



ENVIRONMENTAL MANAGEMENT PLAN

JOHANNESBURG WATER SOC LTD

ENVIRONMENTAL MANAGEMENT PLAN

REVISION:05

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DISCLAIMER

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LIST OF ACRONYMS Acronym Description

BA	Basic Assessment
BAR	Basic Assessment Report
CA	Competent Authority

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DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EO	Environmental Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme Report
GDARD	Gauteng Department of Agriculture and Rural Development
GN	Government Notice
I&AP	Interested and Affected Party
JW	Johannesburg Water
km	Kilometre
m	meter
MSDS	Material Safety Data Sheets
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PHRAG	Provincial Heritage Resources Authority for Gauteng
RE	Resident Engineer
WUL	Water Use License
WULA	Water Use License Application
WWTW	Wastewater Treatment Works

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DEFINITIONS

Environment

The surroundings in which humans exist and which comprise of:

- Land, water and atmosphere of the earth.
- Micro-organisms, plant and animal life.
- Any part or combination of a) and b) and the interrelationships among and between them.
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that can influence human health and well-being.

Environmental Aspect

Those components of the company's activities, products and services that is likely to interact with the environment.

Environmental Authorisation

The written statement from the relevant environmental authority in terms of the National Environmental Management Act (Act 107 of 1998), with or without conditions, that records its approval of a planned activity and the implementation thereof and the mitigating measures required to prevent or reduce the effects of environmental impacts during the life of a contract.

Environmental Impact Assessment (EIA)

The decision making process of examining the environmental impacts of a development in terms of the NEMA (107 of 1998) and the EIA Regulations (Government Notice No. R982, R983, R984, R985 and R986) as amended.

Environmental Management Programme (EMPR)

An environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced.

Environmental Management System (EMS)

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A set of process and practices that enable an organization to reduce its environmental impacts and increase its operational efficiency. The EMS provides a framework that helps a company achieve its environmental goals through consistent control of its operations.

Auditing

A systematic and objective assessment of an organization's activities and services conducted and documented on a periodic basis internally and externally.

Environmental Objective

An overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified where practicable.

Environmental Target

A detailed performance requirement quantified where practicable, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives.

Floodplain

A flat expanse of land bordering a river channel, formed through sediment deposition and other alluvial processes, and often characterized by frequent flooding as a result of bank overspill from the river channel.

Groundwater

Sub-surface water in the zone in which permeable rocks, and often the overlying soil, are saturated.

Hazardous waste

Waste that are proven to be toxic, corrosive, explosive, flammable, carcinogenic, radioactive, poisonous or classified as such in legal terms.

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Heritage Resource

Any place or object of cultural significance including buildings, structures, landscapes, graves and geological, archaeological artefacts and paleontological sites.

Landscape

Land modified for human use and occupation, embracing both the natural (wilderness) environment and the urban.

Management actions

Practical actions aimed at achieving management objectives and targets.

Management objectives

Desired outcome of management measures for mitigating negative impacts and enhancing the positive impacts related to project activities and aspects (i.e. risk sources).

Monitoring

A systematic and objective observation of an organization's activities and services conducted and reported on regularly.

Natural Vegetation

All existing vegetation species, indigenous or otherwise, of trees, shrubs, groundcover, grasses and all other plants found growing on the site.

Pollution

Any change in the environment caused by substances, radioactive or other waves, or noise, odours, dust or heat, emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such

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an effect in the future. Furthermore, pollution can also be regarded as an undesirable state of the natural environment being contaminated with harmful substances as a consequence of human activities.

Protected Plants

Plant species officially listed on the Protected Plants List (each province has one), and which may not be removed or transported without a permit to do so from the relevant provincial authority.

Reinstatement

Reinstatement is defined as the return of a disturbed area to a state, which approximates the state (where possible), which it was before disruption.

Riparian Habitat

The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas.

Runoff

The total water yield from a catchment including surface and subsurface flow.

Sensitive environmental features

Environmental features protected by legislation (e.g. heritage resources), or identified during the EIA as sensitive through specialists' findings and input received from Interested and Affected Parties.

Subsoil

The soil horizons between the topsoil horizon and the underlying parent rock.

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Topsoil

Topsoil can be regarded as the fertile upper part or surface of the soil.

Transplanting

The removal of plant material and replanting the same plants in another designated position.

Veld

Unimproved areas of natural vegetation

Wastewater

Water contaminated by the project activities.

Watercourse

A geomorphological feature characterized by the presence of a stream flow channel, a floodplain and a transitional upland fringe seasonally or permanently conveying surface water.

Waterlogged

Soil or land saturated with water long enough for anaerobic conditions to develop.

Weeds and Alien Invasive Plants

Weeds and Alien Invasive plants are defined as undesirable plant growth that shall include, but not be limited to all declared category 1, 2 and 3 listed Alien Invasive species as set out in the Conservation of Agricultural Resources Act (No 43 of 1983) regulations. Other vegetation deemed to be invasive should be those plant species that show the potential to occupy in number, any area within the defined construction area.

Wetland

Land where a surplus of water (i.e. waterlogging) is the key factor determining the nature of the soil development as well as the types of plants and animals living at the soil surface.

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1. BACKGROUND

The purpose of this document is to provide management measures that will ensure that potential negative impacts associated with the activity are minimized whilst positive impacts are optimised, provided that the EMP is implemented by a suitably qualified Environmental Officer (EO). The development proponent, the main contractor and the sub- contractor are responsible for the implementation of the EMP throughout the stages. Therefore, it is imperative that the EMP is circulated to site managers, contractors and Depots who will perform any work on site which has the potential to cause environmental damage. Any parties responsible for transgression of the underlying management measures outlined in this document will be held liable for non- compliances.

The following is a generic EMP to mitigate against “generally occurring impacts” associated with the construction phase of Johannesburg Water’s activities. “Generally occurring impacts” refers to potential impacts typical of Johannesburg Water’s activities and are not restricted to a single or specific site. The findings of this EMP will be implemented at all sites.

This section is an essential component of the contract specification and shall be included during **planning, design, construction, and operational phases.**

PURPOSE

The purpose of this EMP is to ensure that Johannesburg Water conducts all its activities related to the construction and maintenance in accordance with the provisions of NEMA, and other applicable legislations. This EMP has considered the provisions of the Constitution and the principles of Integrated Environmental Management.

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2. APPLICABLE LEGISLATIONS

Several laws and regulations apply to the protection of the environment. These laws contain environmental principles and standards that need to be applied when applicable permits and licences that need to be obtained. This EMP will be subject to regulatory control under a range of State, Provincial and Local regulations. Such legislation largely embraces pollution prevention, sustainable resource use, conservation, and socio cultural (heritage) protection. This chapter reviews legislation pertaining to this generic EMP.

According to Section 2 (1, 2 & 3) of the National Environmental Management Act No. 107 of 1998 (NEMA), all organs of state must apply certain principles set out in NEMA when taking decisions that may significantly affect the environment. The key principles of this Act include that all “actions” that they approve must be economically, socially, and environmentally sustainable. It further states that “people and their needs” must be at the forefront of “its concern” and their interests must be served equitably. These legislative requirements include, but are not limited to, the provisions of the legislation represented as described below:

The Constitution of the Republic of South Africa Act No. 108 of 1996)

Section 24 of the Constitution of South Africa (Act 108 of 1996) states that “Everyone has the right (a) to an environment that is not harmful to their health or well-being; and

(b) To have the environment protected, for the benefit of present and future generations through reasonable legislative and other”

Measures that:

- Prevent pollution and ecological degradation;
- Promote conservation; and
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.
- Section 152 of the Constitution states that the objectives of local government are to:
- Ensure that services are provided to communities in a sustainable manner.

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- Promote social and economic development; and
- Promote a safe and healthy environment.

National Environmental Management Act No. 107 of 1998 (as amended)

The National Environmental Management Act 107 of 1998 (NEMA) requires that an environmental authorization is obtained before activities, which have been listed in terms of NEMA, are commenced with. The failure to obtain such an environmental authorization, before commencing with listed activities, could result in administrative sanctions, including compliance notices or directives ordering the cessation of the operations until authorized; and fines of up to ZAR10 million for each such contravention.

The Environmental Impact Assessment Regulations (EIA Regulations) set out the process to be followed in applying for an environmental authorization, while the listing notices; list the activities that require authorization (the Listing Notices). NEMA 107 of 1998 amended in 07 of April 2017. The following are the listed activities:

- EIA Regulations GNR 326
- Listing Notice 1; Government Notice Number (GNR) 327 (Basic Assessment).
- Listing Notice 2; Government Notice Number (GNR) 325 (Full EIA/ Scoping & Environmental Impact Report).
- Listing Notice 3; GNR 324 (It applies on both Basic Assessment and full EIA).

National Environmental Management: Biodiversity Act No. 10 of 2004

Provides management and conservation of South Africa's biodiversity within the framework of NEMA 107 of 1998; the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.

The National Environmental Management Waste Act 59 of 2008

The National Environmental Management Waste Act (NEMWA) reforms the law regulating waste management in order to protect health and the environment providing reasonable measures for the

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prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The Occupational Health and Safety Act No. 85 of 1993

The Occupational Health and Safety Act make provision in regulation

- Section 8 for the general duties of employers to their employees.
- Section 9 of the Regulations makes provision for general duties of employers and self-employed persons to persons other than their employees.

National Heritage Resources Act (NHRA) No. 25 of 1999

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act. The South African National Heritage Resources Agency (SAHRA) is the responsible authority for implementing the National Heritage Resources Act (NHRA) 1999, (Act 25 of 1999).

Section 38(1) of the NHRA lists development activities that would require authorisation by the responsible heritage resources authority. Activities considered applicable to the proposed project include the following:

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length.

(b) the construction of a bridge or similar structure exceeding 50 m in length; and

(c) any development or other activity which will change the character of an area of land, or water -
i exceeding 5 000 m² in extent,

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- ii involving three or more existing erven or subdivisions thereof; or
- iii involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- iv the costs of which will exceed a sum set in terms of regulations by SAHRA or a Provincial Heritage Resources Authority.
- v Resources Authority.
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a Provincial Heritage Resources Authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development.

Water Services Act No. 108 of 1997

This Act provides for the rights of people to basic water supply amongst others basic sanitation. It acknowledges that there is a duty on all spheres of government to ensure that sanitation services are provided in a manner which is efficient, equitable and sustainable and that it should be sufficient for subsistence and sustainable economic activity. The provision of sanitation services must be undertaken in a manner consistent with the broader goals of water resource management. This goal is in line with the Act as it aims to provide sufficient sanitation services to the region in a sustainable manner.

Conservation of Agricultural Resources (CARA) Act, Act No. 43 of 1983

The CARA aims to ensure the protection of agricultural resources such as land with agricultural potential and water and makes provision for the eradication of alien and invasive species, and protection of topsoil.

NEMA Air Quality Act (AQA), Act No. 39 of 2004

The aim of this law is to regulate air quality and protect the environment in South Africa through reasonable measures to prevent pollution and ecological degradation, while securing sustainable development. The Act also provides national norms and standards for air quality management, monitoring and control. Under this legislation, Priority Air shed Areas can be proclaimed, where specific

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Air Quality Management Plans are applicable. Regulations are also published under this Act for the format of air quality assessments and what should be included in the assessment. Any Air Quality Management Plan which has been compiled for the area and any proposed WWTW should be in line with this Management Plan. This Act may list activities which may result in atmospheric emissions, and which may have a significant detrimental effect on the environment.

Government Gazette 32434 of 24 July 2009 listed activities, which require an atmospheric emission license before it commences. Air quality limits and thresholds are fundamental to effective air quality management, providing the indicators to safe exposure levels for the majority of the population. The current South African standards have been revised and National Ambient Air Quality Standards were promulgated on the 24th of December 2009 (Government Gazette No. 32816, Notice No. 1210). The newly proposed standards include particulate matter specifically PM10 (particulates with a diameter of less than 10 micrometre), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), ozone (O₃), lead, carbon monoxide (CO) and benzene. These revised standards have been adopted as the VTAPA air quality objectives. Any emissions from the proposed WWTW should be within these standards.

National Water Act (NWA), 36 of 1998

Water use is controlled by the National Water Act (NWA) Act No. 36 of 1998. The NWA recognises that water is a scarce resource in South Africa and its provisions are aimed at achieving sustainable use of water to the benefit of all users. The provisions of the Act are thus aimed at discouraging pollution and waste of water resources. According to Section 21 of the NWA the following activities require a water use licence (WUL) prior construction:

- “21.(a) taking water from a water resource;
- 21.(b) storing water;
- 21.(c) impeding or diverting the flow of water in a watercourse;
- 21.(d) engaging in a stream flow reduction activity contemplated in section 36;
- 21.(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- 21.(f) discharging waste or water containing waste into a water resource through a pipe, canal,

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sewer, sea outfall or other conduit;

21.(g) disposing of waste in a manner which may detrimentally impact on a water resource;

21.(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

21.(i) altering the bed, banks, course or characteristics of a watercourse;

21.(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

21.(k) using water for recreational purposes.”

3. OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The purpose of this EMP is to provide an easily interpreted reference document that ensures that the project environmental commitments, safeguards and mitigation measures from the environmental planning documents, project approvals, and scope of work are implemented.

The objectives for the EMP are:

- To develop, implement and maintain effective management systems for the environmental aspects.
- To document details of environmental protection infrastructure and controls so that they are able to provide long term protection for the natural environment.
- To ensure compliance with relevant legislation (National, Provincial and Local), regulatory requirements and environmental documents.
- To maximise the value and outcomes of environmental monitoring activities so that the information can be applied to the planning and implementation of future projects.
- To ensure that all Environmental Management considerations are implemented during the planning, operational and maintenance phases of the project.

All the environmental specifications and the procedures discussed in this document were also developed in accordance with the relevant legislation applicable to the development.

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3.1 Phases of the Project

The EMP deals with the following phases as detailed below:

3.1.1 The Planning and Design Phase

Overall Goal for Planning and Design: Undertake the planning and design phase of the development in a way that:

- Ensures that the design of the proposed development responds to the identified environmental constraints and opportunities.
- Ensures that the best environmental options are selected for all components of the project.
- **Ensures that there is sufficient financial provision for environmental assessment, monitoring, rehabilitation, and maintenance. The JW rehabilitation calculation template must be used (See Annexure D).**
- The qualified landscaping specialist must be appointed to undertake rehabilitation on site. The landscaping specialist must pose the following qualifications and work experience:
 - Landscaping Specialist should at least have BA/BSc Honours Degree or 4-year Degree in Natural Sciences/Ecological
 - The Landscaping Specialist must at least be registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Copy of SACNASP Certificate must be submitted).
 - At least three letters from their client/s must be submitted, detailing the landscaping work he/she has undertaken (letters should have the name of the client, description of the project and/or scope of work done, contact details and must be signed). Letters should be in their client's company letterhead, and it must indicate if the work has been completed satisfactorily or not.
 - Copy of CV must be submitted, specialist should at least have a minimum of five (5) years working experience as landscaping Specialist (See Table 1).

