



Appendix 1

IFC Handbook

Overview of Performance Standards on Environmental and Social Sustainability

1. IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development, and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. IFC's Access to Information Policy reflects IFC's commitment to transparency and good governance on its operations, and outlines the Corporation's institutional disclosure obligations regarding its investment and advisory services. The Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. The Performance Standards may also be applied by other financial institutions.

2. Together, the eight Performance Standards establish standards that the client¹ is to meet throughout the life of an investment by IFC:

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| Performance Standard 1: | Assessment and Management of Environmental and Social Risks and Impacts |
| Performance Standard 2: | Labor and Working Conditions |
| Performance Standard 3: | Resource Efficiency and Pollution Prevention |
| Performance Standard 4: | Community Health, Safety, and Security |
| Performance Standard 5: | Land Acquisition and Involuntary Resettlement |
| Performance Standard 6: | Biodiversity Conservation and Sustainable Management of Living Natural Resources |
| Performance Standard 7: | Indigenous Peoples |
| Performance Standard 8: | Cultural Heritage |

3. Performance Standard 1 establishes the importance of (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project. Performance Standards 2 through 8 establish objectives and requirements to avoid, minimize, and where residual impacts remain, to compensate/offset for risks and impacts to workers, Affected Communities, and the environment. While all relevant environmental and social risks and potential impacts should be considered as part of the assessment, Performance Standards 2 through 8 describe potential environmental and social risks and impacts that require particular attention. Where environmental or social risks and impacts

¹ The term "client" is used throughout the Performance Standards broadly to refer to the party responsible for implementing and operating the project that is being financed, or the recipient of the financing, depending on the project structure and type of financing. The term "project" is defined in Performance Standard 1.

are identified, the client is required to manage them through its Environmental and Social Management System (ESMS) consistent with Performance Standard 1.

4. Performance Standard 1 applies to all projects that have environmental and social risks and impacts. Depending on project circumstances, other Performance Standards may apply as well. The Performance Standards should be read together and cross-referenced as needed. The requirements section of each Performance Standard applies to all activities financed under the project, unless otherwise noted in the specific limitations described in each paragraph. Clients are encouraged to apply the ESMS developed under Performance Standard 1 to all their project activities, regardless of financing source. A number of cross-cutting topics such as climate change, gender, human rights, and water, are addressed across multiple Performance Standards.

5. In addition to meeting the requirements under the Performance Standards, clients must comply with applicable national law, including those laws implementing host country obligations under international law.

6. The World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) are technical reference documents with general and industry-specific examples of good international industry practice. IFC uses the EHS Guidelines as a technical source of information during project appraisal. The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology. For IFC-financed projects, application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to IFC, become project- or site-specific requirements. The General EHS Guideline contains information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It should be used together with the relevant industry sector guideline(s). The EHS Guidelines may be occasionally updated.

7. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternative performance level is protective of human health and the environment.

8. A set of eight Guidance Notes, corresponding to each Performance Standard, and an additional Interpretation Note on Financial Intermediaries offer guidance on the requirements contained in the Performance Standards, including reference materials, and on good sustainability practices to help clients improve project performance. These Guidance/Interpretation Notes may be occasionally updated.

Introduction

1. Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders.¹ Drawing on the elements of the established business management process of “plan, do, check, and act,” the ESMS entails a methodological approach to managing environmental and social risks² and impacts³ in a structured way on an ongoing basis. A good ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance, and can lead to improved financial, social, and environmental outcomes.

2. At times, the assessment and management of certain environmental and social risks and impacts may be the responsibility of the government or other third parties over which the client does not have control or influence.⁴ Examples of where this may happen include: (i) when early planning decisions are made by the government or third parties which affect the project site selection and/or design; and/or (ii) when specific actions directly related to the project are carried out by the government or third parties such as providing land for a project which may have previously involved the resettlement of communities or individuals and/or leading to loss of biodiversity. While the client cannot control these government or third party actions, an effective ESMS should identify the different entities involved and the roles they play, the corresponding risks they present to the client, and opportunities to collaborate with these third parties in order to help achieve environmental and social outcomes that are consistent with the Performance Standards. In addition, this Performance Standard supports the use of an effective grievance mechanism that can facilitate early indication of, and prompt remediation for those who believe that they have been harmed by a client's actions.

3. Business should respect human rights, which means to avoid infringing on the human rights of others and address adverse human rights impacts business may cause or contribute to. Each of the Performance Standards has elements related to human rights dimensions that a project may face in the course of its operations. Due diligence against these Performance Standards will enable the client to address many relevant human rights issues in its project.

Objectives

- To identify and evaluate environmental and social risks and impacts of the project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize,⁵ and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.

¹ Other stakeholders are those not directly affected by the project but that have an interest in it. These could include national and local authorities, neighboring projects, and/or nongovernmental organizations.

² Environmental and social risk is a combination of the probability of certain hazard occurrences and the severity of impacts resulting from such an occurrence.

³ Environmental and social impacts refer to any change, potential or actual, to (i) the physical, natural, or cultural environment, and (ii) impacts on surrounding community and workers, resulting from the business activity to be supported.

⁴ Contractors retained by, or acting on behalf of the client(s), are considered to be under direct control of the client and not considered third parties for the purposes of this Performance Standard.

⁵ Acceptable options to minimize will vary and include: abate, rectify, repair, and/or restore impacts, as appropriate. The risk and impact mitigation hierarchy is further discussed and specified in the context of Performance Standards 2 through 8, where relevant.

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- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

Scope of Application

4. This Performance Standard applies to business activities with environmental and/or social risks and/or impacts. For the purposes of this Performance Standard, the term “project” refers to a defined set of business activities, including those where specific physical elements, aspects, and facilities likely to generate risks and impacts, have yet to be identified.⁶ Where applicable, this could include aspects from the early developmental stages through the entire life cycle (design, construction, commissioning, operation, decommissioning, closure or, where applicable, post-closure) of a physical asset.⁷ The requirements of this Performance Standard apply to all business activities unless otherwise noted in the specific limitations described in each of the paragraphs below.

Requirements

Environmental and Social Assessment and Management System

5. The client, in coordination with other responsible government agencies and third parties as appropriate,⁸ will conduct a process of environmental and social assessment, and establish and maintain an ESMS appropriate to the nature and scale of the project and commensurate with the level of its environmental and social risks and impacts. The ESMS will incorporate the following elements: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review.

Policy

6. The client will establish an overarching policy defining the environmental and social objectives and principles that guide the project to achieve sound environmental and social performance.⁹ The policy provides a framework for the environmental and social assessment and management process, and specifies that the project (or business activities, as appropriate) will comply with the applicable laws and regulations of the jurisdictions in which it is being undertaken, including those laws implementing host country obligations under international law. The policy should be consistent with the principles of the Performance Standards. Under some circumstances, clients may also subscribe

⁶ For example, corporate entities which have portfolios of existing physical assets, and/or intend to develop or acquire new facilities, and investment funds or financial intermediaries with existing portfolios of assets and/or which intend to invest in new facilities.

⁷ Recognizing that this Performance Standard is used by a variety of financial institutions, investors, insurers, and owner/operators, each user should separately specify the business activities to which this Performance Standard should apply.

⁸ That is, those parties legally obligated and responsible for assessing and managing specific risks and impacts (e.g., government-led resettlement).

⁹ This requirement is a stand-alone, project-specific policy and is not intended to affect (or require alteration of) existing policies the client may have defined for non-related projects, business activities, or higher-level corporate activities.

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to other internationally recognized standards, certification schemes, or codes of practice and these too should be included in the policy. The policy will indicate who, within the client's organization, will ensure conformance with the policy and be responsible for its execution (with reference to an appropriate responsible government agency or third party, as necessary). The client will communicate the policy to all levels of its organization.

Identification of Risks and Impacts

7. The client will establish and maintain a process for identifying the environmental and social risks and impacts of the project (see paragraph 18 for competency requirements). The type, scale, and location of the project guide the scope and level of effort devoted to the risks and impacts identification process. The scope of the risks and impacts identification process will be consistent with good international industry practice,¹⁰ and will determine the appropriate and relevant methods and assessment tools. The process may comprise a full-scale environmental and social impact assessment, a limited or focused environmental and social assessment, or straightforward application of environmental siting, pollution standards, design criteria, or construction standards.¹¹ When the project involves existing assets, environmental and/or social audits or risk/hazard assessments can be appropriate and sufficient to identify risks and impacts. If assets to be developed, acquired or financed have yet to be defined, the establishment of an environmental and social due diligence process will identify risks and impacts at a point in the future when the physical elements, assets, and facilities are reasonably understood. The risks and impacts identification process will be based on recent environmental and social baseline data at an appropriate level of detail. The process will consider all relevant environmental and social risks and impacts of the project, including the issues identified in Performance Standards 2 through 8, and those who are likely to be affected by such risks and impacts.¹² The risks and impacts identification process will consider the emissions of greenhouse gases, the relevant risks associated with a changing climate and the adaptation opportunities, and potential transboundary effects, such as pollution of air, or use or pollution of international waterways.

8. Where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project's area of influence. This area of influence encompasses, as appropriate:

- The area likely to be affected by: (i) the project¹³ and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project;¹⁴ (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.

¹⁰ Defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally.

¹¹ For greenfield developments or large expansions with specifically identified physical elements, aspects, and facilities that are likely to generate potential significant environmental or social impacts, the client will conduct a comprehensive Environmental and Social Impact Assessment, including an examination of alternatives, where appropriate.

¹² In limited high risk circumstances, it may be appropriate for the client to complement its environmental and social risks and impacts identification process with specific human rights due diligence as relevant to the particular business.

¹³ Examples include the project's sites, the immediate airshed and watershed, or transport corridors.

¹⁴ Examples include power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, construction camps, and contaminated land (e.g., soil, groundwater, surface water, and sediments).

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- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.¹⁵
- Cumulative impacts¹⁶ that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

9. In the event of risks and impacts in the project's area of influence resulting from a third party's actions, the client will address those risks and impacts in a manner commensurate with the client's control and influence over the third parties, and with due regard to conflict of interest.

10. Where the client can reasonably exercise control, the risks and impacts identification process will also consider those risks and impacts associated with primary supply chains, as defined in Performance Standard 2 (paragraphs 27–29) and Performance Standard 6 (paragraph 30).

11. Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate environmental and social impacts, the identification of risks and impacts will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence.¹⁷ These include master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant. The risks and impacts identification will take account of the outcome of the engagement process with Affected Communities as appropriate.

12. Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts, and as part of the process of identifying risks and impacts, the client will identify individuals and groups that may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status.¹⁸ Where individuals or groups are identified as disadvantaged or vulnerable, the client will propose and implement differentiated measures so that adverse impacts do not fall disproportionately on them and they are not disadvantaged in sharing development benefits and opportunities.

Management Programs

13. Consistent with the client's policy and the objectives and principles described therein, the client will establish management programs that, in sum, will describe mitigation and performance improvement measures and actions that address the identified environmental and social risks and impacts of the project.

¹⁵ Associated facilities may include railways, roads, captive power plants or transmission lines, pipelines, utilities, warehouses, and logistics terminals.

¹⁶ Cumulative impacts are limited to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities. Examples of cumulative impacts include: incremental contribution of gaseous emissions to an airshed; reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed; interference with migratory routes or wildlife movement; or more traffic congestion and accidents due to increases in vehicular traffic on community roadways.

¹⁷ The client can take these into account by focusing on the project's incremental contribution to selected impacts generally recognized as important on the basis of scientific concern or concerns from the Affected Communities within the area addressed by these larger scope regional studies or cumulative assessments.

¹⁸ This disadvantaged or vulnerable status may stem from an individual's or group's race, color, sex, language, religion, political or other opinion, national or social origin, property, birth, or other status. The client should also consider factors such as gender, age, ethnicity, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources.

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14. Depending on the nature and scale of the project, these programs may consist of some documented combination of operational procedures, practices, plans, and related supporting documents (including legal agreements) that are managed in a systematic way.¹⁹ The programs may apply broadly across the client's organization, including contractors and primary suppliers over which the organization has control or influence, or to specific sites, facilities, or activities. The mitigation hierarchy to address identified risks and impacts will favor the avoidance of impacts over minimization, and, where residual impacts remain, compensation/offset, wherever technically²⁰ and financially feasible.²¹

15. Where the identified risks and impacts cannot be avoided, the client will identify mitigation and performance measures and establish corresponding actions to ensure the project will operate in compliance with applicable laws and regulations, and meet the requirements of Performance Standards 1 through 8. The level of detail and complexity of this collective management program and the priority of the identified measures and actions will be commensurate with the project's risks and impacts, and will take account of the outcome of the engagement process with Affected Communities as appropriate.

16. The management programs will establish environmental and social Action Plans,²² which will define desired outcomes and actions to address the issues raised in the risks and impacts identification process, as measurable events to the extent possible, with elements such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods, and with estimates of the resources and responsibilities for implementation. As appropriate, the management program will recognize and incorporate the role of relevant actions and events controlled by third parties to address identified risks and impacts. Recognizing the dynamic nature of the project, the management program will be responsive to changes in circumstances, unforeseen events, and the results of monitoring and review.

Organizational Capacity and Competency

17. The client, in collaboration with appropriate and relevant third parties, will establish, maintain, and strengthen as necessary an organizational structure that defines roles, responsibilities, and authority to implement the ESMS. Specific personnel, including management representative(s), with clear lines of responsibility and authority should be designated. Key environmental and social responsibilities should be well defined and communicated to the relevant personnel and to the rest of the client's organization. Sufficient management sponsorship and human and financial resources will be provided on an ongoing basis to achieve effective and continuous environmental and social performance.

¹⁹ Existing legal agreements between the client and third parties that address mitigation actions with regard to specific impacts constitute part of a program. Examples are government-managed resettlement responsibilities specified in an agreement.

²⁰ Technical feasibility is based on whether the proposed measures and actions can be implemented with commercially available skills, equipment, and materials, taking into consideration prevailing local factors such as climate, geography, demography, infrastructure, security, governance, capacity, and operational reliability.

²¹ Financial feasibility is based on commercial considerations, including relative magnitude of the incremental cost of adopting such measures and actions compared to the project's investment, operating, and maintenance costs, and on whether this incremental cost could make the project nonviable to the client.

²² Action plans may include an overall Environmental and Social Action Plan necessary for carrying out a suite of mitigation measures or thematic action plans, such as Resettlement Action Plans or Biodiversity Action Plans. Action plans may be plans designed to fill in the gaps of existing management programs to ensure consistency with the Performance Standards, or they may be stand alone plans that specify the project's mitigation strategy. The "Action plan" terminology is understood by some communities of practice to mean Management plans, or Development plans. In this case, examples are numerous and include various types of environmental and social management plans.

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18. Personnel within the client's organization with direct responsibility for the project's environmental and social performance will have the knowledge, skills, and experience necessary to perform their work, including current knowledge of the host country's regulatory requirements and the applicable requirements of Performance Standards 1 through 8. Personnel will also possess the knowledge, skills, and experience to implement the specific measures and actions required under the ESMS and the methods required to perform the actions in a competent and efficient manner.

19. The process of identification of risks and impacts will consist of an adequate, accurate, and objective evaluation and presentation, prepared by competent professionals. For projects posing potentially significant adverse impacts or where technically complex issues are involved, clients may be required to involve external experts to assist in the risks and impacts identification process.

Emergency Preparedness and Response

20. Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts, the ESMS will establish and maintain an emergency preparedness and response system so that the client, in collaboration with appropriate and relevant third parties, will be prepared to respond to accidental and emergency situations associated with the project in a manner appropriate to prevent and mitigate any harm to people and/or the environment. This preparation will include the identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted, response procedures, provision of equipment and resources, designation of responsibilities, communication, including that with potentially Affected Communities and periodic training to ensure effective response. The emergency preparedness and response activities will be periodically reviewed and revised, as necessary, to reflect changing conditions.

21. Where applicable, the client will also assist and collaborate with the potentially Affected Communities (see Performance Standard 4) and the local government agencies in their preparations to respond effectively to emergency situations, especially when their participation and collaboration are necessary to ensure effective response. If local government agencies have little or no capacity to respond effectively, the client will play an active role in preparing for and responding to emergencies associated with the project. The client will document its emergency preparedness and response activities, resources, and responsibilities, and will provide appropriate information to potentially Affected Community and relevant government agencies.

Monitoring and Review

22. The client will establish procedures to monitor and measure the effectiveness of the management program, as well as compliance with any related legal and/or contractual obligations and regulatory requirements. Where the government or other third party has responsibility for managing specific risks and impacts and associated mitigation measures, the client will collaborate in establishing and monitoring such mitigation measures. Where appropriate, clients will consider involving representatives from Affected Communities to participate in monitoring activities.²³ The client's monitoring program should be overseen by the appropriate level in the organization. For projects with significant impacts, the client will retain external experts to verify its monitoring information. The extent of monitoring should be commensurate with the project's environmental and social risks and impacts and with compliance requirements.

23. In addition to recording information to track performance and establishing relevant operational controls, the client should use dynamic mechanisms, such as internal inspections and audits, where relevant, to verify compliance and progress toward the desired outcomes. Monitoring will normally

²³ For example, participatory water monitoring.

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include recording information to track performance and comparing this against the previously established benchmarks or requirements in the management program. Monitoring should be adjusted according to performance experience and actions requested by relevant regulatory authorities. The client will document monitoring results and identify and reflect the necessary corrective and preventive actions in the amended management program and plans. The client, in collaboration with appropriate and relevant third parties, will implement these corrective and preventive actions, and follow up on these actions in upcoming monitoring cycles to ensure their effectiveness.

24. Senior management in the client organization will receive periodic performance reviews of the effectiveness of the ESMS, based on systematic data collection and analysis. The scope and frequency of such reporting will depend upon the nature and scope of the activities identified and undertaken in accordance with the client's ESMS and other applicable project requirements. Based on results within these performance reviews, senior management will take the necessary and appropriate steps to ensure the intent of the client's policy is met, that procedures, practices, and plans are being implemented, and are seen to be effective.

Stakeholder Engagement

25. Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts.²⁴ Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to Affected Communities. The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development.

Stakeholder Analysis and Engagement Planning

26. Clients should identify the range of stakeholders that may be interested in their actions and consider how external communications might facilitate a dialog with all stakeholders (paragraph 34 below). Where projects involve specifically identified physical elements, aspects and/or facilities that are likely to generate adverse environmental and social impacts to Affected Communities the client will identify the Affected Communities and will meet the relevant requirements described below.

27. The client will develop and implement a Stakeholder Engagement Plan that is scaled to the project risks and impacts and development stage, and be tailored to the characteristics and interests of the Affected Communities. Where applicable, the Stakeholder Engagement Plan will include differentiated measures to allow the effective participation of those identified as disadvantaged or vulnerable. When the stakeholder engagement process depends substantially on community representatives,²⁵ the client will make every reasonable effort to verify that such persons do in fact represent the views of Affected Communities and that they can be relied upon to faithfully communicate the results of consultations to their constituents.

28. In cases where the exact location of the project is not known, but it is reasonably expected to have significant impacts on local communities, the client will prepare a Stakeholder Engagement Framework, as part of its management program, outlining general principles and a strategy to identify Affected Communities and other relevant stakeholders and plan for an engagement process

²⁴ Requirements regarding engagement of workers and related grievance redress procedures are found in Performance Standard 2.

²⁵ For example, community and religious leaders, local government representatives, civil society representatives, politicians, school teachers, and/or others representing one or more affected stakeholder groups.

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compatible with this Performance Standard that will be implemented once the physical location of the project is known.

Disclosure of Information

29. Disclosure of relevant project information helps Affected Communities and other stakeholders understand the risks, impacts and opportunities of the project. The client will provide Affected Communities with access to relevant information²⁶ on: (i) the purpose, nature, and scale of the project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such communities and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance mechanism.

Consultation

30. When Affected Communities are subject to identified risks and adverse impacts from a project, the client will undertake a process of consultation in a manner that provides the Affected Communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the client to consider and respond to them. The extent and degree of engagement required by the consultation process should be commensurate with the project's risks and adverse impacts and with the concerns raised by the Affected Communities. Effective consultation is a two-way process that should: (i) begin early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise; (ii) be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information which is in a culturally appropriate local language(s) and format and is understandable to Affected Communities; (iii) focus inclusive²⁷ engagement on those directly affected as opposed to those not directly affected; (iv) be free of external manipulation, interference, coercion, or intimidation; (v) enable meaningful participation, where applicable; and (vi) be documented. The client will tailor its consultation process to the language preferences of the Affected Communities, their decision-making process, and the needs of disadvantaged or vulnerable groups. If clients have already engaged in such a process, they will provide adequate documented evidence of such engagement.

Informed Consultation and Participation

31. For projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation (ICP) process that will build upon the steps outlined above in Consultation and will result in the Affected Communities' informed participation. ICP involves a more in-depth exchange of views and information, and an organized and iterative consultation, leading to the client's incorporating into their decision-making process the views of the Affected Communities on matters that affect them directly, such as the proposed mitigation measures, the sharing of development benefits and opportunities, and implementation issues. The consultation process should (i) capture both men's and women's views, if necessary through separate forums or engagements, and (ii) reflect men's and women's different concerns and priorities about impacts, mitigation mechanisms, and benefits, where appropriate. The client will document the process, in particular the measures taken to avoid or minimize risks to and adverse impacts on the

²⁶ Depending on the scale of the project and significance of the risks and impacts, relevant document(s) could range from full Environmental and Social Assessments and Action Plans (i.e., Stakeholder Engagement Plan, Resettlement Action Plans, Biodiversity Action Plans, Hazardous Materials Management Plans, Emergency Preparedness and Response Plans, Community Health and Safety Plans, Ecosystem Restoration Plans, and Indigenous Peoples Development Plans, etc.) to easy-to-understand summaries of key issues and commitments. These documents could also include the client's environmental and social policy and any supplemental measures and actions defined as a result of independent due diligence conducted by financiers.

²⁷ Such as men, women, the elderly, youth, displaced persons, and vulnerable and disadvantaged persons or groups.

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Affected Communities, and will inform those affected about how their concerns have been considered.

Indigenous Peoples

32. For projects with adverse impacts to Indigenous Peoples, the client is required to engage them in a process of ICP and in certain circumstances the client is required to obtain their Free, Prior, and Informed Consent (FPIC). The requirements related to Indigenous Peoples and the definition of the special circumstances requiring FPIC are described in Performance Standard 7.

Private Sector Responsibilities Under Government-Led Stakeholder Engagement

33. Where stakeholder engagement is the responsibility of the host government, the client will collaborate with the responsible government agency, to the extent permitted by the agency, to achieve outcomes that are consistent with the objectives of this Performance Standard. In addition, where government capacity is limited, the client will play an active role during the stakeholder engagement planning, implementation, and monitoring. If the process conducted by the government does not meet the relevant requirements of this Performance Standard, the client will conduct a complementary process and, where appropriate, identify supplemental actions.

External Communications and Grievance Mechanisms

External Communications

34. Clients will implement and maintain a procedure for external communications that includes methods to (i) receive and register external communications from the public; (ii) screen and assess the issues raised and determine how to address them; (iii) provide, track, and document responses, if any; and (iv) adjust the management program, as appropriate. In addition, clients are encouraged to make publicly available periodic reports on their environmental and social sustainability.

Grievance Mechanism for Affected Communities

35. Where there are Affected Communities, the client will establish a grievance mechanism to receive and facilitate resolution of Affected Communities' concerns and grievances about the client's environmental and social performance. The grievance mechanism should be scaled to the risks and adverse impacts of the project and have Affected Communities as its primary user. It should seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate and readily accessible, and at no cost and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies. The client will inform the Affected Communities about the mechanism in the course of the stakeholder engagement process.

Ongoing Reporting to Affected Communities

36. The client will provide periodic reports to the Affected Communities that describe progress with implementation of the project Action Plans on issues that involve ongoing risk to or impacts on Affected Communities and on issues that the consultation process or grievance mechanism have identified as a concern to those Communities. If the management program results in material changes in or additions to the mitigation measures or actions described in the Action Plans on issues of concern to the Affected Communities, the updated relevant mitigation measures or actions will be communicated to them. The frequency of these reports will be proportionate to the concerns of Affected Communities but not less than annually.

Introduction

1. Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental¹ rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention, and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, clients may create tangible benefits, such as enhancement of the efficiency and productivity of their operations.

2. The requirements set out in this Performance Standard have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN).²

Objectives

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labor.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System (ESMS), the elements of which are outlined in Performance Standard 1.

4. The scope of application of this Performance Standard depends on the type of employment relationship between the client and the worker. It applies to workers directly engaged by the client (direct workers), workers engaged through third parties to perform work related to core business

¹ As guided by the ILO Conventions listed in footnote 2.

² These conventions are:

ILO Convention 87 on Freedom of Association and Protection of the Right to Organize

ILO Convention 98 on the Right to Organize and Collective Bargaining

ILO Convention 29 on Forced Labor

ILO Convention 105 on the Abolition of Forced Labor

ILO Convention 138 on Minimum Age (of Employment)

ILO Convention 182 on the Worst Forms of Child Labor

ILO Convention 100 on Equal Remuneration

ILO Convention 111 on Discrimination (Employment and Occupation)

UN Convention on the Rights of the Child, Article 32.1

UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families

processes³ of the project for a substantial duration (contracted workers), as well as workers engaged by the client's primary suppliers (supply chain workers).⁴

Direct Workers

5. With respect to direct workers, the client will apply the requirements of paragraphs 8–23 of this Performance Standard.

Contracted Workers

6. With respect to contracted workers, the client will apply the requirements of paragraphs 23–26 of this Performance Standard.

Supply Chain Workers

7. With respect to supply chain workers, the client will apply the requirements of paragraphs 27–29 of this Performance Standard.

Requirements

Working Conditions and Management of Worker Relationship

Human Resources Policies and Procedures

8. The client will adopt and implement human resources policies and procedures appropriate to its size and workforce that set out its approach to managing workers consistent with the requirements of this Performance Standard and national law.

9. The client will provide workers with documented information that is clear and understandable, regarding their rights under national labor and employment law and any applicable collective agreements, including their rights related to hours of work, wages, overtime, compensation, and benefits upon beginning the working relationship and when any material changes occur.

Working Conditions and Terms of Employment

10. Where the client is a party to a collective bargaining agreement with a workers' organization, such agreement will be respected. Where such agreements do not exist, or do not address working conditions and terms of employment,⁵ the client will provide reasonable working conditions and terms of employment.⁶

11. The client will identify migrant workers and ensure that they are engaged on substantially equivalent terms and conditions to non-migrant workers carrying out similar work.

³ Core business processes constitute those production and/or service processes essential for a specific business activity without which the business activity could not continue.

⁴ Primary suppliers are those suppliers who, on an ongoing basis, provide goods or materials essential for the core business processes of the project.

⁵ Working conditions and terms of employment examples are wages and benefits; wage deductions; hours of work; overtime arrangements and overtime compensation; breaks; rest days; and leave for illness, maternity, vacation or holiday.

⁶ Reasonable working conditions and terms of employment could be assessed by reference to (i) conditions established for work of the same character in the trade or industry concerned in the area/region where the work is carried out; (ii) collective agreement or other recognized negotiation between other organizations of employers and workers' representatives in the trade or industry concerned; (iii) arbitration award; or (iv) conditions established by national law.

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12. Where accommodation services⁷ are provided to workers covered by the scope of this Performance Standard, the client will put in place and implement policies on the quality and management of the accommodation and provision of basic services.⁸ The accommodation services will be provided in a manner consistent with the principles of non-discrimination and equal opportunity. Workers' accommodation arrangements should not restrict workers' freedom of movement or of association.

Workers' Organizations

13. In countries where national law recognizes workers' rights to form and to join workers' organizations of their choosing without interference and to bargain collectively, the client will comply with national law. Where national law substantially restricts workers' organizations, the client will not restrict workers from developing alternative mechanisms to express their grievances and protect their rights regarding working conditions and terms of employment. The client should not seek to influence or control these mechanisms

14. In either case described in paragraph 13 of this Performance Standard, and where national law is silent, the client will not discourage workers from electing worker representatives, forming or joining workers' organizations of their choosing, or from bargaining collectively, and will not discriminate or retaliate against workers who participate, or seek to participate, in such organizations and collective bargaining. The client will engage with such workers' representatives and workers' organizations, and provide them with information needed for meaningful negotiation in a timely manner. Workers' organizations are expected to fairly represent the workers in the workforce.

Non-Discrimination and Equal Opportunity

15. The client will not make employment decisions on the basis of personal characteristics⁹ unrelated to inherent job requirements. The client will base the employment relationship on the principle of equal opportunity and fair treatment, and will not discriminate with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices. The client will take measures to prevent and address harassment, intimidation, and/or exploitation, especially in regard to women. The principles of non-discrimination apply to migrant workers.

16. In countries where national law provides for non-discrimination in employment, the client will comply with national law. When national laws are silent on non-discrimination in employment, the client will meet this Performance Standard. In circumstances where national law is inconsistent with this Performance Standard, the client is encouraged to carry out its operations consistent with the intent of paragraph 15 above without contravening applicable laws.

17. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job will not be deemed as discrimination, provided they are consistent with national law.

⁷ Those services might be provided either directly by the client or by third parties.

⁸ Basic services requirements refer to minimum space, supply of water, adequate sewage and garbage disposal system, appropriate protection against heat, cold, damp, noise, fire and disease-carrying animals, adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting, and in some cases basic medical services.

⁹ Such as gender, race, nationality, ethnic, social and indigenous origin, religion or belief, disability, age, or sexual orientation.

Retrenchment

18. Prior to implementing any collective dismissals,¹⁰ the client will carry out an analysis of alternatives to retrenchment.¹¹ If the analysis does not identify viable alternatives to retrenchment, a retrenchment plan will be developed and implemented to reduce the adverse impacts of retrenchment on workers. The retrenchment plan will be based on the principle of non-discrimination and will reflect the client's consultation with workers, their organizations, and, where appropriate, the government, and comply with collective bargaining agreements if they exist. The client will comply with all legal and contractual requirements related to notification of public authorities, and provision of information to, and consultation with workers and their organizations.

19. The client should ensure that all workers receive notice of dismissal and severance payments mandated by law and collective agreements in a timely manner. All outstanding back pay and social security benefits and pension contributions and benefits will be paid (i) on or before termination of the working relationship to the workers, (ii) where appropriate, for the benefit of the workers, or (iii) payment will be made in accordance with a timeline agreed through a collective agreement. Where payments are made for the benefit of workers, workers will be provided with evidence of such payments.

Grievance Mechanism

20. The client will provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. The client will inform the workers of the grievance mechanism at the time of recruitment and make it easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism should also allow for anonymous complaints to be raised and addressed. The mechanism should not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

Protecting the Work Force

Child Labor

21. The client will not employ children in any manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. The client will identify the presence of all persons under the age of 18. Where national laws have provisions for the employment of minors, the client will follow those laws applicable to the client. Children under the age of 18 will not be employed in hazardous work.¹² All work of persons under the age of 18 will be subject to an appropriate risk assessment and regular monitoring of health, working conditions, and hours of work.

¹⁰ Collective dismissals cover all multiple dismissals that are a result of an economic, technical, or organizational reason; or other reasons that are not related to performance or other personal reasons.

¹¹ Examples of alternatives may include negotiated working-time reduction programs, employee capacity-building programs; long-term maintenance works during low production periods, etc.

¹² Examples of hazardous work activities include work (i) with exposure to physical, psychological, or sexual abuse; (ii) underground, underwater, working at heights, or in confined spaces; (iii) with dangerous machinery, equipment, or tools, or involving handling of heavy loads; (iv) in unhealthy environments exposing the worker to hazardous substances, agents, processes, temperatures, noise, or vibration damaging to health; or (v) under difficult conditions such as long hours, late night, or confinement by employer.

Forced Labor

22. The client will not employ forced labor, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory labor, such as indentured labor, bonded labor, or similar labor-contracting arrangements. The client will not employ trafficked persons.¹³

Occupational Health and Safety

23. The client will provide a safe and healthy work environment, taking into account inherent risks in its particular sector and specific classes of hazards in the client's work areas, including physical, chemical, biological, and radiological hazards, and specific threats to women. The client will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, as far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice,¹⁴ as reflected in various internationally recognized sources including the World Bank Group Environmental, Health and Safety Guidelines, the client will address areas that include the (i) identification of potential hazards to workers, particularly those that may be life-threatening; (ii) provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) training of workers; (iv) documentation and reporting of occupational accidents, diseases, and incidents; and (v) emergency prevention, preparedness, and response arrangements. For additional information related to emergency preparedness and response refer to Performance Standard 1.

Workers Engaged by Third Parties

24. With respect to contracted workers the client will take commercially reasonable efforts to ascertain that the third parties who engage these workers are reputable and legitimate enterprises and have an appropriate ESMS that will allow them to operate in a manner consistent with the requirements of this Performance Standard, except for paragraphs 18–19, and 27–29.

25. The client will establish policies and procedures for managing and monitoring the performance of such third party employers in relation to the requirements of this Performance Standard. In addition, the client will use commercially reasonable efforts to incorporate these requirements in contractual agreements with such third party employers.

26. The client will ensure that contracted workers, covered in paragraphs 24–25 of this Performance Standard, have access to a grievance mechanism. In cases where the third party is not able to provide a grievance mechanism the client will extend its own grievance mechanism to serve workers engaged by the third party.

¹³ Trafficking in persons is defined as the recruitment, transportation, transfer, harboring, or receipt of persons, by means of the threat or use of force or other forms of coercion, abduction, fraud, deception, abuse of power, or of a position of vulnerability, or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Women and children are particularly vulnerable to trafficking practices.

¹⁴ Defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances, globally or regionally.

Supply Chain

27. Where there is a high risk of child labor or forced labor¹⁵ in the primary supply chain, the client will identify those risks consistent with paragraphs 21 and 22 above. If child labor or forced labor cases are identified, the client will take appropriate steps to remedy them. The client will monitor its primary supply chain on an ongoing basis in order to identify any significant changes in its supply chain and if new risks or incidents of child and/or forced labor are identified, the client will take appropriate steps to remedy them.

28. Additionally, where there is a high risk of significant safety issues related to supply chain workers, the client will introduce procedures and mitigation measures to ensure that primary suppliers within the supply chain are taking steps to prevent or to correct life-threatening situations.

29. The ability of the client to fully address these risks will depend upon the client's level of management control or influence over its primary suppliers. Where remedy is not possible, the client will shift the project's primary supply chain over time to suppliers that can demonstrate that they are complying with this Performance Standard.

¹⁵ The potential risk of child labor and forced labor will be determined during the risks and impacts identification process as required in Performance Standard 1.

Introduction

1. Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.¹ There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention² and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world. These are often implemented through continuous improvement methodologies similar to those used to enhance quality or productivity, which are generally well known to most industrial, agricultural, and service sector companies.

2. This Performance Standard outlines a project-level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. In addition, this Performance Standard promotes the ability of private sector companies to adopt such technologies and practices as far as their use is feasible in the context of a project that relies on commercially available skills and resources.

Objectives

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce project-related GHG emissions.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.

Requirements

4. During the project life-cycle, the client will consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention principles and techniques that are best suited to avoid, or where avoidance is not possible, minimize adverse impacts on human health and the environment.³ The principles and techniques applied during the project life-cycle will be

¹ For the purposes of this Performance Standard, the term "pollution" is used to refer to both hazardous and non-hazardous chemical pollutants in the solid, liquid, or gaseous phases, and includes other components such as pests, pathogens, thermal discharge to water, GHG emissions, nuisance odors, noise, vibration, radiation, electromagnetic energy, and the creation of potential visual impacts including light.

² For the purpose of this Performance Standard, the term "pollution prevention" does not mean absolute elimination of emissions, but the avoidance at source whenever possible, and, if not possible, then subsequent minimization of pollution to the extent that the Performance Standard objectives are satisfied.

³ Technical feasibility is based on whether the proposed measures and actions can be implemented with commercially available skills, equipment, and materials, taking into consideration prevailing local factors such as climate, geography, infrastructure, security, governance, capacity and operational reliability. Financial feasibility is

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tailored to the hazards and risks associated with the nature of the project and consistent with good international industry practice (GIIP),⁴ as reflected in various internationally recognized sources, including the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines).

5. The client will refer to the EHS Guidelines or other internationally recognized sources, as appropriate, when evaluating and selecting resource efficiency and pollution prevention and control techniques for the project. The EHS Guidelines contain the performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from the levels and measures presented in the EHS Guidelines, clients will be required to achieve whichever is more stringent. If less stringent levels or measures than those provided in the EHS Guidelines are appropriate in view of specific project circumstances, the client will provide full and detailed justification for any proposed alternatives through the environmental and social risks and impacts identification and assessment process. This justification must demonstrate that the choice for any alternate performance levels is consistent with the objectives of this Performance Standard.

Resource Efficiency

6. The client will implement technically and financially feasible and cost effective⁵ measures for improving efficiency in its consumption of energy, water, as well as other resources and material inputs, with a focus on areas that are considered core business activities. Such measures will integrate the principles of cleaner production into product design and production processes with the objective of conserving raw materials, energy, and water. Where benchmarking data are available, the client will make a comparison to establish the relative level of efficiency.

Greenhouse Gases

7. In addition to the resource efficiency measures described above, the client will consider alternatives and implement technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project. These options may include, but are not limited to, alternative project locations, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring.

8. For projects that are expected to or currently produce more than 25,000 tonnes of CO₂-equivalent annually,⁶ the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary,⁷ as well as indirect emissions associated with the off-site

based on commercial considerations, including relative magnitude of the incremental cost of adopting such measures and actions compared to the project's investment, operating, and maintenance costs.

⁴ GIIP is defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally. The outcome of such exercise should be that the project employs the most appropriate technologies in the project-specific circumstances.

⁵ Cost-effectiveness is determined according to the capital and operational cost and financial benefits of the measure considered over the life of the measure. For the purpose of this Performance Standard, a resource efficiency or GHG emissions reduction measure is considered cost-effective if it is expected to provide a risk-rated return on investment at least comparable to the project itself.

⁶ The quantification of emissions should consider all significant sources of greenhouse gas emissions, including non-energy related sources such as methane and nitrous oxide, among others.

⁷ Project-induced changes in soil carbon content or above ground biomass, and project-induced decay of organic matter may contribute to direct emissions sources and shall be included in this emissions quantification where such emissions are expected to be significant.

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production of energy⁸ used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice.⁹

Water Consumption

9. When the project is a potentially significant consumer of water, in addition to applying the resource efficiency requirements of this Performance Standard, the client shall adopt measures that avoid or reduce water usage so that the project's water consumption does not have significant adverse impacts on others. These measures include, but are not limited to, the use of additional technically feasible water conservation measures within the client's operations, the use of alternative water supplies, water consumption offsets to reduce total demand for water resources to within the available supply, and evaluation of alternative project locations.

Pollution Prevention

10. The client will avoid the release of pollutants or, when avoidance is not feasible, minimize and/or control the intensity and mass flow of their release. This applies to the release of pollutants to air, water, and land due to routine, non-routine, and accidental circumstances with the potential for local, regional, and transboundary impacts.¹⁰ Where historical pollution such as land or ground water contamination exists, the client will seek to determine whether it is responsible for mitigation measures. If it is determined that the client is legally responsible, then these liabilities will be resolved in accordance with national law, or where this is silent, with GIIP.¹¹

11. To address potential adverse project impacts on existing ambient conditions,¹² the client will consider relevant factors, including, for example (i) existing ambient conditions; (ii) the finite assimilative capacity¹³ of the environment; (iii) existing and future land use; (iv) the project's proximity to areas of importance to biodiversity; and (v) the potential for cumulative impacts with uncertain and/or irreversible consequences. In addition to applying resource efficiency and pollution control measures as required in this Performance Standard, when the project has the potential to constitute a significant source of emissions in an already degraded area, the client will consider additional strategies and adopt measures that avoid or reduce negative effects. These strategies include, but are not limited to, evaluation of project location alternatives and emissions offsets.

Wastes

12. The client will avoid the generation of hazardous and non-hazardous waste materials. Where waste generation cannot be avoided, the client will reduce the generation of waste, and recover and reuse waste in a manner that is safe for human health and the environment. Where waste cannot be recovered or reused, the client will treat, destroy, or dispose of it in an environmentally sound manner that includes the appropriate control of emissions and residues resulting from the handling and processing of the waste material. If the generated waste is considered hazardous,¹⁴ the client will

⁸ Refers to the off-site generation by others of electricity, and heating and cooling energy used in the project.

⁹ Estimation methodologies are provided by the Intergovernmental Panel on Climate Change, various international organizations, and relevant host country agencies.

¹⁰ Transboundary pollutants include those covered under the Convention on Long-Range Transboundary Air Pollution.

¹¹ This may require coordination with national and local government, communities, and the contributors to the contamination, and that any assessment follows a risk-based approach consistent with GIIP as reflected in the EHS Guidelines.

¹² Such as air, surface and groundwater, and soils.

¹³ The capacity of the environment for absorbing an incremental load of pollutants while remaining below a threshold of unacceptable risk to human health and the environment.

¹⁴ As defined by international conventions or local legislation.

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adopt GIIP alternatives for its environmentally sound disposal while adhering to the limitations applicable to its transboundary movement.¹⁵ When hazardous waste disposal is conducted by third parties, the client will use contractors that are reputable and legitimate enterprises licensed by the relevant government regulatory agencies and obtain chain of custody documentation to the final destination. The client should ascertain whether licensed disposal sites are being operated to acceptable standards and where they are, the client will use these sites. Where this is not the case, clients should reduce waste sent to such sites and consider alternative disposal options, including the possibility of developing their own recovery or disposal facilities at the project site.

