

	Scope of Works	Generation
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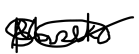
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1. Introduction

Kriel Power Station (KPS) was commissioned in 1979; and legislation governing the ground water contamination and regulations at the time permitted the construction of unlined effluent dams. As regulations were developed the need for natural resource conservation became a priority.

As a result, the KPS closed water system is composed of both lined and unlined effluent dams. The unlined effluent dams fall within the prescripts of the exemptions outlined in the National Water Act (Act 36 of 1998 – Part 3 Existing lawful water uses).

As a result of the processes that occur in the generation of energy, effluent water in KPS contains sediments such as ash and coal residue. The continued deposition of effluent in the respective dams, results in a build-up of silt thus reducing the capacity of the aforementioned dams. The reduced capacity poses risk of overflow of the dams which result in costly legal contraventions.

This document details the scope of work (SOW) for the dredging of effluent dams in KPS. It highlights work packages that contain all planning information including task overview, material requirements, tools and equipment, manpower and skills requirements, SHEQR, contingency considerations, work instructions, post maintenance requirements, history requirements and references required for the successful and safe execution of maintenance work.

The risk of inaccurate, incomplete, and/or unauthorised work packages may result in increased costs of rework, inaccurate system reporting, unplanned downtime of assets and interruption of power supply, poor resource utilisation and increased safety hazards leading to financial losses, legal and/or reputational consequences.

2. Supporting Clauses

2.1 Scope

The appointed Contractor must note that appointment is based on an as and when required basis and must make the necessary provisions for such a contract. This document provides guidance to the KPS effluent dam maintenance and safe use, which complies to the requirements of the National Water Act (Act 36 of 1998) (NWA).

2.1.1 Purpose

This document provides the framework for the execution of effluent dam dredging in KPS. It combines good practice maintenance work package content and provides a consistent approach for administrative control, achieving an appropriate level of planning detail, ensuring an acceptable level of usage and establishes the work package format.

2.1.2 Applicability

This document shall apply to the dredging and cleaning of all Kriel Power Station effluent dams.

2.1.3 Effective Date

This document shall be effective upon authorisation through signatures

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2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the enaung subsections.

2.2.1 Normative

- [1] ISO 9001 Quality Management Systems
- [2] GGS 0462 Eskom Quality Requirement
- [3] 240-105658000 – Supplier Quality Management Specification
- [4] 240-45920887 Process Control Manual (PCM) for Manage Maintenance Base, V2.0, Eskom Holdings SOC Ltd, Johannesburg, South Africa, August 2012.
- [5] 240-99527377 – Inspection Manual for Civil Works at Eskom's Power Stations

2.2.2 Informative

- [6] National Environmental Management Act (Act No. 107 of 1998)
- [7] National Water Act (Act No. 36 of 1998)
- [8] Occupational Health and Safety Act (Act 85 of 1993).
- [9]

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2.3 Definitions

Table 1: Definitions

DEFINITION	DESCRIPTION
Contractor	A service provider contracted to execute the works on behalf of the Employer.
Employer	Kriel Power Station and, by extension, Eskom will be referred to as the Employer. The Employer will appoint a representative to manage and ensure the Employers interests are protected
Temporary Works	Any falsework, formwork, support work, scaffolding, shoring or other temporary structure designed to provide support or means of access during construction work
Work instruction	Instructions for performance of the work to be accomplished, the level of detail of which depends on the assigned planning level. When applicable, approved procedures can be referenced and can suffice as work instructions.
Work order	A document used to control work and testing activities.
Work package	A compilation of documents including the work order, work instructions, and any other supporting material (that is, drawings, vendor manuals, weld process sheets, operating experience, safety analysis, permits, and so on).

*Note: All reference made to the masculine, equally and unequivocally applies to the feminine.

