KHÂI-MA LOCAL MUNICIPALITY

TENDER DOCUMENT

BID NO.: KH01-26/27

CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

Name of Tenderer	
CSD Supplier Number (MAAA)	
CIDB Registration Number	
Tendered Amount (including VAT)	R _____
Tendered Amount in words (including VAT)	_____ _____
Time for Completion	11 calendar months
Closing Date and Time	**20 October 2026 at 09:00**
Tender Validity Period	90 days from closing date

Issued by:

Khâi-Ma Local Municipality
Municipal Offices
21 Nuwe Street,
Pofadder,
8890

Tel: +27 54 933 1000
e-mail: hendry@khaima.gov.za

Attention: Mr. Hendry Christians

Compiled by:

Mind Shape Developments (Pty) Ltd
75A Swartberglaan,
Spitskop,
Bloemfontein,
9301

Tel: +27(0) 82 474 8984
e-mail: riaan.odendaal@outlook.com

Attention: Mr Riaan Odendaal

EXPANDED PUBLIC WORKS PROGRAMME

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

MIND SHAPE DEVELOPMENTS (PTY)LTD

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

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PART T 1:

TENDERING PROCEDURES

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KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

SECTION T1.1: TENDER NOTICE AND INVITATION TO TENDER

Khâi-Ma Local Municipality invites interested Service Providers to tender for the following construction contract.

Tender number	KH01-26/27
Tender title	Construction of Pella Wastewater Treatment Works (Oxidation Ponds)
Estimated CIDB grading	7CE or higher
ADVERTISEMENT DATE	**14 SEPTEMBER 2026**
Compulsory Clarification Meeting	**22 SEPTEMBER 2026 AT 09:30** Pella Community Hall (Gemsbok Street, Pella, Khâi-Ma, 8891, South Africa) 29°02'00.2"S 19°09'14.1"E -29.0333972°, 019.1538306°
Closing date and time	**20 October 2026 at 09:00**
Closing venue	Tender Box, Khâi-Ma Local Municipality, 21 Nuwe Street, Pofadder, 8890
Tender validity	90 days
Pricing strategy	Re-measurement contract
Preference system	80/20 or 90/10
Time for completion	Eleven (11) calendar months from the Commencement Date.
Defects liability period	12 months after Completion
Tender documents	Electronically only - free of charge - from https://www.etenders.gov.za/ and https://khaima.gov.za/notice-board/tenders/

1. SCOPE OF WORKS

The Works comprise the construction, testing and commissioning of the Pella Wastewater Treatment Works (WWTW), an oxidation-pond treatment system serving Pella within the Khâi-Ma Local Municipality. The Works include the complete civil, structural, building, geosynthetic, process-pipework and ancillary infrastructure required to receive, treat, store and manage municipal wastewater and nightsoil flows safely and reliably.

The Contractor shall execute and complete the Works in accordance with the Contract, the drawings, the Bill of Quantities, these specifications, the Employer's Agent's instructions and all applicable statutory requirements. The Works shall be complete and fit for their intended purpose notwithstanding that every minor component, fitting or operation required for a complete installation may not be described individually.

Wastewater will enter the new inlet works, where screening, grit management, flow measurement and controlled distribution will take place. Night soil will be received at the dedicated disposal area and introduced under controlled conditions. Flow will pass through two anaerobic ponds, one primary facultative pond and two secondary maturation ponds before entering the treated-effluent storage pond. Sludge handling will be provided through drying beds and a composting area. The process arrangement, levels, pipework and operating controls shall be as shown on the drawings.

The scope includes, but is not limited to, the following:

- site establishment, construction access, survey control, setting out, clearing and preparation of the Site;
- bulk excavation, cut-to-fill operations, foundation preparation, engineered pond embankments, layerworks and final trimming;
- one inlet works incorporating the required channels, screening, grit handling, flow-control and flow-measurement facilities, together with a dedicated night-soil disposal area and shelter;
- two reinforced-concrete-lined anaerobic ponds, including inlet and outlet structures, joints, waterstops and associated pipework;
- one primary facultative pond and two secondary maturation ponds lined with 2.0 mm HDPE geomembrane and protective geotextile as specified and shown;
- one treated-effluent storage pond, including the specified lining system, inlet, outlet, overflow and drainage arrangements;
- one evaporation pond, including the specified lining system;
- interconnecting gravity pipelines, fittings, chambers, valves, sluices, penetrations, supports and marker systems;
- sludge drying beds, underdrainage, filtrate return arrangements, composting area and associated hardstanding;
- stormwater diversion, collection and discharge measures, including channels, berms, culverts and 200 mm light grouted stone pitching where shown;
- gravel access roads, internal circulation, turning areas and road drainage;
- an operator's facility comprising an office, store, change room and ablutions, complete with finishes, plumbing, drainage and fittings;
- solar-powered security/flood lighting complete with foundations, poles, batteries, controls and protection;
- 1.8 m high concrete palisade fencing, gates and all associated posts, stays and concrete footings;
- two 5 000 litre water tanks installed on 3 m high support stands, including foundations, pipework, valves and fittings;
- project name board, safety signage, pipeline markers and permanent identification;
- environmental protection, dust control, erosion control, rehabilitation and final site clearance; and
- testing, commissioning, operator training, performance demonstration, defects correction, as-built information, operating and maintenance manuals, and handover of the complete facility.

The Time for Completion is eleven (11) calendar months from the Commencement Date. The Contractor shall programme, resource and execute the Works continuously to achieve Completion within this period, subject only to extensions of time granted under the Contract.

Tender documents will be available free of charge electronically only from https://www.etenders.gov.za/ and https://khaima.gov.za/notice-board/tenders/. Tender enquiries must be submitted in writing to the Employer's Agent, Mr Riaan Odendaal of Mind Shape Developments (Pty) Ltd, at telephone 082 474 8984 or email riaan.odendaal@outlook.com. No hard-copy documents will be available for purchase.

Attendance at the clarification meeting and site inspection is **compulsory**. At least **one authorised representative of each tendering entity, including a joint venture**, must attend and sign the official attendance register. A representative may represent only one tendering entity. The Municipality prefers that a senior company representative, Contracts Manager or Project Manager attend the compulsory meeting, as the Scope of Works, design, tender specifications and execution requirements will be discussed.

Tenderers must arrive on time. The attendance register will close 15 minutes after the advertised commencement time, after which no further attendance will be recorded.

It remains the Bidder's responsibility to familiarise itself with and fully understand the tender specifications to submit a responsive tender. Fully completed tender documents must be placed in a sealed envelope clearly marked with the Bid Number and Description and deposited in the tender box at the Closing Venue on or before the Closing Date and Time stated above.

2. FUNCTIONALITY CRITERIA

2.1. Tenders will be evaluated for functionality before price and preference. A minimum score of **75 points out of 100** is required.

2.2. The portfolio of projects submitted must collectively demonstrate experience in at **least two of the mentioned categories.**

2.3. For each project, the tenderer must submit:

2.3.1. an appointment or award letter,

2.3.2. a Practical Completion

2.3.3. or Final Completion Certificate,

2.3.4. a signed client reference confirming the scope, final contract value including VAT and completion.

2.4. A project that is not supported by sufficient documentary evidence will not be counted. Only information submitted by the tender closing time will be evaluated. The Employer may verify all project information and references.

FUNCTIONALITY SCORING

Criteria	Description	Minimum Requirement	Points Allocation
Relevant Company Experience	The tenderer must demonstrate the successful completion, during the ten years preceding the tender closing date, of civil engineering construction contracts each having a final contract value of not less than **R30 million**, including VAT. The submitted portfolio must collectively demonstrate experience in at least two of the following: ➢ Wastewater treatment works or oxidation ponds; ➢ Bulk earthworks and engineered pond embankments; ➢ Reinforced concrete water- or liquid-retaining structures; or ➢ HDPE geomembrane-lined ponds or reservoirs.	Minimum of 3 qualifying projects	4 or more projects: 100 points 3 projects: 75 points 2 projects: 50 points 1 project: 25 points No projects: 0 points
TOTAL	**Tenderers must achieve at least 75 points out of 100.**	Minimum functionality threshold: **75**	**100**
Tenderers must submit an appointment letter or contract award, together with a Practical Completion or Final Completion Certificate and a client reference confirming the scope, value and completion of each project. Projects not supported by sufficient documentary evidence will not be considered.			

3. RETURNABLE DOCUMENTS AND CONSEQUENCES OF NON-SUBMISSION

3.1 The tenderer shall complete and return the documents identified in T2.1: List of Returnable Documents.

3.2 Each returnable document is classified in T2.1 as an Eligibility Requirement (E), Material Responsiveness Requirement (M), Functionality Evidence (F), Preference Evidence (P), Administrative or Clarifiable Information (A), or Preferred-Tenderer/Post-Award Submission (PA).

3.3 Failure to satisfy an Eligibility Requirement at the time specified in the Tender Data shall render the tender ineligible.

3.4 Failure to submit or properly complete a Material Responsiveness Requirement shall render the tender non-responsive where the omission constitutes a material deviation or qualification in terms of C.3.8.

3.5 Functionality shall be evaluated solely on the information and supporting evidence submitted by the closing time. Missing or unsupported information shall receive no points. Clarification or verification shall not permit the introduction of new projects, personnel, resources or other information that improves the tenderer's competitive position.

3.6 Failure to submit evidence required to claim points for a specific goal shall be interpreted to mean that the applicable preference points are not claimed and shall not, by itself, render the tender non-responsive.

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

3.7 The Employer may request clarification or completion of Administrative or Clarifiable Information in accordance with C.2.17 and C.2.18, provided that no change to the substance, price, functionality score, tendering entity or competitive position of the tenderer is sought, offered or permitted.

3.8 Preferred-Tenderer/Post-Award Submissions shall be provided only by the preferred or successful tenderer within the stated period. Failure to provide such information may prevent award, formation of the Contract or access to the Site, as applicable.

3.9 All clarification requests and responses shall be in writing, shall be retained in the procurement record and shall be applied fairly and consistently to tenderers in substantially similar circumstances.

4. SPECIFIC GOALS SCORING

	The specific goals allocated points in terms of this tender	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**
1	**Local area of supplier**	**80/20**	**80/20**	**90/10**	**90/10**
1.1	Within the boundaries of the Khai-Ma Local Municipality	10		5	
1.2	Within the boundaries of Namakwa District Municipality	6		3	
1.3	Within the boundaries of the Northern Cape	4		2	
1.4	Outside of the boundaries of the Northern Cape	0		0	
	The specific goals allocated points in terms of this tender	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**
2	**HDI –Unfairly discriminated by race**	**80/20**	**80/20**	**90/10**	**90/10**
2.1	100% Black Owned	10		5	
2.2	75%-99% Owned	8		4	
2.3	60%-74% Owned	6		3	
2.4	51%-59% Owned	3		2	
2.5	0%-50% Owned	0		0	

5. THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20: Ps = 80 [1 - (Pt - Pmin) / Pmin] or 90/10: Ps = 90 [1 - (Pt - Pmin) / Pmin]

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Lowest acceptable tender

Issued by

Mr KP Leserwane (Municipal Manager)
Khâi-Ma Local Municipality
21 Nuwe Street
POFADDER
8890

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

KHÂI-MA MUNICIPALITY
BID NO: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the Construction Industry Development Board Standard for Uniformity in Construction Procurement, Board Notice 423 of 2019 (Government Gazette No. 42622 of 8 August 2019).

The Standard Conditions of Tender make several references to the Tender Data. The Tender Data also contains project-specific amendments and additions applicable to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Tender.

Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies.

Clause Number	**Tender Data**
C.1 GENERAL	
C.1.1 Actions	*Add the following:* The Employer is Khâi-Ma Local Municipality, represented by the Municipal Manager: Mr KP Leserwane.
C.1.2 Tender Documents	*Add the following:* The tender and contract comprise the following documents. The documents shall be read together. The order of precedence is governed exclusively by Contract Data Clause 1.4. in the stated order of precedence. VOLUME 1 – General Conditions of Contract for Construction Works, Third Edition (2015), published by the South African Institution of Civil Engineering and obtained by the tenderer at its own cost. VOLUME 2 – The applicable SANS 1200 standardised specifications referenced in Part C3, obtained by the tenderer at its own cost. VOLUME 3 – This Tender Document (this document), in which is bound: **TENDER DOCUMENT** **Part T1 Tendering Procedures** Section T1.1 Tender Notice and Invitation to Tender Section T1.2 Tender Data **Part T2 Returnable Documents and Schedules** Section T2.1 List of Returnable Documents Section T2.2 Returnable Schedules **Part C1 Agreements and Contract Data** Section C1.1 Forms of Offer and Acceptance

Clause Number	Tender Data
	Section C1.2 Contract Data Section C1.3 Form of Guarantee Section C1.4 Health and Safety Specifications by Employer **Part C2 Pricing Data** Section C2.1 Pricing Assumptions Section C2.2 Schedule of Quantities Section C2.3 Declaration **Part C3 Scope of Work** Section C3.1 Description of the Works Section C3.2 Engineering..... Section C3.3 Construction..... Section C3.4 Management..... Section C3.5 Project Specifications **Part C4 Site, Location and Access** C4.1 Site Information Annexure A Tender Drawings Annexure B Geotechnical Investigation Annexure C Environmental Management Plan Annexure D Khâi-Ma Local Municipality Preferential Procurement Policy Annexure E Baseline Risk Assessment
C.1.4 Communication and Employer's Agent	*Add the following:* The language for communication is English. Verbal information given by the Employer's Agent during site visits, clarification meetings or at any other time before award will not be binding on the Employer. Only information formally issued in writing by the Employer will amend or clarify the Tender Documents. **The Employer's Agent is:** Name: Mind Shape Developments (Pty) Ltd Address: 75A Swartberglaan, Spitskop, Bloemfontein, 9301 Tel: +27 82 474 8984 E-mail: riaan.odendaal@outlook.com
C.1.5 Cancellation and Re-invitation of Tenders	*Add the following:* The Employer may cancel the tender before award on the grounds stated in the Standard Conditions of Tender and applicable legislation. The Employer does not bind itself to accept the lowest or any tender.
C.1.6.2 Competitive Negotiation Procedure	*Add the following:* A competitive negotiation procedure will not be followed.
C.1.6.3 Proposal Procedure Using the Two-stage System	*Add the following:* A two-stage system will not be followed.

Clause Number	Tender Data
C.2 TENDERER'S OBLIGATIONS	
C.2.1 Eligibility	*Add the following:* Only tenderers who satisfy the eligibility requirements stated below are eligible to submit tender offers: a) The tenderer shall be registered with the Construction Industry Development Board (CIDB), or shall be capable of being so registered before the evaluation of tenders, in a contractor grading designation of 7CE or higher. b) Joint ventures are eligible to submit tenders provided that: i. every member of the joint venture is registered with the CIDB; ii. each member is registered in an appropriate contractor grading designation and class of construction works; iii. the lead partner is registered in the CE class of construction works; and iv. the combined contractor grading designation of the joint venture, calculated in accordance with the Construction Industry Development Regulations, is equal to or higher than 7CE. c) The tenderer shall have attended the compulsory clarification meeting, where attendance is stated as compulsory in the Tender Notice and Invitation to Tender. d) The tenderer shall not be subject to any restriction that prohibits it from conducting business with an organ of state. e) The tenderer shall satisfy any additional eligibility criteria expressly identified as such in the Tender Data.
C.2.7 Clarification Meeting and Site Inspection	*Add the following:* Attendance at the compulsory clarification meeting and site inspection is required. **Date: 22 SEPTEMBER 2026** **Time: 09:30** **Venue:** Pella Community Hall (Gemsbok Street, Pella, Khâi-Ma, 8891, South Africa) 29°02'00.2"S 19°09'14.1"E -29.0333972°, 019.1538306° At least one authorised representative of each tendering entity, including a joint venture, must attend and sign the official attendance register. A representative may represent only one tendering entity. Tenderers must arrive on time. The attendance register will close 15 minutes after the advertised commencement time, after which no further attendance will be recorded. Addenda will be issued to, and tenders will be received only from, tendering entities appearing on the official compulsory briefing session attendance register.
C.2.11 Alterations to Documents	*Add the following:* Tenderers are requested to initial each page of the tender submission. All alterations, corrections and amendments made to the tender documents must be initialled by the authorised signatory. Failure to initial an unchanged page shall not, on its own, constitute a material non-compliance.

Clause Number	Tender Data
C.2.12 Alternative Tender Offers	*Add the following:* Alternative tender offers are not permitted and will not be considered. Tenderers shall submit only a conforming tender offer that complies fully with the requirements of the tender documents. Any alternative tender offer submitted will be rejected and will not be evaluated.
C.2.13 Submitting a Tender Offer	*Add the following:* **C.2.13.1** A tendering entity may submit only one tender offer, either as a single tendering entity or as a member of a joint venture. *Add the following:* **C.2.13.3** Each tender offer communicated on paper must be submitted as one original, plus 0 (zero) copies. *Add the following:* **C.2.13.4** The tender must be signed by a person duly authorised to bind the tenderer, and proof of such authority must be submitted. A joint venture tender must include a signed joint venture agreement identifying the lead partner, participation of each member, responsibilities and the person authorised to bind the joint venture. *Add the following:* **C.2.13.5** The Employer's address for delivery and the identification details to be shown on the tender package are: LOCATION OF TENDER BOX: KHÂI-MA LOCAL MUNICIPALITY, POFADDER PHYSICAL ADDRESS: 21 NUWE STREET, POFADDER, 8890 TENDER NUMBER: KH01-26/27 TENDER TITLE: CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS (OXIDATION PONDS) CLOSING DATE AND TIME: 20 OCTOBER 2026 AT 09:00 The sealed envelope must also bear the tenderer's name and address and must be endorsed with the Tender Number and Tender Title. *Add the following:* **C.2.13.6** A two-envelope procedure will not be followed. *Add the following:* **C.2.13.10** By signing C1.1 Form of Offer and Acceptance, the tenderer declares that all information provided in the tender submission is true and correct.
C.2.15 Closing Time	*Add the following:* **The closing date and time for submission of tender offers is 20 October 2026 AT 09:00.** Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted. Late tenders will not be considered.
C.2.16 Tender Offer Validity	*Add the following:* The tender offer validity period is 90 days calculated from the tender closing date.

Clause Number	Tender Data
C.2.17 Clarification of Tender Offer after Submission	*Add the following:* A tender may be regarded as non-responsive if the tenderer fails to provide material clarification or supporting information requested by the Employer within the period stated in the written request, provided that no clarification may change the competitive position of the tenderer or the substance of the tender offer.
C.2.18 Provide Other Material	*Add the following:* The procurement is expected to exceed **R10 million, inclusive of all applicable taxes**. Accordingly, **MBD 5: Declaration for Procurement above R10 Million (All Applicable Taxes Included)** shall be completed, signed and submitted by every tenderer, irrespective of the amount of its individual tender offer. Where required by law, the tenderer shall submit audited annual financial statements for the past three years, or since its establishment if established during the past three years. Where such commitments exist, full particulars shall be furnished in MBD 5. In accordance with Khâi-Ma Local Municipality's Supply Chain Management requirements, neither the tenderer nor any of its directors may owe municipal rates and taxes or municipal charges to Khâi-Ma Local Municipality, or to any other municipality or municipal entity, that are in arrears for more than three months. The required municipal accounts or supporting documentation shall be submitted with the tender. **Failure to complete and submit MBD 5 and the required supporting information shall render the tender non-responsive.**
C.2.20 Securities, Bonds and Policies	*Replace:* The successful tenderer shall submit the performance guarantee, insurance policies and other securities required by the Contract Data within 14 days after the Acceptance Date and before access to the Site or commencement of physical work.
C.2.23 Certificates and Returnable Documents	*Add the following:* Certificates and supporting documents shall be submitted at the time and with the consequence stated in T2.1: List of Returnable Documents. The mere omission of a document classified as Administrative or Clarifiable Information shall not automatically render the tender non-responsive. The Employer may request evidence of facts or status existing at the tender closing time, provided that such request does not permit the tenderer to alter its tender, improve its functionality score, claim additional preference points, change the tendering entity or otherwise change its competitive position. Certificates classified as Preferred-Tenderer/Post-Award Submissions shall be submitted by the preferred or successful tenderer within the period stated in the Employer's written request or Contract Data.
C.3 THE EMPLOYER'S UNDERTAKINGS	
C.3.2 Issue Addenda	*Add the following:* Notwithstanding any request for confirmation of receipt, the tenderer will be deemed to have received an addendum where the Employer can show that the addendum or notice thereof

Clause Number	Tender Data
	was published on the tender portals or transmitted to the tenderer by electronic mail or another recorded means.
C.3.4 Opening of Tender Submissions	*Add the following:* Tenders will be opened immediately after the closing time stated in the Tender Notice and Invitation to Tender, or as amended by addendum. **Location: Khâi-Ma Local Municipality, 21 Nuwe Street, Pofadder, 8890.**
C.3.8 Test for Responsiveness	*Add the following:* In applying the test for responsiveness, the Employer shall distinguish between material non-compliance and an administrative omission. A tender shall not be rejected solely because of an omission classified in T2.1 as Administrative or Clarifiable Information where the omission can be clarified without changing the substance of the tender or the tenderer's competitive position. A tender shall not be permitted to become responsive after closing through the correction or withdrawal of a material deviation, qualification or omission.
C.3.11 Evaluation of Tender Offers	*Add the following:* **The evaluation method for this contract is: Responsiveness, Functionality then Price and Preference.** Responsive tenders will be evaluated in the following stages: 1. Eligibility and administrative responsiveness; 2. Functionality; 3. Price, in accordance with either the 80/20 or 90/10 preference point system (the lowest acceptable tender will be used to determine the applicable preference point system once tenders have been received) and preference (the Municipality's approved specific goals). Only tenders achieving the minimum functionality score will proceed to the evaluation of price and preference.
C.3.11.1 Functionality Criteria	**<u>Functionality Scoring</u>** 1. Tenders will be evaluated for functionality before price and preference. A minimum score of **75 points out of 100** (3 x conforming projects) is required. 2. The portfolio of projects submitted must collectively demonstrate experience in at **least two of the above categories.** 3. For each project, the tenderer must submit: i) an appointment or award letter, ii) a Practical Completion iii) or Final Completion Certificate, iv) a signed client reference confirming the scope, final contract value including VAT and completion. 4. A project that is not supported by sufficient documentary evidence will not be counted. Only information submitted by the tender closing time will be evaluated. The Employer may verify all project information and references.

Clause Number	Tender Data

Criteria	Description	Minimum Requirement	Points Allocation
Relevant Company Experience	The tenderer must demonstrate the successful completion, during the ten years preceding the tender closing date, of civil engineering construction contracts each having a final contract value of not less than **R30 million**, including VAT. The submitted portfolio must collectively demonstrate experience in at least two of the following: ➢ Wastewater treatment works or oxidation ponds; ➢ Bulk earthworks and engineered pond embankments; ➢ Reinforced concrete water- or liquid-retaining structures; or ➢ HDPE geomembrane-lined ponds or reservoirs.	Minimum of 3 qualifying projects	4 or more projects: 100 points 3 projects: 75 points 2 projects: 50 points 1 project: 25 points No projects: 0 points
TOTAL	**Tenderers must achieve at least 75 points out of 100.**	Minimum functionality threshold: **75**	**100**

- **The portfolio of projects submitted must collectively demonstrate experience in at least two of the above categories.**
- **Tenderers must submit an appointment letter or contract award, together with a Practical Completion or Final Completion Certificate and a client reference confirming the scope, value and completion of each project. Projects not supported by sufficient documentary evidence will not be considered.**

C.3.11.1.X - Evaluation of Joint Venture Experience

Where the Tenderer is a joint venture, the experience of its members may be combined, subject to the following:

a) Experience claimed by a member shall only be considered where that member holds at least 25% participation in the tendering joint venture.
b) Where a member performed a previous project in its own name, the verified final contract value of that project shall be used.
c) Where a member performed a previous project as part of another joint venture, only the value attributable to that member's actual participation shall be recognised, calculated as:
Recognised project value = verified final contract value, inclusive of VAT × the member's percentage participation in the previous joint venture.
d) A previous joint-venture project shall only be recognised where the member held at least 25% participation and performed a material portion of the relevant works.
e) For a project to qualify as one of the required projects valued at R30 million or more, the recognised value attributable to the member, not the total historical contract value, must equal or exceed R30 million, inclusive of VAT.

Clause Number	Tender Data

f) The experience of different members of the tendering joint venture may be combined to satisfy the required number of projects. However, the same project may only be counted once.

g) Each project must be supported by a completion certificate and reference letter from the Employer or Engineer, together with the relevant joint-venture agreement and other verifiable evidence confirming:
- the total final contract value;
- the member's percentage participation;
- the scope actually performed by that member; and
- the completion status and date.

h) Where the member's participation or executed value cannot be verified, the project shall not be considered for functionality scoring.

Preference Scoring

Preference points will be awarded to a tenderer in accordance with the table below:

	The specific goals allocated points in terms of this tender	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**
1	**Local area of supplier** (only the highest single locality receives points)	**80/20**	**80/20**	**90/10**	**90/10**
1.1	Within the boundaries of the Khai-Ma Local Municipality	10		5	
1.2	Within the boundaries of Namakwa District Municipality	6		3	
1.3	Within the boundaries of the Northern Cape	4		2	
1.4	Outside of the boundaries of the Northern Cape	0		0	
	The specific goals allocated points in terms of this tender	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**
2	**HDI –Unfairly discriminated by race**	**80/20**	**80/20**	**90/10**	**90/10**
2.1	100% Black Owned	10		5	
2.2	75%-99% Owned	8		4	
2.3	60%-74% Owned	6		3	
2.4	51%-59% Owned	3		2	
2.5	0%-50% Owned	0		0	

Specific Goal 1: Locality

For this tender, the tenderer's locality means the physical place of business from which the tenderer ordinarily conducts substantive business operations as at the tender closing date.

Clause Number	Tender Data
	A postal address, post-office box, virtual office, temporary site office or address established solely for this tender shall not qualify. The following evidence shall be submitted: a) where the tenderer owns the premises, a municipal rates or services account in the tenderer's name, reflecting the physical address and issued not more than three months before the tender closing date; or b) where the premises are leased, a valid lease agreement signed by the lessor and lessee and in force on the tender closing date, together with the lessor's municipal rates or services account issued not more than three months before the tender closing date; <u>Specific Goal 2: Black ownership</u> The ownership percentage claimed shall be supported by: a) a valid B-BBEE certificate issued by a SANAS-accredited verification agency and showing the black ownership percentage; or b) a valid B-BBEE sworn affidavit in the prescribed form, where the tenderer is legally entitled to use such an affidavit, showing the black ownership percentage; and c) where required for verification, a current CIPC registration or beneficial-ownership report and certified identification documents of the relevant shareholders, members, partners or owners. A B-BBEE certificate that records only the contributor level, without recording or supporting the claimed black ownership percentage, shall not by itself substantiate the ownership percentage claimed.
C.3.11.10 **Risk Analysis**	*Add the following:* Notwithstanding compliance with the CIDB grading and other tender requirements, the Employer may conduct a risk assessment addressing: a) the reasonableness of the financial offer; b) the reasonableness and balance of unit rates and prices; and c) the tenderer's demonstrated financial, managerial, technical and resource capacity to perform the contract. The assessment may include verification of references and clarification of submitted information. No tenderer will be recommended for award unless it has demonstrated the resources and capability required to perform the contract.
C.3.13 **Acceptance of Tender Offer**	A tender offer will be accepted only if the preferred tenderer: a) has satisfied all applicable eligibility and material-responsiveness requirements and has supplied any administrative clarification lawfully requested **and signed and commissioned documents where relevant.** b) is tax compliant when verified through the CSD or SARS Tax Compliance Status system; c) and its directors, members, trustees, partners or principals are not listed on the National Treasury Database of Restricted Suppliers or the Register for Tender Defaulters; d) has not abused the Employer's supply chain management system or materially failed to perform a previous public-sector contract after due process; e) has completed MBD 4 and has no material conflict of interest that would compromise the procurement or performance of the contract; f) is registered on the CSD and complies with the material compulsory returnable requirements; g) has achieved at least 75 points for functionality;

Clause Number	Tender Data
	h) has the legal, financial, managerial and technical capacity to enter into and perform the contract; and i) is not insolvent, under liquidation or business rescue, or otherwise legally prohibited from contracting with the Employer. **The Employer reserves the right to verify declarations made in MBD 4 against the CSD, CIPC and other relevant databases. A deliberate or material false declaration or non-disclosure may result in rejection of the tender and further action in terms of the applicable SCM policy and law.**
C.3.17 **Provide Copies of the Contract**	*Add the following* The Employer will provide the successful tenderer with one electronic copy of the signed contract.
C.4 ADDITIONAL CONDITIONS OF TENDER	
C.4.1 **Compliance with Occupational Health and Safety Legislation**	*Add the following* Tenderers must comply with the Occupational Health and Safety Act, 1993 and the Construction Regulations, 2014, and must allow for all costs associated with such compliance. A project-specific Health and Safety Plan must be submitted and must address at least: • management structure, site supervision and responsible persons, including succession arrangements; • induction training for employees, subcontractors and visitors; • health and safety procedures and controls; • monitoring and inspection procedures; • liaison, consultation and review meetings; • site security, welfare facilities and first aid; and • site rules and emergency procedures. The Contractor must ensure that all subcontractors comply with the same requirements and must prepare and maintain a Health and Safety File for the project. The file must be available on Site and handed to the Employer at Final Completion. The signed Occupational Health and Safety Agreement and a valid Compensation Fund Letter of Good Standing must be submitted within 14 days after the Acceptance Date and before access to the Site.
C.4.2 **Claims Arising after Submission of Tender**	*Add the following* No claim arising solely from doubt or obscurity in the tender documents will be admitted where the matter could reasonably have been clarified before tender closing. Also, before submission, the tenderer must check the document for missing or duplicated pages, indistinct information and obvious errors and must request correction before the closing date.
C.4.3 **Imbalance in Tendered Rates**	Add the following Where tendered rates or lump sums appear excessively high, low or materially unbalanced, the Employer may request explanations and supporting evidence. No rebalancing or adjustment of tendered rates or prices will be permitted after closing, except lawful arithmetic corrections under C.3.9. A materially unbalanced tender may be rejected after clarification.

Clause Number	Tender Data
C.4.4 Invalid Tenders	Add the following At tender opening, submissions shall be recorded in accordance with C.3.4. Responsiveness and validity shall be determined only during evaluation under C.3.8 and the classifications and consequences stated in T2.1. A tender may be rejected only for a material non-compliance, an applicable eligibility failure, or another lawful ground stated in the tender documents.
C.4.5 Negotiations with Preferred Tenderers	*Add the following* The Employer may negotiate the final terms of the contract with a preferred tenderer provided that the negotiation: a) does not afford the preferred tenderer a second or unfair opportunity; b) is not to the detriment of another tenderer; and c) does not result in a price higher than the tendered price. Minutes of all negotiations must be retained for record purposes.
C.4.6 UIF Payments	*Add the following* The tenderer must provide evidence of good standing regarding UIF payments when requested by the Employer.
C.4.7 Price Variations	Add the following The applicability of contract price adjustment is stated in C1.2 Contract Data.
C.4.8 Electronic Tender Documents	*Add the following* The tender documents will be issued electronically free of charge through the National Treasury eTender portal and the Khâi-Ma Local Municipality website. The electronic document issued by the Employer is the official tender document. Tenderers must print, complete (typed entries are accepted) and submit one original hard-copy tender in the tender box. Electronic, e-mailed or facsimile tender submissions will not be accepted. Tenderers may not make unauthorised alterations to the issued document. All permitted corrections made by the tenderer must be initialled by the authorised signatory.
C.4.9 Tenders Forwarded by Post	*Add the following* Tenders sent by post, courier or another delivery method remain the tenderer's responsibility and must be physically deposited in the tender box before the closing date and time. Faxed or e-mailed tenders will not be accepted.
C.4.10 Withdrawal of Tenders	*Add the following* A tenderer may withdraw or substitute its tender by written notice received by the Employer's Agent before the tender closing date and time.
C.4.11 Acceptance or Rejection of Tenders	*Add the following* A conditional, incomplete or materially non-responsive tender may be rejected. Where rates appear materially unbalanced, the Employer may request clarification in accordance with C.2.17, C.3.10, C.3.11.10 and C.4.3. The Employer does not bind itself to accept the lowest, highest-scoring or any tender and will award the contract only in accordance with the applicable law and the Municipality's Supply Chain Management Policy.
C.4.12 Signing of the Contract	*Add the following* The successful tenderer shall sign the contract within seven days after being requested to do so.

Clause Number	Tender Data
	The performance guarantee, insurances and other securities shall be delivered within the periods stated in the Contract Data and before access to the Site or commencement of physical work.
C.4.13 Correction of Arithmetical Errors	*Add the following* Arithmetical errors, omissions and discrepancies will be dealt with in accordance with C.3.9 of the Standard Conditions of Tender. The tenderer will be informed of any correction affecting its tender before award.
C.4.14 Tender Document Deposits	*Add the following* Not applicable. Tender documents are issued electronically free of charge.
C.4.15 Disqualification and Material Non-compliance	*Add the following* Tender offers shall be evaluated in accordance with the classifications and consequences stated in T2.1 and the material-responsiveness test in C.3.8. Non-submission shall result in automatic rejection only where the omitted requirement is expressly classified as an Eligibility Requirement or Material Responsiveness Requirement and the stated consequence is lawful, reasonable and applicable to all tenderers.
C.4.16 Cession of Rights and Claims	*Add the following* The Contractor may not cede or assign any right or claim relating to money payable under the Contract without the prior written consent of the Employer.
C.4.17 Time for Completion of the Works	Add the following The Time for Completion is eleven (11) calendar months from the Commencement Date. The Contractor shall programme, resource and execute the Works continuously to achieve Completion within this period, subject only to extensions of time granted under the Contract.
C.4.18 Currency	*Add the following* All tendered prices and payments must be stated in South African Rand.

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

PART T2:

RETURNABLE DOCUMENTS AND SCHEDULES

Section	Description	Page No
SECTION T2.1	**LIST OF RETURNABLE DOCUMENTS**	**T2.1-1**
SECTION T2.2	**RETURNABLE SCHEDULES**	**T2.2-1**

T2.1 LIST OF RETURNABLE DOCUMENTS

The tenderer shall complete and return the documents identified in T2.1: List of Returnable Documents.

Each returnable document/schedule is classified as an Eligibility Requirement (E), Material Responsiveness Requirement (M), Functionality Evidence (F), Preference Evidence (P), Administrative or Clarifiable Information (A), or Preferred-Tenderer/Post-Award Submission (PA).

Failure to satisfy an Eligibility Requirement at the time specified in the Tender Data shall render the tender ineligible.

Failure to submit or properly complete a Material Responsiveness Requirement shall render the tender non-responsive where the omission constitutes a material deviation or qualification in terms of **C.3.8**.

Functionality shall be evaluated solely on the information and supporting evidence submitted by the closing time. Missing or unsupported information shall receive no points. Clarification or verification shall not permit the introduction of new projects, personnel, resources or other information that improves the tenderer's competitive position.

Failure to submit evidence required to claim points for a specific goal shall be interpreted to mean that the applicable preference points are not claimed and shall not, by itself, render the tender non-responsive.

The Employer may request clarification or completion of Administrative or Clarifiable Information in accordance with **C.2.17** and **C.2.18**, provided that no change to the substance, price, functionality score, tendering entity or competitive position of the tenderer is sought, offered or permitted.

Preferred-Tenderer/Post-Award Submissions shall be provided only by the preferred or successful tenderer within the stated period. Failure to provide such information may prevent award, formation of the Contract or access to the Site, as applicable.

All clarification requests and responses shall be in writing, shall be retained in the procurement record and shall be applied fairly and consistently to tenderers in substantially similar circumstances.

Commissioner of Oaths: Where a certified copy is expressly required, it must be certified by a Commissioner of Oaths or another person authorised by law. A sworn affidavit must be signed and commissioned before a Commissioner of Oaths. A document expressly required to be notarially certified must be certified by a Notary Public. Other schedules require only the stated authorised signature unless expressly indicated otherwise.

TABLE – RETURNABLE DOCUMENT/SCHEDULE CLASSIFICATION

CODE	CLASSIFICATION	CONSEQUENCE OF OMISSION
E	**Eligibility requirement**	Tender is ineligible where the requirement was not satisfied at closing. Evidence of an existing fact may only be clarified where expressly permitted.
M	**Material responsiveness**	Tender is non-responsive. The omission may not be corrected after closing.
F	**Functionality evidence**	No score is awarded for unsupported information. No new projects, personnel or evidence that improves the score may be introduced after closing.
P	**Preference evidence**	No preference points are awarded for the unsupported specific goal; the tender is not rejected merely for failing to claim preference points.
A	**Administrative or clarifiable information**	Employer may request completion or clarification if this does not change the tender's substance or competitive position.
PA	**Preferred-tenderer or post-award submission**	Required only from the preferred/successful tenderer by the stated deadline. Failure may prevent award, contract formation or access to Site.



TABLE – RETURNABLE DOCUMENT/SCHEDULE LIST

Schedule / Reference	Returnable document or requirement	Code	Tick If Sub-mitted
T2.2.01	COMPANY & BANKING DETAILS	**E**	
T2.2.02	COMPULSORY CLARIFICATION MEETING CERTIFICATE	**E**	
T2.2.03	RECORD OF ADDENDA TO TENDER DOCUMENTS	**M**	
T2.2.04	CENTRAL SUPPLIER DATABASE (CSD) REGISTRATION REPORT	**E**	
T2.2.05	CERTIFICATE OF CONTRACTOR REGISTRATION ISSUED CIDB	**E**	
T2.2.06	CERTIFICATE OF AUTHORITY OF SIGNATURE	**M**	
T2.2.07	CERTIFICATE OF AUTHORITY FOR JOINT VENTURE	**M**	
T2.2.08	RESOLUTION / CERTIFICATION BY CONSORTIUM OR JOINT VENTURE AND JV AGREEMENT	**M**	
T2.2.09	SARS TAX COMPLIANCE STATUS AND TCS PIN	**E**	
T2.2.10	DIRECTORS' MUNICIPAL ACCOUNT OR CERTIFIED AND VALID LEASE AGREEMENT	**E**	
T2.2.11	DIRECTORS' ID AND COMPANY REGISTRATION DOCUMENTS - CIPC DISCLOSURE CERTIFICATE, COR 14.3 OR CK1	**M**	
T2.2.12	PROPOSED AMENDMENTS AND QUALIFICATIONS BY TENDERER	**M**	
T2.2.13	COMPULSORY ENTERPRISE QUESTIONNAIRE	**M**	
T2.2.14	MBD 1: INVITATION TO BID AND COMPANY INFORMATION	**M**	
T2.2.15	MBD 4: BIDDER'S DISCLOSURE/DECLARATION OF INTEREST	**M**	
T2.2.16	MBD 5: DECLARATION FOR PROCUREMENT ABOVE 10 MILLION	**M**	
T2.2.17	MBD 6.1: PREFERENCE POINTS CLAIM FORM	**P/M**	
T2.2.18	MBD 8: DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES	**M**	
T2.2.19	MBD9: CERTIFICATE OF INDEPENDENT BID DETERMINATION	**M**	
T2.2.20	SCHEDULE OF TENDERER'S EXPERIENCE	**F**	
T2.2.21	DETAILS OF CONSTRUCTION MANAGER'S & GENERAL FOREMAN'S EXPERIENCE	**A**	
T2.2.22	SCHEDULE OF PLANT AND EQUIPMENT	**A**	
T2.2.23	SCHEDULE OF ESTIMATED MONTHLY EXPENDITURE	**A**	
T2.2.24	SCHEDULE OF SUB-CONTRACTORS	**A**	
T2.2.25	SCHEDULE OF ESTIMATED LOCAL LABOUR TO BE EMPLOYED	**A**	
T2.2.26	PRELIMINARY PROGRAMME	**A**	
T2.2.27	MUNICIPAL RATES AND TAXES	**P/M**	
T2.2.28	DIRECTOR/S PROOF OF ADDRESS AND IDENTITY DOCUMENT	**P/M**	
T2.2.29	ANNUAL FINANCIAL STATEMENTS	**M**	
C1.1	FORM OF OFFER AND ACCEPTANCE	**M**	
C2.2	PRICED BILL OF QUANTITIES	**M**	
Tender Data C.2.13 – C.2.15	SUBMISSION BY THE PRESCRIBED METHOD AND BEFORE CLOSING	**E**	
T1.1 clause 3.18	INITIALLING ALTERATIONS AND CORRECTIONS	**M**	
T1.1 clause 3.20; T2.2.18	NOT RESTRICTED FROM PUBLIC PROCUREMENT	**E**	
Contract Data clause 5.3.1	PROJECT-SPECIFIC HEALTH AND SAFETY PLAN	**PA**	
Contract Data clause 5.3.1	DETAILED CONSTRUCTION PROGRAMME	**PA**	
Contract Data clauses 5.3.1 and 6.2.1; C1.3	PERFORMANCE GUARANTEE	**PA**	
Contract Data clauses 5.3.1 and 8.6	INSURANCE POLICIES AND PROOF OF COVER	**PA**	
Contract Data clauses 4.3 and 5.3.1	OHS AGREEMENT AND COIDA LETTER OF GOOD STANDING	**PA**	

T2.2 RETURNABLE SCHEDULES

T2.2.01: COMPANY & BANKING DETAILS

Classification: Eligibility Requirement (E)

Notes to tenderer:

a) The tenderer shall attach to this form a letter from the bank at which he declares he conducts his account. The contents of the bank's letter must state the credit rating that it, in addition to the information required below, accords to the tenderer for the business envisaged by this tender. The minimum acceptable credit rating applicable to tenderers for this project is a **C** credit rating. Failure to submit the required bank letter, or failure to meet the minimum C credit rating, will render the tender ineligible.

b) The tenderer's banking details as they appear below shall be completed.

c) If the tenderer is a joint venture enterprise, details of all the members of the joint venture shall be similarly provided and attached to this form.

The following company details schedule must be completed to ensure that the prerequisite requirements to tendering are met.

Registered Company Name: .....

Company Registration Number: .....

VAT Number:.....

SARS Tax Reference: .....

Bank Name and Branch: .....

Branch Number .....

Bank Account Number:.....

Bank Rating: .....

Type of Account .....

Contact Person at Bank.....

Telephone number of contact person at bank .....

Name …….. Signature ……

Capacity …….. Date ……

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.02: COMPULSORY CLARIFICATION MEETING CERTIFICATE

Classification: Eligibility Requirement (E)

As required by Clause 2.7 of the Tender Data, I/we certify that I/we have visited the site of the Works and attended the compulsory site visit and clarification meeting on the date certified below.

I/we further certify that I am/we are satisfied with the description of the Work and the explanations given by the Employer's Agent at the site visit and clarification meeting.

SIGNATURE OF TENDERER:

Name …….. Signature ……

Capacity …….. Date ……

Site Visit

This will certify that .....

representing .....

attended a Site Inspection for this Contract on ..... 20.....

FOR THE EMPLOYER'S AGENT: ..... (signed)

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.03: RECORD OF ADDENDA TO TENDER DOCUMENTS

Classification: Material Responsiveness Requirement (M)

We confirm that the following communications received from the Procuring Department before the submission of this tender offer, amending the tender documents, have been considered in this tender offer:

No.	Date	Title or Details
1.		Clarification Meeting Minutes
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Attach additional pages if more space is required.

....

Signature Date

....

Position Name of Bidder

T2.2.04: CENTRAL SUPPLIER DATABASE (CSD) REGISTRATION REPORT (NO OLDER THAN 1 MONTH FROM TENDER CLOSURE

Classification: Eligibility Requirement (E)

Attach Here

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.05: CERTIFICATE OF CONTRACTOR REGISTRATION ISSUED BY THE CONSTRUCTION INDUSTRY DEVELOPMENT BOARD (CIDB)

Classification: Eligibility Requirement (E)

Eligibility timing: CIDB status will be verified on the Register of Contractors. The tenderer must be registered in the required class and grading.

Attach Here

T2.2.06: CERTIFICATE OF AUTHORITY OF SIGNATURE

Classification: Material Responsiveness Requirement (M)

Certification note: The certified copies requested below may be certified by a Commissioner of Oaths or another person authorised by law. The joint-venture constituting document, where expressly required to be notarially certified, must be certified by a Notary Public.

With reference to Clause 2.13.4 of the Tender Data, Part T1.1, I/we herewith certify that this tender is submitted by: *(Mark applicable block)*

(a) A company, and attach hereto a certified copy of the required resolution of the Board of Directors ☐

(b) A partnership, and attach hereto a certified copy of the required resolution by all partners ☐

(c) A close corporation, and attach hereto a certified copy of the required resolution of the Board of Officials ☐

(d) A one-man business, and attach hereto certified proof that I am the sole owner of the business submitting this tender ☐

(e) A joint venture, and attach hereto: ☐

- An notarially certified copy of the original document under which the joint venture was constituted
- Certified authorisation by the participating members of the undersigned to submit tenders and conclude contracts on behalf of the joint venture

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.07: CERTIFICATE OF AUTHORITY FOR JOINT VENTURE

Classification: Material Responsiveness Requirement (M)

This Returnable Schedule is to be completed by joint ventures.

We, the undersigned, are submitting this tender offer in Joint Venture and hereby authorise Mr/Ms …… …… , authorised signatory of the company …… ……., acting in the capacity of lead partner, to sign all documents in connection with the tender offer and any contract resulting from it on our behalf.

NAME OF FIRM	ADDRESS	DULY AUTHORISED SIGNATORY
Lead partner ……..		Signature……... Name …… Designation ……
Lead partner ……..		Signature……... Name …… Designation ……
Lead partner ……..		Signature……... Name …… Designation ……
Lead partner ……..		Signature……... Name …… Designation ……

T2.2.08: RESOLUTION / CERTIFICATION BY CONSORTIUM OR JOINT VENTURE AND JV AGREEMENT

Classification: Material Responsiveness Requirement (M)

RESOLUTION of a meeting of the Board of Directors / Members / Partners of

_____

NAME OF TENDERER (Must agree with bidder details)

Held at _____on _____
(Place) (Date)

RESOLVED THAT:
The enterprise submits a Tender to Khâi-Ma Local Municipality in respect of the following:

BID NO.: KH01-26/27 CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

(list all the legally correct full names and registration numbers, if applicable, of the Enterprises forming the Consortium / Joint Venture).

_____ and

_____ and

_____ and

_____ and

Mr./Mrs./Ms. _____

In his/her capacity as _____

and who will sign as follows: _____
(SPECIMEN SIGNATURE)

be, and is hereby, authorised to sign the Tender and all other documents and/or correspondence in connection with and relating to the Tender, as well as to sign any contract, and or all documentation resulting from the award of the Tender to the **Consortium/ Joint Venture** enterprise mentioned above.

The enterprise in the form of a consortium or joint venture accept jointly and several liability with parties under item 1 above for the fulfilment of the obligations of the joint venture deriving from, and in any way
connected with the contract to be entered with the Khâi-Ma Local Municipality in respect of the project described above under item 1.

The **Consortium / Joint Venture** enterprise chooses as its domicilium citandi et executandi for all purposes arising from the joint venture agreement and contract with the Khâi-Ma Local Municipality in respect of the project under item 1:

(Physical Address)

_____

Note: The resolution **must be signed by all directors or members / partners** of the bidding enterprise. Should the space provided below not be enough for all the directors to sign, please provide a separate sheet in the same format below:

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

NB: COMPULSORY TO BE COMPLETED IN CASE OF CONSORTIUM OR JOINT VENTURE

NAME		ID NUMBER	DIRECTORS/OWNERS PERSONAL TAX NO	SIGNATURE
1				
2				
3				
4				
5				
6				
7				
8				
9				

Name of Joint Venture	
Names of Each Enterprise:	
Name and Address of Enterprise:	
Name and Address of Enterprise:	
Name and Address of Enterprise:	
Has an original valid Tax Clearance Certificate been submitted for each enterprise:	Yes ☐ No ☐
CIDB Registration Number(s), if any:	

Submit your Joint Venture Agreement together with this tender document.

IF NO JOINT VENTURE AGREEMENT IS SUBMITTED, THE TENDER WILL BE SEEN AS NON-RESPONSIVE.

T2.2.09: SARS TAX COMPLIANCE STATUS AND TCS PIN

Classification: Eligibility Requirement (E)

Tenderers shall attach to this page a copy of the South African Revenue Services Tax Compliance Status Pin in respect of his/ her company, close corporation, or partnership. In the case of a joint venture between two or more firms, the tenderer shall attach a copy of the Tax Compliance Status Pin for each of the joint venture partners.

Bidders must provide their Master Registration Number and tax compliance status PIN to enable the municipality to verify the bidder's tax compliance status.

Attach Here

T2.2.10: DIRECTORS' MUNICIPAL ACCOUNT OR CERTIFIED AND VALID LEASE AGREEMENT AS PER C2.23 (G)

Classification: Eligibility Requirement (E)

NB: Please attach Certified copy/copies of Municipal Account(s)

Names of Directors/Partners/Senior Managers	Physical residential address of the Director/Partner/Senior Manager	Residential Municipal Account number(s)	Name of Municipality

DECLARATION

I, THE UNDERSIGNED (NAME)

.....

CERTIFY THAT THE INFORMATION FURNISHED ABOVE IS CORRECT. I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

....

Signature Date

....