Hazardous Materials Management

13. Hazardous materials are sometimes used as raw material or produced as product by the project. The client will avoid or, when avoidance is not possible, minimize and control the release of hazardous materials. In this context, the production, transportation, handling, storage, and use of hazardous materials for project activities should be assessed. The client will consider less hazardous substitutes where hazardous materials are intended to be used in manufacturing processes or other operations. The client will avoid the manufacture, trade, and use of chemicals and hazardous materials subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer.¹⁶

Pesticide Use and Management

14. The client will, where appropriate, formulate and implement an integrated pest management (IPM) and/or integrated vector management (IVM) approach targeting economically significant pest infestations and disease vectors of public health significance. The client's IPM and IVM program will integrate coordinated use of pest and environmental information along with available pest control methods, including cultural practices, biological, genetic, and, as a last resort, chemical means to prevent economically significant pest damage and/or disease transmission to humans and animals.

15. When pest management activities include the use of chemical pesticides, the client will select chemical pesticides that are low in human toxicity, that are known to be effective against the target species, and that have minimal effects on non-target species and the environment. When the client selects chemical pesticides, the selection will be based upon requirements that the pesticides be packaged in safe containers, be clearly labeled for safe and proper use, and that the pesticides have been manufactured by an entity currently licensed by relevant regulatory agencies.

16. The client will design its pesticide application regime to (i) avoid damage to natural enemies of the target pest, and where avoidance is not possible, minimize, and (ii) avoid the risks associated with the development of resistance in pests and vectors, and where avoidance is not possible minimize. In addition, pesticides will be handled, stored, applied, and disposed of in accordance with the Food and Agriculture Organization's International Code of Conduct on the Distribution and Use of Pesticides or other GIIP.

17. The client will not purchase, store, use, manufacture, or trade in products that fall in WHO Recommended Classification of Pesticides by Hazard Class Ia (extremely hazardous); or Ib (highly

¹⁵ Transboundary movement of hazardous materials should be consistent with national, regional and international law, including the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

¹⁶ Consistent with the objectives of the Stockholm Convention on Persistent Organic Pollutants and the Montreal Protocol on Substances that Deplete the Ozone Layer. Similar considerations will apply to certain World Health Organization (WHO) classes of pesticides.



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hazardous). The client will not purchase, store, use, manufacture or trade in Class II (moderately hazardous) pesticides, unless the project has appropriate controls on manufacture, procurement, or distribution and/or use of these chemicals. These chemicals should not be accessible to personnel without proper training, equipment, and facilities to handle, store, apply, and dispose of these products properly.

Introduction

1. Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, this Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.
2. In conflict and post-conflict areas, the level of risks and impacts described in this Performance Standard may be greater. The risks that a project could exacerbate an already sensitive local situation and stress scarce local resources should not be overlooked as it may lead to further conflict.

Objectives

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.
4. This Performance Standard addresses potential risks and impacts to the Affected Communities from project activities. Occupational health and safety requirements for workers are included in Performance Standard 2, and environmental standards to avoid or minimize impacts on human health and the environment due to pollution are included in Performance Standard 3.

Requirements

Community Health and Safety

5. The client will evaluate the risks and impacts to the health and safety of the Affected Communities during the project life-cycle and will establish preventive and control measures consistent with good international industry practice (GIIP),¹ such as in the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) or other internationally recognized sources. The client will identify risks and impacts and propose mitigation measures that are commensurate with their nature and magnitude. These measures will favor the avoidance of risks and impacts over minimization.

¹ Defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally.

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Infrastructure and Equipment Design and Safety

6. The client will design, construct, operate, and decommission the structural elements or components of the project in accordance with GIIP, taking into consideration safety risks to third parties or Affected Communities. When new buildings and structures will be accessed by members of the public, the client will consider incremental risks of the public's potential exposure to operational accidents and/or natural hazards and be consistent with the principles of universal access. Structural elements will be designed and constructed by competent professionals, and certified or approved by competent authorities or professionals. When structural elements or components, such as dams, tailings dams, or ash ponds are situated in high-risk locations, and their failure or malfunction may threaten the safety of communities, the client will engage one or more external experts with relevant and recognized experience in similar projects, separate from those responsible for the design and construction, to conduct a review as early as possible in project development and throughout the stages of project design, construction, operation, and decommissioning. For projects that operate moving equipment on public roads and other forms of infrastructure, the client will seek to avoid the occurrence of incidents and injuries to members of the public associated with the operation of such equipment.

Hazardous Materials Management and Safety

7. The client will avoid or minimize the potential for community exposure to hazardous materials and substances that may be released by the project. Where there is a potential for the public (including workers and their families) to be exposed to hazards, particularly those that may be life-threatening, the client will exercise special care to avoid or minimize their exposure by modifying, substituting, or eliminating the condition or material causing the potential hazards. Where hazardous materials are part of existing project infrastructure or components, the client will exercise special care when conducting decommissioning activities in order to avoid exposure to the community. The client will exercise commercially reasonable efforts to control the safety of deliveries of hazardous materials, and of transportation and disposal of hazardous wastes, and will implement measures to avoid or control community exposure to pesticides, in accordance with the requirements of Performance Standard 3.

Ecosystem Services

8. The project's direct impacts on priority ecosystem services may result in adverse health and safety risks and impacts to Affected Communities. With respect to this Performance Standard, ecosystem services are limited to provisioning and regulating services as defined in paragraph 2 of Performance Standard 6. For example, land use changes or the loss of natural buffer areas such as wetlands, mangroves, and upland forests that mitigate the effects of natural hazards such as flooding, landslides, and fire, may result in increased vulnerability and community safety-related risks and impacts. The diminution or degradation of natural resources, such as adverse impacts on the quality, quantity, and availability of freshwater,² may result in health-related risks and impacts. Where appropriate and feasible, the client will identify those risks and potential impacts on priority ecosystem services that may be exacerbated by climate change. Adverse impacts should be avoided, and if these impacts are unavoidable, the client will implement mitigation measures in accordance with paragraphs 24 and 25 of Performance Standard 6. With respect to the use of and loss of access to provisioning services, clients will implement mitigation measures in accordance with paragraphs 25–29 of Performance Standard 5.

² Freshwater is an example of provisioning ecosystem services.

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Community Exposure to Disease

9. The client will avoid or minimize the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups. Where specific diseases are endemic in communities in the project area of influence, the client is encouraged to explore opportunities during the project life-cycle to improve environmental conditions that could help minimize their incidence.

10. The client will avoid or minimize transmission of communicable diseases that may be associated with the influx of temporary or permanent project labor.

Emergency Preparedness and Response

11. In addition to the emergency preparedness and response requirements described in Performance Standard 1, the client will also assist and collaborate with the Affected Communities, local government agencies, and other relevant parties, in their preparations to respond effectively to emergency situations, especially when their participation and collaboration are necessary to respond to such emergency situations. If local government agencies have little or no capacity to respond effectively, the client will play an active role in preparing for and responding to emergencies associated with the project. The client will document its emergency preparedness and response activities, resources, and responsibilities, and will disclose appropriate information to Affected Communities, relevant government agencies, or other relevant parties.

Security Personnel

12. When the client retains direct or contracted workers to provide security to safeguard its personnel and property, it will assess risks posed by its security arrangements to those within and outside the project site. In making such arrangements, the client will be guided by the principles of proportionality and good international practice³ in relation to hiring, rules of conduct, training, equipping, and monitoring of such workers, and by applicable law. The client will make reasonable inquiries to ensure that those providing security are not implicated in past abuses; will train them adequately in the use of force (and where applicable, firearms), and appropriate conduct toward workers and Affected Communities; and require them to act within the applicable law. The client will not sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat. The client will provide a grievance mechanism for Affected Communities to express concerns about the security arrangements and acts of security personnel.

13. The client will assess and document risks arising from the project's use of government security personnel deployed to provide security services. The client will seek to ensure that security personnel will act in a manner consistent with paragraph 12 above, and encourage the relevant public authorities to disclose the security arrangements for the client's facilities to the public, subject to overriding security concerns.

14. The client will consider and, where appropriate, investigate all allegations of unlawful or abusive acts of security personnel, take action (or urge appropriate parties to take action) to prevent recurrence, and report unlawful and abusive acts to public authorities.

³ Including practice consistent with the United Nation's (UN) Code of Conduct for Law Enforcement Officials, and UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials.

Introduction

1. Performance Standard 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood¹) as a result of project-related land acquisition² and/or restrictions on land use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement. This occurs in cases of (i) lawful expropriation or temporary or permanent restrictions on land use and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.

2. Unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment for the Affected Communities and persons, as well as environmental damage and adverse socio-economic impacts in areas to which they have been displaced. For these reasons, involuntary resettlement should be avoided. However, where involuntary resettlement is unavoidable, it should be minimized and appropriate measures to mitigate adverse impacts on displaced persons and host communities³ should be carefully planned and implemented. The government often plays a central role in the land acquisition and resettlement process, including the determination of compensation, and is therefore an important third party in many situations. Experience demonstrates that the direct involvement of the client in resettlement activities can result in more cost-effective, efficient, and timely implementation of those activities, as well as in the introduction of innovative approaches to improving the livelihoods of those affected by resettlement.

3. To help avoid expropriation and eliminate the need to use governmental authority to enforce relocation, clients are encouraged to use negotiated settlements meeting the requirements of this Performance Standard, even if they have the legal means to acquire land without the seller's consent.

Objectives

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost⁴ and (ii) ensuring

¹ The term "livelihood" refers to the full range of means that individuals, families, and communities utilize to make a living, such as wage-based income, agriculture, fishing, foraging, other natural resource-based livelihoods, petty trade, and bartering.

² Land acquisition includes both outright purchases of property and acquisition of access rights, such as easements or rights of way.

³ A host community is any community receiving displaced persons.

⁴ Replacement cost is defined as the market value of the assets plus transaction costs. In applying this method of valuation, depreciation of structures and assets should not be taken into account. Market value is defined as the value required to allow Affected Communities and persons to replace lost assets with assets of similar value. The valuation method for determining replacement cost should be documented and included in applicable Resettlement and/or Livelihood Restoration plans (see paragraphs 18 and 25).

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that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.

- To improve, or restore, the livelihoods and standards of living of displaced persons.
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure⁵ at resettlement sites.

Scope of Application

4. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.

5. This Performance Standard applies to physical and/or economic displacement resulting from the following types of land-related transactions:

- Land rights or land use rights acquired through expropriation or other compulsory procedures in accordance with the legal system of the host country;
- Land rights or land use rights acquired through negotiated settlements with property owners or those with legal rights to the land if failure to reach settlement would have resulted in expropriation or other compulsory procedures;⁶
- Project situations where involuntary restrictions on land use and access to natural resources cause a community or groups within a community to lose access to resource usage where they have traditional or recognizable usage rights;⁷
- Certain project situations requiring evictions of people occupying land without formal, traditional, or recognizable usage rights;⁸ or
- Restriction on access to land or use of other resources including communal property and natural resources such as marine and aquatic resources, timber and non-timber forest products, freshwater, medicinal plants, hunting and gathering grounds and grazing and cropping areas.⁹

6. This Performance Standard does not apply to resettlement resulting from voluntary land transactions (i.e., market transactions in which the seller is not obliged to sell and the buyer cannot resort to expropriation or other compulsory procedures sanctioned by the legal system of the host country if negotiations fail). It also does not apply to impacts on livelihoods where the project is not changing the land use of the affected groups or communities.¹⁰

⁵ Security of tenure means that resettled individuals or communities are resettled to a site that they can legally occupy and where they are protected from the risk of eviction.

⁶ This also applies to customary or traditional rights recognized or recognizable under the laws of the host country. The negotiations may be carried out by the government or by the company (in some circumstances, as an agent of the government).

⁷ In such situations, affected persons frequently do not have formal ownership. This may include freshwater and marine environments. This Performance Standard may also apply when project-related biodiversity areas or legally designated buffer zones are established but not acquired by the client.

⁸ While some people do not have rights over the land they occupy, this Performance Standard requires that non-land assets be retained, replaced, or compensated for; relocation take place with security of tenure; and lost livelihoods be restored.

⁹ Natural resource assets referred to in this Performance Standard are equivalent to ecosystem provisioning services as described in Performance Standard 6.

¹⁰ More generalized impacts on communities or groups of people are covered in Performance Standard 1. For example, disruption of access to mineral deposits by artisanal miners is covered by Performance Standard 1.

7. Where project impacts on land, assets, or access to assets become significantly adverse at any stage of the project, the client should consider applying requirements of this Performance Standard, even where no land acquisition or land use restriction is involved.

Requirements

General

Project Design

8. The client will consider feasible alternative project designs to avoid or minimize physical and/or economic displacement, while balancing environmental, social, and financial costs and benefits, paying particular attention to impacts on the poor and vulnerable.

Compensation and Benefits for Displaced Persons

9. When displacement cannot be avoided, the client will offer displaced communities and persons compensation for loss of assets at full replacement cost and other assistance¹¹ to help them improve or restore their standards of living or livelihoods, as provided in this Performance Standard. Compensation standards will be transparent and applied consistently to all communities and persons affected by the displacement. Where livelihoods of displaced persons are land-based,¹² or where land is collectively owned, the client will, where feasible,¹³ offer the displaced land-based compensation. The client will take possession of acquired land and related assets only after compensation has been made available¹⁴ and, where applicable, resettlement sites and moving allowances have been provided to the displaced persons in addition to compensation.¹⁵ The client will also provide opportunities to displaced communities and persons to derive appropriate development benefits from the project.

Community Engagement

10. The client will engage with Affected Communities, including host communities, through the process of stakeholder engagement described in Performance Standard 1. Decision-making processes related to resettlement and livelihood restoration should include options and alternatives, where applicable. Disclosure of relevant information and participation of Affected Communities and persons will continue during the planning, implementation, monitoring, and evaluation of compensation payments, livelihood restoration activities, and resettlement to achieve outcomes that are consistent with the objectives of this Performance Standard.¹⁶ Additional provisions apply to consultations with Indigenous Peoples, in accordance with Performance Standard 7.

¹¹ As described in paragraphs 19 and 26.

¹² The term "land-based" includes livelihood activities such as subsistence cropping and grazing of livestock as well as the harvesting of natural resources.

¹³ Refer to paragraph 26 of this Performance Standard for further requirements.

¹⁴ In certain cases it may not be feasible to pay compensation to all those affected before taking possession of the land, for example when the ownership of the land in question is in dispute. Such circumstances shall be identified and agreed on a case-by-case basis, and compensation funds shall be made available for example through deposit into an escrow account before displacement takes place.

¹⁵ Unless government-managed resettlement is involved and where the client has no direct influence over the timing of compensation payments. Such cases should be handled in accordance with paragraphs 27–29 of this Performance Standard. Staggered compensation payments may be made where one-off cash payments would demonstrably undermine social and/or resettlement objectives, or where there are ongoing impacts to livelihood activities.

¹⁶ The consultation process should ensure that women's perspectives are obtained and their interests factored into all aspects of resettlement planning and implementation. Addressing livelihood impacts may require intra-household analysis in cases where women's and men's livelihoods are affected differently. Women's and men's preferences in terms of compensation mechanisms, such as compensation in kind rather than in cash, should be explored.

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Grievance Mechanism

11. The client will establish a grievance mechanism consistent with Performance Standard 1 as early as possible in the project development phase. This will allow the client to receive and address specific concerns about compensation and relocation raised by displaced persons or members of host communities in a timely fashion, including a recourse mechanism designed to resolve disputes in an impartial manner.

Resettlement and Livelihood Restoration Planning and Implementation

12. Where involuntary resettlement is unavoidable, either as a result of a negotiated settlement or expropriation, a census will be carried out to collect appropriate socio-economic baseline data to identify the persons who will be displaced by the project, determine who will be eligible for compensation and assistance,¹⁷ and discourage ineligible persons, such as opportunistic settlers, from claiming benefits. In the absence of host government procedures, the client will establish a cut-off date for eligibility. Information regarding the cut-off date will be well documented and disseminated throughout the project area.

13. In cases where affected persons reject compensation offers that meet the requirements of this Performance Standard and, as a result, expropriation or other legal procedures are initiated, the client will explore opportunities to collaborate with the responsible government agency, and, if permitted by the agency, play an active role in resettlement planning, implementation, and monitoring (see paragraphs 30–32).

14. The client will establish procedures to monitor and evaluate the implementation of a Resettlement Action Plan or Livelihood Restoration Plan (see paragraphs 19 and 25) and take corrective action as necessary. The extent of monitoring activities will be commensurate with the project's risks and impacts. For projects with significant involuntary resettlement risks, the client will retain competent resettlement professionals to provide advice on compliance with this Performance Standard and to verify the client's monitoring information. Affected persons will be consulted during the monitoring process.

15. Implementation of a Resettlement Action Plan or Livelihood Restoration Plan will be considered completed when the adverse impacts of resettlement have been addressed in a manner that is consistent with the relevant plan as well as the objectives of this Performance Standard. It may be necessary for the client to commission an external completion audit of the Resettlement Action Plan or Livelihood Restoration Plan to assess whether the provisions have been met, depending on the scale and/or complexity of physical and economic displacement associated with a project. The completion audit should be undertaken once all mitigation measures have been substantially completed and once displaced persons are deemed to have been provided adequate opportunity and assistance to sustainably restore their livelihoods. The completion audit will be undertaken by competent resettlement professionals once the agreed monitoring period is concluded. The completion audit will include, at a minimum, a review of the totality of mitigation measures implemented by the Client, a comparison of implementation outcomes against agreed objectives, and a conclusion as to whether the monitoring process can be ended.¹⁸

¹⁷ Documentation of ownership or occupancy and compensation arrangements should be issued in the names of both spouses or heads of households, and other resettlement assistance, such as skills training, access to credit, and job opportunities, should be equally available to women and adapted to their needs. Where national law and tenure systems do not recognize the rights of women to hold or contract in property, measures should be considered to provide women as much protection as possible with the objective to achieve equity with men.

¹⁸ The completion audit of the Resettlement Action Plan and/or Livelihood Restoration Plan, will be undertaken by external resettlement experts once the agreed monitoring period is concluded, and will involve a more in-depth assessment than regular resettlement monitoring activities, including at a minimum a review of all mitigation

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16. Where the exact nature or magnitude of the land acquisition or restrictions on land use related to a project with potential to cause physical and/or economic displacement is unknown due to the stage of project development, the client will develop a Resettlement and/or Livelihood Restoration Framework outlining general principles compatible with this Performance Standard. Once the individual project components are defined and the necessary information becomes available, such a framework will be expanded into a specific Resettlement Action Plan or Livelihood Restoration Plan and procedures in accordance with paragraphs 19 and 25 below.

Displacement

17. Displaced persons may be classified as persons (i) who have formal legal rights to the land or assets they occupy or use; (ii) who do not have formal legal rights to land or assets, but have a claim to land that is recognized or recognizable under national law;¹⁹ or (iii) who have no recognizable legal right or claim to the land or assets they occupy or use. The census will establish the status of the displaced persons.

18. Project-related land acquisition and/or restrictions on land use may result in the physical displacement of people as well as their economic displacement. Consequently, requirements of this Performance Standard in respect of physical displacement and economic displacement may apply simultaneously.²⁰

Physical Displacement

19. In the case of physical displacement, the client will develop a Resettlement Action Plan that covers, at a minimum, the applicable requirements of this Performance Standard regardless of the number of people affected. This will include compensation at full replacement cost for land and other assets lost. The Plan will be designed to mitigate the negative impacts of displacement; identify development opportunities; develop a resettlement budget and schedule; and establish the entitlements of all categories of affected persons (including host communities). Particular attention will be paid to the needs of the poor and the vulnerable. The client will document all transactions to acquire land rights, as well as compensation measures and relocation activities.

20. If people living in the project area are required to move to another location, the client will (i) offer displaced persons choices among feasible resettlement options, including adequate replacement housing or cash compensation where appropriate; and (ii) provide relocation assistance suited to the needs of each group of displaced persons. New resettlement sites built for displaced persons must offer improved living conditions. The displaced persons' preferences with respect to relocating in preexisting communities and groups will be taken into consideration. Existing social and cultural institutions of the displaced persons and any host communities will be respected.

21. In the case of physically displaced persons under paragraph 17 (i) or (ii), the client will offer the choice of replacement property of equal or higher value, security of tenure, equivalent or better characteristics, and advantages of location or cash compensation where appropriate. Compensation

measures with respect to the physical and/or economic displacement implemented by the Client, a comparison of implementation outcomes against agreed objectives, a conclusion as to whether the monitoring process can be ended and, where necessary, a Corrective Action Plan listing outstanding actions necessary to met the objectives.

¹⁹ Such claims could be derived from adverse possession or from customary or traditional tenure arrangements.

²⁰ Where a project results in both physical and economic displacement, the requirements of paragraphs 25 and 26 (Economic Displacement) should be incorporated into the Resettlement Action Plan or Framework (i.e., there is no need to have a separate Resettlement Action Plan and Livelihood Restoration Plan).

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in kind should be considered in lieu of cash. Cash compensation levels should be sufficient to replace the lost land and other assets at full replacement cost in local markets.²¹

22. In the case of physically displaced persons under paragraph 17 (iii), the client will offer them a choice of options for adequate housing with security of tenure so that they can resettle legally without having to face the risk of forced eviction. Where these displaced persons own and occupy structures, the client will compensate them for the loss of assets other than land, such as dwellings and other improvements to the land, at full replacement cost, provided that these persons have been occupying the project area prior to the cut-off date for eligibility. Based on consultation with such displaced persons, the client will provide relocation assistance sufficient for them to restore their standard of living at an adequate alternative site.²²

23. The client is not required to compensate or assist those who encroach on the project area after the cut-off date for eligibility, provided the cut-off date has been clearly established and made public.

24. Forced evictions²³ will not be carried out except in accordance with law and the requirements of this Performance Standard.

Economic Displacement

25. In the case of projects involving economic displacement only, the client will develop a Livelihood Restoration Plan to compensate affected persons and/or communities and offer other assistance that meet the objectives of this Performance Standard. The Livelihood Restoration Plan will establish the entitlements of affected persons and/or communities and will ensure that these are provided in a transparent, consistent, and equitable manner. The mitigation of economic displacement will be considered complete when affected persons or communities have received compensation and other assistance according to the requirements of the Livelihood Restoration Plan and this Performance Standard, and are deemed to have been provided with adequate opportunity to reestablish their livelihoods.

26. If land acquisition or restrictions on land use result in economic displacement defined as loss of assets and/or means of livelihood, regardless of whether or not the affected people are physically displaced, the client will meet the requirements in paragraphs 27–29 below, as applicable.

27. Economically displaced persons who face loss of assets or access to assets will be compensated for such loss at full replacement cost.

- In cases where land acquisition or restrictions on land use affect commercial structures, affected business owners will be compensated for the cost of reestablishing commercial activities elsewhere, for lost net income during the

²¹ Payment of cash compensation for lost assets may be appropriate where (i) livelihoods are not land-based; (ii) livelihoods are land-based but the land taken for the project is a small fraction of the affected asset and the residual land is economically viable; or (iii) active markets for land, housing, and labor exist, displaced persons use such markets, and there is sufficient supply of land and housing.

²² Relocation of informal settlers in urban areas may involve trade-offs. For example, the relocated families may gain security of tenure, but they may lose advantages of location. Changes in location that may affect livelihood opportunities should be addressed in accordance with the principles of this Performance Standard (see in particular paragraph 25).

²³ The permanent or temporary removal against the will of individuals, families, and/or communities from the homes and/or lands which they occupy without the provision of, and access to, appropriate forms of legal and other protection.

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period of transition, and for the costs of the transfer and reinstallation of the plant, machinery, or other equipment.

- In cases affecting persons with legal rights or claims to land which are recognized or recognizable under national law (see paragraph 17 (i) and (ii)), replacement property (e.g., agricultural or commercial sites) of equal or greater value will be provided, or, where appropriate, cash compensation at full replacement cost.
- Economically displaced persons who are without legally recognizable claims to land (see paragraph 17 (iii)) will be compensated for lost assets other than land (such as crops, irrigation infrastructure and other improvements made to the land), at full replacement cost. The client is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date for eligibility.

28. In addition to compensation for lost assets, if any, as required under paragraph 27, economically displaced persons whose livelihoods or income levels are adversely affected will also be provided opportunities to improve, or at least restore, their means of income-earning capacity, production levels, and standards of living:

- For persons whose livelihoods are land-based, replacement land that has a combination of productive potential, locational advantages, and other factors at least equivalent to that being lost should be offered as a matter of priority.
- For persons whose livelihoods are natural resource-based and where project-related restrictions on access envisaged in paragraph 5 apply, implementation of measures will be made to either allow continued access to affected resources or provide access to alternative resources with equivalent livelihood-earning potential and accessibility. Where appropriate, benefits and compensation associated with natural resource usage may be collective in nature rather than directly oriented towards individuals or households.
- If circumstances prevent the client from providing land or similar resources as described above, alternative income earning opportunities may be provided, such as credit facilities, training, cash, or employment opportunities. Cash compensation alone, however, is frequently insufficient to restore livelihoods.

29. Transitional support should be provided as necessary to all economically displaced persons, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living.

Private Sector Responsibilities Under Government-Managed Resettlement

30. Where land acquisition and resettlement are the responsibility of the government, the client will collaborate with the responsible government agency, to the extent permitted by the agency, to achieve outcomes that are consistent with this Performance Standard. In addition, where government capacity is limited, the client will play an active role during resettlement planning, implementation, and monitoring, as described below.

31. In the case of acquisition of land rights or access to land through compulsory means or negotiated settlements involving physical displacement, the client will identify and describe²⁴ government resettlement measures. If these measures do not meet the relevant requirements of this Performance Standard, the client will prepare a Supplemental Resettlement Plan that, together with

²⁴ Government documents, where available, may be used to identify such measures.

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the documents prepared by the responsible government agency, will address the relevant requirements of this Performance Standard (the General Requirements and requirements for Physical Displacement and Economic Displacement above). The client will need to include in its Supplemental Resettlement Plan, at a minimum (i) identification of affected people and impacts; (ii) a description of regulated activities, including the entitlements of displaced persons provided under applicable national laws and regulations; (iii) the supplemental measures to achieve the requirements of this Performance Standard as described in paragraphs 19–29 in a way that is permitted by the responsible agency and implementation time schedule; and (iv) the financial and implementation responsibilities of the client in the execution of its Supplemental Resettlement Plan.

32. In the case of projects involving economic displacement only, the client will identify and describe the measures that the responsible government agency plans to use to compensate Affected Communities and persons. If these measures do not meet the relevant requirements of this Performance Standard, the client will develop an Environmental and Social Action Plan to complement government action. This may include additional compensation for lost assets, and additional efforts to restore lost livelihoods where applicable.

Introduction

1. Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.”

2. Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types: (i) provisioning services, which are the products people obtain from ecosystems; (ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes; (iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems; and (iv) supporting services, which are the natural processes that maintain the other services.¹

3. Ecosystem services valued by humans are often underpinned by biodiversity. Impacts on biodiversity can therefore often adversely affect the delivery of ecosystem services. This Performance Standard addresses how clients can sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project’s lifecycle.

Objectives

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services.
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Scope of Application

4. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client’s Environmental and Social Management System (ESMS), the elements of which are outlined in Performance Standard 1.

5. Based on the risks and impacts identification process, the requirements of this Performance Standard are applied to projects (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry).

¹ Examples are as follows: (i) provisioning services may include food, freshwater, timber, fibers, medicinal plants; (ii) regulating services may include surface water purification, carbon storage and sequestration, climate regulation, protection from natural hazards; (iii) cultural services may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment; and (iv) supporting services may include soil formation, nutrient cycling, primary production.

Requirements

General

6. The risks and impacts identification process as set out in Performance Standard 1 should consider direct and indirect project-related impacts on biodiversity and ecosystem services and identify any significant residual impacts. This process will consider relevant threats to biodiversity and ecosystem services, especially focusing on habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, and pollution. It will also take into account the differing values attached to biodiversity and ecosystem services by Affected Communities and, where appropriate, other stakeholders. Where paragraphs 13–19 are applicable, the client should consider project-related impacts across the potentially affected landscape or seascape.

7. As a matter of priority, the client should seek to avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services should be implemented. Given the complexity in predicting project impacts on biodiversity and ecosystem services over the long term, the client should adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the project's lifecycle.

8. Where paragraphs 13–15 are applicable, the client will retain competent professionals to assist in conducting the risks and impacts identification process. Where paragraphs 16–19 are applicable, the client should retain external experts with appropriate regional experience to assist in the development of a mitigation hierarchy that complies with this Performance Standard and to verify the implementation of those measures.

Protection and Conservation of Biodiversity

9. Habitat is defined as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment. For the purposes of implementation of this Performance Standard, habitats are divided into modified, natural, and critical. Critical habitats are a subset of modified or natural habitats.

10. For the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization, and restoration measures have been applied.² A biodiversity offset should be designed and implemented to achieve measurable conservation outcomes³ that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats. The design of a biodiversity offset must adhere to the “like-for-like or better” principle⁴ and must be carried out in

² Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimization and restoration measures have been taken.

³ Measurable conservation outcomes for biodiversity must be demonstrated in situ (on-the-ground) and on an appropriate geographic scale (e.g., local, landscape-level, national, regional).

⁴ The principle of “like-for-like or better” indicates that biodiversity offsets must be designed to conserve the same biodiversity values that are being impacted by the project (an “in-kind” offset). In certain situations, however, areas of biodiversity to be impacted by the project may be neither a national nor a local priority, and there may be other areas of biodiversity with like values that are a higher priority for conservation and sustainable use and under imminent threat or need of protection or effective management. In these situations, it may be appropriate to consider an “out-of-kind” offset that involves “trading up” (i.e., where the offset targets biodiversity of higher

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alignment with best available information and current practices. When a client is considering the development of an offset as part of the mitigation strategy, external experts with knowledge in offset design and implementation must be involved.

Modified Habitat

11. Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.⁵ Modified habitats may include areas managed for agriculture, forest plantations, reclaimed⁶ coastal zones, and reclaimed wetlands.

12. This Performance Standard applies to those areas of modified habitat that include significant biodiversity value, as determined by the risks and impacts identification process required in Performance Standard 1. The client should minimize impacts on such biodiversity and implement mitigation measures as appropriate.

Natural Habitat

13. Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

14. The client will not significantly convert or degrade⁷ natural habitats, unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified habitat;
- Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation;⁸ and
- Any conversion or degradation is mitigated according to the mitigation hierarchy.

15. In areas of natural habitat, mitigation measures will be designed to achieve no net loss⁹ of biodiversity where feasible. Appropriate actions include:

- Avoiding impacts on biodiversity through the identification and protection of set-asides;¹⁰

priority than that affected by the project) that will, for critical habitats, meet the requirements of paragraph 17 of this Performance Standard.

⁵ This excludes habitat that has been converted in anticipation of the project.

⁶ Reclamation as used in this context is the process of creating new land from sea or other aquatic areas for productive use.

⁷ Significant conversion or degradation is (i) the elimination or severe diminution of the integrity of a habitat caused by a major and/or long-term change in land or water use; or (ii) a modification that substantially minimizes the habitat's ability to maintain viable populations of its native species.

⁸ Conducted as part of the stakeholder engagement and consultation process, as described in Performance Standard 1.

⁹ No net loss is defined as the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimize the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (e.g., local, landscape-level, national, regional).

¹⁰ Set-asides are land areas within the project site, or areas over which the client has management control, that are excluded from development and are targeted for the implementation of conservation enhancement measures. Set-asides will likely contain significant biodiversity values and/or provide ecosystem services of significance at the local, national and/or regional level. Set-asides should be defined using internationally recognized approaches or methodologies (e.g., High Conservation Value, systematic conservation planning).

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- Implementing measures to minimize habitat fragmentation, such as biological corridors;
- Restoring habitats during operations and/or after operations; and
- Implementing biodiversity offsets.

Critical Habitat

16. Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered¹¹ species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

17. In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;¹²
- The project does not lead to a net reduction in the global and/or national/regional population¹³ of any Critically Endangered or Endangered species over a reasonable period of time;¹⁴ and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

18. In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains¹⁵ of those biodiversity values for which the critical habitat was designated.

¹¹ As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project by project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

¹² Biodiversity values and their supporting ecological processes will be determined on an ecologically relevant scale.

¹³ Net reduction is a singular or cumulative loss of individuals that impacts on the species' ability to persist at the global and/or regional/national scales for many generations or over a long period of time. The scale (i.e., global and/or regional/national) of the potential net reduction is determined based on the species' listing on either the (global) IUCN Red List and/or on regional/national lists. For species listed on both the (global) IUCN Red List and the national/regional lists, the net reduction will be based on the national/regional population.

¹⁴ The timeframe in which clients must demonstrate "no net reduction" of Critically Endangered and Endangered species will be determined on a case-by-case basis in consultation with external experts.

¹⁵ Net gains are additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated. Net gains may be achieved through the development of a biodiversity offset and/or, in instances where the client could meet the requirements of paragraph 17 of this Performance Standard without a biodiversity offset, the client should achieve net gains through the implementation of programs that could be implemented in situ (on-the-ground) to enhance habitat, and protect and conserve biodiversity.

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19. In instances where biodiversity offsets are proposed as part of the mitigation strategy, the client must demonstrate through an assessment that the project's significant residual impacts on biodiversity will be adequately mitigated to meet the requirements of paragraph 17.

Legally Protected and Internationally Recognized Areas

20. In circumstances where a proposed project is located within a legally protected area¹⁶ or an internationally recognized area,¹⁷ the client will meet the requirements of paragraphs 13 through 19 of this Performance Standard, as applicable. In addition, the client will:

- Demonstrate that the proposed development in such areas is legally permitted;
- Act in a manner consistent with any government recognized management plans for such areas;
- Consult protected area sponsors and managers, Affected Communities, Indigenous Peoples and other stakeholders on the proposed project, as appropriate; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area.¹⁸

Invasive Alien Species

21. Intentional or accidental introduction of alien, or non-native, species of flora and fauna into areas where they are not normally found can be a significant threat to biodiversity, since some alien species can become invasive, spreading rapidly and out-competing native species.

22. The client will not intentionally introduce any new alien species (not currently established in the country or region of the project) unless this is carried out in accordance with the existing regulatory framework for such introduction. Notwithstanding the above, the client will not deliberately introduce any alien species with a high risk of invasive behavior regardless of whether such introductions are permitted under the existing regulatory framework. All introductions of alien species will be subject to a risk assessment (as part of the client's environmental and social risks and impacts identification process) to determine the potential for invasive behavior. The client will implement measures to avoid the potential for accidental or unintended introductions including the transportation of substrates and vectors (such as soil, ballast, and plant materials) that may harbor alien species.

23. Where alien species are already established in the country or region of the proposed project, the client will exercise diligence in not spreading them into areas in which they have not already been established. As practicable, the client should take measures to eradicate such species from the natural habitats over which they have management control.

Management of Ecosystem Services

24. Where a project is likely to adversely impact ecosystem services, as determined by the risks and impacts identification process, the client will conduct a systematic review to identify priority

¹⁶ This Performance Standard recognizes legally protected areas that meet the IUCN definition: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." For the purposes of this Performance Standard, this includes areas proposed by governments for such designation.

¹⁷ Exclusively defined as UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention).

¹⁸ Implementing additional programs may not be necessary for projects that do not create a new footprint.

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ecosystem services. Priority ecosystem services are two-fold: (i) those services on which project operations are most likely to have an impact and, therefore, which result in adverse impacts to Affected Communities; and/or (ii) those services on which the project is directly dependent for its operations (e.g., water). When Affected Communities are likely to be impacted, they should participate in the determination of priority ecosystem services in accordance with the stakeholder engagement process as defined in Performance Standard 1.

25. With respect to impacts on priority ecosystem services of relevance to Affected Communities and where the client has direct management control or significant influence over such ecosystem services, adverse impacts should be avoided. If these impacts are unavoidable, the client will minimize them and implement mitigation measures that aim to maintain the value and functionality of priority services. With respect to impacts on priority ecosystem services on which the project depends, clients should minimize impacts on ecosystem services and implement measures that increase resource efficiency of their operations, as described in Performance Standard 3. Additional provisions for ecosystem services are included in Performance Standards 4, 5, 7, and 8.¹⁹

Sustainable Management of Living Natural Resources

26. Clients who are engaged in the primary production of living natural resources, including natural and plantation forestry, agriculture, animal husbandry, aquaculture, and fisheries, will be subject to the requirements of paragraphs 26 through 30, in addition to the rest of this Performance Standard. Where feasible, the client will locate land-based agribusiness and forestry projects on unforested land or land already converted. Clients who are engaged in such industries will manage living natural resources in a sustainable manner, through the application of industry-specific good management practices and available technologies. Where such primary production practices are codified in globally, regionally, or nationally recognized standards, the client will implement sustainable management practices to one or more relevant and credible standards as demonstrated by independent verification or certification.

27. Credible globally, regionally, or nationally recognized standards for sustainable management of living natural resources are those which (i) are objective and achievable; (ii) are founded on a multi-stakeholder consultative process; (iii) encourage step-wise and continual improvements; and (iv) provide for independent verification or certification through appropriate accredited bodies for such standards.²⁰

28. Where relevant and credible standard(s) exist, but the client has not yet obtained independent verification or certification to such standard(s), the client will conduct a pre-assessment of its conformity to the applicable standard(s) and take actions to achieve such verification or certification over an appropriate period of time.

29. In the absence of a relevant and credible global, regional, or national standard for the particular living natural resource in the country concerned, the client will:

¹⁹ Ecosystem service references are located in Performance Standard 4, paragraph 8; Performance Standard 5, paragraphs 5 and 25–29; Performance Standard 7, paragraphs 13–17 and 20; and Performance Standard 8, paragraph 11.

²⁰ A credible certification system would be one which is independent, cost-effective, based on objective and measurable performance standards and developed through consultation with relevant stakeholders, such as local people and communities, Indigenous Peoples, and civil society organizations representing consumer, producer and conservation interests. Such a system has fair, transparent and independent decision-making procedures that avoid conflicts of interest.

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- Commit to applying good international industry operating principles, management practices, and technologies; and
- Actively engage and support the development of a national standard, where relevant, including studies that contribute to the definition and demonstration of sustainable practices.

Supply Chain

30. Where a client is purchasing primary production (especially but not exclusively food and fiber commodities) that is known to be produced in regions where there is a risk of significant conversion of natural and/or critical habitats, systems and verification practices will be adopted as part of the client's ESMS to evaluate its primary suppliers.²¹ The systems and verification practices will (i) identify where the supply is coming from and the habitat type of this area; (ii) provide for an ongoing review of the client's primary supply chains; (iii) limit procurement to those suppliers that can demonstrate that they are not contributing to significant conversion of natural and/or critical habitats (this may be demonstrated by delivery of certified product, or progress towards verification or certification under a credible scheme in certain commodities and/or locations); and (iv) where possible, require actions to shift the client's primary supply chain over time to suppliers that can demonstrate that they are not significantly adversely impacting these areas. The ability of the client to fully address these risks will depend upon the client's level of management control or influence over its primary suppliers.

²¹ Primary suppliers are those suppliers who, on an ongoing basis, provide the majority of living natural resources, goods, and materials essential for the core business processes of the project.

Introduction

1. Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases.

2. Private sector projects can create opportunities for Indigenous Peoples to participate in, and benefit from project-related activities that may help them fulfill their aspiration for economic and social development. Furthermore, Indigenous Peoples may play a role in sustainable development by promoting and managing activities and enterprises as partners in development. Government often plays a central role in the management of Indigenous Peoples' issues, and clients should collaborate with the responsible authorities in managing the risks and impacts of their activities.¹

Objectives

- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.
- To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts.
- To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle.
- To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.
- To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.

¹ In addition to meeting the requirements under this Performance Standard, clients must comply with applicable national law, including those laws implementing host country obligations under international law.

4. There is no universally accepted definition of “Indigenous Peoples.” Indigenous Peoples may be referred to in different countries by such terms as “Indigenous ethnic minorities,” “aboriginals,” “hill tribes,” “minority nationalities,” “scheduled tribes,” “first nations,” or “tribal groups.”
5. In this Performance Standard, the term “Indigenous Peoples” is used in a generic sense to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:
- Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
 - Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
 - Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; or
 - A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.
6. This Performance Standard applies to communities or groups of Indigenous Peoples who maintain a collective attachment, i.e., whose identity as a group or community is linked, to distinct habitats or ancestral territories and the natural resources therein. It may also apply to communities or groups that have lost collective attachment to distinct habitats or ancestral territories in the project area, occurring within the concerned group members’ lifetime, because of forced severance, conflict, government resettlement programs, dispossession of their lands, natural disasters, or incorporation of such territories into an urban area.
7. The client may be required to seek inputs from competent professionals to ascertain whether a particular group is considered as Indigenous Peoples for the purpose of this Performance Standard.

Requirements

General

Avoidance of Adverse Impacts

8. The client will identify, through an environmental and social risks and impacts assessment process, all communities of Indigenous Peoples within the project area of influence who may be affected by the project, as well as the nature and degree of the expected direct and indirect economic, social, cultural (including cultural heritage²), and environmental impacts on them.
9. Adverse impacts on Affected Communities of Indigenous Peoples should be avoided where possible. Where alternatives have been explored and adverse impacts are unavoidable, the client will minimize, restore, and/or compensate for these impacts in a culturally appropriate manner commensurate with the nature and scale of such impacts and the vulnerability of the Affected Communities of Indigenous Peoples. The client’s proposed actions will be developed with the ICP of the Affected Communities of Indigenous Peoples and contained in a time-bound plan, such as an Indigenous Peoples Plan, or a broader community development plan with separate components for Indigenous Peoples.³

² Additional requirements on protection of cultural heritage are set out in Performance Standard 8.

³ The determination of the appropriate plan may require the input of competent professionals. A community development plan may be appropriate in circumstances where Indigenous Peoples are a part of larger Affected Communities.

Participation and Consent

10. The client will undertake an engagement process with the Affected Communities of Indigenous Peoples as required in Performance Standard 1. This engagement process includes stakeholder analysis and engagement planning, disclosure of information, consultation, and participation, in a culturally appropriate manner. In addition, this process will:

- Involve Indigenous Peoples' representative bodies and organizations (e.g., councils of elders or village councils), as well as members of the Affected Communities of Indigenous Peoples; and
- Provide sufficient time for Indigenous Peoples' decision-making processes.⁴

11. Affected Communities of Indigenous Peoples may be particularly vulnerable to the loss of, alienation from or exploitation of their land and access to natural and cultural resources.⁵ In recognition of this vulnerability, in addition to the General Requirements of this Performance Standard, the client will obtain the FPIC of the Affected Communities of Indigenous Peoples in the circumstances described in paragraphs 13–17 of this Performance Standard. FPIC applies to project design, implementation, and expected outcomes related to impacts affecting the communities of Indigenous Peoples. When any of these circumstances apply, the client will engage external experts to assist in the identification of the project risks and impacts.