The EMP offers an ideal opportunity to incorporate pro-active environmental management measures with the goal of attaining sustainable development.

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Pro-active environmental measures minimize the chance of impacts taking place during the construction and operational phase. There is still the chance of accidental impacts taking place; however, through the incorporation of contingency plans (e.g., this EMP) during the planning phase, the necessary corrective action can be taken to further limit potential impacts. In order to meet this goal, action plans for planning and design stages of the project must be identified together with monitoring requirements.

3.1.2 The Construction Phase

The bulk of the impacts during this phase will have immediate effect (e.g., noise-, dust- and water pollution etc.) If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the contingency plans identified in the planning phase, together with a commitment for sound environmental management from Johannesburg Water and its agents.

3.1.3 Rehabilitation and Reinstatement Phase

This phase will involve restoring the land impacted during the construction phase back to its original state (in the case of slopes, gradients, soil profiles, and hydrology) or better. This process will be mainly on rectifying the negative impacts that have been caused during construction by the removing pollution or contaminants and other dangerous substances from groundwater, sediment, or surface water and improvement of the soil.

3.1.4 The Operational Phase

By taking pro-active measures during the planning and construction phases, potential environmental impacts emanating during the operational phase will be minimised. This, in turn, will minimise the risk and reduce the monitoring effort, but it does not make monitoring obsolete.

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4. ROLES AND RESPONSIBILITY

The implementation of this EMP requires the involvement of several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during the construction and operational phases. The stakeholders are discussed below:

4.1 Johannesburg Water and its Agents shall:

Ensure that the EMP is kept on JW's Sites and construction sites.

- Remain ultimately responsible for ensuring that the development is implemented according to the requirements of the EMP.
- Ensure that the Environmental section attends all project related tender briefing sessions.
- Although Johannesburg Water appoints specific role players to perform functions on its behalf, this responsibility is delegated.
- Be liable for restoring the environment in the event of negligence leading to damage to the environment.
- Ensure that the EMP is included in the tender documentation so that the contractor who is appointed is bound to the conditions of the EMP, and there's sufficient budget for environmental assessments and/or assessment during the planning, design, construction, replacement of vegetation and restoration of habitats, decommissioning (rehabilitation) phases of the project.
- Ensure that the contractor appointed understands, acknowledges and fully accepts the content of this EMP and their responsibilities for implementation and compliance.
- Monitor compliance with the conditions of the environmental authorisation and the EMP and compliance audits are undertaken.
- Ensure that the Environmental section signs all close out reports to confirm rehabilitation.

4.2 Appointments and competencies

- The contractor and its appointed sub-contractor must meet the relevant legislative and non-statutory appointments, which must be maintained valid for the entire contract duration.
- All appointees shall be suitably trained and certified competent for the responsibilities they are assigned for.

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- Copies of all relevant appointments and the relevant competence certificates must be kept in the relevant Environmental file.

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Table 1: Environmental Officer's Appointment Index

Appointment	Project Type	Legislative Ref	Competency requirements (Min)
Contractor SHE Officer	Unauthorised Project	JW EMP/ JW Waste Management Procedure	National Diploma in Safety & ISO14001:2015 (Introduction/Awareness, implementation, and auditing ISO14001:2015) + 2 years' Experience OR National Diploma in Environmental Management + 2 years' Experience OR NEBOSH / SAMTRAC & Basic ISO14001:2015/ Basic Environmental Awareness (Introduction and Implementations to ISO14001:2015) + 4 years' Experience. Register with SACPCMP.
Contractor Environmental Liaison Officer/Environmental Officer	Authorised project	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	National Diploma in Environmental Management/ + 3 years' Experience. BA/BSc Environmental Management + 3 years' experience. The recommended and/or market related minimum Salary/wages for ELO/EO should be R17 000.00.

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Environmental Representative/Environmental Rep	Unauthorised Project	JW EMP	Must hold a Senior Certificate (Matric) and one of the following qualifications. National Diploma in Environmental Management/ BA/BSc Environmental Management or Science/ISO 14001:2015(Introduction; Implementation and Auditing/Certificate in Environmental law/National Certificate in Environmental Management. The recommended and/or market related minimum salary/wages for Environmental Representative should be R10 000.00.
Consultant Environmental Control Office	Authorised project (as and when required)	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	Reputable Environmental Consulting Company National Diploma or BA/BSc Environmental Science or Management + 3 years' experience as an independent ECO/Consultant
Landscaping Specialist	Unauthorised and Authorised project	JW EMP and Project Specific approved EMP /Directives/Environmental Authorisation/GA/WUL	Reputable Environmental Consulting firm /Landscaping Company.

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			Landscaping Specialist should at least have BA/BSc Honours Degree or 4-year Degree in Natural Sciences/Ecological. - The Landscaping Specialist must at least be registered with South African Council for Natural Scientific Professions (SACNASP) as a Professional Natural Scientist (Copy of SACNASP Certificate must be submitted). - Specialist should at least have a minimum of five (5) years working experience as landscaping Specialist (See Table).
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4.3 The Contractor shall:

- Be bound to conform to the EMP conditions through his/her contract with Johannesburg Water, and is responsible for ensuring that he adheres to all the conditions of the EMP.
- Thoroughly familiarise with the EMP requirements before construction begins and must request clarification on any aspect of these documents, should they be unclear.
- Be responsible for mitigation and rehabilitating all environmental damage at his/her expense.
- Ensure adherence to, and implementation of, the environmental management specifications.
- Ensure that environmental damage, whether intentional or unintentional, is prevented in the first instance, mitigated and rehabilitated, and must adopt a proactive approach followed by a reactive approach.
- Ensures identification of, and compliance with, all environmental laws, all by laws and regulations.
- Ensure that any instructions (whether verbal or written) issued by the site manager, project manager, site engineer or EO, in terms of the EMP is adhered to.
- Ensure that an environmental compliance report is tabled at each site meeting, which must document all incidents, complaints, and non-compliances, and their close out progress, which has occurred during the period before the site meeting.
- Provide a photographic report to JW upon request showing close out of identified issues.
- Provide any project or compliance information that may be requested by JW in any format as requested.
- Ensure that proposed site camp areas are approved by JW environmental section prior to establishment.
- Ensure compliance with the EMP conditions even if there will be no site camps or the project is an emergency or subject to Directives.
- Take comprehensive site photographs for before, during and after construction.
- Ensure that each individual resident/landowner/stakeholder requirement is documented, pertaining to the area to be disturbed, special features, vegetation to be disturbed, rehabilitation requirements (contractors must state to residents/stakeholders that indigenous vegetation species will be put

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back, however, should residents/stakeholder require non-indigenous species to be replaced, these are to be documented before being affected) prior to any disturbance.

- Provide a detailed, site-specific method statement for rehabilitation, which must be approved by JW Engineer and EO.
- Ensure that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting.
- Ensure that incidents register is kept in the site office.
- Ensure that a register of all public complaints is maintained.
- Ensure that all employees, including those of sub-contractors receive Environmental Induction before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMP (i.e., ensure their staff are appropriately trained as to the environmental obligations).
- Ensure that all disturbed areas are rehabilitated and at least 85% healthy grass/ground cover has established, that rehabilitation is maintained, the sites are free of erosion, waste and pollution of any kind including rubble and spills, and free of weeds and alien invasive species.
- Appoint an Environmental Liaison Officer (ELO) prior Construction for Environmental Authorised Projects.
- Appoint SHE Officer prior Construction for unauthorized projects i.e., the SHE Officer with Environmental Management experience or be trained on Environmental legislation.
- Provide accurate and factual information pertaining to the projects, communications, and discussions at all times.
- Is responsible for NEMA Duty of Care, and Polluter pays principle.

4.4 Environmental Liaison Officer (ELO)/ SHE Officer shall:

- Ensure that the project team is involved in all aspects of project planning that can influence environmental conditions on the site.
- Be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMP requirements and ensuring that the environmental specifications are adhered to.

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- Assist with day-to-day monitoring of the construction activities. Ensure that any issues raised by the EO will be routed to the SHE Officer for the contractors' attention.
- The ELO/ SHE Officer shall be permanently on site during the construction phase to oversee the Contractor's internal compliance with the EMP requirements and ensuring that the environmental specifications are adhered to.
- Be responsible for keeping detailed records of all site activities that may pertain to the environment and include all these aspects in an environmental register.
- Maintain site documentation and records related to environmental management (EMP, authorisations, permits, way-eaves, method statements, audit reports, monitoring results, receipts for waste removal, environmental file, etc.)
- The ELO/SHE Officer must keep a register of complaints from any community members on environmental issues.
- The ELO /SHE Officer will be required to keep a record of all on-site environmentally related incidents and how these incidents were dealt with.
- Ensure daily implementation of the EMP conditions, and monitoring of the contractor's compliance with EMP conditions, using checklists and visual inspections.
- Provide location details for possible site camp locations to JW environmental section and await approval from this section before establishing.
- Inform JW environmental section when actual work is about to commence.
- Inform JW environmental section of pending completion activities and intention to de-establish, prior.
- Ensure proper rehabilitation is undertaken before site closure.

4.5 Resident Engineer (RE)/ Site Agent shall:

- Liaise with the Contractor and Environmental Officer (EO) on environmental matters, as well as any pertinent engineering matters where these may have environmental consequences.
- Oversee the general compliance of the Contractor with the EMP and other pertinent site specifications.

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- Familiarise him/herself with the EMP specifications and further monitor the Contractor's compliance with the Environmental Specifications daily through the Site Diary and enforce compliance.
- Ensure that Monthly Audits reach the contractor before Monthly Progress Meeting.
- Ensure proper rehabilitation is undertaken before site closure.

4.6 Project Engineer /Inspectors (PE/PI) shall:

- Ensure that there is a sufficient budget for complying with all EMP conditions at the tender stage.
- Ensure sufficient budget is provided for rehabilitation/ Reinstatement.
- Ensure proper rehabilitation is undertaken before site closure.
- Ensure of all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- Ensure that Contractor(s) are made aware of all stipulations within the EMP.
- Ensure that the EMP is correctly implemented throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Be fully conversant with the EIA for the project, the EMP, the conditions of the Environmental Authorisation (if applicable), and all relevant environmental legislation.
- Ensure compliance monitoring of contractors on a day-to-day basis.
- Ensure adherence and implementation of the tender requirements.
- Ensure reference of specific non-compliance/non-conformance issues to the responsible units and/or contractors.

4.7 Environmental Officers shall:

- Be responsible for informing the contractors of any decisions that are taken concerning environmental management during the project phase.
- This would also include informing the contractors of the necessary corrective actions to be taken, issuing stop work orders and rehabilitation and remediation instructions if necessary.
- Liaise with environmental authorities where necessary.
- Review all the environmental documents submitted by the Contractor, including sign off.

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- Review all the environmental documents from the Contractor, including sign off.
- Conduct environmental monthly audits of all contractors' work on site where necessary
- Maintain site documentation of related to environmental management (EMP, Method statements, audit reports, monitoring results, receipts of waste removal etc.). Documents to be maintained on the relevant site Documents Control Systems.
- Inspect and report on environmental incidents and check corrective actions.
- Conduct environmental incidents enquiries.
- Review and sign off method statements prepared by Contractors.
- Ensure that an environmental compliance monitoring strategy/framework is implemented.

4.8 Environmental Control Officer (ECO)

The role of the ECO shall be to:

- Act as site 'custodian' for the implementation, integration, and maintenance of the EMPr in accordance with the contractual requirements.
- Ensure successful implementation of the EMPr; and
- Ensure that the Contractor, his employees and/or Subcontractors receive the appropriate environmental awareness training prior to commencing activities.

The responsibilities of the ECO will be to:

- Liaise with the JW Environmental Section and Project Engineer on the level of compliance with the EMPr achieved by the Contractor on a regular basis for the duration of the contract.
- Advise the Project Engineer on the interpretation and enforcement of the Environmental Specifications (ES), including evaluation of non-compliances.
- Enforce compliance with the EA and EMP through audit report and checklist
- Supply environmental information as and when required.
- Review and approve Method Statements produced by the Contractor, in conjunction with the PM and EO.
- Monitor any basic physical changes to the environment because of the construction works according to an audit schedule.

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- Attend regular site meetings and project steering committee meetings.
- Undertake regular monthly audits of the construction works and to generate monthly audit reports. These reports are to be forwarded to the JW EO who will communicate the results and conclusions with the principal Contractor.
- Submit audit reports to the authority as per the requirement of issued Environmental Authorisation.
- Communicate frequently and openly with the Contractor and the Project Engineer to ensure effective, proactive environmental management, with the overall objective of preventing or reducing negative environmental impacts and/or enhancing positive environmental impacts.
- Advise the Project Engineer on remedial actions for the protection of the environment in the event of any accidents or emergencies during construction, and to advise on appropriate clean-up activities.
- Review complaints received and made instructions as necessary; and
- Identify and make recommendations for minor amendments to the EMP as and when required.

4.9 Environmental Representative (Environmental Rep) shall:

- Review the effectiveness of environmental measures in the workspace/construction environment for which he/she was appointed.
- Identify potential impacts in the workplace.
- Investigate environmental incidents and identify root causes.
- Investigate Environmental Complaints.
- Conduct Awareness training.
- Participate in Environmental inspections.
- Ensure compliance with JW EMP and other environmental management related legislations.
- Ensure Proper Rehabilitation is conducted.
- Attend site SHE meetings where Environmental issues are addressed.
- Guide Construction crew/team on environmental requirements as per JW EMP.
- Assist in day-to-day monitoring of construction activities.

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- Assist in implementation of ISO 14001:2015 standard.
- Assist the SHE Officer/EO with preparation of audits /inspections.

5. CONTENTS FOR CONTRACTOR'S ENVIRONMENTAL FILE

The following documents must be submitted by the contractor in the Environmental file before Construction commences on site. The file must be submitted to the Environmental Section prior construction for approval. The Contractor should achieve a minimum score of 80% for the file to be approved (**Refer to Annexure B: Environmental File Specification**).