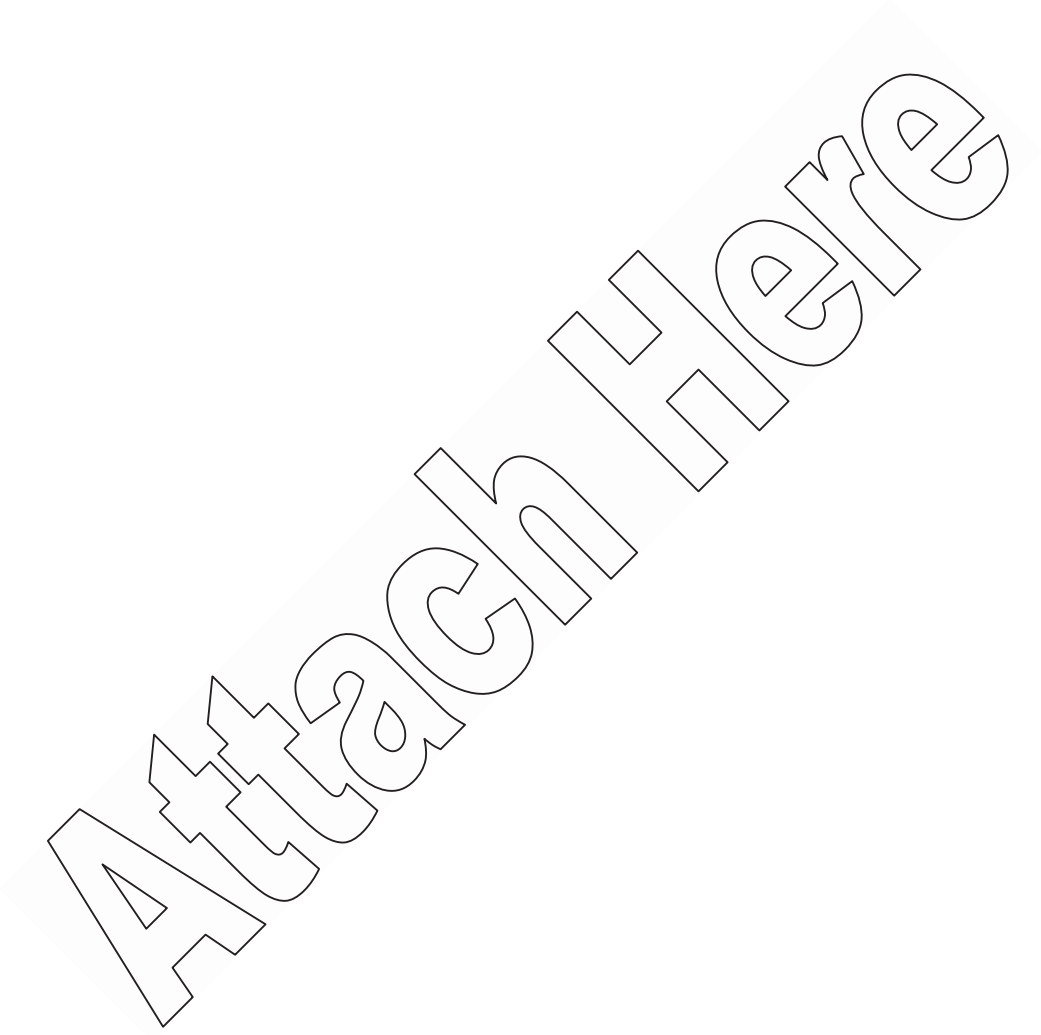
Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.11: DIRECTORS' ID AND COMPANY REGISTRATION DOCUMENTS - CIPC DISCLOSURE CERTIFICATE, COR 14.3 OR CK1

Classification: Material Responsiveness Requirement (M)

NB: Please attach Certified copy/copies of ID and Company Documents



T2.2.12: PROPOSED AMENDMENTS AND QUALIFICATIONS BY TENDERER

Classification: Material Responsiveness Requirement (M)

The Tenderer should record any deviations or qualifications he may wish to make to the tender documents in this Returnable Schedule. Alternatively, a tenderer may state such deviations and qualifications in a covering letter to his tender and reference such letter in this schedule.

The Tenderer's attention is drawn to clause C.3.8 of the Standard Conditions of Tender referenced in the Tender Data regarding the employer's handling of material deviations and qualifications.

Tenderers must not include deviations or qualifications relating to the scope of work in this schedule where they are required to submit an Approach Paper.

	Page	Clause or item	Proposal	

....

Signature Date

....

Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.13: ENTERPRISE QUESTIONNAIRE

Classification: Material Responsiveness Requirement (M)

The following particulars must be furnished. In the case of a joint venture, **separate** enterprise questionnaires in respect of each partner must be completed and submitted.

Section 1: Name of enterprise: . . . . . .

Address of enterprise: . . . . . .

. . . . . .

. . . . . .

Section 2: VAT registration number, if any: . . . . . .

Section 3: CIDB registration number, if any: . . . . . .

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

***** Complete only if sole proprietor or partnership and attach separate page if more than 3 partners

Section 5: Particulars of companies and close corporations

Company registration number . . . . . .

Close corporation number . . . . . .

Tax reference number . . . . . .

Section 6: Record of service of the state

Indicate by marking the relevant boxes with a cross, if any sole proprietor, partner in a partnership or Director, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months in the service of any of the following:

- ☐ a member of any municipal council
- ☐ a member of any provincial legislature
- ☐ a member of the National Assembly or the National Council of Provinces
- ☐ a member of the board of Directors of any municipal entity
- ☐ an official of any municipality or municipal entity
- ☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
- ☐ a member of an accounting authority of any national or provincial public entity
- ☐ an employee of Parliament or a provincial legislature

If any of the above boxes are marked, disclose the following:

Name of sole proprietor, partner, Director, manager, principal shareholder or stakeholder	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		current	Within last 12 months

*insert separate page if necessary

Section 7: Record of spouses, children and parents in the service of the state

Indicate by marking the relevant boxes with a cross, if any spouse, child or parent of a sole proprietor, partner in a partnership or Director, manager, principal shareholder or stakeholder in a company or close corporation is currently or has been within the last 12 months been in the service of any of the following:

- ☐ a member of any municipal council
- ☐ a member of any provincial legislature
- ☐ a member of the National Assembly or the National Council of Province
- ☐ a member of the board of Directors of any municipal entity
- ☐ an official of any municipality or municipal entity
- ☐ an employee of any provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act 1 of 1999)
- ☐ a member of an accounting authority of any national or provincial public entity
- ☐ an employee of Parliament or a provincial legislature

Name of spouse, child or parent	Name of institution, public office, board or organ of state and position held	Status of service (tick appropriate column)	
		current	Within last 12 months

*insert separate page if necessary

The undersigned, who warrants that he/she is duly authorised to do so on behalf of the enterprise:

i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my/our tax matters are in order;
ii) confirms that neither the name of the enterprise or the name of any partner, manager, Director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;
iii) confirms that no partner, member, Director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;
iv) confirms that I/we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest;
v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

....

Signature Date

....

Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.14: MBD 1: INVITATION TO BID AND COMPANY INFORMATION

Classification: Material Responsiveness Requirement (M)

PART A
INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR THE REQUIREMENTS OF THE KHÂI-MA LOCAL MUNICIPALITY					
BID NUMBER:	**KH01-26/27**	CLOSING DATE:	**20 October 2026**	CLOSING TIME:	**09:00**
DESCRIPTION	**CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS**				
THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM.					

BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT:

The Tender Box, Khai-Ma Local Municipality
21 Nuwe Street
Pofadder
8890

SUPPLIER INFORMATION						
NAME OF BIDDER						
POSTAL ADDRESS						
STREET ADDRESS						
TELEPHONE NUMBER	CODE		NUMBER			
CELLPHONE NUMBER						
FACSIMILE NUMBER	CODE		NUMBER			
E-MAIL ADDRESS						
VAT REGISTRATION NUMBER						
TAX COMPLIANCE STATUS	TCS PIN:		**OR**	CSD No:		
B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE [TICK APPLICABLE BOX]	☐ Yes ☐ No		B-BBEE STATUS LEVEL SWORN AFFIDAVIT		☐ Yes ☐ No	

[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES & QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]

ARE YOU THE ACCREDITED REPRESENTATIVE **IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES ENCLOSE PROOF]	ARE YOU A FOREIGN BASED SUPPLIER FOR **THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES, ANSWER PART B:3]
TOTAL NUMBER OF ITEMS OFFERED		**TOTAL BID PRICE**	**R**
SIGNATURE OF BIDDER	……	**DATE**	……
CAPACITY UNDER WHICH THIS BID IS SIGNED			

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:		**TECHNICAL INFORMATION MAY BE DIRECTED TO:**	
DEPARTMENT	Supply Chain Management	CONTACT PERSON	Riaan Odendaal
CONTACT PERSON	Amogelang Leteane	TELEPHONE NUMBER	082 474 8984
TELEPHONE NUMBER	060 525 3885	FACSIMILE NUMBER	
FACSIMILE NUMBER		E-MAIL ADDRESS	riaan.odendaal@outlook.com
E-MAIL ADDRESS	amogelang@khaima.gov.za		

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PART B
TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.

1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR ONLINE**

1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

2. TAX COMPLIANCE REQUIREMENTS

2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.

2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.

2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.

2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.

2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.

2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.

2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO

3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA? ☐ YES ☐ NO

3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? ☐ YES ☐ NO

3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? ☐ YES ☐ NO

3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? ☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS WILL RENDER THE BID INVALID. NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

....

Signature Date

....

Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.15: MBD 4: BIDDER'S DISCLOSURE/DECLARATION OF INTEREST

Classification: Material Responsiveness Requirement (M)

1. No bid will be accepted from persons in the service of the state.

2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.

3. **To give effect to the above, the following questionnaire must be completed and submitted with the bid.**

3.1 Full Name of bidder or his or her representative:……..

3.2 Identity Number:…….

3.3 Position occupied in the Company (director, trustee, shareholder²):.....

3.4 Company registration number:…….....

3.5 Tax Reference Number: …….

3.6 VAT Registration Number: ……..…....

3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.

3.8 Are you presently in the service of the state? **YES / NO**

3.8.1 If so, furnish particulars.

……
……

3.9 Have you been in the service of the state for the past twelve months? **YES / NO**

3.9.1 If so, furnish particulars.

……

* MSCM Regulations: "in the service of the state" means to be –
(a) a member of –
(i) any municipal council.
(ii) any provincial legislature; or
(iii) the national Assembly or the national Council of provinces.

(b) a member of the board of directors of any municipal entity.
(c) an official of any municipality or municipal entity.
(d) an employee of any national or provincial department, national or provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999).
(e) a member of the accounting authority of any national or provincial public entity; or
(f) an employee of Parliament or a provincial legislature.

3.10 Do you, have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid? **YES / NO**

3.10.1 If so, furnish the following particulars:

……

3.11 Are you, aware of any relationship (family, friend, other) between a bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid? **YES / NO**



3.11.1 If so, furnish particulars.

……

3.12 Are any of the company's directors, managers, principal shareholders, or stakeholders in service of the state? **YES / NO**

3.12.1 If so, furnish particulars.

……

3.13 Are any spouse, child or parent of the company's directors, managers, principal shareholders or stakeholders in service of the state? **YES / NO**

3.13.1 If so, furnish particulars.……

3.14 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract? **YES / NO**

3.14.1 If yes, furnish particulars:……..……..

4. Full details of directors / trustees / members / shareholders.

Full Name	**Identity Number**	**State Employee Number**	**Income Tax Number**

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.16: MBD 5: DECLARATION FOR PROCUREMENT ABOVE 10 MILLION

Classification: Material Responsiveness Requirement (M)

DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (ALL APPLICABLE TAXES INCLUDED)

For all procurement expected to exceed R10 million (all applicable taxes included), bidders must complete the following questionnaire:

1 Are you by law required to prepare annual financial statements for auditing? *Yes/No

1.1 If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.

……

……

2 Do you have any outstanding undisputed commitments for municipal services towards any municipality for more than three months or any other service provider in respect of which payment is overdue for more than 30 days? *Yes/No

2.1 If no, this serves to certify that the bidder has no undisputed commitments for municipal services towards any municipality for more than three months or other service provider in respect of which payment is overdue for more than 30 days.

2.2 If yes, provide particulars.

……

…….

…….

……..

* Delete if not applicable

3 Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract? *Yes/No

3.1 If yes, furnish particulars

…….

……

4. Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity is expected to be transferred out of the Republic? *Yes/No

4.1 If yes, furnish particulars

……..

……..



CERTIFICATION

I, THE UNDERSIGNED (NAME)……

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT.

I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....	.....
Signature	Date
.....	.....
Position	Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.17: MBD 6.1: PREFERENCE POINTS CLAIM FORM

Classification: Preference Evidence (P) / Material Responsiveness Requirement (M)

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022

---

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:
- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included); and
- the 90/10 system for requirements with a Rand value above R50 000 000 (all applicable taxes included).

1.2 Either the 90/10 or 80/20 preference point system will be applicable in this tender. The lowest acceptable tender will be used to determine the accurate system once tenders are received.

1.3 Points for this tender shall be awarded for:

(a) Price; and
(b) Specific Goals.

The maximum points for this tender are allocated as follows:

	POINTS	POINTS
PRICE	80	90
SPECIFIC GOALS	20	10
TOTAL POINTS FOR PRICE AND SPECIFIC GOALS	**100**	**100**

1.4 Failure on the part of a tenderer to submit proof or documentation required in terms of this tender to claim points for specific goals with the tender, will be interpreted to mean that preference points for specific goals are not claimed.

1.5 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

2 DEFINITIONS

(a) **"tender"** means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
(b) **"price"** means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
(c) **"rand value"** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
(d) **"tender for income-generating contracts"** means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
(e) **"the Act"** means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

3 FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

3.1.1 THE 80/20 OR 90/10 PREFERENCE POINT SYSTEMS

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20: Ps = 80 [1 - (Pt - Pmin) / Pmin] or 90/10: Ps = 90 [1 - (Pt - Pmin) / Pmin]

Where

Ps	=	Points scored for price of tender under consideration
Pt	=	Price of tender under consideration
Pmin	=	Price of lowest acceptable tender

3.2. FORMULAE FOR DISPOSAL OR LEASING OF STATE ASSETS AND INCOME GENERATING PROCUREMENT

3.2.1. POINTS AWARDED FOR PRICE

A maximum of 80 or 90 points is allocated for price on the following basis:

80/20: Ps = 80 [1 + (Pt - Pmax) / Pmax] or 90/10: Ps = 90 [1 + (Pt - Pmax) / Pmax]

Where

Ps	=	Points scored for price of tender under consideration
Pt	=	Price of tender under consideration
Pmax	=	Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

4.1 In terms of Municipality's Preferential Procurement Policy, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:

4.2 In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of:

i) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or

ii) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system, then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

Note to tenderers: The tenderer must indicate how they claim points for each preference point system.

Specific-goal claims shall be verified against the Central Supplier Database and the supporting evidence specified in this tender. Where a sworn affidavit is submitted, it must be signed and commissioned before a Commissioner of Oaths.

TABLE 1

	The specific goals allocated points in terms of this tender	Number of Points for Preference	Number of Points for Preference (To be completed by the tenderer)	Number of Points for Preference	Number of Points for Preference (To be completed by the tenderer)
1	**Local area of supplier**	**80/20**	**80/20**	**90/10**	**90/10**
1.1	Within the boundaries of the Khai-Ma Local Municipality	10		5	
1.2	Within the boundaries of Namakwa District Municipality	6		3	
1.3	Within the boundaries of the Northern Cape	4		2	
1.4	Outside of the boundaries of the Northern Cape	0		0	
	The specific goals allocated points in terms of this tender	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**	**Number of Points for Preference**	**Number of Points for Preference (To be completed by the tenderer)**
2	**HDI –Unfairly discriminated by race**	**80/20**	**80/20**	**90/10**	**90/10**
2.1	100% Black Owned	10		5	
2.2	75%-99% Owned	8		4	
2.3	60%-74% Owned	6		3	
2.4	51%-59% Owned	3		2	
2.5	0%-50% Owned	0		0	

Specific Goal 1: Locality

For this tender, the tenderer's locality means the physical place of business from which the tenderer ordinarily conducts substantive business operations as at the tender closing date.

A postal address, post-office box, virtual office, temporary site office or address established solely for this tender shall not qualify. The following evidence shall be submitted:

a) where the tenderer owns the premises, a municipal rates or services account in the tenderer's name, reflecting the physical address and issued not more than three months before the tender closing date; or

b) where the premises are leased, a valid lease agreement signed by the lessor and lessee and in force on the tender closing date, together with the lessor's municipal rates or services account issued not more than three months before the tender closing date;

Specific Goal 2: Black ownership

The ownership percentage claimed shall be supported by:

a) a valid B-BBEE certificate issued by a SANAS-accredited verification agency and showing the black ownership percentage; or

b) a valid B-BBEE sworn affidavit in the prescribed form, where the tenderer is legally entitled to use such an affidavit, showing the black ownership percentage; and

c) where required for verification, a current CIPC registration or beneficial-ownership report and certified identification documents of the relevant shareholders, members, partners or owners.

A B-BBEE certificate that records only the contributor level, without recording or supporting the claimed black ownership percentage, shall not by itself substantiate the ownership percentage claimed.

DECLARATION WITH REGARD TO COMPANY/FIRM

4.1. Name of company/firm…….

4.2. Company registration number: ……...

4.3. TYPE OF COMPANY/ FIRM

- o Partnership/Joint Venture / Consortium
- o One-person business/sole propriety
- o Close corporation
- o Public Company
- o Personal Liability Company
- o (Pty) Limited
- o Non-Profit Company
- o State Owned Company

[TICK APPLICABLE BOX]

4.4. I, the undersigned, who is duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the specific goals as advised in the tender, qualifies the company/ firm for the preference(s) shown and I acknowledge that:

i) The information furnished is true and correct;
ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –

(a) disqualify the person from the tendering process;
(b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
(d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and
(e) forward the matter for criminal prosecution, if deemed necessary.

……
SIGNATURE(S) OF TENDERER(S)

SURNAME AND NAME: …….

DATE: ……

ADDRESS: ……

……

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.18: MBD 8: DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

Classification: Material Responsiveness Requirement (M)

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Municipal Bidding Document must form part of all bids invited.
2 It serves as a declaration to be used by municipalities and municipal entities in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.
3 The bid of any bidder may be rejected if that bidder, or any of its directors have:
   a. abused the municipality's / municipal entity's supply chain management system or committed any improper conduct in relation to such system;
   b. been convicted for fraud or corruption during the past five years;
   c. willfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or
   d. been listed in the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004).

4 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? (Companies or persons who are listed on this Database were informed in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the *audi alteram partem* rule was applied). **The Database of Restricted Suppliers now resides on the National Treasury's website(www.treasury.gov.za) and can be accessed by clicking on its link at the bottom of the home page.**	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court of law outside the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		
Item	**Question**	**Yes**	**No**
4.4	Does the bidder or any of its directors owe any municipal rates and taxes or municipal charges to the municipality / municipal entity, or to any other municipality / municipal entity, that is in arrears for more than three months?	Yes ☐	No ☐

4.4.1	If so, furnish particulars:		
4.5	Was any contract between the bidder and the municipality / municipal entity or any other organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.7.1	If so, furnish particulars:		

CERTIFICATION

I, THE UNDERSIGNED (FULL NAME) ……..……..……

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM TRUE AND CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

.....	.....
Signature	Date
.....	.....
Position	Name of Bidder

T2.2.19: MBD9: CERTIFICATE OF INDEPENDENT BID DETERMINATION

Classification: Material Responsiveness Requirement (M)

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1 This Municipal Bidding Document (MBD) must form part of all bids[1] invited.

2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).[2] Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.

3 Municipal Supply Regulation 38 (1) prescribes that a supply chain management policy must provide measures for the combating of abuse of the supply chain management system, and must enable the accounting officer, among others, to:

a. take all reasonable steps to prevent such abuse;
b. reject the bid of any bidder if that bidder or any of its directors has abused the supply chain management system of the municipality or municipal entity or has committed any improper conduct in relation to such system; and
c. cancel a contract awarded to a person if the person committed any corrupt or fraudulent act during the bidding process or the execution of the contract.

4 This MBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.

5 In order to give effect to the above, the attached Certificate of Bid Determination (MBD 9) must be completed and submitted with the bid:

[1] Includes price quotations, advertised competitive bids, limited bids and proposals.
[2] Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an greement between competitors not to compete.

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

in response to the invitation for the bid made by:

KHÂI-MA LOCAL MUNICIPALITY

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of: _____that:
(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word “competitor” shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:

(a) has been requested to submit a bid in response to this bid invitation;

(b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and

(c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder

6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium[3] will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
   (a) prices;
   (b) geographical area where product or service will be rendered (market allocation)
   (c) methods, factors or formulas used to calculate prices;
   (d) the intention or decision to submit or not to submit, a bid;
   (e) the submission of a bid which does not meet the specifications and conditions of the bid; or
   (f) bidding with the intention not to win the bid.
8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.
9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

[3] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

.....	.....
Signature	Date
.....	.....
Position	Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.20: SCHEDULE OF TENDERER'S EXPERIENCE

Classification: Functionality Evidence (F)

Classification: Functionality Evidence (F). Complete all applicable information directly in the spaces provided in this Schedule.

RESPONSES SUCH AS "SEE ATTACHED" OR SIMILAR CROSS-REFERENCES WILL NOT BE ACCEPTED AS A SUBSTITUTE FOR COMPLETING THE SCHEDULE AND WILL BE TREATED AS INCOMPLETE.

All supporting functionality documentation must be attached to and clearly cross-referenced with the relevant project listed in Schedule T.2.2.20.

To claim points for company experience, each project must be supported by a compliant reference letter from the Employer or Consulting Employer's Agent. Points will only be awarded for projects that:

- are fully recorded in Schedule T.2.2.20; and
- are supported by the required appointment/award letter, completion certificate and client reference.

Evaluation of Joint Venture Experience

Where the Tenderer is a joint venture, the experience of its members may be combined, subject to the following:

a) Experience claimed by a member shall only be considered where that member holds at least 25% participation in the tendering joint venture.
b) Where a member performed a previous project in its own name, the verified final contract value of that project shall be used.
c) Where a member performed a previous project as part of another joint venture, only the value attributable to that member's actual participation shall be recognised, calculated as:

Recognised project value = verified final contract value, inclusive of VAT × the member's percentage participation in the previous joint venture.

d) A previous joint-venture project shall only be recognised where the member held at least 25% participation and performed a material portion of the relevant works.
e) For a project to qualify as one of the required projects valued at R30 million or more, the recognised value attributable to the member, not the total historical contract value, must equal or exceed R30 million, inclusive of VAT.
f) The experience of different members of the tendering joint venture may be combined to satisfy the required number of projects. However, the same project may only be counted once.
g) Each project must be supported by a completion certificate or reference letter from the Employer or Engineer, together with the relevant joint-venture agreement or other verifiable evidence confirming:
- the total final contract value;
- the member's percentage participation;
- the scope actually performed by that member; and
- the completion status and date.

h) Where the member's participation or executed value cannot be verified, the project shall not be considered for functionality scoring.

PROJECTS INCLUDED ONLY IN ATTACHMENTS BUT NOT RECORDED IN SCHEDULE T.2.2.20 WILL NOT BE CONSIDERED. A PROJECT LISTED WITHOUT THE REQUIRED PROOF WILL RECEIVE ZERO POINTS.

Incomplete or unsupported information in Schedule T.2.2.20 will receive no functionality points. A tenderer that fails to achieve the prescribed minimum functionality score after unsupported projects have been excluded will be deemed non-responsive. See Tables for Projects on the following pages.

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PROJECT 1	
ATTACH PROOF HERE – REMEMBER TO COMPLETE THIS PAGE	
Project/contract name and number	
Employer, contact person and telephone number	
Consulting Employer's Agent, Contact person and telephone number	
Description of Contract and nature of work	
Category of Similar Project Experience Claimed by the Tenderer. *(Tick all applicable categories. Each category claimed must be supported by the project description and reference letter)*	**Tick** — **Similar project experience** ☐ **Wastewater treatment works or oxidation ponds;** ☐ **Bulk earthworks and engineered pond embankments;** ☐ **Reinforced concrete water- or liquid-retaining structures;** ☐ **HDPE geomembrane-lined ponds or reservoirs.**
Value of work executed by the tenderer, inclusive of VAT (Rand)	
Duration - Start and practical / completion date (month and year)	

Classification: Functionality Evidence (F). Complete all applicable information directly in the spaces provided in this Schedule.

Responses such as "see attached" or similar cross-references will not be accepted as a substitute for completing the Schedule and will be treated as incomplete.

....
Signature Date

....
Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PROJECT 2	
ATTACH PROOF HERE – REMEMBER TO COMPLETE THIS PAGE	
Project/contract name and number	
Employer, contact person and telephone number	
Consulting Employer's Agent, Contact person and telephone number	
Description of Contract and nature of work	
Category of Similar Project Experience Claimed by the Tenderer. *(Tick all applicable categories. Each category claimed must be supported by the project description and reference letter)*	**Tick** — **Similar project experience** ☐ **Wastewater treatment works or oxidation ponds;** ☐ **Bulk earthworks and engineered pond embankments;** ☐ **Reinforced concrete water- or liquid-retaining structures;** ☐ **HDPE geomembrane-lined ponds or reservoirs.**
Value of work executed by the tenderer, inclusive of VAT (Rand)	
Duration - Start and practical / completion date (month and year)	

Classification: Functionality Evidence (F). Complete all applicable information directly in the spaces provided in this Schedule.

Responses such as "see attached" or similar cross-references will not be accepted as a substitute for completing the Schedule and will be treated as incomplete.

....
Signature Date

....
Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PROJECT 3	
ATTACH PROOF HERE – REMEMBER TO COMPLETE THIS PAGE	
Project/contract name and number	
Employer, contact person and telephone number	
Consulting Employer's Agent, Contact person and telephone number	
Description of Contract and nature of work	
Category of Similar Project Experience Claimed by the Tenderer. *(Tick all applicable categories. Each category claimed must be supported by the project description and reference letter)*	**Tick** — **Similar project experience** ☐ **Wastewater treatment works or oxidation ponds;** ☐ **Bulk earthworks and engineered pond embankments;** ☐ **Reinforced concrete water- or liquid-retaining structures;** ☐ **HDPE geomembrane-lined ponds or reservoirs.**
Value of work executed by the tenderer, inclusive of VAT (Rand)	
Duration - Start and practical / completion date (month and year)	

Classification: Functionality Evidence (F). Complete all applicable information directly in the spaces provided in this Schedule.

Responses such as "see attached" or similar cross-references will not be accepted as a substitute for completing the Schedule and will be treated as incomplete.

....
Signature Date

....
Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PROJECT 4	
ATTACH PROOF HERE – REMEMBER TO COMPLETE THIS PAGE	
Project/contract name and number	
Employer, contact person and telephone number	
Consulting Employer's Agent, Contact person and telephone number	
Description of Contract and nature of work	
Category of Similar Project Experience Claimed by the Tenderer. *(Tick all applicable categories. Each category claimed must be supported by the project description and reference letter)*	**Tick** — **Similar project experience** ☐ **Wastewater treatment works or oxidation ponds;** ☐ **Bulk earthworks and engineered pond embankments;** ☐ **Reinforced concrete water- or liquid-retaining structures;** ☐ **HDPE geomembrane-lined ponds or reservoirs.**
Value of work executed by the tenderer, inclusive of VAT (Rand)	
Duration - Start and practical / completion date (month and year)	

Classification: Functionality Evidence (F). Complete all applicable information directly in the spaces provided in this Schedule.

Responses such as "see attached" or similar cross-references will not be accepted as a substitute for completing the Schedule and will be treated as incomplete.

....
Signature Date

....
Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PROJECT 5	
ATTACH PROOF HERE – REMEMBER TO COMPLETE THIS PAGE	
Project/contract name and number	
Employer, contact person and telephone number	
Consulting Employer's Agent, Contact person and telephone number	
Description of Contract and nature of work	
Category of Similar Project Experience Claimed by the Tenderer. *(Tick all applicable categories. Each category claimed must be supported by the project description and reference letter)*	**Tick** — **Similar project experience** ☐ **Wastewater treatment works or oxidation ponds;** ☐ **Bulk earthworks and engineered pond embankments;** ☐ **Reinforced concrete water- or liquid-retaining structures;** ☐ **HDPE geomembrane-lined ponds or reservoirs.**
Value of work executed by the tenderer, inclusive of VAT (Rand)	
Duration - Start and practical / completion date (month and year)	

Classification: Functionality Evidence (F). Complete all applicable information directly in the spaces provided in this Schedule.

Responses such as "see attached" or similar cross-references will not be accepted as a substitute for completing the Schedule and will be treated as incomplete.

....
Signature Date

....
Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.21: DETAILS OF CONSTRUCTION MANAGER'S & GENERAL FOREMAN'S EXPERIENCE

Classification: Administrative or Clarifiable Information (A)

Tenderers shall set out in the Schedule hereunder details of the relevant personnel experience for work of a similar nature to that for which their Tender is submitted. Omission of this Schedule will not, by itself, render the tender non-responsive; the Employer may request clarification in accordance with classification A. CVs must be attached to this schedule for personnel listed below.

CONSTRUCTION MANAGER	**NAME:**				
	NQF LEVEL QUALIFICATION:				
CONTRACT & CLIENT	**NATURE OF WORK**	**POSITION HELD**	**VALUE OF WORK**	**YEAR COMPLETED**	**DURATION**
CONSTRUCTION FOREMAN	**NAME:**				
	NQF LEVEL QUALIFICATION:				
CONTRACT & CLIENT	**NATURE OF WORK**	**POSITION HELD**	**VALUE OF WORK**	**YEAR COMPLETED**	**DURATION**

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.22: SCHEDULE OF PLANT AND EQUIPMENT

Classification: Administrative or Clarifiable Information (A)

All information must be entered directly into the tables provided. Responses such as “see attached” will not be accepted as a substitute for completing this Schedule.
The tenderer must list the major construction plant and equipment that it owns or leases and has immediately available, as well as plant and equipment it intends to hire or acquire if awarded the Contract.

The plant listed below represents the proposed minimum plant for the Works. Equivalent plant may be offered, provided its type, capacity and suitability are clearly stated. Plant may be owned, leased, hired or acquired.

Category	Proposed plant or equipment	Minimum quantity
Earthworks	Hydraulic excavator – minimum operating mass approximately 20 tonnes	2
Earthworks	Bulldozer – Caterpillar D6 or equivalent	1
Earthworks	Front-end loader – minimum bucket capacity approximately 2.0 m³	1
Earthworks	Tractor-loader-backhoe (TLB)	1
Haulage	Tipper truck – minimum carrying capacity approximately 10 m³	4
Earthworks	Motor grader suitable for layerworks, pond floors and access roads	1
Compaction	Padfoot or sheepsfoot vibratory roller – minimum operating mass approximately 10 tonnes	1
Compaction	Smooth-drum vibratory roller – minimum operating mass approximately 10 tonnes	1
Compaction	Walk-behind trench roller	1
Compaction	Plate compactor or mechanical rammer	2
Earthworks	Water bowser – minimum capacity approximately 10,000 litres	1

All information must be entered directly into the tables provided. Responses such as “see attached” will not be accepted as a substitute for completing this Schedule.

The tenderer must list the major construction plant and equipment that it owns or leases and has immediately available, as well as plant and equipment it intends to hire or acquire if awarded the Contract.

DOCUMENTED PROOF, REGISTRATION CERTIFICATE, AND UP-TO-DATE LICENCE TO BE PROVIDED.

(A) PLANT AND EQUIPMENT **OWNED** AND IMMEDIATELY AVAILABLE			
Description (type, size, capacity and year of manufacture)	**Quantity**	**Registration or identification number**	**Current location**
Attach additional pages in the same format if more space is required.			

All information must be entered directly into the tables provided. Responses such as “see attached” will not be accepted as a substitute for completing this Schedule.
The tenderer must list the major construction plant and equipment that it owns or leases and has immediately available, as well as plant and equipment it intends to hire or acquire if awarded the Contract.

AGREEMENT/LETTER OF COMMITMENT FROM LESSOR AND DOCUMENTED PROOF, REGISTRATION CERTIFICATE, AND UP-TO-DATE LICENCE IN THE NAME OF THE LESSOR TO BE PROVIDED.

(B) PLANT AND EQUIPMENT TO BE **HIRED OR ACQUIRED**			
Description (type, size and capacity)	**Quantity**	**Proposed supplier or source**	**Hire or acquisition**
Attach additional pages in the same format if more space is required.			

Where plant or equipment is to be hired, the tenderer must submit a signed letter of intent from the proposed supplier confirming the description, quantity and availability of the plant for this Contract. Plant listed for hire without the required supporting confirmation will not be accepted as available.

Following the award, the Contractor must satisfy the Employer's Agent that the listed plant, or approved equivalent plant, is available and will be brought onto the Site when required by the approved programme. All plant must be properly maintained, licensed where applicable, fit for purpose and kept in good working order.

The Contractor must, at its own cost, provide any additional plant or equipment reasonably required to complete the Works safely, properly and within the specified Time for Completion.

.....	.....
Signature	Date
.....	.....
Position	Name of Bidder

T2.2.23: SCHEDULE OF ESTIMATED MONTHLY EXPENDITURE

Classification: Administrative or Clarifiable Information (A)

The tenderer shall state his estimated expenditure indicating the values of each monthly claim in terms of Clause 6.10 of the General Conditions of Contract, which he estimates will arise based on his preliminary programme and tendered rates, in the table below. The total of the monthly amounts shall be equal to the tender sum

MONTH	VALUE	
1	R	
2	R	
3	R	
4	R	
5	R	
6	R	
7	R	
8	R	
9	R	
10	R	
11	R	
SUBTOTAL	R	
CONTINGENCIES (10%)	R	
SUBTOTAL	R	
VAT (15%)	R	
TOTAL	R	(Incl. VAT @ 15%)

....
Signature Date

....
Position Name of Bidder

T2.2.24: SCHEDULE OF SUB-CONTRACTORS

Classification: Administrative or Clarifiable Information (A)

The tenderer shall state in the schedule below the names of all sub-contractors he wishes to employ in the Works and shall define their duties and outline their experience

	Name and address of Sub-Contractor	Nature and extent of work	Experience
1.			
2.			
3.			
4.			
5.			

.....
Signature

.....
Date

.....
Position

.....
Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.25: SCHEDULE OF ESTIMATED LOCAL LABOUR TO BE EMPLOYED ON THIS CONTRACT

Classification: Administrative or Clarifiable Information (A)

DESCRIPTION OF TASK/ELEMENT/ TRADE	NO. OF ARTISANS AND/OR SKILLED LABOUR	NO. OF SEMI-SKILLED LABOUR	NO. OF LABOURERS	NO. OF OTHERS	TOTAL LABOUR/TASK
TOTAL ACTUAL LABOUR: _____					

Note: Where the same labour is to be re-used on various tasks the Total Labour/Tasks and the Total Actual Labour will differ.

....
Signature Date

....
Position Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

T2.2.26: PRELIMINARY PROGRAMME

Classification: Administrative or Clarifiable Information (A)

The tenderer shall attach a preliminary programme to this schedule.

This programme shall be in the form of a bar chart (Gantt chart) or similar acceptable time/activity form reflecting the proposed sequence and tempo of the various activities and the quantities that will be carried out every week under each of the elements, comprising the work for this contract. The programme shall also indicate the point where the tenderer intends to commence work operations and the direction in which the work will proceed. The working hours shall be indicated.

a) Details of the preliminary programme shall be appended to this Schedule.

Attach Here

T2.2.27: MUNICIPAL RATES AND TAXES

Classification: Preference Evidence (P) / Material Responsiveness Requirement (M)

Attach Here

T2.2.28: DIRECTOR/S PROOF OF ADDRESS AND SOUTH AFRICAN IDENTITY DOCUMENT

Classification: Preference Evidence (P) / Material Responsiveness Requirement (M)

Attach Here

T2.2.29: 3 YEARS ANNUAL FINANCIAL STATEMENTS

Classification: Material Responsiveness Requirement (M)

Attach Here

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

PART C1

AGREEMENTS AND CONTRACT DATA

Section	Description	Page No
SECTION C1.1	FORM OF OFFER AND ACCEPTANCE (AGREEMENT)……	C1.1-1
SECTION C1.2	CONTRACT DATA……	C1.2-1
SECTION C1.3	FORM OF GUARANTEE…….....	C1.3-1
SECTION C1.4	OCCUPATIONAL HEALTH AND SAFETY AGREEMENT……..	C1.4-1

C1.1 FORM OF OFFER AND ACCEPTANCE (AGREEMENT)

OFFER

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract in respect of the following works:

BID NO. KH01-26/27: CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS IN PELLA

The Tenderer, identified in the Offer signature block below, has examined the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, and by submitting this Offer has accepted the Conditions of Tender.

By the representative of the Tenderer, deemed to be duly authorised, signing this part of this Form of Offer and Acceptance, the Tenderer offers to perform all of the obligations and liabilities of the Contractor under the Contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the Conditions of Contract identified in the Contract Data.

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VALUE-ADDED TAX IS

……

……

……(in words) R……(in figures) This Offer may be accepted by the Employer by signing the Acceptance part of this Form of Offer and Acceptance and returning one copy of this document to the Tenderer before the end of the period of validity stated in the Tender Data, whereupon the Tenderer becomes the party named as the Contractor in the Conditions of Contract identified in the Contract Data.

FOR THE TENDERER:

Signatures …… ……

Name(s) …… ……

Capacity …… ……

for the Tenderer ……

(Name and address of organisation)

Name & signature of witness…… Date: ……

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

ACCEPTANCE (TO BE COMPLETED AT ACCEPTANCE STAGE)

By signing this part of this Form of Offer and Acceptance, the Employer identified below accepts the Tenderer's Offer. In consideration thereof, the Employer shall pay the Contractor the amount due in accordance with the, Conditions of Contract identified in the Contract Data. Acceptance of the Tenderer's Offer shall form an agreement, between the Employer and the Tenderer upon the terms and conditions contained in this Agreement and in the Contract that is the subject of this Agreement.

The terms of the contract, are contained in:

Part T1	Tendering Procedures
Part T2	Returnable Documents
Part C1	Agreements and Contract Data, (which includes this Agreement)
Part C2	Pricing Data
Part C3	Scope of Work
All Annexures	

and drawings and documents or parts thereof, which may be incorporated by reference into Parts C1 to C4 above.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules as well as any changes to the terms of the Offer agreed by the Tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Agreement. No amendments to or deviations from said documents are valid unless contained in this Schedule, which must be duly signed by the authorised representative(s) of both parties.

The Tenderer shall within two weeks after receiving a completed copy of this Agreement, including the Schedule of Deviations (if any), contact the Employer's Agent (whose details are given in the Contract Data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data at, or just after, the date of this Agreement comes into effect. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

Notwithstanding anything contained herein, this Agreement comes into effect on the date when the Tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any). Unless the Tenderer (now Contractor) within five days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this Agreement, this Agreement shall constitute a binding contract between the parties.

FOR THE EMPLOYER:

Signatures …… ……

Name(s) …… ……..

Capacity …… ……..

for the Employer ……

(Name and address of organisation)

Name & signature of witness…….. Date: ……....

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

SCHEDULE OF DEVIATIONS

Notes:

1. The extent of deviations from the tender documents issued by the Employer prior to the tender closing date is limited to those permitted in terms of the Conditions of Tender;

2. A Tenderer's cover letter shall not be included in the final contract document. Should any matter in such letter, which constitutes a deviation as aforesaid, become the subject of agreements reached during the process of offer and acceptance, the outcome of such agreement shall be recorded here;

3. Any other matter arising from the process of offer and acceptance either as a confirmation, clarification or change to the tender documents and which it is agreed by the Parties becomes an obligation of the contract shall also be recorded here;

4. Any change or addition to the tender documents arising from the above agreements and recorded here, shall also be incorporated into the final draft of the Contract.

4.1 Subject .....

Details .....

4.2 Subject .....

Details .....

4.3 Subject .....

Details .....

4.4 Subject .....

Details .....

4.5 Subject .....

Details .....

4.6 Subject .....

Details .....

By the duly authorised representatives signing this Schedule of Deviations, the Employer and the Tenderer agree to and accept the foregoing Schedule of Deviations as the only deviations from the amendments to the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, as well as any confirmation, clarification or change to the terms of the offer agreed by the Tenderer and the Employer during this process of offer and acceptance.

It is expressly agreed that no other matter whether in writing, oral communication or implied during the period between the issue of the tender documents and the receipt by the Tenderer of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this Agreement.

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

FOR THE TENDERER:

Signatures …… ……

Name(s) …… ……..

Capacity …… ……..

for the Tenderer…….....

(Name and address of organisation)

Name & signature of witness…… Date: …….....

FOR THE EMPLOYER:

Signatures …… ……

Name(s) …… ……..

Capacity …… ……..

for the Employer ……

(Name and address of organisation)

Name & signature of witness…… Date: …….....

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C1.2: CONTRACT DATA

The following standardized General Conditions of Contract:

C 1.2.1 General Conditions of Contract for Construction Works (Third Edition) 2015

prepared by the South African Institution of Civil Engineering (SAICE) shall apply to and form the General Conditions of Contract for this contract. Copies of these conditions of contract are obtainable from the South African Institution of Civil Engineering (SAICE), PRIVATE BAG X113, Halfway House 1685, Tel: (011) 805 5947, Fax: (011) 805 5971, e-mail: civilinfo@saice.org.za.

Copies of the General Conditions of Contract are available for inspection and scrutiny at the offices of the Employer's Agent and the Employer's Agent.

The Pro-forma's bound with the General Conditions of Contract 2015, on pages 47 to 58 shall not apply to this Contract and shall be replaced with the documentation bound into this Contract Document.

The General Conditions of Contract 2015 make several references to the Contract Data for specific data, which together with these conditions collectively describe the risks, liabilities and obligations of the contracting parties and the procedures for the administration of the Contract. The Contract Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the general conditions of contract.

The General Conditions of Contract shall be read in conjunction with the variations, amendments and additions set out in the Contract Specific Data below. Each item of data given below is cross-referenced to the clause in the General Conditions of Contract to which it mainly applies.

The Contract Data and General Conditions of Contract shall have precedence over the Drawings, Scope of Work and Standardised Specifications in the interpretation of any ambiguity or inconsistency between these documents.

C 1.2.2 CONTRACT SPECIFIC DATA (Special Conditions of Contract)

The following contract specific data, referring to the **General Conditions of Contract for Construction Works, Third Edition, 2015,** are applicable to this Contract:

Clause 1.1.1.16:

The **Employer's Agent**, referred to in the documents, is Mind Shape Developments, authorized thereto in writing.

Clause 1.1.1.26:

The Pricing Strategy is a **Re-measurement Contract** as referred to in Clause 1.1.1.27.

Add the following clauses after Clause 1.1.1.34:

1.1.1.35 "**Drawings**" means all drawings, calculations and technical information forming part of the Contract Documents and any modifications thereof or additions thereto from time to time approved in writing by the Employer's Agent or delivered to the Contractor by the Employer's Agent.

1.1.1.36 "**Letter of Notification**" means the letters of formal notification, signed by the Employer, of the decision of the Supply Chain Management Bid Adjudication Committee sent to all tenderers. The

notification of the decision does not form part of the Employer's Acceptance of the successful tenderer's Offer and no rights shall accrue.

Add the following new clause:

Clause 1.4:

In the event of any conflict or ambiguity between the Contract documents, the order of precedence shall be as stated in the Contract Data. For reference, the general order is:

a) Contract Agreement;
b) Contract Data; Special Conditions of Contract;
c) Scope of Work and Project Specification;
d) Bill of Quantities;
e) Drawings;
f) General Conditions of Contract (GCC 2015);
g) SANS 1200 Standardised Specifications

Clause 1.2.1.2:

The address of the Employer is: PO Box 108
POFADDER
8890
Tel.: +27 54 933 1000
Fax: +27 54 933 0252
Email Address: hendry@khaima.gov.za

Clause 3.1.3:

The Employer's Agent shall obtain the specific approval of the Employer before executing any of his functions or duties according to the following Clauses of the General Conditions of Contract:

1. Clause 3.2.1 Nomination of Employer's Agent's Representative
2. Clause 3.2.4 Employer's Agent's authority to delegate
3. Clause 5.8.1 Non-working times
4. Clause 5.11.1 Suspension of the Works
5. Clause 5.12.4 Acceleration instead of extension of time

Clause 4: BASIS OF CONTRACT

Add the following before sub clause 4.1.1:

"Contract Agreement"

The Contractor and the Employer shall enter into a Contract Agreement within 21 days after the Contractor receives the written notice of C1.1.2 Acceptance unless they agree otherwise. The Contract Agreement shall be based upon the C1.1.4 Contract Agreement form included in the tender document. The costs of duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the Employer."

Notwithstanding the above, the Contractor will not be permitted in terms of the conditions of contract identified in the Contract Data to enter into a Contract Agreement before:

(1) C1.1.3 Schedule of Deviations has been negotiated, agreed and signed off by the Contractor and the Employer;

(2) C1.3 Form of Guarantee has been completed by the Contractor and approved by the Employer;

(3) An original valid Tax Clearance Certificate (valid on date of signing the Agreement) has been submitted and approved;

(4) Insurances (as specified) with proof of validity have been provided by the Contractor and approved by the Employer;

(5) C1.4 Occupational Health and Safety Agreement has been completed and signed by both parties;

(6) Proof of payment in terms of the Compensation for Occupational Injuries and Diseases Act, 1993 has been provided by the Contractor and approved by the Employer.

Clause 4.3:

Add the following clause after Clause 4.3.2.:

4.3.3 The Employer and the Contractor shall enter into an agreement to complete the work required for the construction of the works in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act (Act 85 of 1993) and the Construction Regulations promulgated thereunder.

An agreement is included in the Contract Document (C1.4 of Contract Data) and shall be completed and submitted to the Employer together with a letter of good standing from the Compensation Commissioner (if not insured with a Licenced Compensation Insurer) within fourteen (14) days after the Acceptance Date. The Contractor shall ensure that any letter of good standing shall be timeously renewed in order that it remains in full force for the duration of the Contract.

4.3.4 The Contractor shall provide proof to the Employer, within 14 days from the date of delivery of the Acceptance, that he has paid all contributions required in terms of the Compensation for Occupational Injuries and Diseases Act, No. 130 of 1993."

Clause 4.4.3

Add the following new sub clause:

4.4.3.1 "The procedure for Selected Subcontractors shall be:

All specialist merchants, tradesmen and others executing any work or supplying any goods for which provisional or prime cost sums are provided in the Bill / Schedule of Quantities and who are selected for this purpose by the Contractor as specified hereafter, shall in the execution of such work be subcontractors of the Contractor and are herein referred to as "Selected Subcontractors".

Unless another procedure is specified, Selected Subcontractors are chosen and appointed as follows. The Employer and the Contractor shall compile a list of firms or persons acceptable to both and who will be invited to submit tenders for certain work or goods to be supplied by Selected Subcontractors. Before the closing date of such tenders the Contractor shall furnish the Employer with a sealed list in which is indicated the price increase required by the Contractor regarding the handling and appointment of every tenderer as Selected Subcontractor. No price increase requested by the Contractor in such list may be higher than the percentage or amount the Contractor has tendered in the main Contract against the provisional or prime cost item concerned. The list is then opened with the tenders and on the basis thereof the Employer shall indicate which tender he wishes to accept. The Contractor shall accept the tenderer and appoint him as Selected Subcontractor.

The Contractor shall incorporate in the subcontract provisions that:

a) In respect of the work or the goods that are the subject of the subcontract the Selected Subcontractor undertakes to the Contractor mutatis mutandis the obligations and liabilities as are imposed upon the Contractor to the Employer in terms of the Contract, and holds the Contractor harmless from and indemnifies him against the same and in respect of all claims demands,

lawsuits, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities, and,

(b) The Selected Subcontractor holds the Contractor harmless and indemnifies him against:

(i) Shortcomings in the subcontract work if and where the works were designed by the Selected Subcontractor;

(ii) defects in the goods if and where the goods were manufactured and/or supplied by the Selected Subcontractor;

(iii) any negligence by the Selected Subcontractor, his agents, workmen and servants;

(iv) any misuse by the Selected Subcontractor of any Constructional Plant, Temporary Works or materials provided by the Contractor for the purposes of the Contract;

(v) any claims as aforesaid.

Clause 4.10.1:

Add the following:

The Contractor shall make use of local labour as far as possible where manual labour is required and remuneration must be paid according to the minimum wages for the region.

Clause 4.10.3:

Add the following clause after Clause 4.10.2:

The Contractor must provide adequate accommodation, offices and latrine facilities for his labour and employees and the Contractor shall bear all relevant associated costs for the duration of the contract. For the duration of the contract all latrines must comply to the relevant regulatory of local-, provincial and/or central government requirements and must be placed in such a manner that it will meet the Employer's Agents approval. If at any time during the contract the Contractor fails to meet these requirements, the Employer's Agent shall have the right to put in place all measures to rectify and/or provide adequate sanitary conditions, with all costs incurred hereto to be recovered from the Contractor.

Clause 4.12.4:

Add the following clause after Clause 4.12.3:

It is not the responsibility of the Employer's Agent or his Agent on site to act as Foreman or Surveyor of the works. The Contractor must employ qualified, experienced, trained and skilled Site Agents/engineers/foremen/surveyors and/or any other type of key personnel required with the necessary equipment and instrumentation to their disposal in order to ensure that adequate management, control, and/or execution of the works is obtained during the duration of the contact.

Clause 5.3.1:

The documentation required before commencement with Works execution is:

(1) Health and Safety Plan (Refer to Clause 4.3)

(2) Construction programme (Refer to Clause 5.6)

(3) Security (Refer to Clause 6.2)

(4) Insurance (Refer to Clause 8.6)

(5) Occupational Health and Safety Agreement (C1.4 of the Contract Document)

(6) Letter of Good Standing from the Compensation Commissioner (if not insured with a Licensed Compensation Insurer)

(7) Construction Guarantee to execute the works.

Clause 5.3.2:

The time to submit the documentation required before commencement with Works execution is 14 days.

Add the following clause after Clause 5.3.3:

5.3.4: The Contractor shall commence executing the Works within 14 days after the Commencement Date.

The Commencement Date will be the day when all of the following takes place:

- Site Handover to the Contractor.
- The Completion of the Form of Offer and Acceptance.

The above will take place within 21 days of the issue of the Letter of Acceptance.

Clause 5.4.2:

Access to and possession of the site shall not be exclusive to the Contractor insofar as the provisions of Clause 4.8 apply, and where on-going use by the general public is required.

Add the following clause after Clause 5.4.3:

5.4.4 "The Contractor shall bear all costs and charges for special and temporary rights of way required by him in connection with access to the Site. The Contractor shall also provide at his own cost any additional facilities outside the Site required by him for the purposes of the Works."