12. There is no universally accepted definition of FPIC. For the purposes of Performance Standards 1, 7 and 8, "FPIC" has the meaning described in this paragraph. FPIC builds on and expands the process of ICP described in Performance Standard 1 and will be established through good faith negotiation between the client and the Affected Communities of Indigenous Peoples. The client will document: (i) the mutually accepted process between the client and Affected Communities of Indigenous Peoples, and (ii) evidence of agreement between the parties as the outcome of the negotiations. FPIC does not necessarily require unanimity and may be achieved even when individuals or groups within the community explicitly disagree.

Circumstances Requiring Free, Prior, and Informed Consent

Impacts on Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use

13. Indigenous Peoples are often closely tied to their lands and related natural resources.⁶ Frequently, these lands are traditionally owned or under customary use.⁷ While Indigenous Peoples may not possess legal title to these lands as defined by national law, their use of these lands, including seasonal or cyclical use, for their livelihoods, or cultural, ceremonial, and spiritual purposes that define their identity and community, can often be substantiated and documented.

⁴ Internal decision making processes are generally but not always collective in nature. There may be internal dissent, and decisions may be challenged by some in the community. The consultation process should be sensitive to such dynamics and allow sufficient time for internal decision making processes to reach conclusions that are considered legitimate by the majority of the concerned participants.

⁵ Natural resources and natural areas with cultural value referred to in this Performance Standard are equivalent to ecosystem provisioning and cultural services as described in Performance Standard 6.

⁶ Examples include marine and aquatic resources timber, and non-timber forest products, medicinal plants, hunting and gathering grounds, and grazing and cropping areas. Natural resource assets, as referred to in this Performance Standard, are equivalent to provisioning ecosystem services as described in Performance Standard 6.

⁷ The acquisition and/or leasing of lands with legal title is addressed in Performance Standard 5: Land Acquisition and Involuntary Resettlement.

14. If the client proposes to locate a project on, or commercially develop natural resources on lands traditionally owned by, or under the customary use of, Indigenous Peoples, and adverse impacts⁸ can be expected, the client will take the following steps:

- Document efforts to avoid and otherwise minimize the area of land proposed for the project;
- Document efforts to avoid and otherwise minimize impacts on natural resources and natural areas of importance⁹ to Indigenous People;
- Identify and review all property interests and traditional resource uses prior to purchasing or leasing land;
- Assess and document the Affected Communities of Indigenous Peoples' resource use without prejudicing any Indigenous Peoples' land claim.¹⁰ The assessment of land and natural resource use should be gender inclusive and specifically consider women's role in the management and use of these resources;
- Ensure that Affected Communities of Indigenous Peoples are informed of their land rights under national law, including any national law recognizing customary use rights; and
- Offer Affected Communities of Indigenous Peoples compensation and due process in the case of commercial development of their land and natural resources, together with culturally appropriate sustainable development opportunities, including:
 - Providing land-based compensation or compensation-in-kind in lieu of cash compensation where feasible.¹¹
 - Ensuring continued access to natural resources, identifying the equivalent replacement resources, or, as a last option, providing compensation and identifying alternative livelihoods if project development results in the loss of access to and the loss of natural resources independent of project land acquisition.
 - Ensuring fair and equitable sharing of benefits associated with project usage of the resources where the client intends to utilize natural resources that are central to the identity and livelihood of Affected Communities of Indigenous People and their usage thereof exacerbates livelihood risk.
 - Providing Affected Communities of Indigenous Peoples with access, usage, and transit on land it is developing subject to overriding health, safety, and security considerations.

Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use

15. The client will consider feasible alternative project designs to avoid the relocation of Indigenous Peoples from communally held¹² lands and natural resources subject to traditional ownership or

⁸ Such adverse impacts may include impacts from loss of access to assets or resources or restrictions on land use resulting from project activities.

⁹ "Natural resources and natural areas of importance" as referred to in this Performance Standard are equivalent to priority ecosystem services as defined in Performance Standard 6. They refer to those services over which the client has direct management control or significant influence, and those services most likely to be sources of risk in terms of impacts on Affected Communities of Indigenous Peoples.

¹⁰ While this Performance Standard requires substantiation and documentation of the use of such land, clients should also be aware that the land may already be under alternative use, as designated by the host government.

¹¹ If circumstances prevent the client from offering suitable replacement land, the client must provide verification that such is the case. Under such circumstances, the client will provide non land-based income-earning opportunities over and above cash compensation to the Affected Communities of Indigenous Peoples.

under customary use. If such relocation is unavoidable the client will not proceed with the project unless FPIC has been obtained as described above. Any relocation of Indigenous Peoples will be consistent with the requirements of Performance Standard 5. Where feasible, the relocated Indigenous Peoples should be able to return to their traditional or customary lands, should the cause of their relocation cease to exist.

Critical Cultural Heritage

16. Where a project may significantly impact on critical cultural heritage¹³ that is essential to the identity and/or cultural, ceremonial, or spiritual aspects of Indigenous Peoples lives, priority will be given to the avoidance of such impacts. Where significant project impacts on critical cultural heritage are unavoidable, the client will obtain the FPIC of the Affected Communities of Indigenous Peoples.

17. Where a project proposes to use the cultural heritage including knowledge, innovations, or practices of Indigenous Peoples for commercial purposes, the client will inform the Affected Communities of Indigenous Peoples of (i) their rights under national law; (ii) the scope and nature of the proposed commercial development; (iii) the potential consequences of such development; and (iv) obtain their FPIC. The client will also ensure fair and equitable sharing of benefits from commercialization of such knowledge, innovation, or practice, consistent with the customs and traditions of the Indigenous Peoples.

Mitigation and Development Benefits

18. The client and the Affected Communities of Indigenous Peoples will identify mitigation measures in alignment with the mitigation hierarchy described in Performance Standard 1 as well as opportunities for culturally appropriate and sustainable development benefits. The client will ensure the timely and equitable delivery of agreed measures to the Affected Communities of Indigenous Peoples.

19. The determination, delivery, and distribution of compensation and other benefit sharing measures to the Affected Communities of Indigenous Peoples will take account of the laws, institutions, and customs of these communities as well as their level of interaction with mainstream society. Eligibility for compensation can either be individually or collectively-based, or be a combination of both.¹⁴ Where compensation occurs on a collective basis, mechanisms that promote the effective delivery and distribution of compensation to all eligible members of the group will be defined and implemented.

20. Various factors including, but not limited to, the nature of the project, the project context and the vulnerability of the Affected Communities of Indigenous Peoples will determine how these communities should benefit from the project. Identified opportunities should aim to address the goals

¹² Typically, Indigenous Peoples claim rights and access to, and use of land and resources through traditional or customary systems, many of which entail communal property rights. These traditional claims to land and resources may not be recognized under national laws. Where members of the Affected Communities of Indigenous Peoples individually hold legal title, or where the relevant national law recognizes customary rights for individuals, the requirements of Performance Standard 5 will apply, rather than the requirements under paragraph 17 of this Performance Standard.

¹³ Includes natural areas with cultural and/or spiritual value such as sacred groves, sacred bodies of water and waterways, sacred trees, and sacred rocks. Natural areas with cultural value are equivalent to priority ecosystem cultural services as defined in Performance Standard 6.

¹⁴ Where control of resources, assets and decision making are predominantly collective in nature, efforts will be made to ensure that, where possible, benefits and compensation are collective, and take account of intergenerational differences and needs.

and preferences of the Indigenous Peoples including improving their standard of living and livelihoods in a culturally appropriate manner, and to foster the long-term sustainability of the natural resources on which they depend.

Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues

21. Where the government has a defined role in the management of Indigenous Peoples issues in relation to the project, the client will collaborate with the responsible government agency, to the extent feasible and permitted by the agency, to achieve outcomes that are consistent with the objectives of this Performance Standard. In addition, where government capacity is limited, the client will play an active role during planning, implementation, and monitoring of activities to the extent permitted by the agency.

22. The client will prepare a plan that, together with the documents prepared by the responsible government agency, will address the relevant requirements of this Performance Standard. The client may need to include (i) the plan, implementation, and documentation of the process of ICP and engagement and FPIC where relevant; (ii) a description of the government-provided entitlements of affected Indigenous Peoples; (iii) the measures proposed to bridge any gaps between such entitlements, and the requirements of this Performance Standard; and (iv) the financial and implementation responsibilities of the government agency and/or the client.

Introduction

1. Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

Objectives

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

Scope of Application

2. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System (ESMS), the elements of which are outlined in Performance Standard 1. During the project life-cycle, the client will consider potential project impacts to cultural heritage and will apply the provisions of this Performance Standard.

3. For the purposes of this Performance Standard, cultural heritage refers to (i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

4. Requirements with respect to tangible forms of cultural heritage are contained in paragraphs 6–16. For requirements with respect to specific instances of intangible forms of cultural heritage described in paragraph 3 (iii) see paragraph 16.

5. The requirements of this Performance Standard apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed. The requirements of this Performance Standard do not apply to cultural heritage of Indigenous Peoples; Performance Standard 7 describes those requirements.

Requirements

Protection of Cultural Heritage in Project Design and Execution

6. In addition to complying with applicable law on the protection of cultural heritage, including national law implementing the host country's obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage, the client will identify and protect cultural heritage by ensuring that internationally recognized practices for the protection, field-based study, and documentation of cultural heritage are implemented.

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7. Where the risk and identification process determines that there is a chance of impacts to cultural heritage, the client will retain competent professionals to assist in the identification and protection of cultural heritage. The removal of nonreplicable cultural heritage is subject to the additional requirements of paragraph 10 below. In the case of critical cultural heritage, the requirements of paragraphs 13–15 will apply.

Chance Find Procedures

8. The client is responsible for siting and designing a project to avoid significant adverse impacts to cultural heritage. The environmental and social risks and impacts identification process should determine whether the proposed location of a project is in areas where cultural heritage is expected to be found, either during construction or operations. In such cases, as part of the client's ESMS, the client will develop provisions for managing chance finds¹ through a chance find procedure² which will be applied in the event that cultural heritage is subsequently discovered. The client will not disturb any chance find further until an assessment by competent professionals is made and actions consistent with the requirements of this Performance Standard are identified.

Consultation

9. Where a project may affect cultural heritage, the client will consult with Affected Communities within the host country who use, or have used within living memory, the cultural heritage for long-standing cultural purposes. The client will consult with the Affected Communities to identify cultural heritage of importance, and to incorporate into the client's decision-making process the views of the Affected Communities on such cultural heritage. Consultation will also involve the relevant national or local regulatory agencies that are entrusted with the protection of cultural heritage.

Community Access

10. Where the client's project site contains cultural heritage or prevents access to previously accessible cultural heritage sites being used by, or that have been used by, Affected Communities within living memory for long-standing cultural purposes, the client will, based on consultations under paragraph 9, allow continued access to the cultural site or will provide an alternative access route, subject to overriding health, safety, and security considerations.

Removal of Replicable Cultural Heritage

11. Where the client has encountered tangible cultural heritage that is replicable³ and not critical, the client will apply mitigation measures that favor avoidance. Where avoidance is not feasible, the client will apply a mitigation hierarchy as follows:

- Minimize adverse impacts and implement restoration measures, in situ, that ensure maintenance of the value and functionality of the cultural heritage, including maintaining or restoring any ecosystem processes⁴ needed to support it;
- Where restoration in situ is not possible, restore the functionality of the cultural heritage, in a different location, including the ecosystem processes needed to support it;

¹ Tangible cultural heritage encountered unexpectedly during project construction or operation.

² A chance find procedure is a project-specific procedure that outlines the actions to be taken if previously unknown cultural heritage is encountered.

³ Replicable cultural heritage is defined as tangible forms of cultural heritage that can themselves be moved to another location or that can be replaced by a similar structure or natural features to which the cultural values can be transferred by appropriate measures. Archeological or historical sites may be considered replicable where the particular eras and cultural values they represent are well represented by other sites and/or structures.

⁴ Consistent with requirements in Performance Standard 6 related to ecosystem services and conservation of biodiversity.

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- The permanent removal of historical and archeological artifacts and structures is carried out according to the principles of paragraphs 6 and 7 above; and
- Only where minimization of adverse impacts and restoration to ensure maintenance of the value and functionality of the cultural heritage are demonstrably not feasible, and where the Affected Communities are using the tangible cultural heritage for long-standing cultural purposes, compensate for loss of that tangible cultural heritage.

Removal of Non-Replicable Cultural Heritage

12. Most cultural heritage is best protected by preservation in its place, since removal is likely to result in irreparable damage or destruction of the cultural heritage. The client will not remove any nonreplicable cultural heritage,⁵ unless all of the following conditions are met:

- There are no technically or financially feasible alternatives to removal;
- The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal; and
- Any removal of cultural heritage is conducted using the best available technique.

Critical Cultural Heritage

13. Critical cultural heritage consists of one or both of the following types of cultural heritage: (i) the internationally recognized heritage of communities who use, or have used within living memory the cultural heritage for long-standing cultural purposes; or (ii) legally protected cultural heritage areas, including those proposed by host governments for such designation.

14. The client should not remove, significantly alter, or damage critical cultural heritage. In exceptional circumstances when impacts on critical cultural heritage are unavoidable, the client will use a process of Informed Consultation and Participation (ICP) of the Affected Communities as described in Performance Standard 1 and which uses a good faith negotiation process that results in a documented outcome. The client will retain external experts to assist in the assessment and protection of critical cultural heritage.

15. Legally protected cultural heritage areas⁶ are important for the protection and conservation of cultural heritage, and additional measures are needed for any projects that would be permitted under the applicable national law in these areas. In circumstances where a proposed project is located within a legally protected area or a legally defined buffer zone, the client, in addition to the requirements for critical cultural heritage cited in paragraph 14 above, will meet the following requirements:

- Comply with defined national or local cultural heritage regulations or the protected area management plans;
- Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area.

⁵ Nonreplicable cultural heritage may relate to the social, economic, cultural, environmental, and climatic conditions of past peoples, their evolving ecologies, adaptive strategies, and early forms of environmental management, where the (i) cultural heritage is unique or relatively unique for the period it represents, or (ii) cultural heritage is unique or relatively unique in linking several periods in the same site.

⁶ Examples include world heritage sites and nationally protected areas.

Project's Use of Cultural Heritage

16. Where a project proposes to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes,⁷ the client will inform these communities of (i) their rights under national law; (ii) the scope and nature of the proposed commercial development; and (iii) the potential consequences of such development. The client will not proceed with such commercialization unless it (i) enters into a process of ICP as described in Performance Standard 1 and which uses a good faith negotiation process that results in a documented outcome and (ii) provides for fair and equitable sharing of benefits from commercialization of such knowledge, innovation, or practice, consistent with their customs and traditions.

⁷ Examples include, but are not limited to, commercialization of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibers, or metals.



Appendix 2

Expertise of EAP and Project Team

CURRICULUM VITAE

Robert Arnold Bell

Name Robert Arnold Bell
Profession Civil / Structural Engineer
Name of Firm Bell Consulting
Present Appointment Consultant Civil and Structural Engineer:
Years with Firm 2 Years
Date of Birth 29 August 1946
ID No. 4608295036103
Nationality British



Professional Qualification

Pr. Eng. (760381), C Eng. BSc (Hons.) (UK)

Memberships to Professional Societies

Member of the South African Institute of Civil Engineers (MSAICE)
Member of the Institute of Civil Engineers (MICE)

Employment Record

2016 – 2018 Bell Consulting – Consultant Civil and Structural Engineer
2010 – 2016 SiVEST SA (Pty) Ltd – Consultant Civil and Structural Engineer
1998 – 2010 SiVEST SA (Pty) Ltd – Director
1992 – 1997 SBi (Formerly Shepherd & Shepherd) - Director
1973 – 1992 Shepherd & Shepherd Inc Consulting Engineers – Associate (1976) Director (1980)
1973 University of Strathclyde (Scotland) where he completed a BSc (Hons) degree in Civil Engineering in 1973.
1966 Lanarkshire County Council and later Glasgow City Engineers Department- Civil Engineering Technician

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|----------|--------|--------|--------|
| English | Fluent | Fluent | Fluent |

Key Experience

Arnold is a registered professional engineer with over 40 years of experience in the engineering field. Arnold specialises in civil design, and project and construction management of extensive infrastructure installation for industrial and commercial facilities, as well as civil works associated with various types of process plants including extensive rail sidings pertaining thereto.

Projects undertaken have included roads and services to residential and industrial townships, rail designs, overland pressure pipelines handling slurry, thickener tanks, pump stations, retaining walls for mine surface operations, surface infrastructure and structures for gold and diamond mines (DK1 Diamond mine, Botswana and Vaal Reef Gold Mine), sugar factory and plantation facilities, sewage

CURRICULUM VITAE

Robert Arnold Bell

treatment plants, mine hostel complexes, primary and secondary schools, industrial warehouses and factories.

Although retired as a Shareholder and Director of SiVEST in 2010, he is retained as an independent external Consultant to SiVEST and appointed on various assignments as they arise.

Arnold has in the past been an examiner for the professional examination for The Institution of Civil Engineers and, was involved in the examination of a number of candidates from 1985 to 1990.

Projects Experience

- From May 2012 to January 2014 Arnold was appointed as the Construction Manager on a new Seed Oil Plant in Standerton Mpumalanga. He was responsible for all aspects of the plant from civil works through mechanical, piping and electrical work. As such he had a team of 10 site staff consisting of civil, mechanical and electrical engineers as well as contracts administrator and quantity surveyors. The Oil Plant is a 2000 crushed tonnes/day soya and sunflower plant which was commissioned during September and October 2013.
- In March 2011 Arnold was appointed as the Project Leader on a new "green fields" Sugar Mill and Ethanol Plant for Illovo Sugar in Mali. The project not only consisted of a 320 tonnes cane per hour Sugar Mill and 50,000 litre per day Ethanol Plant but also the associated agricultural requirements consisting of the planting of 14153 hectares of cane with associated irrigation canals, pump stations and centre pivots.
- From February 2010 to August 2010 he has been a Project Manager on certain upgrades and new capital works necessary during the "Off Crop" at Hippo Valley Estates Sugar Mill, Chiredzi Zimbabwe where the emphasis was on timeous procurement to meet the project requirements. In addition the structural upgrade of Diffuser Number 1 was undertaken.
- From June 2008 to November 2008 he was also called upon to act as resident engineer for the structural work to a R1.4 Billion upgrade to a sugar mill at Mazabuka in Zambia for Zambia Sugar.
- Project Manager of a large "green fields" Ferrochrome Smelting Plant in the Eastern Transvaal responsible for all civil and structural aspects of the project.
- Project Civil Engineer on a multi million-rand Continuous Annealing Line for Iscor at Vanderbijlpark South Africa. Prior to commencement of design he was a member of the Civil Management Team, who visited Japan to inspect similar facilities with a view to effecting construction savings and improving the construction programme.



Dr. Neville Bews & Associates – Johannesburg, South Africa

EDUCATION

- *B.A. (Soc), University of South Africa, 1980*
- *B.A. (Soc) (Hons), University of South Africa, 1984*
- *The Henley Post Graduate Certificate in Management, Henley Management College, United Kingdom*
- *M.A. (Cum Laude), Rand Afrikaans University, 1999*
- *D. Litt. et Phil., Rand Afrikaans University, 2000*

Dr Neville Bews is a senior social scientist and human resource professional with 38 years' experience. He consults in the fields of Social Impact Assessments and research, and human resource management. He has worked on a number of large infrastructure, mining and water resource projects. He at times lectures on social impact assessment for the Department of Sociology, University of Johannesburg.

EXPERIENCE – EXAMPLES

Water resources and regional planning Social Impact Assessments

Department of Water Affairs and Forestry

South Africa

Social impact assessment for the Mokolo and Crocodile River (West) Water Augmentation Project for increased and assurance of water supply. Research socio-economic circumstances, data analysis, assessment, authored report.

Mzimvubu Water Project Eastern Cape. Research socio-economic circumstances, data analysis, assessment, authored report. Umkhomazi Water Project Phase 1 – Raw Water Component Smithfield Dam - 14/12/16/3/3/3/94; Water Conveyance Infrastructure - 14/12/16/3/3/3/94/1; Balancing Dam - 14/12/16/3/3/3/94/2.

Umkhomazi Water Project Phases 1 – Raw Water Components

Smithfield Dam – 14/12/16/3/3/3/94/

Water Conveyance Infrastructure – 14/12/16/3/3/3/94/1

Balancing Dam – 14/12/16/3/3/3/94/2

Umkhomazi Water Project Phases 2 – Potable Water Component – 14/12/16/3/3/3/95.

The Aveng (Africa) Group Limited (Grinaker LTA)

South Africa

Assisting the construction company with the social management of the Mokolo and Crocodile River (West) Water Augmentation Project. Consult and mediate between contractors and affected parties advise on strategies to reduce tensions between contractors and the public.

Sedibeng District Municipality

South Africa

Social impact assessment for the Environmental Management Plan for the Sedibeng District, on behalf of Felehetsa Environmental (Pty) Ltd. Research socio-economic circumstances, data analysis, assessment, authored report.

Felehetsa Environmental (Pty) Ltd

South Africa

Social Impact Assessment for Waterfall Wedge housing and business development situated in Midrand Gauteng. Research socio-economic circumstances, data analysis, assessment, authored report.

NEMAI Consulting Environmental & Social Consultants

South Africa

Ncwabeni: Off-Channel Storage Dam, KwaZulu-Natal. Research socio-economic circumstances, data analysis, assessment, authored report.

Social Assessments for mining clients

Vale

Mozambique

Socio-economic impact assessment of proposed Moatize power plant, Tete. Research socio-economic circumstances, data analysis, assessment, authored report.

Exxaro Resources Limited

South Africa

Social impact assessment for the social and labour plan for Leeuwpan Coal Mine, Delmas. Research socio-economic circumstances, data analysis, assessment, authored report.

Social impact assessment for the social and labour plan for Glen Douglas Dolomite Mine, Henley-on-Klip. Research socio-economic circumstances, data analysis, assessment, authored report.

Social impact assessment for the social and labour plan for Grootegeluk Open Cast Coal Mine, Lephallale. Research socio-economic circumstances, data analysis, assessment, authored report.

Social and labour plan for the Paardekraal Project, Belfast. Research socio-economic circumstances, data analysis, assessment, authored report.

Social impact assessment for the Paardekraal Belfast Project Belfast. Research socio-economic circumstances, data analysis, assessment, authored report.

Kumba Resources Ltd

South Africa

Social Impact Assessments for the Sishen Iron Ore Mine in Kathu Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Social Impact Assessments for the Sishen South Project in Postmasburg, Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Social Impact Assessments for the Dingleton resettlement project at Sishen Iron Ore Mine Kathu, Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Gold Fields

South Africa

Social Impact Assessment for the Gold Fields West Wits Project. Research socio-economic circumstances, data analysis, assessment, authored report.

Anglo Coal

South Africa

Review of social impact assessment for the proposed Waterberg Gas 37-spot coalbed methane (CBM) bulk yield test project.

Sekoko Mining

South Africa

Sekoko Wayland Iron Ore, Molemole Local Municipalities in Limpopo Province. Research socio-economic circumstances, data analysis, assessment, authored report.

Memor Mining (Pty) Ltd

South Africa

Langpan Chrome Mine, Thabazimbi, Limpopo. Research socio-economic circumstances, data analysis, assessment, authored report.

Prescali Environmental Consultants (Pty) Ltd

South Africa

Vlakpoort Open Cast Mine – Thabazimbi, Limpopo. Research socio-economic circumstances, data analysis, assessment, authored report.

Afrimat Ltd

South Africa

1. Marble Hall Lime Burning Project: Social Impact Assessment – Limpopo.
2. Glen Douglas Lime Burning Project: Social Impact Assessment - Henley-on Klip, Midvaal

Social assessments for regional and linear projects

Gautrans

South Africa

Social impact for the Gautrain Rapid Rail Link, Pretoria to Johannesburg and Kempton Park. Managed a team of 10 field workers, research socio-economic circumstances, data analysis, assessment, and co-authored report.

South African National Road Agency Limited

South Africa

Social Impact of tolling the Gauteng Freeway Improvement Project. Research socio-economic circumstances, data analysis, assessment, authored report.

Social Impact of the N2 Wild Coast Toll Highway. Managed a team of three specialists. Research socio-economic circumstances, data analysis, assessment, co-authored report.

SIA for the N3 Keeversfontein to Warden (De Beers Pass Section). Research socio-economic circumstances, data analysis, assessment, authored report.

Transnet

South Africa

Social impact assessment for the Transnet New Multi-Product Pipeline Project (555 km) (Commercial Farmers). Research socio-economic circumstances, data analysis, assessment, authored report.

Expansion of Railway Loops at Arthursview; Paul; Phokeng and Rooiheuvel Sidings in the Bojanala Platinum District Municipality in the North West Province for Transnet Soc Ltd.

Eskom Holdings Limited

South Africa

Social Impact Assessment for the Ubertas 88/11kV Substation in Sandton, Johannesburg. Research socio-economic circumstances, data analysis, assessment, authored report.

Nuclear 1 Power Plant. Assisted with the social impact assessment consulting to Arcus GIBB Engineering & Science. Peer review and adjusted the report and assisted at the public participation feedback meetings.

Social impact assessment for Eskom Holdings Limited, Transmission Division's Neptune-Poseidon 400kV Power Line in the Eastern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

Social Impact assessment for Eskom Holdings Limited, Transmission Division, Forskor-Mernsky 275kV±130km Powerline and Associated Substation Works in Limpopo Province. Research socio-economic circumstances, data analysis, assessment, authored report.

Eskom Holdings Limited, Transmission Division

South Africa

Social Impact assessment for Eskom Holdings Limited, Transmission Division, Tubatse Strengthening Phase 1 – Senakangwedi B Integration in Limpopo Province. Research socio-economic circumstances, data analysis, assessment, authored report.

Basic SIA study for Proposed 1 X 400 kV Eskom Maphutha - Witkop 170 km Powerline.

Social Impact Assessment for the Mulalo Main Transmission Substation and Power Line Integration Project, Secunda

MGTD Environmental

South Africa

Social impact assessment for a 150MW Photovoltaic Power Plant and Associated Infrastructure in Mpumalanga. Research socio-economic circumstances, data analysis, assessment, authored report.

10MWp Photovoltaic Power Plant & Associated Infrastructure, North West Province. Research socio-economic circumstances, data analysis, assessment, authored report.

eThekweni Municipality

South Africa

Social impact assessment for the proposed infilling of the Model Yacht Pond at Blue Lagoon, Stiebel Place, Durban. Research socio-economic circumstances, data analysis, assessment, authored report.

Kennedy Road Housing Project, Ward 25 situated on 316 Kennedy Road, Clare Hills (Erf 301, Portion 5).

Afzelia Environmental Consultants and Environmental Planning & Design

South Africa

Proposed Cato Ridge Crematorium In Kwazulu-Natal Province

MGTD Environmental

South Africa

ABC Prieska Solar Project; Proposed 75 MWp Photovoltaic Power Plant and its associated infrastructure on a portion of the remaining extent of ERF 1 Prieska, Northern Cape. Research socio-economic circumstances, data analysis, assessment, authored report.

ABC Prieska Solar Project; Proposed 75 MWp Photovoltaic Power Plant and its associated infrastructure on a portion of the remaining extent of ERF 1 Prieska, Northern Cape.

Assessments for social projects and social research

Australia – Africa 2006 Sport Development Program

South Africa

To establish and assess the impact of the Active Community Clubs Initiative on the communities of NU2 (in the township of Mdantsane)*and Tshabo (a rural village). Lead researcher social, data collection and analysis, assessment.

United Nations Office on Drugs and Crime **South Africa**
Evaluation of a Centre for Violence Against Women in Upington. Research socio-economic circumstances, data analysis, assessment, co-authored report.

University of Johannesburg **South Africa**
Research into research outputs of academics working in the various departments of the university. Research socio-economic circumstances, data analysis, assessment, authored report.

Human Resource and management training

Various national companied **South Africa**
Developed and run various management courses such as, recruitment selection & placement; industrial relations / disciplinary hearings; team building workshops; multiculturalism workshop.
1986-2007

University of South Africa, Department of Industrial Psychology **South Africa**
Developed the performance development study guide for industrial psychology 3. 2000

Authored Chapters in HR books **South Africa**
In Slabbert J.A. de Villiers, A.S. & Parker A (eds.). Managing employment relations in South Africa. Teamwork within the world-class organisation. 2005

In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. Personnel Psychology 3rd Edition
Chapter 9 – Human resource planning.
Chapter 10 – The changing nature of work. 2005

In Rossouw, G. J. and van Vuuren, L. Business Ethics - Made in Africa 4th Edition.
Chapter 11 – Building Trust with Ethics. 2010

South African Management Development Institute (SAMDI) Democratic Republic of the Congo
Developed a course on Strategic Human Resource Planning for SAMDI and the Democratic Republic of the Congo as well as trainer's manuals for this course. 2006.

Competition Tribunal **South Africa**
Developed a Performance Management System and Policy for the Competition Tribunal South Africa. 2006

PUBLICATIONS

Bews, N. & Martins, N. 2002. An evaluation of the facilitators of trustworthiness. SA Journal of Industrial Psychology. 28(4), 14-19.

Bews, N. Martins, N. & von der Ohe, H. 2002. Editorial. SA Journal of Industrial Psychology. 28(4), 1.

Bews, N. & Rossouw, D. 2002. Contemporary organisational change and the importance of trust. SA Journal of Industrial Psychology. 28(4), 2-6.

Bews, N. & Uys, T. 2002. The impact of organisational restructuring on perceptions of trustworthiness. SA Journal of Industrial Psychology. 28(4), 21-28.

Bews, N & Rossouw, D. 2002. A role for business ethics in facilitating trustworthiness. Journal of Business Ethics. 39: 377-390.

Bews, N. 2009. A matter of trust – Gaining the confidence of the public and client. IAIA Newsletter Forthcoming (Spring 2009).

Bews, N. 2009. Does he who pays the bill call the shots? Sitting astride client and public interest – the dilemma of maintaining credibility in impact assessments. IAIA Newsletter Winter – 2009.

Bews, N. 2002. Reducing your company's risk of sexual harassment claims. HR Future. (2) 2 10-11.

Bews, N. & Martins, N. von der Ohe, H. 2002. Organisational change and trust: Experiences here and abroad. Management Today, (18) 8 34-35.

Martins, N. Bews, N. & von der Ohe, H. 2002. Organisational change and trust. Lessons from Europe and South African organisations. HR Future, (2)9 46-47.

Rossouw, D. & Bews, N. 2002. The importance of trust within a changing business environment. Management Today. 18(2) 26-27.

Bews, N. 2001. You can put a value to trust in the new economy. HR Future, (1)1 48-49.

Bews, N. 2001. Maintaining trust during organisational change. Management Today, (17) 2 36-39.

Bews, N. 2001. Business ethics, trust and leadership: how does Africa fare? Management Today, (17) 7 14-15.

Rossouw, D & Bews, N. 2001. Trust is on the decline in the workplace, yet it's vital for modern organisational success. People Dynamics. (18) 6 28-30.

Bews, N. & Uys, T. 2001. The effects of restructuring on organisational trust. *HR Future*, (1)8 50-52.

Rossouw, G. J. & Bews, N. F. 2010. Building Trust with Ethics. In Rossouw, G. J. and van Vuuren, L. *Business Ethics - Made in Africa 4th Edition*. Cape Town: Oxford University Press.

Bews N. 2005. Teamwork within the world-class organisation. In Slabbert J.A. de Villiers, A.S. & Parker A (eds.). *Managing employment relations in South Africa*. Durban : Butterworths.

Bews, N. F. 2005. Human resource planning. In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. 2005. *Personnel Psychology 3rd Edition*. Cape Town; Oxford University Press.

Bews, N. F. 2005. The changing nature of work. In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. 2005. *Personnel Psychology 3rd Edition*. Cape Town; Oxford University Press.

Bews, N. F. 2005. Chapter 9 & 13. In Muchinsky, P. M. Kriek, H. J. & Schreuder, A. M. G. 2005. *Instructor's Manual. Personnel Psychology 3rd Edition*. Cape Town; Oxford University Press.

Bews, N. F., Schreuder, A. M. G. & Vosloo, S. E. 2000. *Performance Development. Study guide for Industrial Psychology 3*. Pretoria: University of South Africa.

Uys, T. and Bews, N. 2003. "Not in my Backyard": Challenges in the Social Impact Assessment of the Gautrain. Department of Sociology Seminar, RAU. 23 May 2003.

Bews, N. 2002. The value of trust in the new economy. Industrial Relations Association of South Africa (Irasa). Morning seminar 21 August 2002.

Bews, N. 2002. The issue of trust considered. Knowledge Recourses seminar on Absenteeism. The Gordon Institute of Business. 27 August 2002.

Bews, N. & Uys, T. 2001. The impact of organisational trust on perceptions of trustworthiness. South African Sociological Association Conference. Pretoria.

Bews, N. 2001. Business Trust, Ethics & Leadership:- Made in Africa. International Management Today/Productivity Development Conference. Hosted by Productivity Development (Pty) Ltd & Management Today. Best Knowledge in Leadership Practice Conference 23-24 July 2001.

Bews, N. 2001. Charting new directions in leading organisational culture and climate change. Workplace Transformation and Organisational Renewal. Hosted by The Renaissance Network. November 2001.

Bews, N. 2000. Towards a model for trust. South African Sociological Association Conference. Saldanha.

Bews, N. 2003. 'Social Impact Assessments, theory and practice juxtaposed – Experience from a South African rapid rail project.' New Directions in Impact Assessment for Development: Methods and Practice Conference. University of Manchester, Manchester, England.

MEMBERSHIP OF PROFESSIONAL BODIES

Member of South African Affiliate of the International Association for Impact Assessment (IAIAsa).
Membership Number: 2399

Registered on database for scientific peer review of iSimangaliso GEF project outputs

Name Stephen Burton

Profession Environmental Scientist

Name of Firm SiVEST SA (Pty) Ltd

Present Appointment Environmental Scientist:
Environmental Division

Years with Firm 11 Years

Date of Birth 12 January 1979

ID Number 7901125138083

Nationality South African



Education

Matric Exemption (Natal Education Department)
Marit burg College, PMB, N (1991 – 1996)

Professional Qualifications

B.Sc. (oology 2002), University of Natal PMB, N
 B.Sc. Honours (oology 2003), University of Natal PMB, N
 M.Sc. (oology 2006), University of wa ulu-Natal PMB, N
 Pr.Sci.Nat. Registration No. 117474

Years of Experience

12 Years

Membership to Professional Societies

International Association for Impact Assessment South Africa (IAIASa)
 South African Council for Natural Scientific Professions (SACNASP) Pr. Sci. Nat. Reg No. 117474

Employment Record

April 2008 – present SiVEST SA (Pty) Ltd: Environmental Division - Environmental Scientist
 May 2007 – March 2008 UDIDI Project Development Company: Environmental Planner

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|-----------|--------|--------|--------|
| English | Fluent | Fluent | Fluent |
| Afrikaans | Good | Good | Good |

Key Experience

Field of Specialisation in Environmental Science, oology (specifically Ornithology and Mammology), Entomology and Wetland Ecology. Stephen is skilled in the following fields:-

- Evaluation of Biodiversity

- Management Recommendations
- Scoping Reports and Environmental Impact Assessments
- Bird Identification
- Grass Identification
- Tree Identification
- Mammal Identification
- Wetland Ecology
- Wetland Delineation
- Wetland Functionality Assessments
- Wetland Rehabilitation Plans
- GIS Package Skills, particularly ESRI products
- Statistical Package Skills, particularly STATISTICA, PDAP and R-Statistics.

Stephen has completed a Bachelor of Science Degree with a Zoology Major (University of Natal, PMB), as well as a Bachelor of Science (Honours) in Zoology (University of Natal, PMB). Stephen has also completed a Master of Science Degree in Zoology (University of Zululand, PMB). This post-graduate degree was fieldwork and lab based and provided practical experience in conceptualising, planning, modelling and executing of a project.

Stephen has been involved in consulting since May 2007, which included scoping reports, environmental management plans, integrated management plans, rezoning applications, development facilitation applications, basic assessment reports, environmental impact reports and strategic environmental assessments. He has been involved in a number of faunal assessments for developments ranging from power lines and water pipelines, to housing developments and light industrial developments. In addition, Stephen has undertaken a number of wetland assessments, and wetland rehabilitation plans, for developments ranging from pipelines through housing and industrial developments.

Since joining SiVEST Environmental Division in April 2008, Stephen has been involved in a number of projects ranging from Environmental Management Planning for Eskom Power lines to the writing up of scoping reports and environmental impact reports for various projects, and the auditing of Eskom Power lines, district roads and Umgeni Water pipelines and dams. In addition, he has developed specialist skills in faunal and wetland assessments for a range of development types.

Projects Experience

April 2008 – present

POWERLINE/ROADS PROJECTS

- D1562 Road Upgrade
- Franklin Overhead Power Line
- Eskom Grassridge Melkhout Power Line Rebuild
- Bulwer-Lamington Power Line
- Lukhanyeni and Maduna Access Roads, Umzimkhulu, Basic Assessment Class Application
- D1131 and D1137 Roads in Msunduzi
- Harvard-Soutdrift Power Line (Solar Reserve South Africa)
- Lengau Sub-Station & Switching Yard (Solar Reserve South Africa)
- Eskom Corinth-Mongwana
- Eskom Ndwedwe to Appelsbosch
- Eskom Empangeni-Mandeni / Fairbreeke
- Spoornet Coal Link Upgrade
- Eskom Eros to Port Edward 132kV distribution lines
- Eskom Royal Substation
- Eskom Corinth-Lamington

DEVELOPMENT PROJECTS

- Shemula Water Treatment Works Expansion
- Mooi River Industrial Park Development, EIA
- MiddelFontein Housing Development, okstad, EIA
- Thanda Integrated Management Plan Development
- Ladysmith Extension 15 Development EIA
- Ladysmith Shopping Mall EIA
- Ladysmith Pedestrian Bridges BA
- Peacetown Taxi Rank BA
- Crookes Brothers EMF – Analysis Report

WATER PROJECTS

- Swayimane Community Water Supply Scheme
- Mooi-Mgeni Water Transfer System – Phase 2 (Trans-Caledon Tunnel Authority)
- Middeldrift Phase 2 Community Water Supply Scheme
- Shemula Water Treatment Works Expansion and Rising Main
- Richmond Pipeline, Umgeni Water
- Imvutshane Dam, Umgeni Water
- Shemula Water Treatment Works Expansion
- Bulwer Dam EIA
- Ha elmere Pipeline, Umgeni Water
- Sundumbilli Community Water Supply Scheme
- Bulwer Farm Community Water Supply Scheme
- Umhlumayo Phase 4 (Fitty Park) Water Supply Scheme
- Raisethorpe Canal

ENVIRONMENTAL AUDITING / ENVIRONMENTAL CONTROL OFFICER (ECO)

- Mooi-Mgeni Water Transfer System – Phase 2 (Trans-Caledon Tunnel Authority)
- imbali Golf Course Estate Development
- Middeldrift Phase 2 Community Water Supply Scheme
- Shemula Water Treatment Works Expansion and Rising Main
- welethu - Port Edward Power Line
- Richmond Pipeline, Umgeni Water
- Imvutshane Dam, Umgeni Water
- Ha elmere Pipeline, Umgeni Water
- Mpumulanga Town Centre Precinct, Shopping Centre Development
- Lukhanyeni and Maduna Access Roads, Um imkhulu Environmental Auditing
- Rainbow Farms Broiler Houses (B17/B18)
- Ludeke- welethu Power Lines, Port Edward
- Sundumbilli Community Water Supply Scheme
- Eros to okstad Power Line
- Roads in the Msundu i Municipality
- Raisethorpe Canal
- Eskom Empangeni-Mandeni / Fairbree e(Obanjeni) Power Line
- Eskom Mandeni-Dlange wa Power Line
- Brewitt Park Housing Development, Escourt

GIS INPUT MAPPING

- Arcelor-Mittal Newcastle Vegetation Assessment – Mapping & Desktop Assessment
- Normandien Farms – Mapping & Desktop Assessment

CURRICULUM VITAE

Stephen Burton

- imbali Lakes and Golf Course Estate - Mapping
- Cornubia Industrial Development one - Mapping
- Mshwathi Pipeline - Mapping
- Porritt Access Road Dispute, Snowdon Farm Trust - Mapping
- SNA Roads - Mapping & Desktop Assessment
- Ballito Flats - Mapping & Desktop Assessment
- DOW Veterinary Quarantine - Mapping & Desktop Assessment
- Farm Isonti - Mapping
- Hawaan CT - Mapping
- Ilinga Phase 3 EIA - Mapping
- Ellingham Estate - Mapping
- Motala Housing - Mapping
- Ndundula Road - Mapping & Desktop Assessment
- Okhahlamba Landfill and Cemetery Project - Mapping & Desktop Assessment
- SNA Roads - Mapping & Desktop Assessment
- Woodridge Estate - Mapping
- Umgeni Water Ngcebo Biodiversity - Mapping
- Alton Warehouse - Mapping & Desktop Assessment
- Shell Hans Dettman - Mapping & Desktop Assessment
- Lower Tugela Bulk Water Supply Scheme Extension - Mapping & Desktop Assessment

WETLAND ASSESSMENTS AND REHABILITATION PLANS

- Rockdale Wetland Assessment
- Tooverberg Wind Energy Farm
- Sibaya Node 5 Development
- Transnet Wetland Functionality and Biodiversity Assessment for Port of Richards Bay
- Cornubia Rem 68 Development
- Dube Tradeport State of the Environment Report
- Eshowe SSA1 Bulk Water Supply Scheme
- Umgeni Water Waste Water Treatment Plant Offsets
- Osiweni Industrial Development
- Bishopstowe Strategic Environmental Assessment
- Esheni D Housing Development
- Ilinga Phase 3 Residential Development Amendment
- Dannhauser Bulk Water Supply
- Transnet Richards Bay Port Wetland Assessment
- Raisethorpe Canal Phase 2
- Mimosadale Bulk Water Supply
- Greater Edendale EMF
- Shemula Phases 2-6 Pipeline
- Sumitomo New Rubber Plant
- Riverside Cemetery Development
- DTP Support Zone 2 Development
- Wosiyane/Swayimane Pipeline
- IRPTN Corridor 4 Development
- Sibaya Development
- Cornubia North Development
- Tinley Manor North Development
- Ilinga Phase 3 Development
- Nonoti-inkwazi Development
- imbali Estate Properties
- Mthandeni Irrigation Scheme

- Strode Property Development
- Ethekewini Integrated Rapid Public Transport Network Corridor 9
- D1562 Road Upgrade
- Cornubia Phase 2 Development
- Compensation Flats Development
- imbali Estate Development
- Mandeni Cemetery
- Fairmont Hotel
- Tinley Manor South Development
- Maidstone Mill Development
- Mnambithi Substation and Powerline
- Nquthu Town Erf 16 & 17 Development
- Goswell Platform Development - Cato Ridge
- Driefontein Pipeline Route - Ladysmith
- Blaaubosch Housing Development - Newcastle
- Madadeni Housing Development - Newcastle
- Hyde Park Country Estate
- Newcastle Municipality New Cemetery Sites

FAUNAL ASSESSMENTS

- Umlaas Gate Faunal Assessment
- Ntunjambili Bulk Water Supply Scheme
- In-depth specialist studies (including faunal) for Port of Richards Bay
- assier Road North Mixed Use Development
- Transnet Richards Bay Port Faunal Assessment
- Greater Edendale EMF
- Shemula Phase 2-6 Pipeline
- Milky Way Shopping Centre Development
- Dudley Pringle Development
- Lindokuhle Housing Development
- Shongweni Bulk Water Pipeline
- Ethekewini Integrated Rapid Public Transport Network Corridor 1
- Ethekewini Integrated Rapid Public Transport Network Corridor 3
- Ethekewini Integrated Rapid Public Transport Network Corridor 9
- Newcastle Municipality New Cemetery Sites
- Shongweni Mixed-Use Development
- Nonoti Beach Tourism Development
- Proposed Shoprite & Checkers Distribution Centre Development, Marianhill
- Proposed Cornubia Development, Umhlanga
- Lower Tugela Bulk Water Supply Scheme Extension
- Proposed Redcliffe Housing Development in Ethekewini Municipality

AVI- FAUNAL ASSESSMENTS

- Proposed High Voltage Powerline to Cygnus Substation, Empangeni
- Proposed High Voltage Powerline between Corinth and Lamington Substations, Underberg
- Proposed High Voltage Powerline between Corinth and M ongwana Substations

CURRICULUM VITAE

ELIZE BUTLER

PROFESSION: Palaeontologist

YEARS' EXPERIENCE: 25 years in Palaeontology

EDUCATION: B.Sc Botany and Zoology, 1988

University of the Orange Free State

B.Sc (Hons) Zoology, 1991

University of the Orange Free State

Management Course, 1991

University of the Orange Free State

M. Sc. *Cum laude* (Zoology), 2009

University of the Free State

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle

Registered as a PhD fellow at the Zoology Department of the UFS

2013 to current

Dissertation title: A new gorgonopsian from the uppermost *Daptocephalus Assemblage Zone*, in the Karoo Basin of South Africa

MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently

EMPLOYMENT HISTORY

Part time Laboratory assistant Department of Zoology & Entomology
University of the Free State Zoology 1989-
1992

Part time laboratory assistant Department of Virology
University of the Free State Zoology 1992

Research Assistant National Museum, Bloemfontein 1993 –
1997

Principal Research Assistant National Museum, Bloemfontein
and Collection Manager 1998–currently

TECHNICAL REPORTS

Butler, E. 2014. Palaeontological Impact Assessment of the proposed development of private dwellings on portion 5 of farm 304 Matjesfontein Keurboomstrand, Knysna District, Western Cape Province. Bloemfontein.