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6. ENVIRONMENTAL SPECIFICATIONS

Table 2: Environmental Management and Mitigation Measures that must be implemented during the Design Phase and Construction Phase

Design Phase Measures						
Aspects	ID	Mitigation Measure/Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance indicators
Project Planning/Design	1	- Proposed project is submitted to Environmental Section for screening (Project scope/layout/Maps), - CAPEX and Ops must ensure that there is budget allocated for environmental management throughout the project life cycle i.e., planned project and Directives.	Johannesburg Water (CAPEX/Ops)	Before project commences	- Screening report - Tender document	Keep the records of the project screening report and scope of work as per Directives
Authorisation	2	- Appoint Consulting Company - Ensure that all required licences and permits have been obtained before the start of construction. - Ensure that ECO and/or ELO is appointed as per the authorisation and EMP requirement during project execution (as when and required).	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Keep record of all permits, licences and authorisations	Keep record of all permits, licences and authorisations
Project Handover	3	- The scope of a project is outlined by CAPEX Engineer during the handover meeting. - Environmental Management Requirements are outlined during the handover meeting.	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Meeting invite EA/GA/WUL/ Screening report	Keep record of all permits, licences and authorisations
Environmental Awareness Training/Induction s	4	- Environmental awareness training is given to the Project Team Leaders - Environmental File Specification provided to the Contractor. - JW Environmental Management Plan and other procedures are provided to the Contractor.	Johannesburg Water (CAPEX/ Environmental Section)	Before construction commences	Meeting invite	Meeting records

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Environmental File & Evaluation	5	- Contractor submits environmental file for approval prior work commences on site. - Construction activities/work (including site establishment) should ONLY commence when file is approved.	Appointed Contractor/Environmental Section	Before construction commences	Environmental evaluation report.	Approval/ rejection letter records
Construction Phase Measures						
Aspects	ID	Mitigation Measure/Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance indicators
Site camp establishment	1	- Invite the Environmental Officer for the site inspection of proposed site camp prior establishment. - Submit a method statement for Site Camp establishment for approval by JW Environmental Officer/ECO prior commencement of works. - Establish a suitably fenced Site Camp at the start of the contract, which will allow for site offices, vehicle, equipment, material, and waste storage areas to be consolidated as much as possible. Locate the Site Camp at a position approved by the JW EO, at least 100m from watercourses and in an area which is not ecologically sensitive. - Provide water and/or washing facilities at the Site Camp for personnel. - Limit construction and lay down areas to areas within the development footprint. - Ensure that environmentally friendly on-site sanitation options are selected, and these facilities are properly managed and maintained. - Designated eating areas shall be provided on site. - These eating areas shall be clearly demarcated and shall be provided with bins with lids.	All Contractors	Before commencement of Project	- Visual inspection - Site establishment checklist/Method statement	Method statements approved by CAPEX and the Environmental Officer - Position of Site Camp approved by ECO - Security and access to Site Camp controlled - Clear demarcation of no-go areas as agreed with JW EO. - Detailed site layout plan - Environmental file approval letter.

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		- Staff will be prohibited from consuming meals anywhere other than at these eating areas and that noise is limited. - All eating areas shall include provision for a water and smoking area.				
Environmental Awareness Training	2	- Provide environmental awareness training to all personnel on site at the start of their employment. Training should include discussion of: - Potential impact of construction waste and activities on the environment. - Suitable disposal of construction waste and litter. - Key measures in the EMPr relevant to worker's activities. - How incidences and suggestions for improvement can be reported. - Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names.	All Contractors	- Before workers start working onsite - Before new activities are undertaken	- Check training attendance register - Observe whether activities are executed in line with EMPr requirements	- Proportion of workers that completed. - Environmental training Compliance of workers with EMP
Plant Search and Rescue/Vegetation clearing	3	- From information gathered during the plant marking exercise, establish the size. - Requirements for the plant rescue team workforce, and the methodology to be employed during the rescue to maximise the likelihood of success; Document and motivate which species found on site are considered to be conservation worthy. - Follow a multi-pronged approach to maximise the likelihood of success wherever feasible. In addition to transplanting of whole plants, seed can be collected and sown in situ in suitable habitats and/or in an off-site nursery. - Any plants not suitable for transplantation must be considered for transplanting to existing conservation	All Contractors	Before commencement of activities	Visual Inspection/ inspection by Botanist/Ecologist	- Incidents of harm coming to fauna/ flora. - Number of incidents of disturbance of vegetation outside construction site boundary; and - Size of area cleared relative to

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		areas nearby. This could involve growing these plants on in an off-site nursery for a period of time. - Depending on the conservation worthy species found, the location of suitable existing conservation areas nearby and the location of the off-site nursery, the most appropriate plant rescue options must be detailed in the search and rescue plan, and could be a combination of the following options: - All required permits must be obtained from the appropriate authority covering plants to be affected by the plant rescue operation prior to the removal of the plants. - Demarcate the area for construction prior to each phase and prevent access by construction personnel outside of this area. - Appoint a suitably qualified botanist to undertake search and rescue of key plant species in the development footprint where necessary (Where is applicable. Clearly demarcate sensitive areas, including buffers, with appropriate signage. - Do not allow personnel to enter calcrete vegetation areas. - Do not allow personnel to pick or destroy plants outside of the construction footprint. - Limit clearing to those areas within the footprint of construction for each phase. - Restrict construction vehicles to designated roadways. - Do not allow the temporary storage of building material within sensitive areas. Aftercare and monitoring				development footprint - Size of area disturbed outside of construction site boundary. - Areas of development footprint must be clearly demarcated
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		- Record numbers and diversity of propagated plants and the health of the same, until they can be planted out; - Aftercare of transplanted plants to be done in accordance with the plant search and rescue plan by an appropriate agent (e.g., staff from the commercial nursery or an appropriately trained onsite Contractor), including watering and alien plant control requirements. If done correctly, the frequency of input will decrease with time. - Record numbers and diversity of transplanted plants and the health of the same. - Monitoring must be undertaken as per requirements of the plant search and rescue plan approved by GDARD, including monitoring of alien plants and maintenance of a photographic record; and - Provide a detailed record (including photographic record) that indicates the success of the plant rescue operation. Records of corrective action taken to improve management of transplanted plants, where relevant, must also be completed. Applicable Legislation - National Environmental Management Act: Biodiversity Act (Act 10 of 2004) including Threatened or Protected Species Regulations. - National Environmental Management Act (Act 107 of 1998). - Gauteng Nature Conservation Bill, 2014/Transvaal Nature Conservation Ordinance 12 of 1983; and - National Forests Act (Act 30 of 1998).				
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ENVIRONMENTAL MANAGEMENT PLAN

Excavation	4	- The process of excavation and back filling must be carried out as a sequential process following one another as quickly as possible. - Excavations must only remain open for a minimum period of time and during this time they must be clearly demarcated. If excavations place the public at risk these sites must be fenced. - Where possible, close excavations immediately after pipe is laid. - The residents directly affected by open trenches must be notified of the dangers. This will be done during the site-specific phase. - Danger tape shall not be utilised to prevent personnel from open excavations, orange nets should be used for all open excavations on site. Construction vehicles should avoid creating new roads, use existing roads. - Wet exposed surfaces using a water cart, bowser or use a biodegradable and environmentally friendly soil binder to prevent dust emissions. - Dewater excavations regularly and channel water to areas of grass cover. If dewatering is near/within a watercourse and is to be discharged to a watercourse, ensure a silt fence/net and sandbags are used to reduce silt loads. - Topsoil must be cleared (considered to be the upper 150mm of soil surface) and retained as it contains most inorganic matter and nutrients. Topsoil must be kept separate from subsoil and stored in windrows parallel to excavations. - Harvested grass should be retained and used as a mulch to combat erosion.	All Contractors	Throughout construction	Visual inspection	- Daily site inspection. - Damage to the environment (sensitive environment)
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ENVIRONMENTAL MANAGEMENT PLAN

		• Soil should be exposed for the minimum time possible once cleared of indigenous or invasive vegetation. • Avoid prolonged exposure of soils to wind and water erosion when clearing and grubbing. • The stockpiled topsoil (which will be left standing for more than 1 month) must be covered with suitable fabric, and / seeded, to prevent erosion and weed invasion. • Stockpiled topsoil must be covered with suitable fabric to prevent erosion and weed invasion. • No vehicles are allowed to access onto the stockpiles after they have been placed. • Topsoil and subsoil must be kept separate throughout construction and rehabilitation. • A marsh wire or snow netting shall be erected around the exposed excavations to warn the public. • The contractor must rip and rehabilitate temporal roads after project completion. • The Contractor shall be in possession of an emergency oil and chemical spill kit, drip trays and bioremediation substances/enzymes that must be complete and available on site at all times.				
Topsoil and subsoil	5	• The contractor should remove 150mm of topsoil and stockpile at a height of not more than 1m. • Topsoil should be temporarily stockpiled, separately from (clay) subsoil and rocky material, when areas are cleared. If mixed with clay sub-soil the usefulness of the topsoil for rehabilitation of the site will be lost. • Stockpiled topsoil should not be compacted and should be replaced as the final soil layer. No	All Contractors	During Vegetation clearance	Visual inspection	• Incident of incorrect storage and harvesting. • Manifestation of alien invasive plants. • Incident of erosions.

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		vehicles are allowed access onto the stockpiles after they have been placed. • Stockpiled soil should be protected by erosion-control berms if exposed for a period of greater than 14 days during the wet season and seeded. • Topsoil must be hydro seeded during shut down in December. • Topsoil stripped from different sites must be stockpiled separately and clearly identified as such. • Topsoil obtained from sites with different soil types must not be mixed. • Topsoil stockpiles must not be contaminated with oil, diesel, petrol, waste or any other foreign matter, which may inhibit the later growth of vegetation and micro-organisms in the soil. • Soil must not be stockpiled on drainage lines or near watercourses without prior consent from the Project Manager. • Soil should be exposed for the minimum time possible once cleared of invasive vegetation, that is the timing of clearing and grubbing should be co-ordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. • Stockpiled topsoil must be either vegetated with indigenous grasses or covered with a suitable fabric to prevent erosion and invasion by weeds. • Limited vehicular access is allowed across rocky outcrops and ridges. • All cut and fill surfaces need to be stabilized with appropriate material or measures when major civil works are complete. • Erosion and donga crossings must be dealt with as river crossings. Appropriate soil erosion and control				
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		procedures must be applied to all embankments that are disturbed and destabilized as per the Authorisation • All equipment must be inspected regularly for oil or fuel leaks before it is operated. Leakages must be repaired on mobile equipment or containment trays placed underneath immobile equipment until such leakage has been repaired. • Soil contaminated with oil must be appropriately treated and disposed of at a permitted landfill site or the soil can be regenerated using bio-remediation methods. • Runoff must be reduced by channelling water into existing surface drainage system.				
Protection of archaeological and heritage resources	6	• Alert the construction workforce of the potential existence of artefacts at the site. • Empower staff to stop works on (chance) discovery of artefacts at the site. • Cease construction on (chance) discovery of archaeological sites of heritage importance or redirect machinery away from finds until an archaeologist is able to make a site inspection and establish the importance of the find and make recommendations for preservation and/or record keeping. • Report the presence of graves or human remains, fragments of fossil bone, ostrich egg and stone fragments to HWC. • Obtain a permit for the removal of artefacts from the site if any are discovered during construction.	All Contractors/Joburg Water	• Before Construction commences • During earthworks	Visual inspection	• Discovery of possible archaeological material • Rescue and reporting of identified material when discovered
Protection of paleontological resources	7	• Identify a stand-by palaeontologist to inspect fossils if they are discovered during construction activities.	Johannesburg Water	Prior commencement	Visual inspection	• Discovery of possible

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ENVIRONMENTAL MANAGEMENT PLAN

		- Empower staff to stop works on (chance) discovery of fossils at the site. - Alert the construction workforce of the potential existence of fossils at the site. - Cease construction on (chance) discovery of fossils and artefacts of paleontological importance or direct machinery away from finds until the identified palaeontologist is able to make a site inspection and establish the importance of the find and make recommendations for preservation, collection or record keeping.	All Contractors	During earthworks		archaeological material. Rescue and reporting of identified material when discovered.
Concrete / cement Work/Batching plant	8	- Use Ready-Mix concrete rather than batching where possible. - Ensure that no cement truck delivery chutes are cleaned on site. Cleaning operations are to take place off site at a location where wastewater can be disposed of in the correct manner. If this is not possible a suitable washing facility is to be developed on site in consultation with the ECO. - Concrete must be mixed only in an area demarcated for this purpose, ideally on an impervious surface (e.g., cement mixing pit). - Batching operations to take place in a designated area, which will be kept clean at all times. - All concrete spilled outside this area, must be promptly removed by the Contractor and taken to a permitted waste disposal site. - After all concrete mixing is complete; all waste concrete must be removed from the batching area and disposed of at an approved dumpsite. - Ensure separation of clean and dirty water from batching plant.	All Contractors	Throughout construction	Visual inspection and JW EO/ECO approval.	- Number of incidents of batching outside works footprint. - Contamination of water and soil; and - Visible litter / waste on site.

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		- Storm water must not be allowed to flow through the batching area. Water laden with cement must be collected in a retention area for evaporation and not allowed to escape the batching area. - Operators must wear suitable safety clothing. - Wastewater from batching operations to be suitably disposed of. - Waste concrete and cement sludge to be removed on a regular basis (to prevent overflowing) and to be disposed of at a suitable facility. - Unused cement bags will be stored in an area not exposed to the weather and packed neatly to prevent hardening or leakage of cement. - Used cement bags will be stored so as to prevent windblown dust and potential water contamination. Used bags will be disposed of adequately at a licenced waste disposal facility. - Limit concrete batching to single sites where possible. - Concrete transportation will not result in spillage. - Cleaning of equipment and flushing of mixers will not result in pollution, with all contaminated wash water entering the wastewater collection system. - To prevent spillage onto roads, ready mix trucks will rinse off the delivery shoot into a suitable sump prior to leaving the site. The Contractor shall ensure such designated concrete wash bay area's/ sumps are created and that all concrete trucks delivering concrete to site first empty and clean their shoots at this point before leaving the site. The dried waste product shall be handled as construction rubble.				
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ENVIRONMENTAL MANAGEMENT PLAN

		- Suitable screening and containment will be in place to prevent windblown contamination from cement storage, mixing, loading and batching operations. - All contaminated water and fines from exposed aggregate finishes will be collected and stored in sumps and will be adequately disposed of. - All visible remains of excess concrete will be physically removed on completion of the plastering or concrete pouring and disposed of in an acceptable manner. - Any spilled concrete to be cleaned up immediately. - In practice all wastes arising from construction activities are to be handled; transported and disposed of in accordance with the relevant regulations. All efforts should be made to minimise, reclaim or recycle waste, and failing that, dispose of it in a manner licensed by the government for that purpose.				
Water Management	9	- Con serve water wherever possible (e.g., ensure that areas are not watered excessively, and all leaking pipes are replaced and repaired immediately). - Adequate erosion, runoff and sedimentation prevention, control and mitigation measures must be instituted at all sensitive areas, such as embankments, slopes, river crossings/watercourses/drainage lines, wetlands, when excavations or disturbance occurs within these areas, within the buffers, beds, and banks. - These control measures must include use of silt fences/traps, sandbags, retention of vegetation, berms, immediate replacement of vegetation. Additionally, reno mattresses, riprap, stone pitching,	All Contractors	Throughout construction/post construction	Visual inspection	- Incidence of storm water contamination. - Visible leaks/ water wastage. - And Visible surface erosion.

