
Consequence	Medium	Medium
Probability	Possible / frequent (Medium)	Conceivable (Low)
Significance	Low -	Very Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible – due to the current operational emissions at the existing facility being low, occurring mainly during intermittent events, and cease entirely when the activity stops, allowing ambient air quality to return to baseline conditions without causing any lasting or irreversible environmental change.	
Degree to which impact may cause irreplaceable loss of resources	None – the emissions involved are low in magnitude, affect only common and non-sensitive environmental resources such as ambient air, and do not result in any permanent degradation, damage, or loss of ecological, physical, or cultural assets.	
Degree to which impact can be avoided	Medium – operational emissions would arise from essential functions such as ventilation systems and standby generators, which cannot be entirely avoided, although good design and engineering controls substantially reduce their occurrence and magnitude.	



Increase in Air Emissions During Operation		
Degree to which impact can be mitigated	High – established engineering controls such as HEPA-filtered HVAC systems, sealed cleanroom operations, proper ventilation design, and the effective management of standby generator emissions are readily implementable and significantly reduce the magnitude of atmospheric emissions during operation.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Possible – a cumulative impact is considered possible because operational emissions, although very low, occur within an airshed that includes other industrial, commercial, and transport-related sources, meaning that minor contributions from the facility could combine with existing background emissions under certain conditions, even if the overall influence remains negligible.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Low -	Low -

7.1.2.3 Mitigation Measures

The following mitigation measures are recommended to manage this impact:

- Maintain HEPA filtration and pressure-controlled cleanrooms to prevent particulate and biological emissions.
- Use local exhaust ventilation (LEV) in formulation, solvent-use, and fill-finish areas to capture VOCs at source.
- Ensure sealed systems and closed transfer lines for solvents and drug-substance processing.
- Use low-sulphur diesel or cleaner fuels for standby generators.
- Conduct regular maintenance of generators, boilers and HVAC systems to minimise NO_x, SO₂, CO and PM emissions.
- Schedule generator testing during off-peak periods and limit run-time to essential operation only.
- Store solvents and disinfectants in bunded, ventilated, and appropriately labelled areas.
- Use low-VOC cleaning agents and disinfectants where feasible.
- Keep chemical containers closed when not in use to limit fugitive emissions.
- Inspect and maintain piping, seals, ducts, and gaskets to prevent leaks.
- Immediately seal waste containers and ensure proper handling to avoid accidental releases.

7.1.2.4 Monitoring

The following methods for monitoring are recommended:

- Maintain accurate records of fuel use, solvent consumption, filtration replacement, and generator operation.
- Undertake targeted ambient monitoring if complaints arise, if processes change, or if emissions unexpectedly increase.
- Implement an incident and odour/emission reporting procedure.
- Integrate air-quality controls into SOPs for all operational processes.



- Train staff in correct chemical handling, cleanroom discipline, and use of emission-control systems.
- Perform internal audits to ensure ongoing compliance.
- Maintain a functional grievance mechanism for nearby communities to report air quality concerns.
- Record incidents, deviations, and corrective actions for emissions or complaints.
- Communicate proactively regarding unusual events such as planned generator tests or maintenance activities.

7.2 Climate Change

This assessment is sourced from the Climate Change Risk Assessment (CCRA¹⁰) undertaken for the project. It does not apply the standard SLR impact assessment methodology as it is not deemed to be appropriate for assessing the impact of GHG emissions. This is because the methodology tends to overstate the significance of the impact despite the relatively insignificant contribution of a Project's GHG emissions due to the global extent of the impact, long-term duration (~100 years), and high probability of the impact occurring.

The assessment of related impacts, therefore, assesses the Project's GHG emissions in terms of two criteria:

- Contribution to South Africa's modelled domestic pathways.
- Pre-defined thresholds.

The first criterion for assessing the potential impact of the Project's GHG emissions is the potential contribution to South Africa's modelled domestic pathways. Climate Action Tracker (CAT) uses rating categories and modelled domestic pathways to evaluate whether a country's targets and policies are on track towards decarbonisation in line with 1.5°C temperature limit of the Paris Agreement¹¹. CAT derives country-level pathways from modelled global pathways, considering a "fair share range" for each country. CAT uses the following rating categories for the modelled domestic pathways:

- **1.5°C Paris Agreement compatible:** Indicates that a country's climate policies and commitments are consistent with the Paris Agreement's 1.5°C temperature limit.
- **Almost sufficient:** Indicates that a country's climate policies and commitments are not yet consistent with the Paris Agreement's 1.5°C temperature limit but could be with moderate improvements.
- **Insufficient:** Indicates that a country's climate policies and commitments need substantial improvements to be consistent with the Paris Agreement's 1.5°C temperature limit.
- **Highly insufficient:** Indicates that a country's climate policies and commitments are not consistent with the Paris Agreement's 1.5°C temperature limit. For many countries in this category, policies and commitments lead to rising, rather than falling, emissions.

¹⁰ Climate-related hazards affecting the project (extreme heat, high rainfall events, and water scarcity) do not represent project impacts and are therefore not assessed here. These are evaluated in the Climate Change Risk Assessment (SLR, 2026) and managed through adaptation measures in the ESMP Risk Register

¹¹ Climate Action Tracker (2022). *South Africa*. <https://climateactiontracker.org> [accessed on 04 January 2026].



Figure 7-1 presents South Africa's policies and action, as well as the Country's NDC targets, relative to CAT's rating categories. In summary, South Africa's "policies and action" are considered insufficient, while the "NDC targets" are considered almost sufficient.

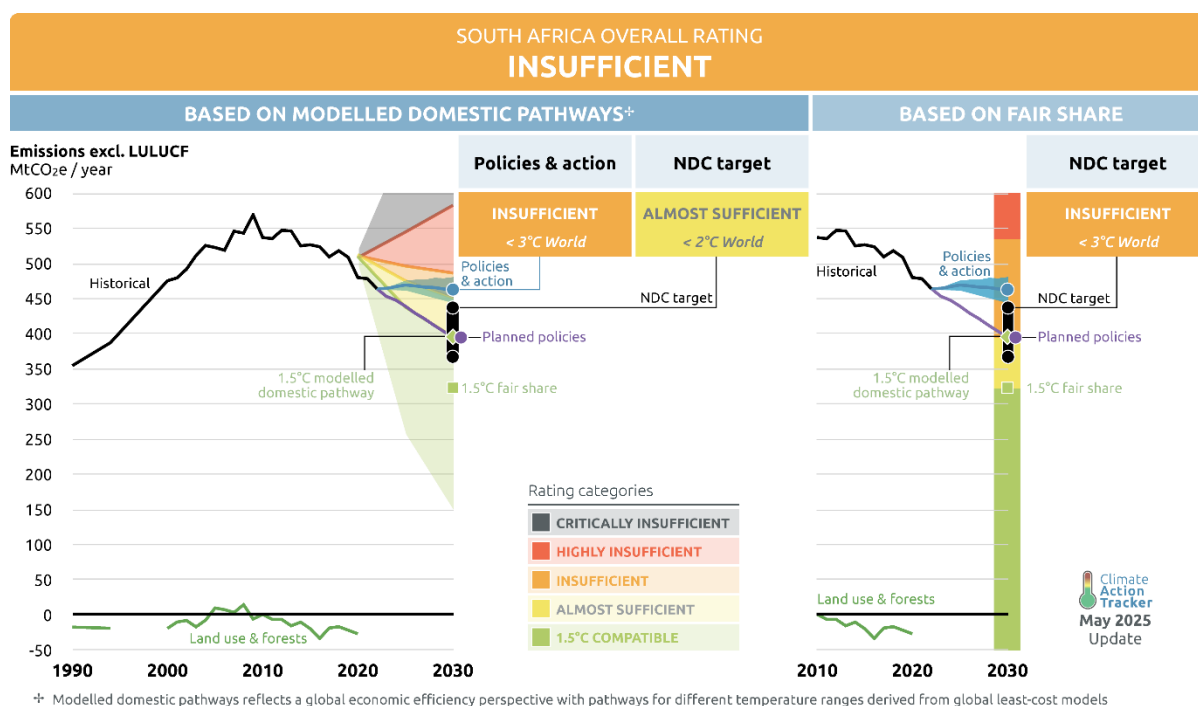


Figure 7-1: South Africa's modelled domestic pathways¹²

While these calculations provide a useful indication of the scale of the contribution of the Project's GHG emissions to South Africa's domestic pathways, this approach does have some limitations:

- First, the contribution of a single project to national GHG emissions inventory is unlikely to look significant, particularly if the project is located within a country, such as South Africa, with high emissions relative to most other countries.
- Second, there are no official benchmarks which could be used to determine the significance of the Project's contribution to the national GHG emissions.

The impact significance is therefore not formally rated.

The second criterion for assessing the Project's GHG emissions is benchmarking against pre-defined thresholds developed by the European Bank of Reconstruction and Development (EBRD) - Table 7-3. The thresholds are used by the EBRD for initial screening to determine the order of magnitude of a Project's annual GHG emissions during the operational phase¹³. These thresholds are used by EBRD as an early indicator of a project's likely contribution to the Bank's GHG inventory and GHG intensity of the Bank's investment portfolio. In the absence of other commonly agreed thresholds they are used as a proxy to rate the significance of the Project's GHG emissions contribution to atmospheric GHG concentrations.

¹² Ibid

¹³ EBRD (2010). *EBRD Methodology for Assessment of Greenhouse Gas Emissions*. Version 7, 6 July 2010



Table 7-3: Thresholds for assessing the significance of a Project's GHG emissions

Benchmark thresholds (tCO ₂ e/a) ¹⁴	Significance rating
Negligible	Very low
< 20,000	Low
> 20,000 and < 100,000	Medium-low
> 100,000 and < 1 million	Medium-high
> 1 million	High

7.2.1 Contribution to South Africa's Modelled Domestic Pathways

As noted above, the first criterion for assessing the Project's Greenhouse Gas (GHG) emissions is the contribution of the project to South Africa's four modelled domestic pathways. With reference to CAT, the contribution of the Project's estimated GHG emissions to country's four modelled pathways was calculated for the period 2027 to 2050 and ranges between 0.000649% (Highly Insufficient pathway) and 0.006364% (1.5°C Paris Agreement Compatible pathway).

7.2.2 Benchmarking Against Pre-Defined Thresholds

The second criterion for assessing the Project's GHG emissions is benchmarking Project-related GHG emissions against pre-defined thresholds.

The Project's average annual GHG emissions during the operations phase are estimated to be 7,244 tCO₂e. Based on the EBRD developed thresholds (see Table 7-3), the significance of the Project's annual GHG emissions is classed as **Very Low**.

7.2.2.1 Mitigation Measures

Required mitigation measures to further reduce the Project's GHG emissions are listed below:

- Size diesel generators appropriately so that they run at their optimal workload (e.g., 70% to 100% of total load rating).
- Regularly maintain diesel generators in accordance with the manufacturers service schedule.
- Source construction materials as close to the work front as possible to reduce transport distances and carbon emissions.
- Maximise vehicle loads for the transport of materials and equipment to increase fuel efficiency and reduce emissions.
- Train truck drivers on good driving practices to improve fuel economy and reduce carbon emissions.

¹⁴ Projects in the Negligible Emission Category typically involve activities with negligible emissions. This includes for example, telecommunications, civil construction projects, industrial wastewater treatment, and small size-built environment projects (i.e., overall floor area < 1,000 m²). For projects in this category, a CCRA is generally not warranted. Projects in the Low and Medium-Low categories typically involve activities with very low to low carbon emissions. This includes for example, property developments, light industrial facilities, agricultural processing facilities, road development projects, municipal solid waste landfill, and brick manufacturing. For projects in these categories, a CCRA is generally not warranted, but should be assessed on a project-by-project basis. Projects in the Medium-High and High Categories, typically involve activities with high carbon emissions. This includes for example, fuel production and processing, glass manufacturing, cement and lime works, metal manufacturing and processing plants, and power generating plants. For projects in this category, a CCRA is generally considered to be mandatory.