Butler, E. 2014. Palaeontological Impact Assessment for the proposed upgrade of existing water supply infrastructure at Noupoort, Northern Cape Province. 2014. Bloemfontein.

Butler, E. 2015. Palaeontological impact assessment of the proposed consolidation, re-division and development of 250 serviced erven in Nieu-Bethesda, Camdeboo local municipality, Eastern Cape. Bloemfontein.

Butler, E. 2015. Palaeontological impact assessment of the proposed mixed land developments at Rooikraal 454, Vrede, Free State. Bloemfontein.

Butler, E. 2015. Palaeontological exemption report of the proposed truck stop development at Palmiet 585, Vrede, Free State. Bloemfontein.

Butler, E. 2015. Palaeontological impact assessment of the proposed Orange Grove 3500 residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Gonubie residential development, Buffalo City Metropolitan Municipality East London, Eastern Cape Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Ficksburg raw water pipeline. Bloemfontein.

Butler, E. 2015. Palaeontological Heritage Impact Assessment report on the establishment of the 65 mw Majuba Solar Photovoltaic facility and associated infrastructure on portion 1, 2 and 6 of the farm Witkoppies 81 HS, Mpumalanga Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed township establishment on the remainder of portion 6 and 7 of the farm Sunnyside 2620, Bloemfontein, Mangaung metropolitan municipality, Free State, Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Woodhouse 1 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Woodhouse 2 photovoltaic solar energy facilities and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Orkney solar energy farm and associated infrastructure on the remaining extent of Portions 7 and 21 of the farm Wolvehuis 114, near Orkney, North West Province. Bloemfontein.

Butler, E. 2015. Palaeontological Impact Assessment of the proposed Spectra foods broiler houses and abattoir on the farm Maiden Manor 170 and Ashby Manor 171, Lukhanji Municipality, Queenstown, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoot concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoot, Northern Cape. Prepared for Savannah Environmental. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed Woodhouse 1 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed Woodhouse 2 Photovoltaic Solar Energy facility and associated infrastructure on the farm Woodhouse 729, near Vryburg, North West Province. Bloemfontein.

Butler, E. 2016. Proposed 132kV overhead power line and switchyard station for the authorised Solis Power 1 CSP project near Upington, Northern Cape. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of of the proposed Senqu Pedestrian Bridges in Ward 5 of Senqu Local Municipality, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Recommendation from further Palaeontological Studies: Proposed Construction of the Modderfontein Filling Station on Erf 28 Portion 30, Founders Hill, City Of Johannesburg, Gauteng Province. Bloemfontein.

Butler, E. 2016. Recommendation from further Palaeontological Studies: Proposed Construction of the Modikwa Filling Station on a Portion of Portion 2 of Mooihoek 255 Kt, Greater Tubatse Local Municipality, Limpopo Province. Bloemfontein.

Butler, E. 2016. Recommendation from further Palaeontological Studies: Proposed Construction of the Heidedal filling station on Erf 16603, Heidedal Extension 24, Mangaung Local Municipality, Bloemfontein, Free State Province. Bloemfontein.

Butler, E. 2016. Recommended Exemption from further Palaeontological studies: Proposed Construction of the Gunstfontein Switching Station, 132kv Overhead Power Line (Single Or Double Circuit) and ancillary infrastructure for the Gunstfontein Wind Farm Near Sutherland, Northern Cape Province. Savannah South Africa. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed Galla Hills Quarry on the remainder of the farm Roode Krantz 203, in the Lukhanji Municipality, division of Queenstown, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Chris Hani District Municipality Cluster 9 water backlog project phases 3a and 3b: Palaeontology inspection at Tsomo WTW. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed construction of the 150 MW Noupoot concentrated solar power facility and associated infrastructure on portion 1 and 4 of the farm Carolus Poort 167 and the remainder of Farm 207, near Noupoot, Northern Cape. Savannah South Africa. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed upgrading of the main road MR450 (R335) from the Motherwell to Addo within the Nelson Mandela Bay Municipality and Sunday's river valley Local Municipality, Eastern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment construction of the proposed Metals Industrial Cluster and associated infrastructure near Kuruman, Northern Cape province. Savannah South Africa. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment for the proposed construction of up to a 132kv power line and associated infrastructure for the proposed Kalkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces. PGS Heritage. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment of the proposed development of two burrow pits (DR02625 and DR02614) in the Enoch Mgijima Municipality, Chris Hani District, Eastern Cape..

Butler, E. 2016. Ezibeleni waste Buy-Back Centre (near Queenstown), Enoch Mgijima Local Municipality, Eastern Cape. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment for the proposed construction of two 5 Mw Solar Photovoltaic Power Plants on Farm Wildebeestkuil 59 and Farm Leeuwbosch 44, Leeudoringstad, North West Province. Bloemfontein.

Butler, E. 2016. Palaeontological Impact Assessment for the proposed development of four Leeuwberg Wind farms and basic assessments for the associated grid connection near Loeriesfontein, Northern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological impact assessment for the proposed Aggeneys south prospecting right project, Northern Cape Province. Bloemfontein.

Butler, E. 2016. Palaeontological impact assessment of the proposed Motuoane Ladysmith Exploration right application, Kwazulu Natal. Bloemfontein.

Butler, E. 2016. Palaeontological impact assessment for the proposed construction of two 5 MW solar photovoltaic power plants on farm Wildebeestkuil 59 and farm Leeuwbosch 44, Leeudoringstad, North West Province. Bloemfontein.

Butler, E. 2016: Palaeontological desktop assessment of the establishment of the proposed residential and mixed use development on the remainder of portion 7 and portion 898 of the farm Knopjeslaagte 385 Ir, located near Centurion within the Tshwane Metropolitan Municipality of Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological impact assessment for the proposed development of a new cemetery, near Kathu, Gamagara local municipality and John Taolo Gaetsewe district municipality, Northern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment Of The Proposed Development Of The New Open Cast Mining Operations On The Remaining Portions Of 6, 7, 8 And 10 Of The Farm Kwaggafontein 8 In The Carolina Magisterial District, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the Proposed Development of a Wastewater Treatment Works at Lanseria, Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological Scoping Report for the Proposed Construction of a Warehouse and Associated Infrastructure at Perseverance in Port Elizabeth, Eastern Cape Province.

Butler, E. 2017. Palaeontological Desktop Assessment for the Proposed Establishment of a Diesel Farm and a Haul Road for the Tshipi Borwa mine Near Hotazel, In the John Taolo Gaetsewe District Municipality in the Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the Proposed Changes to Operations at the UMK Mine near Hotazel, In the John Taolo Gaetsewe District Municipality in the Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment for the Development of the Proposed Ventersburg Project-An Underground Mining Operation near Ventersburg and Henneman, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological desktop assessment of the proposed development of a 3000 MW combined cycle gas turbine (CCGT) in Richards Bay, Kwazulu-Natal. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment for the Development of the Proposed Revalidation of the lapsed General Plans for Elliotdale, Mbhashe Local Municipality. Bloemfontein.

Butler, E. 2017. Palaeontological assessment of the proposed development of a 3000 MW Combined Cycle Gas Turbine (CCGT) in Richards Bay, Kwazulu-Natal. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed development of the new open cast mining operations on the remaining portions of 6, 7, 8 and 10 of the farm Kwaggafontein

8 10 in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed mining of the farm Zandvoort 10 in the Albert Luthuli Local Municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed Lanseria outfall sewer pipeline in Johannesburg, Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of open pit mining at Pit 36W (New Pit) and 62E (Dishaba) Amandelbult Mine Complex, Thabazimbi, Limpopo Province. Bloemfontein.

Butler, E. 2017. Palaeontological impact assessment of the proposed development of the sport precinct and associated infrastructure at Merrifield Preparatory school and college, Amathole Municipality, East London. PGS Heritage. Bloemfontein.

Butler, E. 2017. Palaeontological impact assessment of the proposed construction of the Lehae training and fire station, Lenasia, Gauteng Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of the new open cast mining operations of the Impunzi mine in the Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the construction of the proposed Viljoenskroon Munic 132 KV line, Vierfontein substation and related projects. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed rehabilitation of 5 ownerless asbestos mines. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of the Lephalale coal and power project, Lephalale, Limpopo Province, Republic of South Africa. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of a 132KV powerline from the Tweespruit distribution substation (in the Mantsopa local municipality) to the Driedorp rural substation (within the Naledi local municipality), Free State province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed development of the new coal-fired power plant and associated infrastructure near Makhado, Limpopo Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of a Photovoltaic Solar Power station near Collett substation, Middelberg, Eastern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment for the proposed township establishment of 2000 residential sites with supporting amenities on a portion of farm 826 in Botshabelo West, Mangaung Metro, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed prospecting right project without bulk sampling, in the Koa Valley, Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed Aroams prospecting right project, without bulk sampling, near Aggeneys, Northern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed Belvior aggregate quarry II on portion 7 of the farm Maidenhead 169, Enoch Mgijima Municipality, division of Queenstown, Eastern Cape. Bloemfontein.

Butler, E. 2017. PIA site visit and report of the proposed Galla Hills Quarry on the remainder of the farm Roode Krantz 203, in the Lukhanji Municipality, division of Queenstown, Eastern Cape Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of Tina Falls Hydropower and associated power lines near Cumbu, Mthlontlo Local Municipality, Eastern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed construction of the Mangaung Gariep Water Augmentation Project. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed Belvoir aggregate quarry II on portion 7 of the farm Maidenhead 169, Enoch Mgijima Municipality, division of Queenstown, Eastern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed construction of the Melkspruit-Rouxville 132KV Power line. Bloemfontein.

Butler, E. 2017 Palaeontological Desktop Assessment of the proposed development of a railway siding on a portion of portion 41 of the farm Rustfontein 109 is, Govan Mbeki local municipality, Gert Sibande district municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed consolidation of the proposed Ilima Colliery in the Albert Luthuli local municipality, Gert Sibande District Municipality, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed extension of the Kareerand Tailings Storage Facility, associated borrow pits as well as a storm water drainage channel in the Vaal River near Stilfontein, North West Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed construction of a filling station and associated facilities on the Erf 6279, district municipality of John Taolo Gaetsewe District, Ga-Segonyana Local Municipality Northern Cape. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed of the Lephallale Coal and Power Project, Lephallale, Limpopo Province, Republic of South Africa. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed Overvaal Trust PV Facility, Buffelspoort, North West Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed development of the H2 Energy Power Station and associated infrastructure on Portions 21; 22 And 23 of the farm Hartebeestspruit in the Thembisile Hani Local Municipality, Nkangala District near Kwamhlanga, Mpumalanga Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed upgrade of the Sandriver Canal and Klippan Pump station in Welkom, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed upgrade of the 132kv and 11kv power line into a dual circuit above ground power line feeding into the Urania substation in Welkom, Free State Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.

Butler, E. 2017. Palaeontological Impact Assessment of the proposed diamonds alluvial & diamonds general prospecting right application near Christiana on the remaining extent of portion 1 of the farm Kaffraria 314, registration division HO, North West Province. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Hartebeesfontein, near Panbult, Mpumalanga. Bloemfontein.

Butler, E. 2017. Palaeontological Desktop Assessment for the proposed development of Wastewater Treatment Works on Rustplaas near Piet Retief, Mpumalanga. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment for the Proposed Landfill Site in Luckhoff, Letsemeng Local Municipality, Xhariep District, Free State. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment of the proposed development of the new Mutsho coal-fired power plant and associated infrastructure near Makhado, Limpopo Province. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment of the authorisation and amendment processes for Manangu mine near Delmas, Victor Khanye local municipality, Mpumalanga. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the proposed Mashishing township establishment in Mashishing (Lydenburg), Mpumalanga Province. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the Proposed Mlonzi Estate Development near Lusikisiki, Ngquza Hill Local Municipality, Eastern Cape. Bloemfontein.

Butler, E. 2018. Palaeontological Phase 1 Assessment of the proposed Swaziland-Mozambique border patrol road and Mozambique barrier structure. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the proposed electricity expansion project and Sekgame Switching Station at the Sishen Mine, Northern Cape Province. Bloemfontein.

Butler, E. 2018. Palaeontological field assessment of the proposed construction of the Zonnebloem Switching Station (132/22kV) and two loop-in loop-out power lines (132kV) in the Mpumalanga Province. Bloemfontein.

Butler, E. 2018. Palaeontological Field Assessment for the proposed re-alignment and decommissioning of the Firham-Platrand 88kv Powerline, near Standerton, Lekwa Local Municipality, Mpumalanga province. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.

Butler, E. 2018. Palaeontological field Assessment of the proposed Villa Rosa development In the Buffalo City Metropolitan Municipality, East London. Bloemfontein.

Butler, E. 2018. Palaeontological desktop assessment of the proposed Mookodi – Mahikeng 400kV line, North West Province. Bloemfontein.

Butler, E. 2018. Palaeontological Desktop Assessment for the proposed Thornhill Housing Project, Ndlambe Municipality, Port Alfred, Eastern Cape Province. Bloemfontein.

Butler, E. 2018. Palaeontological desktop assessment of the proposed housing development on portion 237 of farm Hartebeestpoort 328. Bloemfontein.

Butler, E. 2018. Palaeontological desktop assessment of the proposed New Age Chicken layer facility located on holding 75 Endicott near Springs in Gauteng. Bloemfontein.

Butler, E. 2018 Palaeontological Desktop Assessment for the development of the proposed Leslie 1 Mining Project near Leandra, Mpumalanga Province. Bloemfontein.

Butler, E. 2018. Palaeontological field assessment of the proposed development of the Wilealskloof mixed use development near Bloemfontein, Free State Province. Bloemfontein.

Butler, E. 2018. Palaeontological Field Assessment of the proposed Megamor Extension, East London. Bloemfontein.

Butler, E. 2018. Palaeontological Impact Assessment of the proposed diamonds Alluvial & Diamonds General Prospecting Right Application near Christiana on the Remaining Extent of Portion 1 of the Farm Kaffraria 314, Registration Division HO, North West Province. Bloemfontein.

CONFERENCE CONTRIBUTIONS

NATIONAL

PRESENTATION

Butler, E., Botha-Brink, J., and F. Abdala. A new gorgonopsian from the uppermost *Dicynodon Assemblage Zone*, Karoo Basin of South Africa. 18th the Biennial conference of the PSSA 2014. Wits, Johannesburg, South Africa.

INTERNATIONAL

Attended the Society of Vertebrate Palaeontology 73th Conference in Los Angeles, America. October 2012.

CONFERENCES: POSTER PRESENTATION

NATIONAL

Butler, E., and J. Botha-Brink. Cranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle. University of the Free State Seminar Day, Bloemfontein. South Africa. November 2007.

Butler, E., and J. Botha-Brink. Postcranial skeleton of *Galesaurus planiceps*, implications for biology and lifestyle. 14th Conference of the PSSA, Matjiesfontein, South Africa. September 2008:

Butler, E., and J. Botha-Brink. The biology of the South African non-mammaliaform cynodont *Galesaurus planiceps*. 15th Conference of the PSSA, Howick, South Africa. August 2008.

INTERNATIONAL VISITS

Natural History Museum, London

July 2008

Paleontological Institute, Russian Academy of Science, Moscow

November 2014

CECILIA CANAHAI



| | |
|-------------------------------|--|
| Profession | Engineering Geologist / Scientist |
| Position in Firm | Technical Director |
| Area of Specialisation | Geotechnical, Environmental, Waste Management |
| Qualifications | Pr.Sci.Nat., MSc (Eng Geol), BSc (Eng Geology) |
| Years of Experience | 31 Years |
| Years with Firm | 20 Years |

SUMMARY OF EXPERIENCE

Cecilia Canahai gained her first site experience working as a site geologist for oil and gas exploration, in Romania, in 1988. She completed drilling supervision, sampling, gas chromatography, borehole logging and interpretation, report writing and made recommendations for drilling parameters.

Cecilia joined Moore Spence Jones (Pty) Ltd in 1997 as an engineering geologist, where she completed numerous geotechnical investigations for township and industrial development, sports facility developments, private residential properties and pipeline investigations. She has completed slope stability analyses with recommendations for rehabilitation. Other aspects of her experience include dam and tunnel geotechnical investigations. She acquired her first experience as an environmentalist while carrying out groundwater pollution monitoring, at SAPREF.

All projects have included fieldwork, on site testing, site supervision of works, material sampling, interpretation of laboratory results, client liaison, and reporting.

Cecilia joined JG Afrika (Pty) Ltd in 1999 as an environmentalist / engineering geologist.

As an engineering geologist she has worked on various projects, inter alia, geotechnical investigations for rural water supply schemes, housing developments, roads investigations, materials investigations, lateral support design and geotechnical investigations for dams and tunnels.

As an environmental practitioner she has successfully completed numerous Environmental Impact Assessment Scoping and EIA reports, Solid Waste Management, Environmental Management Programme Reports and Closure Reports for various mines/ borrow pits and Environmental Audits. She was also involved in other aspects of the environmental field such as scoping and public participation, impact assessment, mitigation and monitoring and preparation of environmental management plans (EMP).

Cecilia was the Pietermaritzburg Branch Quality System Manager, involved in the maintaining the office' quality standard in terms of ISO 9001 (JG Afrika is ISO 9001 certified) between 2002 and 2007, when work commitments required her to hand over this particular task to someone else.

Cecilia became a shareholder in 2010 and a partner in 2012. Since 2010 her duties are business development and marketing in the fields of engineering geology geotechnical engineering; waste management; environmental science, aquatic health and water resources management, as well as managing various multi- disciplinary projects.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

- Pr.Sci.Nat.** - Registered with the South African Council for Natural Scientific Professions -
Registration No 400011/00: Environmental Science & Geological Science
- SAIEG** - Member of the South African Institute for Engineering and Environmental Geologists -
Membership No 03/211
- IAIA** - Member of the International Association of Impact Assessment; Membership No 1686

EDUCATION

- 1983 – Certificate of Baccalaureate** – Pitesti, Romania
- 1987 – BSc (Hons) (Eng Geol)** – University of Bucharest, Romania
- 1988 – MSc (Eng Geol)** – University of Bucharest, Romania

SPECIFIC EXPERIENCE

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)

2010 - 2019

Position – Technical Director

Sicello Bulk Water Main: EIA & EMPR for water main at Sicello

Kumba Iron Ore Biomonitoring Programme for aquatic health

Kriel Power Station – Geotechnical Investigation for ash dam complex stability and stability monitoring for a period of 11 months

New Ash Facility at Tutuka Power Station for Eskom detail design for water return dams and appurtenant structure and infrastructure as part of an ADF team

New Ash Facility at Kusile Power Station for Eskom detail design for water return dams and appurtenant structure and infrastructure as part of an ADF team

Camden New Ash Dam Facility detail design, encompassing geotechnical investigation for the new ADF, water return dams and appurtenant structure and infrastructure

New Ash Facility at Kendal Power Station for Eskom

Hendrina Step-In and Go-Higher Ash Dam Facility detail design, encompassing geotechnical investigation for the extension of the existing ADF

Mathjabeng Solar Park

Atlas Substation EIA for Closure and Risk Assessment and Due Diligence

Gauteng Department of Roads and Transportation: Environmental assessment for 15 Intersection upgrades

Geotechnical Investigation in support of the Feasibility Study for a **5 GW power Solar Park** in the Northern Cape Province of South Africa (presidential project)

Feasibility Study for the potential sources of water for the **Tikwa Wind Farm**

N11 Sections 6 & 7 Borrow Pit Closure

Various **Water Use Licence Applications**

Basic Assessment for the installation of **Fibre Optic Cable between Aliwal North and George**

Baseline study for Eskom WTW and WWTW for readiness for Blue Drop / Green Drop Certification

Basic Assessment for the installation of **Fibre Optic Cable between Johannesburg and Cape Town**

Various Geotechnical Investigations for Rand Water Pipelines

Various **Environmental Basic Assessments** for Rand Water Pipelines

Various **Geotechnical Investigations** for various Eskom towers (3 year Contract)

2009 – 2010

Position –Executive Associate

N4 Rustenburg to Swartruggens: Geotechnical investigation for N4 road rehabilitation

Pikitup OSH Legal Audits

Dumbe Coalline Geotechnical investigation for Transnet (stability of proposed cuttings)

Various **Geotechnical Investigations** for Rand Water Pipelines

Various **Environmental Basic Assessments** for Rand Water Pipelines

Various **Geotechnical Investigations** for various Eskom towers (3 year Contract)

Basic Assessment for the installation of **Fibre Optic Cable** between Pretoria and Rustenburg

Materials recovery facility in **Ekandustria Waste Licence Application** and Basic assessment

2008 – 2009

Position – Associate

Pikitup Environmental Compliance

Rand Water G25 Pipeline Basic Assessment study downgraded to and Environmental Management Plan; Saved the Client R100 000,00 in fees.

Pikitup Garden sites and Depot sites Application for Waste Licences & Basic Assessment studies

Pretoria North Modal Interchange: full Environmental Impact Assessment for intermodal facility

N11 Section 4: Environmental services for obtaining Authorization for road rehabilitation and borrow pits

Various Geotechnical Investigations for Eskom towers (3 year Contract)

N6: Environmental services and Applications for Borrow Pits Closures

N12 Section 12: Environmental Auditing for road construction

2007 – 2008

Position – Associate

N6 Section 8 Closure Documentation for quarry and borrow pits for Road Rehabilitation

Lesotho Lowlands Water Supply Scheme: Geotechnical Investigation

Lusikisiki Police Station Geotechnical Investigation

Toscana Ridge Geotechnical Investigation for Housing development

Phinda Game Reserve: Geotechnical investigation for Housing development

Lusikisiki Police Station: Geotechnical Investigation.

Pretoria North Station Modal Interchange: full Environmental Impact Assessment for various road realignments, modal interchange and railway refurbishment in Pretoria.

N1 Section 14: Full Environmental Impact Assessment for the N1 rehabilitation.

Mt Ayliff & Mt Frere Access Roads – Environmental services for obtaining authorization from DEAET and DME for 12 access roads and associated borrow pits.

N2 Pongola Borrow pits: Application for borrow pits Closure

N2 Section 32: environmental services for obtaining Authorization for road rehabilitation and borrow pits

Umzimkhulu Municipality: Various environmental services for the upgrade of roads in Umzimkhulu

Environmental Management Plan for the rehabilitation of Dorpspruit River, Pietermaritzburg

Kwamashu Police Station Basic Assessment Report

2006 – 2007

Position – Associate

Elliottdale Landfill Site Classification and Permitting

Impendle Housing Development (1500 units): Geotechnical Investigation.

Lesotho Lowlands Bulk Water Supply Scheme: Geotechnical Investigation

Environmental Impact Assessment for various access roads in the Mt Frere and Mt Ayliff areas for the Umzimvubu Municipality.

Bubu Access Road : Geotechnical and materials investigation

Erf 3 Bishopstowe: Geotechnical Investigation for housing development

Willowton Proposed Shopping Centre: Geotechnical Investigation

Black Umfolozi River Bridge: Basic Assessment for environmental authorization

Mtwalume River sand mining Environmental Management Plan

Vulindlela Access Road: Environmental Management Plan for construction

Inhlazuka CWSS Environmental Management Plan for construction

Ladysmith Development: Preliminary Geotechnical & Environmental assessments

Black Umfolozi River Bridge - Basic Assessment Report as per NEMA Regulations 386.

Erf 3 Bishopstowe Geotechnical investigation for housing development

Vulindlela Access Roads – Environmental services for road rehabilitation.

2005 – 2006

Position – Engineering & Environmental Geologist

Closure of Landfill Site Hluhluwe & Identification of new Landfill Site to replace the old Landfill Site

N11 Sections 6 and 7 Borrow Pits and Quarry Permitting: environmental services (EIA & EMPR's) 10 borrow pits and one quarry

N12 Section 12 Borrow Pits & Quarry Permitting: environmental services (EIA & EMPR's) for 8 borrow pits and one quarry

Impendle Community Water Supply Schemes – Environmental services for obtaining authorization from DAEA for the construction of a community pipeline and associated structures.

Masomonco Community Water Supply Scheme - Environmental services for obtaining authorization from DAEA for the construction of a community pipeline and associated structure.

KwaNovuka Community Water Supply Scheme - Environmental services for obtaining authorization from DAEA for the construction of a community pipeline and associated structure.

Umtshezi Municipality Land Use Management System – Broad Environmental Scan

Vryheid Housing Development – Geotechnical Investigation

Illovo River Mining Right – environmental services for a sand mining operation on the Illovo River

Kwa Gqugquma Community Water Supply Scheme - Environmental services for obtaining authorization from DAEA for the construction of a community pipeline and associated structure.

2004 – 2005

Position – Engineering & Environmental Geologist

Georgedale development – environmental services for sand mining

God’s Haven Housing Development – Geotechnical Investigation

Kwa Senge Clinic – Geotechnical Investigation

Umdoni Municipality Cemetery – Geotechnical & Environmental Assessments

N6 Borrow Pits and Quarry Permitting: environmental services (EIA & EMPR’s) 10 borrow pits and one quarry

Umkomaas River Mining Right – environmental services for sand mining operations on the Umkomaas River

Umkomaas River Footbridge – Geotechnical Investigation

Marburg Prison – Geotechnical Investigation

Enkanyezini Community Water Supply Scheme - Environmental services for obtaining authorization from DAEA for the construction of a community pipeline and associated structures.

Shemula Community Water Supply Scheme - Environmental services for obtaining authorization from DAEA for the construction of a community pipeline and associated structures.

Mtwalume River Mining Permit – environmental services for sand mining operation on the Mtwalume River.

Umzimkulu River Mining Right – environmental services for sand mining operations on the Umzimkulu River

Umvoti River Mining Rights and Permits – environmental services for various sand mining operations on the Umvoti River

N2 Pongola quarry – Geotechnical Investigation

Rugged Glen - Environmental services for upgrading and construction of new structures.

2003 – 2004

Position – Engineering & Environmental Geologist

Kwa Mpande Geotechnical Investigation for school

St Ives Environmental Scoping for tourism development on the Midlands Meander

Ladysmith Petrol Station – Geotechnical Investigation and Scoping report

Kwa Ngwanase Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Kwa Ngwanase Community Water Supply Scheme Environmental Scoping for proposed pipeline and associated structures.

Emkhuzeni & Mhlangana Community Water Supply Schemes – Geotechnical investigation for pipelines and associated structures.

Emkhuzeni & Mhlangana Community Water Supply Schemes Environmental Scoping for proposed pipelines and associated structures.

Inanda Dam Mining Permit – environmental services for a sand mining operation on the Inanda Dam.

Mdloti River Mining Conversion of old right to Mining Right.

Edwin Swales – Environmental Management Plan compilation and Auditing.

Estcourt Prison – Geotechnical Investigation

Kombuzi Environmental Management Programme report for mining

Umhlumayo Community Water Supply Scheme – Geotechnical Investigation

2002 – 2003

Position – Engineering & Environmental Geologist

Dumbe Housing Development – Geotechnical Investigation.

Clouds oh Hope – Children’s Home – Geotechnical Investigation

C4 Water Pipeline – Johannesburg – Geotechnical Investigation.

Kombuzi Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Hlahlindlela Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Shemula Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Mt Frere rehabilitation of 3 roads – Geotechnical Investigation

Mbono Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Camperdown Spar - Geotechnical Investigation for failed pavement.

Thokoza Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Nqutu Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Taxi Rank at Lusikisiki – Geotechnical Investigation

Kwa Hlope Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

Mbazwane Community Water Supply Scheme – Geotechnical investigation for pipeline and associated structures.

2001 – 2002

Position – Engineering & Environmental Geologist

Amangwe Community Water supply Scheme Environmental Scoping for Pipeline and associated structure

Black Umfolozi River Bridge - Basic Assessment Report as per NEMA Regulations 386.

Mt Ayliff & Mt Frere Access Roads – Environmental services for obtaining authorization from DEAET and DME for access roads and associated borrow pits.

Erf 3 Bishopstowe Geotechnical investigation for housing development

2000 – 2001

Position – Engineering & Environmental Geologist

Black Umfolozi River Bridge - Basic Assessment Report as per NEMA Regulations 386.

Mt Ayliff & Mt Frere Access Roads – Environmental services for obtaining authorization from DEAET and DME for access roads and associated borrow pits.

Erf 3 Bishopstowe Geotechnical investigation for housing development

1999 – 2000

Position – Engineering & Environmental Geologist

Nzinga and Langkloof CWSS: Geotechnical Investigation for pipeline and reservoirs, Environmental Scoping: & Environmental Management Programme reports for mining

Mbazwana CWSS: Geotechnical Investigation for pipeline and reservoirs, & Environmental Scoping

Nhlangano to Sicunusa Road: Geotechnical & Materials Investigation

Edendale Hospital New Wing: Geotechnical Investigation

Spandikroon, Dival & Mhlabathini CWSS: Geotechnical Investigations for pipeline and reservoirs, Environmental Scoping: reports

Tugela Estates CWSS: Geotechnical Investigations for pipeline and reservoirs

Debep Quarry Drilling Investigation for materials for road Construction

N2 Road Rehabilitation at Kei River Geotechnical investigation for road rehabilitation

Moore Spence Jones (Pty) Ltd

1998 – 1999

Position – Engineering & Environmental Geologist

Indian Ocean Fertilizers (Richards Bay): Geotechnical Investigation for new plant

Housing Development at Hammarsdale: Geotechnical investigation for foundations, earthworks, suitability of materials for road construction, etc.

Zimbali Housing Development: Geotechnical investigation for foundations, earthworks, suitability of materials for road construction, etc.

Cato Manor: Stability Investigation of platform cuttings

Mpophomeni Housing Development: Geotechnical investigation for foundations, earthworks, suitability of materials for road construction, etc.

Fleetguard Pmb: Geotechnical investigation for warehouse foundations, earthworks, suitability of materials for road construction, etc.

Stukenberg Water Pipeline: Geotechnical investigation for slope stability, pipeline re-routing and tunnel investigation, etc.

Booth Road Housing Development: Geotechnical investigation for foundations, earthworks, suitability of materials for road construction, etc.

1996 – 1998

Position – Engineering & Environmental Geologist

Gateway Development: Geotechnical Investigation for founding conditions, Assessment of waste, Site stability, etc.

Azalea Housing Development Geotechnical investigation for foundations, earthworks, suitability of materials for road construction, etc.

Matatiele Housing Development Geotechnical investigation for foundations, earthworks, suitability of materials for road construction, etc.

Kwa Dabeka Housing Development Geotechnical investigation for foundations, earthworks, suitability of materials for road construction, etc.

Newlands West: Geotechnical Investigation at cracked houses

AECI: Geotechnical Investigation into the stability of the slimes dams at AECI

SAPREF: Groundwater Pollution monitoring

Craiova Drilling Company Romania

1988 – 1992

Position – Site Geologist

Site geologist - Responsible for Drilling supervision at various oil & gas exploration & exploitation boreholes. Main duties included sample and core analysis and description, data logging and interpretation, down-the-hole logging and on site interpretation, gas chromatography and geo-service logging, compilation of reports and recommendations for drilling parameters.

A major project Mrs Canahai was involved in, was the drilling supervision of a 6000 m deep exploration hole. Responsibilities included liaison with design engineers and contractors, gas chromatography and geo-service logging, compilation of reports and recommendations for drilling parameters.

CONTINUED PROFESSIONAL DEVELOPMENT

Courses

2000 - Integrated Environmental Management Course – (University of KwaZulu Natal)

2001 - Environmental Auditing Course - (University of KwaZulu Natal)

2003 - ISO 9001:2000; Registered Internal and Suppliers Auditors Course - (Wynleigh International)

2003 - Waste Management Course – (University of Pretoria)

2005 SHEQMAN Course – (Advance A.C.T.)

- 2017** Resource Efficiency Cleaner Production - 2-Day End User Training CSIR Pretoria
2018 Energy Management Systems Implementation - End User Training CSIR Pretoria

Published Papers

- 1988** - “Mineralogical Study of Devonian Deposits of the Hercinic Orogen, Dobrogea”, *MSc Thesis*, University of Bucharest (Engineering Geology), 1988.

PERSONAL DETAILS

Nationality – South African
Date of Birth – 1965-03-30
Domicile – Johannesburg, South Africa

Languages

English – Very Good
Romanian – Excellent

**PROFESSIONAL CURRICULUM
FOR WOUTER FOURIE**



Name: Wouter Fourie
Profession: Archaeologist
Date of birth: 1974-04-30
Parent Firm: PGS Heritage (Pty) Ltd
Position at Firm: Director
Years with firm: 15
Years of experience: 21
Nationality: South African
HDI Status: White

EDUCATION:

Name of University or Institution : University of Pretoria
Degree obtained : BA
Major subjects : Archaeology, Geography and Anthropology
Year : 1996

Name of University or Institution : University of Pretoria
Degree obtained : BA [Hons] (Cum laude)
Major subjects : Archaeology and Geography
Year : 1997

Name of University or Institution : National Nuclear Regulator
Certificate obtained : Radiation Protection Officer Certificate
Year : 1999

Name of University or Institution : University of Cape Town
Certificate obtained : Project Management Foundations short course
Year : 2015

Name of University or Institution : University of Cape Town
Certificate obtained : MPhil – Conservation of Built Environment
Year : 2016-Current

Professional Qualifications:

Professional Heritage Practitioner – Association of Professional Heritage Practitioners (APHP)
Professional Archaeologist - Association of Southern African Professional Archaeologists -
Professional Member – No 043

CRM Accreditation

Principal Investigator - Grave Relocations
Field Director – Iron Age
Field Supervisor – Colonial Period and Stone Age
Accredited with Amafa KZN

Languages:

Afrikaans
English – Speaking (Good) Reading (Good), Writing (Good)

KEY QUALIFICATIONS

- More than 18 consecutive years of work in the heritage consulting field;
- In depth knowledge of heritage management principles;
- 15 years working experience in the protection of cultural heritage sites and archaeological excavations;
- Proven experience in report writing and report deliverables;
- 15 years experience in management of the cultural heritage consultancy teams;
- 10 years of experience in institutional, multinational company interaction and project implementation;
- Proven experience in project scheduling and programming;
- Experience in development and implementation of quality, environmental and environmental health management systems for projects and companies;
- Experience in the development of policies and guidelines related to heritage management.
- Experience in planning and implementation of workshops and conferences.

CONFERENCE PAPERS AND PUBLICATIONS

- 2016 - Implementing Responsible Grave Relocation – The case for Comprehensive Grave Relocation Action Plan for Integrated Project Management. 21st annual IAIAAsa conference, Port Elizabeth, Eastern Cape.
- 2012 - Heritage management: compliance or just a nuisance during the Environmental Management Programme implementation. 17th annual IAIAAsa conference, Somerset West, Western Cape.
- 2011 – POSTER – W. Fourie and J. van der Walt. Sterkspruit: Micro-layout of Late Iron Age stone walling, Lydenburg, Mpumalanga. . Association of Southern African Professional Archaeologists – Conference, Swazi Land
- 2011 – POSTER – P.D. Birkholtz, W. Fourie and W.C. Nienaber. Onverwacht: Archaeological and Historical Analysis of Swazi settlement layout. Association of Southern African Professional Archaeologists – Conference, Swazi Land
- 2011 – POSTER – H.S. Steyn, W. Fourie and M. Hutten. Kappa Omega Transmission Line: Findings from an Archaeological Walk Down. Association of Southern African Professional Archaeologists – Conference, Swazi Land
- 2011 - Archaeology, Physical Anthropology and DNA analysis – The case of Queen Thomo Jezangani Ndwandwe. *Association of Southern African Professional Archaeologists – Conference, Swaziland*
- 2008 – Probabilistic Modeling of archaeological sites, Pilanesberg National Park. Paper delivered at the *Association of Southern African Professional Archaeologists – Conference, Cape Town*
- 2008 - Archaeological Impact Assessments within South African legislation. *South African Archaeological Bulletin 63 (187): 77–85, 2008*
- 2006 - *Paper delivered at ASAPA conference, Pretoria. Tavistock: Good grave relocation practice.*
- 2005 - Paper delivered at the Three Universities Seminar, University of Pretoria: The repatriation of King Michael Tjiseseta.
- 2005 - 'The Return of a King' - The repatriation of King Michael Tjiseseta, *Paper delivered at the conference of the Pan-African Archaeological Association for Prehistory and Related Studies in Gaborone, Botswana, in July 2005.*
- 2004 - Research poster, Probabilistic Modeling of Archaeological Sites, Pilanesberg National Park. *South African Association of Archaeologist Conference, Kimberley*

INTERNATIONAL PROJECTS

- 2018 – current: **Position:** Heritage Specialist and Project Manager – Sovereign Metals –

Malingunde Graphite Project, Malawi – Heritage Impact Assessment – **Project Value:** R 400 000

- 2017 – current: **Position:** Heritage Specialist and Project Manager – Lesotho Highland Development Authority – Polihali Dam Project - Heritage Management Plan development and Implementation. Mokhotlong, Kingdom of Lesotho – **Project Value:** R 35,5 mil
- 2017 - **Position:** Heritage Specialist and Project Manager – Aurcon Singapore for the Government for Mauritius – Heritage Assessment for the proposed Rapid Rail Link, Port Louis, Mauritius – **Project Value:** R 100, 000
- 2016 – current – **Position:** Heritage Specialist and Project Manager - Anadarko International – Grave Relocation Action Plan and implementation for the Afungi Liquid Natural Gas Project, Palma, Northern Mozambique – **Project Value:** R 2,5 mil
- 2013 – 2016 - **Position:** Heritage Specialist and Project Manager - SLR Consulting - Heritage Impact Assessment, Manica Gold Project, Manica Province, Mozambique - **Project Value:** R 80 000
- 2012 - **Position:** Heritage Specialist and Project Manager - SLR Consulting - Heritage Impact Assessment, Namoya SALR – Gold Mine, Maniema Province in the eastern Democratic Republic of Congo (DRC) - **Project Value:** R 120 000
- 2012 - **Position:** Heritage Specialist and Project Manager - Consolidated Contractors Group S.A.L. -Mitigation and Grave Relocation at Site 37-A3-16 on the Mahalpye to Kudumatse Road Construction Project Central District, Botswana - **Project Value:** R 90 000
- 2010 - **Position:** Heritage Specialist and Project Manager - Digby Wells & Associates - Grave Relocation Procedures and Consultation – RAP Process, Kibali Gold Mine, Watsa, Oriental Province, Democratic Republic of the Congo - **Project Value:** R 85 000
- 2010 - **Position:** Heritage Specialist and Project Manager - Digby Wells & Associates - Archaeological Study, Kibali Gold Mine, Watsa, Oriental Province, Democratic Republic of the Congo - **Project Value:** R 50 000
- 2008 - **Position:** Heritage Specialist and Project Manager - Digby Wells & Associates - Mmamabula Mining Project CIC, Botswana - **Project Value:** R 60 000

HERITAGE IMPACT ASSESSMENTS

South African

Below a selected list of over 400 heritage studies completed

2017

- Manungu Colliery, Heritage Impact Assessment. Carolina, Mpumalanga. – **Position:** Heritage Specialist. **Project Value:** R 65 000.
- Ilima Colliery, Heritage Impact Assessment. Carolina, Mpumalanga. – **Position:** Heritage Specialist. **Project Value:** R 110 000.
- Clanwilliam Dam Heritage Project (2014-2017). Clanwilliam, Western Cape. Department of Water and Sanitation – **Position:** Heritage Specialist. **Project Value:** R 7,5 mil
- Leeuwborg Wind Energy Project. Loeriesfontein, Northern Cape. SiVEST. – **Position:** Heritage Specialist. **Project Value:** R 120 000.
- Leeudoringstad Solar Energy Project. North West Province. SiVEST. – **Position:** Heritage Specialist. **Project Value:** R 50 000.
- Lephalale Combined Power Project, Limpopo Province. Kongiwe Environmental. – **Position:** Heritage Specialist. **Project Value:** R 100 000.
- Lebone Emergency College Upgrade, Pretoria. Department of Infrastructure Development. **Position:** Heritage Specialist. **Project Value:** R 100 000.