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		gabions, use of geotextiles) e.g., biojute must be used at the direction of the JW Engineer. • Adequate sedimentation control measures must be instituted at any river crossings when excavations or disturbance of a riverbanks or riverbeds takes place. • Adequate sedimentation control measures must be implemented where excavations or disturbance of drainage lines of a wetland may take place. • All fuel, chemical, oil, etc. spills must be confined to areas where the drainage of water can be controlled. Use appropriate structures and methods to confine spillages such as the construction of berms and pans, or through the application of surface treatments that neutralise the toxic effects prior to the entry into a water course. • The drip trays and spill kits must be used to contain oil from spilling into the water. Ensure adequate drip trays are available. • During construction through a wetland or watercourse, the majority of the flow of the wetland should be allowed to pass downstream. • Vehicular traffic across wetland and watercourse areas must be avoided. • No dumping of foreign material in streams, rivers and/or wetland areas is allowed. • The wetland area and/or river must not be drained, filled or altered in any way including alteration of a bed and/or, banks, without prior consent from the DWS. The necessary licenses must be obtained in terms of Section 21 and 22 of the National Water Act, 36 of 1998 from DWS. • No fires or open flames are allowed in the vicinity of the wetland, especially during the dry season.				
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ENVIRONMENTAL MANAGEMENT PLAN

		- No swimming, washing (including vehicles and equipment), fishing or related activity is permitted in a wetland or river. - Disturbances to nesting, breeding and roaming sites of animals in or adjacent to wetland areas must be minimized. - Portable Water shall be the last resort info dust suppression on site.				
Air Pollution	10	- Speed limits must be implemented in all areas, including public roads and private property to limit the levels of dust pollution. - Dust must be suppressed on access roads and construction sites during dry periods by the regular application of water or a biodegradable soil stabilisation agent. Water used for this purpose must be used in quantities that must not result in the generation of run-off. - Where possible the use of potable water should be minimised for dust suppression purposes, preferably recycled or reused water. - The site-specific investigation will quantify the impact of dust on nearby wetlands, rivers and dams in terms of sedimentation. Mitigation measures identified during the site-specific study must be implemented. - The Contractor must notify the principal of all schools within 50m of the site of proposed activities. The principal must in turn ensure that children with allergies and respiratory ailments take the necessary precautionary measures during the construction period. The Contractor must ensure that construction activities do not disturb school	All Contractors	Throughout construction	Visual inspection	Visible air pollution.

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		activities e.g., dust clouds may reduce visibility affecting sports activities. - Waste must be disposed of, as soon as possible at a municipal transfer station, skip or on a permitted landfill site. Waste must not be allowed to stand on site to decay, resulting in malodours. - Noise control measures must be implemented. All noise levels must be controlled at the source. All employees must be given the necessary ear protection gear. IAP's must be informed of the excessive noise factors. - The Contractor must inform all adjacent landowners of any after-hour construction activities and any other activity that could cause a nuisance e.g., the application of chemicals to the work surface. Normal working hours must be clearly indicated to adjacent landowners. - No loud music is allowed on site and in construction camps. - No fires are allowed if smoke from such fires will cause a nuisance to IAPs.				
Social and cultural	11	- Access by non-construction people onto any construction sites must be restricted. The Contractors activities and movement of staff must be restricted to designated construction areas only. - The Contractors crew must be easily identifiable due to clothing, identification cards or other methods. - Rapid migration of job seekers could lead to squatting and social conflict with resident communities and increase in social pathologies if not properly addressed. The Contractor must ensure that signs indicating the availability of jobs are installed.	All Contractors	Throughout construction	Visual inspection	- Community complaints. - Complaints register. - Daily environmental inspection

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ENVIRONMENTAL MANAGEMENT PLAN

		- Criteria for selection and appointment (by the Contractor) of construction labour must be established to allow for preferential employment of local communities. The Local Authority must be actively involved in the process of appointing temporary labourers. - Sub-Contractors and their employees must comply with all the requirements of this document and supporting documents e.g., the Contract document that applies to the Contractor. Absence of specific reference to the sub-contractor in any specification does not imply that the sub-contractor is not bound by this document. - No member of the construction workforce is allowed to wander around private property, except within the immediate surroundings of the site. - The Contractor must provide suitable sanitation facilities for site staff. Sanitation provided during the construction phase should be managed so that it does not cause environmental health problems. The use of the surrounding veld for toilet purposes is not permitted under any circumstance. - The Contractor must arrange for all his employees and those of his sub-contractors to be informed of the findings of the environmental report before the commencement of construction to ensure: - A basic understanding of the key environmental features of the work site and environments, and - Familiarity with the requirements of this document and the site-specific report. - Supervisory staff of the Contractor or his sub-contractors must not direct any person to undertake any activities which would place such person in				
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		contravention of the specifications of this document endanger his/her life or cause him/her to damage the environment. - The demand for construction materials and supplies will have an effect on the local economy. This impact can be optimised by sourcing and purchasing materials locally and regionally wherever possible, insofar as the material complies with the design specification. - The Contractor must maintain a detailed complaints register. This must be forwarded, together with solutions, to the authorities when requested.				
Aesthetics	12	- Scenic Quality - Damage to the natural environment must be minimized. - The contractor may not remove any trees. If trees are in the way of the pipe route or with the development sites, the contractor must inform the environmental section who will then liaise with city parks for permission or recommendation. - Trees and tall woody shrubs must be protected from damage to provide a natural visual shield. Excavated material must not be placed on such plants and movement across them must not be allowed, as far as practical. - The clearing of all sites must be kept to a minimum and surrounding vegetation must, as far as possible, be left intact as a natural shield. - No painting or marking of natural features must be allowed. - Above-ground Structures (reservoirs, water hammer tanks, valve chambers, pump stations etc.)	All Contractors	Throughout construction	- Visual inspection. - Way-leaves	- Daily inspection - Environmental incident.

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		- All above ground structures should be located in areas where the visual impact from roads, houses etc. is minimised. - All above ground structures could be treated or painted to blend in with the natural environment. - Cut and fill areas, river and stream crossings and other soil stabilisation works must be constructed to blend in with the natural environment. - Natural outcrops, rocky ridges and other natural linear features must not be bisected. Vegetation on such features must, as far as possible, not be cut unless absolutely necessary for construction. - Excavated material must be flattened (not compacted) or removed from site. No heaps of spoil material must be left on site once the Contractor has moved to a new construction site. - Any complaints from IAP's regarding the appearance of the construction site must be recorded and addressed promptly by the Contractor.				
Fauna and Flora	13	Flora - All suitable and rare flora and seeds must be rescued and removed from the site. They must be suitably stored, for future use in rehabilitation. - The felling and/or cutting of trees and clearing of bush must be minimised. - Bush must only be cleared to provide essential access for construction purposes. - The spread of alien vegetation must be minimized. - Any incident of unauthorised removal of plant material, as well as accidental damage to priority plants, must be documented by the Contractor. - Woody vegetative matter stripped during construction must either be spread randomly	All Contractors	Throughout construction	- Visual inspection - Way-leave from City Parks. - Biodiversity permit from Gauteng Department of Rural and Development	- Environmental incident register - Daily inspection - Number of environmental incidents. - Fauna and flora removal and relocation register

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ENVIRONMENTAL MANAGEMENT PLAN

		throughout the surrounding veld to provide biomass for other micro-organisms and habitats for small mammals and birds, or it may be stockpiled for later redistribution over the reinstated top soiled surface. No vegetative matter must be burnt or removed for firewood other than those removed during the grubbing and clearing phase. Such vegetation can be made available to the local inhabitants to be used as firewood. - No tree outside the footprint of the Works area must be damaged. Fauna - No species of animal may be poached, snared, hunted, captured, or wilfully damaged or destroyed. - Snakes and other reptiles that may be encountered on the construction site must not be killed unless the animal endangers the life of an employee. - Anthills and/or termite nests that occur must not be disturbed unless it is unavoidable for construction purposes. - Disturbances to nesting sites of birds must be minimized. - The Contractor must ensure that the work site is kept clean and free from rubbish, which could attract pests.				
Infrastructure	14	- The relevant authorities must be notified of any interruptions of services, especially the Local Municipality, National Road Agency, Transnet, TELKOM, and ESKOM. In addition, care must be taken to avoid damaging major and minor pipelines and other services. - The integrity of property fences must be maintained.	All Contractors	Throughout construction	- Visual inspection - Wayleaves from different entities.	- Incident register. - Permit/ Way-leave register - Complaints register.

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		- No telephone lines must be dropped during the construction operations, except where prior agreement by relevant parties is obtained. All crossings must be protected, raised or relocated as necessary. - All complaints and/or problems related to impacts on man-made facilities and activities must be promptly addressed by the Contractor and documented. - Proper storage facilities should be provided for the storage of oils, grease, fuels, chemicals and hazardous materials. - The Contractor must ensure that accidental spillage does not pollute soil and water resources. - Fuel stock reconciliation must be done on all underground tanks to ensure no loss of oil, which could pollute groundwater resources. - Cement must be stored and mixed on an impermeable surface. - The Contractor shall ensure that existing services (e.g., roads, pipelines, and power lines and telephone services) are not damaged or disrupted unless required by the contract and with the permission of the RE. - The Contractor shall be responsible for the repair and reinstatement of any existing infrastructure that is damaged or services which are interrupted. - A time limit for the repairs may be stipulated by the RE in consultation with the Contractor.				
Blasting	15	- Blasting must not endanger public or private property. - Noise mufflers and/or soft explosives must be used to minimize the impact on animals.	All Contractors	Throughout construction	Visual inspection/ Engineer report	- Incident register. - Complaints register.

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		- All the provisions of the Explosives Act, 26 of 1956 and the Minerals Act, 50 of 1991 must be complied with. - The Contractor must take measures to limit fly rock. - Certificate of competence. In file - Blasting permit must be obtained from the South African police station issued in terms of section 9 of explosive Act, Act 26 of 1956) prior blasting. - Method statement for drilling and blasting (NB: Submitted for acceptance before any works) in file - Provide the MSDS's for the chemicals are to be used. - Proof of notification to the affected community. - The Appropriate PPE.				Permit register.
Workshops, storage areas and materials handling	16	- These areas shall be chosen so as to cause the least impact on the biophysical and social elements of the area. - The siting of workshops, maintenance and refuelling sites and materials storage areas shall not be in the vicinity of sensitive sites e.g., wetlands, cultivated fields or drainage lines, or where local landowners can be disturbed. - Storm water shall be diverted around the storage area. Storm water falling on the storage area shall be discharged if it meets the required water quality standards. - Proper storage facilities, placed on an impermeable surface, shall be provided for the storage of oils, grease, fuels, chemicals, and other hazardous materials to be used during the construction phase of the project. If fuel is required on site, it shall be stored in a secure area in a steel tank supplied and	All Contractors	Throughout Construction	- Visual inspection - Method statement for handling hazardous substances. - MSDS	- Hazardous substances register. - MSDS file - Spill register - Incident register.

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		maintained by the fuel suppliers. Leakage of fuel shall be avoided. • An adequate bund wall, 110% of volume, shall be provided for fuel and diesel areas to accommodate any spillage or overflow from these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil. • In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or container and Material Safety Data Sheets (MSDS's) will be made available for all hazardous chemicals. Before containers or storage facilities are erected, emergency procedures in the event of misuse or spillage that may negatively affect an individual or the environment will be in place. • The storage facilities (including any tanks) shall be surrounded by a bund wall, in order to ensure that accidental spillage does not pollute local soil or water resources. • The storage areas shall not be utilised for accommodation purposes and shall be access controlled. • The storage area shall be kept tidy, and the area shall be rehabilitated after use. • An inventory of any hazardous chemicals/substances (including that within equipment) kept on site, along with a description of possible ill effects and treatment of health-related afflictions resulting from accidents, shall be kept in the storage area as well as by the appropriate manager. These areas shall be securely fenced.				
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ENVIRONMENTAL MANAGEMENT PLAN

		• Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area. • A notice board with the contact details of the responsible party shall be displayed at the gate to the storage area. • The contractor shall ensure that any delivery drivers are informed of all procedures and restrictions required to comply with the EMP. Someone with an adequate understanding of the CEMP shall supervise drivers during delivery and off-loading. • All vehicles and machinery will be inspected for any leaks or malfunctions regularly. Vehicle servicing or repairs is prohibited from site, unless in an emergency. • Drip trays shall be inspected and emptied daily and serviced when necessary. In particular drip trays shall be closely monitored during rain events to ensure that they do not overflow. The contents must be disposed of at a recognised site. • All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage. • Workers shall be made aware of the health risks associated with any hazardous substances used (e.g., smoking near refuelling depots), and shall be provided with appropriate protective clothing / equipment in case of spillages or accidents. • Cement and other potential environmental pollutants shall be stored and mixed on plastic sheeting or ready-mix trucks shall be used. There shall be no opportunity for environmental contamination.				
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ENVIRONMENTAL MANAGEMENT PLAN

		- Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO. - The Contractor shall be in possession of an emergency spill kit that must be always complete and available on site.				
Waste Management	17	Methods for waste management and waste minimisation shall be implemented from the outset of the contract as per the Waste Management Plan to be submitted to Client. All personnel shall be instructed to dispose of all waste in the proper manner. A waste avoidance and minimisation approach will be encouraged for the duration of the project. The following steps in order will be applied. - Prevention – avoid and minimise waste - Recycle – reuse and recover all general waste - Treat – treatment to reduce toxicity reduce waste quantities - Dispose – waste removal into a registered landfill facility Solid waste Waste with the potential for market re-use will be stored in separate containers, this includes, scrap metal, used tyres and paper. This waste will be recycled wherever possible. Solid waste shall be temporarily stored in tip – poof metal drums or waste skips at an approved area on site for collection and disposal. This area shall be away from drainage lines or water courses. - All general waste drums or skips will be appropriately labelled GENERAL WASTE	All Contractors	Throughout Construction	- Visual inspection/Environmental inspection checklist. - Legal Documents: Transport certificate obtained from GDARD for transporting general or hazardous waste. - Transport certificate obtained from City of Johannesburg for transporting general waste within COJ. - Waste manifest/	- Littering - Soil contamination - Water pollution.