2.4 Abbreviations-†

Table 2: Abbreviations

ABBREVIATION	DESCRIPTION
AWR	Ash Water Return
CSY	Coal Stockyard
KPS	Kriel Power Station
PCM	Process Control Manual
OSHACT	Occupational Safety Health Act
SHEQR	Safety, Health, Environmental, Quality and Risk

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ABBREVIATION	DESCRIPTION
PPE	Personal Protective Equipment
PTW	Permit To Work

2.5 Roles and Responsibilities

2.5.1 Employer

- Prepare a baseline risk assessment for the intended construction works.
- Prepare a suitable, sufficiently documented, and coherent site-specific health and safety specification for the intended construction work based on the baseline risk assessment.
- Include the health and safety specification in the tender documents.
- Ensure that the Contractor to be appointed has the necessary competencies and resources to carry out the construction work safely.
- Ensure that a copy of the Contractor's health and safety plan is available on request to an employee, inspector, or Contractor.
- Stop any contractor from executing a construction activity which poses a threat to the health and safety of persons which is not in accordance with the Employer's health and safety plan for the site.
- Where changes are brought about to the design or construction work, make sufficient health and safety information and appropriate resources available to the Contractor to execute the work safely. Provision of resources shall be done in line with the NEC 3 ECC conditions of contracts and the contract data through compensation events.

2.5.2 Contractor

- The contractor is responsible for the safe construction, commissioning, and handover of the works in line with this scope of works and the relevant contract documents.
- Provide and demonstrate to the Employer a suitable, sufficiently documented, and coherent site-specific health and safety plan, based on the Employer's documented health and safety specifications, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Contractor as work progresses.
- Open and keep on site a health and safety file, which must include all documentation required in terms of the Act and the Construction Regulations 2014, which must be made available on request to an inspector, the Employer, the Employer's Agent, or a Contractor
- The Contractor remains responsible for all Sub-Contractor's appointed for the works. The Contractor must ensure:
 - All sub-contractors appointed to perform the construction work for the Contractor are provided with the relevant sections of the health and safety specifications.

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- Ensure that no Sub-contractor is appointed to perform construction work unless the Contractor is reasonably satisfied that the Sub-contractor has the necessary competencies and resources to perform the construction work safely.
- Stop any sub-contractor from executing construction work which is not in accordance with the Employer's health and safety specifications and the Contractor's health and safety plan for the site or poses a threat to the health and safety of persons and the environment.
- Within reason, ensure co-operation between all Sub-contractor's appointed by the Contractor to enable each of those contractors to comply with the Act and the Construction Regulations.
- That all construction site records of the health and safety induction are made available on request by an inspector, the Employer and the Employer's agent.
- For every new task, the contractor must provide a detailed method statement identifying all the activities that will be undertaken to successful complete the said task.
- The Contractor must, before the commencement of any construction work and during such construction work, have risk assessments performed by a competent person appointed in writing. The risk assessments will form part of the health and safety plan to be applied on site and must include the following:
 - The identification of the risks and hazards to which persons may be exposed to
 - An analysis and evaluation of the risks and hazards identified based on a documented method statement.
 - A documented plan and applicable safe work procedures to mitigate, reduce or control the risks and hazards that have been identified.
 - A monitoring and review plan.

All contractors shall work within the parameter of the job description and scope of work. To keep all instructions/ procedures on hand and supply KPS with reference to be included in this document and supply record and history requirements

Must ensure that the work is performed to the highest standard and quality within the safety standards and respective regulations.

2.5.3 System Engineer

As custodian of their system, the system engineer must ensure all actions required in terms of the reliability base and any other reliability matters are implemented on their systems.

2.5.4 Quality Controller

Must inspect the system after the maintainer has maintained, following the approved quality control plan.

2.6 Process for Monitoring

- Work Package Approval process
- Maintenance Reviews

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- Work Sampling
- Pre-survey – to be undertaken by independent service providers.
- Post survey – to be undertaken by independent service providers.

2.7 Related/Supporting Documents

Refer to Section 2.2.2

3. Scope of Work

3.1 Unlined Pollution Control Dams

This task entails the dredging and cleaning of all unlined effluent dams in KPS. The respective dams are listed in Table 3 below:

Table 3: KPS Unlined pollution control dams

Dam	Description
Borrow Pits	Two unlined effluent dams that act as overflow dams for the High-level effluent dam
Swart Pan Dam	Unlined effluent dam that forms part of the
Vaal Pan Dam	Unlined effluent dam containing process water from the northern side of the power station
Maturation Pond	Unlined effluent dam containing process water from the south of the station, coal stock yard overflow, and stormwater runoff
Low Level effluent dam (LLE)	Unlined dam equipped with two silt traps and two water storage dams (wing dams).
Ducks Pond	Unlined effluent dam recovering effluent water to the LLE

The appointed contractor must be adequately skilled and experienced to undertake the dredging of dams within the stipulated time frames. All machinery used in the execution of the works is the responsibility of the contractor and breakdowns are to be resolved expeditiously in order to complete the works within the set programme.