2016

- Gautrain Management Agency (SiVEST Environmental) – Gautrain Rapid Rail Link – Feasibility Study – **Position:** Heritage Specialist

- Pilgrim's Rest Housing Development – Heritage Impact Assessment, Mpumalanga. Aurecon. – **Position:** Heritage Specialist. **Project Value:** R 60 000.
- Era Brickworks, Delmas, Mpumalanga. Heritage Impact Assessment. Jones and Wagerner. – **Position:** Heritage Specialist. **Project Value:** R 40 000.
- Daggaskaal Road Upgrade, Mpumalanga. Heritage Impact Assessment. NCC Environmental. – **Position:** Heritage Specialist. **Project Value:** R40 000.
- Eureka and Aletta Wind Energy Projects. Copperton, Northern Cape. – **Position:** Heritage Specialist. **Project Value:** R 95 000.
- Sendawo Solar Project, Vryburg, Northern Cape. Heritage Impact Assessment. SiVEST – **Position:** Heritage Specialist. **Project Value:** R 90 000.
- Tlisitseng Solar Project, Lichtenburg, North West Province. Heritage Impact Assessment. – **Position:** Heritage Specialist. **Project Value:** R 80 000.
- Kuruman 66kV Project. Kuruman, Northern Cape. Zitholele. – **Position:** Heritage Specialist. **Project Value:** R 85 000.
- Goodwood Housing Scheme, WC – Heritage Scoping – **Position:** Heritage Specialist
- Vereeniging Gymnasium, Heritage assessment and Guidelines, Meyerton, Gauteng. – **Position:** Heritage Specialist
- Victoria West, Wind Energy Project. CSIR. – **Position:** Heritage Specialist. **Project Value:** R 120 000.
- Kloof and Driefontein Sibanye Gold. Heritage Management Plan. Carletonville, Gauteng. – **Position:** Heritage Specialist and Project Manager. **Project Value:** R 430 000.

2015

- AEL Detonator Campus, Heritage Impact Assessment. Modderfontein, Gauteng. – **Position:** Heritage Specialist and Project Manager. **Project Value:** R 240 000.
- Solar Reserve (Worley Parson RSA), Heritage Impact Assessment, Humansrus Solar Park, Daniëlskuil, Northern Cape – **Position:** Heritage Specialist
- Kappa-Sterrekus 765kV Project. ACER Africa. Heritage Walkdown. Western Cape. – **Position:** Heritage Specialist. **Project Value:** R 140 000.
- Solar Reserve (Worley Parson RSA), Heritage Impact Assessment, Rooipunt Solar Park, Upington, Northern Cape – **Position:** Heritage Specialist
- Solar Reserve (Worley Parson RSA), Heritage Impact Assessment, Arriesfontein Solar Park, Daniëlskuil, Northern Cape – **Position:** Heritage Specialist
- Solar Reserve (Worley Parson RSA), Heritage Impact Assessment, Slypklip Solar Park, Kimberley, Northern Cape – **Position:** Heritage Specialist
- Mainstream Renewable Power South Africa (SiVest), Heritage Impact Assessment, Loeriesfontein Solar Park, Northern Cape – **Position:** Heritage Specialist
- Mainstream Renewable Power South Africa (SiVest), Heritage Impact Assessment, De Aar Solar Park, Northern Cape – **Position:** Heritage Specialist
- Mainstream Renewable Power South Africa (SiVest), Heritage Impact Assessment, Droogfontein
- GRAP103 – Heritage Register for the Ekurhuleni Metropolitan Municipality, Aurecon – **Position:** Heritage Specialist
- Fleurhof Hostel Redevelopment. Florida, Gauteng. Heritage Impact Assessment. **Position:** Heritage Specialist and Project Manager. **Project Value:** R 430 000.
- Mkuze Biomassa Incinerator. Mkuze, KZN. Heritage Impact Assessment. CSIR. **Position:** Heritage Specialist and Project Manager. **Project Value:** R 50 000.
- Transnet Overvaal Tunnel, Ermelo, Mpumalanga. EIMS. **Position:** Heritage Specialist and Project Manager. **Project Value:** R 60 000.
- De Aar 132kv Powerline. De Aar, Northern Cape. Heritage Impact Assessment. Holland and Associates. **Position:** Heritage Specialist and Project Manager. **Project Value:** R 60 000.

2014

- Solar Park, Kimberley, Northern Cape – **Position:** Heritage Specialist
- Kumba Iron Ore (Synergistics), Heritage Impact Assessment, Shishen Relocation Project, Northern Cape - – **Position:** Heritage Specialist
- Kappa-Sterrekus 765kV Project. ACER Africa. Heritage Walkdown. Western Cape. – **Position:** Heritage Specialist. **Project Value:** R 140 000.
- Strategic Environmental Assessment for Independent Energy. CSIR. – **Position:** Heritage Specialist. **Project Value:** R 150 000.
- New Kathu Cemetery. Kathu, Northern Cape. Heritage Impact Assessment. SLR Consulting. – **Position:** Heritage Specialist. **Project Value:** R 50 000.

GRAVE RELOCATIONS

- 2015-7 - Optimum Coal Phase 2 – Relocation of 100 graves, Glencore. Pullenshope, Mpumalanga
- 2014 – Bigen Africa. Lufhereng Grave Investigation, Soweto, Gauteng. Principal Investigator.
- 2014 – Basil Read. Savanna City Residential Development. Relocation of 55 graves. Orange Farm, Gauteng. Principal Investigator.
- 2013-6 – Kalgold Project Harmony Gold. Relocation of 20 graves. Kraaipan, North West Province. Principal Investigator.
- 2013-4 – Ivanhoe Mining. Relocation of graves for the Platreef project. Mokopane, Limpopo Province. Principal Investigator.
- 2013-4 – Eskom SOC, Eskom Mookodi Substation grave relocation of 6 graves. Vryburg, North West Province. Principal Investigator.
- 2013 – Ntshovelo Coal. Relocation of 8 graves. Arbor, Mpumalanga.
- 2013 – Msobo Coal. Relocation of 9 graves for the Msobo Coal Lilliput project. Breyten, Mpumalanga. Principal Investigator.
- 2012-4 - Likweti Holdings, Likweti Grave Project, 1 Grave. Nelspruit, Mpumalanga. Principal Investigator
- 2012-3 - Fleurhof Holdings, Fleurhof rescue and grave relocation of 70 graves. Florida, Gauteng. Principal Investigator
- 2012 – 4 - Calgro/M3, Fleurhof grave rescue and relocation, 100 graves Florida, Gauteng. Principal Investigator
- 2012 - Department of Arts and Culture. J.L. Dube memorial site restoration. Ohlange Institute, Inanda, KwaZulu-Natal. Principal Investigator.
- 2012 - Delmas Super Centre. Delmas grave relocation of 1 grave. Delmas, Mpumalanga.
- 2012 - Anglo Coal, New Largo Colliery. 170 Graves. Ogies, Mpumalanga. Principal Investigator
- 2011-3 - Mashala Resources, Ferreiras Colliery, Ermelo. Relocation of 11 graves. Principal Investigator.
- 2011 - Xtsrata, ATCOM. Bierman cemetery. 14 graves. Principal Investigator Relocation of 8 graves, Kudumatse Road Upgrade, Botswana. Principal Investigator
- 2011 - Seaton Thompson, Kameeldoorn grave relocation. Single grave. Zeerust. Principal Investigator
- 2011 - SAHRA, Relocation of the remains of Queen Thomo KaNdwandwe, Durban, KZN. Principal Investigator
- 2011 - Roadcrete, Lanseria-Randburg Road Upgrade 6 graves, Randburg. Principal Investigator.
- 2011 - New Clydesdale Coal, Relocation of 7 graves from coal project, Witbank. Field Director, under WC Nienaber as PI
- 2011 - Kudumatse Road works. Removal of 11 Iron Age graves. Kudumatse, Botswana. Principal Investigator

- 2010-3 - Optimum Colliery, Hendrina, Mpumalanga. Relocation of 65 graves. Field Director, under WC Nienaber as PI
- 2010 - Investigation on the relocation of 3000 graves, Kibali, DRC. Principal Investigator
- 2010 - Eyethu Coal, Relocation of 7 graves from coal project, Delmas. Field Director, under WC Nienaber as PI
- 2008 - WBHO, Relocation of 5 graves from South Deep tailings project, Fochville Gauteng Province. Field Director, under WC Nienaber as PI
- 2006 - Highland Gate Development. Dullstroom. Gate Developments. Relocation of 39 Graves. Field Director.
- 2006 - Cosmo City Development, Johannesburg. Basil Read Pty Ltd. Relocation of 135 graves. Field Director.
- 2003 - Tselentis Colliery, Duiker Mining. Relocation of 80 graves. Field Director
- 2003 - Alveda Park Development, NewHco. Relocation of 114 graves. Field Director
- 2002 - V3, Brakfontein, Centurion. Reconnaissance excavation on possible grave in new development area. Field Director
- 2002 - Kriel Collieries, Kriel. Investigation into the position of relocated graves on Kriel Golf Course. Principal Investigator
- 2002 - Gardener Ross Golf and Country Estate, DEVCO. Reconnaissance Excavation on possible graves. Field Director
- 2001-2 - iMpunzi Division of Duiker Mining, Witbank, Grave Relocation of 907 graves. Field Director

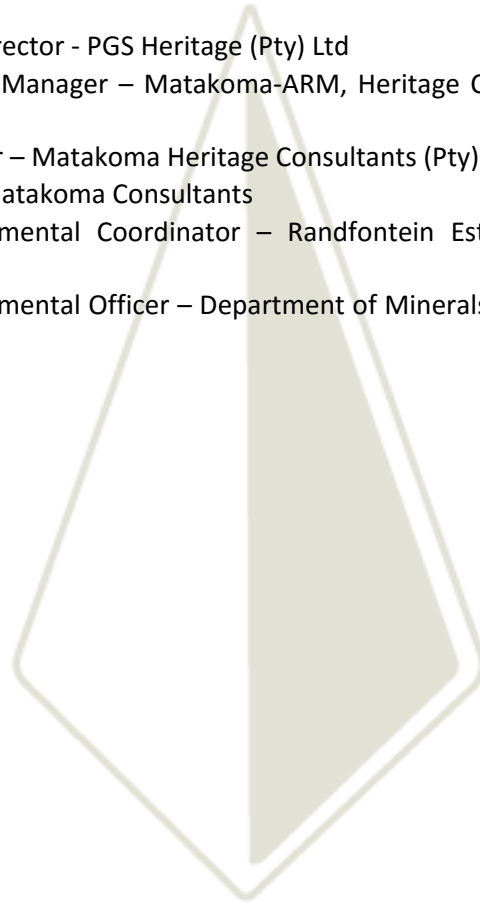
MITIGATION WORK

1. 2017 – Current - Lesotho Highland Development Authority – Polihali Dam Project - Heritage Management Plan development and Implementation. Mokhotlong, Kingdom of Lesotho
Project Manager
2. 2014-2017 - Raising of the Clanwilliam Dam – Heritage Mitigation, Clanwilliam, Western Cape. **Project Manager**
3. 2013 - Kappa Gamma, MSA Mitigation, Touws Rivier, Western Cape. **Field Director, Dr M.M. van der Ryst, PI**
4. 2012 - Misgund N1 Interchange upgrade, Iron Age Phase 2 excavation, Johannesburg, Gauteng Province. **Field Director, under Prof. JCA Boeyens, PI**
5. 2011 – Eskom 400kV – Dinaledi Spitskop – Phase 2 Historical Site, Mitigation - **Field Director, J.P Behrens, PI**
6. 2011 – Eskom 400 kV – Dinaledi Marang – Phase 2 Middel Stone Age Site, Mitigation **Field Director, Dr M.M. van der Ryst, PI**
7. 2011 – Eskom 400 kV – Dinaledi Marang – Phase 2 Late Iron Age, Mitigation - **Field Director, under Prof. JCA Boeyens, PI**
8. 2011 – Eskom 400 kV – Dinaledi Marang – Phase 2 Early Stone Age Site, Mitigation - **Field Director, under Dr K. Kumann, PI**
9. 2011 - Eskom 400kV – Dinaledi-Spitskop – Phase 2 Middel Stone Age Site, Mitigation - **Field Director, under Dr M.M van der Ryst, PI**
10. 2009 - Nkomati Mine, Onverwacht Phase 2 excavations, Badplaas, Mpumalanga. **Field Director, under Prof. TN Huffman, PI**
11. 2008 - TWP, Wesizwe Platinum Phase 2 excavations, Pilanesberg, North West Province. **Field Director, under Prof. TN Huffman, PI**
12. 2008 - The Heads Trust, Heritage Assessment and phase 2 documentation, and monitoring for Lydenburg Ext 38 housing development, Lydenburg, Mpumalanga. **Field Director, under Prof. JCA Boeyens, PI**
13. 2008 - Stonehenge x16, Phase 2 test excavations, Nelspruit, Mpumalanga. **Field Director, under Prof. TN Huffman, PI**

14. 2007 - Phase 2 mitigation of archaeological terrain. Hammanskraal West Proper. Ditsala Construction. Hammanskraal, Gauteng Province. **Field Director, under Prof. JCA Boeyens, PI**
15. 2007 - Phase 2 mitigation of archaeological terrain. Bokfontein Mining Project. Henric Ferrochrome, Brits North West Province. **Field Director, under Prof. JCA Boeyens, PI**
16. 2006 - Phase 2 mitigation of archaeological terrain. Gardener Ross Golf and Country Estate. **Field Director, under Prof. JCA Boeyens, PI**

POSITIONS HELD

- **2003 – current:** Director - PGS Heritage (Pty) Ltd
- **2006 – 2008:** Project Manager – Matakoma-ARM, Heritage Contracts Unit, University of the Witwatersrand
- **2005-2007:** Director – Matakoma Heritage Consultants (Pty) Ltd
- **2000-2004:** CEO– Matakoma Consultants
- **1998-2000:** Environmental Coordinator – Randfontein Estates Limited. Randfontein, Gauteng
- **1997-1998:** Environmental Officer – Department of Minerals and Energy. Johannesburg, Gauteng



PGS
HERITAGE

CURRICULUM VITAE

Andrea Gibb

Name Andrea Gibb

Profession Environmental Practitioner

Name of Firm SiVEST SA (Pty) Ltd

Present Appointment Divisional Manager
Environmental Division

Years with Firm 9 Years

Date of Birth 29 January 1985

ID Number 8501290020089

Nationality South African



Education

- Matriculated 2003, Full Academic Colours, Northcliff High School, Johannesburg, South Africa

Professional Qualifications

- **BSc (Hons) Environmental Management** (University of South Africa 2008-2010)
- **BSc Landscape Architecture** (with distinction) (University of Pretoria 2004-2007)
- **ArcGIS Desktop 1** (ESRI South Africa December 2010)
- Environmental Impact Assessment (EIA) 2014 Legal Regime Workshop (Imbewu 2015)
- NEC4 Contract Course (Coen Snyman International 2018)

Employment Record

Sept 2018 – to date SiVEST SA (Pty) Ltd: Divisional Manager: Environmental Division

May 2017 – Aug 2018 SiVEST SA (Pty) Ltd: Senior Manager: Environmental Division

Aug 2010 – Apr 2017 SiVEST SA (Pty) Ltd: Environmental Practitioner

January 2008 – July 2010 Cave Lapwijk and Associates: Environmental Assistant and
Landscape Architectural Technologist

Feb 2006 – Dec 2006 Cave Lapwijk and Associates: Part time student

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|----------|--------|--------|--------|
| English | Fluent | Fluent | Fluent |

Years of Working Experience: 11

Countries of Work Experience:

- South Africa
- Swaziland (Eswatini)

Fields of Specialisation

- Renewable Energy
- Environmental Impact Assessment (EIA)
- Basic Assessment (BA)
- Visual Impact Assessment (VIA)
- Project and team management
- Marketing and business development
- Financial management
- Documentation / quality control

Overview

Andrea is a Divisional Manager within the SiVEST Environmental Division, heading up the Renewable Energy Sector in the Johannesburg Office. She specialises in overseeing large scale multifaceted EIAs and BAs throughout South Africa, undertaken according to International Finance Corporation (IFC) standards and Equator Principles, within the renewable energy generation and electrical distribution sectors. From a business development perspective Andrea assists the division by marketing the environmental services and identifying prospective clients. Andrea further specialises in VIAs and has developed a specialist team who she oversees.

Projects Experience (by Sector)

Aug 2010 – to date

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) / BASIC ASSESSMENT (BA)

- EIA for the proposed Rondekop Wind Energy Facility near Sutherland, Northern Cape Province.
- BA for the proposed Tooverberg Wind Energy Facility within the Komberg Renewable Energy Development Zone (RED), Western Cape Province.
- BA for the proposed Tooverberg Substation and Power Line within the Komberg Renewable Energy Development Zone (RED), Western Cape Province.
- BA for the proposed construction of the Grasskoppies Substations and Power Line near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of the Ithemba Substations and Power Line near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of the Hartebeest Leegte Substations and Power Line near Loeriesfontein, Northern Cape Province.
- BA for the proposed construction of the 100 ha Boom Substations and Power Line near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Grasskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- EIA for the proposed construction of the 100 ha Boom Wind Farm near Loeriesfontein, Northern Cape Province.

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- Application for an Amendment of the Environmental Authorisation (EA) for the proposed construction of the Droogfontein II PV Plant near Kimberley, Northern Cape Province.
 - Amendment and Resubmission of the FBAR for the Eskom Longdown Substation and Vyeboom 66kV Turn-in Power Lines near Villiersdorp, Western Cape Province.
 - BA for the proposed construction of the Leeuwbosch Power Plant near Leeudoringstad, North West Province.
 - BA for the proposed construction of the Wildebeestkuil Power Plant near Leeudoringstad, North West Province.
 - EIA for the proposed development of the Tlisitseng 1 and 2 75MW Solar Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province.
 - EIAs for the proposed development of the Sendawo 1, 2, and 3 75MW Solar PV Energy Facilities near Vryburg, North West Province.
 - EIA for the proposed construction of the Sendawo Common Collector Substation and power line near Vryburg, North West Province.
 - EIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
 - Application for an Amendment of the Environmental Authorisation (EA) for the proposed construction of the 100MW Limestone Solar Thermal Power Project near Danielskuil, Northern Cape Province.
 - Applications for the Amendment of the EAs for the proposed construction of three 75MW solar PV facilities near Prieska, Northern Cape Province.
 - Applications for the Amendment of the EAs for the proposed construction of the 75MW Arriesfontein and Wilger Solar Power Plants near Danielskuil, Northern Cape Province.
 - Completion and submission of the final EIA report for the proposed Rooipunt PV Solar Power Park Phase 1 and proposed Rooipunt PV Solar Power Park Phase 2 near Upington, Northern Cape Province.
 - EIAs for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
 - EIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
 - EIA for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
 - BA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
 - BA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
 - BA for the proposed Construction of the SSS1 5MW Solar PV Plant on the Western Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
 - BA for the proposed Construction of the SSS2 5MW Solar PV Plant on the Eastern Part of Portion 6 (Portion of Portion 5) of Farm Spes Bona 2355 near Bloemfontein, Free State Province.
 - BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the proposed Bophirima Substation to the existing Schweizer-Reneke Substation, North West Province.
 - BA for the proposed Mookodi Integration Phase 2: Proposed Construction of a 132kV power line from the Mookodi Substation to the existing Magopela Substation, North West Province.
 - BA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
 - Amendment of the Final Environmental Impact Report for the Proposed Mookodi 1 Integration Project near Vryburg, North West Province.
 - BA for the proposed 132kV power line and associated infrastructure for the proposed Redstone Solar Thermal Energy Plant near Lime Acres, Northern Cape Province.

- BA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- BA for the proposed establishment of a Learning and Development Retreat and an Executive Staff and Client Lodge at Mogale's Gate, Gauteng Province.
- Application for an Amendment of the EA to increase the output of the proposed 40MW PV Facility on the farm Mierdam to 75MW, Northern Cape Province.
- BA for the proposed construction of a power line and substation near Postmasburg, Northern Cape Province.
- BA for the proposed West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- EIA for the proposed construction of a wind farm and PV plant near Prieska, Northern Cape Province.
- Public Participation assistance as part of the EIA for the proposed Thyspunt Transmission Lines Integration Project – EIA for the proposed construction of 5 x 400kV transmission power lines between Thyspunt to Port Elizabeth, Eastern Cape Province.
- EIA assistance for the proposed construction of three Solar Power Plants in the Northern Cape Province.
- Public Participation as part of the EIA for the proposed Delareyville Popela Power Line and Substation, North West Province.
- Public Participation as part of the EIA for the Middelburg Water Reclamation Project, Mpumalanga Province.

VISUAL IMPACT ASSESSMENT (VIA)

- VIA for the proposed construction of the Mloni Golf Estate and Hotel Development, Eastern Cape Province.
- VIA for the proposed Tinley Manor South Banks Beach Enhancement Solution, KwaZulu-Natal Province.
- VIA for the proposed construction of the Grasskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed construction of the Kwa Boom Wind Farm near Loeriesfontein, Northern Cape Province.
- VIA for the proposed Pheukomoya Wind Energy Facility near Noupoot, Northern Cape Province.
- VIA for the proposed Sanraal Wind Energy Facility near Noupoot, Northern Cape Province
- VIA for the proposed Assagay Valley Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed Assier Road North Mixed Use Development, KwaZulu-Natal Province.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Alkaar Solar Thermal Power Plant near Kimberley, Free State and Northern Cape Provinces.
- VIA (Scoping Phase) for the proposed construction of a 3000MW Wind Farm and associated infrastructure near Richmond, Northern Cape Province.
- VIA for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- VIA for the proposed construction of a power line and associated infrastructure for the proposed Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.
- VIAs (Impact Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.
- VIA (Impact Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
- VIAs (Impact Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.

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- VIA for the proposed construction of the Tlisitseng substation and associated 132kV power line near Lichtenburg, North West Province.
 - VIA (Scoping Phase) for the proposed construction of the Sendawo substation and associated power line near Vryburg, North West Province.
 - VIA (Scoping Phase) for the proposed construction of the Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province.
 - VIA (Scoping Phase) for the proposed construction of the Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province.
 - Visual recommendations for Phase 1 of the proposed Renishaw Estate Mixed Use Development, wa ulu-Natal Province.
 - VIA for the proposed Tinley Manor South Banks Development, wa ulu-Natal Province.
 - VIAs (Impact Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
 - VIA (Scoping Phase) for the proposed construction of the Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province.
 - Visual Due Diligence Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
 - Visual Status uo and Constraints Report for the possible rapid rail extensions to the Gauteng network, Gauteng Province.
 - VIA for the proposed agricultural components of the Integrated Sugar Project in Nsoko, Swa iland.
 - VIA for the proposed Tweespruit to Welroux power lines and substation, Free State Province.
 - VIA for the proposed construction of the Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province.
 - VIA (Impact Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
 - VIA for the proposed amendment to the authorised power line route from Hera Substation to Westgate Substation, Gauteng Province.
 - VIA (Impact Phase) for the Eastside unction Mixed Use Development near Delmas, Mpumalanga Province.
 - VIA for the proposed construction of two 132kV power lines and associated infrastructure from the Redstone Solar Thermal Power Project site to the Olien MTS near Lime Acres, Northern Cape Province.
 - VIA for the proposed construction of two 132kV power lines and associated infrastructure from Silverstreams DS to the Olien MTS near Lime Acres, Northern Cape Province.
 - VIA (Scoping Phase) for the proposed development of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province.
 - VIA for the proposed Rorqual Estate Development near Park Rynie on the South Coast of wa ulu Natal.
 - VIA (Scoping Phase) for the proposed construction of a Coal-fired Power Station, Coal Mine and Associated Infrastructure near Colenso, wa ulu-Natal Province.
 - VIA for the proposed Mookodi Integration Phase 2: Proposed Construction of the Mookodi - Ganyesa 132kV power line, proposed Ganyesa Substation and Havelock LILO, North West Province.
 - VIA for the proposed construction of the Duma transmission substation and associated Eskom power lines, wa ulu-Natal Province.
 - VIA for the proposed construction of the Madlan ini transmission substation and associated Eskom power lines, Mpumalanga Province.
 - VIA for the proposed rebuild of the 88kV power line from Normandie substation to Hlungwane substation, Mpumalanga and wa ulu-Natal Provinces.
 - VIA for the proposed construction of the N alo transmission substation and associated Eskom power lines, wa ulu-Natal Province.
 - VIA for the proposed construction of the Sheepmoor traction substation with two 20MVA transformer bays and a new associated 88kV turn-in power line, Mpumalanga Province.
 - VIA for the proposed rebuild of the 88kV power line from Uitkoms substation to Antra T-off, Mpumalanga Province.

- VIA for the proposed rebuild of the 88kV power line from Umfolozi substation to Eqwasha traction substation including an 88kV turn-in power line to Dabula traction substation, uMhlabathini Municipality, KwaZulu-Natal Province.
- VIA for the proposed construction of the new 88/25kV Vryheid traction substation with two 20MVA transformer bays and a new associated 88kV turn-in power line, uMhlabathini Municipality, KwaZulu-Natal Province.
- VIA for the proposed construction of a 132kV power line and substation associated with the 75MW PV Plant on the Farm Droogfontein (PV 3) in Kimberley, Northern Cape Province.
- VIA (Impact Phase) for the proposed Construction of a Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Wind Farm near De Aar, Northern Cape Province.
- VIA for the (Impact Phase) proposed Construction of the Renosterberg Solar PV Power Plant near De Aar, Northern Cape Province.
- VIA for the proposed construction of a 132kV power line for the Redstone Thermal Energy Plant near Lime Acres, Northern Cape Province.
- VIA for the proposed Mookodi Integration phase 2 132kV power lines and Ganyesa substation near Vryburg, North West Province.
- VIA for the proposed 132kV power lines associated with the PV Plants on Droogfontein Farm near Kimberley, Northern Cape Province.
- VIA (Scoping phase) for the Eastside Junction Mixed Use Development near Delmas, Mpumalanga Province.
- VIA for the proposed development of a learning and development retreat and an executive and staff lodge at Mogale's Gate, Gauteng Province.
- VIA for the proposed construction of a substation and 88kV power line between Heilbron (via Frankfort) and Villiers, Free State Province.
- Visual Status Quo Assessment for the Moloto Development Corridor Feasibility Study in the Gauteng Province, Limpopo Province and Mpumalanga Province.
- VIA the West Rand Strengthening Project – 400kV double circuit power line and substation extension in the West Rand, Gauteng.
- VIA for the proposed construction of a wind farm and solar photovoltaic plant near Loeriesfontein, Northern Cape Province.
- Visual sensitivity mapping exercise for the proposed Mogale's Gate Expansion, Gauteng.
- VIA (Scoping Phase) for the proposed Renosterberg Solar PV Power Plant and Wind Farm near De Aar, Northern Cape Province.
- Scoping level VIAs for the proposed construction of three Solar Power Plants in the Northern Cape Province.
- VIAs for the Spoornet Coallink Powerline Projects in Northern and Mpumalanga.
- Visual Constraints Analysis for the proposed establishment of four Wind Farms in the Eastern and Northern Cape Province.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in De Aar, Northern Cape.
- VIA (Scoping Phase) for the proposed development of a solar energy facility in Kimberley, Northern Cape.

STRATEGIC ENVIRONMENTAL PLANNING

- Assistance with the Draft Environmental Management Framework for the Mogale City Local Municipality, Gauteng Province.
- Sensitivity Negative Mapping Analysis for the proposed Mogale's Gate Development, Gauteng Province.

Awards

Cave lapwijk prize for highest average in all modules in the Landscape Architecture programme, ILASA book prize for the best Landscape Architecture student in third year design, Johan Barnard planting design prize for the highest distinction average in any module of plant science.

CURRICULUM VITAE

Richard Hirst

Name Richard Hirst

Profession Civil Engineering

Name of Firm SiVEST SA (Pty) Ltd
Civil Engineering Division

Present Appointment Divisional Manager:
SIVEST Engineering Division

Years with Firm 15 years

Date of Birth 16 uly 1964

ID Number 6407165059081

Nationality South African



Education

National Diploma Civil Engineering 1990

Professional Qualifications

- Pr. (200430110) Pr. Techni.
- Pr. (2018300110) Pr. Tech Eng.

Membership in Professional Societies

- South African Institute of Civil Engineers (SAICE) – Member (205155)
- Engineering Council of South Africa (ECSA) – Pr. Tech Eng. 2018300110
- Association of Arbitrators South Africa (ASS Arb) - 3140

Employment Record

| | |
|-----------------------|---|
| an. 2004 – to date | SiVEST SA (Pty) Ltd - Engineering Division: Divisional Manager, Gauteng |
| an 2000 – May 2004 | Consultant to SiVEST SA (Pty) Ltd - Engineering Division: Senior Engineer |
| Oct. 1999 – Dec. 1999 | Gaetsho Investments: Contracts Manager |
| Aug. 1995 – Oct. 1999 | Galaxy Civil Projects: Self Employed (Member) |
| Aug. 1993 – uly 1995 | Pieterse James & Associates: Design Technician and Site Agent |
| May 1991 – May 1993 | Pieterse Lombard & Associate: Design Technician |
| une 1990 – March 1991 | H S Consulting Engineers: Civil Technician |
| uly 1985 – May 1990 | Eskom: Pupil Technician/Draughtsman/Senior Draughtsman/Civil Technician |

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|-----------|--------|--------|--------|
| English | Fluent | Fluent | Fluent |
| Afrikaans | Fluent | Fluent | Fluent |

Years of Experience: 34

Key Experience

Extensive experience in the fields of Civil Engineering Services:

- road design,
- stormwater management,
- sewer reticulation networks & outfalls sewers,
- bulk water supply pipelines & water reticulations networks
- Bulk Infrastructure Mater Planning (water, Sanitation, Stormwater and Roads).

Further experience has been gained in the geometric designing of Class 2 & 3 Roads, Class2 & 3 Road Intersections and preliminary designs for class III aerodromes.

Specialised experience

Roads

- Designing of Class 2 & 3 Roads and Intersections
- Traffic Circles / roundabouts
- Roads Master Planning – Rural & Urban areas
- Road markings and signage to Provincial & Municipal Roads and Intersections
- Designing of residential & industrial township roads
- Pavement design and geotechnical assessments

Stormwater

- Stormwater Management (on site).
- Stormwater Detention and Attenuation facilities and Storm Routing.
- Dam Spillways & Outlet Structures.
- Flood Hydrology & Floodline determination.
- Stormwater Culverts & Bridge si ing.
- Stormwater Technical Assessments for Arbitration.

Sanitation

- Package treatment plant assessments.
- Bulk Sanitation Master Planning.
- Design of sewer pump stations and rising mains.

Water

- Bulk water supply lines.
- Bulk Water Master Planning & pressure one determination.
- Potable water storage reservoir assessment.
- Large Water Network Analysis.
- Booster Pump Stations.

Project Experience

an. 2000 – date

- Ha eldean Boulevard – Class 3 Municipal Road.
- Ha eldean Node – 800ha of mix use development.
- Loftus Park External Infrastructure Upgrades.
- Maroeladal Residential Estate.
- Astral / Meadow Feeds Plant civils and external infrastructure.
- The Ridge Residential Estate – Tijger Valley Extension 9, 17, 18,19, 61 & 62.
- The Meadows Residential Estate – Tijger Valley Extension 10,20 & 21.
- Tijger Valley Retirement Village – Tijger Valley Extension 22,23,27,72,105-112.

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- 800dia. Bulk Water Supply to Ha eldean Node.
 - 500dia. Outfall Sewer servicing Ha eldean Node.
 - 355dia. Bulk Water supply to Waterlake Farm (Boschkop).
 - Oukraal High Density Residential Estate – Tijger Valley Extension 38, 39, 40, 41, 42, 43 & 44.
 - Water Lake Farm 8km bulk water supply.
 - City of Tshwane Roads Master Planning.
 - Ha eldean Office Park – Township Services.
 - Silverlakes Golf estate – Township Services Upgrading.
 - Thorntree Residential Estate – Township Services.
 - Boitekong Floodline analysis.
 - Stormwater Management – Renewable Energy Plants Northern Cape.
 - Holding 4 & 5 Shere AH – Municipal Services Supply.
 - Curro School – Access Circle Design.
 - Rham Rustenburg & Polokwane Bulk Earthworks.
 - Irene Mall – Phase 1 & 2 Township Services.
 - Bojanala Platinum District Municipality – Water & Sanitation Bulk master Planning.
 - Longmeadow Ext. 2 - Township Services.
 - McCormick's Warehouses - Bulk Earthworks.
 - Erf. 189 & 190 Thornhill - Township Services.
 - Holding 3 Willaway Midrand - Township Services.
 - Erven 186, 189 & 190 Thornhill - Township Services.
 - Erf. 898 Sunninghill -Cluster Dev. Services.
 - Golf Course View – Modderfontein - Township Services.
 - Savannah Hills - Township Services, Provincial Road Intersection.
 - Erf. 59 Abbotsford Oaklands – Cluster Development Services.
 - Hyde Park Clusters – Cluster Development Services.
 - Erf. 608 Riverclub extension 27 – Cluster Dev. Services, River Canalisation.
 - yalami Hills Ext. 3 – Township Services, Storm Water Management & Attenuation.
 - San Baranto – Cluster Development Services.
 - Ormonde Extension 27 – Cluster Development Services.
 - Lakeside Forest Estate – Township Services, Bulk reservoir, Sewerage package treatment.
 - Ba aruto Airport – Runway Geometric design, pavement assessment.
 - Longmeadow Commercial Business Estate Ext. 3, 4, 5, 6, 7, 8, 9 & 10 – Township Services provincial road intersection, floodline analysis & Stormwater Management & attenuation.
 - Magalisig Ext. 33 & 34 – apartment / townhouse services.
 - Beverley Ext. 64 – Township Services, Provincial road intersection, floodline analysis & Stormwater Management & attenuation..
 - Greenstone Hill extension 8,9 & 10 – Modderfontein – Township Services, floodline analysis & Stormwater attenuation.
 - Fourways Ext. 46 – Township Services, provincial road intersection, floodline analysis & Stormwater attenuation.
 - Irene Ext 39, 49, 47, 28, 30 & 31 – Township Services.
 - Erf. 181 Lakeside Township Services.
 - Emfuleni Shopping Centre – Storm Water canalisation, Earthworks.
 - Forum Homini – Dam spillway & outlet structure.
 - Centenary Traffic Circle – Geometrics.
 - lein ukskei River Fourways 1:100 year floodline determination.
 - Witpoort drainage line 1:100 year floodline determination.
 - Timabavati River at the Orpen Gate 1:100 year floodline determination
 - Waterval Farm drainage line 1:100 year floodline determination.
 - Greenstone Hill extension 13 – Modderfontein – Township Services.
 - wartkoppies Farm, Pienaars River 1:100 year floodline determination

- Tijger Valley Extension 9 & 10 – 1:100 year Floodline analysis, township services, outfall sewer si ing & bulk water supply determination & si ing, Storm Water & Roads Master Planning.
- Midridge Park Stormwater Management Report & Attenuation .
- ungwini Bulk Water design.
- Ha eyview Cabanas – 1:100 year flooline determination on the Sabi River.
- Erf 4173 Peter Place - 1:100 year flooline determination on the Braamfontein Spruit.
- Irene Glen – 1:100 year floodline verification on the Sesmyl Spruit.
- Ptn 192 Rietfontein - 1:100 year flooline determination.
- Holding 87 & 89 Chartwell - 1:100 year flooline determination on the lein ukskei River.
- Erf 13 Terenure - 1:100 year flooline determination.
- Lilianton Ext 5 – Stormwater attenuation & management report.
- Thompsons Office Park - Stormwater attenuation.

Oct. 1999 – Dec. 1999

- wamhlanga Shopping Centre.
- Mdala Game Lodge Upgrade.
- Siyabuswa Shopping Centre.

Aug. 1995 – Oct. 1999

- Construction of Chicken Licken Franchise outlet – value R58 000.
- Earthworks platform for new warehouse – value R85 000.
- Construction of Office and Factory warehouse for Bottle Printers Midrand – value R1 300 000.

Aug. 1993 – uly 1995

Design Technician May 1991 – May 1993

- Eagles landing township services.
- Rietspruit outfall sewer.
- Paulshof sewer reticulation.
- Country view water reticulation.

une 1990 – Mar. 1991

- Glaxo Pharmaceuticals – Internal roads.
- onki i we township services.

ul. 1985 – May 1990

- Matimba power station – Turbine House Civils.

CURRICULUM VITAE

Dr. David Barry Hoare

B.Sc. (Hons), M.Sc., Ph.D., Pr.Nat.Sci. (Ecology, Botany)

Contact details

Postnet Suite #116
Private Bag X025, Lynnwood Ridge, 0040
Tel.: (012) 804 2281
Fax: 086 550 2053
Cell: 083 284 5111
E-mail: dhoare@lantic.net

Personal information

Date of birth: 04 November 1966, Grahamstown, South Africa
Citizenship: Republic of South Africa
ID no.: 661104 5024 088

Education

Matric - Graeme College, Grahamstown, 1984
B.Sc (majors: Botany, Zoology) - Rhodes University, 1991-1993
B.Sc (Hons) (Botany) - Rhodes University, 1994 with distinction
M.Sc (Botany) - University of Pretoria, 1995-1997 with distinction
PhD (Botany) - Nelson Mandela Metropolitan University, Port Elizabeth

Main areas of specialisation

- Vegetation ecology, primarily in grasslands, thicket, coastal systems, wetlands.
- Plant biodiversity and threatened plant species specialist.
- Alien plant identification and control / management plans.
- Remote sensing, analysis and mapping of vegetation.
- Specialist consultant for environmental management projects.

Membership

Professional Natural Scientist, South African Council for Natural Scientific Professions, 16 August 2005 – present. Reg. no. 400221/05 (Ecology, Botany)
Member, International Association of Vegetation Scientists (IAVS)
Member, Ecological Society of America (ESA)
Member, International Association for Impact Assessment (IAIA)
Member, Herpetological Association of Africa (HAA)

Employment history

1 December 2004 – present, Director, David Hoare Consulting (Pty) Ltd. Consultant, specialist consultant contracted to various companies and organisations.
1 January 2009 – 30 June 2009, Lecturer, University of Pretoria, Botany Dept.
1 January 2013 – 30 June 2013, Lecturer, University of Pretoria, Botany Dept.
1 February 1998 – 30 November 2004, Researcher, Agricultural Research Council, Range and Forage Institute, Private Bag X05, Lynn East, 0039. Duties: project management, general vegetation ecology, remote sensing image processing.

Experience as consultant

Ecological consultant since 1995. Author of over 380 specialist ecological consulting reports. Wide experience in ecological studies within grassland, savanna and fynbos, as well as riparian, coastal and wetland vegetation.

Publication record:**Refereed scientific articles (in chronological order):****Journal articles:**

- HOARE, D.B.** & BREDEKAMP, G.J. 1999. Grassland communities of the Amatola / Winterberg mountain region of the Eastern Cape, South Africa. *South African Journal of Botany* 64: 44-61.
- HOARE, D.B.**, VICTOR, J.E., LUBKE, R.A. & MUCINA, L., 2000. Vegetation of the coastal fynbos and rocky headlands south of George, South Africa. *Bothalia* 30: 87-96.
- VICTOR, J.E., **HOARE, D.B.** & LUBKE, R.A., 2000. Checklist of plant species of the coastal fynbos and rocky headlands south of George, South Africa. *Bothalia* 30: 97-101.
- MUCINA, L, BREDEKAMP, G.J., **HOARE, D.B** & MCDONALD, D.J. 2000. A National Vegetation Database for South Africa *South African Journal of Science* 96: 1-2.
- HOARE, D.B.** & BREDEKAMP, G.J. 2001. Syntaxonomy and environmental gradients of the grasslands of the Stormberg / Drakensberg mountain region of the Eastern Cape, South Africa.. *South African Journal of Botany* 67: 595 – 608.
- LUBKE, R.A., **HOARE, D.B.**, VICTOR, J.E. & KETELAAR, R. 2003. The vegetation of the habitat of the Brenton blue butterfly, *Orachrysops niobe* (Trimen), in the Western Cape, South Africa. *South African Journal of Science* 99: 201–206.
- HOARE, D.B** & FROST, P. 2004. Phenological classification of natural vegetation in southern Africa using AVHRR vegetation index data. *Applied Vegetation Science* 7: 19-28.
- FOX, S.C., HOFFMANN, M.T. and HOARE, D. 2005. The phenological pattern of vegetation in Namaqualand, South Africa and its climatic correlates using NOAA-AVHRR NDVI data. *South African Geographic Journal*, 87: 85–94.
- PFAB, M.F., COMPAAN, P.C., WHITTINGTON-JONES, C.A., ENGELBRECHT, I., DUMALISILE, L., MILLS, L., WEST, S.D., MULLER, P., MASTERSON, G.P.R., NEVHUTALU, L.S., HOLNESS, S.D., **HOARE, D.B.** 2017. The Gauteng Conservation Plan: Planning for biodiversity in a rapidly urbanising province. *Bothalia*, Vol. 47:1. a2182. <https://doi.org/10.4102/abc.v47i1.2182>.