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ENVIRONMENTAL MANAGEMENT PLAN

		- A refuse control system shall be established for the collection and removal of refuse to the satisfaction of Client and ECO. - No waste shall be burned at the site offices or anywhere else on the site. - All building rubble shall be a) removed from the site and disposed of at an appropriate dumping site, or b) temporarily stored in a clearly demarcated area on site for future use. - All waste shall be disposed at an appropriate waste disposal facility. Litter - No littering by construction workers shall be allowed. During the construction period, the facilities shall be maintained in a neat and tidy condition and the site shall be kept free of litter. - Measures shall be taken to reduce the potential for litter and negligent behaviour with regard to the disposal of all refuse. - Littering, discarding or burying of any materials shall not be allowed on site. Hazardous waste - Hazardous waste shall be temporarily stored in tip – poof metal drums or waste skips at an approved area on site for collection and disposal. This area shall be away from drainage lines or water courses. - All hazardous waste drums or skips will be appropriately labelled.			waste disposal certificate/ weighbridge slip.	
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ENVIRONMENTAL MANAGEMENT PLAN

		- Hazardous waste must not be temporary stored on site for a period exceeding 90 days as per the National Environmental Management Waste Act (Act 59 of 2008) as amended in 2014) (Schedule 19 (2)). HAZARDOUS WASTE. - Hazardous waste such as bitumen, tar and oil shall be disposed of at a registered waste disposal facility. Special care shall be taken to avoid spillage of tar products such as tar prime or pre-coating fluid to avoid water-soluble phenols from entering the ground or contaminating water. - All used filter materials shall be stored in a secure bin for disposal off site. Any contaminated soil shall be removed and replaced with clean soil. Soil contaminated by oils and lubricants shall be collected and disposed of at a facility designated by the local authority to accept contaminated materials. - Used oil, lubricants, and cleaning materials from the maintenance of vehicles and machinery shall be collected in a holding tank and returned to the supplier. Water and oil shall be separated in an oil trap. Oils collected in this manner shall be retained in a safe holding tank and removed from site by a specialist oil recycling company for disposal at an approved hazardous waste disposal site. Oil collected by a mobile servicing unit shall be stored in the service unit's sludge tank and discharged into the safe holding tank for collection by the specialist oil recycling company. - Sludge should be managed in accordance with the Sludge Guideline 2010.				
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ENVIRONMENTAL MANAGEMENT PLAN

		- Sludge should be kept only at the drying bed and no sludge should be stored at a permeable ground or natural ground. - Hazardous waste shall be disposed of at a registered hazardous waste disposal site, disposal certificates shall be kept in the site file for record. Medical Waste - All medical waste will be contained in the special bins provided. All sharp needles must be separated from other medical waste, - All outdated and disused medicines will be disposed of as a hazardous medical waste or returned to the supplier for disposal. (Tablets and syrups will be crushed and/or dissolved before disposal as hazardous waste), - Medical waste used on personnel coming for treatment at the clinic are to be placed on a demarcated container storage room, - The Occupational Health Nurse (OHN) will notify a service provider for removal of the medical waste prior exceeding 90 days. - The service provider to provide Waste Manifest as well as the Safe Disposal Certificate, to the OHN who will maintain the copies of the waste manifest and safe disposal certificate. - The OHN will arrange for an approved hazardous waste disposal company to collect and dispose of this medical waste. The OHN is responsible for and authorised to keep all records in connection herewith (disposal certificates).				
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ENVIRONMENTAL MANAGEMENT PLAN

Ablution facilities	18	• Provide ablution facilities (i.e., chemical toilets) for all site staff at a ratio of 1 toilet per 15 workers (absolute minimum 1:25). • Secure all temporary/portable toilets to the ground within the Site Camp to the satisfaction of JW EO/ECO to prevent them toppling due to wind or any other cause. • Maintain toilets in a hygienic state (i.e., toilet dispensers to be provided, toilets to be cleaned and serviced regularly (by registered appropriate waste contractor), and toilets to be emptied before long weekends and builders' holidays). • Remove/ appoint an appropriate supplier to remove accumulations of chemicals and treated sewage from the site and dispose of at an approved waste disposal site or sewage plant. • Ensure that no spillages occur when the toilets are cleaned or emptied. Repeated incidents of spillage of chemicals and or waste (i.e., more than one incident), will require toilets to be placed on a solid base with a sump. • Ablution facilities must be located at least 50m from any watercourse. • Ablution facilities shall be provided on site. • The positioning of the ablution facilities shall be done in consultation with Client and shall be placed so that it cannot contaminate the natural streams and rivers. One toilet shall be provided per 10 staff members on site. Toilets shall be positioned within walking distance of wherever employees are employed on the site. Toilets shall be provided with locks and doors shall be secured to prevent the toilets from blowing over.	All Contractors	Throughout construction	• Visual inspection • Records of waste manifest/disposal certificates/ weighbridge slip	• Incidence of staff not using Facilities • Incidence of pollution
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ENVIRONMENTAL MANAGEMENT PLAN

	• The toilets shall be placed outside of areas susceptible to flooding. • Chemical toilets shall be serviced regularly by an authorised service provider and removed to a registered wastewater treatment works and disposal certificates shall be obtained from the waste disposal facility for each disposal and retained on site. • Polluted run-off must be discharged in the local sewerage main and not overland or into public streams. In instances where a sewerage main is not available, polluted run-off will be collected in sub-surface tanks and a reputable effluent removal contractor will be contracted to dispose of the waste in an environmentally acceptable manner. Official documentation shall be obtained from the waste disposal facility for each disposal and retained on site. • Toilets situated close to the site boundaries or within sight of residential areas shall be hidden behind screens or other cover as approved by the Engineer. • Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. • Only flushable toilets should be utilised on site. • If the Ablution facilities are to be connected to the Municipal sewer line, method statement and a letter for municipal tax and rates should be submitted to JW Environmental section and responsible Depot for approval. • A letter or agreement for disposing waste must be obtained from the applicable WWTW; this must be provided by service provider. Waste manifests, disposal certificates and service certificates are				
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ENVIRONMENTAL MANAGEMENT PLAN

		required; these must be provided by service provider. The contractor shall not appoint service providers who do not have registration certificates with GDARD and CoJ for transporting hazardous (and general waste), and copies of permits for landfills, and agreement letter from WWTW, to be used for disposals. The contractors themselves are encouraged to register as general and hazardous waste transporters, and open accounts with Pikitup, so disposal slips may be obtained.				
Access road and traffic control	19	Access Roads - The Contractor and the affected landowner must collaborate on the planning and construction of new access routes and the repair or upgrading of existing routes. - Access to the site must be controlled such that only vehicles and persons directly associated with the work gains access to the site. - Temporary access roads must not be opened until required and must be restored to its former state as soon as the road is no longer needed. Traffic Control - All reasonable precautions must be taken during construction to avoid severely interrupting the traffic flow on existing roads, especially during peak periods. - Before any work can start the Local Traffic, Department must be consulted about measures to be taken regarding pedestrian and vehicular traffic control and obtain proper road signage's	All Contractors	Throughout construction	- Method statement for access road and traffic control. - Way-leave	- Daily Inspection checklist. - Environmental incident. - Incident register.

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ENVIRONMENTAL MANAGEMENT PLAN

Electrical	20	- Measures must be taken during thunderstorms to protect workers and equipment from lightning strikes. - All tall structures must be properly earthed and protected against lightning strikes.	All Contractors	Throughout construction	- Permit - OHS approval letter - Wayleave	- Approval letter - Electrical certificate
Development Footprint	21	- The development footprints and disturbed areas surrounding the proposed project infrastructure should be kept at minimum as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum. - The extent of all development footprint areas and permanent/ temporary structures must be limited to what is essential. - As far as possible, existing roads are to be utilised, to limit cumulative impacts from roads and traffic. - The height of any temporary structures such as topsoil stockpiles should be kept as low as possible below 1m.	All Contractors	Throughout construction	- Agreement letter. - Wayleave	- Incident register. - Complaints register.
Fire Prevention	22	- The Contractor must take all the necessary precautions to protect the materials on site and to avoid veld fires. - No fires or open flames are allowed on site unless directly used for construction purposes, - Review all SANS standards relating to fire precautions and fire control namely, SANS 0131-3 Section 8 and SANS 089-1 or as amended. - The Contractor must have fire-fighting equipment and a first aid box available on site and on all vehicles working on site. - All waste bins must be kept away from fuel tank installations.	All Contractors	Throughout construction	- Visual inspection - Emergency Response Plan.	- Fire extinguisher inspection checklist. - Incident register - Mock drill report.

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ENVIRONMENTAL MANAGEMENT PLAN

		- All fuel tanks must be installed above ground, depending on the volume of stored fuel, for easy detection of fuel leaks. - Any welding or other sources of heating of materials must be done in a controlled environment, wherever possible and under appropriate supervision, in such a manner as to minimise the risk of veld fires and/or injury to staff. - Fires lit for comfort (warmth) must be actively discouraged by the Contractor, due to the risk of veld fires and the risk to adjacent properties. Also, no waste material must be burnt.				
Noise Pollution	23	- Temporary noise pollution due to construction works should be controlled by proper maintenance of equipment and vehicles and tuning of engines and mufflers. Construction works should be completed in as short a period as possible by assigning qualified engineers and foremen. - It is the responsibility of the Contractor to monitor for the mitigation of such impacts. Noise problems should be reduced to normally acceptable levels by incorporating low-noise equipment in the design and/or locating such mechanical equipment in properly acoustically lined buildings or enclosures. In the presence of adequate buffer zones between the facility and residential areas, noise control measures must be minimized.	All Contractors	Throughout Construction	Random noise measurements	- Results of random noise measurements - Number of registered complaints
Complaints	24	Maintain complaints register for all complaints. The register must list: - Complainant name and contact details. - Date complaint was lodged. - Person who recorded the complaint. - Nature of the complaint.	All Contractors	Throughout construction	Complaints register	- Availability of register on site - Designated person to maintain register

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ENVIRONMENTAL MANAGEMENT PLAN

		• Actions taken to investigate the complaint and outcome of the investigation. • Action taken to remedy the situation. • Date on which feedback was provided to complainant.				• Complaints logged • Complaints followed up and Closed out.
Housekeeping	25	• All construction and operational areas must be kept in a neat and orderly condition at all times. • An efficient removal system of waste and rubble must be ensured during all development phases. • All operational facilities, including vehicles, should be actively maintained. • Any areas for material storage, waste sorting and other potentially intrusive activities must be screened from view as far as considered feasible. • Regularly inspect all construction machinery and holding tanks for leaks or damages. • Place generators on drip trays. • Repair any defects as soon as possible. In the case of leaks, ensure that the leaking water or effluent is captured and not released into the environment. • Service and refuel equipment that uses hydrocarbon fuels, oils, lubricants, and other hazardous chemicals at the designated area at the Site Camp only under conditions approved by JW EO/ECO • Ensure that absorbent pads (or equivalent) and/ or drip trays are available to collect any oil, fluid, etc. in the case of a breakdown or emergency repair outside the designated area. Keep a copy of fuels and hazardous substance inventory on site. • Keep spill containment and clean-up equipment at all work sites and for all polluting materials used at the site.	All Contractors	Throughout	Visual inspection of site camp/ construction site	Regular inspection reports by SHE Officer and JW EO

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ENVIRONMENTAL MANAGEMENT PLAN

		- Prevent discharge of any hazardous substances or pollutants, such as cements, concrete, chemicals, and other contaminated wastewater and fuels into the ground, surface, or storm water systems on site. - Control litter and keep construction areas as clean and neat as possible.				
Transportation and refuelling	26	- Undertake regular maintenance of vehicles and machinery to identify and repair minor leaks and prevent equipment failures. - Undertake any on-site refuelling and maintenance of vehicles/machinery in designated areas. Line these areas with an impermeable surface and install oil traps. - Ensure that oils and lubricants used for maintenance of equipment in the field are correctly contained. - Use appropriately sized drip trays for all refuelling and/or repairs done on machinery – ensure these are strategically placed to capture any spillage of fuel, oil, etc. - Use drip trays under all equipment and plants that are parked overnight or for long periods. - Store and handle fuels, oils and chemicals so as to avoid the risk of spillage, i.e., in waterproof and impervious	All Contractors	Throughout Construction	Visual inspection of vehicles, barges, machinery and refuelling / maintenance areas	- Incidence of non-compliance - Incidence of leaks and spills - Cost of cleaning up spills
Safety and Security	27	- Do not allow any open fires on the site. - Do not allow smoking on the site except within designated areas. Suitable fire-fighting equipment must be readily available in these areas. - Equip all fuel stores and waste storage areas with fire extinguishers.	All Contractors	Throughout construction	- Inspect attendance register for training sessions - Inspect fire extinguishers	- Number of fire incidents - Certified extinguishers in appropriate locations

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ENVIRONMENTAL MANAGEMENT PLAN

		- Ensure that all personnel on site are aware of the location of fire-fighting equipment on the site and how the equipment is operated. - Suitably maintain fire-fighting equipment. - Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing construction. - Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site. - Secure the Site Camp, particularly to restrict - Unauthorised access to fuels and other hazardous substances. - Provide suitable emergency and safety signage on site and demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations, etc.). - Advise the ECO of any emergencies on site, together with a record of action taken.	All Contractors	Before and during construction	and certificates Visual inspection	Number of safety / emergency incidents.
Response to environmental pollution	28	- In the event of environmental pollution, e.g., through spillages, immediately stop the activity causing the problem. - Maintain relevant Material Safety Data Sheets (MSDS) at the site for all potentially hazardous substances (as defined in the regulations for hazardous chemical substances). In the event of an emergency, procedures detailed in the MSDS shall be followed. Clean up any spills immediately, through containment and removal of free product and appropriate disposal of contaminated soils.	All Contractors	Throughout construction	- Maintain register of pollution events and response - Following resumption of activities, frequently inspect repaired	- Number of incidents - Time activities stopped - Number of recurring Incidents - Availability and completeness of register

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		- Immediately remediate and rehabilitate areas in the event of a spill of an environmentally hazardous substance. - Only resume activity once the problem has been stopped or (in the case of spillages) the pollutant can be captured without reaching the environment. Repair faulty equipment as soon as possible. - Treat hydrocarbon spills, e.g., during refuelling, with adequate absorbent material, which then needs to be disposed of at a suitable landfill. - Ensure a quantity of appropriate remedial agent, capable of containing and/or remediating a hydrocarbon spill is available on site at all times in case of an emergency spill. The material shall be capable of handling a spill of at least 200l. - Report all fuel, oil or hydraulic fluid spills to the JW EO/ECO so that appropriate clean-up measures can be implemented. - Report all incidents within 24 hours to JW environmental section. - All environmental incidents must be investigated within seven (7) working days.			equipment to ensure proper functioning	
Storm Water Management	28	Objective - To minimise erosion of soil from site during construction. - To minimise deposition of soil into drainage. - Minimise loss of vegetation cover due to construction related activities. Mitigation Measures - Identify and demarcate construction areas for general construction work and restrict construction activity to these areas. Prevent unnecessary	All Contractors	Throughout Construction	- Visual inspection. - Storm water management Plan. - Way-leave from JRA	- Daily inspection checklist. - Incident register.