The dams listed in Table 3 above shall be dredged in the periods listed below:

- Borrow pits – Once every two (2) years
- Swart Pan Dam - Once every two (2) years
- Vaalpan Dam – Once every two (2) years
- Maturation Pond – Once every year.
- LLE – Once every two (2) years
- Ducks Pond – Once every two (2) years

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3.2 Lined Pollution Control Dams and Raw Water Reservoir

This task entails the dredging and cleaning of all lined effluent dams in Kriel Power Station. The respective dams are listed in Table 4 below:

Table 4: Lined pollution control dams and raw water reservoir

Dams	Description
High Level Effluent Dam (HLE)	HDPE lined dam, composed of two storage compartments and two, independent, silt traps.
Coal Stock Yard (CSY) Dam	Concrete lined effluent dam collecting runoff and leachate from the coal stockyard. The Dam is equipped with a concrete lined silt trap.
Raw Water Dam	HDPE lined dam, composed of two storage compartments

The appointed service provider must be adequately qualified and experienced to undertake the desilting of lined dams without causing damage to the lining. The dams listed in Table 4 above shall be dredged periodically as follows:

- HLE – Once every three (3) years, with the first year of dredging commencing on the placement of this contract. These dams will be dredged no more the twice during the duration of this contract, unless otherwise stated by the employer. Silt traps to dredged or cleaned once every year from the commencement of this contract or as instructed by the Employer.
- CSY Dam to be dredged once every year.
- Raw Water Dam to be dredged or cleaned once every three (3) years with the first year of dredging commencing on the placement of this contract. This dam will be cleaned no more than twice for duration of this contract, unless stated otherwise by the employer.

3.3 Silt Trap Cleaning

The appointed contractor will be required to clean the following silt traps in as follows:

- Coal Stock Yard Dam Silt Trap – To be cleaned on a quarterly basis (4 times per annum) using a method approved by the employer.
- Vaalpan Dam Oil and Grit Separator silt traps to be cleaned twice (2) per annum.
- Vaalpan Dam settling pond to be cleaned on a quarterly basis.

The frequency of cleaning silt traps might increase, or decrease based on the conditions on site at the time of assessment or as advised by the employer. The above frequencies must therefore be used as a baseline.

3.4 Waste Disposal

The Contractor must safely dispose of all silt, vegetation, and any debris emanating from the dredging, in an approved location, in line with his pricing.

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Except for ash, free of all vegetation, no foreign waste material is to be disposed on the ash dam complex, this includes the emergency dumping area within the footprint of the ash dam. The disposal of silt from the CSY dam must be approved by the Coal Management team

3.5 Task Description

The contractor will be required to dredge, or de-silt the dams described in sub-section 3.1 and 3.2 above. The contractor must ensure that during the dredging/ de-silting, the dam capacities, in line with the as-built drawings are not increased. In addition, the contractor must ensure that all lining, in lined dams, is not damaged during the execution of his work.

3.6 Equipment Type

The Contractor must provide reliable equipment that will be used to complete the works within the stipulated time frames. In selecting the equipment, the Contractor must be aware that the conditions in the respective dams change as a result of increased process water discharge or stormwater runoff.

It is therefore imperative for the appointed Contractor to obtain equipment that will be able to function within fluctuating water levels. Where the dams are lined, the Contractor must provide equipment that will not damage any dam lining.

3.7 Approximate dam

Table 5 below provides the approximate dam capacities discussed in this scope.

Table 5: Approximate dam capacities

Dam	Max Volume (m³)
High Level Effluent Dam	24,000
Raw Water Dam	690,000
Borrow Pits	16,600
Swart Pan Dam	250,400
Vaal Pan Dam	1,625,000
Maturation Pond	11,100
Coal Stock Yard Dam	45,700
Low Level Effluent Dam	98,000
Ducks Pond	9,800

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3.8 Equipment number

N/A

3.9 Materials

Materials are divided into consumables and spare parts

3.10 Consumables

N/A

3.11 Spare parts

N/A

3.12 Hand tools

To be determined by contractor in the case of HDPE lined dams that can have compartments isolated.