Clause 5.6.1:

The Contractor shall deliver a detailed programme of work to the Employer's Agent within 14 days from the Acceptance Date.

Clause 5.8.1:

Non-working days are Sundays.

Special non-working days are all gazetted public holidays falling outside the year end break.

Add the following clause after 5.8.2:

5.8.3 The year end break commences as gazetted for the annual industry shutdown.

Clause 5.9:

Add the following:

5.9.8: "Three paper prints of each Drawing will be furnished free of charge to the Contractor. Additional prints of the same Drawings will be for the Contractors account".

5.9.9: "Only dimensions shown on the Drawings may be used for the construction of the Works and no dimension may be scaled without the written instruction of the Employer's Agent. All dimensions shown on the drawings must be checked by the Contractor on Site before any part of the Works is commenced with".

Clause 5.12.2.2:

No extension of time will be granted in respect of any delays attributed to normal climatic conditions. Normal Climatic Conditions shall be deemed to include normal rainfall and associated wet conditions and materials, strong winds and extremes of temperature. However in the event that delays to critical activities exceed the number of working days listed below for each month, then abnormal conditions shall be deemed to exist, and an extension of time shall be granted in accordance with the provisions of Clause 5.12.

The number of **working days** quoted below shall be regarded as a fair estimate of the delays to be anticipated and allowed for under normal climatic conditions where inclement weather prevents or disrupts critical work.

January	0 days
February	1 day
March	1 day
April	1 day
May	2 days
June	3 days
July	2 days
August	1 day
September	0 days
October	0 days
November	0 days
December	0 days

Clause 5.13.1:

The penalty for failing to complete the Works is **R3 500 per calendar day**.

Clause 5.11:

No project-specific planned-suspension provisions apply. Any suspension instructed during the Contract shall be governed solely by GCC 2015 and the applicable Contract Data.

Clause 6.2.1:

The security to be provided by the Contractor shall be a performance guarantee of **10%** of the Contract Sum and must be delivered to the Employer's Agent within 14 days after the Acceptance Date and before access to the Site or commencement of physical work. The performance guarantee shall contain the wording of the document included in **C1.3 Form of Guarantee.**

Clause 6.2.3:

Delete Clause 6.2.3 in its entirety and replace with the following:

The Contractor shall ensure that the performance guarantee remains valid and enforceable until the Certificate of Completion of the Works is issued.

Clause 6.3:

Add the following after Clause 6.3.3:

6.3.4.1: If the scope of the work increased or decreased by a percentage in excess of 20% the tendered amounts in Section 1200A items 8.3.1 will be adjusted pro-rata. No changes to the above items will be considered in case of an increase or decrease of less than 20% variation in the contract amount.

6.4.3.2: All rates will be fixed as tendered irrespective of the percentage variation.

Sub clause 6.6.1 : Provisional sums

In the second line of sub clause 6.6..1.2, after the words "sum or sums" *insert the words* ", excluding VAT,".

In the first line of sub clause 6.6.1.2.1, after the words "sum or sums" *insert the words* ", excluding VAT,".

In the fourth line of sub clause 6.6.1.2.2, after the words "amount" *insert the words* ", excluding VAT,".

Sub clause 6.6.2 : Prime cost sums

In the fourth line of sub clause 6.6.2, after the words "price" *insert the words* ", excluding VAT,".

Clause 6.8.2:

Contract Price Adjustment shall not apply to this Contract. All tendered rates and prices shall remain fixed for the full Contract Period.

x = N/A

a = N/A

b = N/A

c = N/A

d = N/A

Base month = N/A.

Clause 6.8.4:

Add the following to Clause 6.8.4:

Notwithstanding the above, in the event that a public holiday is proclaimed after 28 days before the closing date for tenders, no costs other than those that can be claimed under Clause 5.12.3 shall be added to the contract price.

Clause 6.10.1.5:

The percentage advance on materials not yet built into the Permanent Works is **80%**, upon proof of ownership. Materials off site can be paid for 100% to a reputable supplier when given a guarantee.

Sub clause 6.10.2:

Add the following:

"Payment to the Contractor for any materials on site shall only be authorized after proof of ownership by the Contractor has been lodged with the Employer's Agent in the form of receipted invoices or other acceptable documents."

Clause 6.10.3:

Add the following to Clause 6.10.3:

Notwithstanding the performance guarantee under Clause 6.2.1, the Employer shall deduct retention at 10% of each amount otherwise due until the retained total reaches 5% of the Contract Price. At Completion, the retained amount shall be reduced to 2.5% of the Contract Price for the Defects Liability Period, subject to GCC 2015. A guarantee in lieu of retention is permitted if accepted by the Employer.

Clause 6.10.4:

Add the following to clause 6.10.4:

Notwithstanding the above, Failure to comply shall be subject to written notice and a five-working-day correction period, after which continued non-compliance shall constitute a breach of Contract and be dealt with under GCC 2015.

Clause 6.10.5.1:

In the sixth line, delete the words ".. Of the second half .."

Clause 6.10.10: Tax Invoices

Section 20(1) of the Value Added Tax Act of 1991 (Act 89 of 1991) requires that a supplier (person supplying goods or services) who is registered as a VAT vendor issue to the recipient a tax invoice within 21 days of the date of a supply whether requested or not.

The Contractor shall provide a tax invoice (VAT invoice) which shall be included with each payment certificate delivered to the Employer by the Employer's Agent in terms of Clause 6.10. Failure by the Contractor to provide a tax invoice (VAT invoice) timeously may delay payment by the Employer and no interest shall accrue.

Clause 6.11:

Amend the percentage from **15 percent** to **20 percent** in the title and in the Clause.

Clause 8.6.1:

Clause 8.6.1.1.2:

The value of Plant and materials supplied by the Employer to be included in the insurance sum is **R 0.00 (Nil)**.

Clause 8.6.1.1.3:

The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is R 100 000.00.

The limit of indemnity for liability insurance is R5 000 000.00 for any single claim – the number of claims to be unlimited during the construction and defects liability periods.

Clause 8.6.1.5:

In addition to the insurances required in terms of General Conditions of Contract Clauses 8.6.1.1 to 8.6.1.4 the following insurance is also required:

(a) Insurance of Construction Equipment (including tools, offices and other temporary structures and contents) and other things (except those intended for incorporation into the Works) brought onto the site for a sum sufficient to provide for their replacement.

(b) Insurance in terms of the provisions of the Compensation for Occupational injuries and Diseases Act No. 130 of 1993.

(c) Motor Vehicle Liability Insurance comprising (as a minimum) "Balance of Third Party" Risks including Passenger Liability Indemnity.

(d) Where the contract involves manufacturing and/or fabrication of the works or part thereof at premises other than the Site, the Contractor shall satisfy the Employer that all materials and equipment for incorporation in the works are adequately insured during manufacture and/or fabrication. In the event

of the Employer having an insurable interest in such works during manufacture or fabrication then such interest shall be noted by endorsement to the Contractor's Policies of Insurance.

Clause 9.2.1:

Add the following to Clauses after Clause 9.2.1.3.7:

9.2.1.3.8 The Contractor committed a corrupt or fraudulent act during the procurement process or the execution of the contract.

9.2.1.3.9 An official or other role player committed any corrupt or fraudulent act during the procurement process or in the execution of the contract that benefited the Contractor.

9.2.1.3.10 "The Contractor fails to provide the required Guarantee and insurances within the prescribed time."

Clause 10.5.3:

"The number of Adjudication Board members to be appointed shall be one (1). The Contract shall provide for ad hoc adjudication in terms of Clause 10.5.2. No standing Adjudication Board shall be appointed."

Clause 10.7.1:

"The determination of disputes that remain unresolved following adjudication shall be by arbitration."

Add the following after Clause10:

Clause 11: Contractor to provide everything necessary

The Contractor is to provide all labour, material, workmanship, machinery, and everything which is or may be necessary in and for the execution and entire completion of the Contract in accordance with the Conditions of Contract, Drawings and Scope of Work.

Clause 12: Details to be confidential

The Contractor shall treat the details of the Works comprised in this Contract as private and confidential (save in so far as may be necessary for the purposes hereof) and shall not publish or disclose the same or any particulars thereof in any trade or technical paper elsewhere without the prior written consent of the Employer's Agent.

C1.2.3 CONTRACT ADDITIONAL DATA (Additional Conditions of Contract)

C1.2.3.1 Contract Participation goals

The following contract additional data, referring to the **Clients Procurement Policies** are applicable to this Contract and it is a requirement of this contract that the Main Contractor (be a Joint Venture agreement or a consortium or a single organization) must comply with the following minimum contract participation goals:

C1.2.3.1.1 Subcontracting

The Contractor shall subcontract work having a minimum value equal to 2% of the Contract Price at award, excluding VAT, contingencies and provisional sums, to one or more suitably qualified local enterprises whose principal place of business is situated within the boundaries of the Khâi-Ma Local Municipality.

Each subcontractor shall be appropriately registered and graded with the CIDB where such registration and grading are required for the class and value of the subcontracted construction work.

Within 14 days after the Commencement Date, the Contractor shall submit a local-subcontracting plan to the Employer's Agent identifying the proposed subcontractors, scope of work, subcontract values and evidence of locality, capacity and applicable CIDB registration. Acceptance by the Employer's Agent shall not relieve the Contractor of any obligation or responsibility under the Contract.

Where the Contractor demonstrates, through a documented and transparent local procurement process, that no suitably qualified local enterprise is reasonably available, the Employer may reduce or waive the requirement by written approval. The requirement shall not become automatically null and void.

No separate payment shall be made for compliance with this clause. All associated costs shall be deemed included in the Contractor's tendered rates and prices.

C1.2.3.1.2 Employment of Temporary Labour Force

All temporary unskilled labour recruited specifically for the Contract shall be ordinarily resident within the Khâi-Ma municipal area. This excludes permanent employees engaged before tender closing and skilled, supervisory or specialist personnel.

Recruitment shall be facilitated through the Municipality/CLO. Where sufficient suitable local workers are unavailable within five working days of a written request, the Contractor may obtain written approval from the Employer's Agent to recruit outside the municipal area. The Contractor shall retain evidence of the recruitment process followed.

C1.2.3.1.3 EPWP reporting

The Contractor shall submit the prescribed monthly local-labour and EPWP report by the fifth working day of the following month, supported by attendance, payroll and proof-of-payment records.

Failure to comply shall be subject to written notice and a five-working-day correction period, after which continued non-compliance shall constitute a breach of Contract and be dealt with under GCC 2015.

C1.2.3 SUMMARY OF CONTRACT SPECIFIC DATA

Reference to	Clause	Information
Contractor	1.1.1.9	
Employer	1.1.1.15	KHÂI-MA MUNICIPALITY
	1.2.1.2	PO Box 108 POFADDER 8890 Tel: +27 54 933 1000 Fax: +27 54 933 0252

Reference to	Clause	Information
Employer's Agent	1.1.1.16	Mind Shape Developments 75A Swartberglaan, Spitskop Bloemfontein 9301 Tel: 082 474 8984
Year end break	5.8.3	As per the annual industry shutdown
Contract Guarantee	6.2.1	Within **14 days** of the Acceptance
Guarantee Sum	6.2.1	**10%** of the total tender award sum
Commencement of Works	5.3.2	Within **14 days** of Commencement Date
Programme of Works	5.6.1	Within **14 days** of Commencement Date
Insurances	8.6.1.1.2	R0-00
	8.6.1.1.3	**R 100 000-00**
Limit of indemnity	8.6.1.1.3	R 5 000 000-00 per claim, claims unlimited during construction and defects liability periods
Other Insurances	8.6.1.5	To be included in Contractors All-Risk Insurance
Daywork percentages	6.5.1	Refer to the Dayworks schedule in the Bill of Quantities
Special non-working days	5.8.1	Sundays and all public holidays as well as year end breaks.
Time for Completion	5.5.1	11 calendar months
Penalty for Delay	5.13	The penalty for failing to complete the Works within the Tendered Contract Period is **R 3 500-00** per calendar day.
Contract Price Adjustment a = N/A b = N/A c = N/A d = N/A	6.8.2	The following values for the different factors are to be used: x = N/A a = Labour b = Contractor's Equipment c = Material d = Fuel
Special Materials	6.8.3	N/A
Minimum amount of interim payment certificate	6.10.1	"Not applicable"
Materials on Site	6.10.1.5	**80%**
Retention Money	6.10.3	Retention is deducted at 10% of each amount due until the retained total reaches 5% of the Contract Price. A guarantee in lieu of retention is permitted if accepted by the Employer.
Defects Liability Period	1.1.1.13	**12 Months** from the issuing of Certificate of Completion

Reference to	Clause	Information
Dispute Resolution	10.8.1	Adjudication and Arbitration
Minimum Contract Participation goals:		
Sub-Contracting by Main Contractor	C1.2.3.1	A minimum of 2% of the Contract Price at award, excluding VAT, contingencies and provisional sums, shall be subcontracted to suitably qualified local enterprises within the Khâi-Ma municipal area in accordance with Clause C1.2.3.1.1.
Temporary Workforce Employment	C1.2.3.1.2	Employ all unskilled temporary workforce required for the contract located in the Khâi-Ma municipal boundaries.
EPWP reporting	C1.2.3.1.3	The contractor is responsible for submitting monthly EPWP labour reports to the municipality.

SIGNED ON BEHALF OF TENDERER: .....

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C1.3 FORM OF GUARANTEE

Contract No . . . . . .

WHEREAS **KHÂI-MA MUNICIPALITY** (hereinafter referred to as the Employer") entered into, a Contract with:

. . . . . .

(hereinafter called "the Contractor") on the . . . . . day of . . . . . .20. . . . . .,

for . . . . . .

. . . . . .

at . . . . . .(*indicate site location)*

AND WHEREAS it is provided by such Contract that the Contractor shall provide the Employer with security by way of a guarantee for the due and faithful fulfilment of such Contract by the Contractor;

AND WHEREAS . . . . . has/have at the

request of the Contractor, agreed to give such guarantee;

NOW THEREFORE WE . . . . . do hereby

guarantee and bind ourselves jointly and severally as Guarantor and Co-principal Debtors to the Employer under renunciation of the benefits of division and excussion for the due and faithful performance by the Contractor of all the terms and conditions of the said Contract, subject to the following conditions:

1. The Employer shall, without reference and/or notice to us, have complete liberty of action to act in any manner authorized and/or contemplated by the terms of the said Contract, and/or to agree to any modifications, variations, alterations, directions or extensions of the completion date of the works under the said Contract, and that its rights under this guarantee shall in no way be prejudiced nor our liability hereunder be affected by reason of any steps which the Employer may take under such Contract, or of any modification, variation, alterations of the completion date which the Employer may make, give, concede or agree to under the said Contract.
2. This guarantee shall be limited to the payment of a sum of money.
3. The Employer shall be entitled, without reference to us, to release any guarantee held by it, and to give time to or compound or make any other arrangement with the Contractor.
4. This guarantee shall remain in full force and effect until the issue of the Certificate of Completion in terms of the Contract, unless we are advised in writing by the Employer before the issue of the said Certificate of his intention to institute claims, and the particulars thereof, in which event this guarantee shall remain in full force and effect until all such claims have been paid or liquidated.
5. Our total liability hereunder shall not exceed the Guaranteed Sum of Rand. . . . . . (in words); R . . . . . (in figures).
6. The Guarantor reserves the right to withdraw from this guarantee by depositing the Guaranteed Sum with the beneficiary, whereupon our liability hereunder shall cease.
7. We hereby choose our address for the serving of all notices for all purposes arising here from as

   . . . . . .

   . . . . . .

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

IN WITNESS WHEREOF this guarantee has been executed by us at . . . . . .

on this . . . . . day of . . . . . 20 . . . . . .

Signature . . . . . .

Duly authorized to sign on behalf of . . . . . .

Address . . . . . .

. . . . . .

. . . . . .

As witnesses:

1 . . . . . .

2 . . . . . .

Guarantor’s seal or stamp

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C1.4. OCCUPATIONAL HEALTH AND SAFETY AGREEMENT

AGREEMENT MADE AND ENTERED INTO BETWEEN KHÂI-MA MUNICIPALITY (HEREINAFTER CALLED THE "EMPLOYER") AND

……..……..…… ,

(Contractor/Mandatory/Company/CC Name)

IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, ACT No. 85 OF 1993 AS AMENDED.

I, ……..…… , representing

……..…… , as an employer

in its own right, do hereby undertake to ensure, as far as is reasonably practicable, that all work will be performed, and all equipment, machinery or plant used in such a manner as to comply with the provisions of the Occupational Health and Safety Act (OHSA) and the Regulations promulgated thereunder.

I furthermore confirm that I am/we are registered with the Compensation Commissioner and that all registration and assessment monies due to the Compensation Commissioner have been fully paid or that I/We are insured with an approved licensed compensation insurer.

COID ACT Registration Number:

OR Compensation Insurer: ..... Policy No.: .....

I undertake to appoint, where required, suitable competent persons, in writing, in terms of the requirements of OHSA and the Regulations and to charge him/them with the duty of ensuring that the provisions of OHSA and Regulations as well as the Council's Special Conditions of Contract, Way Leave, Lock-Out and Work Permit Procedures are adhered to as far as reasonably practicable.

I further undertake to ensure that any subcontractors employed by me will enter into an occupational health and safety agreement separately, and that such subcontractors comply with the conditions set.

I hereby declare that I have read and understand the appended Occupational Health and Safety Conditions and undertake to comply therewith at all times.

I hereby also undertake to comply with the Occupational Health and Safety Specification and Plan.

Signed at .....on the.....day of.....20……..

_____ _____

Witness **Mandatory**

Signed at .....on the.....day of.....20……..

_____ _____

Witness **for and on behalf of**
KHÂI-MA MUNICIPALITY

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

OCCUPATIONAL HEALTH AND SAFETY CONDITIONS

1. The Chief Executive Officer of the Contractor shall assume the responsibility in terms of Section 16(1) of the Occupational Health and Safety Act (as amended). Should the Contractor assign any duty in terms of Section 16(2), a copy of such assignment shall immediately be provided to the representative of the Employer as defined in the Contract.
2. All work performed on the Employer's premises shall be performed under the supervision of the construction supervisor who understand the hazards associated with any work that the Contractor performs on the site in terms of Construction Regulations 2014.
3. The Contractor shall appoint a Competent Person who shall be trained on any occupational health and safety aspect pertaining to them or to the work that is to be performed.
4. The Contractor shall ensure that he familiarises himself with the requirements of the Occupational Health and Safety Act and that he, his employees, and any sub-contractors, comply with them.
5. Discipline in the interests of occupational health and safety shall be strictly enforced.
6. Personal protective equipment shall be issued by the Contractor as required and shall be worn at all times where necessary.
7. Written safe work procedures and appropriate precautionary measures shall be available and enforced, and all employees shall be made conversant with the contents of these practices.
8. No substandard equipment/machinery/articles or substances shall be used on the site.
9. All incidents referred to in terms of Section 24 of the Occupational Health and Safety Act shall be reported by the Contractor to the Department of Labour and the Employer.
10. The Employer hereby obtains an interest in the issue of any formal inquiry conducted in terms of Section 32 of the Occupational Health and Safety Act and into any incident involving a Contractor and/or his employees and/or his sub-contractor/s.
11. No use shall be made of any of the Employer's machinery/plant/equipment/substance/personal protective equipment or any other article without prior arrangement and written approval.
12. No alcohol or any other intoxicating substance shall be allowed on the site. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on the site.
13. Prior to commencement of any work, verified copies of all documents mentioned in the agreement, must be presented to the Employer

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C1.4.2 CLIENT HEALTH AND SAFETY SPECIFICATIONS

(AS PER CONSTRUCTION REGULATION 5(1)(b), 2014 OCCUPATIONAL HEALTH AND SAFETY ACT, NO. 85 OF 1993 BASELINE RISK ASSESSMENT – SITE SPECIFIC

1 PURPOSE

In terms of the Construction Regulation 5(1) (b), 2014 of the Occupational Health and Safety Act, No. 85 of 1993, the Client, is required to compile a Health & Safety Specification for any intended project and provide such specification to any prospective tenderer. Khai-Ma Local Municipality that the deviations will not result in a reduction of the safety of the project deliverable, and the deviation being well documented.

This Health & Safety specification identifies and encompasses the working behaviors and safe work practices that are expected of all employees, vendors and Principal Contractors, Sub-contractors and visitors, engaged on Khai-Ma Local Municipality managed projects.
It provides a guideline to comply with Khai-Ma Local Municipality best Health & Safety practices and the **Occupational Health and Safety Act 85/1993** as amended, including reference to applicable legislative requirements.
Every effort has been made to ensure that this Site-Specific Safety specification document is accurate and adequate in all respects. Should it however, contain any errors or omissions, they may not be considered as grounds for claims under the contract for additional reimbursement or extension of time, or relieve the Principal Contractor from his/her responsibilities and accountability in respect of the project to which this specification document pertains. Any such inaccuracies, inconsistencies and/or inadequacies must immediately be brought to the attention of the Safety Manager.

2 SCOPE

The scope is the development of a health & safety specification that addresses all aspects of occupational health and safety as affected by construction work. The Principal Contractor and their sub-contractor must ensure that there is sufficient budget to complete the works in a safe manner.

BID NO.: KH01-26/27 CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

The scope includes, but is not limited to, the following:

- Site establishment, construction access, survey control, setting out, clearing and preparation of the Site;
- Bulk excavation, cut-to-fill operations, foundation preparation, engineered pond embankments, layerworks and final trimming;
- One inlet works incorporating the required channels, screening, grit handling, flow-control and flow-measurement facilities, together with a dedicated night-soil disposal area and shelter;
- Two reinforced-concrete-lined anaerobic ponds, including inlet and outlet structures, joints, waterstops and associated pipework;
- One Primary Facultative Pond and Two Secondary Maturation Ponds lined with 2.0 mm HDPE geomembrane and protective geotextile as specified and shown;
- One Treated-Effluent Storage Pond, including the specified lining system, inlet, outlet, overflow and drainage arrangements;
- Interconnecting gravity pipelines, fittings, chambers, valves, sluices, penetrations, supports and marker systems;
- Sludge drying beds, underdrainage, filtrate return arrangements, composting area and associated hardstanding;
- Stormwater diversion, collection and discharge measures, including channels, berms, culverts and 200 mm thick light grouted pitching;
- Gravel access roads, internal circulation, turning areas and road drainage;
- An operator’s facility comprising an office, store, change room and ablutions, complete with finishes, plumbing, drainage and fittings;
- Solar-powered security/flood lighting complete with foundations, poles, batteries, controls and protection;
- 1.8 m palisade plus 500 mm razor-wire topping, gates and all associated posts, stays and concrete footings;

- two 5,000 L tanks, providing 10,000 L total storage, installed on a 3 m high support stand, including foundations, pipework, valves and fittings;
- Project name board, safety signage, pipeline markers and permanent identification;
- Environmental protection, dust control, erosion control, rehabilitation and final site clearance; and
- Testing, commissioning, operator training, performance demonstration, defects correction, as-built information, operating and maintenance manuals, and handover of the complete facility.

Also refer to the scope of work as per Bill of Quantities and Scope of Works in the tender document
Any other ad hoc works that will be required by the Employer or Employer's Agent.

3 DEFINITIONS

Act: means the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993)
Client: Mangaung Metro Municipality Client's Health and Safety Manager:
Competent person: means any person having the knowledge, training, experience and qualifications specific to the work or task being performed.
Construction work: means any work in connection with—

- the erection, maintenance, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure;
- the installation, erection, dismantling or maintenance of a fixed plant where such work includes the risk of a person falling;
- the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work;

Contractor: means an employer, as defined in section 1 of the Occupational Health and Safety Act, who performs construction work and includes principal contractors;
Hazard identification: means the identification and documenting of existing or expected hazards to the health and safety of persons, which are normally associated with the type of construction work being executed or to be executed;
Health and safety file: means a file or other record in permanent form, containing the information required as contemplated in these regulations; Health and safety plan: means a documented plan, which addresses hazards identified and includes safe work procedures to mitigate, reduce or control the hazards identified;
Health and safety specification: means a documented specification of all health and safety requirements pertaining to the associated works on a construction site, so as to ensure the health and safety of persons;
HCS: Hazardous Biological Agents Regulations SDS: Safety Data Sheet
PPE: Personal Protective Equipment
Principal contractor: means an employer, as defined in section 1 of the Occupational Health and Safety Act who performs construction work and is appointed by the client to be in overall control and management of a part of or the whole of a construction site;
Risk assessment: means a program to determine any risk associated with any hazard at a construction site, in order to identify the steps needed to be taken to remove, reduce or control such hazard;
Structure: means any building, steel or reinforced concrete structure
Designer: means a competent person who

- prepares a design;
- checks and approves a design;
- arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the employer; or • designs temporary work, including its components;
- an architect or Employer's Agent contributing to, or having overall responsibility for a design; • a building services Employer's Agent designing details for fixed plant;
- a surveyor specifying articles or drawing up specifications;
- a contractor carrying out design work as part of a design and building project; or
- an interior designer, shop-fitter or landscape architect;

Construction manager: means a competent person responsible for the management of the physical construction processes and the coordination, administration and management of resources on a construction site;
Construction site: means a work place where construction work is being performed;

4 REQUIREMENTS

4.1 Leadership and Commitments

The Principal Contractor acknowledges Khai-Ma Local Municipality's strong commitment to Health & Safety and the Principal Contractor affirms that it has a written Health & Safety Policy, supporting Khai-Ma Local Municipality and their Health & Safety Management Plan that has been signed, and is actively supported and endorsed by the Principal Contractor's management team. The Principal Contractor agrees that its written policy is widely disseminated and understood among its employees, and that its policy includes a description of the Principal Contractor's organization, procedures and methods of communication to and from personnel. The Principal Contractor must provide copies of its policy and policy statement to Khai-Ma Local Municipality upon request.

4.1.1 Legal Requirements and Regulations for Health & Safety

The Principal Contractor warrants that it is familiar with the contents and implications of the applicable legislation (latest reprints), codes of practice, guidelines and standards applicable to the services to be provided.

The Act and the regulation, where applicable, require development and implementation of Work Method Statements for a range of high-risk construction activities and prescribed demolition activities. Where applicable, the Principal Contractor must develop and implement.

The Principal Contractor must ensure that its personnel and its Sub-contractor's personnel have been informed of all such laws, Acts, regulations, codes of practice, guidelines and standards.

4.1.2 Principal Contractors' General Requirements of Health & Safety

The Principal Contractor is solely responsible for carrying out the work under the Contract having the highest regard for the health and safety of its employees, Khai-Ma Local Municipality's employees and persons at or in the vicinity of the site, the works, temporary work, materials, the property of third parties and any purpose relating to the Principal Contractor carrying out its obligations under this Contract.

The Principal Contractor must initiate and maintain safety precautions and programmes to conform to all applicable Health & Safety laws or other requirements, including requirements of any applicable government body, and Khai-Ma Local Municipality corporate, business unit and site requirements. The Principal Contractor must, at its own cost, erect and maintain safeguards for the protection of workers and the public.

The Principal Contractor must manage all reasonably foreseeable hazards created by performance of the work.

The Principal Contractor must:

Provide all things and take all measures necessary for maintaining proper personal hygiene, ensuring safety of persons and property and protecting the environment at or near the site.

Avoid unnecessary interference with the passage of people and property at or near the site.

Prevent nuisance, excessive noise and unreasonable disturbances in performing the services.

Be responsible for the adequacy, stability and safety of all of its site operations, methods of design, construction and work.

Costs for the above are the responsibility of the Principal Contractor.

The Principal Contractor must comply and is responsible for ensuring that all of its Sub-contractors comply with the relevant legislation(s) and statutory regulations for health and safety, Khai-Ma Local Municipality's Health & Safety requirements included in the Contract and other documents pertaining to health and safety contained in the Health & Safety Management System and include, standards, policies, procedures, guidelines and safe work instructions.

4.1.3 Principal Contractor's Health & Safety Management Plan

The Principal Contractor must prepare, implement and administer a Health & Safety Management Plan. The Plan is in writing and forwarded, prior to site handover to the construction site for work under the Contract, to Khai-Ma Local Municipality's Health and Safety Manager for review. The Health & Safety Management Plan must comply with the Contract including Project Site Rules & Requirements, and applicable laws relating to workplace health and safety and environmental health. Any proposed amendments or revisions to the Principal Contractor's Safety Management Plan must be submitted to Khai-Ma Local Municipality for acceptance and approval.

The Health & Safety Management Plan must provide a systematic method of managing hazards according to the risk priority, and must include all mobilisation and site set-up activities.

The Plan will be audited for completeness by Khai-Ma Local Municipality's Health and Safety Manager using an audit tool, and a score of 80% will be a required before it will be "accepted with comments".

The Plan is presented and at least "accepted with comments" by Khai-Ma Local Municipality's Health and Safety Manager BEFORE permission will be granted to the Principal Contractor to mobilise to site.

The Principal Contractor's Health & Safety Management Plan must demonstrate management's commitment to safety and must include, but not be limited to, the following minimum auditable elements:

b) **Legal & Site-Specific Requirements**

The plan shall demonstrate management's commitment to safety and include, but not be limited to, the following minimum auditable elements:

The Principal Contractor's Safety Policy (**OH&S Act – Section 7**), how safety responsibilities are assigned to different roles within the organisation, and identification of the Safety Co-coordinator role, and on-site agent/managers. (**OH&S Act – Section 8 & Construction Regulations**)

Assessment of Sub-contractors and service providers, including requirements for Health & Safety Plans.

Safety awareness promotions.

Nomination of personnel to carry out safety inspections. The task may be shared with other duties and provided within the resources of individuals and may be rotated.

Occupational Health & Safety Workplace Environment, including provision for monitoring employee exposures to noise, dust, etc. (**OH&S Act – Environmental & Facilities Regulations**).

Rules and regulations including safety procedures the Principal Contractor has in place for recurring work activities.

Personal protective equipment rules **(OH&S Act – General Safety Regulation 2)**.

Control of dangerous and hazardous substances **(OH&S Act – Hazardous Biological Agents Regulations)**.

System of hazard identification and risk control, such as risk assessments, Daily Safe Task Instructions and communication **(OH&S Act – Construction Regulation)**.

Verification procedures including **(OH&S Act – Construction Regulations)**:

- Monthly internal safety audits to ensure compliance with Health & Safety Plans.
- Daily site safety inspections.
- Inspection of plant, tools and equipment prior to introduction to site and at least monthly thereafter.
- Accident/incident reporting, recording, investigation and analysis, which ensure that corrective action is taken and this action is communicated to report initiators (OH&S).
- Evacuation and emergency planning
- Rehabilitation procedures that encourage an early return to work.

The Principal Contractor must provide both electronic and hard copies of its safety manuals, policies and procedures to Khai-Ma Local Municipality and must ensure that its personnel, at all times, strictly observe and comply with the procedures set out therein. Khai-Ma Local Municipality's Health and Safety Manager may from time-to-time request safety procedures applicable to the area of operations. The Principal Contractor must forward to Khai-Ma Local Municipality Health and Safety Manager any updates or revisions to its safety manuals, policies or procedures as soon as practicable following revision or update.

Hazard Identification, Risk Assessment and Risk Control

The development of a project/work scope and activity risk profile identifying and considering, safety, health and environmental hazards and exposures, for example excavations, working at height, welding, confined spaces, delivery, uploading materials and equipment from trucks, hazardous substances, etc.

How controls to manage risks are identified within the risk profile and will be formalised and implemented.

Personal Protection Equipment (PPE)

The hazard identification and risk assessment process for specific operations and activities and for new activities after the development of the project/work scope and activity risk profile. (Considers methodology, expert advice and selection of participants.)

The process to be used to review the effectiveness of risk controls.

Workplace hazard inspections.

The implementation of a safety observation (behaviour audit) and coaching process conducted as a minimum by persons in leadership roles.

Method by which daily activities will be assessed for hazards and controls defined before work commences.

Principal Contractor will carry out inspections and maintain requests for the identification and implementation of inspection and maintenance controls for mobile plant, equipment and tools requiring formal management, including and not limited to:

- Vehicles
- Hoists and winches
- Excavations
- Lifting gear

- PPE
- Ladders
- Pressure vessels
- Portable electrical equipment
- SDS Register and Information

The process for identifying, developing and communicating site rules and standards.
Control of dangerous and hazardous substances.

c) **Injury Management**

Processes to ensure employees are medically fit and suited to perform their functions safely.
An incident reporting and investigation structure which includes root cause establishment and corrective action taken.
Experienced / trained investigators on all projects.
A process to review the effectiveness of incident investigation action plans.
The conducting of first aid needs and emergency response risk assessments.
A return-to-work programme (restricted duties).
A rehabilitation programme includes:

- Trauma counselling
- Processes to ensure the appropriate authorities are notified in the event of a reportable incident.

d) **Health & Safety Communication and Consultative Processes**

Project leadership will ensure all personnel are kept regularly up-to-date with Health & Safety information and prompt feedback will be given to personnel for issues they raise, for example, hazard reports.
The establishment and maintenance of a consultative process for the duration of the project.
Daily pre-start (DSTI) discussions that encourage staff and leaders to try to anticipate and pre-empt potential hazards within the day's activities along with "toolbox" meetings and project safety meetings.
Implementation of improvement programmes that encourage and recognise personnel suggestions to enhance Health & Safety on site.
Health & Safety publicity and awareness programmes, for example, competitions and lifestyle improvement.
Attendance at site safety meetings by Project Manager, Safety Manager and SHE Rep. To be elected and appointed per work area and discipline and comply with the OH&S Act

e) **Education, Training and Competency**

Identification of the competencies required by employees along with selection, placement and any training requirements.
Identification and implementation of the process that will be used to ensure that employees hold the required competencies.
The identification of minimum core and Health & Safety skills required by persons in leadership and supervisory roles.
Identification, assessment and management of hazards.
The establishment of a training and development plan that ensures personnel attains the desired skills and is also able to monitor refresher-training requirements.
Mechanisms to review the effectiveness of training where appropriate.
A site induction and orientation system that includes specific site issues and requirements and compliments the general induction.
Methodology for briefing personnel on new or changed standards, site rules and or procedures, particularly after absence from site.
Compliance with **Khai-Ma Local Municipality** training and competency requirements.

4.1.4 Site Supervision

The Principal Contractor shall comply with **OH&S Act – Section 8, 9, 13 and 16** and the Construction Regulations.

The Principal Contractor must nominate and appoint a person on site to whom **Khai-Ma Local Municipality** may refer in connection with the works. Persons are for all shifts worked or whilst any activity relating to the Contract is being performed on site, and must have the authority to bind the Principal Contractor with respect to the Contract (**OH&S Act – 16 Section (2)**).

The Principal Contractor must ensure that the performance of all specified works is supervised throughout the sufficient number of qualified and competent appointed Construction manager and assistant construction managers of the Principal Contractor, who have experience in the type of work specified **(OH&S Act – Construction Regulation 8 (1) and 8 (2)).**

Note: No work may commence and/or continue without Construction Manager and Supervisor present on site.

The Site Supervisor and assistant Supervisor (**Construction Regulation 8 (7) and 8 (8)** must be competent and appointed in writing. They must be equipped with a mobile telephone with message bank and/or pager or an equivalent communication device so that communication throughout the Contract can be maintained at all times.

The Site Supervisor must provide a list of names and contact telephone numbers of all Principal Contractor's and Sub Contractor's contact persons on site. This list is updated as a new Sub-contractor employee commences on site.

The Site Supervisor must keep a record of all employees, including date of induction, relevant skills and licences, and be able to produce this list at the request of Khai-Ma Local Municipality's Health and Safety Manager.

Khai-Ma Local Municipality's Health and Safety Manager is notified of any new starter with evidence of induction and site-specific induction prior to commencement of work.

4.1.5 Principal Contractor's Safety Officer

Appointment in terms of the **Construction Regulations 8.5**, the Principal Contractor's Safety Officer is on site when work commences and is present until all activities for the day (including Sub-contractors) are finished.

The safety officer must report functionally to Khai-Ma Local Municipality Representative on site. The safety officer equipped with a phone, a PC and a printer to ensure his duties and functions can be met.

A **full-time Safety Officer** must be appointed and must be a competent person registered with SACMCMP.
At least 3 years' experience as a Safety Officer on construction projects.
Sound knowledge of the Occupational Health and Safety Act and Regulations.
Sound knowledge of hazard identification and risk management processes.
Sound knowledge of incident causation phenomena.
Sound knowledge of incident investigation procedures.
Valid First Aid Certificate
Training Certificates such as SAMTRAC, NEBOSH, COMSOC or equivalent.

Prior to work commencing, the Principal Contractor must submit a CV of their proposed Site Safety Officer and Traffic Safety Officer to Khai-Ma Local Municipality's Health and Safety Manager for approval.

The Principal Contractor must notify Khai-Ma Local Municipality's Health and Safety Manager in writing of the name, qualifications, and duties and responsibilities of the proposed Safety Officer. When approval is obtained from Khai-Ma Local Municipality's Health and Safety Manager the person can be appointed and mobilised, prior to the Principal Contractor mobilising to site.

5 OHS MANAGEMENT

5.1 Structures and Organization of OHS Responsibilities

5.1.1 Overall Supervision and Responsibility for OHS

- The Client to ensure that the Principal Contractor, is appointed in terms of Construction Regulation 5(1)(k), implements and maintains the agreed and approved OHS Plan.
- The Chief Executive Officer of the Principal Contractor in terms of Section 16 (1) of the Act to ensure that his Employees (as defined in the Act) complies with the Act. Legal Compliance Audit may be used for this purpose.
- Any OHS Act (85 /1993), Section 16 (2) appointee/s as detailed in his/her/their respective appointment forms
- The Full time Construction Manager, Assistant Construction Manager, Supervisor and Assistant Construction Supervisor/s appointed in terms of Construction Regulation 8.

5.1.2 Further (Specific) Responsibilities for OHS

The contractor shall note that it is a generic list only and is intended for use as a guideline.

Appointment	**Section/Regulation in OHS Act**
Construction Manager	(Construction Regulation 8(1))
Construction Supervisor	(Construction Regulation 8(7))
Construction Vehicles/ Mobile Plant/Machinery Supervisor	(Construction Regulation 23)
Drivers/Operators of Construction Vehicles/Plant	(Construction Regulation 23)
Electrical Installation and Appliances Inspector	(Construction Regulation 24)

Emergency/Security/Fire Coordinator	(Construction Regulation 29)
Excavation Supervisor	(Construction Regulation 13)
First Aider	(General Safety Regulation 3)
Fire Equipment Inspector	(Construction Regulation 29)
Hazardous Biological Agents Regulations Supervisor	(HBA Regulations)
Incident Investigator	(General Admin Regulation 9)
OHS Committee	(OHS Act Section 19)
Health & Safety Officer	(Construction Regulation 8(5))
SHE Representatives	(OHS Act Section 17)
Stacking & Storage Supervisor	(Construction Regulation 28)
Pressure Equipment Supervisor	(Pressure Equipment Regulations)
Temporary works Designer	(Construction Regulations 12)
Temporary works Supervisor	(Construction Regulations 12)

The above appointments shall be in writing and the responsibilities clearly stated together with the period for which the appointment is made. This information shall be communicated and agreed with the appointees.

The principal contractor shall, furthermore, provide the clients Manager with an organogram of all contractors that he/she has appointed or intends to appoint and keep this list updated and kept on the Health & Safety file. All contractors appointed by the Principal Contract must comply with the requirements as set out in Construction Regulations 7.

Should any appointed person resign, a new person must be appointed as soon as possible. The organogram must be updated and the Client and Safety Manager notified of the changes.

5.2 Communication & Liaison

5.2.1 OHS Liaison between the Client, the principal Contractor, the other Contractors, the Designer and other concerned parties will be through the OHS committee or Committee established by Client for this purpose.

5.2.2 In addition to the above, communication may be directly to the Client or his appointed Manager, verbally or in writing, as and when the need arises.

5.2.3 Consultation with the workforce on OHS matters will be through their Supervisors, Safety Officer, OHS Representatives or the OHS committee if any.

5.2.4 The Principal Contractor will be responsible for the dissemination of all relevant OHS information to the other Contractors e.g. design changes agreed with the Client and the Designer, instructions by the Client and/or his/her manager, exchange of information between Contractors, the reporting of hazardous/dangerous conditions/situations etc.

5.3 OHS File

The Principal Contractor must, in terms of Construction Regulation 7(1)(b), keep a health & safety file on site at all times that must include all documentation required in terms of the Act and Regulations and must also include a list of all Contractors on site that are accountable to the Principal Contractor and the agreements between the parties and details of work being done.

The following documents must inter alia be kept in the OHS file:

- Appointment letter
- 37.2 Agreement (OHS Act)
- Notification of Construction Work (Construction Regulation 4.)
- Copy of OHS Act (updated) (General Administrative Regulation 4.)
- Proof of Registration and good standing with a COID Insurer - Construction Regulation 5(1)(j)
- OHS Plan agreed with client including the underpinning Risk Assessment/s & Method Statements (Construction regulation 5(1)(l))
- OHS Policies and procedures (OHS Act)
- Risk Assessment (Construction regulations 9)
- A list of Contractors (Sub-Contractors) including copies of the agreements between the parties and the type of work being done by each Contractor (Construction Regulation 7)
- Appointments/Designation forms as per 5.1.2 above.
- Competency Certificates
- Occupational Medical Certificates of all personnel working on site to proof Fitness to work
- Emergency response plan with diagram

- Registers as follows:
  - Accident/Incident Register (Annexure 1 of the General Administrative Regulations)
  - SHE Representatives Inspection Register
  - Excavations Inspection
  - Excavation Entry Permit
  - Barricading inspections
  - Temporary works inspections
  - Arc & Gas Welding & Flame Cutting Equipment Inspections
  - Construction vehicles & Mobile Plant Inspections
  - Electrical Installation and –Machinery Inspections
  - Fire Equipment Inspection & Maintenance
  - Lifting Tackle and Equipment Inspections
  - Inspection of Pressure Equipment
  - First Aid Boxes
  - Personal Protective Equipment Issue register
  - Personal Protective Equipment Inspections
  - Barricading inspections
  - Portable Electrical Equipment

(This list is not conclusive and additional registers should be placed on file as and when required)

5.4 OHS Goals and objectives and Arrangements for monitoring and review of OHS performance

The principal Contractor is required to maintain a DIFR of less than 1 and report on this to the Client on a monthly basis.

5.5 Identification of Hazards and Development on Risk Assessments, Standard Working Procedure (SWP) and Method Statements

The Principal Contractor is required to develop Risk Assessments, Standard Working Procedures (SWP) and Method Statements for each activity executed in the contract or project.

The Principal Contractor must ensure that all risk and hazard controls are applied in accordance with the "Hierarchy of Control" methodology.

Control measures to eliminate or minimise the risk is considered and implemented in the following order of priority:

- **Elimination** of the hazard is the main objective. If this is not possible, prevent or minimise exposure to the risk by one or a combination of:
- **Substitution** – substituting a less hazardous material, process or equipment
- **Isolation –** isolating the hazard from the person or the person form the hazard
- **Engineering** – redesigning equipment or work processes
- **Administration** – introduce administrative controls
- As a last resort, when exposure to the risk is not (or cannot be) minimised by other means:
- **PPE** – identify and use appropriate personal protective equipment

5.6 Arrangements for Monitoring and Review

5.6.1 Monthly Audit by Client

The Client will be conducting monthly Audits to comply with Construction Regulation 5(1)(o) to ensure that the principal Contractor has implemented and is maintaining the agreed and approved OHS Plan. A minimum score of 90% is required for compliance. Continuous non-compliance will result in a non-conformance being issued which may result in work being stopped.

5.6.2 Other Audits and Inspections by Client

The Client reserves the right to conduct other ad hoc audits and inspections as deemed necessary.

5.6.3 A representative (Safety Officer) of the Principal Contractor must accompany the Client on all Audits and Inspections and may conduct his/her own audit/inspection at the same time. Each party will, however, take responsibility for the results of his/her own audit/inspection results.

5.6.4 Reports

The Principal Contractor is required to provide the Client with a monthly compliance report, for the compliance verification conducted by the appointed, CHSO (registered with the SACPCMP).

The Principal Contractor's safety officer must submit a close out report for findings within 7 days after receiving the audit from the Client's representative.

The Principal Contractor must report all incidents where an employee is injured on duty to the extent that he/she:

- Dies
- becomes unconscious
- loses a limb or part of a limb
- is injured or becomes ill to such a degree that he/she is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he/she was usually employed

OR where:

- a major incident occurred
- the health or safety of any person was endangered
- where a dangerous substance was spilled
- the uncontrolled release of any substance under pressure took place machinery or any part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects
- machinery ran out of control to the Provincial Director of the Department of Labour within seven days. (Section 24 of the Act & General Administrative Regulation 8.)

The Principal Contractor is required to provide the Client with copies of all statutory reports required in terms of the Act. The Principal contractor is required to provide the Client with copies of all internal and external accident/incident investigation reports.

5.6.5 **Review**

- The Principal Contractor is to review the Hazard Identification, Risk Assessments and SWP's at each Production Planning and Progress Report meeting as the construction work develops and progresses and each time changes are made to the designs, plans and construction methods and processes.
- The Principal Contractor must provide the Client, other Contractors and all other concerned parties with copies of any changes, alterations or amendments.
- A 3 monthly review of the Risk Assessment will be done by the Client's Health and Safety representative.
- The contractor must have a monitor and review program available for Risks Assessments.

5.7 Site Rules and other Restrictions

5.7.1 **Site OHS Rules**

The Principal Contractor must develop a set of site-specific OHS rules that will be applied to regulate the OHS aspects of the construction.

5.7.2 **Security access and security management**

The contractor may not hire any security services for the project site unless authorization has been obtained in writing from the nominated project management representative.

- **Trespassing**
  The principal contractor shall ensure as far as is reasonable that no employee (including contractor employees) trespass on any land lying beyond the boundaries of the project site. If instructed by a nominated project management representative to do so, the contractor must remove from the project any employee who fails to comply with this requirement. The contractor's activities must be confined to the specified construction areas, and access to these areas may only be gained by means of specified routes. All required fencing must be erected and maintained by the contractor as per the contract agreement.
- **Visitors**
  Visitors (including reps and suppliers) must be advised in advance of the mandatory Personal Protective Equipment (PPE) requirements for the site and must arrive with all the necessary PPE and identification documentation. Upon arrival, all visitors must report to the Security Office where they must sign in.
  All visitors must undergo a visitors induction briefing before entering the site. Visitor access will be issued to each visitor on conclusion of the induction briefing. All visitors must comply with the requirements for site access. Whilst on site, visitors must be accompanied at all times by an appointed "Host" who has been inducted fully. The visitor(s) must be met at the Site Office, before proceeding to the site.
  Note: Visitors are not permitted to perform any work on site. Any request to carry out a site inspection must be referred to the nominated project management representative. The contractor must not arrange any such inspection without prior approval from the nominated project management representative.
- **Alcohol, drugs and other Intoxicating substances**

The contractor must ensure that all personnel under its authority do not at any time enter the site or perform any work whilst under the influence of alcohol, a drug, or any other intoxicating substance. Selling or possessing drugs, alcoholic beverages or any other intoxicating substance on the site is strictly prohibited.
A substance abuse testing program will be implemented by the principal contractor. Persons entering the site will be randomly tested. Any person who tests positive for alcohol or drug consumption will be subject to disciplinary action and may be permanently removed from the site. Should the actions and / or demeanor of an employee suggest possible narcosis or drunkenness, the employee must be removed from the site. This may be done without testing.
Note: All personnel involved in an incident / accident could be subjected to an alcohol test and or drug test as part of the investigation.

- **Firearms, ammunition and offensive weapons**
  Firearms, ammunition, and offensive weapons of any kind are strictly prohibited. No person may enter / will be permitted to enter the site carrying any such item.
- **Vehicles**
  Every construction vehicle to be used on-site must be inspected and approved by the principal contractor before a site access permit will be granted.
  The contractor must allow any vehicle that is brought onto site (including privately owned vehicles) to be searched at any time while on the premises, or when entering or leaving the premises.
  The contractor is solely responsible for the safety and security of all construction vehicles that it brings onto the site. All road-going vehicles used by the contractor on the site must be roadworthy and registered with the relevant traffic authority. Driver / operator appointments must be signed by each employee intending to drive or operate construction machinery on the project. A vehicle will not be permitted to enter the site in an un-roadworthy condition.

  Access will be denied if, for example:
  - The vehicle has a defective exhaust system;
  - A serious oil or fuel leak is evident;
  - The vehicle has unsafe bodywork or is carrying an unsafe load;
  - The vehicle is fitted with extraneous or non-standard equipment;
  - Passengers are not seated properly; or the vehicle is not fitted with a seat belt for each occupant; or the vehicle has any obvious mechanical defect.
  - Overloaded vehicles will not be permitted to enter the site. The driver / operator of any vehicle / mobile equipment must carry a copy of his license with him at all times.

  Each driver / operator must:
  Comply with all site / project rules and regulations pertaining to traffic and the safe operation of vehicles / mobile equipment; obey all road signs; obey all instructions given by security or emergency services personnel; remain within the boundaries of the site; and ensure that the vehicle that he or she is operating is never overloaded, and that loads are always properly secured.

  - In the interest of safety, only the minimum number of vehicles required by the contractor to complete the work under the contract will be permitted to enter the site.
  - When not in operation, the contractor's vehicles / mobile equipment must be parked within the boundaries of his laydown area or yard or as indicated by the project representative. Parking is only permitted in designated parking areas.
  - All cars are parked on site at the owner's risk and the principal contractor will ensure that a sign stating this is erected at the entrance to the project site.
  - In the event of a vehicle accident on site, the driver(s) must report the incident immediately and must remain at the scene until a nominated project management representative arrives, or until a nominated project management representative authorizes him to leave (unless, the driver requires medical attention).

5.8 Training

The contents of all training required by the Act and Regulations to be included in the Principal Contractor's OHS Plan.

- General Induction training
  All employees of the Principal and other Contractors to be in possession of proof of General Induction training
- Site Specific Induction training
  All employees of the Principal and other Contractors to be in possession of Site Specific OHS Induction training.