- Optimise HVAC energy performance by implementing measures such as:
 - Optimise temperature settings using programmable thermostats and building management system.
 - Improve insulation and sealing by adding insulation to walls, ceilings, and ductwork, where possible.
 - Conduct regular maintenance (e.g. clean or replace air filters) in accordance with manufacturers specifications.
 - Install variable speed drives on fans and pumps, where possible, for better load matching.
 - Reduce internal heat loads by using LED lighting and energy-efficient appliances.
 - The facility should, where possible utilise refrigerant gasses that exhibit a low global warming potential ('GWP'), for example carbon dioxide ('CO₂') or hydrofluoroolefins ('HFOs').

Monitoring

The following methods for monitoring are recommended:

- Record monthly electricity consumption (kWh) for all buildings, HVAC systems and utilities.
- Track solar PV output and confirm inverter derate (0.85 factor used in the CCRA).
- Review energy trends and identify unusual consumption spikes.

7.3 Noise

7.3.1 Increase in Nuisance Noise during Construction

7.3.1.1 Impact description

Construction activities will generate intermittent noise from earthmoving machinery, construction vehicles, generators, compressors, power tools and general site operations. These emissions will be short-term and localised to the development footprint but may propagate to the adjacent residential area.

Baseline monitoring indicates that the existing acoustic environment is influenced by transport activity, surrounding industrial operations, and meteorological conditions. During Phase 1 monitoring, daytime wind speeds averaged approximately 5.8 m/s, marginally above recommended limits for noise monitoring, while nighttime wind speeds were highest at the residential receptor, reaching up to 10.3 m/s. During Phase 2 monitoring, wind conditions exhibited greater variability in direction, with lower nighttime wind speeds (approximately 1.1–2.2 m/s) and intermittent daytime wind speeds reaching up to 8.8 m/s.

Although construction activities will be limited to daytime hours, the proximity of sensitive receptors means that construction noise has the potential to periodically elevate ambient noise levels and cause nuisance if not appropriately managed, particularly under conditions where baseline ambient levels are already elevated by meteorological factors.

7.3.1.2 Assessment

In the absence of mitigation, construction noise is expected to intermittently approach or exceed guideline thresholds at the nearest residential receptor, particularly during periods of



intensive activity or simultaneous operation of multiple machines. During the Phase 1 of monitoring, the hourly baseline measurements at the NSR 1 show daytime levels of 53.63 dB(A), which are close to the SANS and IFC daytime limits of 55 dB(A), indicating limited residual capacity for additional noise without exceeding thresholds.

Similarly, Phase 2 monitoring recorded daytime noise levels of 51.71 dB(A) at NSR 1, 54.50 dB(A) at NSR 2, and 52.30 dB(A) at NSR 3. These results likewise indicate limited residual capacity for additional construction-related noise without exceeding applicable guideline thresholds.

Construction noise impacts will be temporary and fully reversible which, despite the proximity of sensitivity of residential receptors, results in a pre-mitigation significance rating of **Low**. Despite the implementation of standard construction-phase controls including restricted working hours and equipment maintenance, given the limited residual capacity for additional noise without exceeding the above-mentioned thresholds in proximity to the site, the significance of construction noise impacts remains **Low**.

Table 7-4: Assessment of Increase in Nuisance Noise During Construction

Increase in Nuisance Noise During Construction		
Type	Direct	
Nature	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Prominent change (High)	Moderate change (Medium)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Local	Local
Consequence	Low	Low
Probability	Definite / Continuous (Very high)	Probable (High)
Significance	Low -	Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible – construction noise is temporary, occurring only during the active construction period, and ceases entirely once the works are completed, allowing ambient noise levels to return to baseline conditions without causing any lasting or permanent change to the acoustic environment.	
Degree to which impact may cause irreplaceable loss of resources	None – construction noise does not damage or permanently alter any physical, ecological, or cultural resources; it only creates temporary disturbance, and once construction activities cease, the acoustic environment returns to baseline conditions without any lasting loss.	
Degree to which impact can be avoided	Low – construction noise is inherently linked to essential activities such as earthworks, equipment operation, and vehicle movement, meaning the impact cannot be prevented altogether; some measures can be applied to reduce noise, but they will only have a marginal effect in lowering the overall significance.	
Degree to which impact can be mitigated	Medium – feasible noise control measures such as equipment maintenance, operational controls, and	



Increase in Nuisance Noise During Construction		
	temporary barriers can be implemented to reduce noise levels, although they may only partially decrease the overall impact and cannot eliminate construction-related noise entirely.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Likely – construction activities such as earthworks, material handling, heavy-duty vehicle movements and operation of powered equipment typically generate noise levels that, even after distance attenuation, will combine with existing transport and industrial noise sources in this mixed-use urban environment. As a result, the addition of construction noise is expected to be perceptible and will cumulatively increase ambient levels at times, making cumulative construction-phase impacts likely, although these will remain short-term, intermittent, and manageable through standard mitigation measures.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium -	Low -

7.3.1.3 Mitigation Measures

The following mitigation measures are recommended to manage the increase in nuisance noise during construction:

- Schedule high-noise construction activities during standard daytime hours (e.g., 07:00–17:00) to reduce residential disturbance.
- Use low-noise construction equipment where feasible and maintain it properly.
- Install temporary acoustic barriers around high-noise operations, such as generators, compressors, or material handling areas.
- Plan construction and delivery traffic routes to avoid residential streets and sensitive receptors.
- Limit idling of construction and delivery vehicles near sensitive receptors.

7.3.1.4 Monitoring

The following monitoring measures are recommended:

- Routine operational noise compliance monitoring is not required. However, procedures should be in place to respond to exceptional noise-related complaints during both construction and operational phases. All external complaints must be recorded, investigated, and retained in complaints register.

7.3.2 Increase in Ambient Noise during Operation

7.3.2.1 Impact description

During operation, the proposed Biovac facility will generate continuous, low-intensity noise from HVAC systems, ventilation units, compressors, chillers, pumps, standby generators (during testing), and general building services plant typically associated with pharmaceutical manufacturing. These sources are expected to operate predominantly during daytime, with certain mechanical systems running 24 hours to maintain temperature-controlled production environments. Noise emissions will be steady-state rather than intermittent, and will



propagate beyond the site boundary, including toward the nearest residential receptors as indicated in Figure 6-30.

Given the proximity to existing industrial and transport noise sources, operational noise from the facility may incrementally elevate ambient sound levels and contribute to nuisance if not properly controlled, particularly where tonal or mechanical characteristics are present.

7.3.2.2 Assessment

Baseline monitoring results indicate that daytime ambient noise levels at NSR 1 were measured at 53.63 dB(A) during Phase 1 and 51.71 dB(A) during Phase 2, both of which comply with the applicable daytime guideline limit of 55 dB(A). Night-time noise levels at NSR 1 were measured at 49.49 dB(A) during Phase 1 and 46.05 dB(A) during Phase 2, marginally exceeding the SANS 10103:2008 and IFC/WHO night-time guideline of 45 dB(A).

During Phase 2, daytime noise levels of 54.50 dB(A) and 52.30 dB(A) were recorded at NSR 2 and NSR 3, respectively, both of which comply with the daytime guideline. Night-time measurements indicated levels of 44.20 dB(A) at NSR 2 and 63.20 dB(A) at NSR 3. Accordingly, night-time guideline exceedances were observed at NSR 1 and NSR 3 according to the IFC/WHO guideline values. However, the assessment recognises that ambient outdoor noise levels were influenced by multiple interacting sources, including transport activity, surrounding industrial operations, human activity, and varying meteorological conditions. As a result, short-term variations in measured noise levels cannot be confidently attributed to a single source. On this basis, direct attribution of the observed night-time exceedances to Biovac operations is not supported by the baseline monitoring data.

Operational noise from the proposed facility is nevertheless anticipated to be low in magnitude, as most mechanical plant will be located within buildings, acoustically enclosed, or screened as part of standard pharmaceutical facility and clean-room design. However, continuous infrastructure such as HVAC and ventilation systems could, if unmitigated, introduce low-level tonal or broadband noise that may be perceptible at nearby residential receptors. Given the sensitivity of the receiving environment and the limited remaining night-time noise headroom identified in the baseline, the potential unmitigated operational noise impact is conservatively assessed as being of **Medium** significance, thereby necessitating the implementation of good-practice design and operational noise control measures.

With mitigation, including the specification of low-noise mechanical equipment, acoustic housings, vibration isolation, duct attenuation, silencers, and avoidance of tonal frequencies, the resultant operational noise levels are expected to generally remain below guideline thresholds. Residual significance is therefore assessed to be **Low**.

Table 7-5: Assessment of Increase in Ambient Noise During Operation

Increase in Ambient Noise During Operation		
Type	Direct	
Nature	Negative	
Phases	Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change (Medium)	Minor change (Low)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Local	Within/ near site
Consequence	Medium	Medium



Increase in Ambient Noise During Operation		
Probability	Definite / Continuous (Very high)	Possible / frequent (Medium)
Significance	Medium -	Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible – operational noise is tied entirely to running equipment and mechanical systems and ceases immediately when plant is switched off or if operations stop. No permanent change to the acoustic environment occurs.	
Degree to which impact may cause irreplaceable loss of resources	None – no physical or ecological resource is permanently affected.	
Degree to which impact can be avoided	Low – the impact cannot be prevented altogether; some measures can be applied to reduce noise, but they will only have a marginal effect in lowering the overall significance.	
Degree to which impact can be mitigated	Medium – feasible noise control measures such as equipment maintenance, operational controls, and temporary barriers can be easily implemented to reduce noise levels.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Possible – regional ambient noise includes contributions from transport, rail activity, and surrounding industrial sources. The facility's incremental contribution is small and does not materially elevate cumulative levels but is part of a broader industrial acoustic environment.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium -	Low -

7.3.2.3 Mitigation Measures

The following mitigation measures are recommended for managing the increase in ambient noise levels:

- Maintain all equipment according to manufacturer schedules to prevent excessive noise from wear or misalignment.
- Maintain all noise-control equipment regularly to ensure ongoing effectiveness.
- Plan operations and delivery routes to avoid peak residential disturbance times.
- Limit high-noise activities near sensitive receptors, including short-term operational adjustments if complaints arise.
- Enclose major mechanical systems such as HVAC units, cooling towers, and generators with acoustic enclosures.
- Install silencers, vibration isolators, and dampers on pumps, compressors, and fans.
- Strategically locate high-noise equipment as far as practicable from sensitive receptors (e.g., fenceline to nearest residence).
- Use building design measures: sound-insulating materials, double-glazed windows, and façade treatments to reduce off-site noise propagation.

7.3.2.4 Monitoring Measures

The following monitoring measures are recommended:



- Routine operational noise compliance monitoring is not required. However, procedures should be in place to respond to exceptional noise-related complaints during both construction and operational phases. All external complaints must be recorded, investigated, and retained in the form of a complaints register.
- Where necessary, follow-up noise monitoring should be undertaken at locations relevant to the complaint to assess compliance with SANS 10103:2008. The purpose of such monitoring will be to verify the validity of complaints and determine whether additional mitigation measures are required.
- Post-commissioning noise verification monitoring to be undertaken if complaints arise or operational changes occur. Monitoring results to be assessed against SANS and IFC/WHO limits and the +3 dB(A) above background criterion. Corrective actions to be implemented where exceedances are identified.

7.4 Vegetation

7.4.1 Loss of Natural Vegetation

7.4.1.1 Impact description

The proposed development will result in the removal of all remaining vegetation within the project footprint. The site is already heavily transformed through past disturbance and general surrounding development, as such no remnant natural habitat remains on the property.