3.13 Skills requirement

Table 6 below details some of the skills requirements to execute the required tasks

Table 6: Skills requirement

Job Family	Skill Type	Number
Driver	TLB Operator	2
Driver	Amphibious Dredger Operator	3
Driver	Tipper truck	3
Operator	Floating Dredger	2
Supervisor	Overseer	1
Site manager	Civil Engineer	1
Safety	Safety officer	1
Environmental	Officer	1

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4. Pre-work Considerations

4.1 Baseline Risk Assessment

Table 7: Baseline Risk Assessment

Activity	Risk	Mitigation
Pinch Points	Incompetent Person, not wearing PPE	Training & only authorized employees allowed executing tasks. Continues supervision, Toolbox talks to inform employees about dangers
Lack of House Keeping on and around Pedestal	Slip/Trip and Fall	Housekeeping must be done, and High standards must be maintained. Spills must be cleaned up immediately. Dust bins must be provided and cleaned daily. Sue cat ladder
Ergonomics	Foot, Body Injuries & Back	Steps or pedestals must be used to reach high levels of working platforms, Secure on crate
Not wearing / wearing correct PPE	Head, Back injuries, fractures and sprains	Employees must be informed about dangers and toolbox talks must be done to warn them about dangers. Correct PPE must be issued and worn.
Incorrect Lifting Method	Hand, Finger Injuries, equipment damage, Property damage	Statutory inspections must be done and kept on record. Logbooks must be completed.
No Clear Route	Property Damage	Defect & damage must be reported
Falls, Falling Equipment	Fatalities, Equipment Damage	Make sure jacking oil is shut down before lifting. Toolbox talks and constant supervision to be in place. Do not step over pedestals or plastic sheeting's. Dispose in the correct containers as per procedure / site requirement.

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Activity	Risk	Mitigation
Using Cleaning Solvents	Skin Irritations	Cleaning solvents MSDS to be discussed before using solvent.
Slippery Surfaces	Falling Injuries	The oil and water spilling on the floor must be cleaned immediately to avoid having people slip and fall due to slippery surface.
Tripping Hazards	Tripping/Falling	Keep tools, components, rags away from walkways. Workers to be made aware of tripping hazards around the journal bearing assembly by identifying and discussing potential tripping hazards. Follow good housekeeping.
Incorrect Tools	Property Damage/Fatality	Employee to ensure that correct tools are used at all times and if not sure the supervisor must advise
Noise, Dust	Hearing Loss/Inhalation	Ear protection must be worn at all times and dust mask must be worn in case of a dust
Open Holes	Falling/Multiple Injuries	All open holes must be closed and beware of open holes while executing the task
Oil	Contamination	Ensure that all the spills are cleaned and reported, wear eye protection and dispose oily rags in the designated waste bin

4.2 Pre-job Briefs

The crew shall discuss and sign a pre-job brief guide and agree on the safety risks and mitigating factors or practices to be put in place.

- Verify that you are at the correct plant
- Do not make direct contact with any moving parts.
- Wear proper PPE always.
- Never wear loose or torn clothing while working on or near any machinery, as this will result in serious injuries and even death.

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- Only use approved tools and equipment
- STAR and 3 Way Communication.

4.3 Personal Protective Equipment

Table 8: Typical personal protective equipment

PPE Group	Additional Description
Dust Mask	
Ear plugs	
Hard hats	
Protective gloves	
Protective overalls	
Safety boots	
Safety glasses	
Dust Mask	

4.4 Permit requirements

Dam/s must be isolated in order for Permit to work. If cleaning is done online all safety measures must be put in place

4.5 Foreign Material Exclusion (FME)

Not applicable.

4.6 Environmental requirements

Use relevant skips for disposable of any waste:

- White (6m3 open skip) Yellow (Wheely bin) – General Compactable Waste (Domestic Waste)
- Blue (11m3 open skip) – General Uncompact able Waste (Wood scrap)
- Brown (6m3 open skip) – Building Rubble (Bricks, Building gravel, Broken concrete, etc.)
- Red (6m3 closed skip with lid) – Hazardous Waste (Oily Rags, Empty paint tins, Empty spray cans etc.)
- Green (6m3 closed skip) – Scrap Metal (Ferrous metals only).