- Other training
  - All operators, drivers and users of construction vehicles, mobile plant and other equipment to be in possession of Competency Certificates & Medical Certificates of Fitness (Construction Reg 23).
  - All employees in jobs requiring training in terms of the Act and Regulations to be in possession of valid proof of training.
  - OHS Training Requirements: (as required by the Construction Regulations and as indicated by the OHS Specification & the Risk Assessment/s):
    - General Induction (Section 8 of the Act)
    - Site/Job Specific Induction (also visitors) (Sections 8 & 9 of the Act)
    - Site/Project Manager * Construction Supervisor
    - OHS Representatives (Section 18 (3) of the Act)
    - Training of the Appointees
    - Operation of Cranes (Driven Machinery Regulations 18 (11)
    - Operators & Drivers of Construction Vehicles & Mobile Plant (Construction Regulation 23)
    - Basic Fire Prevention & Protection (Environmental Regulations 9 and Construction Regulation 29)
    - Basic First Aid (General Safety Regulations 3)
    - Storekeeping Methods & Safe Stacking (Construction Regulation 28)
    - Emergency, Security and Fire Co-Ordinator
    - Excavation safety
    - Work related training – for example Traffic accommodation

5.9 Accident and Incident Investigation

5.9.1 The Principal Contractor is responsible for the investigation of all accidents/incidents where employees and non-employees were injured to the extent that he/she/they had to be referred for medical treatment by a doctor, hospital or clinic. (General Administrative Regulation 9)

5.9.2 The results of the investigation to be entered into the Accident/Incident Register Annexure 1) (General Administrative Regulation 9)

5.9.3 The Principal Contractor is responsible for the investigation of all non-injury incidents as described in Section 24 (1) (b) & (c) of the Act and keeping a record of the results of such investigations including the steps taken to prevent similar accidents in future.

5.9.4 The Principal Contractor is responsible for the investigation of all road traffic accidents and keeping a record of the results of such investigations including the steps taken to prevent similar accidents in future.

5.10 SHE Representatives and Committees

5.10.1 **Designation of SHE Representatives**

- Where the Principal Contractor employs more than 20 persons (including the employees of other Contractors (sub-contractors) he has to appoint one OHS Representatives for every 50 employees or part thereof. General Administrative Regulation 6. requires that the appointment OR election and subsequent designation of the OHS Representatives are executed in consultation with Employee Representatives or Employees. (Section 17 of the Act and General Administrative Regulation 6. & 7.)
- OHS Representatives have to be designated in writing and the designation must include the area of responsibility of the person and term of the designation.

5.10.2 **Basic functions of SHE Representatives**

- The Principal Contractor must ensure that the designated OHS Representatives conduct a minimum monthly inspection of their respective areas of responsibility using a checklist and report thereon to the Principal Contractor.
- OHS representatives must be included in accident/incident investigations.
- OHS representatives must attend all OHS committee meetings.

5.11 Appointment of OHS Committee

5.11.1 The Principal Contractor must establish an OHS Committee consisting of all the designated OHS Representatives together with a number of management representatives that are not allowed to exceed the number of OHS representatives on the committee. The members of the OHS committee must be appointed in writing.

5.11.2 The OHS Committee must meet minimum monthly and consider, at least, the following Agenda:

1) Opening
2) Previous Minutes
3) Observations
4) Program and Safety considerations
5) Hygiene
6) Housekeeping improvement
7) Incidents & Accidents / Injuries
8) Equipment Registers
9) Safety performance Evaluations
10) Asbestos monitoring and measuring
11) Education & Safety promotion program
12) General
13) Date of Next Meeting
14) Closing

5.12 Occupational Medicals

Ensure that all employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner as per Annexure 3 of Construction Regulation, 2014 -Construction Regulation 7(1)(g). At the end of the contract all employees are required to undergo exit medicals. If there is the risk of contact with sewage, employees must receive the applicable vaccinations. Medical surveillance to be done for employees exposed to asbestos, lead, hazardous chemicals and prolonged vibration.

6 PROJECT SPECIFIC REQUIREMENTS

6.1 The following is a list of specific activities and considerations that have been identified for the project and site and for which Risk Assessments, Standard Working Procedures (SWP), management and control measures and Method Statements (where necessary) have to be developed by the Principal Contractor:

- Secure/Safe Storage for plant & equipment
- Ablutions
- Vehicle access to the site
- Location of existing Services
- Installation & Maintenance of Temporary Construction Electrical Supply, Lighting and Equipment
- Adjacent Land uses/Surrounding property exposures
- Boundary & Access control/Public Liability Exposures (Remember: The Employer is also responsible for the OHS of non-employees affected by his/her work activities.)
- Health risks arising from neighboring as well as own activities and from the environment e.g. threats by dogs, bees, snakes, lightning etc.
- Exposure to Noise
- Protection against dehydration and heat exhaustion
- Protection from wet & cold conditions
- Dealing with HIV/Aids and other diseases
- Use of Portable Electrical Equipment
- Loading & Offloading of Trucks
- Manual and Mechanical Handling
- Lifting and Lowering Operations
- Driving & Operation of Construction Vehicles and Mobile Plant including
- Parking of Vehicles & Mobile Plant
- Towing of Vehicles & Mobile Plant
- Use and Storage of Flammable Liquids and other Hazardous Substances
- Traffic accommodation
- Temporary works

- Safe lifting procedures
- Excavation safety
- Working near water environments
- Fuel Storage
- Concrete works
- Paving
- Overhead Powerlines
- Asbestos work (Only to be done by the approved Asbestos Contractor)
- As discovered by the Principal Contractor's hazard identification exercise
- As discovered from any inspections and audits conducted by the Client or by the Principal Contractor or any other Contractor on site
- As discovered from any accident/incident investigation.

This list is not conclusive and should be revised as work progresses.

6.2 The following are particular requirements depending on the scope of works and will form the basis for compliance audits.

- Administrative and Legal Requirements
- Education, Training & Promotion
- Public Safety & Emergency Preparedness
- Personal Protective equipment
- Housekeeping
- Emergency/Fire prevention and Protection
- Excavations
- Tools
- Personnel & Material Hoists
- Transport & Materials Handling
- Site plant & Machinery
- Plant & Storage Yards/Site Workshops Specifics
- Health & Hygiene

7 PROCUREMENT OF MATERIALS FOR CONSTRUCTION WORK

The Principal Contractor shall ensure that all materials procured for use on site are reasonably safe and without risk to health and safety of employees on site when properly used and that they comply with the prescribed requirements.
The Principal Contractor shall also undertake to ensure that necessary information is made available:

- With regard to the use of the substance at work and provided by the seller of the material;
- With regard to the risks to health and safety associated with such substance;
- With regard to the conditions necessary to ensure that the substance will be safe and without risk to health and safety when properly used; and
- The procedures to be followed in the case of an accident involving such substances.

- 11 ACCOMMODATIONS OF TRAFFIC

The Contractor must comply with the requirements of the Road Traffic Act (Act 93 of 1996) as well as the requirements of relevant authorities. Construction roads signs must be erected to notify all motorist using the road to comply to the requirement. Flag personal must be on standby to assist in the control of traffic, when roads are closed due to construction work. The contractor must make alternatives roads for residents. Ensure owners have safe access to houses. The traffic management plan must be submitted for approval before work starts and must be available on site at all times.

8 TERMINATION AND SUSPENSION OF BREACH OF HEALTH AND SAFETY CONDITIONS

Khai-Ma Local Municipality, the Health and Safety Manager and the Principal Contractor agree that the provisions of this Clause are of the utmost importance and any relevant violation of them is considered to be a material and substantial breach of this contract.
The Principal Contractor must not cause, permit, or tolerate a hazardous, unsafe, unhealthy or environmentally unsound condition or activity over which it has control at the site. If the Principal Contractor becomes aware of any hazardous, unsafe,

unhealthy or environmentally unsound condition, including a violation of any of the Health & Safety requirements, it must immediately notify Khai-Ma Local Municipality or the Health and Safety Manager and take whatever steps are necessary and as is agreed between Khai-Ma Local Municipality, the Manager and the Principal Contractor to remove from site, eliminate, terminate, mitigate and rectify the condition. If remedial action is not implemented within the agreed time, Khai-Ma Local Municipality or the Health and Safety Manager have the right to stop work forthwith.

If the Principal Contractor fails to take the necessary steps to cure the breach or violation promptly or to otherwise comply with this Clause, Khai-Ma Local Municipality may exercise its rights of termination according to the default provisions of this Contract.

Should Khai-Ma Local Municipality, Health and Safety Manager or the Resident Employer's Agent observe an unsafe act or become aware of a planned unsafe act, Khai-Ma Local Municipality, Health and Safety Manager or the Resident Employer's Agent may direct the Principal Contractor to cease or not to proceed with the unsafe work. The Principal Contractor must, at their own cost and risk, modify its Method of Work in order to work safely.

9 SAFETY CONFLICT

Where any conflict exists between the requirements of this Specification, the site rules or statutory requirements/regulations the higher standard must apply unless such conflict is brought to the attention of Khai-Ma Local Municipality, Health and Safety Manager or the Resident Employer's Agent and a direction is provided. The Principal Contractor is deemed to have allowed for the higher standard.

The Principal Contractor is legally responsible for ensuring that he conforms to all applicable aspects of the Occupational Health & Safety Act 85/1993 and Regulations and other relevant Acts and Regulations where applicable. If in dispute with client specification and or legislation, the most stringent requirement must apply for all Khai-Ma Local Municipality controlled project/site.

10 ADMINSTRATION & LEGAL REQUIREMENTS

OHS ACT (SECTION/REGULATIONS)	SUBJECT	REQUIRMENTS
Construction Regulation 4	Notification of Construction work	Submitted to Department of Labour by the Principal Contractor 7 days before work commence on site
General Administrative Regulation 4	Copy of OHS Act (Act 85 of 1993)	Written proof of registration/Letter of Good Standing available on site
Construction Regulation 5(1)(b) OHS programmed developed.	OHS Specification & Programme	OHS Spec received from Client. Updated regularly
Section 8(2)(d) Construction. Regulation 9	Hazard Identification & Risk Assessment	Hazard Identification carried out/Recorded Risk Assessment and – Plan drawn up/Updated RA Plan available on-Site Employees/Sub-Contractors informed/trained
Section 16(2)	Assigned duties (Managers)	Responsibility of complying with the OHS Act assigned to another person/s by CEO.
Construction. Regulation 8.1 & 8.7	Designation of Person Responsible on Site	Competent person appointed in writing as Construction Manager and Supervisor – Full time.
Construction Regulation 8.2 & 8.8	Designation of Person Responsible on Site	Competent person appointed in writing as Assistant Construction Manager and Assistant Supervisor – should the principal contractor be working on more than one area simultaneously – Full time.
Construction Regulation 8.5	Safety officer	Full time safety officer and traffic safety officer Safety officer must attend audits conducted by the Client's Manager Safety officer must be on site full time with high-risk activities (for example confined spaces and deep excavations)
Construction Regulations 9	Risk assessor	Competent person to conduct and review risk assessment

Section 17 & 18 General Administrative Regulations 6 & 7	Designation of Occupational Health & Safety Representatives	More than 20 employees - one OHS Representative, one additional OHS Rep. for each 50 employees or part thereof. Designation in writing, period and area of responsibility specified. Meaningful OHS Rep. reports. Reports actioned by Management.
Section 19 & 20 General Administrative Regulations 5	Occupational Health & Safety Committee/s	OHS Committee/s established. Members appointed in writing. Meetings held monthly. Minutes kept. Actioned by Management.
Section 37(1) & (2)	Agreement with Mandatories (Sub-)Contractors	Written agreement with Principal Contractor & Client. Written agreement between Principal Contractor & Sub-contractor. List of (Sub-) Contractors displayed. Proof of Registration with Compensation Insurer/Letter of Good Standing Construction Supervisor designated Written arrangements. OHS Reps & OHS Committee
Section 24 & General Admin. Regulation 8 COID Act Sect.38, 39 & 41	Reporting of Incidents (Dept. of Labour) Incident	Reporting Procedure displayed. All incidents in terms of Sect. 24 reported to the Provincial Director, Department of Labour, within 3 days. (Annexure 1) (WCL 1 or 2) Cases of Occupational Disease Reported Copies of Reports available on-Site Record of First Aid injuries kept
General Admin. Regulation 9.	Investigation and Recording of Incidents	All injuries which resulted in the person receiving medical treatment other than first aid, recorded and investigated by investigator designated in writing. Copies of Reports (Annexure 1) available on Site Tabled at OHS Committee meeting Action taken by Site Management
Construction. Regulation 13	Excavations	Competent person/s appointed in writing to supervise and inspect excavation work Written Proof of Competence of above appointee/s available on-Site Risk Assessment carried out Inspected: - before every shift - after any blasting - after an unexpected fall of ground - after any substantial damage to the shoring - After rain. Inspections register kept Method statement developed where explosives will be/ are used. Safe work procedure in place and training done for employees. Excavations inspected prior to shift start and declared safe for employees to enter. Deep excavations must be cut back to the maximum angle of repose. Where this is not possible due to space constraints, suitable bracing or shoring must be installed. Excavated material must be placed at a safe distance from the edge of the trench. As a guideline, excavated soil must be placed at least 1 m from the edge or a distance equal to the depth of the trench, whichever is greater (e.g. a

		2 m deep trench requires spoil to be placed at least 2 m from the edge). The sides of the excavation may not be overloaded. All excavations must be barricaded at all times. The following minimum requirements apply: • Barricading must be a minimum of 1 m high from ground level, with no openings at the bottom. • Yellow & Orange nylon netting must be used. • Barricading must be structurally stable and capable of withstanding a load of 100 kg when leaned against. • Barricading must be inspected twice daily (prior to commencement of work and before the end of the shift). Photographic records of these inspections must be retained on site, as well as a barricading register. • Warning signage indicating Danger and Deep Excavations must be clearly displayed. No person may enter or remain in an excavation while a TLB or excavator is operating, as vibrations may result in trench wall collapse. Appropriate PPE, including hard hats, must be worn at all times. Ladders must be provided at intervals not exceeding 7 m to allow safe access and egress. Standing water must be pumped out of excavations daily. Flag persons must be stationed to patrol excavation areas during operations to prevent members of the public or community from accidentally entering or falling into the excavations. Security personnel must patrol excavation areas after hours and over weekends. An Excavation Safety Program, including rescue procedures, must be available on site. A Permit-to-Work system for excavations must be implemented and strictly enforced. Excavations should not be commenced unless the required materials are available on site to complete the work, in order to avoid excavations remaining open for extended periods.
Construction 24/Electrical Machinery Regulations 9 & 10/ Electrical Installation Regulations	Regulation Inspection & Maintenance of Electrical Installation & Equipment (including portable electrical tools)	Competent person appointed in writing to inspect/test the installation and equipment. Written Proof of Competence of above appointee available on Site. Inspections: - Electrical Installation & equipment inspected after installation, after alterations and quarterly. Inspection Registers kept Portable electric tools and -lights and extension leads

		identified/numbered. Monthly visual inspection by User/Issuer/ Store man. Register kept.
Construction Regulation 28/ General Safety Regulation 8(1)(a)	Designation of Stacking & Storage Supervisor.	Competent Person/s with specific knowledge and experience designated to supervise all Stacking & Storage Written Proof of Competence of above appointee available on Site
Construction Regulation 29/ Environmental Regulation 9	Designation of a Person to Co-ordinate Emergency Planning and Fire Protection	Person/s with specific knowledge and experience designated to coordinate emergency contingency planning and execution and fire prevention measures Emergency Evacuation Plan developed: - Drilled/Practiced - Plan & Records of Drills/Practices available on-Site Fire Risk Assessment carried out All Fire Extinguishing Equipment identified and on register. Inspected weekly. Inspection Register kept Serviced annually.
General Safety Regulation 3	First Aid	Every workplace provided with sufficient number of First Aid boxes. (Required where 5 persons or more are employed) First Aid freely available Equipment as per the list in the OHS Act. One qualified First Aider appointed for every 50 employees. (Required)where more than 10 persons are employed) List of First Aiders and Certificates Name of person/s in charge of First Aid box/es displayed. Location of F/Aid box/es clearly indicated. Signs instructing employees to report all Injuries/illness including first aid injuries
General Safety Regulation 9	Inspection & Use of Welding/Flame Cutting Equipment	Competent Person/s with specific knowledge and experience designated to Inspect Electric Arc, Gas Welding and Flame Cutting Equipment Written Proof of Competence of above appointee on Site Equipment identified/numbered and entered into a register Equipment inspected monthly. Inspection Register kept
Hazardous Chemical Manager (HCA) Regulations Construction Regulation 25	Control of Storage & Usage of HCA and Flammables	Competent Person/s with specific knowledge and experience designated to Control the Storage & Usage of HCA (including Flammables) Written Proof of Competence of above appointee available on Site Risk Assessment carried out Register of HCS kept/used on Site
Construction. Regulation 23	Construction Vehicles & Earth Moving Equipment	Operators/Drivers appointed to: - Carry out a daily inspection prior to use - Drive the vehicle/plant that he/she is competent to operate/drive Written Proof of Competence of above appointee available on Site

		Record of Daily inspections kept
	Traffic accommodation	A traffic accommodation plan must be submitted for approval and must be adapted to the site conditions and area where work is taking place. Each section activities should have a specific lay out plan designed for that section, considering road lay out, visibility, traffic and other factors that might affect the safety of employees and road users.
Construction Regulations 12	Temporary Works Supervisor	A Competent person to supervise all Formwork, Support and concrete works. Specialized training. Daily inspections. Inspections before, during and after placement of concrete, inclement weather or any other imposed load.
Ergonomics Regulations	Competent Ergonomics Risk assessor	Ergonomics risk assessment to be done on all activities for all employees.

11 EDUCATION AND TRAINING

SUBJECT	REQUIREMENT
Company OHS Policy Section 7(1)	Policy signed by CEO and published/Circulated to Employees Policy displayed on Employee Notice Boards Management and employees committed.
Company/Site OHS Rules (Section 13(a)	Kept on safety file, explained to employees: written proof Follow-up to ensure employees understand/adhere to the rules.
Induction & Task Safety Training (Section 13(a)	All new employees receive OHS Induction Training. Re-induction training must also be when employees return after 4 weeks of no activities.
General OHS Training (Section 13(a)	Training includes Safe work procedures, Method statements and Risk assessments. Employees acknowledge receipt of training. Follow-up to ensure employees understand/adhere to instructions.
DSTI	All employees receive basic OHS training: written proof Operators of Plant & Equipment receive specialized training Follow-up to ensure employees understand/adhere to instructions. Confined space training, excavation safety and any other specialized training. Training provider must be SAQA registered.
Occupational Health & Safety Promotion	Supervisor to conduct DSTI training on a daily basis. All task must be identified and control measures implemented. All employees (Including plant operators) must sign the register as proof that training was done. DSTI's must be kept with the Supervisor and placed on the H&S file when the task has been completed.
Legal Liability and Risk Assessment training	Incident Experience Board indicating e.g. * No. of hours worked without an Injury * No. of days worked without an Injury Employee Notice Board for OHS Notices. Suggestion scheme. Construction manager and Supervisor

12 PUBLIC SAFETY, SECURITY MEASURES & EMERGENCY PREPAREDNESS

SUBJECT	REQUIREMENT
Notices & Signs	Notices & Signs at entrances / along perimeters indicating "No Unauthorized Entry". Notices & Signs at entrance instructing visitors and non - employees what to do, where to go and where to report on entering the site/yard with directional signs. e.g. "Visitors to report to Office" Notices & Signs posted to of work and other hazardous activities. e.g. General Warning Signs, overhead works. **Deep excavation warning signs.**

Site Safeguarding Security measures	No access should be allowed to unauthorized person/s. All persons entering must sign an access register and undergo Health & Safety Induction training, No unauthorized persons to enter Asbestos storage area.
Emergency Preparedness	Emergency contact numbers displayed.
Emergency Drill & Evacuation	Adequate No. of employees trained to use Fire Equipment. Monthly drills and records must be kept. Evacuation plan drawing must be on site and relevant signs posted.

13 PERSONAL PROTECTIVE EQUIPMENT

SUBJECT	REQUIREMENT
PPE Analysis	Need for PPE identified and prescribed in writing
Head Protection	All persons on site wearing Safety Helmets including Sub-contractors and Visitors (where prescribed)
Foot protection	All persons on site wearing Safety Footwear including Gumboots for concrete / wet work.
Eye and Face Protection	Eye and Face Protection (Goggles, Face Shields, Welding Helmets etc.) used when operating the following: * Jack Hammers * Angle / Bench Grinders * Electric Drills (Overhead work into concrete / cement / bricks * Concrete Vibrators / Pokers * Hammers & Chisels * Cutting / Welding Torches * Arc Welding Equipment
Hearing Protection	Hearing Protectors (Muffs, plugs etc.) used when operating the following: * Jack Hammers * Compactor
Hand Protection	Protective Gloves worn by employees handling / using: * Cement / Bricks / Steel / Chemicals * Welding Equipment * Hammers & Chisels * Jack Hammers etc. * Contact with sewage
Respiratory Protection / Breathing apparatus	Suitable/efficient worn correctly by employees handling / using: * Dry cement * Dusty areas * Hazardous chemicals * Angle Grinders
Working near water bodies.	Suitable personal floatation devices should be made available. Rescue lines and buoyancy rings to be available at suitable intervals. If a person cannot swim, they may not enter water environments where there is a risk of drowning.
Clothing	High visibility clothing to be worn at all times. Fire resistant clothing to be worn when doing hot works. Overalls

14 HOUSEKEEPING

SUBJECT	REQUIREMENT
Waste Removal System	All items of Scrap / Unusable Offcuts / Rubble and redundant material removed from working areas on a regular basis. (Daily). Housekeeping must be done daily before leaving the work site.

	Scrap disposed of in designated containers / areas. Removal from site/yard on a regular basis.
Openings	Unprotected openings adequately guarded/fenced/barricaded/catch nets installed. Warning signs erected and guard/fence/barricading must be inspected twice a day. If nylon netting is used for barricading it must be sturdy and be able to withstand 100kg when leaning against it. No openings at bottom. All guards/fence/barricading must be inspected twice a day (Before shift starts and at the end of shift). Open excavations may not be left open over weekends/holidays. 24-hour security must be on site at all open excavations.

15 ELECTRICITY

SUBJECT	REQUIREMENT
Physical condition of Electrical Appliances & Tools	Electrical Equipment and Tools: (includes all items plugging in to a 15 Amp supply socket) Insulation / casing in good condition. Earth wire connected/intact where not of double insulated design Double insulation mark where no earth wire. Cord in good condition/no bare wires/secured to machine & plug. Plug in good condition, connected correctly and correct polarity. Inspected daily before use.
Temporary Electrical Connections	Done by a qualified electrician Monthly Inspections COC for electrical connection
Overhead Powerlines	No work on live electricity may be done. No work without prior permission by the electricity provider. No work may be done by unskilled labor, only skilled qualified person approved by the electricity provider. Provide a detail method statement, safe work procedure and risk assessment, prior to work being done. Specialized work only to be done by the electricity provider.
Exposing of services	Provide method statement, safe work procedure and risk assessment. Training must be done for employees before work commences. No exposed electricity wires may be left unattended. All measures should be taken to ensure the safety of the community.

16 EMERGENCY/FIRE PREVENTION AND PROTECTION

SUBJECT	REQUIREMENT
Fire Extinguishing Equipment Stores * Flammable Store * Fuel Storage Tank/s	Fire Risks Identified and on record Fire Extinguishing Equipment available for: * Offices * General Stores * Flammable Store * Fuel Storage Tank/s * Gas Welding / Cutting operations * Where flammable substances are being used / applied. * Construction vehicle (9kg)
Maintenance	Fire equipment serviced minimum annually/preferably 6 monthly
Location & Signs	Fire Extinguishing Equipment: * Clearly visible & Unobstructed * Sign posted including “No Smoking” / “No Naked Lights” where required. (Flammable store, Gas store, Fuel tanks etc.)

Storage Issue & Control of Flammables (incl. Gas cylinders)	Storage Area provided for flammables with suitable doors, ventilation, bund etc. Flammable store neat / tidy and no Class A combustibles. Decanting of flammable substances carried out in ignition free and adequately ventilated area. Container bonding principles applied Only sufficient quantities issued for one day's usage Special gas cylinder store/storage area. Gas Cylinders stored / used / transported upright and secured in trolley/cradle/structure and ventilated. Types of Gas Cylinders identified/stored separately Full cylinders stored separately from empty cylinders
Storage, Issue & Control of Hazardous Biological Agents Regulations (HCS)	HCS storage principles applied: products segregated Provision made for leakage/spillage containment Emergency showers/eye wash facilities provided HCS under lock & key controlled by designated person Decanted/issued in containers with information/warning labels Disposal of unwanted HCS by recognized disposal Manager

17 TOOLS

SUBJECT	REQUIREMENT
Hand Tools	Shovels / Spades / Picks: * Handles free from cracks and splinters * Handles fit securely * Working end sharp and true Hammers: * Good quality handles, no pipe or reinforcing steel handles. * Handles free from cracks and splinters Handles fit securely Chisels: * No mushroomed heads / heads chamfered * Not hardened * Cutting edge sharp and square Saws: * Teeth sharp and set correctly * Correct saw used for the job
Slings/Ropes	Must have load bearing certificates

18 TRANSPORT & MATERIALS HANDLING EQUIPMENT

SUBJECT	REQUIREMENT
Site Vehicles	All Site Vehicles, Dumpers, Bobcats, Loaders etc.; checked daily before used by driver / operator. Inventory of vehicles used/operated on site Inspection by means of a checklist / result recorded and kept with the operator/driver (inspection must be filed in the safety file every Friday before close of business). No persons riding on equipment not designed for passengers. Site speed limit posted and not exceeded. Drivers / Operators trained / licensed & in possession of a Medical Certificate of Fitness and Appointment on file on site. No unauthorized persons allowed to drive / operate equipment. No person may operate any machine on construction site who is or appears to be intoxicated (drunk or under the influence of drugs) No machines may be operated if any defaults are detected that is a risk to the driver or community. All vehicles to be fitted with orange flashings lights. Spotter to direct mobile plant on site. All vehicles must be fitted with a fire extinguisher.

19 PLANT & STORAGE YARDS SPECIFICS

SUBJECT	REQUIREMENT
Section 8(2)(1) General Machinery Regulation 2(1): Supervision of the Use & Maintenance of Machinery	Person/s with specific knowledge and experience designated to Supervise the Use & Maintenance of Machinery Critical items of Machinery identified/numbered/placed on register/inventory Inspection/maintenance schedules for abovementioned Inspections/maintenance carried out to above schedules Results recorded
General Machinery Regulation 9(2): Notices re. Operation of Machinery	Schedule D Notice posted in Work areas
Pressure Equipment Regulation 13(1)(b): Supervision of the Use & Maintenance of Vessels under Pressure (VuP)	Person/s with specific knowledge and experience designated to Supervise the Use & Maintenance of VuP's VuP's identified/numbered/placed on register/Manufacturers plate intact Inspection/maintenance schedules for abovementioned Inspections/maintenance carried out to above schedules Results recorded/Test certificates available
Lock-out Procedure	Lock-out procedure in operation
Demarcation & Color Coding	Demarcation principles applied All services, pipes, electrical installation, stop-start controls, emergency controls etc. color coded to own published or SABS standard Employees trained to identify color coding

20 WORKPLACE ENVIRONMNET, HEALTH AND HYGIENE

SUBJECT	REQUIREMENT
Lighting	Adequate lighting in places where work is being executed. Light fittings placed / installed causing no irritating/blinding glare. Plugs must be fitted with waterproof covering.
Ventilation	Adequate ventilation / extraction / exhausting in hazardous areas e.g. chemicals / adhesives / welding / petrol or diesel/ motors running and in confined spaces.
Noise	Tasks identified where noise exceeds 85 db(A) All reasonable steps taken to reduce noise levels at the source. Hearing protection used where noise levels could not be reduced to below 85 db(A)
Heat Stress	Measures in place to prevent heat exhaustion in heat stress problem areas e.g. steel decks, when the WBGT index reaches 30. (See Environmental Regulation 4) Cold drinking water readily available when extreme temperatures are experienced.
Ablutions	Sufficient toilets provided - 1 per 30 employees (National Building Regulations prescribe chemical toilets for Construction sites at close proximity to work location). Male and female toilets. Toilet paper available. Facilities for washing hands provided Soap available for washing hands Means of drying hands available Changing facilities / area provided. Ablution facilities hygienic and clean. Weekly cleaning of toilets by preferred service provider and records must be kept.
Eating / Cooking Facilities	Adequate storage facilities provided. Weather protected eating area provided, separate from changing area Refuse bins with lids provided. Facilities clean and hygienic.
Pollution of Environment	Measures in place to minimize dust generation. Accumulation of empty cement pockets, plastic wrapping / bags, packing materials etc. prevented. Spillage / discarding of oil, chemicals and diesel line into storm water and other drains prohibited.
Hazardous Biological Agents Regulations Hazardous Chemical Agents Regulations	All substances identified and list available e.g. acids, flammables, poisons etc. Safety Data Sheets (SDS) indicating hazardous properties and emergency procedures in case of incident on file and readily available. Substances stored safely.

Intoxication	No principal contractor/contractor shall permit any person who is or appears to be drunk or under the influence of drugs to enter or remain on construction site. If such a person's presence constitutes a threat to the safety of himself or other persons on construction site. Regular drug testing must be done for person who tested positive for drugs at the time of their medicals. At construction site no person shall have in his possession or partake in or offer any other person intoxicating liquor or drugs. Medicines listed in schedules 5,6,7,9 I the medicines and related substances control act 1965 (Act 101 of 1965).
Occupational Exposure Limit (OEL)	Limit exposure of employees to Harmful chemicals and Asbestos Dust

21 STOP-GO SECURITY

SUBJECT	REQUIREMENT
• Vehicle hi-jacking • Vehicle driver mugged/robbed. • Personal injury • Fatality • Property damage Property loss	• Restrict the number of persons at the stop and go this include hitch hikers, vendors and other selling of goods. • Clear vegetation around stops and go area to allow for improved visibility. • Provide lighting around the stop and go ensure visibility at night. • Additional fencing to be placed to restrict access • Main contractor to conduct recorded risk evaluation and mitigation measures prior to setting out of new traffic accommodation stop and go. • Traffic signs to be inspected daily. • Flagman to be present on site. • Traffic accommodation to be done as per the approved traffic accommodation plan.

ACCEPTANCE OF HEALTH AND SAFETY SPECIFICATIONS			
NAME	**DESIGNATION**	SIGNATURE	DATE
	CLIENT REPRESENTATIVE		
	PRINCIPAL CONTRACTOR		

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

PART C2.

PRICING DATA

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SECTION C2.3	DECLARATION ……..…….....	C2.3-1

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C2.1 PRICING ASSUMPTIONS

Pricing Assumptions mean the criteria as set out `below, read together with all Parts of this contract document, which it will be assumed in the contract, that the tenderer has taken into account when developing his prices.

1. This Bill of Quantities has to be read together with the Articles of the Agreement, the Conditions of Contract and Special Conditions of Contract, the Form of Tender, the General Specification, the Project Specification and the Drawings.
2. The method of measurement published by the South African Bureau of Standards in clause 8 of the Standardised Specifications for Civil EngineeringConstruction is applicable, subject to the variations and amendments contained in the section “Applicable SABS 1200 standardised specifications”.
3. General instruction and description of the Work or materials given in the Specification will not be repeated in the Bill of Quantities. It will only be referred to. References shown against items in the Bill of Quantities direct the tenderer to the applicable Conditions of Contract, Contract Data, standardised specifications, Project Specifications and tender drawings. The references are not exhaustive, and the Contract Documents shall be read as a whole.
4. The clauses in a specification in which further information regarding the schedule item appears under "Reference clause" in the Schedule. The reference clauses indicated are not necessarily the only sources of information in respect of scheduled items. Further information and specifications may be found elsewhere in the contract documents. Standardised Specifications are identified by the letter or letters which follow SABS in the SABS 1200 series of specifications, e.g. G for SABS 1200 G.
5. The quantities set out in the Bills of Quantities are the estimated quantities of the Contract Works, but the Contractor will be required to undertake whatever quantities may be directed by the Employer’s Agent from time to time. The Contract Price for the completed contract shall be computed from the actual quantities of work done, valued at the relevant unit rates and prices.
6. The prices and unit prices given in the Bill of Quantities, is all-embracing prices and it should cover the values of the different items completely and has to include all costs and expenses which may occur and for the building of the Work as described and costs and expenses that are required as well as all general liabilities, obligations and risks which forms a part of this contract. The prices should be given separate in the item(s) if special accountability, responsibilities and risks as in the above occurs.
7. A price or unit price has to be filled in against every item in the Bill of Quantities even if the amount isn’t shown. Items where no price or unit price has been filled in, will be regarded as covered by the other prices and unit prices in the Bill of Quantities. VAT shall not be included in the tendered rates and prices and shall be added only in the tender summary where provided.
8. Where an arithmetic discrepancy exists, it shall be dealt with strictly in accordance with clause C.3.9 of the Standard Conditions of Tender. No omitted rate or price shall be inserted or adjusted after tender closing except as lawfully permitted under that clause.
9. Payments will only be made for items occurring in the Bill of Quantities and if the Contractor thinks that provision hasn’t been made for some items, the item should be allowed under another item.
10. Except where rates only are required, insert all amounts to be included in the total tendered price in the "Amount" column and show the corresponding total tendered price.
11. The units of measurement described in the Bills of Quantities are metric units. Abbreviations which may be used in these Bills of Quantities are as follows:

Abbreviation	Meaning	Abbreviation	Meaning
%	per cent	MN	meganewton
ha	hectare	MN.m	meganewton-metre
h	hour	m	metre
kl	kilolitre	m^2	square metre
kg	kilogram	m^2.pass	square metre-pass
km	kilometre	mm	millimetre
kW	kilowatt	No.	number
l	litre	P C sum	Prime Cost sum
m^3	cubic metre	Prov sum	Provisional sum
m^3.km	cubic metre-kilometre	sum	lump sum
Ml	megalitre	t	ton (1000 kg)

The Employer has the right whereas any measurements and/or payments were made before the final Payment Certificate to inspect it and if it is incorrect to correct it. The Employers has the right to remove and correct any work not complying with the specification before the submission of the last Payment Certificate.