Although the area historically supported Critically Endangered Cape Flats Sand Fynbos, this vegetation type is now entirely absent from the site and cannot be restored due to the complete transformation of the property. As a result, the vegetation currently present is considered degraded with negligible ecological value and cannot be deemed as critical habitat.

7.4.1.2 Assessment

Given that the site is already highly degraded and no longer supports any natural vegetation, ecological communities or species of conservation concern, the loss of vegetation associated with the proposed development is assessed as having very low ecological consequence.

The historical presence of Critically Endangered Cape Flats Sand Fynbos is acknowledged; however, this vegetation type has been entirely lost prior to the project and is not recoverable, the proposed activity will not contribute to additional loss of irreplaceable habitat. The impact is therefore of very low intensity, permanent duration but limited to the site extent. Consequently, the significance of this impact remains low (with or without mitigation) as no viable natural vegetation, ecological processes, or restoration potential presently occur on the site.

Table 7-6: Assessment of Loss of Vegetation

Loss of Vegetation and Ecological Processes		
Type	Direct	
Nature	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Negligible change (Very low)	Negligible change (Very low)



Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Within/ near site	Within/ near site
Consequence	Low	Low
Probability	Definite / Continuous (Very high)	Definite / Continuous (Very high)
Significance	Low -	Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Irreversible – the area is completely transformed. Leaving no remnants of natural habitat that could recover.	
Degree to which impact may cause irreplaceable loss of resources	None – the site no longer supports any natural habitat, ecological communities or species of conservation.	
Degree to which impact can be avoided	Medium – the site no longer supports any natural habitat, ecological communities or species of conservation.	
Degree to which impact can be mitigated	N/A	
Cumulative Impact		
Extent to which a cumulative impact may arise	Unlikely – the site is already heavily transformed, and no natural vegetation or ecological processes of conservation value remain within the project footprint.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Insignificant	Insignificant

7.4.1.3 Mitigation Measures

No mitigation is deemed necessary.

7.5 Socio-economic

7.5.1 Creation of Employment Opportunities During Construction

The construction phase of the project will generate a temporary workforce across a range of skill levels, including skilled trades, semi-skilled general labour, and unskilled workers. The specific number of construction workers required for the project is not known at this stage. It is expected that many of these would be existing employees for contractors and sub-contractors, however, some additional new positions may be made available for the project.

In addition to direct job opportunities, the presence of contractors, subcontractors, and ancillary service providers often creates indirect employment and short-term livelihood opportunities within areas such as catering, transport, security services, temporary accommodation, and small-scale supply of materials. These indirect benefits, though usually more diffuse and less predictable, nonetheless contribute to broader income circulation within nearby communities.

However, construction-related employment also tends to raise community expectations. Without clearly communicated recruitment processes, or if labour is primarily sourced through external subcontractors, there is a risk that job allocation may be perceived as unfair, exclusionary, or favouring certain groups over others. These perceptions can generate social tension, feelings of mistrust, or grievances, even in cases where recruitment processes are compliant and equitable. Such risks reflect the socio-economic dynamics of the job market in South Africa rather than any inherent consequence of the project itself.



7.5.1.1 Impact Assessment

The construction phase will generate short-term employment opportunities, creating a direct and positive socio-economic impact for local communities. Given the construction duration of less than one year, the impact is low in intensity but definite, resulting in a **Very Low (positive)** significance rating before mitigation.

With the implementation of enhancement measures such as prioritising the use of local labour and implementing transparent recruitment processes, the benefit increases to a **Low (positive)** impact.

Table 7-7: Assessment of Creation of Employment Opportunities During Construction

Creation of Employment Opportunities During Construction		
Type	Direct	
Nature	Positive	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change (Low)	Moderate change (Medium)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Local	Local
Consequence	Very Low	Low
Probability	Possible / frequent (Medium)	Definite / Continuous (Very high)
Significance	Very Low +	Low +
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible – impact will cease once construction ends	
Degree to which impact may cause irreplaceable loss of resources	None	
Degree to which impact can be avoided	None	
Degree to which impact can be mitigated/enhanced	High	
Cumulative Impact		
Extent to which a cumulative impact may arise	Likely	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Very Low +	Very Low +

7.5.1.2 Enhancement measures:

- Implement a Local Employment Strategy prioritising candidates from neighbouring communities (where possible).
- Maintain transparent, merit-based recruitment criteria.
- Establish local SMME supplier pipelines (catering, cleaning, transport, security).
- Provide fair wages, safe working conditions, and clear employment contracts.



- Develop and implement a fair and transparent labour, working condition and recruitment policy, which complies with local law, IFC Performance Standard 2: Labour and Working Conditions, and International Labour Organisation (ILO) conventions:
 - ILO convention 87 on Freedom of Association and protection of the right to organise;
 - ILO convention 98 on the right to organise and collective bargaining;
 - ILO convention 29 on forced labour;
 - ILO convention 105 on the abolition of forced labour;
 - ILO convention 138 on the minimum age of employment;
 - ILO convention 182 on child labour;
 - ILO convention 100 on equal remuneration; and
 - ILO convention 111 on discrimination.
- Ensure contractors abide by the labour and recruitment policy.
- Maintain an internal worker grievance mechanism with confidential reporting and timely resolution.

7.5.2 Increased Security Risks During Construction

7.5.2.1 Impact Description

During the construction phase, the introduction of high-value equipment, machinery, fuel stores, and construction materials onto the site has the potential to elevate security risks within the immediate area. Construction sites often contain portable tools, metals, electrical components, and other items that can attract opportunistic theft or unauthorised access, especially during periods when the site is unattended.

In the early stages of site establishment, temporary fencing and incomplete boundary control can further increase vulnerability. The influx of construction workers and subcontractors may also create concerns among local residents related to unfamiliar individuals accessing the area. These conditions may lead to heightened community perceptions of insecurity and, in some cases, isolated incidents of theft, vandalism, or attempted intrusion.

This represents a short-term increase in security risk, directly associated with construction activities, and differs from long-term operational impacts or pre-existing safety challenges in the area.

7.5.2.2 Assessment

The 2025 focus group discussions conducted by Mthente Consulting and Research Services, highlighted existing community concerns regarding petty theft, vandalism, and general security vulnerabilities in the areas surrounding the project site (Mthente Research and Consulting Services, 2025b) (Mthente Research and Consulting Services, 2025c). These issues reflect long-standing socio-economic conditions and the presence of under-managed spaces that have historically enabled opportunistic crime. Against this baseline, the introduction of high-value construction equipment, tools, machinery, and fuel stores during site establishment temporarily increases the attractiveness of the area for opportunistic theft, particularly before perimeter controls are fully installed.

Given these existing vulnerabilities and the nature of construction activities, the probability of security-related incidents occurring in the absence of mitigation is considered high, and isolated incidents are viewed as definite or very likely during early works. However, the



extent of this impact is limited to the construction footprint and immediate surroundings, and the duration is very short-term, as construction is expected to be completed within less than one year. While the introduction of valuable materials elevates the potential for opportunistic theft, the overall significance remains **Low**, as incidents would be localised, reversible, and unlikely to result in broader community-level harm.

With mitigation, the likelihood and intensity of the impact reduce. Standard construction-phase security measures will substantially lower the opportunity for unauthorised access or theft. As a result, the probability of security incidents decreases from “probable” to “possible/frequent,” and the intensity falls from moderate to low, reflecting the effectiveness of these measures. Given its very short duration, full reversibility, and strong potential for mitigation, the residual impact is assessed to be **Very Low**.

Table 7-8: Assessment of Increased Risks during Construction

Increased Security Risks During Construction		
Type	Direct	
Nature	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change (Medium)	Minor change (Low)
Duration	Very Short-term (< 1 year)	Very Short-term (< 1 year)
Extent	Local	Local
Consequence	Low	Very Low
Probability	Probable (High)	Possible / frequent (Medium)
Significance	Low -	Very Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible – security related risks such as opportunistic crime, unauthorised access, or theft are temporary and occur only during the construction period when the site is open, busy and more accessible. These risks cease once construction is complete and the site transitions to a controlled operational environment with permanent security infrastructure in place.	
Degree to which impact may cause irreplaceable loss of resources	None	
Degree to which impact can be avoided	Medium – the impact cannot be avoided, but mitigation measures can reduce the risk of the impact.	
Degree to which impact can be mitigated	High – mitigation measures can be easily applied.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Possible	
Rating of cumulative impacts	Without Mitigation	With Mitigation



	Low -	Very Low -
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7.5.2.3 Mitigation Measures

The following mitigation measures are recommended:

- Install a fully enclosed perimeter fence around the construction site before major materials or equipment are brought on-site.
- Establish single-entry-controlled access points with security personnel.
- Enforce sign-in/out procedures for all contractors, visitors, and delivery personnel.
- Deploy trained and vetted security officers on a 24-hour basis during active construction.
- Implement regular internal and perimeter patrols, especially at night and during weekends.
- Ensure security staff are equipped with radios and clear escalation protocols.
- Maintain a daily inventory log of all tools, equipment, and fuel.
- Install temporary construction lighting along the perimeter, access points, storage zones, and dark corners.
- Deploy CCTV cameras at gates, equipment yards, and material storage areas (if feasible).
- Establish communication with Pinelands CID, City law enforcement, and SAPS to ensure quick response to incidents.
- Share site access and emergency contact information with local authorities.
- Record all security incidents in an Incident Register (nature, location, time, response).
- Implement investigation and corrective action procedures for recurring issues.
- Ensure rubbish, scrap, and unused materials are removed quickly.

7.5.3 Creation of Employment Opportunities During Operations

7.5.3.1 Impact description

Operation of the proposed new facility will create a stable portfolio of jobs across specialised fields, such as bioprocessing, laboratory and quality functions, engineering and maintenance, logistics, facility management, and administration (see Section 5.5.2). Many of these roles demand competencies that are scarce locally, thereby addressing a recognised gap in high-value employment. The project's structured learning and development pathways (e.g., internships, apprenticeships, on-the-job technical training, mentorship, and progression frameworks) enable early-career entrants and under-represented groups to access, build, and retain specialised skills. Over time, this strengthens the local skills ecosystem, boosts worker mobility and earnings potential, and supports a more resilient biotech/pharmaceutical value chain in the region.

7.5.3.2 Assessment

The creation of long-term operational employment represents a positive socio-economic impact; however, as most of these roles require specialised scientific, technical, engineering,



or regulatory skills, the immediate benefit to surrounding communities is moderated by the relatively limited availability of such competencies in the local labour market. Despite this, the impact is inherently positive and becomes more meaningful over time. The facility establishes a permanent employment footprint, with opportunities for laboratory support staff, facility management, logistics, administration, cleaning, waste handling, maintenance, and technical functions. These long-term positions provide sustained income stability and create indirect employment opportunities through local procurement and ancillary services. Moreover, the project's structured Learning and Development (L&D) pathways including internships, apprenticeships, operator training, mentorship, and skills-bridging programmes enable residents with lower skills starting points to access specialised career pathways that would otherwise be unavailable within the area of influence.

With these enhancement measures, the probability of local benefit increases, as more residents become eligible for skilled roles over time. The project's commitment to inclusive recruitment, transparent job advertising, and targeted skills development strengthens the capacity of local youth, women, and historically disadvantaged individuals to compete for and retain high-value positions. As a result, the residual significance increases from **Low (positive)** significance to **Medium (positive)**, reflecting the long-term cumulative value of skills upliftment and the facility's role in strengthening the regional biotechnology labour market.

The impact is fully reversible only if operations cease; however, skills acquired through employment and training will persist beyond the life of the project, meaning the long-term benefit to individuals and the regional skills ecosystem is durable. No irreplaceable resources are affected, and the impact is highly capable of enhancement, particularly through continued investment in local capacity building, educational partnerships, and expanded workforce development programmes.