Book chapters and conference proceedings:

- HOARE, D.B.** 2002. Biodiversity and performance of grassland ecosystems in communal and commercial farming systems in South Africa. Proceedings of the FAO's Biodiversity and Ecosystem Approach in Agriculture, Forestry and Fisheries Event: 12–13 October, 2002. Food and Agriculture Organisation of the United Nations, Viale delle Terme di Caracalla, Rome, Italy. pp. 10 - 27.
- STEENKAMP, Y., VAN WYK, A.E., VICTOR, J.E., **HOARE, D.B.**, DOLD, A.P., SMITH, G.F. & COWLING, R.M. 2005. Maputaland-Pondoland-Albany Hotspot. In: Mittermeier, R.A., Gil, P.R., Hoffmann, M., Pilgrim, J., Brooks, T., Mittermeier, C.G., Lamoreux, J. & Fonseca, G.A.B. da (eds.) *Hotspots revisited*. CEMEX, pp.218–229. ISBN 968-6397-77-9
- STEENKAMP, Y., VAN WYK, A.E., VICTOR, J.E., **HOARE, D.B.**, DOLD, A.P., SMITH, G.F. & COWLING, R.M. 2005. Maputaland-Pondoland-Albany Hotspot. <http://www.biodiversityhotspots.org/xp/hotspots/maputaland/>.
- HOARE, D.B.**, MUCINA, L., RUTHERFORD, M.C., VLOK, J., EUSTON-BROWN, D., PALMER, A.R., POWRIE, L.W., LECHMERE-OERTEL, R.G., PROCHES, S.M., DOLD, T. and WARD, R.A. *Albany Thickets*. in Mucina, L. and Rutherford, M.C. (eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19, South African National Biodiversity Institute, Pretoria.
- MUCINA, L., **HOARE, D.B.**, LÖTTER, M.C., DU PREEZ, P.J., RUTHERFORD, M.C., SCOTT-SHAW, C.R., BREDEKAMP, G.J., POWRIE, L.W., SCOTT, L., CAMP, K.G.T., CILLIERS, S.S., BEZUIDENHOUT, H., MOSTERT, T.H., SIEBERT, S.J., WINTER, P.J.D., BURROWS, J.E., DOBSON, L., WARD, R.A., STALMANS, M., OLIVER, E.G.H., SIEBERT, F., SCHMIDT, E., KOBISI, K., KOSE, L. 2006. *Grassland Biome*. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
- RUTHERFORD, M.C., MUCINA, L., LÖTTER, M.C., BREDEKAMP, G.J., SMIT, J.H.L., SCOTT-SHAW, C.R., **HOARE, D.B.**, GOODMAN, P.S., BEZUIDENHOUT, H., SCOTT, L. & ELLIS, F., POWRIE, L.W., SIEBERT, F., MOSTERT, T.H., HENNING, B.J., VENTER, C.E., CAMP, K.G.T., SIEBERT, S.J., MATTHEWS, W.S., BURROWS, J.E., DOBSON, L., VAN ROOYEN, N., SCHMIDT, E., WINTER, P.J.D., DU PREEZ, P.J., WARD, R.A., WILLIAMSON, S. and HURTER, P.J.H. 2006. *Savanna Biome*. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
- MUCINA, L., RUTHERFORD, M.C., PALMER, A.R., MILTON, S.J., SCOTT, L., VAN DER MERWE, B., **HOARE, D.B.**, BEZUIDENHOUT, H., VLOK, J.H.J., EUSTON-BROWN, D.I.W., POWRIE, L.W. & DOLD, A.P.

2006. *Nama-Karoo Biome*. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
- MUCINA, L., SCOTT-SHAW, C.R., RUTHERFORD, M.C., CAMP, K.G.T., MATTHEWS, W.S., POWRIE, L.W. and **HOARE, D.B.** 2006. *Indian Ocean Coastal Belt*. In: Mucina, L. & Rutherford, M.C. (eds.) The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.

Conference Presentations:

- HOARE, D.B. & LUBKE, R.A. *Management effects on diversity at Goukamma Nature Reserve, Southern Cape*; Paper presentation, Fynbos Forum, Bienne Donne, July 1994
- HOARE, D.B., VICTOR, J.E. & LUBKE, R.A. *Description of the coastal fynbos south of George, southern Cape*; Paper presentation, Fynbos Forum, Bienne Donne, July 1994
- HOARE, D.B. & LUBKE, R.A. *Management effects on fynbos diversity at Goukamma Nature Reserve, Southern Cape*; Paper presentation, South African Association of Botanists Annual Congress, Bloemfontein, January 1995
- HOARE, D.B. & BOTHA, C.E.J. *Anatomy and ecophysiology of the dunegrass Ehrharta villosa var. maxima*; Poster presentation, South African Association of Botanists Annual Congress, Bloemfontein, January 1995
- HOARE, D.B., PALMER, A.R. & BREDENKAMP, G.J. 1996. *Modelling grassland community distributions in the Eastern Cape using annual rainfall and elevation*; Poster presentation, South African Association of Botanists Annual Congress, Stellenbosch, January 1996
- HOARE, D.B. *Modelling vegetation on a past climate as a test for palaeontological hypotheses on vegetation distributions*; Paper presentation, Randse Afrikaanse Universiteit postgraduate symposium, 1997
- HOARE, D.B., VICTOR, J.E. & BREDENKAMP, G.J. *Historical and ecological links between grassy fynbos and afro-montane fynbos in the Eastern Cape*; Paper presentation, South African Association of Botanists Annual Congress, Cape Town, January 1998
- LUBKE, R.A., HOARE, D.B., VICTOR, J.E. & KETELAAR, R. *The habitat of the Brenton Blue Butterfly*. Paper presentation, South African Association of Botanists Annual Congress, Cape Town, January 1998
- HOARE, D.B. & PANAGOS, M.D. *Satellite stratification of vegetation – structure or floristic composition?* Poster presentation at the 34th Annual Congress of the Grassland Society of South Africa, Warmbaths, 1-4 February 1999.
- HOARE, D.B. & WESSELS, K. *Conservation status and threats to grasslands of the northern regions of South Africa*, Poster presentation at the South African Association of Botanists Annual Congress, Potchefstroom, January 2000.
- HOARE, D.B. *Phenological dynamics of Eastern Cape vegetation*. Oral paper presentation at the South African Association of Botanists Annual Congress, Grahamstown, January 2002.
- HOARE, D.B., MUCINA, L., VAN DER MERWE, J.P.H. & PALMER, A.R. *Classification and digital mapping of grasslands of the Eastern Cape* Poster presentation at the South African Association of Botanists Annual Congress, Grahamstown, January 2002.
- HOARE, D.B. *Deriving phenological variables for Eastern Cape vegetation using satellite data* Poster presentation at the South African Association of Botanists Annual Congress, Grahamstown, January 2002.
- MUCINA, L., RUTHERFORD, M.C., HOARE, D.B. & POWRIE, L.W. 2003. *VegMap: The new vegetation map of South Africa, Lesotho and Swaziland*. In: Pedrotti, F. (ed.) Abstracts: Water Resources and Vegetation, 46th Symposium of the International Association for Vegetation Science, June 8 to 14 – Napoli, Italy.
- HOARE, D.B. 2003. *Species diversity patterns in moist temperate grasslands of South Africa*. Proceedings of the VIIth International Rangeland Congress, 26 July – 1 August 2003, Durban South Africa. *African Journal of Range and Forage Science*. 20: 84.

Unpublished technical reports:

- PALMER, A.R., HOARE, D.B. & HINTSA, M.D., 1999. *Using satellite imagery to map veld condition in Mpumalanga: A preliminary report*. Report to the National Department of Agriculture (Directorate Resource Conservation). ARC Range and Forage Institute, Grahamstown.
- HOARE, D.B. 1999. *The classification and mapping of the savanna biome of South Africa: methodology for mapping the vegetation communities of the South African savanna at a scale of 1:250 000*. Report to the National Department of Agriculture (Directorate Resource Conservation). ARC Range and Forage Institute, Pretoria.

- HOARE, D.B. 1999. The classification and mapping of the savanna biome of South Africa: size and coverage of field data that exists on the database of vegetation data for South African savanna. Report to the National Department of Agriculture (Directorate Resource Conservation). ARC Range and Forage Institute, Pretoria.
- THOMPSON, M.W., VAN DEN BERG, H.M., NEWBY, T.S. & HOARE, D.B. 2001. Guideline procedures for national land-cover mapping and change monitoring. Report no. ENV/P/C 2001-006 produced for Department of Water Affairs and Forestry, National Department of Agriculture and Department of Environment Affairs and Tourism. Copyright: Council for Scientific and Industrial Research (CSIR) and Agricultural Research Council (ARC).
- HOARE, D.B. 2003. Natural resource survey of node O R Tambo, using remote sensing techniques, Unpublished report and database of field data for ARC Institute for Soil, Climate & Water, ARC Range and Forage Institute, Grahamstown.
- HOARE, D.B. 2003. Short-term changes in vegetation of Suikerbosrand Nature Reserve, South Africa, on the basis of resampled vegetation sites. Gauteng Department of Agriculture, Conservation, Environment and Land Affairs, Conservation Division.
- BRITTON, D., SILBERBAUER, L., ROBERTSON, H., LUBKE, R., HOARE, D., VICTOR, J., EDGE, D. & BALL, J. 1997. The Life-history, ecology and conservation of the Brenton Blue Butterfly (*Orachrysops niobe*) (Trimen)(*Lycaenidea*) at Brenton-on-Sea. Unpublished report for the Endangered Wildlife Trust of Southern Africa, Johannesburg. 38pp.
- HOARE, D.B., VICTOR, J.E. & MARNEWIC, G. 2005. Vegetation and flora of the wetlands of Nylsvley River catchment as component of a project to develop a framework for the sustainable management of wetlands in Limpopo Province.

Consulting reports:

Total of over 380 specialist consulting reports for various environmental projects from 1995 – present.

Workshops / symposia attended:

- International Association for Impact Assessment Annual Congress, Durban, 16 – 19 May 2018.
- Workshop on remote sensing of rangelands presented by Paul Tueller, University of Nevada Reno, USA, VIIth International Rangeland Congress, 26 July – 1 August 2003, Durban South Africa.
- VIIth International Rangeland Congress, 26 July – 1 August 2003, Durban South Africa.
- BioMap workshop, Stellenbosch, March 2002 to develop strategies for studying vegetation dynamics of Namaqualand using remote sensing techniques
- South African Association of Botanists Annual Congress, Grahamstown, January 2002.
- 28th International Symposium on Remote Sensing of Environment, Somerset West, 27-31 March 2000.
- Workshop on Vegetation Structural Characterisation: Tree Cover, Height and Biomass, 28th International Symposium on Remote Sensing of Environment, Strand, 26 March 2000.
- South African Association of Botanists Annual Congress, Potchefstroom, January 2000
- National Botanical Institute Vegmap Workshop, Kirstenbosch, Cape Town, 30 September-1 October 1999.
- Sustainable Land Management – Guidelines for Impact Monitoring, Orientation Workshop: Sharing Impact Monitoring Experience, Zithabiseni, 27-29 September 1999.
- WWF Macro Economic Reforms and Sustainable Development in Southern Africa, Environmental Economic Training Workshop, development Bank, Midrand, 13-14 September 1999.
- 34th Annual Congress of the Grassland Society of South Africa, Warmbaths, 1-4 February 1999
- Expert Workshop on National Indicators of Environmental Sustainable Development, Dept. of Environmental Affairs and Tourism, Roodevallei Country Lodge, Roodeplaat Dam, Pretoria, 20-21 October 1998.
- South African Association of Botanists Annual Congress, Cape Town, January 1998
- Randse Afriakaanse Universiteit postgraduate symposium, 1997.
- South African Association of Botanists Annual Congress, Bloemfontein, January 1995.

Referees:

- Prof. Roy Lubke, Associate Professor Emeritus, Botany Department, Rhodes University, Grahamstown
Tel: 0461-318 592. E-mail: r.lubke@ru.ac.za
- Prof. Richard Cowling, Botany Department, Nelson Mandela Metropolitan University, Tel (042) 298 0259 E-mail: rmc@kingsley.co.za
- Michele Pfab, Scientific Co-ordinator: Scientific Authority, Applied Biodiversity Research, South African National Biodiversity Institute, (012) 843 5025, E-mail: M.Pfab@sanbi.org.za

Name Stephan Hendrik acobs
Profession Environmentalist
Name of Firm SiVEST SA (Pty) Ltd
Present Appointment Environmental Consultant
Years with Firm 3 years
Date of Birth 28 May 1991
ID Number 9105285065080
Nationality South African



Education

Pretoria Boys High, Pretoria, South Africa, Matriculated 2009.

Professional Qualification

- B.Sc. Hons Environmental Management and Analysis, (Post Graduate) University Of Pretoria Honours (2014).
- B.Sc. Environmental Sciences (Undergraduate) University Of Pretoria (2012-2013)

Employment Record

May 2015 – current SiVEST SA (Pty) Ltd – Graduate Environmental Consultant
 Nov 2014 – Feb 2015 Sodwana Bay Fishing Charters – Assistant Manager
 Oct 2014 – Mar 2015 Ufudu Turtle Tours – Tour Guide

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|-----------|-----------|-----------|-----------|
| English | Excellent | Excellent | Excellent |
| Afrikaans | Good | Good | Good |

Key Experience

Stephan joined SiVEST in May 2015 and holds the position of Environmental Consultant in the Johannesburg office.

Stephan specialises in the field of Environmental Management and has been extensively involved in Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes for various types of projects / developments. As such, Stephan has vast experience with regards to the compilation of Environmental Impact Assessments (EIAs) and Basic Assessments (BAs). Additionally, Stephan has extensive experience in undertaking public participation and stakeholder engagement processes. Stephan has also assisted extensively in the undertaking of field work and the compilation of reports for specialist studies such as Surface Water and Visual Impact Assessments. Stephan also has experience in Environmental Compliance and Auditing and has acted as an Environmental Control Officer (ECO) for several infrastructure projects.

Stephan has been educated and achieved his degrees (B.Sc. and B.Sc. Hons) at the University of Pretoria in Environmental Sciences (Environmental Management & Analysis).

Skills include:

- Strong computer skills (Word, excel, PowerPoint etc.);
- Strong Proposal and report writing skills;
- Report compilation skills for Environmental Impact Assessments (EIAs) and Basic Assessments (BAs);
- Report compilation skills for Environmental Management Plans/Programmes (EMPr);
- Compilation and conducting Visual Impact Assessments;
- Assisting in Surface Water / Wetland Delineations and Assessments.

Key experience includes:

- Environmental Impact Assessment (EIA) of small, medium and large-scale infrastructure projects,
- Basic Assessment (BA), of small, medium and large-scale infrastructure projects,
- Environmental Management Plans (EMPr), of small, medium and large-scale infrastructure projects,
- Undertaking of Public Participation and Stakeholder Engagement Processes
- Proposal and tender compilation,
- Environmental Compliance and Auditing (ECO);
- Various site inspections, and
- Visual Impact Assessments (Field work and report compilation).

Projects Experience

Stephan is responsible for the following activities: report writing, proposal writing, assisting in specialist surface water delineation and functional assessments, assisting in visual impact assessments and environmental compliance and auditing procedures. Current and completed projects / activities are outlined in detail below:

- Environmental Control Officer (ECO) for the Polokwane Integrated Rapid Public Transport System (IRPTS), Limpopo Province.
- Basic Assessment (BA) for the construction of a Non-Motorised Transport (NMT) Training and Recreational Park adjacent to the Peter Mokaba Stadium in Polokwane, Limpopo Province.
- Basic Assessment (BA) for the Proposed Expansion of the Tissue Manufacturing Capacity at the Twinsaver Liprivier Operations Base, Gauteng Province.
- Basic Assessment (BA) for the Proposed Construction of a New SPAR Distribution Centre on Erf 1092 at Redhouse in Port Elizabeth, Eastern Cape Province.
- Basic Assessment (BA) for the Proposed Construction of the Graskoppies Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Basic Assessment (BA) for the Proposed Construction of the Hartebeest Leegte Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Basic Assessment (BA) for the Proposed Construction of the Ithemba Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Basic Assessment (BA) for the Proposed Construction of the Mha Boom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province
- Environmental Impact Assessment (EIA) for the Proposed Construction of the Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province.

- Environmental Impact Assessment (EIA) for the Proposed Construction of the Hartebeest Leegte Wind Farm near Loeriefontein, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the Ithemba Wind Farm near Loeriefontein, Northern Cape Province.
- Environmental Impact Assessment (EIA) for the Proposed Construction of the 100 ha Boom Wind Farm near Loeriefontein, Northern Cape Province.
- Environmental Control Officer (ECO) for Phase 1 and Phase 2 of the Newmarket Retail Development, Gauteng Province.
- Environmental Control Officer (ECO) for the proposed NuPay Office Block development at the Newmarket Retail Development, Gauteng Province.
- Environmental Control Officer (ECO) for the proposed Construction of the Decathlon Building at the Newmarket Retail Development, Gauteng Province.
- Environmental Control Officer (ECO) for the External Road Upgrades at the Newmarket Retail Development, Gauteng Province.
- Environmental Review of the 1000 ha Coal Operations, adjacent to the proposed Eastside Junction Development.
- Environmental Due Diligence for the Woodlands and Harrowdene Office Parks in Woodmead, Gauteng Province.
- Visual Impact Assessment for the Helena Solar PV Plant, Northern Cape Province.
- Visual Impact Assessment for the Nsoko Msele Integrated Sugar Project, Swaziland.
- Visual Impact Assessments for the proposed construction of the Sendawo Solar 1, Sendawo Solar 2 and Sendawo Solar 3 Photovoltaic (PV) Energy Facilities near Vryburg, North West Province.
- Visual Impact Assessments for the proposed construction of the Sendawo Substation and Associated 400kV Power Line near Vryburg, North West Province.
- Visual Impact Assessments for the proposed construction of the Tlisitseng Solar 1 and Tlisitseng Solar 2 Photovoltaic (PV) Energy Facilities near Lichtenburg, North West Province.
- Visual Impact Assessment for the proposed construction of the Tlisitseng 1 132kV Substation and associated 132kV Power Line near Lichtenburg, North West Province.
- Visual Impact Assessment for the proposed construction of the Tlisitseng 2 132kV Substation and associated 132kV Power Line near Lichtenburg, North West Province.
- Visual Impact Assessment for the proposed construction of the 3000MW PhilCo Green Energy Wind Farm and Associated Infrastructure near Richmond, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Aletta 140MW Wind Energy Facility near Copperton, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Aletta 132kV Substation and associated 132kV Power Line near Copperton, Northern Cape Province.

- Visual Impact Assessment for the proposed construction of the Eureka 140MW Wind Energy Facility and associated Infrastructure near Copperton, Northern Cape Province.
- Visual Impact Assessment for the proposed construction of the Eureka 400kV Substation and 400kV Power Line near Copperton, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province.
- Basic Visual Impact Assessment for the Proposed Construction of the Graskoppies Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province.
- Basic Visual Impact Assessment for the Proposed Construction of the Hartebeest Leegte Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the Ithemba Wind Farm near Loeriesfontein, Northern Cape Province.
- Basic Visual Impact Assessment for the Proposed Construction of the Ithemba Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the 100 ha Boom Wind Farm near Loeriesfontein, Northern Cape Province.
- Basic Visual Impact Assessment for the Proposed Construction of the 100 ha Boom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the 315MW Phe ukomoya Wind Energy Facility near Noupoot, Northern Cape Province.
- Visual Impact Assessment for the Proposed Construction of the 390MW Sankraal Wind Energy Facility near Noupoot, Northern Cape Province.
- Visual Impact Assessment for the proposed development of the Phase 1 uruman Wind Energy Facility, uruman, Northern Cape Province
- Visual Impact Assessment for the proposed development of the Phase 2 uruman Wind Energy Facility, uruman, Northern Cape Province
- Basic Visual Impact Assessment for the proposed development of Supporting Electrical Infrastructure to the Phase 1 and Phase 2 uruman Wind Energy Facilities, uruman, Northern Cape Province
- Visual Impact Assessment for the Proposed Tinley Manor South Banks Beach Enhancement Solution, wa ulu-Natal Province.
- Visual Impact Assessment for the proposed Mlon i Hotel and Golf Estate Development, Near Lusikisiki, Eastern Cape Province

- Visual Impact Assessment for the Proposed Assagay Valley Development, wa ulu-Natal Province.
- Visual Impact Assessment for the Proposed assier Road North Development, wa ulu-Natal Province.
- Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the Rooipunt Solar Thermal Power Plant near Upington, Northern Cape Province.
- Basic Visual Impact Assessment for the proposed construction of up to a 132kV Power Line and Associated Infrastructure for the proposed alkaar Solar Thermal Power Plant near imberly, Free State and Northern Cape Provinces.
- Surface Water Assessment for the Steve Thswete Local Municipality, Mpumalanga Province.
- Surface Water Delineation and Assessment for the proposed coal Railway Siding at the Welgedacht Marshalling Yard and associated Milner Road Upgrade near Springs, Ekurhuleni Metropolitan Municipality.

SALVERSAN KULLEN



| | |
|-------------------------------|--------------------------------------|
| Profession | Engineering Geologist |
| Position in Firm | Engineering Geologist |
| Area of Specialisation | Engineering Geology / Geotechnical |
| Qualifications | BSc. (Hons)(Geology), BSc. (Geology) |
| Years of Experience | 4,5 Years |
| Years with Firm | 3 Years |

SUMMARY OF EXPERIENCE

Salversan Kullen is an Engineering Geologist at JG Afrika and has 4.5 years of experience in the Engineering Geology field. He has worked as a student geologist at Sky Chrome (International Ferro Metals (SA) Ltd). He then worked as a junior geologist at Raft Foundation Solutions (Pty) Ltd.

He has experience in various aspects of engineering geology namely: Slope stability analyses (kinematic analysis), geotechnical site investigations, geotechnical report writing, soil testing (foundation indicators), geological mapping, rock identification, soil profiling, Dynamic Cone Penetrometer Testing (DCP) , soil resistivity surveys, soil percolation tests and geotechnical borehole logging. He also has experience working with geology related software: Rocscience Dips, 3D Field and Arc GIS and Dot plot.

EDUCATION

- 2007 - **Matric** – Northwood School
- 2012 – **B Sc** (Geology) – University of Pretoria
- 2013 – **B Sc** (Hons)(Geology) – University of Pretoria

SPECIFIC EXPERIENCE

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)

2016 – **Date**

Position – Engineering Geologist

Stormvoel Toll Plaza Gantries

The geotechnical investigation was undertaken for the proposed construction of three overhead gantries along Stormvoel road, Pretoria. The objectives of the investigation were to provide an overview of the founding conditions for the proposed gantries, provide founding recommendations, identify the presence of problematic ground conditions and assess the excavation conditions for earthworks. The field work comprised of the excavation of 5 tests pits at the foundation footprints of the proposed gantries.

Bakwena N4 Upgrade - Section 9 Km 23,300 to Section 10 Km 18.00

The detailed geotechnical investigation was conducted for the proposed upgrade of the N4 highway between Ga-Rankuwa and Brits. The upgrade consists of the construction of a second carriageway adjacent to the existing carriageway, the extension of structures to accommodate the second carriageway and the realignment of interchange ramps to tie into the new carriageway. A centreline and materials investigation was carried out which comprised of 144 test pits as well as DCP testing at selected locations.

Buffer Tank at Simba, Isando

A geotechnical investigation was conducted for the proposed construction of a buffer tank at the Simba Isando facility in Isando, Johannesburg. The objective of the investigation was to determine the founding conditions and the founding specifications for the buffer tank. The investigation comprised of 2 test pits and 2 DCP tests.

164 Eugene Street house, Grootfontein Country Estate, Pretoria

The geotechnical investigation was undertaken for the proposed construction of a house within the Grootfontein Country Estate. Due to the proximity of the house to dolomitic land, the Council for geosciences was consulted to determine whether a specialized dolomitic stability investigation would be required. Fortunately, the location of the house fell out of the dolomitic land region and a conventional geotechnical investigation was carried out. The investigation comprised of 6 test pits and 6 DCPs at critical locations beneath the footprint of the house. A percolation test was also carried out to determine whether the site would be suitable for the construction of a Septic tank/French drain system.

Eskom Hendrina Power Station Ash dam: Step-in and Go-Higher

The overall objective of the project was to investigate the potential to extend the life of the existing ash dam complex at Hendrina Power Station (Mpumalanga) by increasing the final height, above the current design height, and assess whether a step-in would be required to maintain stability. The objective of this geotechnical investigation is to provide the project design engineers with the relevant geotechnical information for them to assess the feasibility of increasing the dam height. The investigation comprised of drilling 3 boreholes including Standard Penetration tests (drilled through the ash dam using a sonic drill rig), 22 Dynamic Probe Super Heavy (DPSH) tests and 30 test pits.

Sedimentation and Flocculation Plant at Vereeniging Pumping Station

The investigation was carried out to assess the soil and rock profile across the site to determine the geotechnical and geohydrological conditions for the proposed construction of a new sedimentation and flocculation plant at the Vereeniging Pumping Station in Vereeniging, Gauteng. The investigation comprised of drilling 8 boreholes, 3 test pits, 3 DCP tests and a field resistivity survey. The borehole data and the resistivity survey data were used in combination to produce a cross section of the sub-surface lithology.

Eskom Marathon Substation Extension

The geotechnical investigation was carried out for the proposed extension of the Marathon Substation in Nelspruit. The main objectives of the investigation were to assess the suitability of the site, from a geotechnical perspective, to provide an overview of the founding conditions for the proposed substation extension, provide founding recommendations, identify the presence of problematic ground conditions, assess the resistivity of the soil, identify possible sources of construction materials and assess the excavation conditions for earthworks. The investigation comprised of 6 test pits, 6 DCP tests and 4 soil resistivity traverses.

Anglo American Mafube Life Extension Project

Additional geotechnical investigations were carried out for the life extension project of the Mafube Coal Mine. The objective of the additional investigation was to undertake “footprint investigations” beneath selected structures, to provide “infill investigations” between previous investigation points and to provide additional information on the subgrade conditions beneath haul roads and access roads, to allow for the detailed design of the infrastructure. A materials utilization investigation was also carried out to assess the feasibility of using material from the initial box cut of the mine during construction. In addition to the above investigations, fulltime on-site geotechnical services are also provided during the construction phase of the project.

Ekuphumuleni Informal Settlement

The investigation was carried out to assess the suitability of the site from a geotechnical perspective and provide an overview of the founding conditions for the proposed ablution facilities and other future developments, identify the presence of problematic ground conditions and assess the excavation conditions at the site. The investigation comprised of 13 test pits.

Cosmo City Sewer Pipeline

The geotechnical investigation was undertaken for the proposed upgrade on 1590 m of existing sewer line. The first 770 m section of the upgrade, from South Africa Drive to Kanas Crescent, required that the existing 200 mm uPVC sewer line be upgraded to 300 mm. The second 820 m section, from Kanas Crescent to the existing 600 mm diameter AC outfall sewer line, required that the existing 315 mm also be upgraded. Johannesburg Water indicated that the preferred method of upgrading the existing sewer line would be trenchless. The geotechnical investigation was tailored to provide sufficient information for the trenchless methodology (pipe bursting).

Talavera Bulk Water Line

The geotechnical site investigation undertaken for the proposed construction of a bulk water pipeline that will pass through the Bloubastrand, Needwood and Maroeladal suburbs, in Northern Johannesburg. The project is necessary, to increase the bulk supply capacity of the area, and involves the construction of approximately 3130 m of new 600 mm diameter bulk supply pipeline that will replace an existing bulk supply pipeline. Test pits and geophysics (seismic refraction soundings) were undertaken for this project.

Eskom Kriel Power Station Ash Dam Geotechnical Investigation And Stability Risk Assessment

The geotechnical site investigation was undertaken as part of the Kriel Ash Dam Geotechnical Investigation and Stability Risk Assessment Project. JG Afrika (Pty) Ltd were appointed by Eskom Holdings SOC Limited to conduct geotechnical investigation and stability risk assessment of Ash Dams at Kriel Power Station, in the Mpumalanga Province. The work included all field and laboratory testing necessary, stability and Rate of Rise (RoR) analyses including report writing, and provision of recommendations to allow the dams to continue ashing with a minimum risk of failure. The investigation comprised of the drilling of boreholes (with SPT testing), CPTu, tests pits and pressure meter testing.

Rand Water H43 Pipeline Design Level Dolomite Hazard Study

The geotechnical investigation was undertaken for the proposed H43 Pipeline in Centurion, Gauteng. The proposed pipeline traverses dolomitic land. The investigation entailed a gravity survey on a 30 m grid and, where feasible, trenching, to explore the areas where shallow dolomite, or bedrock, was expected. The trenching has more accurately defined the extent of dolomite land in the southern section of the route and further assessed the bedrock profiles. The gravity survey has delineated several major anomalies indicating both shallow and very deep bedrock along the length of the line.

Raft Foundation Solutions (Pty) Ltd

2014 – 2016

Position – Junior Geologist

Geotechnical site investigations
Geotechnical report writing
Soil sampling and testing
Geotechnical research and academic report writing

Sky Chrome (International Ferro Metals SA Ltd)

2013

Position – Student Geologist

Slope stability analysis of a (scan line survey and kinematic analysis)

CONTINUED PROFESSIONAL DEVELOPMENT

Courses

- 2016** - Geotechnical Borehole Core Logging (presented by profiling presented by the South African Institute of Engineering and Environmental Geologists)
- 2016** - Level 1 First Aid training HIRAC – Risk Assessment training , Fire Fighting training.
- 2015** - Geotechnical Soil Profiling (presented by profiling presented by the South African Institute of Engineering and Environmental Geologists)

PERSONAL DETAILS

Nationality – South African
Date of Birth – 1989-09-17
Domicile – Johannesburg, South Africa

Languages

English – Good
Afrikaans – Fair



University of Pretoria

The Council and Senate hereby declare that
at a congregation of the University the degree

Bachelor of Science Honours in Geology

with all the associated rights and privileges
was conferred on

Salversan Kullen

in terms of the Higher Education Act, 1997 and the Statute of the University

On behalf of the Council and Senate

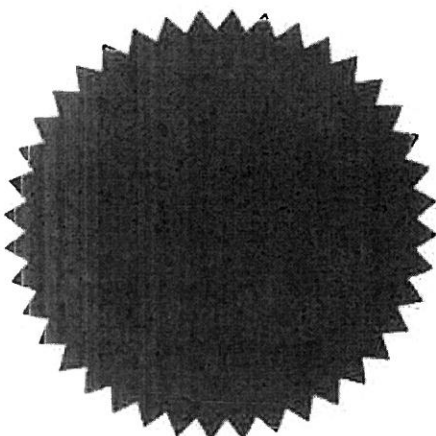
Handwritten signature of C. de la Rey in cursive.

Vice-Chancellor and Principal

On behalf of the Faculty of
Natural and Agricultural Sciences

Handwritten signature of the Dean in cursive.

Dean



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Registrar

2014-04-23

Johann Lanz

Curriculum Vitae

Education

- M.Sc. (Environmental Geochemistry) University of Cape Town 1996 - June 1997
- B.Sc. Agriculture (Soil Science, Chemistry) University of Stellenbosch 1992 - 1995
- BA (English, Environmental & Geographical Science) University of Cape Town 1989 - 1991
- Matric Exemption Wynberg Boy's High School 1983

Professional work experience

I am registered as a Professional Natural Scientist (Pri.Sci.Nat.) in the field of soil science, registration number 400268/12.

- **Soil Science Consultant** **Self employed** **2002 - present**
I run a soil science consulting business, servicing clients in both the environmental and agricultural industries. Typical consulting projects involve:
 - Soil specialist study inputs to EIA's, SEA's and EMPR's. These have focused on impact assessments and rehabilitation on agricultural land, rehabilitation and re-vegetation of mining and industrially disturbed and contaminated soils, as well as more general aspects of soil resource management. Recent clients include: CSIR; SRK Consulting; Aurecon; Mainstream Renewable Power; SiVEST; Savannah Environmental; Subsolar; Red Cap Investments; MBB Consulting Engineers; Enviroworks; Sharples Environmental Services; Haw & Inglis; BioTherm Energy; Tiptrans.
 - Soil resource evaluations and mapping for agricultural land use planning and management. Recent clients include: Cederberg Wines; Unit for Technical Assistance - Western Cape Department of Agriculture; Wedderwill Estate; Goedgedacht Olives; Zewenwacht Wine Estate, Lourensford Fruit Company; Kaarsten Boerdery; Thelema Mountain Vineyards; Rudera Wines; Flagstone Wines; Solms Delta Wines; Dornier Wines.
 - I have conducted several research projects focused on conservation farming, soil health and carbon sequestration.
- **Soil Science Consultant** **Agricultural Consultants International (Tinie du Preez)** **1998 - end 2001**
Responsible for providing all aspects of a soil science technical consulting service directly to clients in the wine, fruit and environmental industries all over South Africa, and in Chile, South America.
- **Contracting Soil Scientist** **De Beers Namaqualand Mines** **July 1997 - Jan 1998**
Completed a contract to make recommendations on soil rehabilitation and re-vegetation of mined areas.

Publications

- Lanz, J. 2012. Soil health: sustaining Stellenbosch's roots. In: M Swilling, B Sebitosi & R Loots (eds). *Sustainable Stellenbosch: opening dialogues*. Stellenbosch: SunMedia.
- Lanz, J. 2010. Soil health indicators: physical and chemical. *South African Fruit Journal*, April / May 2010 issue.
- Lanz, J. 2009. Soil health constraints. *South African Fruit Journal*, August / September 2009 issue.
- Lanz, J. 2009. Soil carbon research. *AgriProbe*, Department of Agriculture.
- Lanz, J. 2005. Special Report: Soils and wine quality. *Wineland Magazine*.

I am a reviewing scientist for the *South African Journal of Plant and Soil*.

CURRICULUM VITAE

Merchandt Le Maitre

Name Merchandt Le Maitre

Profession Civil Engineer

Name of Firm SiVEST SA (Pty) Ltd
Civil Engineering Division

Present Appointment Senior Civil Engineering Technician

Years with Firm 13 Years

Date of Birth 25 September 1982

ID Number 8209255037086

Nationality South African



Education

- University of Johannesburg (2006)
- University of South Africa (2016)

Professional Qualifications

- N Dip: Civil Engineering
- B Tech: Civil Engineering (Water)
- Pr.Tech.Eng. (Reg. No. 2018300094)

Membership in Professional Societies

- Engineering Council of South Africa (ECSA) – Pr Tech Eng; (Reg N 2018300094)
- South African Institute of Civil Engineers (SAICE)

Employment Record

May 2004 – to date SiVEST SA (PTY) LTD: Senior Civil Engineering Technician
 Jan 2004 – April 2004 Con Roux Zambia - Senior Foreman
 Dec 2002 – Dec 2003 Neda Engineering - Vacation Work

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|-----------|--------|--------|--------|
| English | Fluent | Fluent | Fluent |
| Afrikaans | Fluent | Fluent | Fluent |

Key Experience

Merchandt joined SiVEST as a student Civil Engineering Technician in 2004 to which he received a company bursary to complete his studies and join the company permanently thereafter. Since joining permanently he has been actively involved in numerous township projects and associated infrastructure projects.

Experience covers:-

- Bulk Services Studies,
- Feasibility Studies,
- Service Reports,

CURRICULUM VITAE

Merchandt Le Maitre

- Infrastructure Design,
- Contract Documentation & Procurement,
- Contract Administration,
- Procurement and Construction Monitoring.

A summary of the experience in each field is indicated below.

Roads & Stormwater

- Design, Implement & Contract Administration of Provincial Road Intersections (Class 2 Roads)
- Design, Implement & Contract Administration of Municipal Roads (Class 3-5 Roads)
- Design, Implement & Contract Administration of Residential & Industrial Township services
- Design, Implement & Contract Administration of Bulk Stormwater Infrastructure
- Floodline determination & stormwater assessments

Hydrology

- Draughting and compiling of Attenuation Reports
- Flood Inundation Assessments / Floodline Reports
- Stormwater Management Reports
- Stormwater Assessments / Investigations

Water & Sanitation

- Design, Implement & Contract Administration of Water supply lines including Bulk Water
- Design, Implement & Contract Administration of Water pump stations
- Design, Implement & Contract Administration of Sanitation networks including Outfall Sewers
- Design, Implement & Contract Administration of Sewer pump stations

Projects Experience

May 2004 – to date

- Tijger Valley Extension 10, 20, 21, 22, 23, 27, 38-44, 72, 105-113, 19, 62, 103, 104, 34, 35, 36, 123 etc. - Design, Procurement, Contract Administration and Monitoring.
- Derdepoort Extension 181- Design, Procurement, Contract Administration and Monitoring.
- Project Springbok, Sasolburg - Design, Procurement, Contract Administration and Monitoring.
- Arcadia Extension 11 - Design, Procurement, Contract Administration and Monitoring.
- Lakeside Erf 181- Design, Procurement, Contract Administration and Monitoring.
- Longmeadow Extension 10, 11 & 12 - Design, Procurement, Contract Administration and Monitoring.
- Bushwillow Estate - Design, Procurement, Contract Administration and Monitoring.
- Forum Homini – Draughting Monitoring of Dam Spillway construction & sewer reticulation.
- Longmeadow Extension 7, 8, 9, 10, 11, 12 – Township services and design of earth retaining wall.
- Lakeside Erf 181 – Design and supervision of Township Services including Attenuation facilities.
- Mbabane Kingdom Hall – Bulk earthworks and road Design, Procurement, Contract Administration and Monitoring.
- Irene Mall Township – Design of Township Services and Stormwater Management.
- Mitsubishi McCarthy Midrand – Design and compilation of Stormwater Management report.
- Longmeadow Extension 10 (Pick & Pay) – Design and compilation of Stormwater Management report.
- Erf 4173 Peter Place – Floodline Determination.
- Mungwini Bulk Water – Draughting and supervision of a Steel Bulk Water Supply Pipe.
- Mooikloof Booster Station – Design and supervision of a water booster pump facility..
- Chartwell Floodline – Floodline Determination.
- PTN 2 of 148 Athol – Compiling and analysis Stormwater Assessment.
- Hyde Close Floodline – Floodline Determination.
- Brikor – Design of New Intersection.

CURRICULUM VITAE

Merchandt Le Maitre

- Mooibosch Development – Compiling of Services reports and Floodline Determination.
- Erf 4173 Peter Place – Floodline Determination.
- Ha eldean Extension 39 – Design and supervision of Township Services.
- PTN 35 Houtkoppen – Floodline Determination.
- Ha eldean Retirement – Design of Township Services.
- Erf 90 Douglasdale – Floodline Determination.
- ungwini Collector Sewer – Design of Collector Sewer.
- Maroeladal Extension 9 – Design and compilation of Services Report.
- Ha eldean Oukraal – Design of Township Services.
- Lot 204 Edenburg – Floodline Determination.
- Ha eldean Business Park – Design and compilation of Services Reports.
- Erf 181 Derdepoort – Design and compilation of Services Reports and preliminary design of Provincial Intersection.
- Erf 92 Edenburg – Floodline Determination and design and compilation of the Services reports.
- New ealand Embassy – Design of Intersection.
- Longmeadow Extension 12 Stormwater – Design of Stormwater Reticulation.
- Isago N12 – Floodline Determination.
- Innoland – Floodline Determination.
- Astral Foods - Design, Procurement, Contract Administration and Monitoring of civil services.

ROADS & INTERSECTION DESIGN

- D631 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- D36 Intersection & Road Widening - Design, Wayleave Approval, Procurement.
- 34 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- 101 Intersection – Design, Wayleave Approval.
- Justice Mahomed, University, Walton Jameson Rd Intersection – Design, Wayleave Approval.
- Cedar Road West – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- Brikor – Design of New Intersection.

Hydrology and Stormwater

- Ha eldean Floodline - Data collection, Flood determination and compilation.
- Gautrain Railway Stormwater Management – Design and compile stormwater management and attenuation facilities.
- Stormwater Modelling for Project Springbok – Attenuation of hazardous material in stormwater system.
- Sappi Ngodwana Floodline – Data collection, Flood determination and compilation. This floodline included cognisance of the Ngodwana dam.
- Irene Mall Stormwater Management - Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Loftus Park Stormwater Management – Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Pienaars River Floodline Modelling – Modelling of the river through two future Class 1 & 3 road bridge structures.
- Renewable Energy Stormwater Management – A number of Management Plans for the Renewable Energy sector has been completed.

Water Transfer / Reticulation and Sanitation Collectors / Outfalls

- Bojanala Platinum District Municipality – Water & Sanitation Bulk Master Planning.
- Ha eldean Development – Bulk Water Supply & Collector Sewer Design, Procurement, Contract Administration and Monitoring.
- Mamba ingdom – Bulk Water Analysis.

- Lesedi Local Municipality Bulk Water - Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.