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C2.2 BILLS OF QUANTITIES

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
	SANS 1200 A	**SECTION A : PRELIMINARY AND GENERAL**				
A1	**8.3**	**FIXED-CHARGE ITEMS**				
A1.1	PSA 8.1; SANS 1200 A 8.3.1	Contractual requirements	Sum	1		
A1.2	PSA 8.1; SANS 1200 A 8.3.2.3	Establish facilities on site for Engineer as listed in PSAB 3	Sum	1		
A1.3	PSA 4; PSA 5; SANS 1200 A 8.3.2.3	Establish facilities on site for Contractor including: offices, storage sheds, workshops, living accommodation, ablution and latrine facilities, tools and equipment, water supplies, electric power, communications, setting out of Works, dealing with water and access and accommodation of traffic.	Sum	1		
A1.4	PSA 8.1; SANS 1200 A 8.3.3	Other fixed-charge obligations	Sum	1		
A1.5	PSA 8.1; SANS 1200 A 8.3.4	Remove Engineer's and Contractor's Site Establishment on completion	Sum	1		
A1.6	H&S SPEC PSA 8	Health and Safety in accordance with Client Specification				
A1.6.1	PSA 8.3.5	Compliance with OHS Act (Act 85/1993), Construction Regulations and Employer's Safety Specification	Sum	1		
A1.6.2	PSA 8.3.6	Compliance with Environmental Management Plan and Environmental Authorisation	Sum	1		
A2	**8.4**	**TIME-RELATED ITEMS**				
A2.1	PSA 8.1; SANS 1200 A 8.4.1	Contractual requirements	Month	11		
A2.2	482	Operate and maintain facilities on the Site for duration of construction except where otherwise stated				
A2.2.1	PSA 8.1; SANS 1200 A 8.4.2.1	Facilities for Engineer as for item A1.2, plus survey assistants and materials	Month	11		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
A2.2.2	PSA 8.1; SANS 1200 A 8.4.2.2	Facilities for Contractor as for item A1.3	Month	11		
A2.3	PSA 8.1; SANS 1200 A 8.4.3	Supervision for duration of construction	Month	11		
A2.4	PSA 8.1; SANS 1200 A 8.4.4	Company and head office overhead costs for the duration of the contract	Month	11		
A2.5	PSA 8.1; SANS 1200 A 8.4.5	Other time-related obligations (specify)	Month	11		
A2.6	PSA 8.4.6	Compliance with OHS Act - time-related charge	Month	11		
A2.7	PSA 8.4.7	Compliance with the Environmental Management Plan - time-related charge	Month	11		
A2.8	PSA 8.1	Transportation for the Engineer for the duration of construction	Month	11		
A2.8.1	PSA 8.1	Contractor's cost and profit on Item A2.8 (State quantity based on Item A2.8, and % and extend as an amount)	%	0		
A2.9	PSA 8.1; SANS 1200 A 8.4.2.1	Accommodation for the Engineer for the duration of the construction	Provisional Sum	1	**330,000.00**	330,000.00
A2.9.1	PSA 8.1	Contractor's cost and profit on Item A2.9 (State quantity based on Item A2.9, and % and extend as an amount)	%	330,000		
A2.10	PSA 8.1; SANS 1200 A SANS 1200 AB	Electronic equipment for the Engineer for the duration of the Contract	Month	11		
A2.10.1	PSA 8.1	Contractor's cost and profit on Item A2.10 (State quantity based on Item A2.10, and % and extend as an amount)	%	0		
A2.11	PSA 8.1; SANS 1200 A SANS 1200 AB	Telephone calls and faxes in excess of R2 000 and computer paper, printing cartridges and photocopy paper to be paid by the Employer	Provisional Sum	1	**10,000.00**	10,000.00
A2.11.1	PSA 8.1	Commission on Item A2.11 (State % and extend as an amount)	%	10,000		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
A3	**8.7**	**DAYWORK (Provisional)**				
A3.1		Labour				
A3.1.1	PSA 8.1	Skilled labour	Provisional Sum	1	**10,000.00**	10,000.00
A3.1.2	PSA 8.1	Semi-skilled labour	Provisional Sum	1	**10,000.00**	10,000.00
A3.1.3	PSA 8.1	Unskilled labour	Provisional Sum	1	**150,000.00**	150,000.00
A3.1.4	PSA 8.1	Percentage mark-up on Items A3.1.1 to A3.1.3	%	170,000		
A3.2		Materials				
A3.2.1	PSA 8.1	Allow for net cost of goods or materials actually used	Provisional Sum	1	**150,000.00**	150,000.00
A3.2.2	PSA 8.1	Percentage mark-up on Item A3.2.1 (State % and extend as an amount)	%	150,000		
A3.3		Contractor's own plant on Site				
A3.3.1	PSA 8.1	Allow for all-inclusive cost of using Contractor's own plant on Site	Provisional Sum	1	**50,000.00**	50,000.00
A3.4		Plant hired by Contractor				
A3.4.1	PSA 8.1	Allow for net cost of hired plant	Provisional Sum	1	**50,000.00**	50,000.00
A3.4.2	PSA 8.1	Percentage mark-up on Item A3.4.1 (State % and extend as an amount)	%	50,000		
A4	**8.8**	**TEMPORARY WORKS**				
A4.1	PSA 8.1	Main access road to works: Maintain access road to acceptable standards during construction.	Sum	1		
A4.2	PSA 8.1	Excavation by hand in all materials to expose services	m³	1		
A5	**8.8.5**	**LAND SURVEYING**				
A5.1	PSA 5	Locate existing pegs and set-out new benchmarks	Provisional Sum	1	**42,000.00**	42,000.00
A5.2	PSA 5	Survey and Setting Out as per PSA 5.2	Sum	1		
A5.3	PSA 5.8	Complete As-Built Survey	Sum	1		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
A6	**8.5**	**TRAINING**				
A6.1	PSA 8.5.1	Accredited process-controller training for three municipal nominees, including course fees, assessment, learning material, travel and accommodation allowance	Provisional Sum	1	**180,000.00**	180,000.00
A6.2	PSA 8.5.2	Contractor's overheads, charges and profit on Item A6.1 (state percentage and extend as an amount)	%	180,000		
A7	**8.5**	**PROJECT STEERING COMMITTEE**				
A7.1	PSA 12.3	Remuneration of Committee Members and Liaison Officer	Provisional Sum	1	**137,500.00**	137,500.00
A7.2	PSA 12.3.1	Contractor's overheads, charges and profit on Item A7.1	%	137,500		
A8	**8.3**	**PROJECT NAME BOARD**				
A8.1	PSA 8.1	Name Board as per drawing MSD114-013	Sum	1		
A9	**PSA 12**	**PROVISIONAL SUMS AND PROJECT-SPECIFIC ALLOWANCES**				
A9.1	PSA 12.10	Provisional Sum for specialist locating and identification of existing services	Provisional Sum	1	**50,000.00**	50,000.00
A9.2	PSA 12.10.1	Contractor's overheads, charges and profit on Item A9.1	%	50,000		
A9.3	PSA 12.11	Provisional Sum for instructed relocation of existing services by approved specialists	Provisional Sum	1	**50,000.00**	50,000.00
A9.4	PSA 12.11.1	Contractor's overheads, charges and profit on Item A9.3	%	50,000		
A9.5	PSA 12.12	Provisional Sum for independent or additional specialist services not measured elsewhere	Provisional Sum	1	**100,000.00**	100,000.00
A9.6	PSA 12.12.1	Contractor's overheads, charges and profit on Item A9.5	%	100,000		
A9.7	PSA 12.13	Provisional Sum for one new nominal 18 000 L municipal water-bowser truck and three new 2 500 L braked Pella WWTW water-bowser trailers, complete with specified hoses, pumps, fittings, GPS tracking, immobilisation/security and asset marking to PS-OM 4	Provisional Sum	1	**1,800,000.00**	1,800,000.00
A9.8	PSA 12.13.1	Contractor's overheads, charges and profit on Item A9.7 (state percentage and extend as an amount)	%	1,800,000		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
A9.9	PSA 12.14	Provisional Sum for Pella WWTW site assets comprising two 80 mm trash-pump packages and two 5.5 kW mobile generators, and municipal mobile assets comprising one 14 kVA wheel-mounted petrol generator and four approximately 4.8 hp clean-water-pump packages, complete with all specified hoses, cables, fittings, spares, security and asset marking to PS-OM 3	Provisional Sum	1	**300,000.00**	300,000.00
A9.10	PSA 12.14.1	Contractor's overheads, charges and profit on Item A9.9 (state percentage and extend as an amount)	%	300,000		
A9.11	PSA 12.15	Provisional Sum for one new 6 000 L stainless-steel municipal vacuum tanker (honey sucker), complete with suction hoses, wash-down system, fittings, safety devices, GPS tracker, immobiliser, durable asset marking, registration, commissioning and training to PS-OM 5	Provisional Sum	1	**1,500,000.00**	1,500,000.00
A9.12	PSA 12.15.1	Contractor's overheads, charges and profit on Item A9.11 (state percentage and extend as an amount)	%	1,500,000		
A9.13	PSA 12.16	Provisional Sum for operational PPE, gas monitoring, certified confined-space davit/anchor sockets, tripod and rescue equipment, entry/rescue procedure, rescue drill and training for three process controllers, self-contained emergency eyewash/drench unit, first-aid, spill response, field monitoring, hygiene and initial safety consumables to PS-OM 6	Provisional Sum	1	**350,000.00**	350,000.00
A9.14	PSA 12.16.1	Contractor's overheads, charges and profit on Item A9.13 (state percentage and extend as an amount)	%	350,000		
A9.15	PSA 8.3.7	Prepare, implement and report on the Local Economic Participation Plan	Sum	1		
		TOTAL SECTION A: Carried to Summary				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		SECTION B: ANAEROBIC PONDS, PRIMARY PONDS, MATURATION PONDS, SLUDGE-DRYING BEDS AND EARTHWORKS FOR NIGHT-SOIL RECEIVING FACILITY, OFFICE AND ABLUTION FACILITIES AND INLET WORKS *Refer to the Drawings and the project-specific specifications cited against each scheduled item.*				
B1	**PSC SANS 1200 C**	**SITE CLEARANCE**				
B1.1	PSC 8.3.1	Clear and grub the Site within the approved limits, including removal of vegetation, roots, obstructions, trees and stumps up to 1 m girth.	m²	57232		
B1.2	PSC 8.3.2	Clear, gather, load, haul within the Site and stockpile existing refuse, landfill-type material, dumped waste and garbage from within the clearing limits. Quantity is a tender allowance based on a nominal 500 mm in-situ depth.	m3	12740		
B2	**PSD SANS 1200 D**	**EARTHWORKS - EXCAVATION, FILL, DISPOSAL AND CEMENT-TREATED EMBANKMENT ZONES**				
B2.1	PSD 8.3.1	Excavate in all materials to authorised lines and levels (base item). Includes selection and loading. Hard rock extra-over is measured under B2.2; fill construction and disposal are measured separately.	m³	8466		
B2.2	PSD 8.3.2	Extra-over B2.1 for material classified and jointly recorded as hard rock before disturbance, including exposure, demonstration, breaking or approved blasting, permits, monitoring, protection and records.	m³	2093		
B2.3	PSD 8.3.3	Construct compacted fill using suitable material from excavations in layers not exceeding 150 mm, compacted to at least 95% MDD in accordance with SANS 3001-GR30, complete with processing, moisture conditioning, benching, testing and trimming.	m³	5740		
B2.4	PSD 8.3.4	Construct compacted fill using imported approved material, including source approval, royalties, all haul, processing, moisture conditioning, compaction, testing and trimming.	m³	4091		
B2.5	PSD 8.3.5	Dispose of unsuitable or surplus material within the 10 km one-way freehaul distance, including permissions, fees, haul, spreading, shaping, drainage, environmental compliance and rehabilitation.	m³	2727		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
B2.6	PSD 8.3.6	Overhaul beyond the 10 km freehaul distance, only where scheduled, instructed and eligible under PSD 5.3.	m³.km	100		
B2.7	PSD 8.3.7	Earthworks and cement-treatment trial sections complete, including plant, survey, sampling, laboratory and field testing, records, protection and removal of failed trials.	Sum	1		
B2.8	PSD 8.3.8; PSDE 5.4	Construct cement-treated embankment protection zones to both faces and the crest, including processing, mixing, water, compaction, interfaces, curing, testing, protection and final liner-support finish. Cement is measured separately under B2.9.	m³	3782		
B2.9	PSD 8.3.9; PSDE 5.4	Portland cement incorporated in accepted cement-treated zones, measured by accepted dry mass from verified delivery and calibrated application records.	t	378		
B3	**PSDE SANS 1200 DE**	**EMBANKMENTS**				
B3.1	PSDE 5.1; PSDE 7	Prepare foundations beneath pond embankments and pond bottoms by scarifying to 150 mm, moisture-conditioning and compacting to at least 95% MDD in accordance with SANS 3001-GR30.	m²	8380		
B3.2	PSDE 3; PSDE 5.4; PS-HDPE 4	Finishing of embankments and pond formations to the specified lines, levels and liner-support tolerances				
B3.2.1	PSDE 5.4; PS-HDPE 4	Cut and fill slopes	m²	6505		
B3.2.2	PSDE 5.4; PS-HDPE 4	Top of embankments	m²	3527		
B3.2.3	PSDE 5.1; PS-HDPE 4	Pond bottoms and inverts prepared to receive the geotextile and geomembrane liner system	m²	11404		
B4	**SANS 1200 G**	**CONCRETE**				
	PSG 3; PSG 4; PSG 5	Supply all materials, excavation and trimming, reinforcement, formwork, joints, curing and testing, and construct concrete work to the grades shown on the Drawings and in the Project Specification.				
B4.1	PSG 3; PSG 5.2; PSG 8.3.2	150 mm thick, 35 MPa / 19 mm reinforced-concrete lining to anaerobic ponds, complete WITH REF 245 MESH	m²	1460		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
B4.2	PSG 3; PSG 4; PSG 5.2; PSG 8.3.3	Reinforced-concrete access steps to anaerobic ponds, cast monolithically with the adjacent side-slope pour, complete with reinforcement, non-slip finish, curing and protective coating above the maximum water level; no separate joint around steps	No	2		
B4.3	PSG 3; PSG 5; PSG 8.3.1	100 mm thick, 25 MPa / 19 mm reinforced-concrete apron slabs, complete with Ref 193 mesh, prepared G5 support, 15 mm IJ with durasheet 40 and flexothane P, saw-cut PCJ with duracord, epidermix 326 and flexothane P, curing, finishing and making good; no waterstop at PCJ or IJ above full water level	m²	583		
B5	**PSG 5.2; PSG 8.3.4**	**JOINTS**				
B5.1	PSG 5.2.2; PSG 8.3.4	Extra-over Item B4.1 for watertight construction joints (COJ) in the anaerobic-pond reinforced-concrete lining at the locations shown.	m	164		
B5.2	PSG 5.2.3; PSG 8.3.4	Extra-over Item B4.1 for continuous floor-to-slope toe kicker joints (KJ) in the anaerobic-pond reinforced-concrete lining at the locations shown.	m	106		
B5.3	PSG 5.2.4; PSG 8.3.4	Extra-over Item B4.1 for saw-cut contraction joints (SCJ) in the anaerobic-pond reinforced-concrete lining at the locations shown.	m	505		
B5.4	PSG 5.2.5; PSG 8.3.4	Extra-over Item B4.1 for 20 mm wide full-depth movement joints (MJ) in the anaerobic-pond reinforced-concrete lining at the locations shown.	m	14		
B6	**PSMJ / PSDK / PS-HDPE**	**PAVING, EROSION PROTECTION AND LINER ANCILLARIES**				
B6.1	PSMJ 3; PSMJ 5; PSMJ 8.3.1	60 mm thick interlocking concrete paving complete, including approved pavers, bedding sand, jointing sand, cutting, edge restraints, compaction and making good. Pavement layers scheduled elsewhere are excluded.	m²	2497		
B6.2	PSDK 3; PSDK 5; PSDK 8.3.2	200 mm minimum-thickness light grouted stone pitching, complete with 1:4 cement:sand grout, surface preparation, footing trenches, toe and edge keys, stone, grout, curing and making good.	m²	2500		
B6.3	PS-HDPE 8.3	Geomembrane anchor trench complete, including excavation, preparation, liner placement, backfilling and compaction in accordance with the Drawings and liner installer's requirements	m	1078		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
B6.4	PS-HDPE 5	Approved slow-release vegetation-control treatment to liner-supporting surfaces, applied strictly in accordance with the accepted product data and liner compatibility requirements	m²	1350		
B7		**INLET AND OUTLET STRUCTURES (COMPLETE)**				
B7.1	PSLD; PSGA; PSG; PS-PM	**MANHOLE 02 (MH02)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
B7.2	PSLD; PSGA; PSG; PS-PM	**MANHOLE 03 (MH03)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
B7.3	PSLD; PSGA; PSG; PS-PM	**MANHOLE 04 (MH04)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
B7.4	PSLD; PSGA; PSG; PS-PM	**MANHOLE 05 (MH05)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
B7.5	PSLD; PSGA; PSG; PS-PM	**MANHOLE 06 (MH06)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
B7.6	PSLD; PSGA; PSG; PS-PM	**CHANNEL 01 (CH01)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
B7.7	PSLD; PSGA; PSG; PS-PM	**CHANNEL 02 (CH02)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
B7.8	PSDB 5; PSDB 7; PSLD 3; PSLD 5; PSG 3,4,5,7;	**OUTLET STRUCTURE (OT01)** - Construct the complete structure in accordance with Drawing No. MSD114-C-002; 009 & 010, including all excavation, foundation preparation, blinding, reinforced concrete, reinforcement, formwork, brickwork where shown, concrete benching and channels, inlet and outlet pipes, fittings, connections, seals and puddle flanges, Rectagrid grating cover, supporting frames and fixings, joints, waterproofing, backfilling, compaction, testing, cleaning, making good and everything necessary for a complete, watertight and fully functional installation.	No	1		
B8	**PS-HDPE**	**HDPE GEOMEMBRANE LINING SYSTEM** The measured liner areas include the pond floors, internal side slopes, 0.6 m top termination strips and 0.9 m anchor-trench lengths. All material overlaps, seams, weld-test strips, cutting and normal installation wastage shall be included in the applicable tendered rates and shall not be measured separately.				
B8.1	PS-HDPE 8.1	**BIDIM A5 GEOTEXTILE PROTECTION LAYER**				
B8.1.1	PS-HDPE 8.1	Facultative (primary) pond	m²	7564		
B8.1.2	PS-HDPE 8.1	Maturation pond No. 1	m²	2243		
B8.1.3	PS-HDPE 8.1	Maturation pond No. 2	m²	2243		
B8.1.4	PS-HDPE 8.1	Treated-effluent storage/irrigation pond	m²	576		
B8.1.5	PS-HDPE 8.1	Evaporation pond	m²	1406		
B8.2	PS-HDPE 8.2	**2.0 MM SINGLE-SIDE TEXTURED HDPE GEOMEMBRANE**				
B8.2.1	PS-HDPE 8.2	Facultative (primary) pond	m²	7564		
B8.2.2	PS-HDPE 8.2	Maturation pond No. 1	m²	2243		
B8.2.3	PS-HDPE 8.2	Maturation pond No. 2	m²	2243		
B8.2.4	PS-HDPE 8.2	Treated-effluent storage/irrigation pond	m²	576		
B8.2.5	PS-HDPE 8.2	Evaporation pond	m²	1406		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
B8.3	PS-HDPE 8.4	Geomembrane penetrations complete, including boots, flanges, fixings, sealing and testing	No.	11		
B8.4	PS-HDPE 8.5	Employer allowance for instructed liner repairs not attributable to the Contractor or installer	Sum	1		
B8.5	PS-HDPE 8.6	Independent CQA consultant and electrical leak-location survey complete	Sum	1		
B9		**SLUDGE DRYING-BED AND UNDERDRAINAGE**				
B9.1		Construct the complete 15 m × 50 m sludge-drying-bed facility, having a total plan area of 750 m², in accordance with the Drawings and Project Specifications. Include setting out; excavation; disposal; formation preparation; compacted fill; reinforced-concrete or specified impermeable floor; perimeter and dividing walls; foundations; reinforcement; formwork; joints and waterstops; access ramps; sludge inlet and distribution pipework; valves and fittings; geotextile separator; specified sand and graded gravel filter layers; perforated underdrain pipes; filtrate collection pipework, sumps and chambers; connection to the filtrate-return system; drainage; finishes; testing; cleaning; commissioning; and all labour, plant and materials necessary for a complete operational installation.	Sum	1		
B10	**PSPA**	**SITE REHABILITATION**				
B10.1	PSPA 8.3.1	Topsoil spreading and grading on rehabilitation areas	m²	10000		
B10.2	PSPA 8.3.2	Hydroseeding complete with approved seed mix, mulch and tackifier	m²			Rate Only
B10.3	PSPA 8.3.3	Erosion-control blanket on slopes complete	m²			Rate Only
		TOTAL SECTION B: Carried to Summary				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		SECTION C : NIGHT SOIL, NIGHT SOIL BALANCING CHAMBER AND INLET WORKS *Refer to the Drawings and the project-specific specifications cited against each scheduled item.*				
C1	**SANS 1200 D**	**EARTHWORKS**				
C1.1	8.3.1	Site preparation:				
C1.1.1	PSD 5.1; PSD 7	Scarify to 150 mm, moisture-condition and compact foundations beneath inlet-works structures to at least 95% MDD in accordance with SANS 3001-GR30	m²	83		
C1.1.2	PSD 5.2; PSD 8.3.4	Imported approved fill for inlet-works and building terraces, placed in layers not exceeding 150 mm and compacted to at least 95% MDD in accordance with SANS 3001-GR30	m³	25		
C1.2	PSD 8.3.1	Hand excavation:				
C1.2.1	PSD 8.3.1; PSD 8.3.11; PSAH 4	Extra-over authorised excavation measured under PSD 8.3.1 for excavation by hand around the grit channel, special manholes, structures and services	m³	50		
C2	**1200 G**	**CONCRETE**				
C2.1	8.2 SDG8-4	Scheduled formwork items:				
C2.1.1	PSG 4; PSG 5	Smooth for vertical internal and external walls	m²	165		
C2.2	8.3 SDG8-1	Scheduled reinforcement items:				
C2.2.1	PSG 4	High-tensile welded mesh (Ref No. 245)	m²	160		
C2.3	8.4 SDG8-2	Scheduled concrete items:				
C2.3.1	PSG 3; PSG 5.1	Blinding concrete, 15 MPa / 19 mm, 50 mm thick, under inlet works	m²	83		
C2.3.2	PSG 3; PSG 5.2	Strength concrete, 35 MPa / 19 mm, for the floor and walls of the night soil, night soil chamber and inlet works and all benching complete	m³	27		
C2.4	PSG 5	Wood-floated finish to walkway slab and floor slab around grit channel	m²	45		
C2.5	PSG 5	Steel-floated finish to top of walls and floor of grit channel	m²	25		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
C2.6	PSG 5.2	Joints:				
C2.6.1	PSG 5.2.2; PSG 8.3.4	Watertight construction joints (**COJ**) in the inlet works at the locations shown: continuous centrally placed a.b.e. durajoint PVC dumbbell 150 in 150 mm walls or dumbbell 200 in 200 mm walls, and external C150 or C200 in base slabs of corresponding thickness. Include stop ends; reinforcement continuous through the joint; wet-face seal comprising epidermix 326, duracord and flexothane P or G as applicable; factory-made intersections; approved straight butt welds; trial welds; fixing, protection, inspection and making good.	m	8		
C2.6.2	PSG 5.2.3; PSG 8.3.4	Watertight kicker joints (**KJ**) between inlet-works kickers and subsequent wall pours at the locations shown. Include stop ends; reinforcement continuous through the joint; continuous centrally placed a.b.e. durajoint PVC dumbbell 150 in 150 mm walls or dumbbell 200 in 200 mm walls; wet-face seal comprising epidermix 326, duracord and flexothane G; factory-made intersections; approved straight butt welds; trial welds; fixing, protection, inspection and making good.	m	100		
C2.6.3	PSG 5.2.5; PSG 8.3.4	Saw-cut contraction joints (**SCJ**) shown in the liquid-retaining concrete of the night-soil balancing chamber and inlet works, including early saw cutting, routing, duracord, epidermix 326 and flexothane P/G wet-face seal; no embedded waterstop, filler or grout	m	20		
C2.6.4	PSG 5.2.5; PSG 8.3.4	20 mm wide full-depth watertight movement joints (**MJ)** in the inlet works at the locations shown. Include termination of reinforcement 50 mm clear of each joint face; a.b.e. durasheet 100 compressible filler; continuous external E150 or E200 waterstop in base slabs and centrally placed centre-bulb 150 or 200 waterstop in walls of corresponding thickness; factory-made transitions and intersections; bond-breaking backing; applicable primer; flexothane P or G wet-face seal; fixing, protection, inspection and making good.	m	12		
C2.6.5	PSG 5.2.5; PSG 8.3.4	Watertight pipe-penetration joints (**PPJ**) shown at the night-soil balancing chamber and inlet-works inlet/outlet manhole, including puddle flange or approved proprietary sealing system, non-shrink grout, reinforcement trimming, sealing and making good, complete	No	5		
C2.6.6	PSG 5.2.5; PSG 8.3.4	Non-retaining isolation joints (**IJ**) around the night-soil balancing chamber and inlet-works perimeter where shown, including approved compressible filler, bond breaker, backing cord, primer and flexible sealant, complete	m	65		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
C3		**MISCELLANEOUS**				
C3.1	PSHA 8.1	1 000 mm high hot-dip-galvanised ball-and-tube interlinked handrail system around the inlet-works perimeter, complete with midrail, toe-board where required, gates, fixings and making good	m	45		
C3.2	PSHA 8.2	UV- and chemical-resistant non-slip GRP grating, 38 x 38 x 25 mm, cut to suit the night-soil disposal slab manhole and balancing-tank openings, in removable sections not exceeding 1.22 m, including designed supports and SS316 clips	m²	25		
C3.5	PS-PM 8.1	Coarse 3CR12 screen or grid assembly complete, as shown on Drawing MSD014-C-006	No	1		
C3.6	PS-PM 8.3	Supply, store and install removable HDPE hand sluice complete at grit channels, as detailed. Include UV-stabilised HDPE panel, recessed lifting handhold, replaceable conveyor-belt or EPDM side and bottom seals, fitting, testing and all incidental work. Concrete recesses are included under the relevant concrete channel works.	No	4		
C3.7	PS-PM 8.4	Supply, store and install removable HDPE hand sluice complete at manholes and channels, as detailed. Include UV-stabilised HDPE panel, recessed lifting handhold, replaceable conveyor-belt or EPDM side and bottom seals, fitting, testing and all incidental work. Concrete recesses are included under the relevant concrete and benching works.	No	10		
C3.8	PS-PM 8.5; PSG 5	Supply, install and commission one standard full 3-inch (76 mm throat) corrosion-resistant Parshall flume in the 400 mm common channel downstream of the inlet-works channel recombination, approximately 2.0 m downstream of the transition, including standard geometry, concrete infill, anchorage, transitions, seals, staff gauge, datum benchmark, hydraulic verification and making good	No	1		
C3.8.1	PS-PM 8.5.1	Low-power inlet flow-measurement system complete: IP68 non-contact 80 GHz radar sensor mounted at the certified Ha point; totaliser/data logger; 15-minute or shorter records; daily and cumulative totals; minimum 12-month storage; staff-gauge commissioning check; lockable anti-tamper mounting and enclosure; buried armoured cable to the secure electrical room; 24 V DC battery-backed supply and charger for minimum 14-day autonomy; surge protection; calibration certificate, software, O&M manuals and training	No	1		
C3.9	PS-PM 8.6	Flow-splitting weirs and adjustable control components complete	Sum	1		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
C3.10	PS-PM 8.7	Provisional Sum for Pella WWTW O&M tools, monitoring aids, vegetation-control equipment and initial spares: four 80 L industrial wheelie bins; four galvanised screen hand-rakes; four galvanised spades; four galvanised shovels; four galvanised steel rakes; four corrosion-protected industrial wheelbarrows; lockable tool chest; two heavy-duty petrol brush cutters; two pond scum/skimmer nets; two Imhoff cones with stands; Secchi disc; manual rain gauge; pond staff-gauge boards; sludge sampler; sampling pole; two sample coolers; lockable sample/consumables cabinet; and initial hoses, couplings, clamps, pump seals, spark plugs, filters, pull cords and service kits to PS-OM 2	Provisional Sum	1	**175,000.00**	175,000.00
C3.10.1	PS-PM 8.7.1	Contractor's overheads, charges and profit on Item C3.10 (state percentage and extend as an amount)	%	175,000		
C3.11	PS-PM 8.11	Process pipe supports, brackets, anchors and fasteners complete	Sum	1		
		TOTAL SECTION C: Carried to Summary				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		SECTION D: OFFICE AND ABLUTION FACILITIES *Refer to the Drawings and the project-specific specifications cited against each scheduled item. See Drawings MSD114-C-016 and MSD114-C-017.*				
D1	**SANS PS-BLD**	**BUILDING, DEDICATED SITE POWER AND EXTERNAL BUILDING SEWER**				
D1.1	PS-BLD 8.10	Provisional Sum for the complete office and ablution facilities in accordance with Drawings MSD114-C-016 and MSD114-C-017, including building work, finishes, sanitary fittings, internal plumbing and drainage, testing and handover. The elevated water-tank/wash-down system under D2.1, dedicated generator and generator-fed electrical installation under D1.3, and external gravity sewer under D1.4 are excluded. Solar water geyser is included.	Provisional Sum	1	**1,200,000.00**	1,200,000.00
D1.1.1	PS-BLD 8.10.1	Contractor's overheads, charges and profit on the Provisional Sum under Item D1.1	%	1200000		
D1.2	PS-BLD 8.11	Provisional Sum for operator office furniture and records equipment: two robust desks, three adjustable office chairs, meeting/work table with four chairs, two lockable steel filing cabinets, lockable plan/O&M manual cabinet, shelving, noticeboard, whiteboard, waste bins and lockable equipment cabinet	Provisional Sum	1	**100,000.00**	100,000.00
D1.2.1	PS-BLD 8.11.1	Contractor’s overheads, charges and profit on Item D1.2 (state percentage and extend as an amount)	%	100000		
D1.3	PS-BLD 8.12	Dedicated fixed nominal 6 kVA diesel site generator (minimum 5 kVA continuous) in reinforced, lockable and ventilated generator room/enclosure, complete with external exhaust, integral-tank bunding, earthing, changeover/isolator, protected DB, surge and earth-leakage protection, generator-fed internal and entrance LED lighting, maintenance socket, armoured cabling, fire extinguisher, signage, anti-theft work, testing, load test, commissioning and electrical CoC	Sum	1		
D1.4	PS-BLD 8.13	Gravity sewer from the operator office/ablution building to the inlet works upstream of screening, complete with survey and hydraulic-grade verification, minimum 110 mm uPVC sewer, excavation, bedding, backfilling, cleanouts/manholes, connection, watertight and flow testing, making good and as-built levels; no existing municipal sewer reticulation is available	Sum	1		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
D2	**PS-BLD 8.9**	**ELEVATED POTABLE-WATER STORAGE SYSTEM**				
D2.1	PS-BLD 8.9	Design, supply and install a 3 m high elevated tank stand with two 5,000 litre JoJo-type potable-water storage tanks, including foundations, certified stand, restraints, interconnecting pipework, valves, overflow and drains, and two gravity-fed wash-down points: one at the inlet/night-soil works and one at the sludge-drying-bed/operations area, complete with minimum 25 mm distribution pipework, isolation and backflow protection, two 30 m heavy-duty hoses, adjustable nozzles, lockable hose storage, corrosion protection, testing and commissioning; no booster pump required	Sum	1		
		TOTAL SECTION D: Carried to Summary				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		SECTION E: EXTERNAL WATER, SEWER AND PROCESS PIPEWORK *Refer to the Drawings and the project-specific specifications cited against each scheduled item.*				
E1	SANS **PSC; PSDB**	**SITE CLEARANCE**				
E1.1	PSC 5; PSC 8.3.3	Clear vegetation along a 1.5 m wide strip	m			Rate Only
E2	**PSDB 5; PSDB 8**	**EXCAVATION - "MECHANICAL":**				
E2.1	SANS 1200 DB 8.3.2; PSDB 3.5; PSDB 5	Pipes up to 300 mm dia for depths:				
		Over and Up to				
E2.1.1		0,0 m 1,0 m	m	275		
E2.1.2		1,0 m 2,0 m	m			Rate Only
E2.2		Extra over Items E2.1 for:				
E2.2.1		Extra-over trench excavation for material classified and recorded as hard rock	m3			Rate Only
E2.3	SANS 1200 DB 8.3; PSDB 5	Extra excavation in all materials to provide working space around structures	m3	10		
E3	**PSDB 5; PSDB 8**	**EXCAVATION ANCILLARIES - "MECHANICAL"**				
E3.1	SANS 1200 DB 8.3.3;	Make up deficiency in backfill material:				
E3.1.1	SANS 1200 DB 8.3.3.1;	From other necessary excavations on Site	m3	5		
E3.1.2	SANS 1200 DB 8.3.3.2	By importation from designated borrow pits	m3			Rate Only
E3.2		Provision of bedding from:				
E3.2.1	SANS 1200 LB 8.2.2.1	Provision of bedding material from trench excavations				
E3.2.1.1	PSLB 3; PSLB 5; PSDB 5	Selected fill material	m3	220		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
E3.3	PSD 8.3.11; PSDB 5	Hand excavation where ordered by the Engineer	m3	5		
E3.4	SANS 1200 DB 8.3; PSD 5.3; PSDB 5	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m3			Rate Only
E4		**PIPEWORK**				
	PSLD 3; PSLD 5; PSLD 8	Supply, lay, joint, test and bed pipes complete with sleeve couplings and including disinfection:				
E4.1	PSL 3; PSL 5; PSL 7	HDPE CLASS 10				
E4.1.1		50mm dia	m	185		
E4.1.2		250mm dia	m	15		
E4.1	PSL 3; PSL 5; PSL 7	250MM PCV-U CLASS 9				
E4.1.1		250mm dia	m	90		
E5		**FITTINGS**				
		Supplying, installing, bedding and testing of the following fittings complete (incl. cutting of pipes, labour and transport):				
E5.1		Bends for:				
E5.1.1	PS-PM 8.16	a) 50 mm	No	5		
E5.1.2	PS-PM 8.16	b) 250 mm	No	2		
E5.2		Tee for:				
E5.2.1	PS-PM 8.16	a) 50 mm	No	5		
E5.2.2	PS-PM 8.16	b) 250 mm	No	2		
E5.3	PS-PM 8.16	EPDM puddle flange, suitable for 250 mm pipe od, secured with grade 316 stainless-steel clamping bands and cast centrally into the concrete wall				
E5.3.1	PS-PM 8.16	a) 250 mm	No	18		
E6	**PSDB / PSLB**	**SPECIAL TRENCH BACKFILL AND FOUNDATION ITEMS - RATE ONLY**				
E6.1	PSDB 8.3.1	Extra-over for cement-treated granular main backfill above the selected-fill zone	m³	20		
E6.2	PSDB 8.3.2	Flowable soilcrete backfill, where instructed	m³			Rate Only
E6.3	PSLB 8.2.6	Bedding stabilised with 5% cement, where instructed	m³			Rate Only
E6.4	PSLB 8.2.7	Geotextile wrapping around bedding, Bidim A4/U24 or approved equivalent	m²	10		
E6.5	PSLB 8.2.8	450 mm hard-fill pioneer layer at trench bottom, compacted until settlement is less than 10 mm	m²			Rate Only
		TOTAL SECTION E: Carried to Summary				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R
		SECTION F: CONCRETE PALISADE FENCE AND SLIDING GATES *Refer to Drawing MSD114-C-011 and PS-FEN.*				
F1	**PS-FEN**	**FENCING, GATES AND SECURITY**				
F1.1	PS-FEN 8.1	1.8 m high prestressed precast concrete palisade fence complete, comprising 2 400 x 225 x 140 mm posts tapered from 140 mm to 80 mm and provided with two rail slots, installed at 2 000 mm maximum centres; two 2 000 x 80 x 150 mm prestressed rails per panel with 10 mm diameter holes for galvanized carriage bolts; nine 1 770 x 75 x 100 mm prestressed pales per panel, tapered from 100 mm to 80 mm and installed at 200 mm maximum centres; 600 x 600 x 600 mm Class 20/19 concrete post foundations; continuous 200 x 300 mm Class 20/19 concrete ground beam; all galvanized fixings, specialist shop details and making good	m	1,023		
F1.2	PS-FEN 8.2	500 mm galvanized razor-wire flat-wrap topping complete, including 600 mm long 30 x 30 x 3 mm angle supports welded to 130 x 50 x 3 mm flat bars, fixing to top rails, clips, laps and corrosion-protection repairs	m	950		
F1.3	PS-FEN 8.3	Sliding vehicle security gate complete, size and configuration as shown on the Drawings, including gate, frame and infill, guide and support posts, track and rollers, foundations, stops, anti-lift devices, lockset, galvanized fittings, adjustment and commissioning	No	2		
F1.4	PS-FEN 8.4	Complete corrosion-resistant safety signage system to the approved schedule, including NO ENTRY / AUTHORISED PERSONNEL ONLY, DANGER: DEEP WATER, DROWNING HAZARD, PPE, NO SMOKING and emergency-contact signs; tamper-resistant fixings, earth bonding and coating repairs	Sum	1		
F1.5	PS-FEN 8.5	Lockable anti-theft pond-rescue station complete with SOLAS/SANS-recognised lifebuoy, minimum 30 m floating rescue line and weatherproof cabinet; provide two stations at each anaerobic pond and two shared 4.5 m non-conductive rescue poles	No.	4		
		TOTAL SECTION F: Carried to Summary				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		SECTION G: SOLAR ELECTRICAL WORK, COMMISSIONING AND HANDOVER *Refer to PS-EL, PS-COM and the Drawings.*				
G1	**PS-EL**	**SOLAR AREA LIGHTING**				
G1.1	PS-EL 8.1	BEKA Schréder SOLARFLOOD-ECO integrated solar LED flood-light, or approved equal, complete with panel, luminaire, LiFePO4 battery, controller, internal cabling, tamper-resistant fasteners, earthing, aiming, commissioning and minimum five-night autonomy	No.	3		
G1.2	PS-EL 8.2	6.0 m above-ground hot-dip-galvanised steel solar-light pole, nominal 168.3 mm OD x 4.5 mm wall minimum or accepted equal, lower 3.0 m concrete/grout filled, 1.0 m high conical anti-climb shroud starting at least 2.4 m above ground, internal cabling, reinforced-concrete foundation and structural certification	No.	3		
G1.3	PS-EL 8.3	Photometric and structural design submissions complete	Sum	1		
G1.4	PS-EL 8.4	Testing, commissioning, certification and handover of solar-lighting system	Sum	1		
G2	**PS-COM**	**INTEGRATED TESTING, COMMISSIONING AND HANDOVER**				
G2.1	PS-COM 8.1	Integrated commissioning plan	Sum	1		
G2.2	PS-COM 8.2	Completion inspections, snagging and close-out	Sum	1		
G2.3	PS-COM 8.3	Integrated dry commissioning	Sum	1		
G2.4	PS-COM 8.4	Controlled clean-water filling, hydraulic verification and staged wastewater introduction	Sum	1		
G2.4.1	PS-COM 8.4.1	Provisional Sum for approved clean-water purchase and external cartage instructed for concrete water-retention tests and minimum hydraulic commissioning; test structures sequentially and reuse water; excludes full clean-water filling of HDPE-lined ponds	Provisional Sum	1	**350,000.00**	350,000.00
G2.4.2	PS-COM 8.4.2	Contractor’s overheads, charges and profit on Item G2.4.1 (state percentage and extend as an amount)	%	350,000		
		Carried forward / …				

PELLA WWTW – BILL OF QUANTITIES

Item No	Payment Clause	Short Description	Unit	Quantity	Rate	Amount R c
		Brought forward / …				
G2.5	PS-COM 8.5	As-built, operating, quality-dossier and close-out information	Sum	1		
G2.6	PS-COM 8.6	Clean-water retention and drainage-function testing	Sum	1		
G2.7	PS-COM 8.7	Provisional Sum for instructed effluent sampling and laboratory analysis	Provisional Sum	1	**200,000.00**	200,000.00
G2.7.1	PS-COM 8.7.1	Contractor's overheads, charges and profit on Item G2.7	%	200,000		
G2.8	PS-COM 8.8	Operator training and practical demonstrations	Sum	1	**25,000.00**	25,000.00
G2.9	PS-COM 8.9	Permanent, safely accessible and labelled sampling points: one screened-influent point downstream of screening and one final-effluent point before reuse/discharge, complete with corrosion- and UV-resistant fittings, secure caps/valves, brackets, drain/flush provisions, signs, making good and as-built locations	No.	2		
		TOTAL SECTION G: Carried to Summary				

PELLA WWTW – TENDER BOQ SUMMARY

SECTION	DESCRIPTION	R	AMOUNT
SECTION A	PRELIMINARY AND GENERAL	R	
SECTION B	SECTION B: ANAEROBIC PONDS, PRIMARY PONDS, MATURATION PONDS, SLUDGE-DRYING BEDS AND EARTHWORKS FOR NIGHT-SOIL RECEIVING FACILITY, OFFICE AND ABLUTION FACILITIES AND INLET WORKS	R	
SECTION C	NIGHT SOIL AND INLET WORKS	R	
SECTION D	OFFICE AND ABLUTION FACILITIES	R	
SECTION E	EXTERNAL WATER, SEWER AND PROCESS PIPEWORK	R	
SECTION F	CONCRETE PALISADE FENCE AND SLIDING GATES	R	
SECTION G	SOLAR ELECTRICAL WORK, COMMISSIONING AND HANDOVER	R	
TOTAL OF PRICED ITEMS		**R**	
FIXED PROVISIONAL SUM FOR CONTINGENCIES UNDER PSA 12.1 – 10%		R	
NET TOTAL OF TENDER		**R**	
VALUE ADDED TAX (15%)		R	
GROSS TOTAL OF TENDER		**R**	

Tenderer: _____ Signature: _____

Authorised representative: _____ Date: _____

Witness: _____ Date: _____

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C2.3 DECLARATION (IN RESPECT OF COMPLETENESS OF TENDER)

I/We, the undersigned, declare that the Bills of Quantities forming Part C2.2 of this Contract Document have been fully and properly priced and comprise 24 consecutively numbered pages. I/We further declare that the GROSS TOTAL OF TENDER recorded on Page 24, being the Tender BOQ Summary, corresponds with the tendered amount stated in the Form of Offer.

BID NO.: KH01-26/27 CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

SIGNATURE OF TENDERER/S

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

PART C3.

SCOPE OF WORK

Section	Description	Page No
SECTION C3.1	DESCRIPTION OF THE WORKS ……..……	C3.1-1
SECTION C3.2	ENGINEERING…….……	C3.2-1
SECTION C3.3	CONSTRUCTION ……..…….....	C3.3-1
SECTION C3.4	MANAGEMENT ……..…….....	C3.4-1
SECTION C3.5	PROJECT SPECIFICATIONS……..…….....	C3.5-1

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

3.1 DESCRIPTION OF THE WORKS

C3.1.1 General

The Works comprise the construction, testing and commissioning of the Pella Wastewater Treatment Works (WWTW), an oxidation-pond treatment system serving Pella within the Khâi-Ma Local Municipality. The Works include the complete civil, structural, building, geosynthetic, process-pipework and ancillary infrastructure required to receive, treat, store and manage municipal wastewater and night-soil flows safely and reliably.

The Contractor shall execute and complete the Works in accordance with the Contract, the drawings, the Bill of Quantities, these specifications, the Employer's Agent's instructions and all applicable statutory requirements. The Works shall be complete and fit for their intended purpose notwithstanding that every minor component, fitting or operation required for a complete installation may not be described individually.

Tenderers shall use the compulsory clarification meeting and site inspection to satisfy themselves regarding the Site, access, haul distances, material sources, disposal areas, climatic exposure, services, ground conditions, water and power availability, environmental constraints, local logistics and all other matters that may affect the tender. Failure to inspect or to make reasonable enquiries does not relieve the Contractor of obligations that could reasonably have been anticipated.

Site information is provided in good faith for use with the Contract Documents. It does not constitute a warranty that conditions are uniform or that every physical feature has been identified. The allocation of risk for physical conditions, discrepancies and instructions remains as stated in GCC 2015 and the Contract Data.

Contract completeness: Tendered rates and prices shall include all labour, supervision, plant, temporary works, materials, transport, testing, quality records, protection, commissioning and incidentals necessary to deliver the Works, except where the Bill of Quantities expressly provides a separate item.

C3.1.2 Process arrangement

Wastewater will enter the new inlet works, where screening, grit management, flow measurement and controlled distribution will take place. Night soil will be received at the dedicated disposal area and introduced under controlled conditions. Flow will pass through two anaerobic ponds, one primary facultative pond and two secondary maturation ponds before entering the treated-effluent storage pond. Sludge handling will be provided through drying beds and a composting area. The process arrangement, levels, pipework and operating controls shall be as shown on the drawings.

C3.1.3 Scope of Contract

The scope includes, but is not limited to, the following:

- site establishment, construction access, survey control, setting out, clearing and preparation of the Site;
- bulk excavation, cut-to-fill operations, foundation preparation, engineered pond embankments, layerworks and final trimming;
- one inlet works incorporating the required channels, screening, grit handling, flow-control and flow-measurement facilities, together with a dedicated night-soil disposal area and shelter;
- two reinforced-concrete-lined anaerobic ponds, including inlet and outlet structures, joints, waterstops and associated pipework;
- one primary facultative pond and two secondary maturation ponds lined with 2.0 mm HDPE geomembrane and protective geotextile as specified and shown;
- one treated-effluent storage pond, including the specified lining system, inlet, outlet, overflow and drainage arrangements;
- one evaporation pond, including the specified lining system;
- interconnecting gravity pipelines, fittings, chambers, valves, sluices, penetrations, supports and marker systems;
- sludge drying beds, underdrainage, filtrate return arrangements, composting area and associated hardstanding;
- stormwater diversion, collection and discharge measures, including channels, berms, culverts and 200 mm light grouted stone pitching where shown;
- gravel access roads, internal circulation, turning areas and road drainage;
- an operator’s facility comprising an office, store, change room and ablutions, complete with finishes, plumbing, drainage and fittings;
- solar-powered security/flood lighting complete with foundations, poles, batteries, controls and protection;
- 1.8 m high concrete palisade fencing, gates and all associated posts, stays and concrete footings;
- two 5 000 litre water tanks installed on 3 m high support stands, including foundations, pipework, valves and fittings;
- project name board, safety signage, pipeline markers and permanent identification;
- environmental protection, dust control, erosion control, rehabilitation and final site clearance; and
- testing, commissioning, operator training, performance demonstration, defects correction, as-built information, operating and maintenance manuals, and handover of the complete facility.

C3.1.4 Contract period

The Time for Completion is eleven (11) calendar months from the Commencement Date. The Contractor shall programme, resource and execute the Works continuously to achieve Completion within this period, subject only to extensions of time granted under the Contract.

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C3.2 ENGINEERING

C3.2.1 Employer's design

The permanent Works have been designed by the Employer's Agent. The Contractor remains responsible for interpreting the Contract Documents correctly, verifying dimensions and levels before construction, coordinating the various work packages, and constructing the Works in accordance with the approved information.

C3.2.2 Drawings issued with the tender

The following drawings are issued with the tender and form part of the Contract. The latest revision issued by the Employer's Agent shall apply.

DRAWING NUMBER	DRAWING TITLE
MSD114-C-001	LOCALITY PLAN AND LIST OF DRAWINGS
MSD114-C-002	SITE LAYOUT PLAN
MSD114-C-003	TYPICAL SECTIONS
MSD114-C-004	SURFACING LAYOUT AND CROSS SECTIONS OF PONDS
MSD114-C-005	NIGHTSOIL DISPOSAL AREA & INLET WORKS: LAYOUT
MSD114-C-006	NIGHTSOIL DISPOSAL AREA & INLET WORKS: DETAILS
MSD114-C-007	DETAILS OF INLET WORKS & SHELTER BUILDING
MSD114-C-008	DETAIL OF ANAEROBIC PONDS
MSD114-C-009	DETAIL OF INLET & OUTLET STRUCTURES
MSD114-C-010	GENERAL LAYOUT - INLETS, INTERCONNECTIONS, OUTLETS AND DRYING BEDS
MSD114-C-011	TYPICAL DETAIL: CONCRETE PALISADE FENCE
MSD114-C-012	TYPICAL DETAILS: MISCELLANEOUS
MSD114-C-013	NAME BOARD DETAIL
MSD114-C-014	CONCRETE NOTES, TYPICAL ROAD CROSSING DETAIL, PIPE LINE MARKER
MSD114-C-015	MISCELLANEOUS
MSD114-C-016	PLAN AND SECTIONS: SHELTER BUILDING, STOREROOM AND ABLUTION
MSD114-C-017	ELEVATIONS: SHELTER BUILDING, STOREROOM AND ABLUTION

C3.2.3 Contractor's Engineering responsibilities

- design, certification and monitoring of all temporary works, including excavations, shoring, formwork, falsework, access platforms, temporary drainage, dewatering and lifting arrangements;
- working drawings, shop drawings, bending schedules, fabrication details, pipe-spool drawings, penetration schedules, liner deployment drawings and method statements;
- verification of existing ground levels, benchmarks, control points, tie-in positions, invert levels and dimensions before ordering or fabrication;
- coordination of civil, structural, building, pipework, geosynthetic, solar-lighting and ancillary elements;
- selection and design of proprietary items where performance requirements are specified; and
- submission of calculations and certificates signed by appropriately registered competent persons where required by law or the Contract.

The Employer's Agent's review, acceptance or comment does not relieve the Contractor of responsibility for dimensions, coordination, temporary works, construction methods, safety or compliance with the Contract.

C3.2.4 Discrepancies and dimensions

The Contractor shall not scale dimensions from drawings. Figured dimensions and stated levels govern. Any discrepancy, ambiguity, omission or conflict shall be referred to the Employer's Agent in writing before the affected work is executed or materials are ordered. Work performed without clarification is at the Contractor’s risk.

C3.2.5 As-built information

The Contractor shall maintain a marked-up as-built set on Site throughout construction. Surveyed coordinates and levels shall be recorded for all buried pipes, valves, chambers, structures, liner anchor trenches, pond floors, embankment crests, road crossings and drainage works before covering. At handover the Contractor shall provide the final record drawings in editable electronic format and PDF, together with survey data, photographs, test results, material certificates and asset information required by the Employer.

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C3.3 CONSTRUCTION

C3.3.1 Applicable standard specifications

The SANS 1200 Standardised Specifications for Civil Engineering Construction listed below apply to the extent relevant to the Works, subject to the variations and additions in this Project Specification. References to SABS specifications shall be read as references to the corresponding SANS publication where superseded. The latest edition and amendments effective at the tender closing date shall apply unless the Contract states otherwise.

Other standards referenced in the drawings, Bill of Quantities, manufacturer's requirements or this Project Specification also apply. Where requirements conflict, the order of precedence stated in C1.2 of the Contract applies; otherwise the more stringent requirement shall be referred to the Employer's Agent for determination.

C3.3.2 General project requirements

C3.3.2.1 Submissions before commencement of the Works

Before commencing any activity, the Contractor shall submit to the Employer's Agent, within the periods stated in the Contract, all applicable material data sheets, certificates, samples, proposed sources, shop drawings, method statements, inspection and test plans (ITPs), risk assessments and programme information. Approval by the Employer's Agent shall not relieve the Contractor of any obligation or responsibility under the Contract. Approval of a material source, product or method shall not be inferred from silence, previous use on another contract or inclusion in a tender submission.

C3.3.2.2 Materials and workmanship

All materials shall be new, of the specified quality and suitable for wastewater service and for the climatic, environmental and exposure conditions at Pella. Materials exposed to sunlight shall be ultraviolet-resistant or UV-stabilised, as applicable. Products in contact with wastewater, sludge or treated effluent shall be resistant to corrosion, chemical action and biological attack. Unless otherwise specified, materials and workmanship shall comply with the relevant SANS 1200 standard specifications, the applicable South African National Standards and the manufacturer's written requirements. Work shall be carried out by suitably trained personnel and, where required, certified or approved specialists.

C3.3.2.3 Samples and trial sections

The Employer's Agent may require trial embankment sections, compaction trials, concrete mock-ups, geomembrane trial seams, pipe-joint trials, stone-pitching panels or building-finish samples before production work commences. An approved trial shall establish the minimum standard of workmanship. A trial may be incorporated into the permanent Works only with the prior written approval of the Employer's Agent.

C3.3.2.4 Survey control and tolerances

The Contractor shall establish, verify and protect a survey control network connected to the benchmarks provided or approved by the Employer's Agent. Pond floor levels, embankment crest levels, pipeline inverts, structure levels and hydraulic control levels are critical. Survey checks and records shall be submitted at each applicable hold point. Work outside the specified tolerances shall be rectified by the Contractor at its own cost, unless otherwise determined in terms of the Contract.

C3.3.3 Site clearance and preparation

Site clearance shall comply with SANS 1200 C and shall be restricted to the limits approved by the Employer's Agent. Topsoil shall be stripped to the specified or instructed depth, stockpiled separately in stable heaps and protected for later rehabilitation. Vegetation, roots, organic matter, refuse, unsuitable material and obstructions shall be removed from beneath structures, pond embankments, roads and lined areas. Burning and indiscriminate disposal of cleared material are prohibited. Disposal shall be at approved locations and in accordance with the Environmental Management Programme and applicable legislation.

C3.3.4 Bulk earthworks and pond embankments

C3.3.4.1 Foundation preparation

Bulk earthworks and pond embankments shall comply with SANS 1200 D, SANS 1200 AD and SANS 1200 DE, as applicable and as amended by this Project Specification. After stripping, the exposed foundation shall be inspected and approved by the Employer's Agent before fill is placed. Soft, loose, organic, expansive or otherwise unsuitable material shall be removed to the instructed depth and replaced with approved material. Sloping ground beneath embankments shall be benched to provide an adequate bond and to prevent a continuous slip surface. Foundations shall be scarified, moisture-conditioned and compacted to the specified density.

C3.3.4.2 Fill material and placement

Embankment fill shall comprise approved, durable material free from vegetation, refuse, oversized rock and deleterious matter. Selection, processing and zoning of fill shall comply with the geotechnical requirements, the drawings and the Employer's Agent's instructions. Fill shall be placed in uniform layers not exceeding 150 mm compacted thickness, unless an approved trial section demonstrates that a greater layer thickness consistently achieves the specified density and uniformity.

C3.3.4.3 Compaction and moisture control

Unless a higher requirement is shown on the drawings or stated in the Bill of Quantities, engineered pond embankments and structure platforms shall be compacted to at least 95% of Mod AASHTO maximum dry density at a moisture content suitable for the material. Road layers and trench reinstatement shall comply with the specified requirements for the relevant layer or zone. No layer shall be covered until the required survey records and field-density test results have been approved by the Employer's Agent.

C3.3.4.4 Trimming and erosion protection

Pond floors, side slopes, crest widths and batters shall be trimmed to the lines, levels, grades and tolerances shown on the drawings. Finished surfaces shall drain as intended and shall be free from abrupt changes, loose material and protrusions that could damage the lining system. The Contractor shall provide temporary and permanent measures to prevent erosion, gullying and ponding throughout construction.

C3.3.4.5 Cement-treated embankment protection zones

Subject to confirmation by an approved laboratory stabilisation design, the outer 500 mm final compacted thickness of the pond-side and external embankment slopes, measured normal to the finished slope, and the upper 150 mm of the embankment crest shall comprise cement-treated material.

A nominal cement content of 5% by dry mass of untreated material shall be used for tender purposes. The final cement content shall be determined from laboratory testing of representative material and approved by the Employer's Agent before construction.

The cement-treated zones shall be constructed concurrently with the general embankment fill in uniform layers not exceeding 150 mm compacted thickness. The treatment shall be uniformly mixed through the full specified zone thickness. The construction method shall prevent the formation of smooth, inadequately compacted or continuous planes between treated and untreated material.

Mixing, moisture conditioning, placement and compaction shall be completed within the approved working time. The treated material shall be compacted to the density established by the approved mix design and trial section and shall be cured and protected against rapid moisture loss for at least seven days.

The pond-side surface shall be trimmed smooth and shall be free from cracks, projections or loose material that could damage or leave unsupported areas beneath the geotextile and HDPE geomembrane.

Cement treatment shall be supplemented by the specified geomembrane protection, stormwater controls, erosion protection and filter or drainage measures. It shall not be regarded as the sole measure against seepage or internal erosion.

C3.3.5 Excavations, trenches and dewatering

Excavation shall comply with SANS 1200 D, SANS 1200 DB and SANS 1200 DE, as applicable. The geotechnical information indicates shallow refusal on gneiss bedrock and hard rock excavation shall be encountered. The Contractor shall allow in its rates, programme, construction methods and plant resources for ripping, hydraulic breaking, controlled

excavation and disposal or reuse of hard material and hard rock. Material shall be classified, measured and paid for in accordance with the applicable SANS 1200 provisions, this Project Specification and the Bill of Quantities.

Excavations shall be maintained in a safe, stable and dry condition. The Contractor shall provide battering, shoring, access, barricading, pumping, sumps and temporary drainage suitable for the actual ground and groundwater conditions. Approved excavated material shall be reused where practicable. Unsuitable and surplus material shall be disposed of only at locations approved by the Employer's Agent and the relevant authority.

Pipe trenches shall provide the specified bedding thickness and working space. Over-excavation shall be made good with approved selected material or concrete, as instructed by the Employer's Agent. Pipes, structures and embankments shall not be founded on disturbed, softened, loose or flooded material.

C3.3.6 Reinforced concrete and liquid-retaining structures

C3.3.6.1 General

Structural concrete work shall comply with SANS 1200 G, SANS 1200 GA and SANS 1200 GB, as applicable and as amended by this Project Specification. Concrete structures include the inlet works, night-soil disposal facilities, anaerobic pond linings, inlet and outlet structures, chambers, slabs, foundations, tank support structure and associated works. Concrete grades, reinforcement, cover, finishes and joint details shall be as shown on the drawings. Where a concrete grade is not stated, structural concrete shall have a characteristic 28-day compressive strength of not less than 30 MPa, subject to confirmation by the Employer's Agent.

C3.3.6.2 Watertight construction

Concrete that contains or conveys wastewater shall be dense, durable and watertight. The mix design, casting sequence, construction joints, movement joints, waterstops, penetrations and curing method shall be coordinated and submitted before concreting. Unplanned construction joints shall not be permitted. Movement joints shall be continuous through the relevant wall, slab or foundation elements, as detailed, and shall incorporate compatible waterstops. Waterstops shall be securely fixed, correctly jointed and protected against displacement during concreting.

C3.3.6.3 Formwork, reinforcement and embedded items

Formwork shall be grout-tight, true to line and sufficiently rigid to maintain the required dimensions and finish. Reinforcement shall be clean, accurately fixed and supported on approved spacers or chairs. Pipe sleeves, puddle flanges, cast-in items, anchor plates, waterstops and other embedded items shall be checked during the pre-pour inspection. Reinforcement shall not be cut or displaced to accommodate a penetration unless approved in writing by the Employer's Agent.

C3.3.6.4 Placing, curing and testing

Concrete shall not be placed during extreme temperature, high wind or other adverse conditions unless the Contractor has implemented an approved concreting method appropriate to those conditions. Concrete shall be placed continuously within planned pours, compacted without segregation, finished to the specified class and cured immediately for the specified period. Sampling and compressive-strength testing shall comply with the applicable SANS requirements and the approved ITP. Defects shall not be repaired until the Employer's Agent has assessed the defect and approved the proposed repair method.

C3.3.6.5 Water-retention tests

Liquid-retaining structures shall be cleaned, inspected and water-tested before coatings, backfilling or commissioning where such work would conceal defects. Filling and drawdown shall be controlled to avoid structural distress. The test procedure, duration and acceptance criteria shall comply with the Contract and the approved ITP. Leakage, damp patches or unexplained water loss shall be investigated and rectified before the structure is accepted.

C3.3.7 HDPE geomembrane lining system

C3.3.7.1 Materials

The geomembrane shall be new, 2.0 mm UV-stabilised HDPE geomembrane, single-side textured on the underside and suitable for exposed wastewater ponds and shall comply with GRI-GM13 where no directly applicable SANS requirement exists. The geomembrane surface finish shall be textured on the underside, as shown on the drawings or approved for the relevant slope and detail. Every roll shall be traceable to the manufacturer's quality-control certificate.

The protective and separation geotextile shall be Bidim A5 or an approved equivalent that meets or exceeds the specified performance requirements. Welding rod, termination bars, seals, boots and prefabricated fittings shall be compatible with the geomembrane and suitable for long-term wastewater exposure.

C3.3.7.2 Specialist installer and submissions

Installation shall be undertaken by an experienced specialist geomembrane installer using suitably trained and certified welding technicians. At least 21 days before installation, the Contractor shall submit product data, material certificates, installer credentials, the panel layout, deployment sequence, anchor and penetration details, welding procedures, construction quality-assurance plan, inspection and test forms and repair procedures to the Employer's Agent for approval.

C3.3.7.3 Subgrade approval

The liner subgrade shall be smooth, firm, stable and free from standing water, vegetation, sharp stones, abrupt steps, cracks, loose material and any object capable of damaging the lining system. Compaction and level tests shall be completed before the subgrade is handed over to the specialist installer. The Contractor, installer and Employer's Agent shall jointly inspect the subgrade, and the approval record shall be signed before the geotextile or geomembrane is placed.

C3.3.7.4 Deployment and anchorage

Panels shall be deployed to minimise seams on slopes, avoid cross seams in highly stressed areas and prevent bridging. Plant with exposed tracks, projections or tyres capable of damaging the lining shall not travel on the liner. Temporary ballasting shall prevent wind uplift without damaging the sheeting. Anchor trenches shall be excavated, rounded, protected, backfilled and compacted in the sequence recommended by the installer and approved by the Employer's Agent.

C3.3.7.5 Welding and testing

Production seams shall be formed by dual-track fusion welding wherever practicable. Extrusion welding shall be restricted to details and repairs. Trial seams shall be completed at the start of each shift, after equipment changes and whenever weather conditions change materially. Ambient temperature, sheet temperature, equipment settings, welder identity and seam numbers shall be recorded.

All field seams shall be subjected to continuous non-destructive testing by air-channel, vacuum-box, spark testing or another approved method appropriate to the seam. Destructive seam samples shall be tested at the frequency stated in the approved quality plan and at not less than one sample per 150 m of production seam, unless otherwise approved by the Employer's Agent. Testing shall comply with GRI-GM19 and the relevant ASTM methods where no SANS method applies. Failed areas shall be identified, repaired and retested.

C3.3.7.6 Penetrations, concrete interfaces and completion

Pipe penetrations and concrete terminations shall incorporate purpose-made boots, cast-in components, termination bars and compressible seals designed to accommodate movement and maintain watertightness. Direct clamping against irregular or unprepared concrete shall not be permitted. On completion, the liner shall be inspected, cleaned and repaired, and shall be handed over with panel drawings, seam logs, test results, repair records, material certificates and installer warranties.

C3.3.8 Process pipework, fittings and flow-control equipment

Process pipework shall comply with SANS 1200 L, SANS 1200 LB and SANS 1200 LD, as applicable. Pipe materials, nominal diameters, pressure classes and jointing systems shall be as shown on the drawings and schedules. Pipes shall be handled and stored to prevent UV damage, scoring, ovality and contamination. Gravity pipelines shall be laid accurately to line and level on approved bedding. Pressurised sections, where applicable, shall be installed and tested to the specified class. Flanged joints shall be compatible, correctly drilled and fitted with suitable gaskets and corrosion-resistant fasteners.

Sluice gates, stoplogs, valves and flow-control equipment shall be accessible, removable for maintenance and operable without unsafe entry. Stainless-steel components exposed to wastewater shall be Grade 316 unless otherwise shown. Dissimilar metals shall be electrically isolated. Open pipework and structures shall be protected against the entry of debris before commissioning.

C3.3.9 Inlet works and night-soil disposal area

The inlet works shall be constructed to the hydraulic dimensions and levels shown on the drawings. Channels shall have smooth, durable finishes and shall drain without unintended low points. Screens, gratings, handrails, covers, stoplogs,

Parshall flume components and access arrangements shall be installed plumb, secure and safe to operate. The night-soil disposal area shall provide a durable, washable surface, controlled drainage, wash-down facilities and measures to prevent uncontrolled discharge and unauthorised public access.

C3.3.10 Sludge drying beds and composting area

Sludge drying beds shall include the specified lined base, graded filter media, underdrainage, filtrate collection and return arrangements. Filter media shall be clean, durable and placed without contamination or damage to the underdrains or lining. The composting area shall have a durable surface and shall be graded and drained so that contaminated runoff is contained and returned to the treatment process.

C3.3.11 Stormwater, erosion protection and stone pitching

Stormwater drainage shall comply with SANS 1200 LE and erosion-protection work, including stone pitching, shall comply with SANS 1200 DK. Clean stormwater shall be diverted around process areas, while runoff from contaminated areas shall drain to controlled collection points. Channels, cut-off drains and outlets shall be completed sufficiently early to protect the Works during construction.

Stone pitching shall be dry-packed or grouted, of the type and thickness shown on the drawings or stated in the Bill of Quantities. Stone shall be sound, durable and of suitable size and shape for close hand packing. The foundation shall be trimmed, compacted and provided with the specified filter layer or geotextile. Edges, toes and transitions shall be keyed in to prevent displacement and undermining. Where grouted pitching is specified, voids shall be completely filled with the specified mortar and the exposed faces shall be neatly finished. Measurement and payment shall be in accordance with SANS 1200 DK as amended by this Project Specification.