Table 7-9: Assessment of the Creation of Employment Opportunities During Operations

Creation of Employment Opportunities During Operations		
Type	Direct	
Nature	Positive	
Phases	Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change (Low)	Minor change (Low)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Local	Local
Consequence	Medium	Medium
Probability	Possible / frequent (Medium)	Probable (High)
Significance	Low +	Medium +
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible – only if operations cease for employment creation during operations	
Degree to which impact may cause irreplaceable loss of resources	None	
Degree to which impact can be avoided	None	
Degree to which impact can be mitigated/enhanced	High	
Cumulative Impact		



Extent to which a cumulative impact may arise	Likely - positive cumulative outcomes are present but remain modest, reflecting the isolated nature of job opportunities in the local labour market.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Low +	Low +

7.5.3.3 Enhancement Measures

The following mitigation measures are recommended:

- Publicly advertise all operational vacancies through multiple accessible channels (website, community noticeboards, WhatsApp groups, local LED offices).
- Clearly state entry requirements, qualifications, contract type, and whether roles are permanent or fixed-term.
- Use plain-language descriptions to ensure local residents understand which roles require specialised skills and which do not.
- Partner with local SMMEs, training providers, TVET colleges, and universities to ensure training availability for emerging skill needs.
- Develop SMME support programmes to support long-term supply chain participation linked to employment growth.
- Implement targeted outreach to women, youth, persons with disabilities, and historically disadvantaged candidates.
- Ensure recruitment processes are non-discriminatory and transparent.
- Provide fair wages, safe working conditions, and clear employment contracts.
- Prohibit child labour, forced labour, harassment, and discrimination.
- Maintain an internal worker grievance mechanism with confidential reporting and timely resolution.

7.5.4 Inflated Expectations Regarding Employment and Benefit Access

7.5.4.1 Impact description

Engagement activities and focus group discussions conducted by Mthente Research and Consulting Services, indicate that neighbouring communities hold inflated expectations about the number, type, and accessibility of employment opportunities that will be created during both construction and operation of the proposed Biovac facility (Mthente Research and Consulting Services, 2025b) (Mthente Research and Consulting Services, 2025c). These expectations are shaped by high unemployment levels, past experiences of limited access to formal work, and the perception that large infrastructure and industrial projects automatically translate into large-scale local hiring.

Community members expressed uncertainty about how recruitment will work, whether positions will be reserved for local residents, whether opportunities will be temporary or long-term, and what entry-level skills will be required. This creates a risk that residents may overestimate the scale of benefits, misunderstanding the specialised nature of operational roles (which often require technical, GMP-aligned competencies not commonly held locally) and the short-term, contractor-driven nature of construction jobs.



7.5.4.2 Assessment

Where expectations exceed what the project can realistically deliver, there is potential for disappointment, perceptions of exclusion, loss of trust, and tension between community groups, particularly if some individuals believe others have privileged access to information.

Without mitigation, high expectations are likely to persist, as communities anticipate substantial employment opportunities that the project cannot realistically meet. This may result in **Medium** significance negative social effects, including dissatisfaction, strained community relations, and a decline in trust in the project proponent if the perceived benefits do not materialise. The risk is amplified by the technical nature of operational vacancies and the use of subcontractors during construction, both of which can make recruitment processes appear opaque.

With mitigation such as clear, early, and repeated communication on job numbers, required skills, recruitment pathways, contractor alignment with local labour commitments, and accessible channels for employment queries the impact reduces to **Low** significance. Transparent engagement stabilises expectations, prevents misinformation, and ensures communities understand the actual scale and nature of opportunities, reducing the residual significance.

Table 7-10: Assessment of Inflated Expectations Regarding the Employment Opportunities

Inflated Expectations Regarding Employment Opportunities		
Type	Direct	
Nature	Negative	
Phases	Construction and Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change (Medium)	Minor change (Low)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Local	Local
Consequence	Medium	Medium
Probability	Possible / frequent (Medium)	Possible / frequent (Medium)
Significance	Medium -	Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	None	
Degree to which impact can be avoided	High	
Degree to which impact can be mitigated	High	
Cumulative Impact		
Extent to which a cumulative impact may arise	Possible – existing high unemployment and historical unmet expectations in surrounding communities mean that any new project contributes to an ongoing cumulative pattern of elevated expectations for job access; the project adds to this dynamic but does not drive it.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium -	Low -



7.5.4.3 Mitigation Measures

The following mitigation measures are recommended:

- Establish a dedicated Employment Enquiry and Grievance Line where residents can ask questions or request clarification about job processes.
- Ensure that grievances are logged, acknowledged, and responded to within defined timeframes.
- Engage Community Leadership Structures such as ward councillors and civil society representatives to ensure accurate, consistent information flow.
- Communicate the specialised nature of operational roles early, stating clearly which jobs require technical or GMP-aligned qualifications.
- Emphasise the short-term nature of most construction jobs to avoid false assumptions about long-term employment.
- Provide realistic estimates of:
 - number of jobs;
 - length of contracts;
 - proportion of low, medium and high-skill roles.
- Require all contractors and subcontractors to align with the project's recruitment rules, including:
 - transparent advertising of vacancies;
 - fair selection processes;
 - documentation of hiring decisions;
 - no informal job promises.
- Centralise all job advertisements on a single official channel (website, WhatsApp broadcast list, community noticeboard).
- Conduct regular community briefings (monthly or milestone-based) to update residents on recruitment progress, upcoming opportunities, training options, and to clearly communicate which job categories will be available to local communities and which will not, in order to manage employment expectations.

7.5.5 Reduction in safety and security risks

7.5.5.1 Impact Description

The redevelopment of the project site will result in the formalisation and active management of an area that has historically been left unmanaged, experienced unauthorised access, and periodic anti-social activities.

Prior to the project, portions of the proposed project area were characterised by informal footpaths, sporadic dumping and vegetation overgrowth. These conditions created opportunities for low-level criminal behaviour in the wider area, including petty theft, vandalism, and unsafe congregation in poorly lit or unmanaged spaces. Focus-group participants (2025) described the site as highly degraded, used for dumping, and was associated with security vulnerabilities to the immediate surroundings.



7.5.5.2 Assessment

The establishment of the proposed project introduces continuous site management, controlled access, improved lighting, formalised security presence, and routine maintenance of the property. The rehabilitation of previously degraded areas, the removal of accumulated waste, and the prevention of unauthorised access are expected to significantly reduce safety and security risks in the area. Furthermore, the increase in pedestrian activity, local employment, and the establishment of an active facility creates natural surveillance, contributing to a safer and more cohesive community environment.

Against a baseline of degraded land condition, illegal dumping, and petty crime/anti-social behaviour reported by stakeholders, the transition to an actively managed, access-controlled site constitutes a **Low (positive)** change even without additional measures.

With enhancement including coordinated liaison with SAPS/CID, incident logging and response, periodic lighting/glare audits, a zero-tolerance dumping protocol, and a public GRM contact for safety and dumping concerns the likelihood and consistency of the benefit increase, raising the overall significance to **Medium (positive)**. The effect is localised (site and immediate edges), long-term (integral to operations), and fully reversible if security and maintenance regimes cease.

Table 7-11: Assessment in Reduction in Crime and Land Degradation

Reduction in Crime and Land Degradation		
Type	Direct	
Nature	Positive	
Phases	Construction and Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change (Medium)	Moderate change (Medium)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Local	Local
Consequence	Medium	Medium
Probability	Conceivable (Low)	Probable (High)
Significance	Low +	Medium +
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible	
Degree to which impact may cause irreplaceable loss of resources	None	
Degree to which impact can be avoided	High	
Degree to which impact can be mitigated/enhanced	High	
Cumulative Impact		
Extent to which a cumulative impact may arise	Possible	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Medium -	Medium +

7.5.5.3 Enhancement Measures

The following enhancement measures are recommended:



- Maintain 24/7 access control, perimeter integrity, routine patrols.
- Install down-directed boundary lighting; conduct quarterly glare/spill audits at residential interfaces.
- Operate CCTV at gates and high-risk zones.
- Enforce zero-tolerance dumping
- Liaise with SAPS/CID.
- Provide a public Grievance Reporting Mechanism.

7.5.6 Relocation of Informal Occupants

7.5.6.1 Impact description

A census of site occupants conducted by Mthente between 15 and 24 September 2025 identified five individuals who had occupied the proposed project area prior to commencement of land preparation activities. Despite Mthente's best efforts to identify and engage all occupants through repeated site visits during the census period, only two individuals (a 47-year-old female and her 42-year-old partner) were present at the time of the survey and could be interviewed. Both individuals were found to be highly vulnerable, residing in hazardous conditions within large concrete pipes, without access to water, sanitation, electricity, or stable livelihood opportunities. Their socio-economic circumstances reflected chronic instability, including limited access to documentation, elevated health and safety risks, and social isolation.

7.5.6.2 Assessment

Subsequent site inspections undertaken by SLR Consulting confirmed that all five previously identified occupants had voluntarily vacated the site and that no individuals remained within the project footprint. This was independently verified by SLR's social consultant during follow-up assessments in December 2025. Nevertheless, the ESIA must consider the potential impact associated with the required relocation of the two eligible vulnerable occupants should they decide to return at a later stage, as the project necessitates land clearance prior to construction. If unmanaged, displacement could expose these individuals to further vulnerability, loss of basic shelter, increased social harm, and the risk of homelessness. Relocation constitutes a physical and economic displacement event, requiring structured, rights-compliant intervention consistent with IFC Performance Standard 5, EIB Standard 6 and AfDB's ISS Operational Safeguard 5.

Without mitigation, a future relocation of the occupants would have a **Medium** negative impact, given their extremely precarious living conditions and lack of access to alternative accommodation, livelihoods, or social support systems. Forced displacement in such circumstances could result in acute harm, including homelessness, loss of fragile coping mechanisms, inability to access health or social services, and psychological distress. The transient nature of the three additional individuals observed on site further reflects the broader vulnerability dynamics associated with urban informal occupation, although only two individuals were traceable.

Mthente has prepared a draft RAP aligned with national legal requirements and international lender standards, which will be finalised if and when all informal occupants are identified and engaged. These measures are intended to ensure that affected individuals, should they choose to return to the site, are not displaced without appropriate safeguards and that their living conditions are restored or improved, in accordance with IFC Performance Standard 5. Given the very small number of eligible affected persons, the availability of tailored support



measures, and the verified voluntary departure of all occupants from the site, the residual impact associated with potential relocation is assessed as **Low**.

Table 7-12: Impacts Associated with the Relocation of Informal Occupants

Impacts Associated with the Relocation of Informal Occupants		
Type	Direct	
Nature	Negative	
Phases	Construction and Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	Moderate change (Medium)	Moderate change (Medium)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Within/ near site	Within/ near site
Consequence	Medium	Medium
Probability	Definite / Continuous (Very high)	Conceivable (Low)
Significance	Medium -	Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Irreversible – the transformation of the site precludes the possibility of re-occupation by displaced individuals, and previous baseline conditions cannot be reinstated.	
Degree to which impact may cause irreplaceable loss of resources	High – the site functioned as a critical livelihood and accommodation resources. Its loss would result in the permanent removal of place-based security, familiarity and access to nearby family support.	
Degree to which impact can be avoided	None – land clearance is essential for construction and relocation is unavoidable; however, adverse social impacts can be avoided through lawful, humane and compliant resettlement	
Degree to which impact can be mitigated	High – the finalised RAP will provide comprehensive safeguards	
Cumulative Impact		
Extent to which a cumulative impact may arise	Possible - vulnerability among informal occupants is common in the metropolitan context and displacement events can contribute cumulatively to urban homelessness and social marginalisation. However, the project’s scale is very small (two eligible individuals), and the RAP’s structured support significantly reduces cumulative risk.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Low -	Low -



7.5.6.3 Mitigation Measures

The following mitigation measures are recommended¹⁵¹⁶:

- Provide the two eligible occupants with formal written communication of entitlements, timelines, grievance procedures, and relocation steps.
- Conduct relocations in a voluntary, negotiated, and dignified manner with no forced removal.
- Offer eligible individuals security of tenure in suitable alternative accommodation.
- Ensure all housing options comply with minimum adequacy standards, including access to water, sanitation, and electricity.
- Provide transport for the movement of belongings, including arrangements for safe transfer of personal items.
- Ensure assistance is available on the day of relocation to avoid any risk of temporary homelessness.
- Provide appropriate livelihood restoration support, which may include measures such as skills development support, access to employment or income-generation opportunities, and temporary assistance where required, informed by individual needs assessments.
- Replace or support re-acquisition of essential identity documents (e.g., ID book), enabling access to employment and state services.
- Provide referral to City of Cape Town social services or accredited NGOs for counselling, trauma support, social reintegration, and substance use assistance where needed.
- Facilitate connection to family or support networks, where requested by the affected persons.
- Tailor the relocation approach to each person's specific needs (e.g., privacy, proximity to family, safety considerations).
- Maintain consistent engagement through:
 - Pre-relocation consultations;
 - Provision of written and verbal updates;
 - A contact person for questions;
 - A structured grievance mechanism.
- Ensure equal access to information for all eligible persons.
- Provide a clear, accessible grievance mechanism that allows complaints related to relocation, housing, or entitlements.
- Ensure response timelines are documented and adhered to.