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ENVIRONMENTAL MANAGEMENT PLAN

		destructive activity within construction areas (prevent over-excavations) • Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion. All stockpiles must be positioned at least 50 m away from drainage lines and wetlands. • Erosion control measures: Run-off control and attenuation on slopes (sandbags, logs), silt fences, storm water channels and catch-pits, shade nets, soil binding, geofabrics, hydro seeding or mulching over cleared areas. • Control depth of excavations and stability of cut faces/sidewalls. • Compile a comprehensive storm water management plan as part of the final design of the project and implement during construction and operation.				
Re-vegetation, Rehabilitation, Reinstatement	29	Objective To ensure re-vegetation and rehabilitation of disturbed areas is undertaken Legislation and Standards Conservation of Agricultural Resources Act (Act 43 of 1983) Environment Conservation Act (Act 73 of 1989) National Forestry Act (Act 84 of 1998) National Environmental Management Act 107 of 1998 and Gauteng Nature Conservation Bill, 2014. Mitigation measures In order to meet this goal, the following objective, actions, and monitoring requirements are relevant: • Disturbed areas must be rehabilitated/re-vegetated with appropriate natural vegetation and/or local	All Contractors	Throughout Construction	• Rehabilitation Plan • JW EMP • Visual inspection • Ecologist Specialist report • Environmental Authorisation/ GA • Practical and completion certificate.	• Daily inspection checklist. • Rehabilitation report • Waste management collection report (Waste Disposal Certificate).

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ENVIRONMENTAL MANAGEMENT PLAN

		seed mix. Re-use native/indigenous plant species removed from disturbance areas in the rehabilitation phase as per the re-vegetation and rehabilitation management plan. • Alien/non-native species must not be used. If these are requested/ required by stakeholders, then this must be documented by contractor. • Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved. • On-going alien plant monitoring and removal within the disturbed project footprint (where the initial clearing for construction took place) must be undertaken on all areas of natural vegetation on an annual basis. • All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of. • All temporary access road must be rehabilitated to their original condition • Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion. • On-going inspection of rehabilitated areas to determine effectiveness of rehabilitation measures implemented. • On-going alien plant monitoring and removal should be undertaken as per the approved Rehabilitation/Re-vegetation plan. Management and Mitigation Requirement • Conduct a detailed search of at the area. As a minimum, this should take place during the			• Community Happy Letters.	
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		spring and summer months prior to impoundment so positive identification of flowering plants can be made. This should be done taking due cognisance of specialist studies already undertaken as part of the EIA process; • Allow time for additional searches if these are deemed necessary, based on progress and diversity of plant species found; • Identify and physically mark all conservation worthy plants found on the ground; and • Capture markers and reference in a retrievable system, so that these can be located again for transplanting (e.g., using a combination of aerial photography, GPS, and GIS, as appropriate).				
Practical and Final completion inspection	30	• Ensure that practical inspection is conducted before the Contractor hands over the project back to JW in order to ascertain if the reinstatement or rehabilitation has been done accordingly. • The snag list is to be compiled and accepted by all parties (JW CAPEX Representatives, JW environmental section as applicable, and appointed Contractor) All responsible personnel including Environmental representative sign both practical and final completion letter.	CAPEX/ OHSE& DM/ All Contractors	During the final stage of project	• Meeting invite • Visual inspection	• Meeting invite • Attendance register • Snag list • Signed practical and final completion inspection letter.
Final close out report	31	• Conduct final audit on site. • EO must ensure that audit reports are signed by RE/Engineer and Contractor. • Environmental File is returned to JW, after rehabilitation has been deemed successful.	OHSE & DM	During the final stage of project.	• Final audit report. • Signing of Audit reports.	• Final Audit report. • Signed Audit report. • Environmental file.

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ENVIRONMENTAL MANAGEMENT PLAN

Table 3: Environmental Management and Mitigation Measures that must be implemented during the Operational Phase

Operational Phase Measures						
Aspects	ID	Mitigation Measure/Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance indicators
Waste Management	1	Sanitation Facilities - Ablution facilities shall be provided on site. - The positioning of the ablution facilities shall be done in consultation with Client and shall be placed so that it cannot contaminate the natural streams and rivers. One toilet shall be provided per 15 staff members on site. Toilets shall be positioned within walking distance of wherever employees are employed on the site. Toilets shall be provided with locks and doors shall be secured to prevent the toilets from blowing over. - The toilets shall be placed outside of areas susceptible to flooding. - Chemical toilets shall be serviced regularly by an authorised service provider and removed to a registered wastewater treatment works and disposal certificates shall be obtained from the waste disposal facility for each disposal and retained on site. - Polluted run-off must be discharged in the local sewerage main and not overland or into public streams. In instances where a sewerage main is not available, polluted run-off will be collected in sub-surface tanks and a reputable effluent removal contractor will be contracted to dispose of the waste in an environmentally acceptable manner. Official documentation shall be obtained from the waste	Johannesburg Water	During operation and maintenance activities	- Visual inspection of Waste collection and disposal areas. - Visual inspection of site. - Check waste disposal slips. - Monitor activities against JW Waste Management Plan. - Waste Inventory Register.	- Presence of litter - Availability of waste bins and skips. - Degree to which rubbish bins and skips are filled - Total volume of general and hazardous waste storage capacity - Total volume of general and hazardous waste stored on site - Degree to which different waste is separated. - Frequency of waste collection. - Total volume of recycled and reused waste.

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		disposal facility for each disposal and retained on site. - Any cooking on Site shall be done on well-maintained gas cookers with fire extinguishers present. No cooking shall be permitted to occur on open fires. - Toilets situated close to the site boundaries or within sight of residential areas shall be hidden behind screens or other cover as approved by the Engineer. - No spillage shall occur when the toilets are cleaned or emptied and the contents shall be properly stored and removed from site. - Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. - All building rubble and rubble from the demolished structures, solid and liquid waste must be disposed of as necessary at an appropriately licensed refuse facility. - Ensure that no refuse wastes are burnt on the premises or on surrounding premises. No fires will be allowed on site. Contaminated water - Workshops, refuelling depots and washing areas shall be bunded. - Any wastewater or spilled fuel collected within bunded areas around the refuelling area shall be disposed of as hazardous waste - Wastewater containing hydrocarbons, paints oil etc. shall be treated as hazardous waste				
Protection of Vegetation	2	Limit the footprint of the maintenance and operational activities to the minimum to minimise environmental damage.	Johannesburg Water	During operation and maintenance activities/.	Visual inspection	Incidents of vegetation damage.

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		- Designate vegetated areas outside the development footprint as “No go” areas. - Limit the off-road driving within the Johannesburg Water Sites. - Protected or endangered species of plants shall not be removed unless they are interfering with a structure. - All trees and vegetation cleared from the site shall be cut into manageable lengths. - Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root system are removed. - Stumps shall be treated with herbicide. - Protected or endangered species of plants shall not be removed unless they are interfering with a structure. - Where such species have to be removed due to interference with a structure, the necessary permission and permits shall be obtained from Provincial Department of Agriculture and Rural Development. - All protected species not to be removed must be clearly marked and such areas fenced off if required. - The use of herbicides shall only be allowed after a proper investigation into the necessity, the type to be used, the long-term effects and the effectiveness of the agent. - No scalping shall be allowed on any part of Johannesburg Water Sites.		When necessary? is		Number of incidents of disturbance of vegetation outside site boundary.
Alien invasive/weeds control	3	Some of the areas of JW area are covered with moderate to very dense invasive alien shrubs and trees. Clearing of such vegetation will be necessary	Johannesburg Water	During operation and maintenance activities	Visual inspection.	- Daily inspections register. - Incident register.

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		to gain access. However, clearing of this vegetation from the entire project area as far as possible will reduce the re-establishment rate of this vegetation over time, and will thus not only benefit the environment but also the proposed project and potential future phases of the project in the long term. • The type of invasive, however, will require regular follow-up eradication of seedlings after clearing, as extensive seedbanks of these species are present underneath present infestations. • Wood from alien vegetation can be used. However, care must be taken not to leave any of the leaf- or seed material on the site where the vegetation was cleared. Rather, identify a particular area that no longer has any indigenous vegetation, demarcate that area and dump excess material of alien species there. • Once the material is sufficiently dry, it should be burned to destroy any regenerating capacity of stems and roots as well as seeds. • Only registered PCO with Certificate for competency to handle the hazardous substances (e.g., Herbicides) is allowed to use herbicide. • Only environmentally friendly herbicide is allowed within JW sites. • MSDS for the herbicides must be kept in the storage area. • Method Statement for applying and handling herbicides and Risk Assessment for applying and handling herbicides. • Appropriate PPE for handling herbicides. • Herbicides stored only in a designated storage.			• Monitoring against Vegetation Management Plan. • PCO certificate.	
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		• Empty containers of herbicides disposed of accordingly to the registered hazardous landfill site. • Proof of disposal provided to JW Environmental Section.				
Sludge Management	4	• The sludge must be managed according to the sludge guideline. • All agreements or Contract must be placed in the file. • The sludge must be kept on a designated bunded and concrete lined drying bed.	Johannesburg Water/Bulk Waste	During operations activities	• Visual inspection according to Sludge SOP. • Monitoring against Sludge Guideline. • Monitoring against WUL.	• Sludge test report • Complaints register. • Sludge spill register. • Environmental Officers Internal WUL Audit Report.
Workshop and storage Area	5	• The siting of workshops, maintenance and refuelling sites and materials storage areas shall not be in the vicinity of sensitive sites e.g., wetlands, cultivated fields or drainage lines, or where local landowners can be disturbed. • Storm water shall be diverted around the storage area. Storm water falling on the storage area shall be discharged if it meets the required water quality standards. • Proper storage facilities, placed on an impermeable surface, shall be provided for the storage of oils, grease, fuels, chemicals, and other hazardous materials to be used during the construction phase of the project. If fuel is required on site, it shall be stored in a secure area in a steel tank supplied and maintained by the fuel suppliers. Leakage of fuel shall be avoided.	Johannesburg Water	During operations and maintenance activities	• Visual inspection • SOP for handling hazardous substances. • MSDS register	• Workshop and storage register. • MSDS register. • Incident register.

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- An adequate bund walls, 110% of volume, shall be provided for fuel and diesel areas to accommodate any spillage or overflow from these substances. The area inside the bund wall shall be lined with an impervious lining to prevent infiltration of the fuel into the soil.
- In addition, hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or container and Material Safety Data Sheets (MSDS's) will be made available for all hazardous chemicals. Before containers or storage facilities are erected, emergency procedures in the event of misuse or spillage that may negatively affect an individual or the environment will be in place.
- The storage facilities (including any tanks) shall be surrounded by a bund wall, in order to ensure that accidental spillage does not pollute local soil or water resources.
- The storage areas shall not be utilised for accommodation purposes and shall be access controlled.
- The storage area shall be kept tidy, and the area shall be rehabilitated after use.
- An inventory of any hazardous chemicals/substances (including that within equipment) kept on site, along with a description of possible ill effects and treatment of health-related afflictions resulting from accidents, shall be kept in the storage area as well as by the appropriate manager. These areas shall be securely fenced.
- Gas welding cylinders and LPG cylinders shall be stored in a secure, well-ventilated area.

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		- A notice board with the contact details of the responsible party shall be displayed at the gate to the storage area. - All vehicles and machinery will be inspected for any leaks or malfunctions regularly. Vehicle servicing or repairs is prohibited from site, unless in an emergency. - Drip trays shall be inspected and emptied daily and serviced when necessary. In particular drip trays shall be closely monitored during rain events to ensure that they do not overflow. The contents must be disposed of at a recognised site. - All repairs done on machinery using hydrocarbons as fuels or lubricants shall have a drip tray placed strategically to avoid incidental spillage. - Workers shall be made aware of the health risks associated with any hazardous substances used (e.g., smoking near refuelling depots), and shall be provided with appropriate protective clothing / equipment in case of spillages or accidents. - Cement shall be mixed on a plank, metal plate or a plank only or ready-mix trucks shall be used, and other potential environmental pollutants shall be stored at the designated area. There shall be no opportunity for environmental contamination. - Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the EO. - The site shall be in possession of an emergency spill kit that must be complete and available at all times on site.				
Complaints	6	Maintain complaints register for all complaints. The register must list:	Johannesburg Water	During operations and maintenance activities	Complaints register.	Availability of register on site

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		- Complainant name and contact details. - Date complaint was lodged. - Person who recorded the complaint. - Nature of the complaint. - Actions taken to investigate the complaint and outcome of the investigation. - Action taken to remedy the situation. - Date on which feedback was provided to complainant.			GDARD complaints reference number.	- Designated person to maintain register - Complaints logged - Complaints followed up and closed out.
Collection of water sample	7	- Water sampling shall be undertaken at the selected sampling points as per the WUL. - Any incident or non-compliance with the WUL parameters or DWS Water Quality Guidelines shall be reported accordingly and investigated - Unused sampling bottle shall be disposed of accordingly.	Johannesburg Water/CDYNA	During operation activities	- Visual inspection. - Online Lab reports	- Daily water sample report. - Incident register.
Environmental Incident reporting and Emergency Response and Preparedness	8	NEMA Section 30 and 30A emergency incidents and situations must be reported to GDARD or DEA immediately after as an incident or situation occurs. NWA Section 20 emergency must be reported to DWS, mostly by Operations Department. This can be done via phone, fax, or email. JW must implement measures to contain the incident or situation immediately. Thereafter the Emergency Incident Report (EIR) or Emergency Situation Report (ESR) must be submitted to the authorities ASAP. The reports must provide as much information as possible, if not; the reports can be updated later as the investigation progresses. Not reporting an incident could result in the authorities issuing a directive or a compliance notice to the responsible person.	Johannesburg Water Sites	During operation and maintenance activities.	- Visual inspection. - Flash report/ Incident investigation report. - Section 30A Annexure A. - JW Environmental Emergency Preparedness	- Incident register - Bioremediation report. - Section 30A Directive. - Corrective Action Plan

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		- Important Note: For Section 30A Emergency Situation, an oral or written directive must be obtained from GDARD or DEA before works can be undertaken in the watercourse to avoid undertaking listed activities without obtaining EA. - Johannesburg Water takes responsibility in order to effectively respond to emergency incidences such as fire, hydrocarbon and sewer spills or leakages, disturbance of wildlife and archaeological artefacts. The SHE Rep must conduct daily inspections to ensure that the required equipment needed to handle environmental incidents/ emergencies are readily available and in working condition. Quick response to an incident prevents escalation to an emergency:			ess and Response Procedure.	
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9. Water Management

- Water is a scarce resource and water shall be conserved wherever possible.
- Improved and protected watercourses to Class C classification which is moderately modified in terms of determined class of water resource and resource quality objectives of chapter 3 (Part 2) of National Water Act (Act 36 of 1998).
- Demand reduction/ Alternative sources.
- Building a water sensitive city.
- Well managed and maintained water infrastructure networks.