C3.3.12 Access roads and layerworks

Roadworks shall comply with SANS 1200 M, SANS 1200 DM, SANS 1200 ME, SANS 1200 MF or SANS 1200 MFL, and SANS 1200 MM, as applicable. The road formation, selected layers, subbase, base where specified and gravel wearing course shall be constructed to the dimensions, material classifications and compaction requirements shown on the drawings or stated in the Bill of Quantities. The Contractor shall maintain safe access throughout the Works and shall repair damage caused by construction traffic. Finished roads shall shed water to stable side drains and shall not discharge runoff into lined ponds or structures.

C3.3.13 Operator facility, fencing, water tank and solar lighting

The operator facility shall be completed with foundations, walls, roof, ceilings where shown, doors, windows, finishes, sanitary fittings, plumbing and drainage. Building work shall comply with SANS 1200 GB, the applicable requirements of SANS 10400 and the drawings. The completed building shall be weatherproof, secure, readily cleanable and suitable for the local climate. All keys, schedules, test results and compliance certificates shall be handed over at completion.

Fencing and gates shall comply with the drawings, shall be true to line and level and shall remain secure across changes in ground level. The elevated water-tank installation shall include a certified support structure, restricted access, foundations and all associated pipework and fittings. Electrical work associated with solar lighting shall comply with SANS 10142-1. Solar-lighting equipment shall be suitable for outdoor use, tamper-resistant and commissioned to demonstrate the specified operating cycle.

C3.3.14 Testing, commissioning and handover

The Contractor shall prepare an integrated commissioning plan covering pre-commissioning inspections, cleaning, pipeline and structure tests, geomembrane records, dry commissioning, controlled wet commissioning, introduction of wastewater, sampling, operating trials, training and emergency procedures. Commissioning shall not commence until the Employer’s Agent has approved the plan and the applicable health and safety and environmental controls are in place.

Performance monitoring shall demonstrate stable hydraulic operation and the correct functioning of all inlets, outlets, controls, interconnections and storage arrangements. Final-effluent performance is dependent on influent characteristics and biological establishment; however, the Contractor shall rectify any defect in the Works, equipment or installation that impairs the design performance.

Work package	Minimum completion evidence
Earthworks	Survey records; material approvals; field-density and moisture results; final levels and profiles.

Concrete	Batch records; cube results; reinforcement and pre-pour records; joint and waterstop inspections; water-retention test results.
Geomembranes	Material certificates; panel layout; seam and repair logs; non-destructive and destructive test results; warranties and quality-assurance report.
Pipework and equipment	Line-and-level surveys; jointing records; leakage or pressure tests, as applicable; operational checks.
Roads and stormwater	Layer approvals; density results; levels; outlet, stone-pitching and erosion-control inspections.
Buildings and services	Completion inspections; plumbing tests; electrical and solar certificates; equipment manuals.
Handover	As-built drawings; operation and maintenance manuals; training records; spares; keys; asset schedule; close-out of defects.

All records shall be indexed, signed where applicable and included in the handover documentation.

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C3.4 MANAGEMENT

C3.4.1 Construction programme

Within the period stated in the Contract Data, the Contractor shall submit a logic-linked baseline programme and supporting narrative in accordance with GCC 2015. The programme shall show the sequence, duration, resources and interdependence of all activities and shall identify the critical path and available float.

- design and approval of temporary works, shop drawings and method statements;
- procurement lead times for geomembrane, geotextile, pipework, valves, sluices, steelwork, solar equipment and proprietary items;
- survey, earthworks balancing, embankment construction and compaction testing;
- concrete pour sequences, curing periods and water-retention tests;
- liner subgrade preparation, installer mobilisation, deployment, welding, testing and protection;
- weather, public holidays, industry shutdowns and the remote-site logistics; and
- commissioning, operator training, record documentation and correction of defects.

The programme shall be updated monthly using the accepted baseline. Actual start and finish dates, remaining durations, approved changes, critical path, delays, mitigation measures and forecast completion shall be clearly shown. A programme update does not constitute approval of an extension of time or additional payment.

C3.4.2 Construction continuity

The Contractor shall plan and resource the Works for continuous execution over the eleven-month Time for Completion. Temporary works, drainage, security, environmental protection and health-and-safety controls shall be maintained throughout construction.

C3.4.3 Site management and key personnel

The Contractor shall provide competent, full-time management appropriate to a CIDB Grade 7CE project and the specialist nature of the Works. Key personnel named in the tender may not be replaced without prior written acceptance. The Site Agent shall have authority to receive instructions and commit the Contractor. Specialist supervision shall be provided for geomembrane installation, reinforced concrete, earthworks quality control, pipework and commissioning.

C3.4.4 Quality management

The Contractor shall implement a project-specific quality plan supported by ITPs, checklists, hold points and traceable records. Work shall not proceed beyond a hold point without the specified release. The minimum hold points include foundation acceptance, each embankment zone, liner subgrade handover, pre-pour inspections, waterstop and penetration inspections, pipework before covering, geomembrane seam acceptance, structure tests and commissioning readiness.

The Contractor is responsible for production testing. The Employer's Agent may arrange independent verification tests. Failed work and all associated investigation, retesting and remedial work shall be for the Contractor’s account where non-compliance is confirmed.

C3.4.5 Site records and reporting

The following current records shall be maintained on Site and made available to the Employer's Agent:

- the Contract, latest drawings, approved shop drawings and specifications;
- site instruction, request-for-information and drawing registers;
- daily diary recording weather, labour, plant, activities, delays, visitors and incidents;
- survey, quality, laboratory, material certificate and test records;
- concrete pour, reinforcement, waterstop, liner panel, seam, repair and pipe-joint records;
- environmental, waste, water-use, dust-control and rehabilitation records;

- H&S file, statutory appointments, inspection registers and audit close-outs; and
- progress photographs from fixed viewpoints and of all work before covering.

Monthly progress reports shall include an executive summary, programme update, progress and expenditure, resources, procurement status, quality results, H&S and environmental performance, community and local participation, risks, decisions required and a four-week look-ahead.

C3.4.6 Site facilities and utilities

The Contractor shall make its own arrangements for offices, stores, ablutions, potable water, construction water, power, communications, waste collection, accommodation and transport. Any municipal connection is subject to approval, metering and payment and is not guaranteed for continuity or capacity. Site facilities shall be removed and affected areas rehabilitated at completion.

C3.4.7 Existing services and tie-ins

Information on existing services is indicative. Before excavation, the Contractor shall obtain available records, inspect the Site, use appropriate detection methods and carefully expose services by hand. Services shall be treated as live until confirmed otherwise. Damage caused by the Contractor shall be reported immediately and repaired at the Contractor’s cost to the satisfaction of the owner and Employer's Agent.

C3.4.8 Traffic, access and public safety

The Contractor shall maintain safe access for municipal staff, residents, emergency services and adjacent land users. Temporary traffic accommodation, warning signs, flag personnel, barriers and lighting shall be provided where construction interfaces with public or operational routes. Open excavations and ponds shall be secured against unauthorised access.

C3.4.9 Environmental management

The Contractor shall comply with the environmental authorisation, environmental management requirements, water-use conditions and lawful instructions applicable to the project. The work area shall be kept within approved boundaries. Fuel and chemicals shall be stored in bunded areas; spills shall be contained and reported; waste shall be separated and removed to authorised facilities; dust and noise shall be controlled; and disturbed areas shall be rehabilitated progressively.

C3.4.10 Local participation and labour

Local participation, recruitment and reporting shall comply with Clauses C1.2.3.1.1 to C1.2.3.1.3. Temporary unskilled labour shall be local, subject to the defined availability and approval procedure. The Contractor remains responsible for recruitment, employment and statutory compliance.

C3.4.11 Community liaison

The Contractor shall cooperate with the Employer’s authorised community structures and any appointed Community Liaison Officer. No commitment concerning employment, subcontracting, compensation, access or scope may be made on behalf of the Employer without written authority. Grievances and work stoppages shall be recorded and managed through the agreed communication procedure.

C3.4.12 Completion and handover

The Works will not be considered ready for completion until all process units and ancillary works are safe, clean, accessible, tested and functional; defects affecting operation are corrected; waste and temporary works are removed; rehabilitation is complete; and the required as-built information, manuals, certificates, warranties, spares, training and H&S file have been accepted.

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C3.5 PROJECT SPECIFIC SPECIFICATION

C3.5.1 Standard Specifications

The Standard Specifications on which this Contract is based are the applicable sections of the SANS 1200 Standardised Specifications for Civil Engineering Construction, as varied or supplemented by this Project Specification.

The applicable SANS 1200 sections listed below form part of the Contract notwithstanding that they are not reproduced or bound into this document. The Contractor shall obtain and use the complete applicable standards.

C3.3.2 Variation and Additional Clauses to the Standard Specification listed in the list of Specifications

Clauses in this Project Specification are prefixed "PS" and refer to, replace or add to the corresponding clauses of the Standard Specifications. A project-specific requirement applies in addition to the Standard Specification unless it expressly states that it replaces the corresponding clause.

Materials for which a recognised SABS/SANS certification mark is applicable shall bear that mark, or the Contractor shall submit current certificates demonstrating compliance with the specified standard. Submission or acceptance of a certificate shall not relieve the Contractor of responsibility for the material's compliance and fitness for its intended use.

PROJECT-SPECIFIC SPECIFICATION

VARIATIONS AND ADDITIONS TO THE SANS 1200 STANDARDISED SPECIFICATIONS

Contract Form: GCC 2015 (Third Edition) | Defined Term: "Employer's Agent" | Issue Date: September 2026

DOCUMENT BASIS AND STATUS

This Project Specification contains project-specific requirements that supplement or vary the SANS 1200 Standardised Specifications incorporated into the Contract. The SANS specifications are not reproduced in this document and shall be obtained separately. Only project-specific requirements commonly required tender clarifications and requirements arising from the Pella site conditions are stated here.

The Drawings, Bill of Quantities, Scope of Work, Contract Data and this Project Specification shall be read together. Where a discrepancy occurs, the order of precedence stated in C1.4 of the Contract shall apply.

Design and Tender Assumptions

The Works comprise lined oxidation ponds, inlet and outlet structures, night-soil disposal facilities, sludge drying beds, composting area, interconnecting pipework, access roads, stormwater controls, fencing, an office and ablution facility, two 5,000 litre potable-water tanks on a 3 m high elevated stand, three anti-theft solar area lights, a dedicated low-power diesel generator installation, a gravity building sewer connection to the inlet works and treated-effluent reuse infrastructure. There is no electricity supply and no municipal sewer reticulation at Pella.

- The principal pond lining is a 2.0 mm textured, UV-stabilised HDPE geomembrane protected by Bidim A5 geotextile or approved equivalent.
- The Geotechnical Investigation identifies low-plasticity, erodible and highly dispersive near-surface soils, an irregular gneissic weathering profile, and the likelihood that difficult excavation and competent rock will be encountered at variable levels. The report is Site Information and does not determine excavation classification or payment under this Contract.
- Untreated engineered pond-embankment fill shall be placed in layers not exceeding 150 mm compacted thickness and compacted to at least 95% of MDD determined in accordance with SANS 3001-GR30.

- A cement-treated erosion-protection zone is required on both embankment faces (500 mm final compacted thickness normal to the slope) and the upper 150 mm of the crest. Five per cent (5%) cement by dry mass is a tender basis only.
- The Contractor shall protect all incomplete works throughout construction.

Applicable SANS 1200 Sections

- SANS 1200 A - General: All work packages
- SANS 1200 AB - Employer's Agent's office
- SANS 1200 AD - General requirements for small dams: Pond embankments
- SANS 1200 AH - General requirements for structural work
- SANS 1200 C - Site clearance
- SANS 1200 D - Earthworks: Bulk excavation, platforms, fill and spoil
- SANS 1200 DB - Earthworks (pipe trenches)
- SANS 1200 DE - Earthworks for small earth dams: engineered pond embankments
- SANS 1200 DK - Gabions and pitching
- SANS 1200 DM - Earthworks (roads, subgrade)
- SANS 1200 G - Concrete (structural)
- SANS 1200 GA - Concrete (small works)
- SANS 1200 GB - Concrete (ordinary buildings)
- SANS 1200 GE - Precast concrete
- SANS 1200 H/HA/HB/HC - Structural and sundry steelwork, cladding, corrosion protection
- SANS 1200 L - Medium-pressure pipelines
- SANS 1200 LB - Bedding (pipes)
- SANS 1200 LC - Cable ducts
- SANS 1200 LD - Sewers
- SANS 1200 LE - Stormwater drainage
- SANS 1200 M/ME/MF/MFL/MK/MM - Roadworks and pavement layers
- SANS 1200 MJ - Segmented paving: interlocking concrete paving
- SANS 1200 PA - Site finishing

PSA SANS 1200 A: GENERAL

PSA 1 Scope

REPLACE THE CONTENTS OF SUBCLAUSE 1.1 WITH THE FOLLOWING:

This section applies to every work package including all obligations necessary for the proper establishment, execution, protection, testing, completion and handover of the Works, whether or not each obligation is separately scheduled.

PSA 1.4 Priority of Contract Documents

ADD THE FOLLOWING NEW CLAUSE:

The order of precedence of the documents forming the Contract shall be solely that stated in C1.2 of the Contract.

This Project Specification shall not create a separate or competing order of precedence.

The Contractor shall notify the Employer's Agent in writing immediately after identifying any ambiguity, discrepancy or conflict and, before executing the affected work, shall obtain a written clarification or instruction in accordance with the Contract. The Contractor shall not select an interpretation merely because it is less costly or more convenient.

Nothing in this clause shall be construed as relieving the Contractor of the obligation to comply with the requirements of all applicable legislation, regulations and by-laws, which shall take precedence over all Contract documents.

PSA 2 Interpretations

ADD THE FOLLOWING DEFINITIONS TO SUBCLAUSE 2.3:

- "Employer's Agent" has the meaning assigned in GCC 2015. "Approved" means approved in writing by the Employer's Agent.
- "Specified" means stated in the Contract, Drawings, Bill of Quantities, schedules or this Project Specification.
- "Oxidation Ponds": The series of lined ponds designed for the biological treatment of wastewater by natural processes involving sunlight, algae and bacteria.
- "Pond Liner": The 2.0 mm textured HDPE geomembrane lining system used to prevent seepage from the oxidation ponds.
- "Geotextile": The Bidim A5 or approved equivalent protection and separation layer placed beneath or above the geomembrane as shown on the Drawings.
- "Cement-treated zone": The stabilised erosion-protection layer on embankment faces and crests constructed in accordance with PSDE 5.4.
- "MDD": Maximum Dry Density determined in accordance with SANS 3001-GR30 for untreated material, or SANS 3001-GR31 for cementitiously stabilised material, as applicable.
- "OMC": the corresponding Optimum Moisture Content.
- "CQA": Construction Quality Assurance.
- "ITP": Inspection and Test Plan.

PSA 3 Materials

ADD THE FOLLOWING AT THE END OF SUBCLAUSE 3.1:

All manufactured materials shall be new and suitable for the intended service. Materials exposed to wastewater, sludge, treated effluent, aggressive ground or solar radiation shall be corrosion-resistant and UV-stabilised as applicable. Product data, compliance certificates, samples and proposed sources shall be submitted before ordering. Materials shall not be substituted without prior written approval of the Employer's Agent.

PSA 4 Plant, Temporary Works and Site Establishment

ADD THE FOLLOWING:

The Contractor shall provide and maintain plant suited to hard-rock excavation, bulk earthworks, controlled embankment construction, cement treatment, concrete production, pipe installation and geomembrane work. Plant breakdown, normal maintenance and replacement of unsuitable or insufficient plant shall be allowed for in the Contractor's programme and rates and shall not, of themselves, establish entitlement to additional payment or extension of time.

The construction camp shall be fenced, secure and maintained in a clean condition. Fuel and chemicals shall be stored within impermeable secondary containment having a capacity of at least 110% of the largest container. Concrete wash water, oils, sewage and contaminated runoff shall not be discharged onto the ground or into drainage lines or watercourses.

PSA 5 Construction Requirements

PSA 5.1 Submissions and Hold Points

ADD THE FOLLOWING:

Before commencing each activity, the Contractor shall submit the relevant method statement, risk assessment, ITP, material approvals, shop drawings, temporary-works design and programme information. Work shall not proceed beyond a hold point without the Employer's Agent's written release. Minimum hold points:

- Foundation and subgrade acceptance before liner, slab or embankment fill placement
- Formwork and reinforcement inspection before each concrete pour (signed pre-pour checklist required)
- Layer completion survey and density results before next earthworks layer
- Geomembrane subgrade release before liner deployment
- Pressure or leakage test results before concealing joints or backfilling structures

PSA 5.2 Survey and Setting Out

ADD THE FOLLOWING:

The Contractor shall verify benchmarks and establish a protected survey control network. Pond floors, crest levels, structure levels, pipeline inverts and hydraulic control points are critical. Survey records shall be submitted at foundation, layer, pre-pour, pipe-laying and completion hold points.

PSA 5.3 Existing Services and Property

ADD THE FOLLOWING:

Existing services shall be located from available records and verified by careful exposure before mechanical excavation approaches them. The existing WWTW shall remain operational during construction unless otherwise agreed in writing.

PSA 5.4 Quality Management

ADD THE FOLLOWING:

The Contractor shall maintain traceable lot-based records for earthworks, concrete, geomembranes, pipelines, road layers and equipment. Work covered before completion of required inspection or testing may be exposed or removed at the Contractor's cost.

PSA 5.5 Continuity and protection of the Works

ADD THE FOLLOWING NEW SUBCLAUSE:

Throughout construction, the Contractor shall keep the Site safe, stable, secure and free-draining. Incomplete embankments shall be trimmed and protected against erosion; channels and cut-off drains shall remain operational; excavations shall be secured; and structures, materials and liner systems shall be protected against weather, damage, vandalism and theft.

PSA 5.6 Environmental and Community Requirements

ADD THE FOLLOWING:

Clearing shall be limited to approved areas. Dust, noise, erosion and waste shall be controlled. No uncontrolled wastewater or polluted water discharge is permitted. All chemicals and fuels shall be stored in secondary containment (110% capacity). Contaminated runoff shall not discharge to natural watercourses.

PSA 5.7 Safety

REPLACE THE CONTENTS OF SUBCLAUSE 5.7 WITH THE FOLLOWING:

The Contractor shall comply fully with the Occupational Health and Safety Act (Act 85 of 1993) and the Construction Regulations 2014. Special hazards specific to oxidation pond construction:

- Risk of drowning - all open pond areas shall be fenced and signed during construction
- Exposure to raw sewage and pathogens - appropriate PPE shall be provided and enforced at all times
- Toxic or asphyxiating gases - confined space entry procedures shall be implemented
- Working at height on embankments and structures
- Hard rock excavation and use of hydraulic breaking equipment

The Employer's Agent may instruct the suspension of work that presents an imminent danger or materially fails to comply with the approved health and safety requirements. Where the suspension results from the Contractor's breach or non-compliance, the resulting delay, protection, correction and remobilisation costs shall be borne by the Contractor, subject to the Conditions of Contract.

PSA 5.8 As-Built and Handover Information

ADD THE FOLLOWING:

As-built information shall be recorded progressively and submitted in editable and PDF formats. Handover documents shall include test results, survey records, material certificates, warranties, commissioning records, O&M manuals, training records, keys, spares and an asset schedule.

PSA 6 Tolerances

ADD THE FOLLOWING:

Degree of accuracy II shall apply unless another tolerance is shown. Hydraulic levels, pond floor levels, weir crest levels and outlet control structures shall comply with project tolerances shown on the Drawings. Local depressions that could pond water beneath the liner or prevent drainage are not permitted.

PSA 7 Testing

ADD THE FOLLOWING:

The Contractor shall give the Employer's Agent at least 48 hours' written notice before acceptance testing. The Contractor's process-control and quality-control testing is additional to acceptance testing ordered by the Employer's Agent. Laboratory testing shall be undertaken by a SANAS-accredited laboratory for the applicable method where such accreditation is available. Field and specialist testing shall be undertaken by demonstrably competent personnel using calibrated equipment and accepted procedures.

PSA 8 Measurement and Payment

PSA 8.1 General Measurement and Payment Requirements

ADD THE FOLLOWING:

Unless an item description expressly states otherwise, each tendered rate shall include all labour, supervision, plant, materials, transport, temporary works, setting out, protection, quality control, testing, records, waste, finishing and incidental work necessary to complete the item in accordance with the Contract.

An obligation described in more than one specification clause shall be paid once only under the most specific applicable Bill of Quantities item. No separate payment shall be made merely because the same obligation is repeated or because a method, submission, hold point or test is necessary to execute a measured item.

Quantities stated in the Bill of Quantities are estimated and shall be measured in accordance with the applicable SANS 1200 measurement rules and the Conditions of Contract. A change in quantity shall not alter the technical acceptance criteria.

PSA 8.3.5 Compliance with OHS Act (Act 85/1993),

Construction Regulations and Employer's Safety Specification - Fixed charge ..... Unit: Sum

Includes: Health and Safety Plan preparation; H&S File; induction and training; PPE; barricades and signage around open water; confined space entry equipment; Safety Officer; administration.

PSA 8.4.6 Compliance with OHS Act - Time-related charge ..... Unit: month

Includes: health and safety personnel; plan updates; audits; risk assessments; safety meetings; monthly reports; PPE maintenance; fence and sign maintenance.

PSA 8.3.6 Compliance with Environmental Management Plan and

Environmental Authorisation - Fixed charge ..... Unit: Sum

Includes: initial environmental induction; mitigation measures; environmental setup.

PSA 8.4.7 Compliance with Environmental Management Plan - Time-related charge ..... Unit: month

Includes: ongoing monitoring; monthly environmental reporting; erosion-control maintenance.

PSA 8.3.7 Provision of Local Economic Participation Plan ..... Unit: Sum

Includes: preparation of LEP Plan; external auditing (interim and final audits); monthly LEP progress reporting.

PSAB SANS 1200 AB: EMPLOYER'S AGENT'S OFFICE

PSAB 3 Office and Services

ADD THE FOLLOWING:

The Contractor shall provide a lockable, insulated, air-conditioned office of approximately 24 m² for the exclusive use of the Employer's Agent's personnel. The office shall have a level floor, windows with security bars, adequate lighting, electrical outlets, potable water, ablution access and reliable internet connectivity.

Furnishings: two desks; four office chairs; a meeting table with six chairs; lockable filing cabinets; plan-storage facilities; fire extinguisher; basic first-aid equipment. Services, cleaning, consumables and maintenance shall be provided for the full contract duration.

Survey equipment for the exclusive use of the Employer's Agent:

- 1 No. automatic surveyor's level complete with tripod and carry case
- 1 No. nylon-coated steel surveyor's tape, 100 m long
- 1 No. 10 m steel tape;
- 1 No. measuring wheel
- 2 No. 5 m three-piece telescopic survey staves (metric double-face)
- 3 No. survey level books; 1 No. 2 kg rubber-handle hammer
- 100 No. steel pegs, 300 mm long x 12 mm dia.
- 1 No. digital spirit level; 1 No. 3 m aluminium straight edge
- 2 No. Dynamic Cone Penetrometers (DCP) complete with all accessories

The Contractor shall provide one mobile phone for the Employer's Agent's Representative with minimum 400 minutes and 10 GB data/month. Minimum spec: 6.5" display; Octa-core CPU; 4 GB RAM; 64 GB storage; 128 MP camera; GPS.

The Contractor shall provide and maintain a laptop for the Employer's Agent: Core i7; 16 GB RAM; 1 TB SSD; 15" screen; licensed Windows OS and MS Office suite; shoulder carry bag.

PSAB 4 Survey and Testing Assistance

ADD THE FOLLOWING:

The Contractor shall make available a competent survey assistant for joint surveys, inspections and sampling as directed. Transport for the survey assistant shall be provided by the Contractor when requested.

PSAD SANS 1200 AD: GENERAL REQUIREMENTS FOR SMALL DAMS

PSAD 1 Application

ADD THE FOLLOWING:

The requirements for small earth dams apply to the oxidation pond embankments insofar as they concern water-retaining earthworks, zoning, seepage control, erosion protection and construction records. The HDPE geomembrane is the primary seepage barrier but does not remove the requirement for stable, filter-compatible embankments and foundations.

PSAD 5 Construction Control

ADD THE FOLLOWING:

The Contractor shall submit an embankment zoning and material-management plan showing excavation sources, stockpile locations, treatment zones, filter and drainage materials, layer lots and haul routes before filling commences. Construction shall proceed from an approved trial embankment section only.

Pipes and structures passing through embankments shall be detailed to minimise differential settlement and internal erosion. Filter and drainage zones shall be continuous and shall discharge to inspectable outlets.

PSAD 7 Records

ADD THE FOLLOWING:

Daily embankment records shall state: material source; zone; layer level; moisture condition; plant used; number of roller passes; field density results; and weather conditions. Records shall be linked to the final as-built embankment sections.

PSAH SANS 1200 AH: GENERAL REQUIREMENTS FOR STRUCTURAL WORK

PSAH 4 Shop Drawings and Temporary Works

ADD THE FOLLOWING:

Shop drawings shall be coordinated across civil, structural, mechanical and electrical disciplines before manufacture. Temporary works affecting structural safety (formwork, falsework, lifting, excavation support) shall be designed by and signed off by a competent person registered with ECSA.

PSAH 5 Embedded and Interface Items

ADD THE FOLLOWING:

Cast-in pipes, puddle flanges, sleeves, anchor bolts, waterstops, baseplates and equipment openings shall be verified at a coordinated pre-pour inspection. The signed pre-pour checklist is a hold point. Cutting completed structural work or reinforcement to correct coordination errors is prohibited without Employer's Agent approval.

PSC SANS 1200 C: SITE CLEARANCE

PSC 3 Materials Arising from Clearance

ADD THE FOLLOWING:

Topsoil shall be separated from unsuitable material and stockpiled for rehabilitation. Topsoil shall not be incorporated into structural fill. Hazardous waste shall be isolated, reported and disposed of lawfully. Burning is prohibited.

PSC 5 Clearing and Grubbing

ADD THE FOLLOWING:

Clearing limits shall be pegged and approved before work starts. Roots, organic material and obstructions shall be removed to at least 200 mm depth beneath embankments, lined ponds, roads and structures. Areas outside approved limits disturbed by the Contractor shall be rehabilitated at its cost.

PSC 5.2.3.2 Individual Trees

REPLACE THE LAST SENTENCE WITH THE FOLLOWING:

A tree outside an approved clearing limit shall not be damaged or removed without prior written instruction. Where the Contractor unnecessarily damages or removes such a tree, it shall, at its cost, replace the tree with an approved species and size, make good the affected area, and protect and maintain the replacement for the specified establishment period or, where none is specified, until the end of the Defects Liability Period. If the Contractor fails to do so after written notice, the Employer may recover the reasonable demonstrated cost of the remedial work in accordance with the Contract. No predetermined penalty shall apply unless expressly stated in the Contract Data.

PSC 8 Measurement and Payment

ADD THE FOLLOWING:

PSC 8.3.1 Clearing and grubbing ..... Unit: m²

The unit of measurement shall be the plan area cleared within the approved limits. The rate shall include setting out the clearing limits, cutting and removal of vegetation, grubbing of roots, removal of trees and stumps up to 1 m girth, removal of

minor obstructions, loading, haul within the Site, stockpile management, trimming and making good. Refuse and landfill-type material measured under PSC 8.3.2 is excluded.

PSC 8.3.2 Clear and stockpile refuse, landfill-type material and garbage ..... Unit: m³

The tender quantity is an allowance for a nominal in-situ thickness of 0.50 m. The quantity shall be remeasured from agreed pre-clearance survey records, test pits or agreed area-and-depth measurements before disturbance. Loose or stockpiled volume shall not be used for measurement.

The rate shall include identification of the affected areas; separation of topsoil; gathering, excavation, sorting, loading and haul within the Site; stockpiling at the location instructed by the Employer's Agent; shaping, stabilising, covering where required, drainage, dust and litter control; and maintaining the stockpile until its subsequent use or disposal is instructed. Hazardous or regulated waste shall be isolated and reported and shall not be mixed into the stockpile. Off-site disposal and statutory disposal fees are excluded unless expressly stated in the Bill of Quantities.

PSC 8.3.3 Clear vegetation along a scheduled linear strip of stated width ..... Unit: m

The unit of measurement shall be the length of the completed strip measured along its centreline. The scheduled width shall be stated in the Bill of Quantities. The rate shall include all work described under PSC 8.3.1 across the full scheduled strip width.

PSD SANS 1200 D: EARTHWORKS

PSD 3 Classification and Suitability

REPLACE THE CONTENTS OF SUBCLAUSE 3.1.2 WITH THE FOLLOWING:

For measurement and payment purposes, excavation shall be classified only as **soft excavation** or **hard rock excavation**.

(a) Soft excavation

Soft excavation shall include:

- material that can be efficiently removed by a back-acting excavator having a flywheel power of approximately 0.10 kW per millimetre of tined-bucket width;
- material that can be efficiently loaded without prior ripping by a rubber-tyred front-end loader of approximately 15 t mass and 100 kW flywheel power;
- dense or very dense soil, residual soil, weathered material, calcrete, ferricrete and material requiring ripping or assistance from pneumatic tools;
- material that would ordinarily be classified as intermediate excavation under SANS 1200 D; and
- loose or embedded boulders that can be excavated, lifted, loaded or removed intact by suitable construction plant.

No separate measurement or payment shall be made for intermediate excavation or boulder excavation. The cost thereof shall be included in the applicable rates tendered for soft excavation.

The use of undersized, unsuitable, poorly maintained or inefficient plant, or the failure of the Contractor's selected plant to excavate a material, shall not constitute evidence that the material is hard rock.

(b) Hard rock excavation

Hard rock excavation shall be excavation in competent rock, or in individual boulders exceeding 0.15 m³, that cannot be efficiently removed until it has first been broken by drilling and blasting, wedging and splitting, or an equivalent controlled rock-breaking method accepted by the Employer's Agent.

Where hydraulic breaking is proposed instead of blasting, wedging or splitting, the material shall qualify as hard rock only where it was exposed, inspected and classified as hard rock before breaking commenced. The Contractor's election to use a hydraulic breaker shall not, by itself, determine the classification.

The Contractor's attention is drawn to the variable and undulating weathered gneissic bedrock profile described in the Geotechnical Investigation. Refusal of the light TLB used during the investigation does not automatically constitute hard rock under this specification. The Contractor shall provide plant suited to the anticipated dense residual soils, weathered rock and competent bedrock.

(c) Classification procedure

Where the Contractor considers that hard rock has been encountered, the Contractor shall:

- give the Employer's Agent at least 24 hours' written notice before disturbing or breaking the material;
- expose and clean a representative area sufficiently to permit inspection and classification;
- when required by the Employer's Agent, demonstrate the excavatability of the disputed material using a suitable, properly maintained 30 t to 40 t tracked excavator fitted with an appropriate rock bucket, or equivalent plant accepted for the demonstration; and
- jointly survey and record the limits and levels of the material before excavation.

Hard rock quantities shall be determined from agreed survey records or other measurements accepted by the Employer's Agent. Material removed or broken before the Employer's Agent has been afforded a reasonable opportunity to inspect and measure it shall be classified using the records and evidence available. The Contractor shall bear the risk of any inability to substantiate the claimed classification or quantity.

(d) Blasting and controlled rock breaking

Blasting shall not commence without the Employer's Agent's prior written approval of the proposed method. Such approval shall not relieve the Contractor of any responsibility under the Contract or applicable legislation.

The Contractor shall obtain all permits and approvals and shall provide a blasting method statement, risk assessment, blast design, pre-blast condition survey, monitoring, security, notifications and the services of legally competent personnel. All costs associated with lawful and safe blasting or controlled rock breaking shall be included in the applicable hard rock excavation rates unless expressly scheduled otherwise.

PSD 3.2 Suitability of Material

ADD THE FOLLOWING TO SUBCLAUSE 3.2:

The Geotechnical Investigation records double-hydrometer values ranging from approximately 53% to 98% and identifies the tested onsite soils as highly dispersive. Tenderers shall price the Works with full knowledge of this condition.

The Geotechnical Investigation is based on seventeen shallow TLB test pits and laboratory testing of selected samples. Conditions between test positions and below the investigated depths may differ. The reported test-pit termination depths or average excavation depth shall not be used to establish excavation classification, quantities, plant entitlement or payment.

The Contractor shall inspect the Site and use the Geotechnical Investigation together with its own construction planning. Actual excavation shall be classified and measured only in accordance with PSD 3.1.2 and the agreed contemporaneous records.

Untreated dispersive material shall not be placed:

- within the cement-treated protection zones;
- within 500 mm of a liner-support surface;
- around pipes, structures, penetrations, filters or drainage systems;
- in erosion-protection zones; or
- where otherwise prohibited by the Drawings or Project Specifications.

Processed onsite material may be used in the general embankment core where it complies with the specified grading, plasticity, density and moisture requirements and is completely enclosed by the specified liner system and cement-treated protection zones.

Topsoil, refuse, organic matter, roots, vegetation, building rubble, contaminated material, segregated dispersive clay lumps and other deleterious material shall not be incorporated into fill or embankments.

Oversize particles shall be removed or crushed. Material shall be processed and blended to produce a uniform fill. Compliance shall be confirmed by representative testing for each material source or soil horizon and whenever the material characteristics change.

Acceptance of a material source shall not constitute acceptance of all material obtained from that source. The Contractor shall remain responsible for selecting, processing and placing only compliant material.

PSD 5: CONSTRUCTION

PSD 5.1 Excavation and Founding

ADD THE FOLLOWING:

The Contractor shall provide and maintain all temporary drainage, diversion berms, sumps, pumps, shoring, battering and other measures required to keep excavations safe, stable and free from stormwater, seepage and loose material. Temporary dewatering associated with rainfall, surface runoff or shallow perched water shall be included in the applicable excavation rates.

No foundation, pond floor or formation shall be covered until it has been inspected and accepted by the Employer's Agent. Acceptance shall not relieve the Contractor of responsibility for compliance with the specified lines, levels and founding requirements.

Loose rock, unstable blocks, organic material, refuse, disturbed material and unsuitable founding material shall be removed. Rock pinnacles, abrupt hard points and sharp projections within the required formation beneath liners, slabs or structures shall be trimmed to provide continuous and uniform support.

Voids and local depressions shall be filled with approved selected material compacted to at least 95% MDD or with blinding concrete where adequate compaction cannot be achieved.

Over-excavation, disturbance or overbreak resulting from the Contractor's operations shall be made good at the Contractor's cost using material and methods accepted by the Employer's Agent.

Pond floors and other earthworks formations shall be trimmed to within ±25 mm of the specified levels. Abrupt steps, depressions, loose material and high points shall not be permitted, notwithstanding compliance with the level tolerance.

PSD 5.2 Fill and Embankments

ADD THE FOLLOWING:

Fill shall be placed in uniform horizontal layers not exceeding 150 mm compacted thickness.

Each untreated dispersive fill layer shall be moisture-conditioned on the wet side of optimum, within the range from OMC to OMC + 2 percentage points. The trial section shall target OMC + 1.5 to OMC + 2 percentage points and shall establish the material-specific range that achieves density without pumping, rutting or strength loss. Compaction dry of OMC shall not be accepted. Each layer shall be compacted to at least 95% of MDD determined in accordance with SANS 3001-GR30.

A separate MDD and OMC determination shall be undertaken for each materially different fill type or source and whenever a change in grading, plasticity, origin or visual character is observed.

Each layer shall be processed and compacted over its full width before the succeeding layer is placed. No fill shall be placed on material that is loose, desiccated, cracked, flooded, contaminated, rutted or otherwise non-compliant.

Embankments shall be raised substantially uniformly over their full width. Adjacent construction zones shall not differ by more than one compacted layer unless otherwise accepted by the Employer's Agent.

Where new fill is placed against previously compacted fill or sloping natural ground, the interface shall be benched or stepped to provide positive interlock. Feather-edged construction shall not be permitted.

No subsequent layer shall be placed until the underlying layer has been tested and accepted. Failed material shall be ripped, moisture-conditioned, reworked, recompacted and retested at the Contractor's cost.

Except for work expressly covered by a separate scheduled item, all costs associated with material processing, blending, moisture conditioning, compaction, benching, process-control testing, reworking and retesting shall be included in the applicable tendered rates.

PSD 5.3 Unsuitable and Surplus Material

ADD THE FOLLOWING:

Material classified by the Employer's Agent as unsuitable shall be excavated separately and transported to a disposal area identified by the Contractor and accepted by the relevant authorities and the Employer's Agent.

The Contractor shall obtain all permissions required for the disposal area and shall be responsible for access, loading, transport, tipping fees, spreading, shaping, drainage, environmental compliance and rehabilitation.

The freehaul distance shall be 10 km, measured one way along the shortest practicable approved haul route from the point of excavation to the disposal point.

Haul beyond 10 km shall be measured and paid as overhaul only where:

- an overhaul item is included in the Bill of Quantities;
- the disposal point or haul route has been instructed or accepted in writing by the Employer's Agent before hauling; and
- the additional haul was not caused by the Contractor's choice, default or failure to secure an acceptable disposal area within the freehaul distance.

No overhaul shall be payable for double handling, rehandling, movement between Contractor-selected stockpiles or use of a more distant disposal area for the Contractor's convenience.

PSD 7: TESTING

ADD THE FOLLOWING:

For earthworks acceptance testing, a lot shall comprise material from a substantially uniform source placed in one layer during one continuous construction operation. The Employer's Agent may reduce the size of a lot where material, moisture, plant or construction conditions vary.

The minimum density-testing frequencies shall be:

- general bulk fill: one test per 500 m² of each compacted layer, with not fewer than three tests per lot; and
- pond embankments, liner-support formations and structure platforms: one test per 250 m² of each compacted layer, with not fewer than three tests per lot.

In-situ dry density shall be determined in accordance with SANS 3001-GR35 or SANS 3001-NG5, as applicable. Moisture content shall be recorded at each density-test position.

Testing positions shall be distributed across the full width of the layer and shall include edges, transitions, areas adjacent to structures and other locations selected by the Employer's Agent. Test locations, layer levels, material sources and results shall be recorded and submitted in an auditable earthworks quality-control register.

The Contractor shall include the cost of all specified process-control and compliance testing in the applicable earthworks rates. Failed lots shall be reworked and retested at the Contractor's cost.

PSD 8 Measurement and Payment

ADD THE FOLLOWING:

Excavation shall be measured in situ to the lines and levels shown or instructed. No payment shall be made for over-excavation, overbreak, bulking, shrinkage, temporary stockpiles, double handling, rehandling or work outside the authorised limits unless expressly provided for in the Bill of Quantities.

PSD 8.3.1 Excavate in all materials to authorised lines and levels (base item) ..... Unit: m³

The rate shall include excavation, selection and loading of all authorised excavation, including material falling within the soft classification, intermediate material and removable boulders. Hard rock remains included in the measured base quantity and the additional cost of hard-rock excavation is paid only as the extra-over under PSD 8.3.2. Fill construction, imported fill and disposal are measured separately under PSD 8.3.3, PSD 8.3.4 and PSD 8.3.5 respectively. No payment shall be made for over-excavation, bulking, shrinkage, temporary stockpiles, double handling or work outside the authorised limits.

PSD 8.3.2 Extra-over PSD 8.3.1 for material classified as hard rock ..... Unit: m3

The extra-over rate shall include the additional cost of exposing, demonstrating, breaking, blasting where approved, loading and handling hard rock, including permits, competent personnel, monitoring, protection and records. It shall apply only to quantities classified and jointly recorded before disturbance in accordance with PSD 3.1.2.

PSD 8.3.3 Construct compacted fill using suitable material from excavations ..... Unit: m3

The rate shall include selection, processing, crushing or removal of oversize particles, blending, haul within freehaul, spreading, moisture conditioning, 150 mm compacted layers, compaction to the specified density, benching, trimming, process-control testing, records and protection.

PSD 8.3.4 Construct compacted fill using imported approved material ..... Unit: m3

The rate shall include locating and obtaining the source, royalties, permits, winning, processing, loading, all haul, offloading, spreading, moisture conditioning, compaction, testing, trimming and protection. No additional overhaul shall apply to imported material selected by the Contractor.

PSD 8.3.5 Dispose of unsuitable or surplus material within freehaul ..... Unit: m3

The rate shall include separate excavation where required, loading, transport within 10 km one-way freehaul, disposal permissions and fees, spreading, shaping, drainage, environmental compliance and rehabilitation of the disposal area.

PSD 8.3.6 Overhaul beyond the 10 km freehaul distance, where scheduled and instructed ..... Unit: m3.km

Overhaul shall be measured as the product of the accepted in-situ volume and the one-way distance, in kilometres, beyond 10 km along the approved route. No overhaul shall be payable unless every condition in PSD 5.3 is satisfied.

PSD 8.3.7 Earthworks and cement-treatment trial sections complete ..... Unit: Sum

The sum shall include both required trials, materials other than cement measured separately, plant, survey, laboratory and field testing, records, protection and removal of failed trials. If no separate item is scheduled, these costs shall be included in the applicable fill rates.

PSD 8.3.8 Construct cement-treated embankment protection zones ..... Unit: m3

The rate shall include compliant soil, processing, controlled spreading, mixing, water, shaping, compaction, interfaces, curing, protection, testing and finishing, but shall exclude only the approved mass of cement measured under PSD 8.3.9.

PSD 8.3.9 Portland cement incorporated in accepted cement-treated zones ..... Unit: t

Cement shall be measured by the accepted dry mass actually incorporated within the specified zones at the accepted application rate, verified from delivery records and calibrated application records. The rate shall include supply, delivery, secure weatherproof storage, handling and losses. Cement wasted, applied outside the specified zones or used in rejected work shall not be measured.

PSD 8.3.10 Strip topsoil and stockpile — included in the applicable site-clearance and earthworks items; not separately measured

Topsoil stripping, loading, haul within 1000 m, separate stockpiling, shaping, drainage, weed and erosion control, maintenance and making good shall be included in the rates for the applicable site-clearance and earthworks items. Re-spreading is measured only where expressly scheduled under PSPA 8.3.1.

PSD 8.3.11 Extra-over PSD 8.3.1 for authorised excavation by hand ..... Unit: m³

The unit of measurement shall be the authorised in-situ volume excavated by hand where specifically required by the Drawings or instructed by the Employer's Agent. The rate shall be an extra-over to PSD 8.3.1 and shall include hand tools, careful exposure and protection of services or structures, temporary support, trimming and additional handling. The base excavation, fill construction and disposal remain measured under their applicable items.

PSDB SANS 1200 DB: EARTHWORKS (PIPE TRENCHES)

PSDB 3.5 Backfill Materials

ADD THE FOLLOWING:

Bedding, selected fill and main backfill shall comply with SANS 1200 DB and LB, the pipe manufacturer's installation requirements and the Drawings. Material shall be free from topsoil, refuse, organic matter, dispersive clay lumps, sharp particles and deleterious matter.

Where cement-treated granular backfill is shown or instructed, the tender-design cement content shall be 5% by dry mass. The untreated material shall have a maximum particle size of 38 mm and a plasticity index not exceeding 10. The final cement content, moisture range and working time shall be established by an accepted laboratory mix design and site trial.

Where flowable soilcrete is expressly specified, it shall comprise approved aggregate uniformly mixed with a tender-design 5% cement by dry mass and sufficient water to flow into and completely fill the designated void without segregation. The proposed mix, flow, strength, shrinkage and future-excavatability characteristics shall be submitted and accepted before use.

PSDB 5 Construction

ADD THE FOLLOWING:

Trenches shall be supported or battered as required, barricaded and maintained safe, stable and free from water. Excavated material and plant loads shall be kept clear of trench edges. No pipe shall be laid on a softened, disturbed, flooded or unaccepted trench bottom.

Minimum cover shall be as shown on the Drawings. Where no cover is shown, it shall be 700 mm in non-traffic areas and 1 000 mm beneath roads or trafficked areas, measured vertically from finished level to pipe crown.

Bedding and selected fill shall be placed and compacted evenly beneath the haunches and on both sides of flexible pipes in layers not exceeding 100 mm compacted thickness, using plant and procedures that do not displace, ovalise or damage the pipe. Main backfill shall be placed in layers not exceeding 150 mm compacted thickness.

Bedding, selected fill and main backfill shall be compacted to at least 95% of MDD determined in accordance with SANS 3001-GR30. Cement-treated backfill shall be compacted to at least 95% of the MDD of the stabilised mixture determined in accordance with SANS 3001-GR31, within the accepted working time.

Particles exceeding 38 mm shall not be placed in bedding or selected fill, and stones exceeding 75 mm shall not be placed within 300 mm of a pipe. Backfill at road crossings shall match the material type, layer thickness and density required for the adjoining road layers. Damage or settlement attributable to trench work shall be made good at the Contractor's cost.

PSDB 7 Testing and Acceptance

ADD THE FOLLOWING:

A trench-backfill lot shall not exceed 100 m of trench, one compacted layer and one substantially uniform material source. At least three in-situ density tests shall be undertaken per layer per lot, distributed between the trench centreline and both side zones. At each road crossing and structure, at least two additional tests per layer shall be undertaken.

No subsequent layer shall be placed until the underlying layer has complied. Failed material shall be reworked and retested at the Contractor's cost. Test locations, layer levels, pipe chainages, material sources, MDD references and results shall be recorded in the trench-backfill register.

PSDB 8 Measurement and Payment

ADD THE FOLLOWING:

Unless separately scheduled, trench rates shall include excavation support, temporary drainage and dewatering associated with normal surface water or shallow seepage, disposal within freehaul, bedding preparation, layer placement, moisture conditioning, compaction, testing, protection of services and making good.

PSDB 8.3.1 Extra-over for cement-treated granular main backfill above the selected-fill zone ..... Unit: m3

The rate shall apply only to cement-treated main backfill above the selected-fill zone and shall include processing, spreading, mixing, water, compaction, curing, testing and working-time control. Cement-treated bedding and selected fill shall be measured under PSLB 8.2.6 and shall not be included in this item. Cement shall be included in this rate unless a separate trench-backfill cement item is scheduled.

PSDB 8.3.2 Flowable soilcrete backfill, where instructed ..... Unit: m3

The rate shall include mix design, all constituents, batching, transport, placement, temporary containment, curing, testing and making good. Soilcrete placed without prior written instruction shall not be measured.

PSDE: SANS 1200 DE - EARTHWORKS FOR SMALL EARTH DAMS (POND EMBANKMENTS)

PSDE 3 Embankment Materials and Zoning

ADD THE FOLLOWING:

The following materials shall not be incorporated into pond embankments:

- topsoil;
- refuse, building rubble or contaminated material;
- vegetation, roots, organic matter or biologically disturbed material;
- segregated dispersive clay lumps;
- unstable or degradable rock;
- sharp or angular particles capable of damaging the liner system; and
- particles exceeding 75 mm or two-thirds of the compacted layer thickness, whichever is smaller.

The tested onsite materials are highly dispersive. Processed onsite material may be used in the general embankment core only where it complies with this specification and is enclosed by the specified cement-treated protection zones and liner system.

Material within 500 mm of the liner-support surface shall be selected and processed so that:

- the maximum particle size does not exceed 20 mm;
- no sharp, angular or protruding particles are present;
- the material is uniform and free from segregation; and
- the completed surface is firm, stable, smooth and suitable to receive the specified geotextile protection layer and HDPE liner.

Material processing, screening, removal of oversize particles and blending required to achieve these requirements shall be included in the applicable embankment rates.

PSDE 5 Construction

PSDE 5.1 Foundation Preparation

ADD THE FOLLOWING:

Foundation preparation shall constitute a hold point. No embankment fill shall be placed until the prepared foundation has been inspected and accepted in writing by the Employer's Agent.

Topsoil, refuse, dumped material, roots, organic matter, loose material, unstable rock and unsuitable founding material shall be completely removed.

Sloping foundations and interfaces with existing compacted fill shall be benched to provide positive interlock and safe access for compaction equipment. Benches shall be sufficiently wide to permit effective compaction and shall not be feather-edged.

Soil foundations shall be scarified to a minimum depth of 150 mm, moisture-conditioned on the wet side of optimum within the accepted trial range, but not below OMC, and compacted to at least 95% of MDD determined in accordance with SANS 3001-GR30.

Where competent rock is exposed, loose and weathered material shall be removed and the surface shall be cleaned and treated to eliminate abrupt steps, open voids and sharp projections.

The first fill layer shall be thoroughly worked into the prepared foundation so that no loose, smooth or continuous contact plane remains between the foundation and the embankment.

PSDE 5.3 Placement and Compaction

ADD THE FOLLOWING:

The requirements of PSD 5.2 shall apply to all pond embankment fill.

Pond embankment fill shall be placed in uniform horizontal layers not exceeding 150 mm compacted thickness and compacted to at least **95% MDD determined in accordance with SANS 3001-GR30**.

Each layer shall be processed and compacted over the full embankment width, including the general core and cement-treated protection zones, before the succeeding layer is placed.

The difference between adjacent fill zones shall not exceed one compacted layer. Where a difference cannot be avoided, the previously compacted material shall be stepped or benched before filling resumes. Feather-edged construction shall not be permitted.

Fill shall not be placed on material that is loose, desiccated, cracked, flooded, contaminated, softened or visibly non-compliant. A surface that has dried out, become glazed or remained exposed sufficiently long to deteriorate shall be scarified, moisture-conditioned and recompacted before filling continues.

PSDE 5.4 Cement-Treated Protection Zones

ADD THE FOLLOWING NEW SUBCLAUSE:

The following zones shall comprise cement-treated material:

- the outer 500 mm final compacted thickness of the inner pond-side embankment face, measured normal to the finished slope;
- the outer 500 mm final compacted thickness of the external embankment face, measured normal to the finished slope; and
- the upper 150 mm of the embankment crest, unless superseded by a pavement or crest detail shown on the Drawings.

The treated face zones shall be constructed concurrently with the general embankment. Positive interlock shall be maintained between treated and untreated material, and no smooth continuous construction plane shall be permitted.

The tender-design cement content shall be 5% by dry mass of the untreated material. The final accepted cement content shall be based on laboratory and site trials. Cement shall be measured by accepted mass under PSD 8.3.9; the treatment

operations shall be measured under PSD 8.3.8. No payment shall be made for waste, excess application or cement incorporated in rejected work.

The final cement type and content shall be confirmed by laboratory trials undertaken on representative material from each proposed source. The Employer's Agent shall issue the accepted application rate in writing before production treatment. The measured quantity of cement may vary with the accepted application rate; the treatment rate shall not be adjusted solely because the accepted cement percentage differs from the tender-design percentage.