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4.7 Contingency Considerations

N/A

4.8 Task Preparations

- Obtain updated and authorized procedures and drawings for the dams to be cleaned.
- Isolate dam if cleaning will be done offline
- Confirm that tools, equipment and machinery required are available
- Confirm that the required manpower and skills are available
- Check if required PPE is available
- Upon opportunity, ensure other necessary inspections are completed on the interfacing piping and infrastructure to the dam

4.9 Detailed work instruction

- Contractor to submit a detailed method statement on cleaning of the dams for the employer to approve
- Dam must be isolated before works can continue, unless proposed methodology is to clean while the dam is online.
- The contractor to perform strategic surveys in order to quantify sludge and vegetation removed but not limited to oil contamination removed
- The contractor must remove all vegetation, silt build up and oil contamination from the dam to predetermined levels
- The contractor must use existing design drawings and survey levels to determine the amount of material to be removed.
- The contractor must take care not to damage the liner system
- If damage is done to any liner, it must be repaired at the cost of the contractor or employer who has done the damage
- Once dredging is complete to predetermined levels, the dam walls must be rehabilitated to original design as seen on the existing drawings. If no original design is available, slopes must be rehabilitated to 1V:3H.
- The contractor must use surveys or other approved methodology to determine the quantity of silt, oil contamination and vegetation removed.

4.10 Quality Requirements

- Contractor to develop a detail QCP in line with the approved Method statement

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4.11 Post-maintenance testing

- A post cleaning survey will be conducted by an independent service provider to confirm dredging levels.
- Inspections must be completed on any inlets and outlets to see if there are any leaking pipes or flanges.
- Ensure all defects raised from inspections are put into SAP and planned for to be repaired if unable to do so while the dam is offline

4.12 General Feedback

- Pre Cleaning Survey
- Post Cleaning Survey
- Quantity of Silt and vegetation removed

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- Unanticipated leaks on interfacing infrastructure
- Interfacing infrastructure condition
- Obstacles to work performance
- Things that went well

6. References

- Plant Safety Regulations Procedure
- Technical support Procedures
- Equipment vendor technical manual (OEM Manual)
- ISO14001
- Quality 9001
- OHSAS 18001

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7. Temporary Works

In line with Clause 12 of the Construction regulations, the contractor shall be responsible for the design of all temporary works required to carry out the construction of the permanent works including but not limited to, temporary formwork, ramps, access and suspended platforms, scaffolding, ladders, and the like. The Contractor must, at the Employer's request or any other authorised inspector; timeously provide the temporary works design to the Employer or inspector. The submission must contain all drawing details, erecting instructions, method statements, risk assessments etc. These details must demonstrate compliance with the applicable SANS, ISO, and relevant Eurocodes.

The cost of all temporary works as well as the required design, drawings, certification, and additional safety inspections required on site to ensure compliance in this regard shall be deemed to be included in the Contractor's rates and overhead costs.

8. Storage of Plant and Equipment

All plant and equipment required for the works will be procured and supplied, by the appointed Contractor. Handling, transportation and storage shall be the responsibility of the Contractor. A site camp for the Contractor's personnel, plant, and equipment, will be identified and agreed upon by the Contractor and the Employer. The Contractor will oversee the site and take full responsibility of the site camp, as detailed in Section 6.2 below.

9. Site Facilities Required

9.1 Temporary Offices

The Contractor shall be required to provide their own offices equipped with the necessary telecommunications. The Employer will identify the position to be utilised and, where possible, provide services such as water and electricity. This shall remain the case unless stated otherwise by the Employer.

9.2 Site Camp, Assumption of Material Ownership

All material utilized while executing this scope will be supplied and delivered by the appointed Contractor to a designated site camp, within reasonable proximity to the project area. The Contractor will be responsible for the following activities from commencement to close out:

- Provision of security for the duration of the project (Day and Night), unless agreed otherwise with the Employer.
- Maintenance of firebreaks
- Maintenance of access roads within the site camp.

The Contractor shall remain responsible for the transportation, offloading, and the correct stacking of material, equipment, and plant upon delivery to the site camp. The Contractor shall, in addition, be responsible for the following tasks within the site camp during the validity period of the contract:

- The Contractor shall repair defects, or replace damaged material, equipment, or plant at his expense to the satisfaction of the Employer. This includes all damages as a result of fire, theft, or vandalism.

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9.3 Laboratory Facilities

No testing laboratory is required on site for use by the Employer. Where concrete is used, a set of 6 moulds and a slump cone and necessary labour for taking concrete samples is to be provided and maintained for the use of the Employer.

9.4 Sanitary Facilities

Unless stated otherwise by the Employer, the Contractor must provide his own lavatories, for the duration of this Contract, to service all his personnel on site. All latrines shall conform to the requirements of the Local Authority and the EMP. All sanitary fees and charges, if any, due under the Local Authority or State Health Regulations for bylaws shall be paid by the Contractor. Throughout the progress of the Contract, all latrines shall be maintained by the Contractor in a clean and sanitary condition to the satisfaction of the Employer.