¹⁵It is noted that, despite reasonable efforts by Mthente to trace and engage all affected occupants during RAP preparation, not all individuals could be identified. The two occupants who had been previously surveyed subsequently vacated the site and could not be re-engaged. The RAP therefore remains in draft form and will be re-opened and finalised should any of the previously identified occupants re-appear and require engagement.

¹⁶These proposed mitigation measures will be confirmed upon finalisation of the RAP.



- Conduct at least two post-relocation visits to assess well-being, stability, and integration.
- Provide additional support where gaps are identified (e.g., delayed document issuance, unmet housing needs).

7.5.6.4 Monitoring

- Maintain a Relocation Implementation Register documenting each step of the process.
- Conduct at least one post-relocation verification to ensure that conditions have improved or been restored.
- If monitoring identifies non-compliance or gaps (e.g., incomplete documentation, housing instability), Biovac will prepare a Corrective Action Plan (CAP) within a defined timeframe and implement the required measures, with follow-up monitoring.
- Ensure that the RAP includes a grievance mechanism through which Project-Affected Persons (PAPs) can lodge complaints regarding the resettlement process.

7.6 Visual

7.6.1 Potential Visual Impact of the Proposed Development

7.6.1.1 Impact Description

The proposed development will result in the transformation of a currently vacant and largely undeveloped site into a vaccine manufacturing facility. This will introduce a permanent built form where no structures presently exist, leading to a change in the visual character of the site.

The existing landscape is characterised by an open, disturbed plot within an established industrial precinct, with surrounding land uses including industrial buildings, transport infrastructure, and railway lines.

7.6.1.2 Assessment

Although the area is not of recognised scenic or visual sensitivity, the change from an open, unused parcel to a large industrial building will create a moderate and permanent alteration to the immediate visual landscape.

From nearby road users, commuters along the adjacent railway line, and passers-by within the local street network, the new structure will be clearly visible and will reduce the sense of openness currently afforded by the vacant plot. However, the development will be consistent with the broader urban-industrial context and will not introduce visual elements that are incongruent with the surrounding built environment. No designated scenic routes, visual heritage resources, or protected view corridors are located within or adjacent to the site, and therefore the sensitivity of receptors to visual change is considered low.

Overall, while the development will materially alter the existing view of the site, the change is aligned with the established character of the area and is not expected to result in a significant adverse visual impact beyond the immediate surroundings. Thus, the overall impact significance is expected to be **Low** without and with mitigation.



Table 7-13: Assessment of the Potential Visual Impact of the Proposed Development

Potential Visual Impact of the Proposed Development		
Type	Direct	
Nature	Negative	
Phases	Construction and Operation	
Criteria	Without Mitigation	With Mitigation
Intensity	Negligible change (Very low)	Negligible change (Very low)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Within/ near site	Within/ near site
Consequence	Low	Low
Probability	Definite / Continuous (Very high)	Definite / Continuous (Very high)
Significance	Low -	Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Partially reversible – although the development introduces a permanent built structure, the visual impact can be reduced over time as the facility becomes absorbed into the existing industrial landscape. Given that the area in front of the nearest residential receptor is already industrial, the change in visual character can be softened through landscaping and design treatments, even though the original open state cannot be fully restored.	
Degree to which impact may cause irreplaceable loss of resources	None – the impact will not cause any irreplaceable loss of resources, as the affected area is an established industrial precinct with no natural, cultural, scenic, or heritage resources of conservation value. The visual character is already defined by industrial land uses, and the proposed development does not result in the loss of any unique or non-renewable visual resources.	
Degree to which impact can be avoided	Low – the impact cannot be fully avoided, as the introduction of a permanent built structure is an inherent requirement of the proposed development. While minor design and layout adjustments can reduce the visibility of the facility, the visual change associated with constructing a new building in the industrial precinct cannot be prevented entirely.	
Degree to which impact can be mitigated	Low – mitigation can only partially soften the visual impact; the large, permanent structure will remain prominent, and the site's original open character cannot be restored.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Likely – the new facility will add to the existing industrial structures in the area, contributing to the ongoing change in the local visual character, even though the broader landscape is already industrial.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Very Low -	Very Low -



7.6.1.3 Mitigation measures

The following measures are recommended to soften the visual impact of the proposed facility:

- Use façade treatments, such as neutral or natural colours, to reduce contrast with the industrial surroundings.
- Incorporate landscaping (e.g., perimeter planting, trees, shrubs) to soften views of the facility.
- Apply design measures such as articulated building façades, screening elements, and visually recessive materials.
- Position high-visibility or bulky equipment away from sensitive viewpoints where possible.
- Maintain clean and well-kept site appearance to minimise visual clutter or degradation over time.
- Security flood lighting and operational lighting should only be used where necessary and be carefully directed away from the sensitive viewing areas (i.e. Pinelands). Where possible, lights should be directed downwards to avoid illuminating the sky and minimising light spill.

7.6.1.4 Monitoring

The following monitoring measures are recommended:

- Record and respond to any visual-related complaints, assessing whether additional mitigation is required.

7.7 Heritage

7.7.1 Loss of Heritage Resources

7.7.1.1 Impact description

A new development on vacant land has the potential to disturb tangible and non-tangible cultural heritage resources and archaeological artefacts, which are protected by the National Heritage Resources Act, 1999.

While it was confirmed by SAHRA that there is no reason to believe that the proposed project will have an impact on heritage resources, the proposed construction activities and associated earthworks has the potential to uncover unknown heritage resources during vegetation clearance and soil excavation activities.

7.7.1.2 Assessment

Given the prior disturbance of the site through the establishment of the surrounding industrial activities, the likelihood of encountering meaningful or intact subsurface resources is considered low, and the sensitivity of any such finds is expected to be low to medium. In the event that heritage resources are uncovered during the construction activities, it would be of low intensity, with interest to the wider region (regional extent) and permanent duration. However, given the very low probability of such an impact occurring, the overall significance is **Very Low** without or with mitigation.



Table 7-14: Assessment of Loss of Heritage Resources

Loss of Heritage		
Type	Direct	
Nature	Negative	
Phases	Construction	
Criteria	Without Mitigation	With Mitigation
Intensity	Minor change (Low)	Minor change (Low)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Regional	Regional
Consequence	Medium	Medium
Probability	Unlikely / improbable (Very low)	Unlikely / improbable (Very low)
Significance	Very Low -	Very Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Irreversible – heritage resources cannot be restored once destroyed.	
Degree to which impact may cause irreplaceable loss of resources	High – if heritage resources are destroyed, the loss is permanent and cannot be recreated or replaced.	
Degree to which impact can be avoided	High – this impact can be avoided through the implementation of a Chance Finds Procedure.	
Degree to which impact can be mitigated	High – easily mitigated through the implementation of a Chance Finds Procedure.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Unlikely – the surrounding area is an established industrial complex with no multiple or significant heritage-sensitive areas present in the region, and therefore the project is unlikely to contribute to any cumulative heritage or palaeontological impacts.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Insignificant	Insignificant

7.7.1.3 Mitigation Measures

The following measures are recommended:

- Implement a Chance Finds Procedure during Construction and Civil Works should an unknown heritage resource be discovered during construction;
- Limit vegetation clearance and ground disturbance to the approved construction footprint.

7.8 Traffic

The traffic impacts assessed in this ESIA are limited to those associated with the operational phase of the proposed vaccine manufacturing facility. The Traffic Impact Assessment (TIA) evaluated the effects of operational-phase traffic generated by the Project on the surrounding road network and key intersections. Traffic impacts associated with the construction phase were not assessed as part of the TIA and are therefore not included in this impact assessment. This approach is considered appropriate given that the Project is located within an established urban-industrial area with an existing road network designed to accommodate regular construction and service traffic, and that the construction footprint and



duration are expected to be relatively limited. Notwithstanding this, Biovac is in the process of finalising a Construction Traffic Management Plan to address traffic management, access control, and road safety considerations during the construction phase.

7.8.1 Impact on surrounding road network

7.8.1.1 Impact description

The proposed development will generate new vehicle movements associated with staff commuting, service vehicles, and limited heavy-vehicle deliveries. These additional trips will access the site via the existing public road network, resulting in an increase in traffic volumes on Alexandra Road, Ndabeni Road, and Diesel Road during peak and off-peak periods.

An increase in traffic has the potential to affect the surrounding road network by contributing to higher intersection demand, longer queue lengths, changes in traffic flow patterns, and potential safety risks at conflict points depending on the existing levels of service experienced on the existing road network.

7.8.1.2 Assessment

A TIA conducted by Trafficon concluded that the operational phase of the proposed project would generate approximately 67 additional vehicle trips during the AM and PM peak hours, including 2-3 trucks per day. The specialist concluded that this represents a small addition to existing corridor volumes.

However, it was noted that the surrounding road network already experiences pre-existing saturation at the Alexandra/Raapenberg intersection, which presently operates at LOS F (which represents the worst conditions with congestion and very high delays). Nevertheless, the traffic modelling confirms that the proposed project would not materially worsen this pre-existing condition of this intersection. Furthermore, at all other critical intersections, including Alexandra/Berkley and Alexandra/Ndabeni, performance remains within acceptable Levels of Service (LOS B-C) with degrees of saturation below critical thresholds, and the minor increase in traffic would not cause any intersection to reach an unacceptable LOS.

The traffic specialist also modelled stacking requirements at the proposed access point of the facility, which showed that the maximum ingress queues of 14.3 m can be accommodated within the design (provision has been made for 33 m on-site storage), thus preventing any spillback from the facility onto Ndabeni Road.

The only recommended road improvement is an exclusive right-turn lane on Alexandra Road (south approach) at the Alexandra/Ndabeni intersection and a new stop-control arrangement at the Ndabeni/Diesel intersection to enhance safety and manage conflict points.

Considering the overall low trip generation, generally adequate performance of surrounding intersections, the availability of on-site queue storage, and the minor geometric upgrades proposed, potential traffic impacts within the surrounding road network (local extent) are deemed to be of low intensity for the operational phase of the proposed facility resulting in a **Low** significance impact with or without mitigation.