The laboratory mix design shall include:

- MDD and OMC of the cementitiously stabilised mixture in accordance with SANS 3001-GR31;
- preparation, compaction and curing of laboratory specimens in accordance with SANS 3001-GR50;
- 7-day unconfined compressive strength in accordance with SANS 3001-GR53;
- indirect tensile strength in accordance with SANS 3001-GR54;
- wet-dry durability in accordance with SANS 3001-GR55;
- working time;
- plasticity and linear shrinkage;
- dispersivity assessed by repeat double-hydrometer testing and, where directed, crumb and pinhole testing; the accepted mix shall demonstrate a material reduction in dispersion and shall be classified non-dispersive by the accepted test method, unless a project geotechnical specialist approves a documented alternative criterion;
- erosion resistance; and
- assessment of shrinkage cracking.

Treated material shall be placed in layers not exceeding 150 mm compacted thickness. Cement shall be spread mechanically at a controlled application rate and mixed uniformly through the full layer depth before water is added.

The Contractor shall verify cement application using calibrated spreading equipment, cement-bag counts, weighbridge records or tray tests, as applicable. Daily records shall identify the area treated, material volume, cement mass, application rate, mixing time, water addition, compaction time and test results.

Mixing, moisture conditioning, shaping and compaction shall be completed within the working time established by the accepted trial and before initial setting occurs.

The treated material shall be compacted to at least **97% of the laboratory MDD of the stabilised mixture**.

Treated zones shall be protected from drying, traffic, erosion and damage and shall be cured for at least seven days. Curing water shall be applied in a manner that does not erode, segregate or damage the treated surface.

Before placement of the geotextile or liner, the liner-side treated surface shall be:

- free from shrinkage cracks, loose material and delamination;
- free from sharp projections, cement nodules and abrupt irregularities;
- trimmed to the specified lines and levels; and
- inspected and accepted by the Employer’s Agent and liner installer.

Defective treated material shall be removed and reconstructed at the Contractor’s cost.

PSDE 5.5 Filters, Drainage and Erosion Protection

ADD THE FOLLOWING:

Cement treatment of the embankment faces provides surface protection and shall not be regarded as the sole defence against seepage, piping or internal erosion.

Underliner drainage, filter zones, pipe-penetration filters, cut-off details and toe drainage shown on the Drawings shall be continuous and constructed using the specified filter-compatible materials.

Filter and drainage material shall be protected against contamination and segregation during storage and placement. Construction joints, pipe penetrations and transitions shall not interrupt the continuity of the filter or drainage system.

Where vegetated erosion protection is shown on the Drawings, the external face shall receive not less than 150 mm compacted thickness of approved non-dispersive topsoil and the specified indigenous grassing or hydroseeding system. Topsoil shall not be placed on the liner-side face or where it would obscure drainage outlets, stone pitching or inspection points.

Drainage outlets shall be connected to the discharge points shown on the Drawings and shall remain accessible for inspection and maintenance.

PSDE 7 Testing and Acceptance

ADD THE FOLLOWING:

Before production filling commences, the Contractor shall construct a trial embankment section using the proposed materials, plant, operators and construction procedures.

The general embankment trial shall:

- be not less than 20 m long;
- reproduce the proposed embankment zoning and full working width;
- comprise at least three consecutive compacted layers; and
- demonstrate material processing, layer thickness, moisture range, compaction plant, roller pattern, number of passes, achievable density, surface finish and construction interfaces.

A separate cement-treatment trial of not less than 100 m² shall demonstrate cement spreading, application-rate control, mixing, moisture conditioning, working time, compaction, curing and final surface preparation.

Trial sections accepted by the Employer's Agent may be incorporated into the permanent Works. Failed trial sections shall be removed and reconstructed at the Contractor's cost. Acceptance of a trial shall not relieve the Contractor of responsibility for continued compliance.

For pond embankments, each lot shall comprise one layer of substantially uniform material from one source placed during one continuous operation. A lot shall not exceed 750 m² unless otherwise accepted by the Employer's Agent.

Density testing shall be undertaken at not less than one test per 250 m² of each compacted layer, with a minimum of three tests per lot. Moisture content shall be determined at each density-test location.

For cement-treated zones:

- the reference MDD shall be the MDD of the stabilised mixture determined in accordance with SANS 3001-GR31;
- density testing shall be undertaken at not less than one test per 250 m² per layer, with a minimum of three tests per lot;
- cement application shall be verified for every area treated;
- UCS, ITS and durability testing shall be repeated whenever the material source, cement type or cement content changes and at the frequencies stated in the accepted quality-control plan; and
- the completed surface shall be inspected for cracking, delamination, erosion, loose material and irregularities before liner installation.

No succeeding layer shall be placed until the underlying layer has complied with the specified density, moisture, thickness and surface requirements.

All trial sections, sampling, process-control testing, compliance testing, record keeping, failed-work removal, reworking and retesting shall be included in the applicable tendered rates unless expressly scheduled otherwise.

PSDK 3 Materials

ADD THE FOLLOWING:

Stone shall be sound, durable, angular and resistant to weathering. A trial panel shall be approved before production work. Geotextile, mortar and wire shall comply with durability requirements for the exposure environment.

PSDK 5 Stone Pitching and Gabions

ADD THE FOLLOWING:

Pitching shall be dry-packed or grouted as shown on the Drawings. Grouted pitching for this Contract shall be light pitching not less than 200 mm thick, measured normal to the finished surface.

The receiving surface shall be trimmed to line and level, proof-rolled where accessible and compacted to at least 95% MDD in accordance with SANS 3001-GR30. Soft spots, loose material and erosion gullies shall be removed and made good before pitching is placed. Where shown, a continuous nonwoven filter geotextile shall be installed with overlaps and terminations arranged to prevent soil loss and undermining.

Stone shall comply with SANS 1200 DK for light pitching. Each stone shall be placed individually from the toe upwards, with its largest dimension approximately normal to the slope, in close contact with adjoining stones and with joints broken. Dumping stone into position is prohibited. The completed layer shall be tight, stable and not less than 200 mm thick.

Grout shall comprise one part Portland cement to four parts clean fine aggregate by volume, with only sufficient water to permit the grout to flow into the voids when assisted by spading or rodding. Stone surfaces shall be cleaned and dampened before grouting. Grout shall penetrate not less than 150 mm below the finished surface and shall completely fill the accessible voids without leaving a weak surface wash.

Toe trenches, perimeter trenches, edge keys, crest terminations and transitions shall be constructed as shown or as required to prevent undermining and unraveling. The pitching shall be divided into panels by movement joints where it abuts concrete structures, across abrupt changes in geometry and at centres not exceeding 6 m unless shown otherwise. The surface shall be protected from traffic for at least 48 hours and cured for not less than four days.

A trial panel of not less than 4 m² shall be constructed and accepted before production work. Acceptance criteria shall include stone quality and packing, thickness, grout penetration, alignment, surface regularity, toe and edge details, curing and drainage at transitions.

PSDK 8 Measurement and Payment

Only the PSDK payment items expressly included in the Bill of Quantities apply to the Contract scope. Unscheduled dry pitching, gabions, mattresses or filter geotextile shall not be deemed included merely because their standard payment clauses are retained for possible instructed variations.

PSDK 8.3.2 200 mm minimum-thickness light grouted stone pitching ..... Unit: m²

The unit of measurement shall be the square metre of completed finished surface. The rate shall include surface preparation; proof rolling and local making good; footing and edge trenches not exceeding 1 m vertical depth; toe, crest and perimeter keys; approved stone; 1:4 grout; placing and hand packing; spalls; grouting; joints; curing; the trial panel; protection; trimming and making good. Filter geotextile is included only where expressly described in the item; otherwise it is measured under PSDK 8.3.5.

PSDK 8.3.5 A4 filter geotextile beneath pitching or gabions — not separately scheduled

Where filter geotextile is expressly required beneath scheduled grouted pitching, it shall be included in the composite grouted-pitching rate. Other use requires a written variation.

PSDM SANS 1200 DM: EARTHWORKS (ROADS AND SUBGRADE)

PSDM 3 Materials

ADD THE FOLLOWING:

Roadbed and selected material shall comply with the classes shown on the pavement drawings, free from organics, refuse and oversize particles. Marginal material shall not be improved without an approved mix design.

PSDM 5 Construction

ADD THE FOLLOWING:

The roadbed shall be ripped to at least 150 mm, moisture-conditioned and compacted to at least 93% MDD. Soft spots shall be undercut and replaced. The formation shall be shaped to drain before pavement layers are placed. Haul routes shall be maintained and watered for dust control throughout.

PSDM 7 Testing

ADD THE FOLLOWING:

At least one density test per 500 m², minimum three per lot. Proof rolling shall supplement, but not replace, density testing.

PSMJ SANS 1200 MJ: SEGMENTED PAVING

PSMJ 3 Materials

ADD THE FOLLOWING:

Concrete paving units shall be 60 mm thick interlocking units complying with SANS 1058, of the class, shape and colour shown on the Drawings or accepted from samples. Units shall be sound, uniform and free from cracks, chips and dimensional defects that impair interlock or appearance. Bedding and jointing sand shall comply with SANS 1200 MJ and shall be clean, durable and free from clay, organic matter and deleterious material.

PSMJ 5 Construction

ADD THE FOLLOWING:

The completed base or subbase shall be accepted before paving commences. Bedding sand shall be spread uniformly to an uncompacted thickness that produces a compacted bedding layer of 20 mm to 30 mm. Pavers shall be laid to line, level and fall in the approved pattern, cut with a mechanical saw at edges and obstructions, and restrained by concrete kerbs, edge beams or other approved permanent restraints.

The laid surface shall be compacted with a suitable plate compactor, joints shall be completely filled with approved dry jointing sand, and final compaction shall continue until the units are fully bedded and interlocked. The finished surface shall drain without ponding. Cracked, rocking, stained, misaligned or chipped units shall be removed and replaced.

PSMJ 8 Measurement and Payment

PSMJ 8.3.1 60 mm thick interlocking concrete paving complete ..... Unit: m²

The unit of measurement shall be the square metre of completed paving measured in the finished plane. The rate shall include pavers, samples, bedding sand, jointing sand, laying pattern, cutting, fitting around structures, waste, compaction, cleaning and making good. Base and subbase layers, kerbs and concrete edge beams are excluded where separately scheduled.

PSG SANS 1200 G: CONCRETE (STRUCTURAL)

PSG 3 Materials

ADD THE FOLLOWING:

Unless otherwise shown on the Drawings or specified elsewhere, the following minimum concrete grades shall apply:

Application	Minimum concrete grade
a) Blinding below foundations, bases and floor slabs	15 MPa / 19 mm
b) Mass concrete, non-structural fill and minor pipe encasement	20 MPa / 19 mm
c) Thrust blocks, anchor blocks and unreinforced foundations	25 MPa / 19 mm
d) Concrete aprons, walkways, hardstands and minor surface slabs	25 MPa / 19 mm
e) Concrete channels, open drains and headwalls not exposed to, or retaining, sewage	25 MPa / 19 mm
f) General reinforced-concrete foundations, bases, slabs, beams and columns	30 MPa / 19 mm
g) Cast in-situ manholes and chambers not exposed to, or retaining, raw sewage	30 MPa / 19 mm
h) Manholes, chambers, channels and sumps exposed to, or retaining, raw sewage	35 MPa / 19 mm
i) Water- or sewage-retaining walls, bases and floor slabs	35 MPa / 19 mm

j) Inlet works, anaerobic pond walls and bases, 60° cone structures and other liquid-retaining structures — 35 MPa / 19 mm

k) Precast concrete elements — Manufacturer's design, but not less than 30 MPa

The stated concrete grade denotes the specified 28-day characteristic compressive strength and maximum nominal aggregate size.

Cement used in concrete exposed to wastewater, raw sewage, aggressive ground conditions, or situated below the design water level shall be sulphate-resistant cement complying with the applicable requirements of SANS 50197. Chloride-bearing admixtures shall not be used in reinforced or prestressed concrete.

The Contractor shall submit proposed concrete mix designs, including cement type, cement content, water to cement ratio, aggregate grading and admixture details, to the Employer's Agent for review before commencing concrete work. No concrete shall be placed until the applicable mix design has been accepted.

PSG 4 Formwork and Reinforcement

ADD THE FOLLOWING:

Formwork shall be grout-tight and rigid. Reinforcement shall be supported on approved concrete or proprietary plastic spacers - porous mortar blocks, brick and stone spacers are prohibited. Minimum concrete cover:

- Water retaining structures and wastewater contact: 50 mm
- Below ground level: 50 mm
- Other exposed surfaces: 40 mm

All reinforcement: SANS 920, high tensile deformed bars (Y-bars). Bending schedules and mill certificates required before commencement.

PSG 5 Construction

PSG 5.1 Pre-pour Hold Point

ADD THE FOLLOWING:

A signed pre-pour checklist is required confirming: formwork dimensions, cleanliness and stability; reinforcement placement and cover; waterstops, puddle flanges, sleeves and embedded items; construction joint surface preparation; pre-pour level survey.

PSG 5.2 Liquid-Retaining Work

ADD THE FOLLOWING:

Casting sequences and joint positions shall minimise restraint cracking and shall conform to the joint codes and locations shown on the Drawings. Unplanned construction joints are prohibited. All waterstops, joint fillers, backing materials, primers and sealants shall form coordinated systems and shall be inspected before adjoining concrete or sealant is placed.

PSG 5.2.1 Joint Products and Selection

Only products manufactured or supplied by a.b.e. Construction Chemicals South Africa shall be named for concrete joint sealing. Use a.b.e. durajoint PVC external C profiles at construction joints in base slabs, pond linings and at kicker/base-to-wall joints; durajoint PVC external E profiles at movement joints in base slabs; and centrally placed durajoint PVC centre-bulb profiles at movement joints in walls. Centrally placed dumbell profiles may be used only at full-depth vertical wall construction joints where expressly shown. Profile size shall suit the concrete thickness, reinforcement arrangement, aggregate size and pour complexity and shall be confirmed on the accepted waterstop shop drawing.

PSG 5.2.2 Construction and Kicker Joints

Reinforcement shall remain continuous through COJ and KJ. In 150 mm base slabs and pond linings provide durajoint PVC external C150 on the dry or external face. At kicker/base-to-wall joints provide durajoint PVC external C150 installed vertically across the joint on the dry or external face. At a full-depth vertical wall construction joint, provide the centrally

placed durajoint PVC dumbell profile shown on the accepted joint shop drawing. The waterstop centreline shall coincide with the joint and approximately half of the profile shall be embedded in each adjoining pour.

Kickers shall be 150 mm high and cast monolithically with the base slab. The KJ shall occur at the top of the kicker. The a.b.e. durajoint external C150 waterstop shall be installed vertically across the joint on the dry or external face, with approximately 75 mm embedded in the kicker pour and 75 mm embedded in the wall pour. It shall be fixed to prevent displacement, kept free of concrete contamination over the projecting half and connected to adjoining slab or wall waterstops by factory-manufactured intersections or transitions.

Provide a 12 mm by 12 mm flexible wet-face seal at COJ and KJ using flexothane P on horizontal faces and flexothane G on inclined or vertical faces, with epidermix 326 primer and duracord backing. The PVC waterstop is the primary embedded seal and the flexothane seal is the accessible secondary seal.

PSG 5.2.3 Anaerobic-Pond Joint Arrangement

Provide the continuous COJ between the pond floor and slope toe and four diagonal corner COJ per pond, one at each corner. Reinforcement shall remain continuous. Pond access steps shall be cast monolithically with the adjacent side-slope pour and no joint shall be formed around the steps. No additional pond construction joint shall be introduced without the Employer's Agent's prior written approval.

PSG 5.2.4 Saw-Cut Contraction and Paving Control Joints

SCJ in liquid-retaining concrete shall have continuous reinforcement. Saw-cut as soon as the concrete can be cut without ravelling and before uncontrolled shrinkage cracking. The initial cut shall be 3 mm to 5 mm wide and one-third of the member depth, being 50 mm in the 150 mm pond lining. No PVC waterstop, swellable waterstop, joint filler, grout or sealant shall be installed in the deep narrow portion of an SCJ.

After the concrete has cured and dried sufficiently for sealant application, route the upper portion to accommodate duracord and a finished 12 mm by 12 mm sealant section. Prime concrete with epidermix 326 and use flexothane P on horizontal surfaces or flexothane G on inclined and vertical surfaces. Duracord shall control sealant depth and prevent three-sided adhesion.

PCJ in 100 mm apron slabs shall be saw-cut to one-third of the slab depth. Panels shall be approximately square and shall not exceed 3.0 m in either direction. Seal the routed upper portion with a 12 mm by 12 mm flexothane P seal, epidermix 326 primer and duracord backing. No waterstop shall be provided.

PSG 5.2.5 Movement and Isolation Joints

MJ shall be 20 mm wide and full depth. Reinforcement shall terminate 50 mm clear of each joint face. Provide durasheet 100 compressible filler and a continuous movement-joint waterstop: external E150 in 150 mm base slabs, external E200 in 200 mm base slabs, centre-bulb 150 in 150 mm walls and centre-bulb 200 in 200 mm walls. Provide factory-manufactured transitions between external and centrally placed profiles. Seal horizontal wet faces with flexothane P and inclined or vertical wet faces with flexothane G.

The joint between the top of the anaerobic-pond concrete lining and the apron slab shall be a 15 mm full-depth IJ where the complete joint is above full water level. Provide durasheet 40 filler and a 15 mm wide by 12 mm deep flexothane P surface seal with epidermix 326 primer. No waterstop, reinforcement, dowel or rigid connection shall cross an IJ. Any portion below full water level shall be detailed as an MJ.

PSG 5.2.6 Waterstop Fabrication and Installation

Waterstops shall form a continuous network through slabs, walls, corners and intersections. Mitres, T-pieces, three-way and four-way intersections and transitions between external and centrally placed profiles shall be factory manufactured by a.b.e. Site welding shall be limited to straight butt welds made with the manufacturer's heat-welding equipment by trained personnel.

Centrally placed waterstops shall be secured with approved clips or through the reinforced fixing edge without puncturing the web or sealing ribs. External profiles shall be supported on blinding or fixed to shuttering through the outer nailing flange. Concrete shall be fully compacted around all ribs. Folded, punctured, displaced or poorly welded profiles shall be replaced before concreting.

PSG 5.2.7 Pipe Penetrations

New pipes cast through liquid-retaining concrete shall have a factory-fitted puddle flange compatible with the pipe material. Core-drilled or sleeved penetrations shall have a proprietary mechanical compression seal sized for the pipe and annulus. Provide a wet-face recess sealed with flexothane G, duracord and the applicable a.b.e. primer. Epidermix 326 shall be used on porous concrete and epidermix 391 only on compatible non-porous surfaces after adhesion has been confirmed.

Where specifically accepted, a rigid annulus from 6 mm to 25 mm may be filled with duragrout CG and provided with a separate flexible wet-face seal. Grout or sealant alone shall not constitute the primary seal around HDPE or PVC pipework. HDPE shall have a factory-welded puddle flange or an approved mechanical compression seal.

PSG 5.2.8 Joint-Sealant Preparation and Acceptance

Sealant recesses shall have sound parallel faces and shall be mechanically prepared to remove laitance, curing compound, mould oil and contamination. Clean with dry oil-free compressed air and allow the faces to dry before priming. Install a representative trial length of each joint type. Water testing or sewage exposure shall not commence until the sealant has fully cured in accordance with the current a.b.e. product data sheet.

PSG 5.3 Hot-Weather Precautions

ADD THE FOLLOWING:

Given the Pella climate: concrete temperature at discharge shall not exceed 30°C; materials and forms shall be shaded; mixing water shall be chilled if necessary; immediate curing shall be applied after surface finishing; curing shall continue for at least seven days using approved compound, wet hessian and polythene sheeting.

PSG 5.4 Defects and Repairs

ADD THE FOLLOWING:

Defects shall be mapped and assessed before repair. Honeycombing, cracks, displaced waterstops and leaking penetrations shall not be concealed. Repair products and methods shall be approved and compatible with the substrate, exposure and any subsequent coatings.

PSG 7 Testing

ADD THE FOLLOWING:

At least one sample set per concrete grade per 10 m³ placed, and at least one set per casting day per grade. Each set: six cubes (three for 7-day indicative, three for 28-day acceptance testing). All liquid-retaining structures shall be water-tested before backfilling, coating or commissioning. Allowable water loss: not more than 1/500 of the average water depth per day (excluding evaporation). Failed tests shall result in rectification before acceptance.

PSG 8 Measurement and Payment

PSG 8.3.1 100 mm thick reinforced-concrete apron slab complete ..... Unit: m²

The slab shall be 100 mm thick, 25 MPa / 19 mm concrete reinforced with Ref 193 welded mesh unless otherwise shown. Mesh shall terminate 50 mm clear of free edges and joints and shall be supported to maintain the specified cover. The supporting layer shall comprise at least 150 mm of approved G5 material compacted to at least 95% MDD in accordance with SANS 3001-GR30, unless a different pavement detail is shown.

Aprons shall be laid to positive drainage falls. Provide 15 mm full-depth IJ against buildings, structures, columns, manholes, pond crests and other restraints. Provide PCJ to divide the apron into approximately square panels not exceeding 3.0 m in either direction and at re-entrant corners. Saw-cut PCJ to one-third of the slab depth and seal the routed upper portion with a 12 mm by 12 mm flexothane P seal, epidermix 326 primer and duracord backing. Construction joints shall coincide with planned PCJ. No waterstop shall be provided at PCJ or at IJ located entirely above full water level.

The unit of measurement shall be the square metre of completed apron measured in plan. The rate shall include excavation to formation, disposal of surplus material within freehaul, G5 support layer, compaction and testing, edge formwork, concrete, Ref 193 mesh and supports, non-slip wood-float finish, curing, protection and making good. PCJ and IJ are included for the apron slab around the Anaerobic Ponds.

PSG 8.3.2 150 mm thick, 35 MPa / 19 mm reinforced-concrete pond lining complete ..... Unit: m²

The unit of measurement shall be the square metre of completed lining measured in the plane of the finished surface. The rate shall include surface preparation; local trimming; formwork at edges, steps and penetrations; 35 MPa / 19 mm concrete reinforced with Ref 245 welded mesh unless otherwise shown; placing, vibration and finishing; waterstops and embedded items other than joints separately scheduled; curing; cube testing; protection; watertightness repairs; and making good.

PSG 8.3.3 Reinforced-concrete access steps to anaerobic ponds complete ..... Unit: No.

The unit of measurement shall be each complete accepted set of access steps at the location shown. The rate shall include setting out; reinforcement; formwork; 35 MPa / 19 mm concrete reinforced with Ref 245 welded mesh unless otherwise shown; non-slip treads; inserts and fixings; monolithic casting and integration with the adjacent pond side-slope pour; curing; finishing; protective coating above maximum water level where shown; testing; and making good. No separate joint shall be formed or measured around the steps.

PSG 8.3.4 Joint work separately scheduled

Joint work shall be measured separately by joint type. Each unit rate shall include setting out, stop ends or formwork, surface preparation, all specified proprietary components, factory-made intersections and transitions, approved straight butt welds, terminations, trial installations, protection, inspection, curing coordination and making good. No material or operation measured under one joint item shall be duplicated under another item. PPJ remains included in the applicable pipe, chamber or manhole item unless expressly scheduled separately.

PSG 8.3.4.1 Watertight construction joints (COJ) ..... Unit: m

The unit of measurement shall be the metre of completed COJ measured along its centreline. The rate shall include stop ends; continuous reinforcement; the specified a.b.e. durajoint PVC external C150 or expressly detailed centrally placed profile; fixing and support; full compaction around the waterstop; and the 12 mm by 12 mm wet-face flexothane P or G seal with epidermix 326 primer and duracord backing.

PSG 8.3.4.2 Kicker/base-to-wall construction joints (KJ) ..... Unit: m

The unit of measurement shall be the metre of completed KJ measured along the joint centreline. The rate shall include the monolithic 150 mm high kicker; continuous reinforcement; a.b.e. durajoint PVC external C150 installed vertically on the dry or external face with approximately 75 mm embedded in each pour or expressly detailed centrally placed profile; secure temporary support and protection; factory connections to adjoining waterstops.

PSG 8.3.4.3 Saw-cut contraction joints in liquid-retaining concrete (SCJ) ..... Unit: m

The unit of measurement shall be the metre of completed SCJ measured along the saw-cut centreline. The rate shall include early saw cutting to one-third member depth; later routing of the upper recess; drying and mechanical preparation; duracord backing; epidermix 326 primer; and a finished 15 mm by 15 mm flexothane P or G seal. No embedded waterstop, joint filler or grout shall be included.

PSG 8.3.4.4 Watertight movement joints (MJ) ..... Unit: m

The unit of measurement shall be the metre of completed 20 mm full-depth MJ measured along its centreline. The rate shall include terminating reinforcement 50 mm clear of both joint faces; a.b.e. durasheet 100 compressible filler; the specified external E150/E200 or centrally placed centre-bulb 150/200 waterstop; factory transitions; bond-breaking backing; and the specified polyurae wet-face seal and compatible primer.

PSG 8.3.4.5 Saw-cut paving/apron control joints (PCJ) ..... Unit: m

The unit of measurement shall be the metre of completed PCJ measured along the saw-cut centreline. The rate shall include saw cutting to one-third slab depth, routing the upper recess, mechanical preparation, duracord backing, epidermix 326 primer and a finished 12 mm by 12 mm flexothane P seal. No waterstop shall be included.

PSG 8.3.4.6 Non-retaining isolation joints above full water level (IJ) ..... Unit: m

The unit of measurement shall be the metre of completed 15 mm full-depth IJ measured along its centreline. The rate shall include a.b.e. durasheet 40 filler; arrises and sealant recess; epidermix 326 primer; and a 15 mm wide by 12 mm deep flexothane P surface seal. No reinforcement, dowel, waterstop or rigid connection shall cross the joint. Any portion below full water level shall be measured as MJ.

PSGA SANS 1200 GA: CONCRETE (SMALL WORKS)

PSGA 3 Materials

ADD THE FOLLOWING:

Small concrete work includes thrust blocks, anchor blocks, pipe surrounds, minor slabs, marker blocks and drainage appurtenances. Minimum 25 MPa / 19 mm unless otherwise shown; blinding may be 15 MPa / 19 mm. Thrust and anchor blocks shall bear against undisturbed ground or compacted fill and shall not obstruct pipe joints or bolt access.

PSGB SANS 1200 GB: CONCRETE (ORDINARY BUILDINGS)

PSGB 3 Materials and Finishes

ADD THE FOLLOWING:

Concrete for the operator facility and ancillary building work shall comply with SANS 10400 requirements. External concrete shall be durable under high solar exposure. Finished floors shall be dense, non-slip and graded to drains. Damp-proofing, sleeves, services and termite treatment shall be coordinated before concrete placement.

PSGE SANS 1200 GE: PRECAST CONCRETE

PSGE 3 Manufacture and Approval

ADD THE FOLLOWING:

Precast units (manhole rings, covers, channels, proprietary units) shall be from an approved manufacturer and shall be fully traceable. Shop drawings showing dimensions, reinforcement, lifting points, jointing and design loads are required. Damaged, cracked or non-compliant units shall not be incorporated.

PSGE 5 Installation

ADD THE FOLLOWING:

Units shall be lifted at designated points, bedded uniformly and joined watertight where required. Covers and slabs shall have the load rating shown. Manhole covers in the veld shall finish at least 150 mm above ground level to exclude stormwater.

PSH SANS 1200 H: STRUCTURAL STEELWORK

PSH 3 Materials

ADD THE FOLLOWING:

Structural steel grades, bolts and welding consumables shall be as shown on the Drawings. Stainless steel in direct wastewater exposure shall be Grade 316L. Mill certificates shall be submitted for all principal members and stainless-steel components.

PSH 5 Fabrication and Erection

ADD THE FOLLOWING:

Fabrication drawings shall be coordinated with concrete, mechanical and electrical works before manufacture. Welding shall be by qualified personnel using approved procedures. Site drilling or flame cutting of protective coatings is not permitted without an approved repair procedure.

PSHA SANS 1200 HA: SUNDRY STRUCTURAL STEELWORK

PSHA 3 Items

ADD THE FOLLOWING:

Sundry items include handrails, ladders, gratings, covers, screen frames, brackets, gate guides, supports and anchor plates. Edges shall be rounded and safe. Fixings in wet or wastewater areas shall be 316L stainless steel. Dissimilar metals shall be isolated.

PSHA 5 Inlet-Works Handrails and Removable Grating

ADD THE FOLLOWING:

The inlet-works perimeter handrail shall be a proprietary 1 000 mm high galvanised ball-and-tube interlinked system, complete with top rail, intermediate rail, standards, baseplates, anchor bolts, closures and removable access sections where shown. Steel components shall be hot-dip galvanised after fabrication to SANS 121. A 100 mm toe board shall be provided where tools or material may fall to a lower level. The completed system shall be continuous, rigid, free of sharp projections and capable of resisting the applicable pedestrian barrier loads.

Removable covers over the night-soil disposal-slab manhole and night-soil balancing tank shall comprise UV-stabilised, chemical-resistant, anti-slip moulded GRP grating with nominal 38 x 38 mm mesh and 25 mm depth. Panels shall be cut to suit the openings and arranged in removable sections not exceeding approximately 1.22 m width. The supplier shall design the panel layout, support framing and support spacing for a minimum 5 kPa uniformly distributed pedestrian load and 1.5 kN point load. No panel shall span beyond the manufacturer’s certified safe span. All clips and all support framing shall be corrosion-resistant (heavy galvanised) and removable without entering the structure.

PSHA 8 Measurement and Payment

PSHA 8.1 1 000 mm high galvanised ball-and-tube interlinked handrail system complete ..... Unit: m

The unit of measurement shall be the metre of accepted handrail measured along the handrail centreline. The rate shall include design, shop drawings, standards, rails, balls, bends, closures, toe boards where required, baseplates, anchors, removable sections, hot-dip galvanising, erection, making good, testing and certification.

PSHA 8.2 Removable 38 x 38 x 25 mm GRP grating and corrosion-resistant support system complete ..... Unit: m²

The unit of measurement shall be the net plan area of completed accepted cover. The rate shall include supplier design, grating panels, cutting, edge banding, support beams and frames, corrosion-resistant clips, lifting handles, identification, installation, load certification and all incidental work required for safe removable covers.

PSHB SANS 1200 HB: CLADDING AND SHEETING

PSHB 3 Materials

ADD THE FOLLOWING:

Roof and wall sheeting for the operator facility shall be suitable for high UV exposure and wind conditions at Pella. Flashings, fasteners, washers and sealants shall be compatible with the sheeting and corrosion environment. Manufacturer's colour-coated systems shall be supplied as complete systems with matching accessories.

PSHB 5 Installation

ADD THE FOLLOWING:

Sheets shall be installed to the manufacturer's lap, fixing and edge-distance requirements. Cut edges and damaged coatings shall be repaired. Roof drainage shall discharge away from foundations and process areas without causing erosion.

PSHC SANS 1200 HC: CORROSION PROTECTION OF STRUCTURAL STEELWORK

PSHC 3 Protective Systems

ADD THE FOLLOWING:

The corrosion-protection system shall be selected for the specific exposure: wastewater immersion; external atmospheric (high UV); or buried. Galvanizing shall be completed after fabrication. Paint systems shall be by one manufacturer applied to specified DFT over Sa 2½ blast-cleaned surfaces. Coating thickness, holiday testing and surface-preparation records shall be submitted.

PSHC 5 Repairs and Inspection

ADD THE FOLLOWING:

Coating repairs shall extend to sound material and restore the original system. All buried steel pipe specials shall be tape-wrapped with Denso tape or approved equivalent per manufacturer's instructions.

PSL SANS 1200 L: MEDIUM-PRESSURE PIPELINES

PSL 3 Pipes, Fittings and Valves

ADD THE FOLLOWING:

Unless otherwise shown, HDPE pressure pipe shall be PE100 PN10 SDR17. Fittings and valves shall have pressure ratings not less than the connected pipeline. Flanges shall comply with SANS 1123 and be drilled to Table D of BS 10. Gate valves shall comply with SANS 664 Class 10, be clockwise closing, non-rising spindle type, suitable for 16 bar, with permanently displayed direction of closing.

HDPE butt-fusion and electrofusion jointing shall be by trained operators using calibrated equipment. Each joint shall be recorded in a fusion log: operator name; machine serial; parameters; time; weather; joint number.

PSL 5 Installation

ADD THE FOLLOWING:

Minimum cover shall comply with PSDB 5 and the Drawings. Flexible connections shall be provided at structures. Dissimilar metals shall be electrically isolated. Valves and flow-control equipment shall remain accessible and removable for maintenance.

PSL 5.13 Welding of Polyethylene Pipes

ADD THE FOLLOWING NEW SUBCLAUSE:

Welding shall comply with SANS 1671 series (equipment), SANS 10268 series (processes), SANS 10269 (welder approval) and SANS 10270 (procedure approval). A qualified welding inspector shall witness and certify each welder qualification.

Destructive sampling rates during construction:

- 0-250 welds: 5%; 250-500 welds: 3%; 500-1 200 welds: 2%; 1 200-3 200 welds: 1%; 3 200-10 000 welds: 0.5%

PSL 7 Testing

ADD THE FOLLOWING:

The test pressure and procedure shall be as shown on the Drawings and appropriate to the pipe material, class, temperature and elevation. Unless otherwise specified, the field test pressure shall be 1.5 times the stated maximum working pressure but shall not exceed the pipe, fitting, valve or restraint rating. Testing shall commence only after joints, anchors, thrust restraint and end closures are complete and capable of safely resisting the test load.

PSLB SANS 1200 LB: BEDDING (PIPES)

PSLB 3 Bedding Materials

REPLACE SUBCLAUSE 3.1 WITH THE FOLLOWING:

Selected granular bedding material: PI not exceeding 6; free from sharp-edged particles exceeding 19 mm; non-dispersive or proven erosion-resistant. The selected blanket shall extend at least 200 mm above the pipe crown.

PSLB 5 Placement and Compaction

ADD THE FOLLOWING:

The trench bottom, bedding, haunch material and selected fill shall be prepared and compacted in accordance with PSDB 5 to at least 95% of MDD determined in accordance with SANS 3001-GR30. Material shall be worked beneath pipe haunches and compacted equally on both sides in layers not exceeding 100 mm around flexible pipes. Road crossings shall comply with the adjoining pavement-layer requirements.

PSLB 7 Testing

ADD THE FOLLOWING:

Bedding and selected-fill testing shall comply with PSDB 7. The two Dynamic Cone Penetrometers specified for the Employer's Agent's use shall supplement, and shall not replace, the specified density testing.

PSLB 8 Measurement and Payment

PSLB 8.2.6 Bedding stabilised with 5% cement (where instructed) ..... Unit: m³

PSLB 8.2.7 Geotextile wrapping around bedding (Bidim A4/U24 or equivalent) ..... Unit: m²

PSLB 8.2.8 450 mm hard fill pioneer layer (dump rock) at trench bottom - compact until settlement < 10 mm ..... Unit: m²

PSLC SANS 1200 LC: CABLE DUCTS

PSLC 3 Materials

ADD THE FOLLOWING:

Ducts shall be uPVC or HDPE as shown, including long-radius bends, spacers, draw wire, end caps, markers and draw pits. Duct colour shall suit the service (orange LV power; grey communication; red MV).

PSLC 5 Installation and Testing

ADD THE FOLLOWING:

Each completed duct shall be proved with an appropriately sized mandrel, cleaned and fitted with a durable draw wire before backfilling. Ends shall remain sealed until cable installation.

PSLD SANS 1200 LD: SEWERS

PSLD 3 Pipes and Structures

ADD THE FOLLOWING:

Gravity wastewater and filtrate pipes shall be PVC-U Class 34, HDPE PE100 PN10 SDR17 or steel-reinforced spirally wound polyethylene (SANS 674:2008) as scheduled. All HDPE pipes shall be welded per PSL 5.13. Manholes shall be in-situ cast and constructed according to the drawings. Benching slope: 1:4 (V:H). Covers in the veld shall finish ≥ 150 mm above ground.

PSLD 5 Construction

ADD THE FOLLOWING:

Gravity pipelines shall be laid accurately to line and grade. Open ends shall be sealed against debris and stormwater. Connections to the existing system shall be planned to minimise interruption and prevent uncontrolled discharge.

PSLD 7 Testing

ADD THE FOLLOWING:

Sewers and gravity process lines shall be cleaned and tested before acceptance. CCTV inspection for pipelines ≥ 150 mm diameter where scheduled or directed. Payment: 80% on completion of laying and jointing; 20% on completion and approval of testing.

PSLE SANS 1200 LE: STORMWATER DRAINAGE

PSLE 3 Materials

ADD THE FOLLOWING:

Pipes, culverts, channels, headwalls, subsoil drains and outlet protection shall be as shown on the Drawings. Materials exposed to contaminated runoff shall be compatible with wastewater exposure.

PSLE 5 Construction

ADD THE FOLLOWING:

Clean stormwater shall be intercepted and diverted around process areas. Contaminated runoff shall drain to controlled collection and return points. Permanent cut-off drains and outlets shall be completed early enough to protect earthworks during construction. Outlets shall be protected against scour using pitching, gabions or measures shown on the Drawings.

PSLE 7 Testing

ADD THE FOLLOWING:

Completed drains shall be surveyed and demonstrated to be free-draining. Subsoil drains shall be flushed and outlet locations recorded.

PSM SANS 1200 M: ROADWORKS (GENERAL)

PSM 5 Construction and Traffic

ADD THE FOLLOWING:

The Contractor shall maintain safe access to the WWTW and all construction areas at all times. Unless otherwise shown, the access road shall be an unsealed gravel road comprising prepared roadbed, selected layer, subbase (where scheduled) and gravel wearing course. Crossfall and side drains shall prevent water from entering pond embankments or structures.

PSM 7 Lot Acceptance

ADD THE FOLLOWING:

Each pavement layer shall be accepted for material quality, thickness, level, width and density before the next layer is placed. No subsequent layer shall be placed on a rejected or uninspected layer.

PSME SANS 1200 ME: SUBBASE

PSME 3 Materials

ADD THE FOLLOWING:

For tender purposes, a natural gravel G5 or G6 class material is assumed where subbase is scheduled, subject to confirmation by the pavement design.

PSME 5 Construction

ADD THE FOLLOWING:

Compact the subbase to at least 95% of MDD determined in accordance with SANS 3001-GR30, unless a higher project-specific requirement is shown on the Drawings. Where the compacted thickness cannot be achieved in one layer with the proposed plant, place and compact the layer in equal lifts.

PSME 7 Testing

ADD THE FOLLOWING:

At least one density test per 500 m², minimum three per lot; grading, Atterberg limits and classification tests at each change in source.

PSMF / PSMFL SANS 1200 MF AND MFL: BASE AND GRAVEL WEARING COURSE

PSMF 3 Materials

ADD THE FOLLOWING:

For tender purposes, a 150 mm compacted gravel wearing course is assumed. Material shall be durable, well-graded and free from oversize particles.

PSMF 5 Construction

ADD THE FOLLOWING:

Compact the gravel wearing course to at least 95% of MDD determined in accordance with SANS 3001-GR30, unless a higher project-specific requirement is shown on the Drawings. Segregation, corrugations, loose aggregate and ponding shall not be permitted.

PSMF 7 Testing

ADD THE FOLLOWING:

Density at least once per 500 m², minimum three per lot. Thickness and levels verified by survey.

PSMK SANS 1200 MK: KERBING AND CHANNELLING

PSMK 3 Materials

ADD THE FOLLOWING:

Concrete mix design for cast-in-situ kerbing shall be submitted for Employer's Agent approval. No kerbing shall be placed before the mix design is approved.

PSMK 7 Testing

REPLACE SUBCLAUSE 7.2.2 WITH THE FOLLOWING:

Minimum three cube crushing tests per 1 000 m of kerbing placed. Each test: six cubes tested at 7 and 28 days. If 28-day average is more than 3 MPa below specified strength, the represented kerbing shall be rejected.

PSMM SANS 1200 MM: ANCILLARY ROADWORKS

PSMM 3 Items

ADD THE FOLLOWING:

Ancillary work includes signs, markers, guard posts, road furniture and erosion-control features. Products shall be suitable for the remote, high-UV environment with theft-resistant fixings. Signs and markers shall remain legible for the project design life.

PSPA SANS 1200 PA: SITE FINISHING

PSPA 5 Finishing and Rehabilitation

ADD THE FOLLOWING:

On completion, all temporary works, surplus material, waste, temporary fencing and unused services shall be removed from the Site. External embankment slopes shall receive the erosion-protection treatment shown on the Drawings (topsoil, hydroseeding, erosion-control blankets, stone pitching or cement-treated surface zones per PSDE 5.4). Establishment watering and repair of failed areas shall continue until the specified handover condition is achieved.

PSPA 8 Measurement and Payment

PSPA 8.3.1 Topsoil spreading and grading on rehabilitation areas ..... Unit: m²

PSPA 8.3.2 Hydroseeding (seed mix, mulch and tackifier as specified) ..... Unit: m²

PSPA 8.3.3 Erosion-control blanket on slopes ..... Unit: m²

PS-HDPE HDPE GEOMEMBRANE LINING SYSTEM

PS-HDPE 1 Materials

ADD THE FOLLOWING:

The geomembrane shall be new, 2.0 mm UV-stabilised HDPE geomembrane, single-side textured on the underside and compliant with GRI-GM13. The protection geotextile shall be Bidim A5 (mass per unit area ≥ 500 g/m²) or approved equivalent. Product certificates, roll traceability records and third-party test reports shall be submitted for each roll delivered.

Minimum geomembrane properties:

- Nominal thickness: 2.0 mm UV-stabilised HDPE geomembrane, single-side textured on the underside
- Density: > 0.940 g/cm³ (ASTM D1505)
- Tensile strength at yield: ≥ 27 kN/m; at break: ≥ 40 kN/m (ASTM D6693)
- Elongation at break: ≥ 700% (ASTM D6693)
- Carbon black content: 2-3% (ASTM D1603)
- UV stability: certified minimum 20-year exposed service life

PS-HDPE 2 Specialist Installer

ADD THE FOLLOWING:

Installation shall be by an experienced specialist with trained and certified welding technicians. Required submissions ≥ 21 days before installation:

- Product certificates and factory test reports
- Installer experience portfolio (minimum five similar projects)
- Panel layout and deployment sequence drawing
- Welding procedures (dual-track fusion and extrusion)
- Anchor trench and penetration details
- Quality Assurance Plan (ITP with hold and witness points)
- Repair procedures; manufacturer's and installer's warranties

PS-HDPE 3 Subgrade Acceptance

ADD THE FOLLOWING:

The subgrade shall be jointly inspected by the earthworks Contractor, lining installer and Employer's Agent before liner deployment. The subgrade shall be smooth, firm, stable and free from standing water, sharp particles, loose material, abrupt steps and shrinkage cracks. A signed subgrade-release record is a hold point.

PS-HDPE 4 Deployment and Welding

ADD THE FOLLOWING:

Panels shall be deployed to minimise seams on slopes and avoid cross seams in highly stressed areas. Dual-track hot-wedge fusion welding shall be used wherever practicable; extrusion welding shall be limited to details and repairs. Trial seams shall be completed at the start of each shift and after relevant changes in equipment or weather.

PS-HDPE 5 Testing and Handover

ADD THE FOLLOWING:

All production seams shall receive continuous non-destructive testing:

- Dual-track seams: continuous air-pressure inflation at ≥ 200 kPa for 5 minutes per section
- Extrusion welds and repairs: vacuum box at ≥ 25 kPa for 10 seconds

Destructive testing: minimum one sample per 150 m of production seam (GRI-GM19 test methods). Failed areas shall be bounded, repaired and retested.

Handover documentation:

- Material certificates and roll/panel traceability records
- As-built panel layout drawing
- Complete seam register with all NDT and destructive test results
- Repair register; weather records during installation
- Independent CQA report
- Electrical leak-location survey results where technically feasible
- Manufacturer's and installer's warranties

PS-HDPE 8 Measurement and Payment

PS-HDPE 8.1 Bidim A5 geotextile protection layer - supply and install ..... Unit: m²

The unit of measurement shall be the net area of accepted Bidim A5 geotextile installed to the lines shown, including specified overlaps. The rate shall include supply, delivery, storage, deployment, overlaps, cutting, temporary restraint, protection, certificates, traceability and replacement of damaged or rejected material.

PS-HDPE 8.2 2.0 mm UV-stabilised HDPE geomembrane, single-side textured on the underside - supply and install (all seaming included) .... Unit: m²

The unit of measurement shall be the net area of accepted 2.0 mm UV-stabilised HDPE geomembrane, single-side textured on the underside and installed to the lines shown, including all seams and normal welding allowances. The rate shall include supply, delivery, storage, panel layout, deployment, trial seams, fusion and extrusion welding, all production quality control, seam testing, destructive samples, records, warranties and correction and retesting of defective work.

PS-HDPE 8.3 Geomembrane anchor trench - excavate, install and backfill ..... Unit: m

The unit of measurement shall be the completed anchor-trench length. The rate shall include setting out, excavation, trimming, temporary protection, placement of geotextile and geomembrane, 15 MPa / 19 mm backfill, moisture conditioning, compaction, testing, reinstatement and erosion protection.

PS-HDPE 8.4 Geomembrane penetrations (pipe boots, flanges and fixings) ..... Unit: No.

The unit of measurement shall be each accepted penetration. The rate shall include coordinated shop details, pipe boot or flange assembly, stainless steel materials, cutting, welding, clamps and fasteners, sealing, local support, non-destructive testing, records and making good.

PS-HDPE 8.5 Employer allowance for instructed liner repairs not attributable to the Contractor or installer ..... Unit: Sum

The tendered sum shall apply only to repairs specifically instructed for damage to previously accepted liner that is demonstrably not attributable to the Contractor or lining installer. Routine extrusion details, failed seams, installation damage, defective workmanship, retesting and associated repairs remain included in PS-HDPE 8.2 and shall not be measured separately.

PS-HDPE 8.6 Independent CQA and electrical leak-location survey ..... Unit: Sum

The tendered sum shall cover the independent CQA consultant and electrical leak-location survey, including review of submittals, site attendance, audit of trial and production welding, witness of testing, review of records, leak survey, final CQA report and close-out confirmation. This item shall not be duplicated under PSA 12.12.

PS-PM PROCESS MECHANICAL EQUIPMENT AND PIPEWORK

PS-PM 1 General

ADD THE FOLLOWING:

Screens, sluice gates, penstocks, weir boards, valves, flumes, pumps (where included), supports and associated equipment shall be coordinated with the civil works and hydraulic levels before manufacture. All steelwork in direct wastewater contact shall be 316L stainless steel except where explicitly specified otherwise on the Drawings.

PS-PM 2 Submissions and Manufacture

ADD THE FOLLOWING:

Required submissions before manufacture: data sheets and duty information; coordinated shop drawings; materials and coating specifications; power requirements; installation tolerances; maintenance clearance requirements; recommended two-year spares list; warranties.

PS-PM 3 Installation and Commissioning

ADD THE FOLLOWING:

Equipment shall be installed plumb, aligned and accessible. Moving components shall operate without binding. Gates, stoplogs and weir boards shall demonstrate sealing and removal under operating conditions. Manufacturer's representatives shall attend commissioning where required.

PS-PM 8 Measurement and Payment

Unless otherwise stated, process-mechanical items shall be measured only after they have been supplied, installed, adjusted, tested and accepted. Rates shall include design coordination, shop drawings, manufacture, transport, storage, off-loading, erection, proprietary fixings, anchor bolts, gaskets, fasteners, protective treatment, labels, operating tools, normal unit testing, warranties and all work necessary for a complete functional installation. Civil concrete, structural steel and pipework separately scheduled elsewhere are excluded. Integrated commissioning under PS-COM is measured separately.

PS-PM 8.1 3CR12 Coarse screen assembly complete ..... Unit: No.

The unit of measurement shall be each complete coarse-screen installation serving the inlet received channel. The rate shall include the bar screen, frame, guides, supports, removable rake, all in 3CR12 stainless-steel material, lifting and removal features, fixings with cast-in fishtail lugs of 100 x 25 x 4.5mm at 300mm c/c and all accessories necessary for safe operation. Structural concrete is measured separately.

PS-PM 8.3 8.3 Removable HDPE hand sluices at grit channels complete..... Unit: No.

Provide removable HDPE hand sluices at the grit channels shown on the drawings. Each hand sluice shall comprise a 20 mm thick UV-stabilised HDPE panel, sized to suit the opening, with a recessed lifting handhold and replaceable 5 mm thick conveyor-belt or EPDM sealing strips to both vertical edges and the bottom edge.

Form continuous vertical recesses, nominally 30 mm wide × 35 mm deep, in the opposing concrete channel walls. The recesses shall be smooth, true and square and shall provide not less than 30 mm engagement of the HDPE panel on each side. The panel shall extend to the channel invert and not less than 150 mm above maximum operating water level.

The concrete recesses shall be formed as part of the concrete channel construction and are included in the relevant concrete works. No aluminium, steel, stainless-steel or other permanent guide channels, frames, spindles or handwheels shall be provided.

The rate shall include the HDPE hand sluice, seals, fitting, testing, demonstration of satisfactory isolation under operating conditions and storage in the lockable operator facility when not in use.

PS-PM 8.4 Removable HDPE hand sluices at manholes and channels complete ..... Unit: No.

Provide removable HDPE hand sluices at the manholes and channels shown on the drawings. Each hand sluice shall comprise a UV-stabilised HDPE panel, sized to suit the opening, with a recessed lifting handhold and replaceable 5 mm thick conveyor-belt or EPDM sealing strips to both vertical edges and the bottom edge.

HDPE panels shall be 20 mm thick for clear openings not exceeding 500 mm and 25 mm thick for wider openings. Form continuous vertical recesses, nominally 30 mm wide × 35 mm deep, in the opposing concrete walls and/or concrete benching. The recesses shall continue to the invert, be smooth, true and square, and provide not less than 30 mm engagement of the panel on each side.