Water Usage	9.1	- The site must be kept tidy and hygienic at all times with special reference to sanitation & water management. - Maintain a monthly water usage. - Reporting of water pipe burst and damaged meters	Johannesburg Water Sites	During operation	- Visual inspection - Meter readings	Records of Monthly water Usage.
Reduce water demand	9.2	Implement effective demand-side management practices while exploring investment into smart infrastructure and alternative supplies to increase levels of net water savings.	Johannesburg Water (Network)	During operation	- Monthly Monitoring - Monthly water	- Records of percentage reduction on non-revenue water. - Records of Percentage

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		- Establish Task Team with different law enforcement agencies to develop and implement solution for infrastructure abuse problem. - Promote the implementation of Sustainable Urban Drainage System practice.			managem ent report	reduction of Rand Water system input volume.
Incentivise water saving interventions across domestic and economic sector users.	9.3	- Implementation of command-and-control base mechanism that promote water saving (CoJ By-laws). - Implementation of incentives base mechanism - Develop partnerships beyond the City to encourage water savings. - Expand current CoJ drought policy to build greater resilience of the water system. - Integrate water conservation requirements in conditions of planning approval. - Develop an awareness and communications campaign using available technology.	Johannesburg Water	CoJ/Operations	Monthly water managem ent report	- Records of reduction in annual water consumption per capita - Water from alternative sources as % of total water supply
Rehabilitation/ Reinstatement	10	- Clean up and remove any spills and contaminated soil in the appropriate manner. - Ensure that no discarded materials are buried on site or on any other land not designated for this purpose. - Rehabilitate any disturbed areas as soon as maintenance or construction in the area is complete. - If disturbed areas are left to rehabilitate naturally, they must be frequently monitored and interventions put in place immediately should it become necessary. Special attention must be given to the potential for soil erosion and the associated environmental degradation. It is also essential to undertake alien vegetation control and management.	Johannesburg Water	During operation and maintenance activities	- EO complianc e monitoring - Visual inspection. - Complianc e inspection against rehabilitati on plan.	- Inspection report. - Audit report by External Auditor. - Photos before and after.

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					• JW EMP.	
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6.1 Method Statement

The objective is to ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk. The environmental specifications are required to be underpinned by a series of Method statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to Johannesburg Water Environmental Section and ECO.

Method Statement is defined as “a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plan, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager and Environmental Officers are able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications”. The Method Statement must cover applicable details with regard to:

- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/material will be moved while on-site
- How and where material will be stored
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
- Timing and location of activities
- Compliance/non-compliance with the Specifications, and
- Any other information deemed necessary by the Johannesburg Water.

The Contractor may not commence the activity covered by the Method Statement until it has been approved by the Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved. The EO and ECO should monitor the construction activities to ensure that these are undertaken in accordance with the approved Method Statement.

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6.2 Monitoring

- Regular inspections of the site by EO/SHE and Environmental Reps
- Immediate reporting of ineffective sediment control systems.
- Public complaints register must be developed and maintained on site.

6.2.1 Monitoring Program

OBJECTIVE: Monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMP, but also to monitor any environmental issues and impacts which have not been accounted for in the EMP that are or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the environmental authorisation (once issued). Where this is not clearly dictated, Johannesburg Water will determine and stipulate the frequency of monitoring required in consultation with the relevant authority. The contractor project manager will work with the site manager of the contractor to ensure that monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.
- Ensure appropriate and adequate record keeping related to environmental compliance.
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, to enhance the efficacy of environmental management on site.
- Aid communication and feedback to authorities and stakeholders.

6.2.2 Method of Monitoring

The Environmental Officer will ensure compliance with the EMP and will conduct monitoring activities. The EO will undertake site inspections monthly or as specified in the environmental authorisation once issued.

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6.2.3 Monitoring Reports

Environmental Monthly reports will be compiled by the EO monthly and must be submitted to Environmental Specialist. The report should include details of the activities undertaken in the reporting period, any non-conformances or incidences recorded, corrective action required and details of these non-conformances or incidents which have been closed out.

A document handling system must be established to ensure accurate updating of EMP documents, and availability of all documents required for the effective functioning of the EMP. The compiled environmental file must be ISO14001:2015 conformant as per JW environmental file specification (Annexure B). Supplementary EMP documentation could include:

- Method Statements.
- Environmental Action Plan
- Environmental File Site instructions.
- Emergency preparedness and response procedures.
- Record of environmental incidents.
- Non-conformance register
- Training records.
- Site inspection reports.
- Waste Register
- Water Usage Register
- Fauna and Flora Register
- Hazardous chemical Inventory list
- Monitoring reports.
- Auditing reports; and
- Public complaints register (single register for maintained for overall site).

Table 4: Monitoring Programme

ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
WATER		
Prevention of water pollution	Weekly in rainy season	Contractor's Representative (CR)/ Johannesburg Water
Prevention of stagnant water on site.	Weekly in rainy season	
Proper functioning of sanitation facilities	Weekly	

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ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
SOIL		
Surface or gully erosion on site	Weekly in rainy season	CR/JW
Soil contamination with oils	Monthly	CR/JW
If small, clean up. If large, appoint a suitable contractor for clean-up.	Immediately	CR/JW
Air		
Control domestic fires.	Weekly	CR/ JW
Heavy vehicle emission control.	Monthly	CR/JW
Dust control of access roads. Wetting when required.	Weekly inspection	CR
WASTE		
Efficiency of domestic waste collection.	Weekly	CR/JW
Prevention of burning of solid/liquid wastes on site.	Weekly	CR/JW
Proper collection and containment of liquid wastes (petroleum, oils, paints, resins & cooking oils)	Monthly	CR/JW
The recycling and/or disposal thereof.		
The collection and disposal of construction waste (concrete, wood, steel)	Biweekly	CR
	Monthly Biweekly	CR/JW
Collection of hazardous waste.		CR/JW
WILDLIFE		
Weed Control	On-going	CR/JW
Control of illegal hunting or snaring of game, birds, or other wild animals.	On-going	CR/JW
SOCIAL		
Inspect overall appearance of site.	Weekly	CR

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ISSUE	FREQUENCIES OF MONITORING	RESPONSIBLE PERSON
(Paint work, cleanliness & housekeeping)	Daily	CR/JW
Resolve complaints	Daily	CR/JW
Monitor behaviour of labourers		
SAFETY		
Inspect road signs, pedestrian, and vehicle behaviour	At least once a week	CR/JW

6.3 Internal Audits and Reporting

Typically, an audit analyses the results obtained from monitoring, assesses whether objectives and targets have been met and whether there are variances from the stipulated EMP and legal requirements. In addition, the audit assesses whether EMP implementation has been undertaken according to planned arrangements and that the EMP itself is being appropriately updated. The audit should confirm that identified corrective actions have been undertaken and then assess the effectiveness of such actions. The timing of audits should be included in the implementation schedule in the EMP.

The key steps in a successful audit are:

- Establish audit procedures.
- Determine the frequency of audits.
- Ensure that the auditors are competent, in that they must be able to undertake the audit objectively and competently. Audits may be undertaken by internal or external parties, although certain I&AP requirements may define a need for external auditors.
- Maintain records of audits.

A procedure is to be developed by the project management team for conducting EMP audits, and should incorporate processes for scheduling and reporting, as well as the timing and frequency of the audits. This procedure should also address responsibilities and required resources. The EO is usually responsible for the maintenance of the environmental audit information that is required prior, during and

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after an audit. Internal audits must be undertaken by Johannesburg Water Environmental Section on monthly basis.

6.3.1 Monthly compliance rating

A monthly compliance rating will be calculated for each Principal Contractor as per a formula determined by Johannesburg Water SOC Ltd focussing on or incorporating outcomes of assurance (e.g., monthly audit), operational assessments and other requirements, as necessary. Johannesburg Water SOC Ltd reserves the right to adjust the monthly compliance calculation formula as and when required – each revision of the monthly compliance calculation formula will be communicated to the Principal Contractor before implementation (**Each Principal Contractor is required to maintain a minimum compliance rating of 93% (Ninety-Three Percent).**)

Table 5: Compliance Rating Protocol

Classification	Scoring	Classification description
Good	93 – 100%	Substantial compliance
Average	80-92%	Compliance status needs to be improved
Poor	61-79%	Methods to ensure compliance require substantial improvement
Very poor	<60%	Methods to ensure compliance failed completely - no system in place

6.3.2 Work Stoppage

Work stoppages will be identified for 2 (two) types of work stoppages to be implemented:

- Overall work stoppage – the Principal Contractor and its Contractors are not allowed to continue with any type of construction / site work up until the work stoppage has been closed-out.
- Activity work stoppage – The Principal Contractor and its Contractors are not allowed to continue with the specific activity / task / job up until the work stoppage has been closed-out (**Overall work stoppages will be issued where non-conformances are identified against the criteria in Annexure C).**

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6.4 Environmental Awareness Plan

OBJECTIVE: Ensure all operation personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm (Environmental Awareness Plan).

To achieve effective environmental management, it is important that Contractors and site employees are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMP. Johannesburg Water is responsible for informing its employees and contractors (transportation contractor) of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. Johannesburg Water's obligations in this regard include the following:

- Employees must have a basic understanding of the key environmental features of the depot and its surrounding environment.
- Ensuring that a copy of the EMP is readily available on-site and that all site staff is aware of the location and has access to the document.
- Employees must be familiar with the requirements of the EMP and the environmental specifications as they apply to the operation of the facility.
- Ensuring that, prior to commencing any new site works, all employees have attended an Environmental Awareness Training course. The course must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Awareness of any other environmental matters, which are deemed to be necessary by the depot manager.
- Ensure that construction workers have received basic training in environmental management, including the storage and handling of hazardous substances, minimise of disturbance to sensitive areas (wetland), management of waste and prevention of water pollution
- Records must be kept of those that have completed the relevant training.
- Training should be done either in a written or verbal format but must be in an appropriate format and language for the receiving audience

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- Refresher sessions must be held to ensure the operating staffs are aware of their environmental obligations.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present onsite, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

6.4.1 Environmental Awareness and Training

Environmental Awareness and Training must be undertaken by the Environmental Officer or SHE/ELO and must take the form of an on-site talk and demonstration by the Environmental Officer before the commencement of construction activities on site. A record of attendance of this training must be maintained by the Environmental Liaison Officer/SHE Officer on site.

6.4.2 Formal Environmental Training

NB: JW must ensure that there is a budget allocated for environmental formal training in CAPEX projects for the skills development of contractor staff, development of community where project is being undertaken. The principal Contractor shall identify short courses and include them on the training matrix that can be done on site during project duration. The following are some of the trainings that can be done on site:

- ISO14001:2015 Environmental Management System Awareness
- Handling of beehives
- Snake awareness and handling
- Environmental legal Liability.
- Waste Management
- Environmental Site Representative
- Recycling
- Grass cutting training

The principal Contractor must ensure that they are appointing a registered company that meet all the requirements and before appointment of service provider, the files shall be submitted to Environmental Section for evaluation.

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6.4.3 Induction Training

Environmental induction training must be presented to all persons who are to work on the site, be it for short or long durations. Contractors or Engineers staff, site staff, sub-contractors, or visitors to site. This induction training should include discussing Johannesburg Water's environmental policy and values, the function of the EMP and the importance and reasons for compliance to these. The induction training must highlight overall dos and don'ts on site and clarify the repercussions of not complying with these. The reporting procedure must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE officer on site.

6.4.4 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least once a month) where the foreman/site supervision manager, environmental and safety representative and all employees on site hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5 Erosion Management Plan

The objective to control soil erosion from an ecological perspective is:

- To reduce the effects of raindrop splash erosion on exposed soil surfaces.
- To keep rainwater on the soil surface for as long as possible to increase the infiltration rate and reduce surface runoff.
- To reduce the speed of surface runoff to reduce the erosion effect of the soil surface.
- To provide methods to retain soil, debris, seed banks and organic matter being carried away by runoff.
- To improve water retention of the area (Coetzee, 2005).

a) Areas with a high soil erosion potential on the site

Areas identified as being of high soil erosion potential on the site include:

- Any areas without vegetation cover

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- Excavated areas
- Steep areas
- Areas which undergo overland flow of water.
- Areas close to water
- Irrigated areas
- Compacted areas
- Rivers
- Drainage lines
- Any areas where developments cause water flow to accelerate on a soil surface.

If any erosion features are present as a result of the activities mentioned above the ELO must:

Assess the situation.

- Take photographs of the soil degradation.
- Determine the cause of the soil erosion.
- Inform and show the relevant contractors the soil degradation.
- Inform the contractor that rehabilitation must take place and that the contractor is to implement a rehabilitation method statement and management plan.
- Monitor that the contractor is taking action to stop the erosion and assist them where needed.
- The progress of the rehabilitation must be monitored weekly and recorded in the site diary.
- All actions with regards to the incidents must be reported on in the monthly Audit report.
- If the erosion incident has not been addressed by the contractor within 14 days of you reporting it, the Johannesburg Water 's Environmental Section must be informed.

The contractor/ developer (with the EO's consultation) must:

- Select a system to treat the erosion
- Design the treatment system
- Implement the system
- Monitor the area to see if the system functions like it should, if it the system fails adapt or adjust the system to ensure erosion is controlled.