Table 7-15: Assessment of Impact on Surrounding Road Network

Impact on surrounding road network	
Type	Direct
Nature	Negative
Phases	Operation



Criteria	Without Mitigation	With Mitigation
Intensity	Minor change (Low)	Minor change (Low)
Duration	Permanent (> 20 years)	Permanent (> 20 years)
Extent	Local	Local
Consequence	Medium	Medium
Probability	Possible / frequent (Medium)	Possible / frequent (Medium)
Significance	Low -	Low -
Additional Assessment Criteria		
Degree to which impact can be reversed	Fully reversible – If the development ceases operations, site-generated traffic would fall away immediately, and surrounding intersections and road links would revert to baseline conditions.	
Degree to which impact may cause irreplaceable loss of resources	None – the impact relates solely to traffic on existing engineered urban roads and does not involve the disturbance or loss of any ecological, heritage, or socio-economic resources. All affected infrastructure is fully managed and replaceable.	
Degree to which impact can be avoided	High – impact can largely be avoided through geometric improvements, access-management measures, travel demand management, and operational traffic controls.	
Degree to which impact can be mitigated	High – proven traffic engineering measures (turn lanes, stop-control, queue management, signage, and operational controls) effectively minimise residual impacts.	
Cumulative Impact		
Extent to which a cumulative impact may arise	Possible – the road network is already constrained, particularly at Alexandra/Raapenberg; however, the incremental contribution of the development is negligible and does not materially intensify cumulative traffic effects.	
Rating of cumulative impacts	Without Mitigation	With Mitigation
	Very Low -	Very Low -

7.8.1.3 Mitigation measures

The following mitigation measures are recommended to ensure that there isn't an increase in the traffic in the surrounding road network:

- Construct an exclusive right-turn lane on Alexandra Road (south approach) at the Alexandra/Ndabeni intersection, comprising a 3m lane width, 18m storage land and 30m taper, to safely accommodate right turning site traffic and reduce conflict with through movements (Figure 7-2)
- Implement stop-control on the east approach and stop/yield left control on the west approach at the Ndabeni/Diesel Road Intersection to manage turning conflicts and improve overall intersection safety (Figure 7-3).
- Ensure that the access gatehouse operates with one ingress and one egress land and maintain a minimum 33m ingress throat length to prevent vehicle queues from spilling onto Ndabeni Road.



- Provide South African Road Traffic Signs Manual (SARTSM)-compliant signage, road markings and lighting at all access points to improve visibility, driver expectancy and adhere to control measures.
- Schedule heavy-vehicle deliveries outside of AM and PM peak periods and require all trucks to remain within the on-site loading yard, preventing kerbside waiting or obstruction of public roads.
- Prepare and implement a Construction Traffic Management Plan (CTMP) detailing:
 - Construction vehicle routing;
 - Peak-hour restrictions for heavy vehicles;
 - Temporary traffic signage and flagmen when required;
 - Protection of pedestrian routes and sidewalks;
 - Prohibition of construction-related queuing on public roads; and
 - Reinstate any road surfaces, markings, or kerbs impacted during construction works.

7.8.1.4 Monitoring

The following monitoring measures are recommended

- Maintain a log of freight arrivals to ensure adherence to scheduled delivery times and prevent road-network interference.



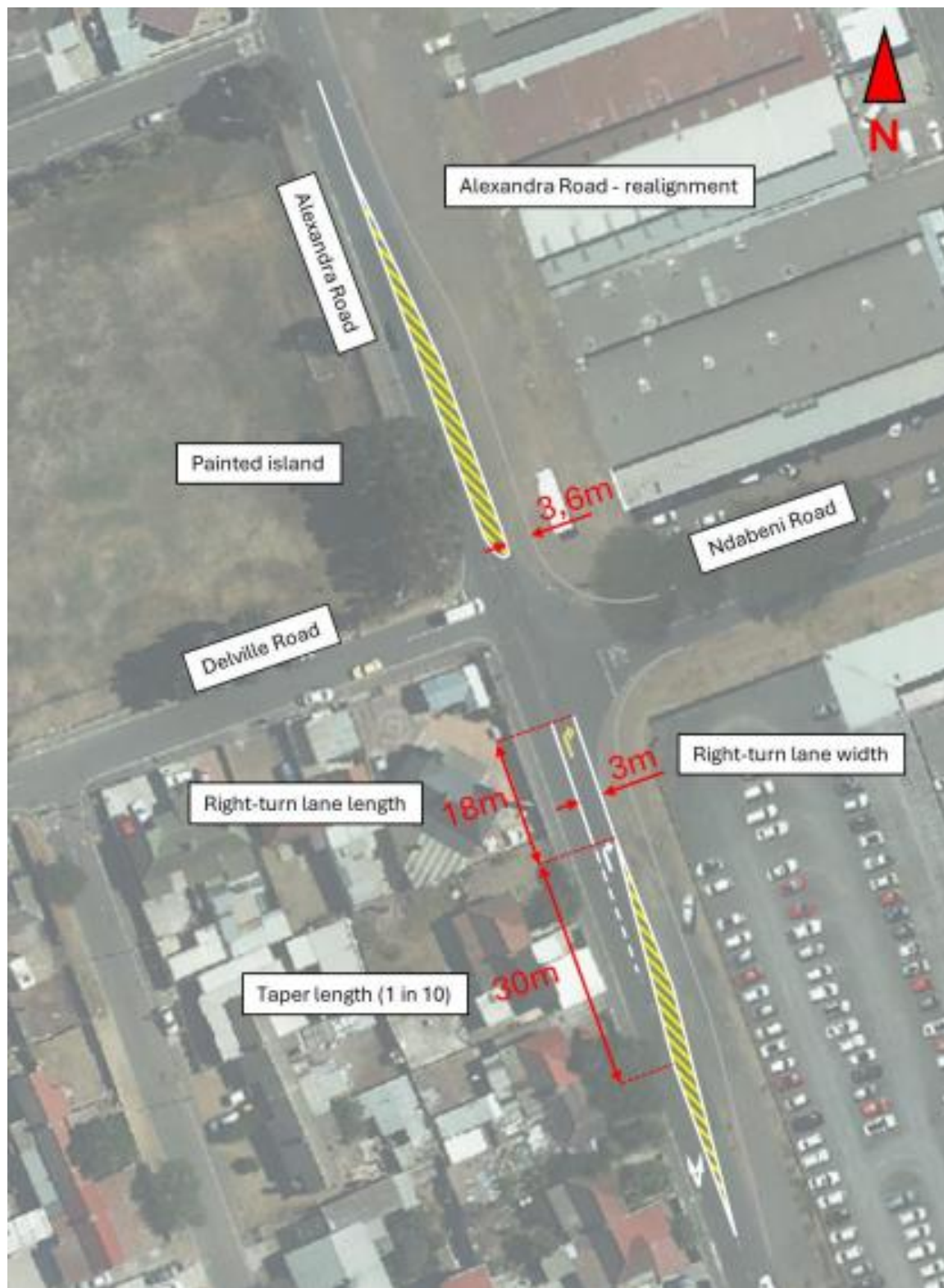


Figure 7-2: Recommended Alexandra Road/Ndabeni Road Intersection Upgrade by the Traffic Engineer

Source: (Trafficon CC, 2025)





Figure 7-3: Ndabeni Road/Diesel Road Intersection Upgrade recommended by the Traffic Engineer

Source: (Trafficon CC, 2025)



8.0 Conclusion

This ESIA has identified and assessed the specific biophysical and socioeconomic impacts relating to the proposed project. This chapter provides a summary of the impact assessment, provides conclusions and lists mitigation measures for both the construction and operational phases of the proposed project.

8.1 Impact Summary

The summary of potential impacts on the biophysical and socioeconomic environment is provided in Table 8-1.

The assessment concludes that no fatal-flaw environmental constraints have been identified. All anticipated adverse impacts are localised, predictable, and capable of mitigation to **Low** or **Very Low** residual significance.

Construction-phase impacts are temporary and confined to the site and its immediate surroundings. These relate primarily to noise, dust generation, traffic disruption, and short-term security risks typical of construction activities. Through implementation of standard controls, including dust suppression, acoustic management, traffic coordination, perimeter security, and contractor oversight these impacts are fully reversible and do not give rise to long-term environmental liabilities.

Operational impacts are moderate in scale and occur within an already industrialised setting. They relate mainly to mechanical noise, traffic movements, hazardous materials handling, waste streams, and resource consumption. The facility's engineered design, including compliance with Good Manufacturing Practice (GMP) and biosafety standards, ensures containment of process risks and minimises off-site effects. With adherence to regulatory requirements and international best practice, residual operational impacts are assessed as Low and are not expected to result in material environmental degradation or unacceptable risk to neighbouring receptors.

Cumulative environmental effects are limited. The project contributes only marginal incremental pressure to existing infrastructure systems, and no cumulative impact is anticipated to reach moderate or high significance following mitigation. No irreversible or irreplaceable environmental resource losses have been identified.

With respect to socio-economic impacts, the assessment identifies manageable impacts alongside potential benefits. Key social impacts relate to heightened community expectations regarding employment and potential perceptions of inequitable recruitment. In the absence of mitigation, these impacts are of **Medium** significance. However, through transparent recruitment procedures, structured stakeholder engagement, clear communication of employment criteria, and implementation of an accessible grievance mechanism, residual social impacts are reduced to **Low** and remain manageable.

In contrast, the project presents socio-economic benefits. These include employment generation during construction, long-term skilled operational positions, expanded procurement opportunities for local enterprises, and strengthening of regional technical capacity. These positive impacts are assessed as **Medium (positive)** significance with the implementation of enhancement measures.



Table 8-1: Summary of potential impacts assessed pre- and post-mitigation for the proposed manufacturing facility

Theme	Phase	Impact	Pre-Mitigation	Post-Mitigation
Air Quality	Construction	Increase In Particulate Matter and Dustfall Emissions during Construction	Low -	Very Low -
	Operation	Increase in Air Emissions During Operation	Low -	Very Low -
Noise	Construction	Increase in Nuisance Noise during Construction	Low -	Low -
	Operation	Increase in Ambient Noise During Operation	Medium -	Low -
Vegetation	Construction	Loss of Vegetation and Ecological Processes	Low -	Low -
Social	Construction	Employment Creation during Construction	Very Low +	Low +
		Increased Security Risks During Construction	Low -	Very Low -
	Operation	Employment Creation During Operations	Low +	Medium +
	Construction and Operation	Inflated Expectations Regarding Employment and Benefit Access	Medium -	Low -
		Reduction in Crime and Land Degradation	Low +	Medium +
		Impacts Associated with the Relocation of Informal Occupants	Medium -	Low -
Visual	Construction and Operation	Potential Visual Impact of the Proposed Development	Low -	Low -
Heritage	Construction	Loss of Heritage Resources	Very Low -	Very Low -
Traffic	Construction and Operation	Impact on Surrounding Road Network	Low -	Low -



8.2 Recommendations

The recommended key mitigation measures are summarised below in terms of the different biophysical and socio-economic issues that were identified. These measures (along with together standard mitigation measures and monitoring actions, where necessary) have been incorporated into the Construction and Operational Phase ESMPs.

8.2.1 Air Quality

Construction phase:

- Use water sprays (subject to any water use restrictions that may be in place at the time of construction) and dust suppression during the construction phase.
- Cover materials and chemicals during transport.

Operation phase:

- Maintain HEPA filtration and pressure-controlled cleanrooms to prevent particulate and biological emissions.
- Use local exhaust ventilation (LEV) in formulation, solvent-use, and fill-finish areas to capture VOCs at source.
- Ensure sealed systems and closed transfer lines for solvents and drug-substance processing.
- Use low-sulphur diesel or cleaner fuels for standby generators.
- Conduct regular maintenance of generators, boilers and HVAC systems to minimise NO_x, SO₂, CO and PM emissions.
- Schedule generator testing during off-peak periods and limit run-time to essential operation only.
- Store solvents and disinfectants in bunded, ventilated, and appropriately labelled areas.
- Use low-VOC cleaning agents and disinfectants where feasible.
- Keep chemical containers closed when not in use to limit fugitive emissions.
- Inspect and maintain piping, seals, ducts, and gaskets to prevent leaks.
- Immediately seal waste containers and ensure proper handling to avoid accidental releases.