9.5 Housing Facilities

The Contractor shall include in his pricing, the cost of accommodation for his key personnel. All general labour will be sourced in accordance with the Eskom labour requirements and the accommodation will be addressed accordingly.

10. Features Requiring Special Attention

10.1 Dealing with Water

The Contractor shall be responsible for dealing with all water during the execution of works from whatever source, and the cost of all de-watering unless otherwise itemised in the pricing, shall be deemed to be included in the tender price.

10.2 Dust Prevention

The creation of dust in the Contractor's working area shall be kept to a minimum, particularly when working in inhabited areas, and shall conform to the requirements of the EMP. The Contractor shall water, on a daily basis, the areas of the site, which are creating dust outside, particularly in the site camp, as ordered by the Employer.

The Contractor shall take all measures necessary to ensure the protection of his employees from dust generated from his activities and the those emanating from normal energy generation processes or undesirable events such as uncontrolled fly ash emanating from dumping or general plant defects.

10.3 Permits

The Contractor shall be responsible for obtaining all necessary permits to transport materials and plant to the respective site.

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10.4 Facilities for Other Contractors

The Contractor shall make allowance for the presence of other Contractors (sub-contractors) on Site, which may involve, inter alia, the adaptation of his plan to fit in with work to be done by the other Contractors, as well as assuring other Contractor's access to the site.

10.5 Spoil Material

No indiscriminate spoiling of material or rubble will be allowed. All surplus or unsuitable material and rubble shall be disposed of at the nearest approved Municipal waste site, or alternatively upon specific approval spoiled, levelled and spread in designated areas as directed by the Employer.

10.6 Finishing and Tidying

Progressive and systematic finishing and tidying will form an essential part of this Contract. On no account may spoil, rubble, materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily impede the activities of others, and in the event of this occurring, the Employer shall have the right to withhold payment for as long as may be necessary in respect of the relevant Works in the area (s) concerned without thereby prejudicing the rights of others to institute claims against the Contractor on the grounds of unnecessary obstruction.

Finishing and tidying must not be deferred to the end of the Contract. All finishing and tidying shall be carried in accordance with the EMP and to the best advantage of the project as a whole and in the closest co-operation with other contractors and all environmental requirements.

11. Pricing Data

The pricing list attached in Annexure A is applicable to each of the dams detailed Section 3.1 and 3.2 above.

Only completed items, which are without defects, are assessed for payment at each assessment date; no part payment is made if the item is not completed by the assessment date. Where the Contractor deems additional items are to be added at tender, or descriptions changed, the Contractor must amend the items and price accordingly.

The Employer will not pay for any items on the Price list that have not been done. By accepting this Contract, the Contractor is aware and accepts all conditions detailed in this Scope of Work and the Contract data.

12. Site Specific Information

12.1 General

Kriel Power Station is situated approximately halfway between Bethal and Ogies on the R545, being just over 30 km from each town and 10 km north-west of Kriel town. The information provided below dates as far back as the year 2008. All figures presented below should be considered historical data and the Contractor must familiarize himself with the prevailing conditions, at the time of appointment.

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12.2 Climate

Kriel Power Station is situated in a summer rainfall area with an average annual precipitation of about 750-mm falling almost entirely during the months of October to April. The average rainfall per month generally exceeds 40 mm during this period, although drought periods do occur which can last for 20 days or longer. Drought periods occur most frequently during the months of October/November and March/April. January is statistically the highest rainfall month with an average monthly rainfall of about 130-mm. June has the lowest rainfall with an average monthly rainfall of about 7 mm.

Approximately 85% of the annual rainfall occurs in the summer months and heavy falls of 125 to 150 mm occasionally occur in a single day. The annual average number of thunderstorms is about 75. These storms are often violent with severe lightning and strong (but short-lived) gusty winds and are sometimes accompanied by hail. This region has among the highest hail frequencies in South Africa; about 4 to 7 occurrences (depending mainly on altitude) may be expected annually.