Other

- Project Springbok – Design of Services and Railway Siding.
- Phalaborwa Mining Company – Preliminary Design of Bulk Water feed and Railway Line.
- Kansanshi Copper Mine, Zambia – Junior Site Foreman.
- Final Design for Sasol Secunda.
- NDT testing – MMC Nelspruit, Global Forest Products Sabie.
- Boiler inspections and preliminary design – MMC Nelspruit, Global Forest Products, TSB Malelane.

Computer Skills

- AutoCAD Civil 3D
- AutoCAD Storm and Sanitary Analysis
- Microsoft Office
- Microsoft Project
- TechnoCAD
 - Surfmate
 - Roadmate
 - Pipemate
 - Watermate
- AutoTURN (Vehicle Turning Simulation Software)
- RiverCAD
- HecRAS
 - 1D Flood Modelling
 - 2D Flood Modelling

Name Hlengiwe Innocentia Ntuli

Profession PPP Support and Administrator

Name of Firm SiVEST SA (PTY) LTD

Present Appointment Projects Secretary /
Support and PPP Administrator

Years with Firm 6 Years

Date of Birth 27 September 1989

ID Number 890927 02300 83

Nationality South African



Education

Minerva High School (2002 - 2006)
College Campus (2007-2009)

Professional Qualifications

Certificate in Contact Centre Support N F2 (2010)
Diploma in IT Programming (2007 – 2009)

Employment Record

from 2012 – to date SiVEST SA (Pty) Ltd: Divisional Secretary / PPP Support and Administrator

May 2009 – May 2012 DSG (PTY) LTD: Contact Centre Agent

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|----------|--------|--------|--------|
| Isi ulu | Fluent | Fluent | Fluent |
| English | Fluent | Fluent | Fluent |

Key Experience

Hlengiwe joined SiVEST in 2012 and holds the position of Projects Secretary in the Johannesburg Office of SiVEST and assists in the general day to day administration of the organisation.

She has taken on the role of public participation process administrator which includes maintaining project database, arranging and coordinating public meetings as well as following up with organs of states to get comments on projects.

Administrative Experience

Administrative responsibilities include:

- PPP Administration and use of Maximiser
- Filing electronically and paper copies
- Faxing, scanning, emailing, phoning, printing and typing
- Collecting of HR documents (timesheets, leave forms, expense, travel)
- Reception and switchboard reliever
- Document distribution

- Travel arrangements
- Purchasing and outsourcing

Project Experience

- Public Participation Process for the Proposed Construction of the Graskoppies On-site Eskom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Public Participation Process for the Proposed Construction of the Hartebeest Leegte On-site Eskom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Public Participation Process for the Proposed Construction of the Ithemba On-site Eskom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Public Participation Process for the Proposed Construction of the ha Boom On-site Eskom Substation, Linking Substation and Associated 132kV Power Line near Loeriesfontein, Northern Cape Province.
- Public Participation Process for the Proposed Refurbishment of the Swartberg Repeater Road near Ladysmith, Western Cape Province
- Basic Assessment (BA) for Proposed Refurbishment of the Swartberg Repeater Road near Ladysmith, Western Cape Province

Name erry Lianne Schwart

Profession GIS Specialist

Name of Firm SiVEST SA (Pty) Ltd

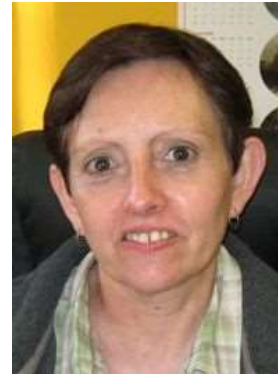
Present Appointment Senior GIS Consultant:
Environmental Division

Years with Firm 30 Years

Date of Birth 21 October 1960

ID No. 6010210231083

Nationality South African



Professional Qualifications

BA (Geography), University of Leeds 1982

Membership to Professional Societies

South African Geomatics Council – GTc GISc 1187

Employment Record

1994 – Present SiVEST SA (Pty) Ltd - Environmental Division: GIS/Database Specialist.
1988 - 1994 SiVEST (formerly Scott Wilson Kirkpatrick): Town Planning Technician.
1984 – 1988 Development and Services Board, Pietermaritzburg: Town Planning Technician.

Language Proficiency

| LANGUAGE | SPEAK | READ | WRITE |
|----------|--------|--------|--------|
| English | Fluent | Fluent | Fluent |

Key Experience

erry is a GIS specialist with more than 20 years' experience in the application of GIS technology in various environmental, regional planning and infrastructural projects undertaken by SiVEST.

Kerry's GIS skills have been extensively utilised in projects throughout South Africa in other Southern African Countries. These projects have involved a range of GIS work, including:

- Design, compilation and management of a demographic, socio-economic, land use, environmental and infrastructural databases.
- Collection, collation and integration of data from a variety of sources for use on specific projects.
- Manipulation and interpretation of both spatial and alphanumeric data to provide meaningful inputs for a variety of projects.
- Production of thematic maps and graphics.
- Spatial analysis and 3D modelling, including visual and landscape assessments.

Projects Experience

STRATEGIC PLANNING PROJECTS

Provision of database, analysis and GIS mapping support for the following:

- Water Plan 2025: Socio-economic, Land Use and Demographic Update – Umgeni Water (wa ulu-Natal).
- Eskom Strategic Plan – Eskom (wa ulu-Natal).
- Umgeni Water Quality Management Plan – Department of Water Affairs and Umgeni Water (wa ulu-Natal).
- wa ulu-Natal Development Perspective – Department of Economic Affairs (wa ulu-Natal).
- Indlovu Regional Integrated Plan – Department of Local Government and Housing (wa ulu-Natal).
- Umgeni Water and Sanitation Needs Analysis – Umgeni Water (wa ulu-Natal).
- Metro Waste Water Management Plan – Durban Waste Water management, City of Durban (wa ulu-Natal).
- wa ulu-Natal Electrification Prioritisation Model – Eskom (wa ulu-Natal).
- Uminyathi Regional Development Plan – Uminyathi Regional Council (wa ulu-Natal).
- GIS driven model to assess future population growth in quaternary catchments under different growth scenarios – Umgeni Water (wa ulu-Natal).
- Ubombo Master Water Plan Study – Mhlathu e Water Board (wa ulu-Natal).
- Development strategy for local economic development and social reconstruction of the Germiston-Daveyton Activity Corridor – Eastern Gauteng Services Council (Gauteng).
- Land identification study for low cost housing in the Indlovu Region – Indlovu Regional Council (wa ulu-Natal).
- Local Development Plan for Manini – Manini Town Council (Swa iland).
- Database development for socio-economic and health indicators arising from Social Impact Assessments conducted for the Lesotho Highlands Development Association – Lesotho.
- Development Plan for the adjacent towns of Masane and Mafungula - Ministry of Local Government, Land and Housing (Botswana).
- Development Plan for the rural village of Hukuntsi - Ministry of Local Government, Land and Housing (Botswana).
- Integrated Development Plans for various District and Local Municipalities including:
 - Nquthu Local Municipality (wa ulu-Natal)
 - Newcastle Local Municipality (wa ulu-Natal)
 - Amajuba District Municipality (wa ulu-Natal)
 - Mthatha Local Municipality (wa ulu-Natal)
 - Umhlabuyalingana Local Municipality (wa ulu-Natal)
- uMhlathu e Rural Development Initiative – uMhlathu e Local Municipality (wa ulu-Natal).
- Rural roads identification – uMhlathu e Local Municipality (wa ulu-Natal).
- Mapungubwe Tourism Initiative – Development Bank (Limpopo Province).
- Northern Cape Tourism Master Plan – Department of Economic Affairs and Tourism (Northern Cape Province).
- Spatial Development Framework for Gert Sibande District Municipality (Mpumalanga) in conjunction with more detailed spatial development frameworks for the 7 Local Municipalities in the District, namely:
 - Albert Luthuli Local Municipality
 - Msukaligwa Local Municipality
 - Mkhondo Local Municipality

- Pixley ka Seme Local Municipality
- Dipaleseng Local Municipality
- Govan Mbeki Local Municipality
- Lekwa Local Municipality
- Land Use Management Plans/Systems (LUMS) for various Local Municipalities including:
 - Nkandla Local Municipality (wa ulu-Natal)
 - Hlabisa Local Municipality (wa ulu-Natal)
 - uPhongolo Local Municipality (wa ulu-Natal)
 - uMshwathi Local Municipality
- Spatial Development Framework for uMhlathu e Local Municipality (wa ulu-Natal).
- Spatial Development Framework for Greater Clarens – Maloti-Drakensberg Transfrontier Park (Free State).
- Land use study for the Johannesburg Inner City Summit and Charter – City of Johannesburg (Gauteng).
- Port of Richards Bay Due Diligence Investigation – Transnet
- oini Sustainable Development Plan – oini Local Municipality (wa ulu-Natal)
- Spatial Development Framework for Umhlabuyalingana Local Municipality (wa ulu-Natal)

BUILT INFRASTRUCTURE

- EIA and EMP for a 9km railway line and water pipeline for manganese mine – alagadi Manganese (Northern Cape Province).
- EIA and EMP for 5x 440kV Transmission Lines between Thyspunt (proposed nuclear power station site) and several substations in the Port Elizabeth area – Eskom (Eastern Cape Province).
- Initial Scoping for the proposed 750km multi petroleum products pipeline from Durban to Gauteng/Mpumalanga – Transnet Pipelines.
- Detailed EIA for multi petroleum products pipeline from Wendall Waltloo, and from Ameson Park to Langlaagte Tanks farms –Transnet Pipelines.
- Environmental Management Plan for copper and cobalt mine (Democratic Republic of Congo).
- EIA and Agricultural Feasibility study for Miwani Sugar Mill (enya).
- EIAs for Concentrated Solar and Photovoltaic power plants and associated infrastructure (Northern Cape, Free State, Limpopo and North West Province).
- EIAs for Wind Farms and associated infrastructure (Northern Cape and Western Cape).
- Basic Assessments for 132kV Distribution Lines (Free State, wa ulu-Natal, Mpumalanga and North West Province).
- Environmental Assessment for the proposed Moloto Development Corridor (Limpopo).
- Environmental Advisory Services for the Gauteng Rapid Rail Extensions Feasibility Project.
- Environmental Screening for the Strategic Logistics and Industrial Corridor Plan for Strategic Infrastructure Project 2, Durban-Free State-Gauteng Development Region.

STATE OF THE ENVIRONMENT REPORTING

- 2008 State of the Environment Report for City of Johannesburg.
- Biodiversity Assessment – City of Johannesburg.

STRATEGIC ENVIRONMENTAL ASSESSMENTS AND ENVIRONMENTAL MANAGEMENT FRAMEWORKS

- SEA for Greater Clarens – Maloti-Drakensberg Transfrontier Park (Free State).

- SEA for the Marula Region of the Kruger National Park, SANParks.
- SEA for Thanda Private Game Reserve (wa ulu-Natal).
- SEA for waDuku a Local Municipality (wa ulu-Natal).
- EMF for proposed Renishaw Estate (wa ulu-Natal).
- EMF for Mogale City Local Municipality, Mogale City Local Municipality (Gauteng).
- SEA for Molemole Local Municipality, Capricorn District Municipality (Limpopo).
- SEA for Blouberg Local Municipality, Capricorn District Municipality (Limpopo).
- SEA for the Bishopstowe study area in the Msundu i Local Municipality (wa ulu-Natal).

WETLAND STUDIES

- Rehabilitation Planning for the Upper Olifant River and Olifantspruit Catchments, City of Johannesburg (Gauteng).
- Wetland assessments for various Concentrated Solar and Photovoltaic power plants and associated infrastructure (Limpopo, Northern Cape, North West Province and Western Cape).
- Wetland assessments for Wind Farms and associated infrastructure (Northern Cape and Western Cape).
- Wetland assessments for various 132kV Distribution Lines (Free State, wa ulu-Natal, Mpumalanga and North West Province).

VISUAL IMPACT ASSESSMENTS

- VIA for the Thyspunt Transmission Lines Integration Project (Eastern Cape).
- VIA s for various Solar Power Plants and associated grid connection infrastructure (Northern Cape, Free State, Limpopo and North West Province).
- VIAs for various Wind Farms and associated grid connection infrastructure (Northern Cape and Western Cape), the most recent projects including:
 - Graskoppies, Hartebeest Leegte, Ithemba and wa Boom Wind Farms near Loeriesfontein (Northern Cape);
 - Duruman 1 and 2 WEFs near Duruman (Northern Cape);
 - San raal and Phe ukomoya WEFs near Noupoort (Northern Cape);
 - Paulputs WEF near Pofadder (Northern Cape)
 - duusberg WEF near Matjiesfontein (Western Cape);
 - Tooverberg WEF, near Touws River (Western Cape);
 - Rondekop WEF, near Sutherland (Northern Cape).
- VIAs for various 132kV Distribution Lines (Free State, wa ulu-Natal, Mpumalanga and North West Province).
- VIA for the proposed Rorqual Estate Development near Park Rynie on the South-Coast of wa ulu-Natal Province.
- VIA for the proposed Assagay Valley Mixed Use Development (wa ulu-Natal).
- VIA for the proposed Passier Road North Mixed Use Development (wa ulu-Natal).
- VIA for the proposed Tinley Manor South Banks Development (wa ulu-Natal).
- VIA for the proposed Tinley Manor South Banks Beach Enhancement Solution, (wa ulu-Natal).
- VIAs for the proposed Mlon i Hotel and Golf Estate Development (Eastern Cape Province).
- Visual sensitivity mapping exercise for the proposed Mogale's Gate Lodge Expansion (Gauteng).
- Analysis phase visual assessment for the proposed Renishaw Estate Environmental Management Framework in the Scottburgh Area (wa ulu-Natal).
- Landscape Character Assessment for Mogale City Environmental Management Framework (Gauteng).



Dr Bruce Scott-Shaw
Hydrologist



Carter High School
Pietermaritzburg, South Africa



The University of KwaZulu-Natal
Pietermaritzburg, South Africa
BSc, BSc Honours, MSc, PhD Hydrology

REFERENCES

Prof. Roland Schulze
Emeritus Professor
Phone: +2782 5727 937
E-mail: SchulzeR@ukzn.ac.za

Prof. Colin Everson
Professor
Phone: +2783 320 9570
E-mail: eversonc@ukzn.ac.za

Nick Davis
Hydrologist/Director (Isikhungusethu Environmental Services)
Phone: +27 79 490 6963
Email: nick@isik.co.za

CONTACT INFORMATION

Phone: +2778 3999 139
E-mail: bruce@naturestamp.com
Linkedin: www.linkedin.com/in/bruce-scott-shaw-58b20231
Address: 22 Hilton Ave, Hilton, 3245, South Africa

ABOUT ME

I am an experienced, motivated and dynamic hydrologist, with a passion for sustainable land-use management and global change issues. Throughout my academic and consulting career I have mastered numerous models and tools relating to hydrology, soil science and GIS. Some of these include ACRU, SWAT, HEC-RAS, ArcGIS, Idrisi, SEBAL, MatLab and Loggernet. I have basic programming skills on the Java and CR Basic platforms. I have vast experience in hydro-meteorological monitoring, including automatic weather stations, eddy covariance, heat pulse velocity, flow and ecological monitoring.

I completed my MSc under Prof Roland Schulze where I developed an agro-hydrological grassland biomass model for applications in management and climate change studies. Subsequently I completed my PhD at the School of Bioresources Engineering and Environmental Hydrology (BEEH) which focused on quantifying the water-use of alien invaded riparian forests and catchments for rehabilitation programmes. I have presented my research around the world, where I have gained a wide network of academic contacts and experience.

As a consultant, I am the director and principal hydrologist of NatureStamp (PTY) Ltd. In this capacity I undertake flood studies, calculate hydrological flows, perform general hydrological modelling, stormwater design, dam designs, wetland assessments, water quality assessments, groundwater studies and soil surveys.

I am affiliated to the University of KwaZulu-Natal where I am a part-time lecturer for undergraduate hydrology and dam design. I am also a post-doctoral student where I run and calibrate soil erosion models.


SKILLS

| | | |
|-------------------------------------|--------------------------------|---------------------------------------|
| Hydrological Modelling ● ● ● ● ● | GIS ● ● ● ● ● | General Computing Skills ● ● ● ● ● |
| MS Office ● ● ● ● ● | Field Assessments ● ● ● ● ● | Soil Surveys ● ● ● ● ● |
| Communication Skills ● ● ● ● ● | Networking ● ● ● ● ● | Scientific Writing ● ● ● ● ● |


WORK EXPERIENCE



Director March 2015 – Present
NatureStamp (PTY) Ltd.
Environmental consulting company, offering a range of services to promote sound natural resource management. We are a team of qualified, experienced and dedicated people, who take pride in producing a high quality of work and providing a personalized, professional service.



Hydrology Lecturer January 2016 – Present
University of KwaZulu-Natal
Part-time lecturer for Hydrology modules. This includes dam design, hydrology basics and modelling. I also run a Soil Water Assessment Toll (SWAT) workshop through ArcGIS to provide students with the skills to run the model for their research purposes.



Post-doctoral Researcher June 2018 – Present
University of KwaZulu-Natal
Assess the impact of erosion and sediment yield from different land uses in farming and forestry systems and their effect on water resources in selected catchments of South Africa. This is done by measuring and modelling soil erosion losses under different land uses and management practices.

PUBLICATIONS

1. Paper for the 14th SANCHIAS symposium, 2009. Development and Verification of a Dynamic Grassland Biomass Model for Agrohydrological Applications under Different Scenarios of Climate and Management. B.C. Scott-Shaw and R.E. Schulze.
2. Water-Use Dynamics of a Peat Swamp Forest and a Dune Forest in Maputaland, South Africa. A.D. Clulow, C.S. Everson, J.S. Price, G.P.W. Jewitt, and B.C. Scott-Shaw. *Hydrol. Earth Syst. Sci.* -2013-31.
3. Use of an Agrohydrological Model for Applications in Management Studies Related to Tall and Short Grassveld in South Africa. B.C. Scott-Shaw and R.E. Schulze (In Press).
4. Water-Use Dynamics of An Alien Invaded Riparian Forest Within the Mediterranean Climate Zone of the Western Cape, South Africa, *Hydrol. Earth Syst. Sci.*, 21, 4551–4562, 2017. Scott-Shaw, B.C., Everson, C. S., and Clulow, A. D.
5. Handbook on Adaptation to Climate Change for Farmers, Officials and Others in the Agriculture Sector of South Africa (Released 2018): Short and Tall Natural Grasslands in South Africa and Climate Change. B.C. Scott-Shaw and R. E. Schulze.
6. Water-use dynamics of an alien invaded riparian forest within the summer rainfall zone of South Africa. *Hydrol. Earth Syst. Sci., Discussion*, 2018. Scott-Shaw, B.C., Everson, C. S.
7. Rehabilitation of alien invaded riparian zones and catchments using indigenous trees: an assessment of indigenous tree water-use. Scott-Shaw B.C, Everson C.S, Geldenhuys C.J, Starke, A, Atsame-Edda A, Schutte S, R, Mupemba Mwamba. Water Research Commission Report K5/2081. 2016.
8. Water-efficient production methods and systems in agroforestry, woodlands and forestry plantations. Everson C.S, Scott-Shaw B.C, Kelbe, B.E, Starke, A, Pearton T, Geldenhuys, C, Vather, T, Maguire, M. Water Research Commission Report K5/2554. 2018.
9. Assessing the impact of erosion and sediment yield from different land uses in farming and forestry systems and their effect on water resources in selected catchments of South Africa. This is done by measuring and modelling soil erosion losses under different land uses and management practices. Hill, T.R, Scott-Shaw B.C, Gillham, J.S, Dickey, M, Duncan, G.E, Everson, C.S, Everson, T.M, Zuma, K, Birkett, C.K. Water Research Commission Report K5/2402. 2019.
10. Assessment of soil erosion under rainfed sugarcane in KwaZulu-Natal, South Africa" by Abdalla, Khatab; Dickey, Matthew; Hill, Trevor; Scott-Shaw, Bruce. *Natural Resources Forum*. Under Review.

Research and Training

- o Hydro-pedological characterization of degraded soils with the Institute de recherche pour le developement (IRD)
- o Advanced international training programme on Climate Change: Mitigation and Adaptation in Norrkoping, Sweden at the Swedish Meteorological and Hydrological Institute (SMHI)
- o Advanced international training programme on Climate Change: Mitigation and Adaptation in Kasane, Botswana. Regional follow up course. Swedish Meteorological and Hydrological Institute (SMHI)
- o Advanced MatLab @ course: Model building, inference and hypothesis testing in hydrology. Gabriel Lippmann, Luxembourg. April 2013.
- o Advanced training course on Eddy Covariance. Mike Savage, Pietermaritzburg, 2018.
- o Advanced training course on Surface Renewal. Mike Savage, Pietermaritzburg, 2018.
- o Environmental Law training: 2014 E+EIA Regulations in Context. Shepstone & Wylie, Umhlanga. 2016.
- o KZN Wetlands Forum Buffers workshop. Umngeni Valley, September, 2014.

Presentations/Showcase/Awards

- o European Science Foundation (Amsterdam, 2010),
- o COP17 (Durban, 2011),
- o World Water Forum (Marseille, 2012),
- o MatLab advanced modelling (Luxembourg, 2013),
- o World Water Week (Singapore, 2014),
- o Forests & Water, British Colombia, (Canada, 2015),
- o World Forestry Congress (Durban, 2015),
- o Society for Ecological Restoration (Brazil, 2017).
- o Conservation Symposium (Howick, South Africa, 2018)
- o Roland Schulze award for the top third year hydrology student.
- o Golden Key award for obtaining marks in the top 15 % of the University of KwaZulu-Natal.
- o NRF scholarship for being a top achiever.

Personal Information

| | |
|----------------|--|
| Date of Birth | 7th January 1986 |
| Place of Birth | Pietermaritzburg, South Africa |
| Citizenship | South African, UK Ancestry, Italian citizen pending (through marriage) |
| Language | English |
| Sex | Male |
| Marital Status | Married |
| Children | Two |
| Hobbies | All sports & outdoors, tree species, geology |

CURRICULUM VITAE

Liandra Scott-Shaw

| | |
|----------------------------|----------------------------------|
| Name | Liandra Scott-Shaw (ne Bertolli) |
| Profession | Environmental Scientist |
| Name of Firm | SiVEST SA (Pty) Ltd |
| Present Appointment | Environmental Consultant |
| Years with Firm | 5 Years |
| Date of Birth | 08 March 1986 |
| Nationality | South African |
| ID No. | 8603080022083 |



Education

Matric Exemption (Natal Education Department) Durban Girls High School (2002-2003)

Professional Qualifications

Bachelor of Science (Biological Science): University of wa ulu-Natal, 2008
 Bachelor of Science (Honours) Ecological Science: University of wa ulu-Natal, 2009

Membership to Professional Societies

- South African Council for Natural Scientific Professions (SACNASP) Pr.Sci.Nat. No. 117442
- Royal Society of South Africa
- International Association for Impact Assessment South Africa (IAIASa)
- Society for Ecological Restoration

Years of Experience

6 Years

Employment Record

| | |
|---------------------|--|
| an 2014 - date | SiVEST SA (PTY) LTD – Environmental Division: Environmental Consultant |
| un 2013 - Dec 2013 | ECO-PULSE Environmental Consulting Services - Internship |
| an 2010 - an 2013 | University of the North West (Diatom collection, process and analysis) |
| an 2012 - Dec 2012 | ohn Bews Herbarium, (Geo referencing specimen) |
| Feb 2006 - une 2013 | University of wa ulu-Natal (Laboratory and field assistant for the School of Biological and Conservation Science, Demonstrating and Lecturing in Biology and Biogeography) |

Language Proficiency

CURRICULUM VITAE

Liandra Scott-Shaw

| LANGUAGE | SPEAK | READ | WRITE |
|-----------|--------|--------|--------|
| English | Fluent | Fluent | Fluent |
| Afrikaans | Basic | Basic | Basic |

Key Experience

Liandra joined SiVEST in January 2014 in her capacity as an Environmental Consultant.

Liandra has completed a Bachelor of Science Degree in Biological Science (University of Waikato, PMB), a Bachelor of Science (Honours) in Ecological Science (University of Waikato, PMB) and is completing her Master of Science Degree in Environmental Science (University of Waikato, PMB), of which the focus is on Diatoms as indicators of wetland water quality in the Waikato Midlands.

Liandra has been involved in consulting since 2013, which included biodiversity assessments and analyses as well as report writing. Prior to that, Liandra had been involved in academic research and demonstrating/lecturing since 2008.

Liandra's expertise and knowledge areas involve:

- Plant biodiversity assessments
- Alien plant identification/management
- Diatom diversity assessments
- Field identification
- Taxonomical background
- Report writing
- NEMA and NEM:BA regulations and policies

Projects Experience

VELD CONDITION ASSESSMENTS

- eThekweni Sandstone Grasslands Annual Veld Condition Assessments and Carry capacity estimates.
- Kruger National Park Annual Veld Condition Assessments and Carry capacity estimates.
- Mbulu i Game Reserve Annual Veld Condition Assessments and Carry capacity estimates.
- Mokolo Game Reserve Annual Veld Condition Assessments and Carry capacity estimates.
- Zululand Rhino Reserve Annual Veld Condition Assessments and Carry capacity estimates.
- Mount Verde Veld Condition Assessments.

VEGETATION ASSESSMENTS, REHABILITATION PLANS AND PERMIT APPLICATIONS

- Eshowe SSA1 Pipeline Project
- Bishopstowe Development Area
- Dube TradePort State of Environment Report
- Transnet Richards Bay Port Development Vegetation Assessment
- Transnet South Dune Vegetation Assessment
- Umsundu i Greater Edendale Environmental Management Framework
- Sumitomo Rubber Manufacturing Plant Vegetation Assessments, Alien Plant Management Plan and Plant Permits
- Umgeni Water Darvill Constructed Wetland Vegetation Assessment
- P75-2 Road Upgrade Vegetation Assessment
- Masinege Sewer Line Vegetation Permits
- Tongaat Hulett Cornubia North Development Vegetation Assessment
- Tongaat Hulett Lindokuhle Housing Development Vegetation Assessment

CURRICULUM VITAE

Liandra Scott-Shaw

- Tongaat Hulett Simhlangentsha Pipeline Vegetation Assessment
- Tongaat Hulett Dudley Pringle Development Vegetation Assessment
- Tongaat Hulett Maidstone Mill Development Vegetation Assessment
- Arcelor Mittal Newcastle Works Alien Plant Management Plan
- Umgeni Water Umshawathi Pipeline Vegetation Assessment
- ACSA GCS Diatom Sampling
- Mandeni Cemetery Vegetation Assessment
- Fountain Hill Development Vegetation Assessment
- Salt Rock Development Vegetation Assessment
- Colenso Coal Project
- Strode Property Development Vegetation Assessment
- Tongaat Hulett Tinley Manor South Wetland Assessment (vegetation)
- Tongaat Hulett Tinley Manor North Wetland Assessment (vegetation)
- Umgeni Water South Coast Pipeline Vegetation Assessment, Plant Permits
- Swayimane Bulk Water Pipeline
- Westbrook Club Development Vegetation Assessment
- Eskom Candover – Mba wana Vegetation Assessment and Plant Permits
- Eskom Eshowe Electrification Vegetation Assessment and Plant permits
- Eskom Empangeni Electrification Vegetation Assessment and Plant permits
- Eskom o ini Electrification Vegetation Assessment and Plant permits
- Eskom Electrification Vegetation Assessment and Plant permits
- Eskom Nsele Godi Electrification Vegetation Assessment and Plant permits
- Eskom Makhatini Electrification Vegetation Assessment and Plant permits
- Eskom Esicaba eni Electrification Vegetation Assessment and Plant permits
- Ethekewini Hammarsdale Electrification Vegetation Assessment
- Shemula Pipeline Vegetation Assessment and Plant permits
- E akheni Housing Vegetation Assessment
- Ashton College Vegetation Assessment
- eThekewini Metropolitan Marianridge Housing Development Vegetation Assessment
- Edendale Town Centre Development Vegetation Assessment
- N2 Pongola Ecological Studies Vegetation Assessment
- Sani Pass Hotel Upgrades Vegetation Assessment
- Eskom Lake Eland Vegetation Assessment and Plant permits
- Eskom Phungashe Phase 3 Vegetation Assessment and Plant permits
- Eskom Bhanbanani Vegetation Assessment and Plant permits
- Eskom Sundu a Vegetation Assessment and Plant permits
- Eskom TC umalo Vegetation Assessment and Plant permits
- Eskom Cwakeme Vegetation Assessment and Plant permits
- Eskom Mambane Vegetation Assessment and Plant permits
- Eskom Nkangala Vegetation Assessment and Plant permits
- Eskom Estcourt Permits Vegetation Assessment and Plant permits
- Eskom Emahusheni Permits Vegetation Assessment and Plant permits
- Eskom Mamfene Permits Vegetation Assessment and Plant permits
- Eskom wabe Permits Vegetation Assessment and Plant permits
- Eskom BA humalo Permits Vegetation Assessment and Plant permits
- Eskom ululand Melmoth Vegetation Assessment and Plant permits
- Eskom Muller Helgardt Permits Vegetation Assessment and Plant permits
- Eskom ama ama Permits Vegetation Assessment and Plant permits
- World Tomorrow Fund South Bank Permits Vegetation Assessment and Plant permits

ENVIROMENTAL CONTROL OFFICER

- Eskom Candover-Mba wana Powerline
- Lombardskop Pipeline

- imbali Lakes Golf Course
- Fitty Park Water Pipeline
- Driefontein Phase 1 Water Pipeline
- Middledrift SSA5 Water Pipeline
- Lower Tugela Bulk Water Off-take 12
- Lower Tugela Bulk Water Off-take 10
- Lower Tugela Bulk Water Off-take 1
- Lower Tugela Bulk Water Off-take 11
- Mpumulanga Unit G Development
- Maphumulo (Invutshane Dam) Phase 2 Pipeline

BASIC ASSESSMENTS / ENVIRONMENTAL IMPACT ASSESSMENTS

- La Mercy Integrated Human Settlement Development
- Waterval Prison Upgrade Project
- Greater okstad Bulk Raw Water Upgrade Project
- Dube TradePort Agriculture 2
- D1562 Road Upgrade BA
- Mthandeni Irrigation Extension Project
- Shemula Bulk Raw Water Phases 2 - 6 BA
- I inga Phase 3 BA
- imbali Estate Properties BA
- Cornubia Portion 14 Petrol Filling Station
- South Coast Pipeline BA
- Swayimane Bulk Water BA
- Mswhathi Pipeline (Amendment)
- Compensation Organic Waste Facility
- Sumitomo Rubber Manufacturing Plant
- Darvill Constructed Wetland
- Dube Tradeport Agriculture 2
- Rondekop WEF

ENVIRONMENTAL MANAGEMENT FRAMEWORK AND MAINTENANCE MANAGEMENT PLAN

- Greater Edendale Area
- Phinda Private Game Reserve Maintenance Management Plan

Academic contributions

Lang P, Taylor , Bertolli L, Lowe S, Dallas H, ennedy MP, Gibbins C, Sichingabula H, Saili, Day , Willems F, Briggs A and Murphy 2013. Proposed procedure for the sampling, preparation and analysis of benthic diatoms from ambian rivers: a bioassessment and decision support tool applicable to freshwater ecoregions in tropical southern Africa. Africa, Caribbean, Pacific- European Union Project Report.

Martins S, ennedy M, Lowe S, Lang P, Briggs , Dallas H, Taylor , Bertolli L, Gibbins C, Soulsby C, Day , Sichingabula H, Saili H, apungwe E, Willems F, Mbulwe F, Murphy . 2013. SAFRASS Methodology Manual.

Shrader AM, Bell C, Bertolli L and Ward D 2012. Forest or the trees: at what scale do elephants make foraging decisions Acta Oecologica 42: 3-10.

Lang P, Taylor , Bertolli L, 2012. River diatom biodiversity assessments in ambian rivers: a SAFRASS conservation perspective. European Congress of Conservation Biology, Glasgow.

Martins S, ennedy M, Lowe S, Lang P, Briggs , Dallas H, Taylor , Bertolli L, Gibbins C, Soulsby C, Day , Sichingabula H, Saili H, apungwe E, Willems F, Mbulwe F, Murphy . 2012. SAFRASS Photographic guide to the Aquatic Macroinvertebrates of ambia. European Union Project Report.

Martins S, ennedy M, Lowe S, Lang P, Briggs , Dallas H, Taylor , Bertolli L, Gibbins C, Soulsby C, Day , Sichingabula H, Saili H, apungwe E, Willems F, Mbulwe F, Murphy . 2012. SAFRASS Guide to Common Diatoms. European Union Project Report.

Martins S, ennedy M, Lowe S, Lang P, Briggs , Dallas H, Taylor , Bertolli L, Gibbins C, Soulsby C, Day , Sichingabula H, Saili H, apungwe E, Willems F, Mbulwe F, Murphy . 2012. SAFRASS Macrophyte Identification Manual.

Conferences and workshops

SAFRASS Diatom Genera Guide Workshop 2013

Programa de Avaliação de Rios no Sul de África (SAFRASS): estabelecimento de uma estrutura de investigação na construção de capacidade para promoção da saúde e biodiversidade dos rios africanos.

Martins S, ennedy M, Lowe S, Lang P, Briggs , Dallas H, Taylor , Bertolli L, Gibbins C, Soulsby C, Day , Sichingabula H, Saili H, apungwe E, Willems F, Mbulwe F, Murphy . *14th Congr. Bras. Limnol., Bonito, Brasil*, Sept. 2013

SAFRASS biomonitoring scheme: general aspects, macrophytes (MTR) and benthic macroinvertebrates (ISS) protocols 2013

SAFRASS Training Introduction May 2012: Helen Dallas

SAFRASS Decision Support Scheme (DSS) to assist the use of river health biomonitoring protocols in ambia: general aspects, invertebrates (ISS) and macrophytes (MTR) components 2012

SAFRASS Training Macrophytes May 2012 Mike ennedy 2012

SAFRASS Training Invertebrates May 2012 Steven Lowe

SAFRASS Training Diatoms May 2012 onathan Taylor

Shrader AM, Bell C, **Bertolli L** and Ward D 2011. Forest or the trees: at what scale do elephants make foraging decisions *Ezemvelo KZN Wildlife Contemporary Conservation Symposium*.

SAFRASS Proposed procedure for the sampling, preparation and analysis of benthic diatoms from ambian rivers: a bioassessment and decision support tool applicable to freshwater ecoregions in tropical southern 2011

SAFRASS Assessment of performance of the SAFRASS pilot river biomonitoring scheme 2011

Curriculum vitae: Chris van Rooyen

Profession/Specialisation : Avifaunal Specialist
Highest qualification : BA LLB
Nationality : South African
Years of experience : 22 years

Key Experience

Chris van Rooyen has twenty-two years' experience in the assessment of avifaunal interactions with industrial infrastructure. He was employed by the Endangered Wildlife Trust as head of the Eskom-EWT Strategic Partnership from 1996 to 2007, which has received international acclaim as a model of co-operative management between industry and natural resource conservation. He is an acknowledged global expert in this field and has consulted in South Africa, Namibia, Botswana, Lesotho, New Zealand, Texas, New Mexico and Florida. He also has extensive project management experience and he has received several management awards from Eskom for his work in the Eskom-EWT Strategic Partnership. He is the author and/or co-author of 17 conference papers, co-author of two book chapters, several research reports and the current best practice guidelines for avifaunal monitoring at wind farm sites. He has completed around 130 power line assessments; and has to date been employed as specialist avifaunal consultant on more than 50 renewable energy generation projects. He has also conducted numerous risk assessments on existing power lines infrastructure. He also works outside the electricity industry and he has done a wide range of bird impact assessment studies associated with various residential and industrial developments. He serves on the Birds and Wind Energy Specialist Group which was formed in 2011 to serve as a liaison body between the ornithological community and the wind industry.

Key Project Experience

Bird Impact Assessment Studies and avifaunal monitoring for wind-powered generation facilities:

1. Eskom Ipheuwel Experimental Wind Power Facility, Western Cape
2. Mainstream Wind Facility Jeffreys Bay, Eastern Cape (EIA and monitoring)
3. Biotherm, Swellendam, (Excelsior), Western Cape (EIA and monitoring)
4. Biotherm, Napier, (Matjieskloof), Western Cape (pre-feasibility)
5. Windcurrent SA, Jeffreys Bay, Eastern Cape (2 sites) (EIA and monitoring)
6. Caledon Wind, Caledon, Western Cape (EIA)
7. Innwind (4 sites), Western Cape (EIA)
8. Renewable Energy Systems (RES) Oyster Bay, Eastern Cape (EIA and monitoring)
9. Oelsner Group (Berrifontein), Western Cape (EIA)
10. Oelsner Group (Langfontein), Western Cape (EIA)
11. InCa Energy, Vredendal Wind Energy Facility Western Cape (EIA)
12. Mainstream Loeriesfontein Wind Energy Facility (EIA and monitoring)
13. Mainstream Noupoot Wind Energy Facility (EIA and monitoring)
14. Biotherm Port Nolloth Wind Energy Facility (Monitoring)
15. Biotherm Laingsburg Wind Energy Facility (EIA and monitoring)
16. Langhoogte Wind Energy Facility (EIA)
17. Vleesbaai Wind Energy Facility (EIA and monitoring)
18. St. Helena Bay Wind Energy Facility (EIA and monitoring)
19. Electrawind, St Helena Bay Wind Energy Facility (EIA and monitoring)
20. Electrawind, Vredendal Wind Energy Facility (EIA)
21. SAGIT, Langhoogte and Wolseley Wind Energy facilities
22. Renosterberg Wind Energy Project – 12-month preconstruction avifaunal monitoring project
23. De Aar – North (Mulilo) Wind Energy Project – 12-month preconstruction avifaunal monitoring project
24. De Aar – South (Mulilo) Wind Energy Project – 12-month bird monitoring
25. Namies – Aggenys Wind Energy Project – 12-month bird monitoring
26. Pofadder - Wind Energy Project – 12-month bird monitoring
27. Dwarsrug Loeriesfontein - Wind Energy Project – 12-month bird monitoring
28. Waaihoek – Utrecht Wind Energy Project – 12-month bird monitoring
29. Amathole – Butterworth Utrecht Wind Energy Project – 12-month bird monitoring & EIA specialist
30. Phekomoya and Sanraal Wind Energy Projects 12-month bird monitoring & EIA specialist study (Innwind)
31. Beaufort West Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mainstream)
32. Leeuwdraai Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mainstream)
33. Sutherland Wind Energy Facility 12-month bird monitoring (Mainstream)
34. Maralla Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm)
35. Esiyayo Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm)
36. Humansdorp Wind Energy Facility 12-month bird monitoring & EIA specialist study (Cennergi)
37. Aletta Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm)
38. Eureka Wind Energy Facility 12-month bird monitoring & EIA specialist study (Biotherm)
39. Makambako Wind Energy Facility (Tanania) 12-month bird monitoring & EIA specialist study (Windlab)
40. R355 Wind Energy Facility 12-month bird monitoring (Mainstream)
41. Groenekloof Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mulilo)
42. Tsitsikamma Wind Energy Facility 24-months post-construction monitoring (Cennergi)
43. Noupoot Wind Energy Facility 24-months post-construction monitoring (Mainstream)
44. Okerboom Wind Energy Facility 12-month bird monitoring & EIA specialist study (Business Venture Investments)
45. Duruman Wind Energy Facility 12-month bird monitoring & EIA specialist study (Mulilo)
46. Dassieklop Wind Energy Facility 3 years post-construction monitoring (Biotherm)
47. Loeriesfontein 2 Wind Energy Facility 2 years post-construction monitoring (Mainstream)
48. Hobab Wind Energy Facility 2 years post-construction monitoring (Mainstream)
49. Excelsior Wind Energy Facility 18 months construction phase monitoring (Biotherm)
50. Boesmansberg Wind Energy Facility 12-months pre-construction bird monitoring (juwi)
51. Mahica Wind Energy Facility, Moambique, 12-months pre-construction monitoring (Windlab)

Bird Impact Assessment Studies for Solar Energy Plants:

1. Concentrated Solar Power Plant, Upington, Northern Cape.
2. Globeleq De Aar and Droogfontein Solar PV Pre- and Post-construction avifaunal monitoring
3. UWI ronos PV project, Copperton, Northern Cape
4. Sand Draai CSP project, Groblershoop, Northern Cape
5. Biotherm Helena PV Project, Copperton, Northern Cape
6. Biotherm Letsiao CSP Project, Aggeneys, Northern Cape
7. Biotherm Enamandla PV Project, Aggeneys, Northern Cape
8. Biotherm Sendawo PV Project, Vryburg, North-West
9. Biotherm Tlisitseng PV Project, Lichtenburg, North-West
10. UWI Hota el Solar Park Project, Hota el, Northern Cape
11. Veld Solar One Project, Aggeneys, Northern Cape
12. Brypaal Solar Power Project, akamas, Northern Cape
13. ABO Vryburg 1,2,3 Solar PV Project, Vryburg, North-West
14. NamPower CSP Facility near Arandis, Namibia

Bird Impact Assessment Studies for the following overhead line projects:

1. Chobe 33kV Distribution line
2. Athene - Umfolo i 400kV
3. Beta-Delphi 400kV
4. Cape Strengthening Scheme 765kV
5. Flurian-Louis-Trichardt 132kV
6. Ghan i 132kV (Botswana)
7. Ikaros 400kV
8. Matimba-Witkop 400kV
9. Naboomspruit 132kV
10. Tabor-Flurian 132kV
11. Windhoek - Walvisbaai 220 kV (Namibia)
12. Witkop-Overysse 132kV
13. Breyten 88kV
14. Adis-Phoebus 400kV
15. Dhuva- anus 400kV
16. Perseus-Mercury 400kV
17. Gravelotte 132kV
18. Ikaros 400 kV
19. hanye 132kV (Botswana)
20. Moropule – Thamaga 220 kV (Botswana)
21. Parys 132kV
22. Simplon –Everest 132kV
23. Tutuka-Alpha 400kV
24. Simplon-Der Brochen 132kV
25. Big Tree 132kV
26. Mercury-Ferrum-Garona 400kV
27. eus-Perseus 765kV
28. Matimba B Integration Project
29. Caprivi 350kV DC (Namibia)
30. Gerus-Mururani Gate 350kV DC (Namibia)
31. Mmamabula 220kV (Botswana)
32. Steenberg-Der Brochen 132kV
33. Venetia-Paradise T 132kV
34. Burgersfort 132kV
35. Majuba-Umfolo i 765kV
36. Delta 765kV Substation
37. Braamhoek 22kV
38. Steelpoort Merensky 400kV
39. Mmamabula Delta 400kV
40. Delta Epsilon 765kV
41. Gerus- ambe i 350kV DC Interconnector: Review of proposed avian mitigation measures for the Okavango and wando River crossings
42. Giyani 22kV Distribution line
43. Lihobong- ao 132/11kV distribution power line, Lesotho
44. 132kV Leslie – Wildebeest distribution line
45. A proposed new 50 kV Spoornet feeder line between Sishen and Saldanha
46. Cairns 132kv substation extension and associated power lines
47. Pimlico 132kv substation extension and associated power lines
48. Gyani 22kV
49. Matafin 132kV
50. Nkoma i Fig Tree 132kV
51. Pebble Rock 132kV
52. Reddersburg 132kV
53. Thaba Combine 132kV
54. Nkomati 132kV
55. Louis Trichardt – Musina 132kV

56. Endicot 44kV
57. Apollo Lepini 400kV
58. Tarlton-Spring Farms 132kV
59. uschke 132kV substation
60. Bendstore 66kV Substation and associated lines
61. uiseb 400kV (Namibia)
62. Gyani-Malamulele 132kV
63. Watershed 132kV
64. Bakone 132kV substation
65. Eerstegoud 132kV LILO lines
66. umba Iron Ore: SWEP - Relocation of Infrastructure
67. udu Gas Power Station: Associated power lines
68. Steenberg Booyssendal 132kV
69. Toulon Pumps 33kV
70. Thabatshipi 132kV
71. Witkop-Silica 132kV
72. Bakubung 132kV
73. Nelsriver 132kV
74. Rethabiseng 132kV
75. Tilburg 132kV
76. Ga gapane 66kV
77. nobel Gilead 132kV
78. Bochum nobel 132kV
79. Madibeng 132kV
80. Witbank Railway Line and associated infrastructure
81. Spencer NDP phase 2 (5 lines)
82. Akanani 132kV
83. Hermes-Dominion Reefs 132kV
84. Cape Pensinsula Strengthening Project 400kV
85. Magalakwena 132kV
86. Benficoso 132kV
87. Dithabaneng 132kV
88. Taunus Diepkloof 132kV
89. Taunus Doornkop 132kV
90. Tweedracht 132kV
91. ane Furse 132kV
92. Majeje Sub 132kV
93. Tabor Louis Trichardt 132kV
94. Riversong 88kV
95. Mamatsekele 132kV
96. abokweni 132kV
97. MDPP 400kV Botswana
98. Marble Hall NDP 132kV
99. Bokmakiere 132kV Substation and LILO lines
100. Styldrift 132kV
101. Taunus – Diepkloof 132kV
102. Bighorn NDP 132kV
103. Waterkloof 88kV
104. Camden – Theta 765kV
105. Dhuva – Minerva 400kV Diversion
106. Lesedi –Grootpan 132kV
107. Waterberg NDP
108. Bulgerivier – Dorset 132kV
109. Bulgerivier – Toulon 132kV
110. Nokeng-Fluorspar 132kV
111. Mantsole 132kV
112. Tshilamba 132kV
113. Thabamoopo - Tshebela – Nhlovuko 132kV
114. Arthurseat 132kV
115. Borutho 132kV MTS
116. Volspruit - Potgietersrus 132kV
117. Neotel Optic Fibre Cable Installation Project: Western Cape
117. Matla-Glockner 400kV
118. Delmas North 44kV
119. Houwhoek 11kV Refurbishment
120. Clau-Clau 132kV
121. Ngwedi-Silwerkrans 134kV
122. Nieuwehoop 400kV walk-through
123. Booyssendal 132kV Switching Station
124. Tarlton 132kV
125. Medupi - Witkop 400kV walk-through
126. Germiston Industries Substation
127. Sekgame 132kV
128. Botswana – South Africa 400kV Transfrontier Interconnector
129. Syferkuil – Rampheri 132kV
130. ueens Substation and associated 132kV powerlines
131. Oranjemond 400kV Transmission line

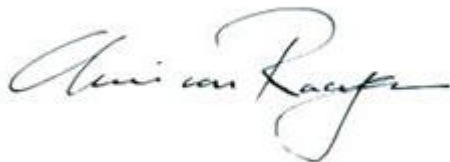
132. Aries – Helios – uno walk-down
133. uruman Phase 1 and 2 Wind Energy facilities 132kV Grid connection
134. Transnet

Bird Impact Assessment Studies for the following residential and industrial developments:

1. Liard Point Golf Estate
2. Lever Creek Estates
3. Leloko Lifestyle Estates
4. Vaaloewers Residential Development
5. Clearwater Estates Grass Owl Impact Study
6. Sommerset Ext. Grass Owl Study
7. Proposed Three Diamonds Trading Mining Project (Portion 9 and 15 of the Farm Blesbokfontein)
8. N17 Section: Springs To Leandra – “Borrow Pit 12 And Access Road On (Section 9, 6 And 28 Of The Farm Winterhoek 314 Ir)
9. South African Police Services Gauteng Radio Communication System: Portion 136 Of The Farm 528 q, Lindley.
10. Report for the proposed upgrade and extension of the eekoegat Wastewater Treatment Works, Gauteng.
11. Bird Impact Assessment for Portion 265 (a portion of Portion 163) of the farm Rietfontein 189- R, Gauteng.
12. Bird Impact Assessment Study for Portions 54 and 55 of the Farm wartkop 525 , Gauteng.
13. Bird Impact Assessment Study Portions 8 and 36 of the Farm Nooitgedacht 534 , Gauteng.
14. Shumba’s Rest Bird Impact Assessment Study
15. Randfontein Golf Estate Bird Impact Assessment Study
16. ilkaatsnek Wildlife Estate
17. Regenstein Communications Tower (Namibia)
18. Avifaunal Input into Richards Bay Comparative Risk Assessment Study
19. Maquasa West Open Cast Coal Mine
20. Glen Erasmia Residential Development, empton Park, Gauteng
21. Bird Impact Assessment Study, Weltevreden Mine, Mpumalanga
22. Bird Impact Assessment Study, Olifantsvlei Cemetery, ohanneburg
23. Camden Ash Disposal Facility, Mpumalanga
24. Lindley Estate, Lanseria, Gauteng
25. Proposed open cast iron ore mine on the farm Lylyveld 545, Northern Cape
26. Avifaunal monitoring for the Sishen Mine in the Northern Cape as part of the EMPr requirements
27. Steelpoort CNC Bird Impact Assessment Study

Professional affiliations

I work under the supervision of and in association with Albert Froneman (MSc Conservation Biology) (SACNASP ological Science Registration number 400177/09) as stipulated by the Natural Scientific Professions Act 27 of 2003.



Chris van Rooyen
06 May 2019



SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF **STEPHEN VAN STADEN**

PERSONAL DETAILS

| | |
|---------------------|---|
| Position in Company | Managing member, Ecologist, Aquatic Ecologist |
| Date of Birth | 13 July 1979 |
| Nationality | South African |
| Languages | English, Afrikaans |
| Joined SAS | 2003 (year of establishment) |
| Other Business | Trustee of the Serenity Property Trust |

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
- Accredited River Health practitioner by the South African River Health Program (RHP)
- Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
- Member of the Gauteng Wetland Forum;
- Member of International Association of Impact Assessors (IAIA) South Africa;
- Member of the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

| | |
|--|------|
| MSc (Environmental Management) (University of Johannesburg) | 2003 |
| BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) | 2001 |
| BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) | 2000 |
| Tools for wetland Assessment short course Rhodes University | 2016 |

COUNTRIES OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

SELECTED PROJECT EXAMPLES OUT OF OVER 2000 PROJECTS WORKED ON

- 1 Mining: Coal, Chrome, PGM's, Mineral Sands, Gold, Phosphate, river sand, clay, fluorspar
- 2 Linear developments
- 3 Energy Transmission, telecommunication, pipelines, roads
- 4 Minerals beneficiation
- 5 Renewable energy (wind and solar)
- 6 Commercial development
- 7 Residential development
- 8 Agriculture
- 9 Industrial/chemical

| <u>Project</u> | <u>Project Description</u> | <u>Area</u> |
|---|--|---------------------|
| RESIDENTIAL | | |
| Bloemwater Knelpoort Project | Full ECO Assessment | Free State |
| Bongwini and Toekomsrus Project Gold 1 | Environmental Sensitivity Analyses as part of the development of site Development Plans and Precinct Planning on the outskirts of Takoradi Ghana (2000 ha) | Randfontein |
| Skoenmaker River | Wetland, Aquatic & ECO Assessment | Somerset East |
| The Hills Eco Estate | Wetland delineation and ecological assessment, and rehabilitation plan | Midrand, Gauteng |
| ROADS, PIPELINES, POWERLINES AND OTHER LINEAR DEVELOPMENTS | | |
| Lesotho Border Road Project | Soil & Land Capability Assessment, full wetland ecological assessment and aquatic assessment as part of the EIA process | Lesotho |
| Thabazimbi Waste Water Treatment Works; Upgrade of Sewer Pipeline | Freshwater resource ecological assessment and rehabilitation and management plan | Limpopo |
| N11 Ring Road | Freshwater Ecological Assessment | Limpopo |
| N7 Road Upgrade Cederberg & Kransvleikloof | Floral RDL scan and delineation of the wetland areas along the proposed N7 road upgrade between Clanwilliam and Citrusdal | Western Cape |
| N3TC De Beers Pass Route | Variation order for additional work on N3TC De Beers pass route and existing N3 route | Kwa-Zulu Natal |
| MINING | | |
| Der Brochen Mine | Ongoing bi-annual seasonal aquatic biomonitoring from 2011 to present | Steelport Limpopo |
| Der Brochen Mine | Wetland Ecological Assessment (2014) Full terrestrial, wetland and aquatic ecological assessment, soil and land capability assessment (2018) | Steelpoort, Limpopo |
| Bokoni Platinum Mine | Annual Soil Monitoring & Soil Contamination | Free State |

| | | |
|---|--|---------------------------------|
| Rustenburg Bridges | Aquatic Biomonitoring Assessment | Rustenburg, North West |
| Assmang Chrome Machadodorp Works | Biomonitoring & Toxicological Monitoring for the 2015 period | Machadodorp, Mpumalanga |
| Sabie TGME Project | Freshwater Ecological Assessment as part of the environmental assessment and authorization process for the proposed development (gold mining project – pre-mined residue and hard rock mining near Sabie) | Mpumalanga |
| Ikwezi Doornkop Colliery | Develop freshwater resource rehabilitation and management plans, and conduct ecological biomonitoring in fulfillment of the water use licensing process for the Ikwezi Doornkop Colliery near Newcastle | Newcastle |
| Blesbokspruit Enstra Mill | Biomonitoring studies, whole effluent toxicity (WET) studies, bioaccumulation assessment and sediment heavy metal contaminant analyses | Johannesburg |
| Malati Opencast | Freshwater ecological assessment, risk assessment and freshwater rehabilitation and management plan and plant species plan as part of the water use authorization process for a proposed Malati opencast near Tzaneen | Limpopo |
| Heuningkranz Mine | Freshwater assessment, soil and land capability assessment done for Sishen Iron Ore Company (Pty) Ltd part of Kumba Iron Ore limited as part of the environmental management services for the Heuningkranz project | Northern Cape |
| Leslie Colliery | Project manager, freshwater ecological assessment as part of the environmental impact assessment process for the underground coal mine to determine the status of the freshwater resources within the proposed mining area | Mpumalanga |
| Commissiekraal Colliery | Full Ecological investigation, including a terrestrial fauna and flora assessment as well as an assessment of the wetland and aquatic PES and wetland ecoservices on the site. | Kwa-Zulu Natal |
| Leandra Colliery | Full Ecological Assessment, including a terrestrial fauna and flora assessment as well as an assessment of the wetland and aquatic PES and wetland ecoservices on the site. | Mpumalanga |
| Marula Platinum Mine | Freshwater resource ecological assessment. Development of a plant species plan in line with the project's rehabilitation objectives | Burgersfort |
| Donkerhoek Dam development | Full ecological assessment (Fauna, floral, wetland and aquatic assessment) as part of the EIA process | Mpumalanga |
| Evander Gold Mine Wetland Offset | Determination of the Wetland Offset Requirements for the proposed expansion of the Elikhulu Tailings Storage Facility | Mpumalanga |
| Canyon Coal - Witfontein mining project | Delineate and characterize the wetland and aquatic resources for the Witfontein mining project located by the farms Holfontein and Witrand near Bethal | Mpumalanga |
| The Sierra Rutile Mine | Specialist terrestrial ecology, aquatic ecology and wetland ecology studies | Moyamba District - Sierra Leona |

INFRASTRUCTURE

| | | |
|---|--|-----------------|
| Bronkhorstspuit Feeder Line | Monthly Aquatic Biomonitoring as part of the environmental assessment and authorization process for the proposed conversion of the Bronkhorstspuit plots feeder from 6.6kv to 22kv | Bronkhorstspuit |
| South Dunes Precinct Project | Full Ecological Assessment | Richards Bay |
| Braamfonteinspruit Rehabilitation | Terrestrial, Freshwater and Aquatic Ecological Assessment as part of the rehabilitation and management plan for the Braamfonsteinspruit, Johannesburg | Johannesburg |
| City of Johannesburg | Aquatic Ecological Assessment, monitoring and managing the ecological state of rivers in the City Of Johannesburg Metropolitan area | Johannesburg |
| Lethabo Pump Station | Aquatic present ecological state assessment of the Vaal river | Vereeniging |
| CTIA runway re-alignment project – Wetland Offset | Determination of the Wetland offset requirements for Cape Town international Airport runway realignment, identification of a suitable offset location and compilation of relevant baseline assessments (Wetland and faunal), Khayelitsha. (2017) | Cape Town |
| Musami Dam | Determination of the draft environmental water quality requirements for the project | Zimbabwe |
| uMkhomazi Water Project | Determination of the Wetland and Terrestrial Biodiversity Offset Requirements for the proposed uMkhomazi Water Project | Richmond - KZN |

POWER GENERATION

| | | |
|--|---|---------------|
| Mzimvubu Dam | Full Terrestrial (Flora and Faunal), Wetland and Aquatic Baseline Ecological Assessment | Eastern Cape |
| HGA HAGA WEF | Hydrological Assessment | Eastern Cape |
| RPM Crossing | Wetland Delineation | Free State |
| Eskom Denova Powerline and sub-station | Freshwater assessment as part of the EIA process for the proposed Eskom powerline (1,75 km in length) and sub-station (132kV) near Denova, Western Cape. (2014) | Western Cape |
| Sutherland WEF | Freshwater Ecological Assessments | Northern Cape |
| Victoria West WEF | Freshwater Ecological Assessments | Northern Cape |

INFRASTRUCTURE

| | | | |
|--------------------------|-----------------------------------|--|-----------------|
| GIBB (Pty) Ltd | Bronkhorstspuit Feeder Line | Monthly Aquatic Biomonitoring as part of the environmental assessment and authorization process for the proposed conversion of the Bronkhorstspuit plots feeder from 6.6kv to 22kv | Bronkhorstspuit |
| SRK Consulting (PTY) Ltd | South Dunes Precinct Project | Full Ecological Assessment | Richards Bay |
| SRK Consulting (PTY) Ltd | Braamfonteinspruit Rehabilitation | Terrestrial, Freshwater and Aquatic Ecological Assessment as part of the rehabilitation and management plan for the Braamfonsteinspruit, Johannesburg | Johannesburg |

| | | | |
|---|---|--|----------------|
| Iliso Consulting (Pty Ltd) | City of Johannesburg | Aquatic Ecological Assessment, monitoring and managing the ecological state of rivers in the City Of Johannesburg Metropolitan area | Johannesburg |
| Maanakana Projects and Consulting (Pty) Ltd | Lethabo Pump Station | Aquatic present ecological state assessment of the Vaal river | Vereeniging |
| SRK Consulting | CTIA runway re-alignment project – Wetland Offset | Determination of the Wetland offset requirements for Cape Town international Airport runway realignment, identification of a suitable offset location and compilation of relevant baseline assessments (Wetland and faunal), Khayelitsha. (2017) | Cape Town |
| GIBB (Pty) Ltd | Musami Dam | Determination of the draft environmental water quality requirements for the project | Zimbabwe |
| Nemai Consulting (PTY) Ltd | uMkhomazi Water Project | Determination of the Wetland and Terrestrial Biodiversity Offset Requirements for the proposed uMkhomazi Water Project | Richmond - KZN |
| POWER GENERATION | | | |
| Iliso Consulting | Mzimvubu Dam | Full Terrestrial (Flora and Faunal), Wetland and Aquatic Baseline Ecological Assessment | Eastern Cape |
| WKN-Wind current SA C/O Alan Wolfromm | HGA HAGA WEF | Hydrological Assessment | Eastern Cape |
| SRK Consulting (PTY) Ltd | RPM Crossing | Wetland Delineation | Free State |
| SRK Consulting (Pty) Ltd | Eskom Denova Powerline and sub-station | Freshwater assessment as part of the EIA process for the proposed Eskom powerline (1,75 km in length) and sub-station (132kV) near Denova, Western Cape. (2014) | Western Cape |
| CSIR Consulting & Analytical Services | Sutherland WEF | Freshwater Ecological Assessments | Northern Cape |
| CSIR Consulting & Analytical Services | Victoria West WEF | Freshwater Ecological Assessments | Northern Cape |

REFERENCES

- Terry Calmeyer
 Director: ILISO Consulting Environmental Management (Pty) Ltd
 Tel: +27 (0) 11 465 2163
 Email: terry@icem.co.za



Appendix 3
Declarations of Interest and the EAP
Affirmation



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

File Reference Number:
NEAS Reference Number:
Date Received:

(For official use only)

DEA/EIA/

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PROJECT TITLE

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3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
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Departmental Details

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Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:

Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | |
|--|---|-------|------------------------------------|
| Specialist Company Name: | NatureStamp (PTY) Ltd | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 4 | Percentage Procurement recognition |
| Specialist name: | Bruce Scott-Shaw | | |
| Specialist Qualifications: | PhD Hydrology | | |
| Professional affiliation/registration: | Candidate Natural Scientist KZN Wetland Forum | | |
| Physical address: | 22 Hilton Avenue, Hilton, Pietermaritzburg | | |
| Postal address: | 22 Hilton Avenue, Hilton, Pietermaritzburg | | |
| Postal code: | 3245 | Cell: | 078 399 9139 |
| Telephone: | 033 343 1352 | Fax: | |
| E-mail: | bruce@naturestamp.com | | |

2. DECLARATION BY THE SPECIALIST

I, BRUCE SCOTT-SHAW, declare that --

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

NatureStamp (PTY) Ltd

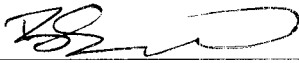
Name of Company:

15th November 2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, BRUCE SCOTT-SHAW, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

NatureStamp (PTY) Ltd

Name of Company

15th November 2019

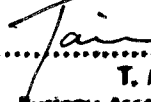
Date

Signature of the Commissioner of Oaths

15th November 2019

Date

COMMISSIONER OF OATHS



T. MACHPESH

Business Accountant in Practice (SA)

EX OFFICIO RSA

Date: 15 NOVEMBER 2019

Place: Hilton

Bus. Address: 27 Hilton Avenue



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

| | |
|------------------------|-------------------------|
| File Reference Number: | (For official use only) |
| NEAS Reference Number: | DEA/EIA/ |
| Date Received: | |

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Construction of the Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV Energy Facilities and Associated Grid Connection Infrastructure, near Noupoot in the Northern and Eastern Cape Provinces.

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Email: EIAAdmin@environment.gov.za

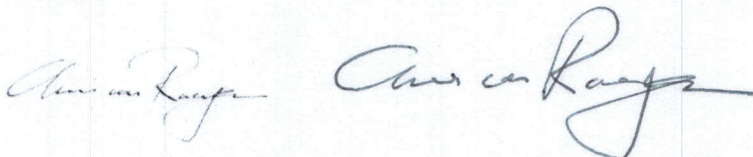
1. SPECIALIST INFORMATION

| | | | | |
|--|---|---|---|---|
| Specialist Company Name: | Afrimage Photography (Pty) Ltd t/a Chris van Rooyen Consulting | | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | Contribution level (indicate 1 to 8 or non-compliant) | Contribution level (indicate 1 to 8 or non-compliant) | Contribution level (indicate 1 to 8 or non-compliant) |
| Specialist name: | Chris van Rooyen | | | |
| Specialist Qualifications: | BA LLB | | | |
| Professional affiliation/registration: | I work under the supervision of and in association with Albert Froneman (MSc Conservation Biology) (SACNASP Zoological Science Registration number 400177/09) as stipulated by the Natural Scientific Professions Act 27 of 2003. | | | |
| Physical address: | 30 Roosevelt Street, Robindale, Randburg | | | |
| Postal address: | 30 Roosevelt Street, Robindale, Randburg | | | |
| Postal code: | 2194 | | | |
| Telephone: | 0824549570 | | | |
| E-mail: | Vanrooyen.chris@gmail.com | | | |

2. DECLARATION BY THE SPECIALIST

I, Chris van Rooyen, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

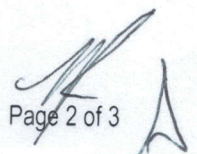


Signature of the Specialist
Chris van Rooyen Consulting

Name of Company:

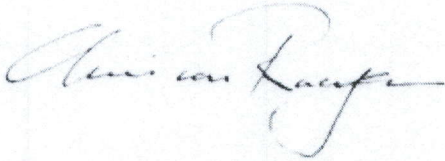
6 May 2019

Date



3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Chris van Rooyen, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



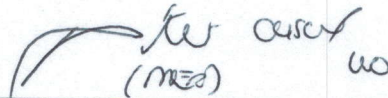
Signature of the Specialist

Chris van Rooyen Consulting

Name of Company

6 May 2019

Date



(M20) 60

Signature of the Commissioner of Oaths

6 May 2019

Date



30 BUCKLEY ROAD
ROBENHURGH
LINDEN
WARRANT OFFICER



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

| | |
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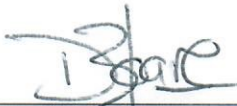
1. SPECIALIST INFORMATION

| | | | |
|--|---|-------|------------------------------------|
| Specialist Company Name: | David Hoare Consulting (Pty) Ltd | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 4 | Percentage Procurement recognition |
| | | | 100% |
| Specialist name: | Dr David Hoare | | |
| Specialist Qualifications: | PhD | | |
| Professional affiliation/registration: | SACNASP (Pr.Sci.Nat.) Registration no. 400221/05 | | |
| Physical address: | 41 Soetdoring Avenue, Lynnwood Manor, Pretoria | | |
| Postal address: | Postnet Suite 116, Private Bag X025, Lynnwood Riadge | | |
| Postal code: | 0040 | Cell: | 0832845111 |
| Telephone: | 0877017629 | Fax: | 0875502053 |
| E-mail: | dhoare@lantic.net | | |

2. DECLARATION BY THE SPECIALIST

I, David Hoare, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

David Hoare Consulting (Pty) Ltd

Name of Company:

7 May 2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, David Hoare, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

David Hoare
Signature of the Specialist

David Hoare Consulting (Pty) Ltd
Name of Company

7 May 2019
Date

[Signature]
Signature of the Commissioner of Oaths

7/5/2019 **COMMISSIONER OF OATHS (RSA)**
Date **A J Venter B Com; ACIS;GTP(SA)**
Practice No: 12531397
177 Beech Street
Lynnwood Ridge Pretoria



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:

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Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | |
|--|--|------------------------------------|--|
| Specialist Company Name: | Bongo Environmental | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | Percentage Procurement recognition | |
| Specialist name: | E. Butler | | |
| Specialist Qualifications: | MSc | | |
| Professional affiliation/registration: | PSSA | | |
| Physical address: | 14 Eddie de Beer Street, Dan Pienaar, Bloemfontein, 9301 | | |
| Postal address: | | | |
| Postal code: | 9301 | Cell: | |
| Telephone: | 0844478759 | Fax: | |
| E-mail: | elijabutler002@gmail.com | | |

2. DECLARATION BY THE SPECIALIST

I, E. Butler, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

E. Butler
Signature of the Specialist

Bongo Environmental
Name of Company:

21/05/2019
Date

MM

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Elize Butler, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

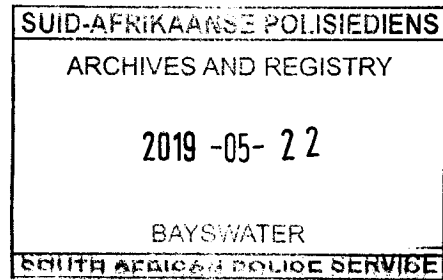
[Signature]
Signature of the Specialist

Banza Environmental
Name of Company

21/05/2019
Date

[Signature] 72224774
M. MOROALO
Signature of the Commissioner of Oaths

2019-05-22
Date



Statement was taken by
[Signature] on [Date]
[Signature] M. MOROALO
Bayswater 2019-05-22 17:32
T Simane moroalo
FULL NAME
99 Wilcocks Road, Bayswater
BFM
ALC
RANGIRANK
SAPOLISI EDENS
SAPOLISI EDENS

1. SPECIALIST INFORMATION

| | | | |
|--|---|-------|------------------------------------|
| Specialist Company Name: | Johann Lanz – Soil Scientist | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 4 | Percentage Procurement recognition |
| Specialist name: | Johann Lanz | | |
| Specialist Qualifications: | M.Sc. (Environmental Geochemistry) | | |
| Professional affiliation/registration: | Registered Professional Natural Scientist Member of the Soil Science Society of South Africa | | |
| Physical address: | 1a Wolfe Street, Wynberg, Cape Town, 7800 | | |
| Postal address: | 1a Wolfe Street, Wynberg, Cape Town, 7800 | | |
| Postal code: | 7800 | Cell: | 082 927 9018 |
| Telephone: | 082 927 9018 | Fax: | Who still uses a fax? |
| E-mail: | johann@johannlanz.co.za | | |

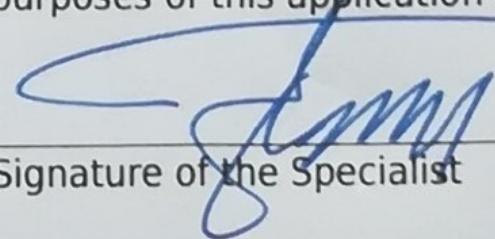
2. DECLARATION BY THE SPECIALIST

I, **Johann Lanz**, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
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- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
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- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

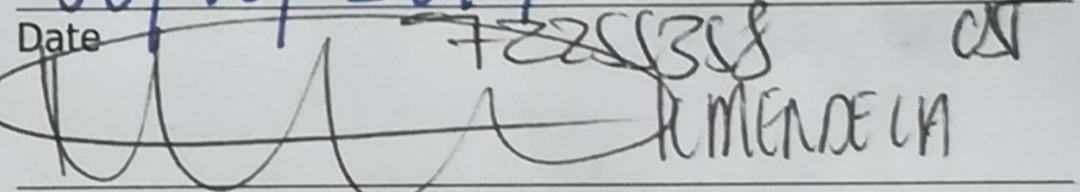
3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Johann Lanz**, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.


Signature of the Specialist

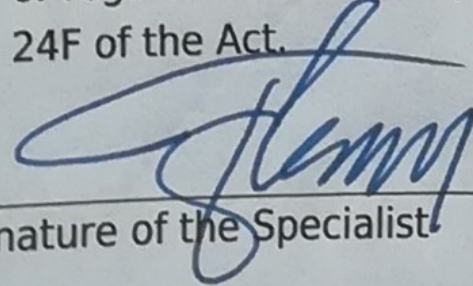
Johann Lanz - Soil Scientist (sole proprietor)
Name of Company

30/10/2019
Date


Signature of the Commissioner of Oaths

2019.10.30.
Date




Signature of the Specialist

Johann Lanz - Soil Scientist (sole proprietor)
Name of Company:
30/10/2019
Date



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

(For official use only)

File Reference Number:

NEAS Reference Number:

Date Received:

DEA/EIA/

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Construction of the Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV Energy Facilities and Associated Grid Connection Infrastructure, near Noupoort in the Northern and Eastern Cape Provinces.

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Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:

Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | | |
|--|---|-------|------------------------------------|-----|
| Specialist Company Name: | SiVEST SA (Pty) Ltd | | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 3 | Percentage Procurement recognition | 110 |
| Specialist name: | Kerry Schwartz | | | |
| Specialist Qualifications: | BA | | | |
| Professional affiliation/registration: | SAGC (GISc Technician) | | | |
| Physical address: | 51 Wessels Road, Rivonia | | | |
| Postal address: | PO Box 2921, Rivonia | | | |
| Postal code: | 2128 | Cell: | | |
| Telephone: | 011 798 0632 | Fax: | 011 803 7272 | |
| E-mail: | kerrys@sivest.co.za | | | |

2. DECLARATION BY THE SPECIALIST

I, **Kerry Schwartz**, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

K Schwartz

Signature of the Specialist

SiVEST

Name of Company:

11 July 2019

Date

Details of Specialist, Declaration and Undertaking Under Oath

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Kerry Schwartz, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

K Schwartz

Signature of the Specialist

SiVEST

Name of Company

11 July 2019

Date

JcJacks

Signature of the Commissioner of Oaths

11 July 2019

Date

Jacqueline Chantel Jackson
COMMISSIONER OF OATHS

Signature: JcJacks

Divisional Controller
Ref. 9/1/8/2 (R/O) KZN PMB - 08/02/2019

Date: 11/07/2019 Place: PMB
Business Address: VCC Estate, 170 Peter Brown Drive, PMB



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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| File Reference Number: | |
| NEAS Reference Number: | DEA/EIA/ |
| Date Received: | |

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PROJECT TITLE

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473 Steve Biko Road
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Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | |
|--|---|-------|------------------------------------|
| Specialist Company Name: | SIVEST SA (Pty) Ltd | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 4 | Percentage Procurement recognition |
| Specialist name: | MERCHANDT LE MAITRE | | |
| Specialist Qualifications: | B TECH – CIVIL ENGINEER | | |
| Professional affiliation/registration: | ECSA (PR TECH ENG N° 2018300094) | | |
| Physical address: | 51 WESSEL ROAD, RIVONIA | | |
| Postal address: | PO BOX 2921, RIVONIA | | |
| Postal code: | 2128 | Cell: | 072 435 8497 |
| Telephone: | 011 798 0600 | Fax: | 011 803 7272 |
| E-mail: | merchandtm@sivest.co.za | | |

2. DECLARATION BY THE SPECIALIST

I, Merchand Le Maitre, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
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Signature of the Specialist

SIVEST SA

Name of Company:

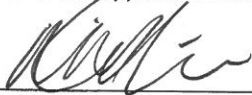
3rd September 2019

Date

Details of Specialist, Declaration and Undertaking Under Oath

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, MERCHANDT LE MAITRE, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

SiVEST SA (Pty) Ltd

Name of Company

3RD SEPTEMBER 2019

Date



Signature of the Commissioner of Oaths

3RD SEPTEMBER 2019

Date

Jacqueline Chantel Jackson
COMMISSIONER OF OATHS

Signature: 

Divisional Controller

Ref. 9/1/3/2 (R/O) KZN PMB - 08/02/2019

Date: 03/09/2019 Place: PMB

Business Address: VCC Estate, 170 Peter Brown Drive, PMB



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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| File Reference Number: | (For official use only) |
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| Date Received: | |

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Construction of the Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV Energy Facilities and Associated Grid Connection Infrastructure, near Noupoot in the Northern and Eastern Cape Provinces.

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Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | |
|--|---|-------|------------------------------------|
| Specialist Company Name: | Dr Neville Bews & Associates | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | | Percentage Procurement recognition |
| Specialist name: | Neville Bews | | |
| Specialist Qualifications: | D. Litt et Phil | | |
| Professional affiliation/registration: | IAIAsa | | |
| Physical address: | 84 Hennie Alberts Street, Brackenhurst, Alberton. | | |
| Postal address: | P. O. Box 145412 Bracken Gardens | | |
| Postal code: | 1452 | Cell: | +27 82 557-3489 |
| Telephone: | +27 11 867-0462 | Fax: | +27 86 621-8345 |
| E-mail: | bewsco@netactive.co.za | | |

2. DECLARATION BY THE SPECIALIST

I, Neville Bews, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
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- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

Dr Neville Bews & Associates

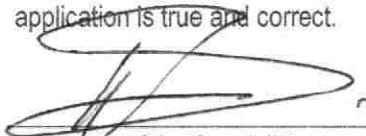
Name of Company:

09 May 2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Neville Bews, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

Dr Neville Bews & Associates

Name of Company

09 May 2019

Date



Signature of the Commissioner of Oaths



09 May 2019

Date



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

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| File Reference Number: | |
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| Date Received: | |

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Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | |
|--|---|-------|------------------------------------|
| Specialist Company Name: | SIVEST SA (Pty) Ltd | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 4 | Percentage Procurement recognition |
| Specialist name: | Stephen Burton | | |
| Specialist Qualifications: | | | |
| Professional affiliation/registration: | Pr. Sci. Nat. (SACNASP Reg No. 117474) | | |
| Physical address: | VCC Estate, 170 Peter Brown Drive, Pietermaritzburg, 3201 | | |
| Postal address: | P O Box 707, Msunduzi | | |
| Postal code: | 3201 | Cell: | 083 795 2804 |
| Telephone: | 033 347 1600 | Fax: | 033 347 5762 |
| E-mail: | stephenb@sivest.co.za | | |

2. DECLARATION BY THE SPECIALIST

I, Stephen Burton, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
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Signature of the Specialist

SIVEST SA

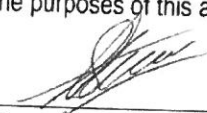
Name of Company:

3rd September 2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Stephen Burton, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the Specialist

SIVEST SA (Pty) Ltd

Name of Company

03 September 2019

Date



Signature of the Commissioner of Oaths

03 September 2019

Date

Jacqueline Chantel Jackson
COMMISSIONER OF OATHS

Signature: 

Divisional Controller
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Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | |
|--|--|-------|------------------------------------|
| Specialist Company Name: | JG AFRIKA | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 1 | Percentage Procurement recognition |
| Specialist name: | SALVERSAN KULLEN | | |
| Specialist Qualifications: | B.Sc. HONOURS GEOLOGY | | |
| Professional affiliation/registration: | N/A | | |
| Physical address: | 37 SUNNINGHILL OFFICE PARK; PELTIER DRIVE; SUNNINGHILL; 2191 | | |
| Postal address: | P.O. BOX 1109; SUNNINGHILL; 2157, SOUTH AFRICA | | |
| Postal code: | 2157 | Cell: | |
| Telephone: | 011 231 2200 | Fax: | 011 807 1607 |
| E-mail: | KULLENS@JGAFRIKA.COM | | |

2. DECLARATION BY THE SPECIALIST

I, SALVERSAN KULLEN, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

JG AFRIKA

Name of Company:

23/07/2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, SALVERSAN KULLEN, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

[Handwritten Signature]

Signature of the Specialist

JG AFRIKA

Name of Company

23/07/2019

Date

[Handwritten Signature] 7149513
87
Ramlanala

Signature of the Commissioner of Oaths

2019-07-23

Date





environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

| | (For official use only) |
|------------------------|-------------------------|
| File Reference Number: | |
| NEAS Reference Number: | DEA/EIA/ |
| Date Received: | |

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Construction of the Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV Energy Facilities and Associated Grid Connection Infrastructure, near Noupoort and Middelburg in the Northern and Eastern Cape Provinces

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.environment.gov.za/documents/forms>.
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4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:

Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:

Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

| | | | |
|--|--|---------|------------------------------------|
| Specialist Company Name: | SCIENTIFIC AQUATIC SERVICES | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | Level 4 | Percentage Procurement recognition |
| Specialist name: | Stephen Van Staden | | |
| Specialist Qualifications: | MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) Tools for wetland Assessment short course Rhodes University | | |
| Professional affiliation/registration: | Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP), Accredited River Health practitioner by the South African River Health Program (RHP), Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum, Member of International Association of Impact Assessors (IAIA) South Africa; Member of the Land Rehabilitation Society of South Africa (LaRSSA) | | |
| Physical address: | 29 Arterial Road West, Oriel Bedfordview | | |
| Postal address: | PO BOX 751779 Gardenview | | |
| Postal code: | 2047 | Cell: | 083 415 2356 |
| Telephone: | 011 616 7893 | Fax: | 0867243132 |
| E-mail: | stephen@sasenvgroup.co.za | | |

2. DECLARATION BY THE SPECIALIST

I, Stephen van Staden, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

Scientific Aquatic Services

Name of Company:

18-11-2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Stefan van Stade, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Stade

Signature of the Specialist

Scientific Aquatic Services

Name of Company

18-11-2019

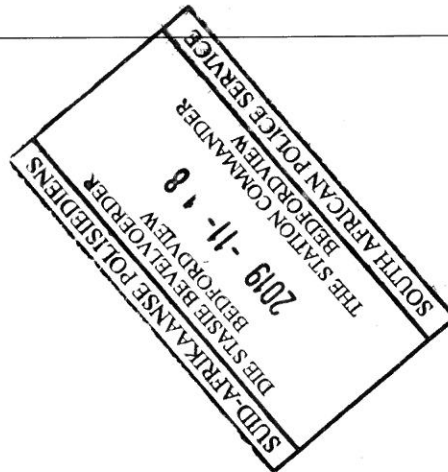
Date

[Signature]

Signature of the Commissioner of Oaths

2019-11-18

Date





environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

File Reference Number:
NEAS Reference Number:
Date Received:

(For official use only)

DEA/EIA/

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Construction of the Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV Energy Facilities and Associated Grid Connection Infrastructure, near Noupoort in the Northern and Eastern Cape Provinces.

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Email: EIAAdmin@environment.gov.za

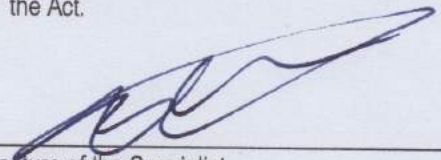
1. SPECIALIST INFORMATION

| | | | |
|--|---|-------|------------------------------------|
| Specialist Company Name: | PGS Heritage pty Ltd | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 5 | Percentage Procurement recognition |
| Specialist name: | Wouter Fourie | | |
| Specialist Qualifications: | BA Hon Archaeology | | |
| Professional affiliation/registration: | ASAPA, APHP | | |
| Physical address: | 906 Bergarend Street, East Lynne, Pretoria | | |
| Postal address: | PO Box 32542, Totiusdal | | |
| Postal code: | 0134 | Cell: | 0828513575 |
| Telephone: | 012 332 5305 | Fax: | |
| E-mail: | wouter@pgsheriage.co.za | | |

2. DECLARATION BY THE SPECIALIST

I, Wouter Fourie, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



 Signature of the Specialist

PGS Heritage

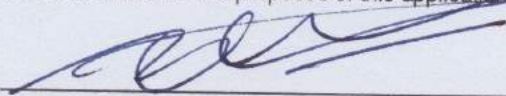
 Name of Company:

02 May 2019

 Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Wouter Fourie, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



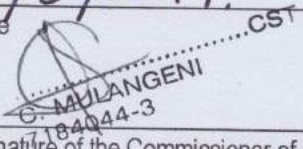
Signature of the Specialist

PGS Heritage

Name of Company

6/5/2019

Date



Signature of the Commissioner of Oaths

Date





environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

| | (For official use only) |
|------------------------|-------------------------|
| File Reference Number: | |
| NEAS Reference Number: | DEA/EIA/ |
| Date Received: | |

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Proposed Development of the Wonderhevel Solar Photovoltaic (PV) Energy Facility and Associated Infrastructure near Noupoort in the Northern Cape Province

Kindly note the following:

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Email: EIAAdmin@environment.gov.za

1. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) INFORMATION

| | | | | |
|--|--|-------|------------------------------------|------|
| EAP Company Name: | SiVEST SA (Pty) Ltd | | | |
| B-BBEE | Contribution level (indicate 1 to 8 or non-compliant) | 3 | Percentage Procurement recognition | 110% |
| EAP name: | Stephan Jacobs | | | |
| EAP Qualifications: | B.Sc. (Hons) Environmental Management & Analysis B.Sc. Environmental Sciences | | | |
| Professional affiliation/registration: | IAIAsa Membership Number: 5736 | | | |
| Physical address: | 51 Wessel Road, Rivonia | | | |
| Postal address: | P.O. Box 2921, Rivonia | | | |
| Postal code: | 2128 | Cell: | 072 737 2114 | |
| Telephone: | 011 798 0677 | Fax: | 011 803 7272 | |
| E-mail: | stephanj@sivest.co.za | | | |

The appointed EAP must meet the requirements of Regulation 13 of GN R982 of 04 December 2014, as amended.

2. DECLARATION BY THE EAP

I, Stephan Jacobs, declare that –

- I act as the independent environmental assessment practitioner in this application;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I will take into account, to the extent possible, the matters listed in Regulation 13 of the Regulations when preparing the application and any report relating to the application;
- I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
- I will perform all obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;
- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~


Signature of the Environmental Assessment Practitioner

SIVEST SA (PT) LTD
Name of Company:

18 JULY 2019
Date

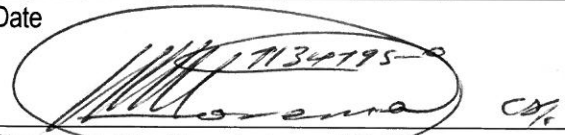
3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Stephan Jacobs, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.


Signature of the Environmental Assessment Practitioner

SIVEST SA (PT) LTD
Name of Company

18 JULY 2019
Date


Signature of the Commissioner of Oaths

18 July 2019
Date

Details of EAP, Declaration and Undertaking Under Oath