8.2.2 Climate Change

Operational Phase:

- Optimising temperature settings through programmable thermostats/BMS.
- Improving insulation and sealing for walls, ceilings, ducting.
- Regular maintenance (e.g., cleaning or replacing filters per manufacturer schedule).
- Installing variable speed drives (VSDs) on pumps and fans where possible.
- Reducing internal heat loads by using LED lighting and energy-efficient equipment.
- Choosing low-GWP refrigerants (CO₂, HFOs) when replacing or servicing cooling systems
 - Ensure generators are sized to run at 70–100% optimal load.
 - Maintain generators in line with manufacturer schedules to avoid inefficiencies.



- Limit use of generators to essential outages and critical testing only
- Prioritise energy-efficient lighting and appliances.
- Ensure building management systems are tuned for minimum energy wastage.
- Apply preventative maintenance across all high-energy equipment.
- Train operations staff to reduce unnecessary energy use.
- Minimise waste heat loads in process rooms
- Maximise load efficiency on delivery vehicles.
- Optimise routing and scheduling to reduce unnecessary kilometres.
- Ensure driver training in fuel-efficient driving practices.

8.2.3 Noise

Construction phase:

- Schedule high-noise construction activities during standard daytime hours (e.g., 07:00–17:00) to reduce residential disturbance.
- Install temporary acoustic barriers around high-noise operations, such as generators, compressors, or material handling areas.
- Plan construction and delivery traffic routes to avoid residential streets and sensitive receptors.

Operation phase:

- Maintain all equipment according to manufacturer schedules to prevent excessive noise from wear or misalignment.
- Maintain all noise-control equipment regularly to ensure ongoing effectiveness.
- Enclose major mechanical systems such as HVAC units, cooling towers, and generators with acoustic enclosures.
- Strategically locate high-noise equipment as far as practicable from sensitive receptors (e.g., fenceline to nearest residence).
- Use building design measures: sound-insulating materials, double-glazed windows, and façade treatments to reduce off-site noise propagation.

8.2.4 Socio-Economic

8.2.4.1 Enhancement measures for project benefits

Construction phase:

- Implement a Local Employment Strategy prioritising candidates from neighbouring communities (where possible).
- Establish local SMME supplier pipelines (catering, cleaning, transport, security).
- Provide fair wages, safe working conditions, and clear employment contracts.



- Develop and implement a fair and transparent labour, working condition and recruitment policy, which complies with local law, IFC Performance Standard 2: Labour and Working Conditions, and International Labour Organisation (ILO) conventions.
- Maintain an internal worker grievance mechanism with confidential reporting and timely resolution.

Operation phase:

- Publicly advertise all operational vacancies through multiple accessible channels (website, community noticeboards, WhatsApp groups, local LED offices).
- Clearly state entry requirements, qualifications, contract type, and whether roles are permanent or fixed-term.
- Partner with local SMMEs, training providers, TVET colleges, and universities to ensure training availability for emerging skill needs.
- Develop SMME support programmes to support long-term supply chain participation linked to employment growth.
- Implement targeted outreach to women, youth, persons with disabilities, and historically disadvantaged candidates.

8.2.4.2 Mitigation measures for project impacts

If the previously identified vulnerable occupants of the proposed project area return, the measures set out in the previously compiled RAP must be implemented.

Construction phase:

- Install a fully enclosed perimeter fence around the construction site before major materials or equipment are brought on-site.
- Establish single-entry-controlled access points with security personnel.
- Enforce sign-in/out procedures for all contractors, visitors, and delivery personnel.
- Deploy trained and vetted security officers on a 24-hour basis during active construction.
- Implement regular internal and perimeter patrols, especially at night and during weekends.
- Establish communication with Pinelands CID, City law enforcement, and SAPS to ensure quick response to incidents.
- Record all security incidents in an Incident Register (nature, location, time, response).

Operation phase:

- Establish a dedicated Employment Enquiry and Grievance Line where residents can ask questions or request clarification about job processes.
- Ensure that grievances are logged, acknowledged, and responded to within defined timeframes.
- Engage Community Leadership Structures such as ward councillors and civil society representatives to ensure accurate, consistent information flow.
- Provide realistic estimates of:
 - number of jobs;
 - length of contracts;
 - proportion of low, medium and high-skill roles.



- Require all contractors and subcontractors to align with the project's recruitment rules, including:
 - transparent advertising of vacancies;
 - fair selection processes;
 - documentation of hiring decisions;
 - no informal job promises.
- Centralise all job advertisements on a single official channel (website, WhatsApp broadcast list, community noticeboard).
- Conduct regular community briefings (monthly or milestone-based) to update residents on recruitment progress, upcoming opportunities, and training options.

8.2.5 Visual

- Use façade treatments, such as neutral or natural colours, to reduce contrast with the industrial surroundings.
- Incorporate landscaping (e.g., perimeter planting, trees, shrubs) to soften views of the facility.
- Apply design measures such as articulated building façades, screening elements, and visually recessive materials.
- Position high-visibility or bulky equipment away from sensitive viewpoints where possible.
- Maintain clean and well-kept site appearance to minimise visual clutter or degradation over time.
- Security flood lighting and operational lighting should only be used where necessary and be carefully directed away from the sensitive viewing areas (i.e. Pinelands). Where possible, lights should be directed downwards to avoid illuminating the sky and minimising light spill.

8.2.6 Heritage

Construction phase:

- Implement a Chance Finds Procedure during Construction and Civil Works should an unknown heritage resource be discovered during construction.
- Limit vegetation clearance and ground disturbance to the approved construction footprint.

8.2.7 Traffic

Construction phase:

- Prepare and implement a Construction Traffic Management Plan (CTMP) detailing:
 - Construction vehicle routing;
 - Peak-hour restrictions for heavy vehicles;
 - Temporary traffic signage and flagmen when required;
 - Protection of pedestrian routes and sidewalks;
 - Prohibition of construction-related queuing on public roads; and
 - Reinstate any road surfaces, markings, or kerbs impacted during construction works.



Operation Phase:

The traffic specialist has recommended some road intersection and marking upgrades. The Applicant would have to obtain the necessary infrastructure approvals from the City of Cape Town Metropolitan Municipality before they are implemented prior to the commencement of the proposed facility operations.

8.3 Conclusion

Based on the findings of this ESIA, the proposed development of a new vaccine manufacturing facility on the proposed project site is considered to be environmentally viable and socially beneficial. The identified impacts are limited in scale, readily mitigated, and proportionate to the industrial setting within which the project will operate.

Subject to full and effective implementation of the ESMP and ongoing monitoring commitments, the project may proceed without causing significant adverse environmental or social effects. The ESIA therefore supports advancement of the project for lender consideration and financing approval.

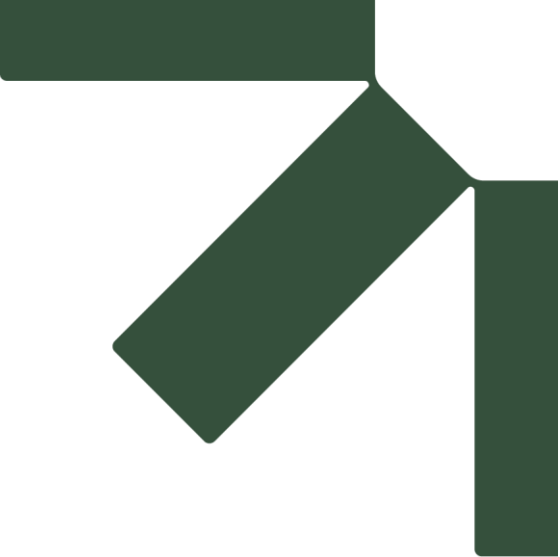


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Appendix A Determination Letter from DEA&DP

**Environmental and Social Impact Assessment for the
Proposed Vaccine Manufacturing Facility, located in
Pinelands, Western Cape**

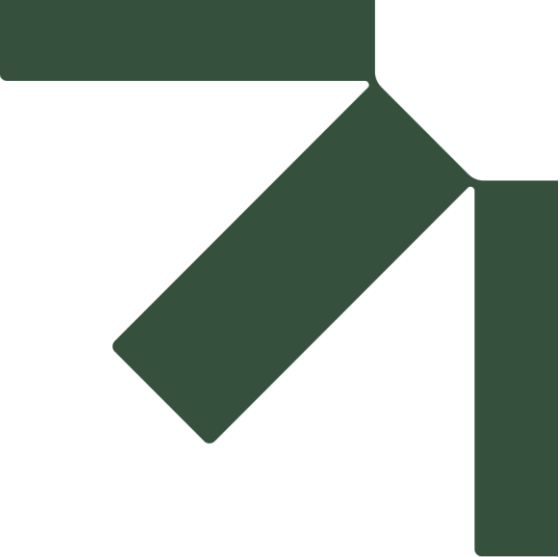
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Appendix B DFFE Screening Tool

Environmental and Social Impact Assessment for the Proposed Vaccine Manufacturing Facility, located in Pinelands, Western Cape

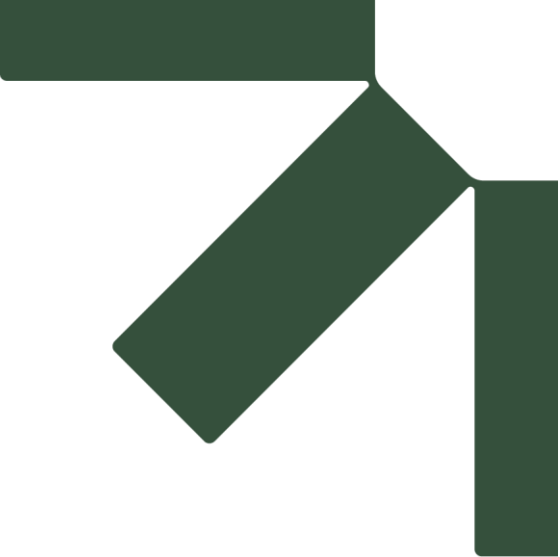
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Appendix C Notice of Intent to Develop Correspondence

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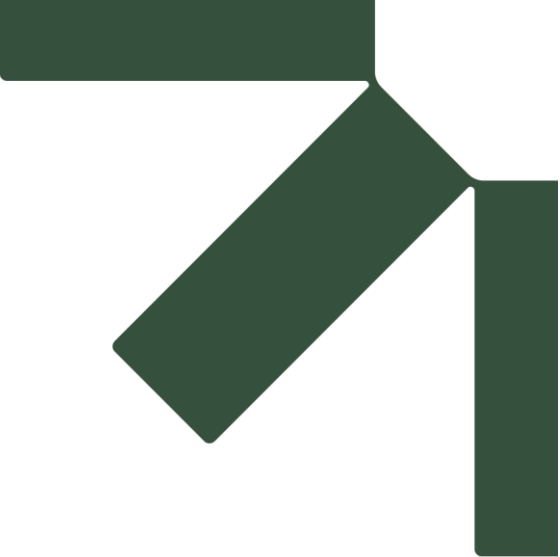
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Appendix D Water Use Licence Approval

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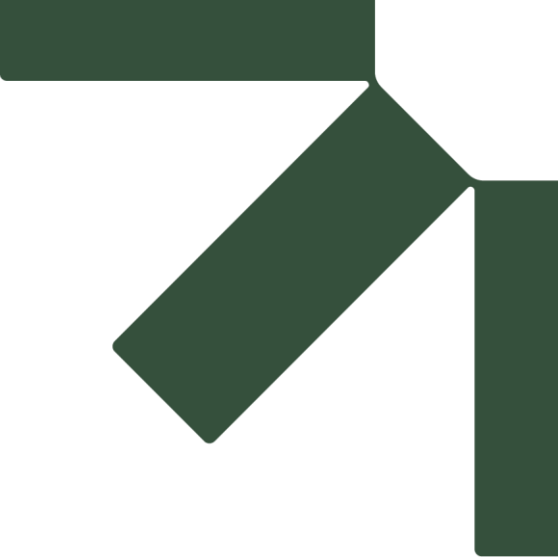
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Appendix E Curriculum Vitae of Project Team