January is normally the hottest month with an average daily maximum temperature of 27°C with a mean daily temperature in winter being about 16°C. Winter average daily temperatures vary from 18,5°C maximum to -1°C minimum. The extreme temperatures recorded range from 34,7°C to minus 12,4°C for the period 1920 - 1984. (Source: Weather Bureau, Pretoria)

Winds are generally light to moderate except during thunderstorms. Generally, the prevailing wind directions are from the Northwest during the day and from the east at night. During daytime, the prevailing winds are from the north-western direction. During night-time, the prevailing winds are from the north-eastern direction. The highest recorded average wind speed is 17,6 km/hour. The average wind velocity over the year is 14, 5 km/hour.

12.3 Weather Data

a) Relative Humidity

Records for Bethal (2008 - 2009) The average relative humidity on an annual base is as follows:

- For 08:00 = 80%
- For 14:00 = 52%
- For 20:00 = 73%

b) Prevailing Winds

Records for Bethal (2008 - 2009) - Winds are mostly north-westerly except for February and March when they are easterly to south-easterly. The highest wind speeds are recorded from the south-east: on average 14km/h.

c) Other Climatic Factors

Records for Bethal (2008 - 2009) - Thunder occurs mostly from November to January with average of 35.7 days annually.

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- Hail occurs mostly in December with average of 2.8 days annually.
- Fog occurs mostly in the winter months with an average of 19 days annually.
- Snow rarely occurs.
- Cloud coverage is highest in the summer months with annual average as follows:
 - 08:00 = 2.8/8
 - 14:00 = 3.8/8
 - 20:00 = 3.1/8
 - Evaporation for the area is in range of 75mm to 190mm per month. The highest evaporation occurs in December, and the lowest in June.

Conditions might have changed since the 2008-2009 survey; it is the Contractor's duty to familiarize himself with the latest weather information from the Weather Bureau

12.4 Air Quality

The existing and potential sources of air pollution in Kriel area are the following:

- Kriel Power Station smoke-stack emissions
- Kriel Power Station dry dust (fly ash) handling plant
- Dust blow from the Eskom coal stock yard
- Dust blow from the roads in the area
- Seasonal dust blow caused by ploughing of farmlands, and dust blow off denuded fields.
- Dust blow from dried out exposed surfaces of the wet ash dam.

However, Eskom utilises the majority of the top surface of the ash dam as an evaporation pan for polluted water, which means that the exposed surface is constantly wet. The sides of the ash dam have generally been rehabilitated.

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13. Acceptance

This document has been seen and accepted by:

Name	Designation
[REDACTED]	Senior Civil Engineer
[REDACTED]	Auxiliary Engineering Manager
[REDACTED]	OPS Support Manager
[REDACTED]	Operating Manager
[REDACTED]	Outages Manager

14. Revisions

Date	Rev.	Compiler	Remarks
July 2025	3.0	[REDACTED]	Revised dredging periods and title change
August 2024	2.0	[REDACTED]	Final document
February 2021	0.2	[REDACTED]	Establishment of contract

15. Development Team

The following people were involved in the development of this document:

- [REDACTED]
- [REDACTED]

16. Acknowledgements

[REDACTED]

N/A

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[REDACTED]
[REDACTED]
[REDACTED]

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ANNEXURE A: PRICE LIST

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Item nr	Description	Unit	Estimated Quantity	Rate	Price
	Preliminary and General				
	The works information is provided and no claims arising from brevity of description of items fully described in the said works information will be entertained				
	Works Information/scope of work is incorporated to satisfy the requirements of this project. Such information shall take precedence				
	The contractor's prices for all items throughout this document must take account of and include for all obligations, requirements and specifications given in the said works information/scope of work				
	Site Establishment	Item	1		
	Transport	Months	5		
	Accommodation	Months	5		
	Health and Safety Requirements	Item	1		
	Project Management	Months	5		
	Site De-Establishment	Item	1		
	Sub Total - Preliminaries				
	Section No 2: External work (Provisional)				

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	Summary				
	Preliminary and General				
	Dam				
	Access Roads				
	Removal				
	Oil contamination				
	Reeds and Vegetation				
	Draining of sludge/Silt from the dam				
	Disposal of the Removed Sludge/Slit/oil				
	The silt/sludge and reeds/vegetation to be disposed at an approved environment disposing site				
	Cart away				
	Reeds to a location to be authorised by the Employer				
	Cleaning				
	Cleaning of the dam after removal of oil, silt and sludge				
	Sub Total				
	Pavement layers of gravel material				

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Revision: 1.0

	Rip and Compact the existing layer to 93% MOD AASHTO	m ³			
	Summary				
	Preliminary and General				
	Dam				
	Access Roads				

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