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- Monitoring must continue until the area has been stabilized

b) General Erosion

The civil works contractor may use the following instruments to combat erosion when necessary:

- Reno matrices
- Slope attenuation
- Shade catches nets
- Mulching
- Hydro-seeding or transplanting
- Re-vegetating
- Tilling (roughing the surface)

c) Erosion Management control measures

- Areas susceptible to erosion must be protected by appropriate measures and repair of any damage caused by erosion due to construction activities must be undertaken as soon as possible.
- Minimise erosion and sedimentation into water courses through effective stabilisation (gabions and reno-mattresses) and re-vegetation of disturbed riverbanks (Refer to rehabilitation specifications and erosion control measures below).
- Stabilisation of sandy, dispersive slopes or slopes steeper than 1:3 will be required. Ensure that bare soil is covered, and hydro seeded to reduce topsoil loss.
- Ensure that all soil surfaces are protected by vegetation or a covering to avoid the surface being eroded by wind or water.
- Ensure that heavy machinery don't compact areas that are not meant to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area.

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d) Surface water control measures

- Prevent the concentration or flow of surface water or storm water down cut or fill slopes or along pipeline routes or roads and ensure measures to prevent erosion are in place prior to construction.
- Storm water and any runoff generated by hard surfaces should be discharged into retention swales or areas with rock riprap.
- These areas should be grassed with indigenous vegetation.
- These energy dissipation structures should be placed in a manner that flows are managed prior to being discharged back into the natural water courses, thus not only preventing erosion, but also supporting the maintenance of natural base flows within these systems, i.e., hydrological regime (water quantity and quality) is maintained.
- Mitigate against siltation and sedimentation using the above-mentioned structures and ensure that all structures do not cause erosion.
- Ensure that all storm water control features have soft engineered areas that attenuate flows, allowing for water to percolate into the local aquifers.
- Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation.
- Vegetation clearing should occur in parallel with the construction progress to minimize erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation in the lower portions of the catchment.
- Minimise the diversion of flows into different catchments.
- If implementing dust control measures, prevent over-wetting, saturation and run-off that may cause erosion and sedimentation.
- Water course (stream) crossings should not trap any run-off, thereby creating inundated areas, but allow for free-flowing water courses.

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e) Environmental Incident/Accident

All environmental related incidents should be reported to environmental section. The ELO should compile and keep an Incidents and Accidents Register on the file/book in which all environmental related incidents and accidents are recorded, e.g., chemical spills, fires, accidents involving workers and vehicles, etc.

The following information must be recorded in the Incidents Register:

- The name and contact details of the persons involved
- The person recording the incident
- The date and time of incident
- The nature, extent, and cause of the accident
- The name and contact details of any persons notified of the incident
- The actions taken to deal with the incident and whether the accident has been sufficiently
- Dealt with additional steps required to prevent recurrence of the incident.

7. RECORD KEEPING, COMPLIANCE AND PENALTIES

Various records will be kept on site for monitoring purposes these include but not limited to:

- Copy of Environmental Management Plan
- Approved Environmental Method Statements
- Environmental Authorisation
- Environmental induction attendance register
- Hazardous chemicals register
- Waste disposals register and disposal certificates
- Oil/fuel spill register

Records of non-compliance shall also be kept on record and will include the nature and magnitude of the non-compliance in a register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. External complaints received regarding activities on the construction site pertaining to the environment shall be recorded in public complaints register and

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the response noted with the date and action taken. This record shall be submitted with the monthly reports and a verbal report given at the monthly site meetings. A score of 90% is required for the Monthly Audit undertaken by the Johannesburg Water 's Environmental Officers.

8. DECOMMISSIONING

Objective

- To avoid and or minimise the potential environmental and social impacts associated with the decommissioning phase

Mitigation Measures

Mitigation measures as detailed in the construction phase on the EMP regarding impacts on flora, fauna, habitats, and wetlands would be applicable to this phase.

- Rehabilitation to be undertaken in terms of specifications outlined in the Rehabilitation section of this EMP as well as in terms of any specific requirements applicable at the time.
- Johannesburg Water EO will need to supervise and monitor all decommissioning activities as per the snag list.
- All disturbed areas should be rehabilitated closer to its original state and more.

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Retainable Annexure A (Ref: Annexure 5 of JW 6.4): Acknowledgement of EMP specification by the Contractor.

Environmental Requirement for Contractors and Suppliers working for Johannesburg Capital Expenditure (CAPEX) projects	Unique no	JWEMP:122017
	Revision no	00

I, the undersigned, hereby acknowledge that I have obtained copies of the following listed documentation and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates its commitment to compliance of the requirements contained within the following provided documentation:

Name of the Contractor	
Vendor Number	
Project Number	
Scope of Work	
Declaration by Capital Expenditure Projects Contractor	
- I undertake to adhere to the requirements as set out in: - Johannesburg Water Environmental Management Plan and Waste Management Plan - Environmental requirements for Contractors working on Capital Expenditure Projects - I undertake to comply with all applicable environmental legal and other requirements. - Undertake to comply with Johannesburg Water 's environmental standards, policies, and procedures where applicable. - I pledge to inform all staff of their role in managing environmental impacts on site. - I am fully aware that incidents must be reported within 24 hours of occurrence. - I pledge to always implement environmental best practice on site during the contract. - I pledge that all non-conformances issued to us will be addressed promptly.	

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I hereby acknowledge that I have obtained copies of Johannesburg Water Environmental Management Plan and Waste Management Plan and confirm that I fully understand the contents thereof and the consequences of non-compliance. The Contractor furthermore reiterates their commitments to compliance of the requirements contained within the following provided documentations and conform to all above mentioned requirements.

Signed at on this Day of 20.....

Contractor Representative Name:	Signature:	Date:
Designation:		
JW Project Engineer/Manger (Witness) Name:	Signature:	Date:

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Annexure B: Contractors Environmental File Evaluation Form

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		A minimum score of 80% is required on all sections for the approval of the submitted Environmental file System. Failure to achieve the required score will result in non-approval of the Environmental file, and the project will not commence prior file approval.	
ENVIRONMENTAL SYSTEM EVALUATION OUTCOME			
AVERAGE SCORE OBTAINED			0.00%
APPROVED/REJECTED			
EVALUATED BY:	REVIEWED BY:	APPROVED/REJECTED BY:	ACKNOWLEDGED BY:
DESIGNATION:	DESIGNATION:	DESIGNATION:	DESIGNATION:
SIGNATURE:	SIGNATURE:	SIGNATURE:	SIGNATURE:
DATE:	DATE:	DATE:	DATE:
PROJECT DETAILS			
Contract Number			
Project Title			
Name of Contractor			
Is the project screened?	YES/NO	IF NO	Construction activities/work (including site establishment) should ONLY commence when after the project is Screened

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Specialist Studies/Report		
Environmental Authorisation (If applicable)		
Water Use Licence /General Authorisation (If applicable)		
SCORE ANALYSIS		
	Satisfactory (Approved)	Requirements have been met
0.00%	Unsatisfactory (Not Approved)	Requires substantial improvement / partially achieved
ENVIRONMENTAL REQUIRED DOCUMENTS		
1	Copy EMP and signed acknowledgement letter for JW EMP	0
2	SHE/ELO appointment letter	0
3	Contractor Environmental Induction presentation	0
3	Environmental Toolbox talk and copy of attendance register template	0
5	Environmental Objective (Site specific)	0
6	Environmental Policy Statement	0
7	Registers	0
3	Legal Register (Site specific)	0
9	Environmental Aspect and Impact register (site specific)	0
10	Permit register	0
11	Non-Conformance Register	0
12	Waste register template	0
13	Complaint register	0
14	Incident register	0

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15	Method statement register	0
16	Hazardous substances register	0
17	Daily Environmental checklist/ weekly checklist and spill kit checklist	0
18	Spill kit checklist	0
19	Method statements or procedures	0
20	Document control procedure	0
21	Storm water management plan/ Erosion control	0
22	Alien invasive and weeds control plan	0
23	Hazardous Management Plan/ Procedure (i.e., handling of hazardous substances)	0
24	Method statement for the activities to be undertake/ (include environmental aspects on the technical MS)	0
25	Waste management plan/ Method statement for waste management	0
26	Incident report template (Flash report/Investigation report)	0
3	Emergency Response Plan	0
28	Training Matrix	0
29	Dust Management Plan or Method Statement for dust suppression	0
30	Contractor Audit procedure/template	0
31	Rehabilitation Plan or Method Statement for Rehabilitation/Reinstatement	0
TOTAL		0

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Annexure C: Environmental Work instruction

ENVIRONMENTAL MANAGEMENT (EM) SITE INSTRUCTION Document No: JW- EMS-HO—R014	  a world class African city
1. All JW rules and regulation including JW Environmental Management Plan and other applicable legislation, standard and by-laws must be adhered to at all times. 2. Copies of Environmental Authorisation, Water Use License/General Authorization, Rehabilitation plan, EMP shall be kept on site (where applicable). 3. All JW sites must have waste bins, drip trays, spill kit and designated hazardous storage (where applicable). 4. Only registered Waste Service providers who comply with National Environmental Management Waste Act and Municipal By-laws shall be appointed. 5. No burning or burying of waste is allowed on site. 6. The conservation of water and the use of energy efficiently shall be implemented in all JW sites. 7. The letter from City Parks for occupying the open space shall be received and kept in the file and if the land belongs to the private owner, the copy of an agreement letter shall be kept in the file (where applicable). 8. The photos are taken before and during and after the project (where applicable). 9. The Environmental file must be approved before the commencement of works on site (where applicable). 10. The Environmental file will be kept on site all the times and shall be made available to competent authority and JW environmental representative (where applicable). 11. Rehabilitation/ reinstatement of the site must be done as per the JW EMP, rehabilitation method statement. 12. The hazardous waste must only be stored not more than 90 days on site as per the legislation. 13. Only asbestos registered service providers shall be appointed to handle and dispose asbestos to registered landfill site. 14. No mixing of general and hazardous waste will be allowed. 15. No cutting of trees is allowed on site without permit. 16. If archaeological artefacts or anything of heritage importance are found at JW sites/ servitude Environmental Section must be informed. 17. Everyone working within JW sites shall familiarize with the EMP requirements and other applicable JW environmental procedures. 18. All the environmental incidents shall be reported within 24 hours to JW environmental Section.	

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19. Ensure that all JW employees and its service providers or suppliers receive environmental induction.
20. All work must be carried out under close supervision by the competent persons.
21. Repetitive findings or non-compliances shall be avoided.
22. Topsoil stockpile shall be protected by erosions control berms if it is exposed to a period of 14 days during wet season (where applicable).
23. Only 150mm of topsoil shall be removed and stockpile at a height of not more than 1m.
24. All hazardous material must be stored on a bunded and ventilated storage, and MSDS must be available for all of them.
25. No painting or marking of natural features is allowed on site.
26. Pollution of the environment shall be prevented all the times.
27. No leaking mobile plant is allowed on site.
28. Dust control measures shall be implemented on site (where applicable).
29. No sewer spillage shall spill into the storm water or the watercourse.
30. All environmental related incidents and/or emergencies shall be investigated within 48 hours from the date of notice.
31. Killing of fauna and/or Avifauna is prohibited.
32. Alien invasive and weeds must be eradicated.
33. Fumigation shall be done by trained personnel that is registered with DAFF.
34. No smoking is allowed in restricted areas. All such areas are posted appropriately.
35. Personal protective equipment is required to be worn at all times in production areas.
36. Maintain good housekeeping in your work area.
37. Keep fire lanes, roadways, walkways, and aisles free and clear of material.
38. The use of unsafe or defective equipment or tools is not permitted.
39. A contractor or subcontractor shall leave no unused materials on site. At the completion of a project the contractor shall remove all unused material and all waste shall be properly disposed of at a registered landfill site.
40. Any contractor or subcontractor found to be in violation of any EH&S rules can be ejected or escorted off premises if deemed necessary.
41. This file shall be kept on site and will be available at all times to the JW Reps and authorities (upon request).

ACKNOWLEDGEMENT BY MANAGER/CONTRACTOR

I, _____ the Manager/Contractor, do hereby declare that my site/company

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_____ acknowledges having read and understood the conditions contained in this document and furthermore, the employees agree to abide by these conditions.

CONTRACTOR/FACILITY	REP.	SIGNATURE	DATE
ENVIRONMENTAL SITE INSTRUCTION		Document No: JW- EMS-HO- R014	  a world class African city
Name of Contractor/Facility			
Responsible Manager/ Engineer			
Project No. <i>(where applicable)</i> :		Date Issued:	Date of Inspection:
Environmental Representative:		Designation:	
<i>Should the responsible persons fail to comply with any term of this instruction, JW may demand compliance in writing from the defaulting party. Should the defaulting party fail to comply within the stipulated time frames, JW shall take the necessary steps to remedy the situation.</i>		PROJECT DESCRIPTION	
Reference No. of Non-Conformances		Action Required	
EM-1.			
EM-2.			

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EM-3.		
EM-4.		
EM-5.		
EM-6.		
EM-7.		
EM-8.		
EM-9.		
EM-10.		
Received & Acknowledged by	Signature	Date
Responsible Manager/Contractor		
Responsible Consultant (<i>where applicable</i>)		
JW Environmental Representative		
JW Project Inspector / Engineer (<i>where applicable</i>)		
Contractor SHE/EL Officer (<i>where applicable</i>)		
COMMENTS BY RESPONSIBLE MANAGER/ENGINEER:		Target date for corrections
		Accepted/Acknowledged by Manager/Contractor

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COMMENTS BY CONTRACTOR (<i>WHERE APPLICABLE</i>):	Follow up comments by JW Environmental Representative

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Annexure D: Johannesburg Water General Surface Rehabilitation Specification

Johannesburg Water General Surface Rehabilitation Specification

Doc No: JW-EMS-CAPEX-T040
Effective Date:14/9/2021

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Rehabilitation Plan	m2	0	10.05	1	1	0
2	Rehabilitation of disturbed area/s including roads (prepare the ground/level profiling,soil surfaces including	m2	0	22.05	1	1	0
2	Replacement/import of topsoil (if required)	m2	0	22.05	1	1	0
3	Planting of grass/hydroseeding (Including hydro seeding seed mix ratio).	m2	0	22.05	1	1	0
4	Maintainance for 3 month (weed removal, replanting, soil conditioner, erosion repairs ect.)	m2	0	17.4	1	1	0
5	Rehabilitation close-out report	m2	0	10.05	1	1	0
6	Bioremediation (process to be determined if required)	m2	0	22.05	1	1	0
					Sub Total 1		0

1	Preliminary and General	0	weighting factor 2		0
			1		
2	Contingencies		0		0
			Subtotal 2		0.00
			VAT (15%)		0.00
			Grand Total		0

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