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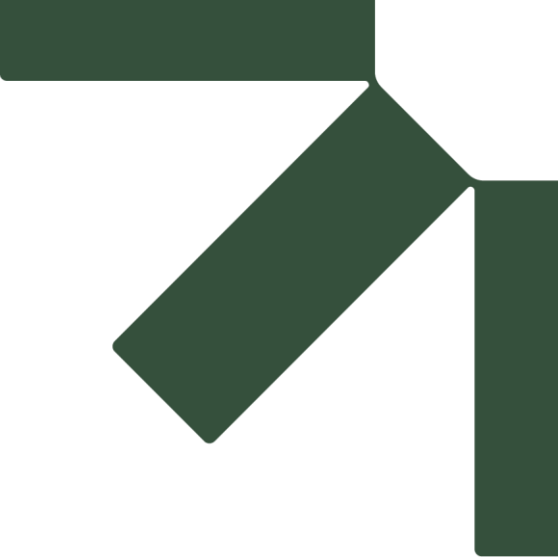
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Appendix F Stakeholder Engagement Plan

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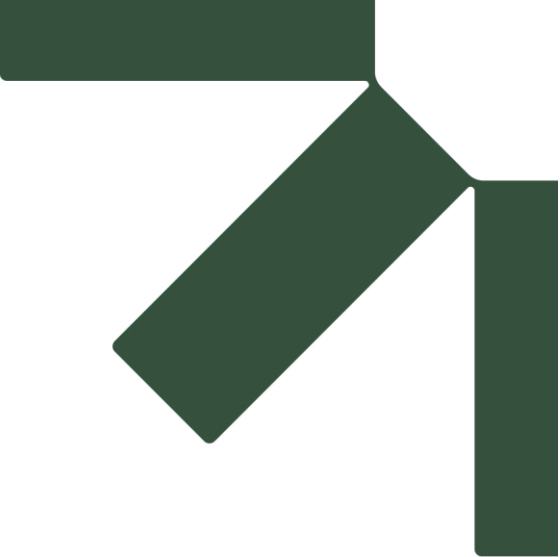
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Appendix G Site Verification Report

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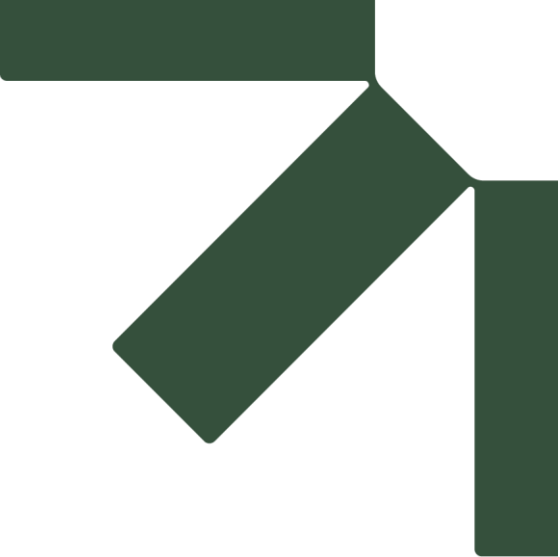
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Appendix H High Level Meeting Notes From Quarterly Stakeholder Meeting Held On 5 December 2025

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Appendix I Conceptual Design

Environmental and Social Impact Assessment for the Proposed Vaccine Manufacturing Facility, located in Pinelands, Western Cape

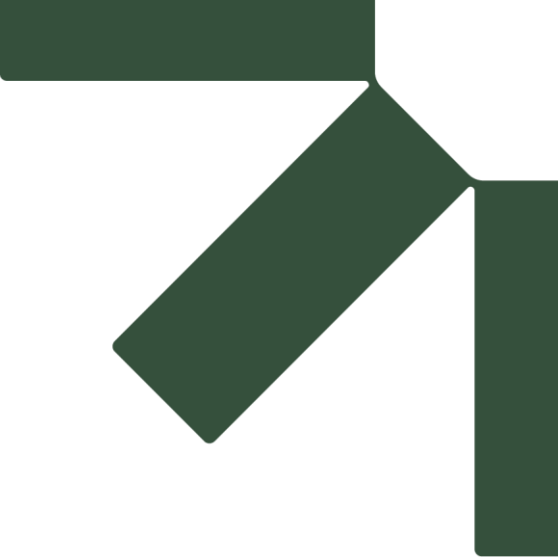
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Appendix J Air Quality Baseline Assessment Report

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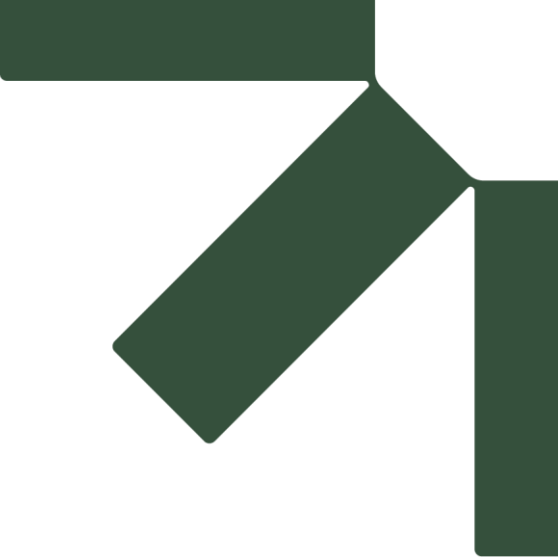
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Appendix K Climate Change Risk Assessment

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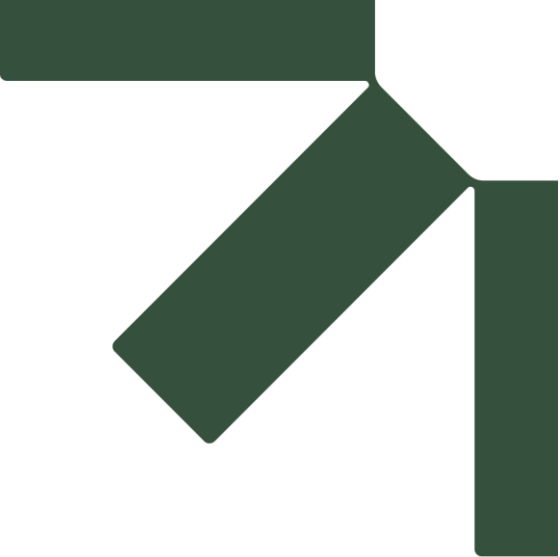
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Appendix L Noise Baseline Assessment

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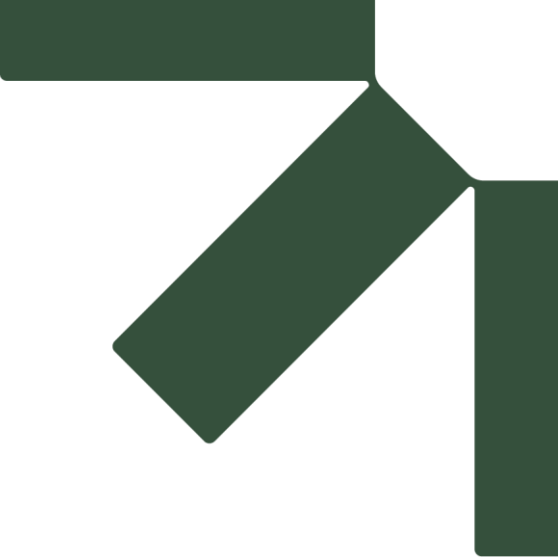
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Appendix M Terrestrial Plant Species and Terrestrial Biodiversity Compliance Statement

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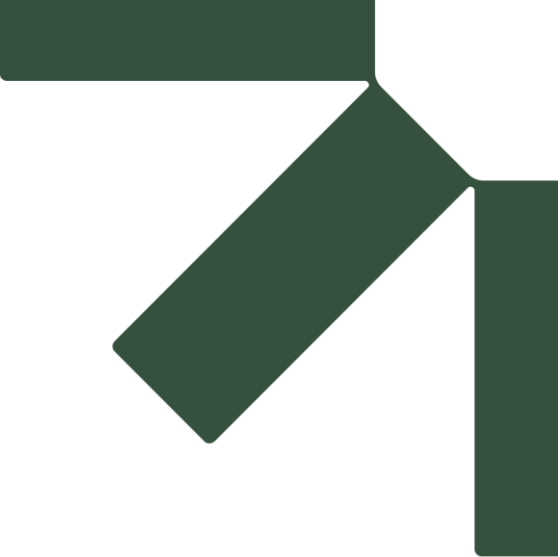
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Appendix N Land Use Motivation Report

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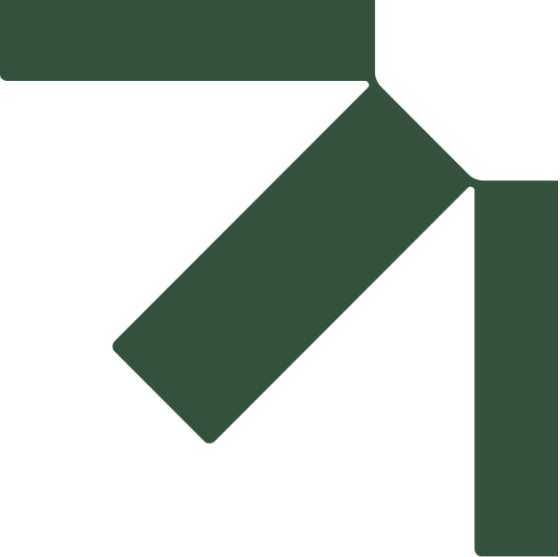
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Appendix O Transport Impact Assessment

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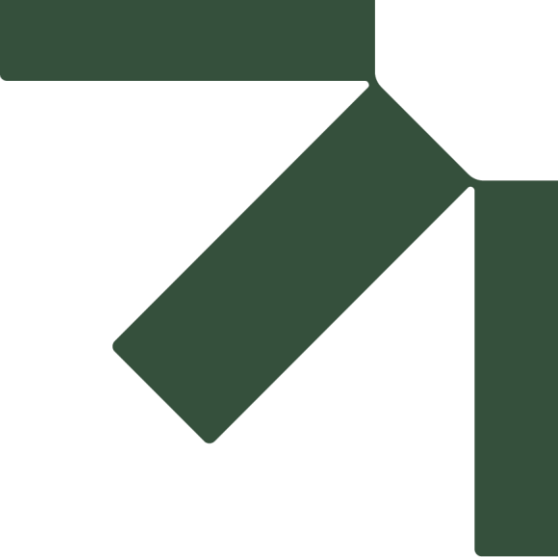
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Appendix P Impact Assessment Methodology

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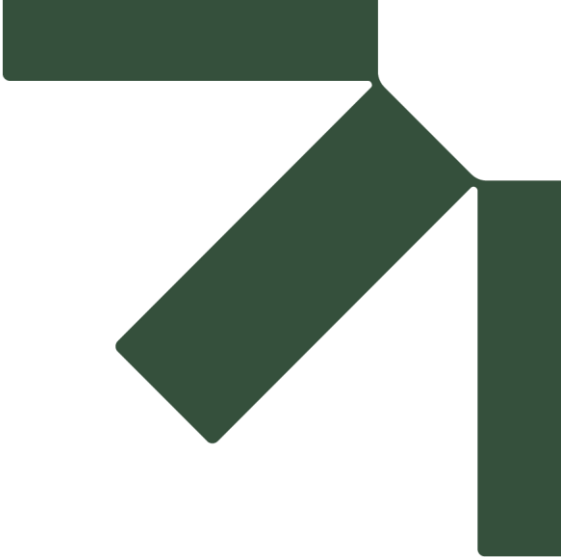
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Making Sustainability Happen