The panel shall extend to the invert and not less than 150 mm above maximum operating water level. Concrete recesses shall be formed as part of the relevant manhole, channel and benching concrete works and are included in those items.

No aluminium, steel, stainless-steel or other permanent guide channels, frames, spindles or handwheels shall be provided. The rate shall include the HDPE hand sluice, seals, fitting, testing, demonstration of satisfactory isolation under operating conditions and storage in the lockable operator facility when not in use.

PS-PM 8.5 Standard 76 mm throat Parshall flume complete ..... Unit: No.

The unit of measurement shall be one complete 3-inch (76 mm throat) standard full Parshall flume installation in the 400 mm wide common channel downstream of the two inlet-works channels. The upstream face shall be positioned approximately 2.0 m downstream of the end of the recombination transition, subject to the approved shop drawing and hydraulic levels. The rate shall include the proprietary corrosion-resistant flume, standard unmodified geometry and rating data, reinforced-concrete infill and anchorage, smooth upstream and downstream transitions, watertight seals, a calibrated staff gauge, permanent sill datum and nearby survey benchmark, and all making good. The Contractor shall demonstrate a straight, uniform approach and free-flow operation throughout the design range. At the peak design flow of 12.358 L/s, the downstream head at the standard Hb point shall not exceed 50 percent of the upstream Ha head and the inlet-works freeboard shall be maintained. No non-standard scaling of the flume is permitted.

PS-PM 8.5.1 Low-power inlet flow-measurement, totalising and logging system complete ..... Unit: No.

The unit of measurement shall be one complete commissioned flow-measurement system serving the Parshall flume under PS-PM 8.5. The rate shall include an IP68 non-contact 80 GHz radar level sensor, mounted vertically over the manufacturer's certified Ha measuring point in the converging section; 4-20 mA/HART, SDI-12 or approved low-power digital output; flow totaliser and data logger; instantaneous flow, daily total and cumulative total display; recording at intervals not exceeding 15 minutes; not less than 12 months retrievable storage; high- and low-flow alarms; lockable weatherproof field enclosure; anti-tamper stainless-steel bracket and fasteners; underground armoured power and signal cable to the secure electrical room; 24 V DC battery-backed supply and charger sized for not less than 14 days autonomy between generator charging periods; surge protection; software and local data-download facility; certified rating configuration; calibration and zero-setting certificate; commissioning against the staff gauge; O&M manuals, operator training and one annual verification visit. The sensor shall not be mounted at the throat or in either of the parallel channels. Procurement shall follow approval of the flume shop drawing, Ha location and a hydraulic calculation demonstrating free-flow conditions.

PS-PM 8.6 Flow-splitting weirs and adjustable control components ..... Unit: Sum

The tendered sum shall cover all adjustable weir plates, crest plates, guide channels, level-control components, scales, fasteners, seals and setting to the hydraulic levels shown. Concrete walls and channels are measured separately.

PS-PM 8.7 Provisional Sum for WWTW O&M hand tools, monitoring aids, vegetation-control equipment and initial spares ..... Unit: Provisional Sum

The Provisional Sum shall be expended only on written instruction for the complete scheduled set listed under PS-OM 2. It shall include the bins, screen rakes, hand tools, wheelbarrows, maintenance tool chest, sampling equipment, two heavy-duty petrol brush cutters, pond scum/skimmer nets, Imhoff cones and stands, Secchi disc, manual rain gauge, pond staff-gauge boards, a lockable sample and consumables cabinet and the initial pump/generator spares and consumables. Items shall be delivered, labelled, demonstrated and accepted. Contractor's overheads and profit are measured separately.

PS-PM 8.7.1 Contractor's overheads, charges and profit on PS-PM 8.7 ..... Unit: %

The percentage shall be applied to the verified amount expended under PS-PM 8.7 and shall constitute full compensation for procurement, coordination, delivery administration and payment of the instructed items.

PS-PM 8.8 Isolation-valve assemblies — included in the applicable composite pipework or equipment item; not separately measured

Each required isolation valve, companion flange, dismantling joint where shown, bolts, gaskets, supports, operating gear, coating repair, identification and testing shall be included in the applicable composite pipework or equipment item in the Bill of Quantities.

PS-PM 8.9 Non-return-valve assemblies — included in the applicable composite pipework or equipment item; not separately measured

Each required non-return valve, companion flange, bolts, gaskets, supports, access provision, identification and testing shall be included in the applicable composite pipework or equipment item in the Bill of Quantities.

PS-PM 8.10 Air-release or vacuum valve assembly complete ..... Unit: No.

The unit of measurement shall be each complete air-release or vacuum-valve assembly. The rate shall include the valve, isolating valve, branch and fittings, chamber fittings where scheduled, supports, drainage arrangement, identification and testing.

PS-PM 8.11 Pipe supports, brackets, anchors and fasteners ..... Unit: Sum

The tendered sum shall cover all process-pipe supports, guides, brackets, anchors, clamps, baseplates, holding-down bolts, isolation pads and corrosion-resistant fasteners not measured separately. Structural thrust blocks scheduled as concrete are excluded.

PS-PM 8.12 Wash-down points and hose connections — included under PS-BLD 8.9 and BOQ Item D2.1; not separately measured

Two gravity-fed wash-down points shall be supplied from the elevated JoJo-type tank system: one at the inlet/night-soil works and one at the sludge-drying-bed/operations area. The points, valves, backflow protection, pipework, hoses, nozzles, secure storage and testing are included under PS-BLD 8.9 and BOQ Item D2.1. No separate booster pump is required.

PS-PM 8.13 Water-meter assembly complete ..... Unit: No.

The unit of measurement shall be each complete commissioned water-meter assembly. The rate shall include the specified meter, reducers, companion flanges, gaskets, bolts, dismantling provision, supports, earthing or bonding where required, calibration certificate, identification, pressure testing and all fittings necessary for connection to the scheduled pipeline.

PS-PM 8.14 Pipeline strainer assembly complete ..... Unit: No.

The unit of measurement shall be each complete strainer assembly. The rate shall include the strainer body and basket, companion flanges, gaskets, bolts, drain or flushing connection, supports, access for cleaning, identification, pressure testing and all fittings necessary for a complete installation.

PS-PM 8.15 Line-isolation valve assembly complete ..... Unit: No.

The unit of measurement shall be each complete line-valve assembly. The rate shall include the specified valve, companion flanges, dismantling joint where shown, bolts, gaskets, supports, operating gear, extension spindle where required, identification, coating repairs, functional testing and leakage testing.

PS-PM 8.16 Pipeline fitting supplied, installed and tested complete ..... Unit: No.

The unit of measurement shall be each complete scheduled fitting. The rate shall include the fitting, cutting and preparation of pipes, jointing materials, couplings or adaptors not separately scheduled, supports or thrust restraint shown, protective treatment, bedding, testing, labour, transport and making good.

PS-OM OPERATIONAL EQUIPMENT, MUNICIPAL MOBILE PLANT AND OHS HANDOVER ITEMS

PS-OM 1 General

ADD THE FOLLOWING:

All equipment supplied under this section shall be new, unused, suitable for municipal wastewater-service duty and delivered complete with accessories, guards, tools, operating manuals, warranties, commissioning and operator instruction. Road-going units shall be licensed, roadworthy and registered in the Employer's name. The final make and model of items paid from a Provisional Sum shall be selected only on written instruction after review of compliant quotations. Separate percentage items are the only compensation for the Contractor's procurement and handling of Provisional Sum purchases.

PS-OM 2 Pella WWTW O&M Hand Tools, Monitoring Aids, Vegetation-Control Equipment and Initial Spares

The Pella WWTW operational set shall comprise:

- four 80 litre industrial wheeled bins with lids;

- four additional hot-dip-galvanised screen hand rakes with handle length suited to safe operation from the walkway;
- four galvanised spades;
- four galvanised shovels;
- four galvanised steel garden rakes;
- four industrial wheelbarrows with corrosion-resistant trays and puncture-proof wheels;
- one lockable maintenance tool chest with normal mechanical hand tools;
- two heavy-duty petrol brush cutters with harnesses, guards, PPE and service kits;
- two long-handled pond scum/skimmer nets;
- one manual rain gauge;
- UV- and chemical-resistant staff-gauge boards and fixings for each pond/storage pond;
- one extendable sludge-depth sampler;
- one wastewater sampling pole;
- two sample cooler boxes; one lockable sample/consumables cabinet;
- and an initial set of hoses, quick couplings, clamps, pump seals, spark plugs, filters, pull cords and manufacturer service kits for the portable pumps and generators.

PS-OM 3 Portable Pumps and Generators

- Pella WWTW site assets shall include two 80 mm petrol-driven true trash pumps, each capable of passing not less than 25 mm solids and supplied in a heavy-duty roll frame with strainer, 10 m reinforced suction hose, not less than 30 m lay-flat discharge hose, quick couplings, clamps, bends, reducers, repair kit, operating tools, lockable security chain and durable asset marking.
- Four approximately 4.8 hp petrol clean-water pumps shall be municipal mobile assets, Honda WB20XT or approved equivalent, 50 mm nominal bore, each with suction strainer, 10 m suction hose, 30 m discharge hose, couplings, clamps, spares, tools, lockable security chain and durable municipal asset marking.
- Pella WWTW site assets shall include two 5.5 kW mobile petrol generators with electric start, AVR, wheel or roll frame, weatherproof 230 V distribution board, earth-leakage protection, earth spike, 30 m heavy-duty extension lead, plugs, adaptors, fuel can, service kit, extinguisher, lockable security chain and durable asset marking.
- One 14 kVA wheel-mounted petrol generator shall be a municipal mobile asset powered by a Honda GX690 or approved equivalent commercial engine, with AVR, electric start, 230 V output, lockable wheel frame, protected outlets, earth-leakage protection, earth spike, cables, adaptors, fuel can, service kit, GPS tracker, immobiliser and durable municipal asset marking. Generator packages require electrical cables and distribution accessories, not pump pipes and fittings.

PS-OM 4 Municipal Water-Bowser Truck and Pella WWTW Water-Bowser Trailers

- The principal water bowser shall be one new nominal 18 000 litre municipal roadworthy 6x4 water-bowser truck. The benchmark configuration is a FAW J5N 28.290FL or approved equivalent with nationwide OEM parts and service support, a minimum two-year OEM chassis warranty and sufficient legal axle and GVM capacity at full water load. The baffled potable-water tank shall have certified lining, lockable manholes, hygienic fill and discharge points, level indication, PTO-driven pump, suction and delivery connections, spray bars, 30 m hose reel, 20 m suction hose, couplings, hydrant adaptor, toolbox, spare wheel, reverse alarm, beacon, reflective markings, GPS tracker, immobiliser, durable municipal asset marking, licensing and registration in the Employer's name.
- Three 2 500 litre roadworthy water-bowser trailers shall be Pella WWTW operational assets. Each shall have a baffled UV-stabilised tank, hot-dip-galvanised double-axle chassis, service and parking brakes, legal lighting and registration, spare wheel, jockey wheel, lockable equipment box, flow meter, pump, 30 m hose and nozzle, 20 m suction hose, strainer, couplings, hydrant adaptor, GPS tracker, wheel/ball-hitch immobiliser and durable asset marking. Gross mass, brakes, tyres and coupling shall be certified for the fully laden trailer.

PS-OM 5 Municipal Vacuum Tanker

One honey sucker shall be nominal 6 000 litre municipal dedicated septic-tank vacuum truck on a suitable minimum 15 t GVM 4x2 chassis with established South African dealer support. It shall have a corrosion-resistant stainless-steel tank, PTO-driven Jurop or approved equivalent reversible vacuum pump, minimum 6 m effective suction depth, pressure/vacuum

gauge, primary and secondary overfill protection, PTO interlock, relief protection, rear drain, hose trays, at least 30 m of 100 mm suction hose, strainers, couplings, suction lance, 500 litre wash-down tank and pump, spill kit, reverse alarm, beacon, reflective markings, GPS tracker, immobiliser, durable municipal asset marking, operator training, roadworthy certification, licensing and registration in the Employer's name. A sewer-jetting combination unit is not required.

PS-OM 6 Operational OHS, Confined-Space Rescue, Monitoring and Hygiene Equipment

The operational starter set shall include, for three process controllers: size-selected chemical-resistant gumboots, safety boots, two coveralls per person, high-visibility vests, hard hats, safety spectacles, face shields, reusable PVC/nitrile gauntlets, disposable nitrile gloves and respiratory protection selected by the operational risk assessment. It shall further include one calibrated portable four-gas detector with bump-test and calibration kit; one confined-space tripod, retrieval winch, full-body harness and rescue line; certified davit/anchor sockets at each identified confined-space entry point; a site-specific confined-space entry and rescue procedure; one witnessed rescue drill; confined-space and rescue training for all three process controllers; two stocked first-aid kits; two wastewater spill kits; one self-contained emergency eyewash/drench unit capable of at least 15 minutes continuous flow; lockable PPE storage; wall-mounted soap and paper-towel dispensers with initial consumables; a sample refrigerator operating at 2–8 °C; and a portable pH/EC/temperature/dissolved-oxygen field meter with calibration standards and consumables.

PS-OM 7 Office Furniture and Records Equipment

The permanent operator office furniture set shall comprise at least two robust office desks, three adjustable office chairs, one meeting/work table with four chairs, two lockable steel filing cabinets, one lockable plan and O&M manual cabinet, shelving, noticeboard, whiteboard, waste bins and a lockable equipment charging/storage cabinet. Furniture supplied for the Employer's Agent's temporary office under PSAB is excluded.

PS-OM 8 Inspection, Acceptance, Ownership Schedule and Asset Handover

Before acceptance, every item shall be inspected, started or function-tested as applicable, photographed and entered in the asset register with make, model, serial/VIN number, warranty, supplier contact, replacement value and maintenance interval. The ownership schedule shall identify the 18 000 litre bowser truck, 14 kVA generator, four clean-water pumps and one 6 000 litre vacuum tanker as municipal mobile assets; the three 2 500 litre bowser trailers, two trash pumps, two 5.5 kW generators and all routine O&M equipment as Pella WWTW assets. Durable asset numbers, GPS/immobiliser details where specified, keys, registration papers, certificates, manuals, service kits and warranties shall be handed over in indexed hard-copy and electronic form.

PS-SDB SLUDGE DRYING-BED FILTER MEDIA AND UNDERDRAINAGE

PS-SDB 1 Materials

ADD THE FOLLOWING:

Filter sand and gravel shall be clean, hard, durable, washed and free from clay, organic matter, friable particles and contaminants. Before procurement, the Contractor shall submit representative samples and grading curves for each layer. The selected grading shall prevent migration of filter sand into the supporting gravel and shall provide free drainage without clogging. Unless otherwise shown on the Drawings, the filter sand shall have an effective size D10 between 0.30 mm and 0.75 mm and a uniformity coefficient not exceeding 4.0; fine gravel shall be nominally 5 mm to 10 mm and coarse drainage gravel nominally 20 mm to 40 mm.

PS-SDB 2 Installation

ADD THE FOLLOWING:

The concrete floor, falls, outlets and embedded work shall be inspected and accepted before filter media are placed. Underdrains shall be laid to the lines and falls shown, with perforations oriented as detailed, and shall be wrapped in the specified geotextile. Filter media shall be placed without segregation or damage to the underdrains, in uniform layers of the thicknesses shown. Construction plant shall not traffic directly on completed underdrains or contaminate the media.

PS-SDB 7 Testing

ADD THE FOLLOWING:

Each media source and grading shall be tested before approval and whenever the source or appearance changes. Before sand placement, the completed underdrain system shall be flushed and flow-tested to demonstrate continuity, free drainage and watertight connections. Blocked, damaged or contaminated work shall be removed and replaced at the Contractor's cost.

PS-SDB 8 Measurement and Payment

Filter media shall be measured as the net compacted volume in place within the specified layer limits. No allowance shall be made for bulking, settlement, overbreak, waste or material placed outside the specified profiles.

PS-SDB 8.1 Complete sludge-drying-bed facility ..... Unit: Sum

The unit of measurement shall be one complete sludge-drying-bed facility, comprising the 15 m × 50 m installation shown on the Drawings, measured and paid as a composite lump sum under BOQ Item B9.1.

The tendered sum shall include:

Setting out, excavation, disposal of surplus material, foundation and formation preparation, compacted fill and trimming. The specified impermeable floor, foundations, perimeter and dividing walls, access ramps, reinforcement, formwork, joints, waterstops, curing and finishes. Sludge inlet and distribution pipework, valves, fittings, supports and connections. Geotextile separators, selected filter sand, graded fine gravel and coarse drainage gravel, including sourcing, washing, grading tests, transport and placement to the specified thicknesses. Perforated underdrain pipes, geotextile wrapping, cleanouts, fittings, filtrate collection pipework, sumps, chambers and connection to the filtrate conveyance and disposal arrangements shown on the Drawings. Quality-control testing, flushing, leakage and drainage-function testing, cleaning, commissioning, as-built records, making good and all labour, plant, materials and incidental work necessary for a complete operational installation. Notwithstanding the introductory measurement provisions of PS-SDB 8, filter media and underdrainage forming part of this facility shall be included in the lump sum. No separate measurement or payment shall apply under PS-SDB 8.2, 8.3 or 8.4 for work included in BOQ Item B9.1. Work expressly measured under another BOQ item shall not be measured or paid twice.

PS-BLD OPERATOR FACILITY AND BUILDING SERVICES

PS-BLD 1 Standards

ADD THE FOLLOWING:

Building work shall comply with SANS 10400, applicable municipal requirements and the Drawings. Water services shall comply with SANS 10252 and SANS 10254. Electrical installations shall comply with SANS 10142-1 and shall be accompanied by a valid Certificate of Compliance on completion.

PS-BLD 2 Completion

ADD THE FOLLOWING:

The building shall be weatherproof, secure, cleanable and complete with all finishes, fittings, plumbing, drainage, ventilation, doors, windows, locks, ironmongery and signage. Plumbing shall be water-tested. The office and ablution facilities shall be constructed in accordance with Drawings MSD114-C-016 and MSD114-C-017 and shall include all rooms, fittings, services and external interfaces shown.

PS-BLD 8 Measurement and Payment

Unless otherwise stated, each building-service item shall be measured only when installed, connected, tested and ready for use. Rates shall include coordination with the building work, samples and product data, brackets, sleeves, cutting and making good, sealants, identification, normal testing, cleaning, warranties and all minor fittings necessary for a complete installation. Where PS-BLD 8.10 is scheduled, the work described under PS-BLD 8.1 to 8.8 is included in that Provisional Sum and shall not be measured separately. External pipelines, the structural tank stand and its concrete foundations are measured separately.

The complete internal drainage scope described by this clause, including all fittings, connections, testing and making good, shall be included in the Provisional Sum under PS-BLD 8.10 and BOQ Item D1.1 and shall not be measured separately.

PS-BLD 8.9 Elevated potable-water storage and gravity-fed wash-down system complete ..... Unit: Sum

The tendered sum shall cover the complete design, supply, construction, installation, testing and commissioning of the elevated potable-water storage system. It shall include foundations; a 3 m high specialist-designed and certified corrosion-protected stand; two approved 5 000 litre JoJo-type tanks; lockable lids; inlet, outlet, overflow, drain and interconnecting pipework; valves; flexible connections; supports; restraints; cleaning and watertightness testing. It shall also include two gravity-fed wash-down points, one at the inlet/night-soil works and one at the sludge-drying-bed/operations area, complete with minimum 25 mm pipework, isolation valves, approved backflow protection, two 30 m heavy-duty hoses, adjustable nozzles, labelled lockable hose storage and functional testing. No booster pump is required.

PS-BLD 8.10 Provisional Sum for office and ablution facilities complete ..... Unit: Provisional Sum

A Provisional Sum shall be expended only on written instruction for the complete office and ablution facilities shown on Drawings MSD114-C-016 and MSD114-C-017. It shall include building work, foundations, floors, walls, roof, ceilings, doors, windows, finishes, sanitary fittings, internal plumbing and drainage, testing, cleaning and handover. The elevated water-tank and wash-down system under PS-BLD 8.9, dedicated generator and generator-fed lighting under PS-BLD 8.12, and external gravity sewer under PS-BLD 8.13 are excluded.

PS-BLD 8.10.1 Contractor's overheads, charges and profit on PS-BLD 8.10 ..... Unit: %

The percentage shall be applied to the amount actually expended under PS-BLD 8.10 and shall constitute full compensation for the Contractor's overheads, charges and profit associated with the instructed Provisional Sum work.

PS-BLD 8.11 Provisional Sum for permanent operator-office furniture and records equipment ..... Unit: Provisional Sum

The Provisional Sum shall be expended only on written instruction for the complete furniture and records-equipment set listed under PS-OM 7. It excludes temporary Employer's Agent office furniture under PSAB and excludes fixed building cupboards shown on the Drawings.

PS-BLD 8.11.1 Contractor's overheads, charges and profit on PS-BLD 8.11 ..... Unit: %

The percentage shall be applied to the verified amount expended under PS-BLD 8.11 and shall constitute full compensation for procurement, coordination, delivery, assembly and payment of the instructed items.

PS-BLD 8.12 Dedicated 5–7 kVA diesel site generator, reinforced enclosure and generator-fed lighting installation complete . ... Unit: Sum

The tendered sum shall cover one fixed, nominal 6 kVA diesel generator with not less than 5 kVA continuous single-phase 230 V output, electric start, AVR and integral fuel tank; an Engineer-approved reinforced-concrete or reinforced-masonry lockable generator room/enclosure with tamper-resistant steel door, protected ventilation, external exhaust and heat shielding; integral-tank bunded drip containment; earthing; manual changeover/isolator with provision for an approved temporary alternate supply; generator distribution board with overload, earth-leakage and surge protection; generator-room, office, ablution and entrance LED lighting; one maintenance socket; armoured cabling, conduits, labels and anti-tamper fixings; one suitable fire extinguisher; fuel and electrical warning signs; testing, commissioning, load test, operator demonstration, O&M manual, warranty and a valid electrical Certificate of Compliance. No bulk permanent fuel store is included.

PS-BLD 8.13 Gravity sewer from operator ablution building to inlet works complete ..... Unit: Sum

The tender basis is a watertight gravity sewer from the office/ablution building to a controlled connection at the inlet works upstream of screening, because no municipal sewer reticulation exists at Pella. The sum shall include verification of survey levels and hydraulic grade before construction; an approved route and connection detail; minimum 110 mm uPVC sewer pipework of suitable stiffness class; excavation, bedding, backfilling and compaction; cleanouts, inspection chambers or manholes; sleeves and flexible connections; odour and vermin seals; connection and making good; leakage and flow testing; and as-built levels and coordinates. If the Employer's Agent determines in writing that gravity discharge is not hydraulically feasible, any septic or conservancy-tank alternative shall be dealt with by variation and shall not be assumed in the tendered sum.

PS-FEN FENCING, GATES AND SECURITY

PS-FEN 1 Permanent Security-Fence System

ADD THE FOLLOWING:

The permanent security barrier shall comprise a nominal 1.8 m high prestressed precast concrete palisade fence measured above finished ground level, surmounted by a continuous 500 mm diameter galvanized razor-wire flat wrap. The nominal overall barrier height shall therefore be approximately 2.3 m. The fence alignment, the positions and clear openings of the two sliding gates, corners, changes in level and terminal posts shall be as shown on the Drawings or as instructed by the Employer's Agent.

The complete system shall be supplied and installed by an experienced concrete-palisade-fence specialist. Components shall be compatible and capable of safely resisting handling, installation, operational and wind actions without cracking, excessive deflection, instability or loosening. Shop details and the manufacturer's installation requirements shall be submitted for acceptance before manufacture or installation. Acceptance shall not relieve the Contractor of responsibility for the adequacy and performance of the completed system.

PS-FEN 2 Precast Concrete Components and Fixings

ADD THE FOLLOWING:

Posts shall be 2 400 x 225 x 140 mm prestressed precast concrete units with the width tapered from 140 mm to 80 mm, and shall incorporate two formed slots to receive the horizontal load-bearing rails. Posts shall be installed at centres not exceeding 2 000 mm. Corner, terminal and gate posts shall be strengthened, stayed or otherwise purpose-designed where required by the accepted shop details.

Pales shall be 1 770 x 75 x 100 mm prestressed precast concrete units with the width tapered from 100 mm to 80 mm. Pales shall be installed plumb at centres not exceeding 200 mm. Each nominal 2 000 mm panel shall contain nine pales unless a shorter closing panel is required at a corner, gate or change in alignment.

Horizontal rails shall be 2 000 x 80 x 150 mm prestressed precast concrete units. Two rails shall be provided per panel. Rails shall incorporate 10 mm diameter formed holes for the galvanized carriage bolts securing nine pales. Site drilling, cutting or chasing of prestressed units is prohibited unless specifically approved in writing by the component manufacturer and the Employer's Agent.

All exposed bolts, nuts, washers, clips, straps, brackets and other steel fixings shall be hot-dip galvanized after fabrication. Fixings shall be tamper-resistant or peened after final adjustment where removal from the public side is possible. Precast units shall be uniform in colour and finish and shall be free from structural cracks, exposed reinforcement, honeycombing, significant spalling, distortion and other defects affecting appearance, durability or performance. Damaged structural units shall be rejected and replaced; cosmetic repairs require prior acceptance.

PS-FEN 3 Foundations, Ground Beam and Installation

ADD THE FOLLOWING:

The final alignment shall be surveyed and locally cleared before excavation. Each post shall be founded in a 600 x 600 x 600 mm deep Class 20/19 concrete foundation. A continuous 200 mm wide x 300 mm deep Class 20/19 concrete ground beam shall be constructed between posts. Foundation and ground-beam excavations shall be taken to firm undisturbed material. Loose, soft or unsuitable material shall be removed and replaced with approved material or additional concrete as instructed.

Posts shall be accurately positioned, plumb and temporarily supported until the concrete has attained sufficient strength. The tops of foundations and the ground beam shall be finished neatly and shaped where necessary to prevent ponding. Panels shall be stepped to follow changes in ground level; excessive gaps below pales or between panels are not permitted. The fence shall not obstruct natural or constructed drainage. Excavations shall be backfilled, compacted and made good to the surrounding surface after the concrete has cured sufficiently.

Concrete manufacture, placing, compaction, curing and testing shall comply with the applicable concrete requirements of PS-G and the Drawings. The fence shall not be loaded, the temporary supports removed, or rails and pales installed until the post foundations have developed adequate strength. Any existing fence required to maintain site security shall not be removed until an approved temporary barrier is in place or the permanent replacement can be completed without leaving the site unsecured.

PS-FEN 4 Razor-Wire Topping

ADD THE FOLLOWING:

A continuous 500 mm diameter galvanized razor-wire flat wrap shall be fixed centrally above the fence. Supports shall comprise 30 x 30 x 3 mm galvanized angle-iron members, 600 mm long, welded to 130 x 50 x 3 mm galvanized flat bars and securely fixed to the top rail at spacing not exceeding the post spacing. The fixing method shall not crack, cut, drill or otherwise damage the prestressed rail or its prestressing steel. Approved clamps or cast-in fixing points shall be used where required by the component manufacturer.

The flat wrap shall be continuous, evenly tensioned and securely clipped to every support and at sufficient intermediate points to prevent displacement, sagging or rotation. Joints shall overlap and be connected in accordance with the razor-wire manufacturer's recommendations. Razor wire shall be handled and installed using appropriate protective equipment and controlled work methods. All welding shall preferably be completed before galvanizing. Site-cut edges, welds and damaged galvanized areas shall be prepared and repaired with an approved zinc-rich coating system to restore equivalent corrosion protection.

PS-FEN 5 Sliding Security Gates

ADD THE FOLLOWING:

Two sliding vehicle security gates shall be provided at the positions, clear openings and configurations shown on the Drawings. Gate height and security level shall match the adjacent fence and razor-wire barrier. Gate frames and infill shall be purpose-designed for the span and operating loads and shall be hot-dip galvanized after fabrication unless another protective system is specified on the Drawings.

Each gate installation shall include the complete gate leaf, matching security infill, support and guide posts, concrete foundations, track or cantilever mechanism as shown, rollers, guides, end stops, receiving post or catcher, anti-lift and anti-derail devices, hold-open arrangement, lockable heavy-duty latch, lockset and keys, handles, galvanized fittings, drainage around the operating mechanism and all making good. Gates shall be manually operable unless automation is specifically shown. Completed gates shall move freely, remain stable throughout their travel, close squarely and lock securely without binding or excessive effort.

PS-FEN 6 Submissions, Inspection and Acceptance

ADD THE FOLLOWING:

Before manufacture or installation, the Contractor shall submit coordinated shop drawings showing the fence alignment, panel arrangement, levels, post spacing, foundations, ground beam, corner and terminal details, razor-wire supports, gate openings, gate foundations, tracks or cantilever supports, hardware and drainage. Product data, concrete strength and prestressing certificates, galvanizing certificates and the specialist installer's details shall accompany the submission.

The first completed fence panel, including the foundation, ground beam, rails, pales, fixings and razor-wire support, shall serve as a benchmark and shall be accepted before production installation proceeds. The completed works shall be inspected for line, level, plumbness, spacing, security, damage, coating continuity and gate operation. Defective, cracked, loose, unstable or misaligned work shall be corrected or replaced before acceptance.

PS-FEN 8 Measurement and Payment

Rates shall include setting out, local clearing along the alignment, excavation, handling and disposal of surplus material, temporary support, backfilling and compaction, all labour, plant, manufacture, transport, off-loading, storage, wastage, testing, protection, making good and every operation necessary for a complete and accepted installation. General site clearing and bulk earthworks measured elsewhere are excluded. Gates and razor-wire topping are measured separately from the concrete palisade fence.

PS-FEN 8.1 1.8 m high prestressed precast concrete palisade fence complete ..... Unit: m

The unit of measurement shall be the horizontal length of completed concrete palisade fence measured along its centreline between gate openings. The rate shall include 2 400 x 225 x 140 mm prestressed posts at centres not exceeding 2 000 mm; two 2 000 x 80 x 150 mm prestressed rails per panel; nine 1 770 x 75 x 100 mm prestressed pales per nominal panel at centres not exceeding 200 mm; galvanized carriage bolts and all fixings; 600 x 600 x 600 mm Class 20/19 concrete post foundations; the continuous 200 x 300 mm Class 20/19 concrete ground beam; corner, terminal and closing panels; specialist design and shop drawings; stepping to suit ground profile; and making good. Razor wire and gates are excluded and are measured separately.

PS-FEN 8.2 500 mm galvanized razor-wire flat-wrap topping complete ..... Unit: m

The unit of measurement shall be the horizontal length of completed razor-wire flat wrap measured along the fence centreline. The rate shall include the 500 mm galvanized flat wrap; all laps, clips, ties and connectors; 600 mm long 30 x 30 x 3 mm angle-iron supports welded to 130 x 50 x 3 mm flat bars; approved fixing or clamping to the top rail; galvanizing; zinc-rich repair of site-cut, welded or damaged areas; specialist installation; protection and making good.

PS-FEN 8.3 Sliding vehicle security gate complete, as shown on the Drawings ..... Unit: No.

The unit of measurement shall be each complete sliding gate. The rate shall include the gate leaf, frame and security infill; design and shop drawings; support, guide and receiving posts; foundations; track, cantilever or roller system as shown; guides; end stops; catcher; anti-lift and anti-derail devices; hold-open arrangement; heavy-duty lockable latch, lockset and keys; handles; razor-wire continuation where shown; galvanizing and coating repairs; drainage; adjustment, testing and commissioning for free and secure operation.

PS-FEN 8.4 Fence and gate signage, earth bonding and coating repairs ..... Unit: Sum

The tendered sum shall cover two complete scheduled sets of durable, UV-resistant warning and identification signs, including as applicable: NO ENTRY – AUTHORISED PERSONNEL ONLY; DANGER – DEEP WATER; RAW SEWAGE; NO SWIMMING; REQUIRED PPE; CONFINED SPACE; emergency contacts; flow-direction and asset-identification signs. It shall also include electrical earth bonding and continuity connections where required, permanent markers and final coating repairs. Sign fixings shall be tamper-resistant and sign locations shall be accepted before installation.

PS-FEN 7 Permanent Pond-Safety Measures

ADD THE FOLLOWING:

Full-surface swimming-pool nets over oxidation ponds and improvised floating plastic-drum rescue devices shall not be used. They are not maintainable wastewater safety systems and may introduce entanglement, structural-loading and access hazards. Drowning prevention shall rely on controlled access, permanent fencing or handrails, warning signs and recognised rescue equipment.

PS-FEN 8.5 Complete tamper-resistant pond-rescue station ..... Unit: No.

Each rescue station shall comprise one certified minimum 700 mm diameter high-visibility lifebuoy, minimum 30 m UV-resistant floating rescue line in a controlled-pay-out bag or reel, a tamper-resistant weatherproof cabinet with break-glass or sealed emergency access, durable instructions and identification, hot-dip-galvanised mounting post and fixings. Four stations shall be provided, two at each anaerobic pond on opposing accessible sides. Two minimum 4.5 m non-conductive telescopic rescue poles with shepherd's-crook heads shall also be included in the item and mounted in lockable quick-release brackets at agreed locations.

PS-EL SOLAR LIGHTING AND ELECTRICAL WORK

PS-EL 1 General

ADD THE FOLLOWING:

Solar-lighting systems shall be outdoor-rated, UV-resistant and tamper-resistant. Required submissions before installation:

- Photometric calculations confirming lux levels at working areas
- Solar panel and battery specifications including autonomy calculations (minimum five-night design autonomy)
- Mounting details and wind-load foundation design for Pella conditions
- Control and switching settings; warranties

PS-EL 2 Testing

ADD THE FOLLOWING:

Each solar light shall be tested for: charging performance; automatic dusk-to-dawn switching; operating cycle duration; and control settings. All electrical work shall comply with SANS 10142-1. A valid Certificate of Compliance shall be issued. Keys, manuals and recommended spare parts shall be handed over.

PS-EL 8 Measurement and Payment

Solar-lighting equipment shall be measured only when installed and operational. Three BEKA Schréder SOLARFLOOD-ECO units, or approved photometrically equivalent South African-supported products, shall be provided. Unit rates shall include manufacture, delivery, erection, proprietary brackets and fasteners, UV- and corrosion-resistant components, anti-theft protection, wiring entirely within the unit and pole, labels, normal tests and warranties. Cable ducts scheduled under SANS 1200 LC are excluded.

PS-EL 8.1 Complete solar flood-light unit ..... Unit: No.

The unit of measurement shall be each complete operational lighting point. Each unit shall comprise a BEKA Schréder SOLARFLOOD-ECO luminaire or approved equivalent, correctly sized photovoltaic module, lithium battery with minimum five-night design autonomy, charge controller, dusk-to-dawn control, lockable tamper-resistant battery enclosure, anti-theft fasteners, internal cabling, earthing and bonding, labels, aiming and identification. The rate shall include mounting to the specified pole, normal testing and accepted warranties.

PS-EL 8.2 Solar-light pole foundation and holding-down assembly ..... Unit: No.

The unit of measurement shall be each complete pole, anti-climb system, foundation and holding-down assembly. The pole shall be a 6.0 m above-ground hot-dip-galvanised steel CHS, nominal 168.3 mm outside diameter and minimum 4.5 mm wall thickness, or an accepted tapered pole providing equal or greater structural capacity. The lower minimum 3.0 m of the erected pole shall be filled with 25 MPa fine concrete or non-shrink cementitious grout and receive a one Y16 reinforcement placed at the centre. A purpose-made 1.0 m high conical hot-dip-galvanised anti-climb shroud shall be installed with its lower edge at least 2.4 m above finished ground. Cabling shall be internal and there shall be no external footholds. The rate shall include structural and wind design, excavation, reinforced-concrete foundation, reinforcement, concrete, holding-down bolts or embedded sleeve, earthing electrode, anti-rotation and anti-removal details, backfilling, making good and certification.

PS-EL 8.3 Photometric and structural design submissions ..... Unit: Sum

The tendered sum shall cover site verification, photometric calculations, lighting layout, autonomy calculations, wind-load design, pole and foundation design, coordinated shop drawings, product data, design certificates and all revisions required for acceptance before manufacture.

PS-EL 8.4 Testing, commissioning, certification and handover ..... Unit: Sum

The tendered sum shall cover night-time aiming and illumination checks, charging and autonomy checks, dusk-to-dawn and control-setting tests, electrical testing, Certificate of Compliance where applicable, final settings, labelled spare keys or tools, recommended spares, warranties, manuals and instruction of the Employer's operating personnel.

PS-COM TESTING, COMMISSIONING AND HANDOVER

PS-COM 1 Commissioning Plan

ADD THE FOLLOWING:

The Contractor shall submit an integrated commissioning plan for Employer’s Agent approval at least 30 days before commissioning commences. The plan shall identify: prerequisites and completion inspections; responsibilities; temporary bypass arrangements; staged filling sequence; test methods and acceptance criteria; effluent sampling; emergency isolation; operator training; and reporting schedule.

PS-COM 2 Commissioning Sequence

ADD THE FOLLOWING:

Commissioning shall proceed in the following sequence:

- Completion inspections and snagging of all civil, mechanical and electrical works
- Cleaning and flushing of all pipelines
- Pipe and structure leakage and pressure tests
- Geomembrane close-out inspection, CQA report and leak-location survey
- Dry operation of mechanical equipment
- Sequential clean-water testing of reinforced-concrete liquid-retaining structures; staged wastewater filling of HDPE-lined ponds

- Staged introduction of wastewater under supervision
- Verification of hydraulic distribution and flow-control performance
- Operational trials and operator training

No uncontrolled discharge of wastewater, sludge or treated effluent is permitted at any time during commissioning.

PS-COM 3 Handover Evidence

ADD THE FOLLOWING:

- Earthworks: material approvals; density, moisture and cement-treatment records; trial results; as-built profiles
- Concrete: batch records; cube test results; pre-pour records; waterstop inspections; water-retention test results
- Geomembrane: certificates; panel plan; seam and repair logs; all NDT and destructive test results; CQA report; leak survey; warranties
- Pipelines: fusion/jointing records; as-built surveys; leakage and pressure test results; cleaning confirmation; CCTV records
- Roads and drainage: layer approvals; density results; levels; outlet and erosion-control inspections
- Buildings and services: completion inspections; plumbing tests; electrical certificates; keys and manuals
- Mechanical and solar: shop test records; installation checks; commissioning sheets; warranties; spares
- Final handover: as-built drawings (editable and PDF); O&M manuals; training records; asset schedule; closed defects list

PS-COM 8 Measurement and Payment

Payment under PS-COM is for integrated project-wide activities not included in normal construction quality control, individual equipment testing or the correction of defects. The Contractor remains responsible for achieving compliance under every work item. No separate payment shall be made for retesting following a failure or for correcting defective work.

PS-COM 8.1 Integrated commissioning plan ..... Unit: Sum

The tendered sum shall cover preparation, coordination, submission and revision of the integrated commissioning plan, method statements, programme, responsibility matrix, test sheets, acceptance criteria, emergency procedures and permits necessary to obtain approval before commissioning.

PS-COM 8.2 Completion inspections, snagging and close-out ..... Unit: Sum

The tendered sum shall cover coordination of discipline completion inspections, preparation and maintenance of consolidated defect lists, evidence of close-out and attendance at re-inspections. The cost of correcting defects is deemed included in the applicable construction rates.

PS-COM 8.3 Integrated dry commissioning ..... Unit: Sum

The tendered sum shall cover coordinated dry operation and functional checks of screens, gates, stoplogs, valves, controls, solar systems and other operating equipment as an integrated system, including specialist attendance, temporary power or water, test instruments, records and approved adjustments.

PS-COM 8.4 Controlled staged filling and wastewater introduction ..... Unit: Sum

The tendered sum shall cover the Contractor's planning, temporary hoses and pumps, supervision, level monitoring, transfer and reuse of test water, records, emergency-response readiness and reporting for controlled staged filling. The two reinforced-concrete anaerobic ponds and other reinforced-concrete liquid-retaining structures shall be water-tested to the specified test level before wastewater introduction. Test water shall be transferred sequentially and reused between structures wherever technically practicable. The HDPE-lined facultative, maturation and storage ponds shall not be fully filled using carted clean water; their acceptance shall rely on liner CQA, seam testing and leak-location work, followed by controlled staged wastewater filling. Purchased water and external cartage instructed by the Employer's Agent are paid under PS-COM 8.4.1 and are excluded from this sum.

PS-COM 8.4.1 Provisional Sum for approved clean-water supply and external cartage for retention and commissioning tests .. .. Unit: Provisional Sum

The Provisional Sum shall be expended only on written instruction for the verified purchase, abstraction charges where applicable, loading and external cartage of approved clean water required for concrete water-retention tests and minimum hydraulic commissioning. The Contractor shall submit a water-balance and trip estimate before expenditure. The 18 000 litre municipal bowser and other available containers shall be used where instructed, and water shall be transferred and reused between structures to minimise cost. Filling all HDPE-lined ponds with carted clean water is excluded.

PS-COM 8.4.2 Contractor's overheads, charges and profit on PS-COM 8.4.1 ..... Unit: %

The percentage shall be applied to the verified amount expended under PS-COM 8.4.1 and shall constitute full compensation for administration, coordination, payment and handling of instructed external water supply and cartage. Contractor-owned temporary hoses, pumps and supervision remain included in PS-COM 8.4.

PS-COM 8.5 As-built, operating and close-out information ..... Unit: Sum

The tendered sum shall cover surveyed as-built drawings; operations and maintenance manuals; asset and component schedules, warranties, keys and spares; the consolidated quality dossier; health and safety, environmental and statutory close-out files; and final handover and defects close-out. The rate shall include compilation, checking, indexing, electronic editable and PDF copies, required hard copies, revisions and final acceptance. Survey work measured separately elsewhere shall not be duplicated.

PS-COM 8.6 Clean-water retention and drainage-function testing ..... Unit: Sum

The tendered sum for each separately scheduled structure or system shall cover test preparation, temporary blanks and seals, controlled filling, maintaining test levels, calibrated level monitoring, evaporation and rainfall records, drainage-function checks, safe transfer and reuse of water and disposal arrangements. For the anaerobic ponds, test one pond at a time and pump the retained water to the second pond before topping up. Retesting after failure and remedial work shall not be measured separately. HDPE-lined ponds are governed by PS-HDPE testing and staged operational filling and do not require full clean-water retention filling.

PS-COM 8.7 Effluent sampling, laboratory analysis and commissioning reports ..... Unit: P Sum

The Provisional Sum shall be expended only on written instruction. Payment shall be based on verified invoices for instructed sampling and analysis by an approved SANAS-accredited laboratory. No percentage adjustment shall apply unless it is separately scheduled in the Bill of Quantities. The Contractor's attendance, coordination and commissioning-report compilation, and routine Contractor quality-control testing, remain included in the applicable work rates.

PS-COM 8.7.1 Contractor's overheads, charges and profit on PS-COM 8.7 ..... Unit: %

The percentage shall be applied to the verified amount expended under PS-COM 8.7 and shall constitute full compensation for the Contractor's overheads, charges and profit associated with the instructed laboratory services.

PS-COM 8.8 Operator training and practical demonstrations ..... Unit: Sum

The tendered sum shall cover the approved training programme, competent trainers, training material, practical demonstrations, operating and maintenance instruction, emergency and isolation procedures, attendance records, competency confirmation where specified and one repeat session for personnel reasonably unable to attend the first session.

PS-COM 8.9 Permanent influent and final-effluent sampling points complete ..... Unit: No.

The unit of measurement shall be each complete labelled sampling point. Provide one representative screened-influent point downstream of screening and one final-effluent point before reuse or discharge. Each point shall be safely accessible without entering a confined space or pond, constructed of corrosion- and UV-resistant materials, fitted with a secure cap or valve, drain/flush provisions where applicable, a durable identification sign, and all brackets, access provisions and making good. Locations shall be approved before installation and recorded on the as-built drawings. Routine 12-month laboratory monitoring is not included.

PSA 8.5 TRAINING

PSA 8.5.1 Accredited process-controller training for three municipal nominees ..... Unit: Provisional Sum

The Provisional Sum shall be expended only on the written instruction of the Employer's Agent for accredited wastewater process-controller training for three municipal nominees. It shall include course fees, prescribed learning material, assessments, examination fees, reasonable travel and accommodation where instructed, and initial registration assistance. The training level shall be aligned with the final DWS classification of the works. The Contractor's normal site-specific operator training under PS-COM 8.8 is excluded.

PSA 8.5.2 Contractor's overheads, charges and profit on PSA 8.5.1 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 8.5.1 and shall constitute full compensation for procurement, coordination, administration and payment of the instructed training provider.

PSA 12 SUMS STATED PROVISIONALLY

PSA 12.1 Contingencies

A Provisional Sum equal to ten per cent (10%) of the Total of Priced Items, calculated before contingencies and VAT, shall be included in the Tender BOQ Summary. The Provisional Sum shall be expended only upon the written instruction of the Employer's Agent. No separate percentage mark-up shall apply, except for compensation determined under the Conditions of Contract for work instructed against the Provisional Sum.

PSA 12.3 LDO, CLO and Project Steering Committee Salaries

Where scheduled, the Provisional Sum shall cover salaries paid to the Labour Desk Officer, Community Liaison Officer and Project Steering Committee on the Employer's Agent's written instruction. The separately scheduled percentage item shall constitute full compensation for the Contractor's overheads, charges and profit.

PSA 12.3.1 Contractor's overheads, charges and profit on PSA 12.3 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.3.

PSA 12.10 Locating Existing Services

A Provisional Sum shall be scheduled for specialist locating and identification of existing services where required and agreed with the Employer's Agent, including ground-penetrating radar or other approved methods. The separately scheduled percentage item shall apply to the verified amount expended.

PSA 12.10.1 Contractor's overheads, charges and profit on PSA 12.10 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.10.

PSA 12.11 Relocation of Existing Services

A Provisional Sum shall be scheduled for relocation of existing services by approved specialists where instructed by the Employer's Agent. The separately scheduled percentage item shall apply to the verified amount expended.

PSA 12.11.1 Contractor's overheads, charges and profit on PSA 12.11 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.11.

PSA 12.12 Specialised Services

A Provisional Sum shall be scheduled for independent or additional specialist services instructed by the Employer's Agent and not measured under another specific payment item. It shall not pay for the Contractor's specified quality control, routine compliance testing, design submissions, method statements, supervision, correction of defects or retesting after failure, all of which remain included in the applicable tendered rates. Specialist services that may be instructed include:

- Specialist services not expressly measured under PS-HDPE, PS-EL, PS-COM or another scheduled item
- Laboratory stabilisation design for cement treatment of embankments
- Geotechnical testing and supervision for embankments
- Electrical and instrumentation specialist
- Land Surveyor; Hydroseeding and rehabilitation specialist
- Acceptance control testing of pipework, linings and coatings
- Night-soil disposal facility specialist

PSA 12.12.1 Contractor's overheads, charges and profit on PSA 12.12 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.12.

PSA 12.13 Municipal Water-Bowser Truck and Pella WWTW Water-Bowser Trailers

A Provisional Sum shall be scheduled for the municipal nominal 18 000 litre water-bowser truck and the three Pella WWTW 2 500 litre water-bowser trailers specified under PS-OM 4. The amount shall be expended only on written instruction against

accepted compliant quotations and shall include the verified net purchase price, specified security and tracking, delivery, commissioning, licensing, registration and asset marking. No Contractor's markup is included.

PSA 12.13.1 Contractor's overheads, charges and profit on PSA 12.13 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.13.

PSA 12.14 Pella WWTW and Municipal Portable Pumps and Generators

A Provisional Sum shall be scheduled for the Pella WWTW site assets comprising two trash-pump packages and two 5.5 kW mobile-generator packages, and the municipal mobile assets comprising one 14 kVA wheel-mounted petrol-generator package and four approximately 4.8 hp clean-water-pump packages, all as specified under PS-OM 3. The amount shall be expended only on written instruction against accepted compliant quotations. No Contractor's markup is included.

PSA 12.14.1 Contractor's overheads, charges and profit on PSA 12.14 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.14.

PSA 12.15 Municipal 6 000 L Vacuum Tanker

A Provisional Sum shall be scheduled for one municipal 6 000 litre dedicated septic-tank vacuum truck and all accessories specified under PS-OM 5. It shall include the verified purchase price, security and tracking, asset marking, delivery, commissioning, training, licensing and registration in the Employer's name. No Contractor's markup is included.

PSA 12.15.1 Contractor's overheads, charges and profit on PSA 12.15 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.15.

PSA 12.16 Operational OHS, Confined-Space Rescue, Monitoring and Hygiene Equipment

A Provisional Sum shall be scheduled for the operational PPE, gas detector, confined-space tripod, rescue equipment, certified davit/anchor sockets, site-specific entry and rescue procedure, witnessed rescue drill, training for three process controllers, self-contained emergency eyewash/drench unit, first-aid and spill kits, sample refrigerator, field meter, dispensers and initial hygiene consumables specified under PS-OM 6. Permanent pond-rescue stations measured under PS-FEN 8.5 are excluded. The amount shall be expended only on written instruction against accepted compliant quotations. No Contractor's markup is included.

PSA 12.16.1 Contractor's overheads, charges and profit on PSA 12.16 ..... Unit: %

The percentage shall be applied to the verified amount expended under PSA 12.16.

- END OF PROJECT-SPECIFIC SPECIFICATION -

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

PART C4.

SITE INFORMATION

Section	Description	Page No
SECTION C4.1	**SITE, LOCATION AND ACCESS ……..…… C4.1-1**	

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

C4.1 SITE, LOCATION AND ACCESS

C4.1 Site Information

C4.1.1 Purpose and status of the information

The information contained in this section describes the Site, as far as reasonably known to the Employer at the time of tender, to assist tenderers in pricing the Works and determining their proposed construction methods, resources, programme and risk allowances.

Tenderers shall read this section together with the drawings, geotechnical investigation, environmental authorisation and all other information incorporated into the Contract.

C4.1.2 Location of the Site

The Site is situated near the settlement of Pella within the jurisdiction of Khâi-Ma Local Municipality, Namakwa District Municipality, Northern Cape Province. Pella is located approximately 53 km from Pofadder, which is the nearest main commercial and administrative centre.

The precise position and limits of the Site are indicated on the locality plan, site layout drawings and setting-out information included in the tender documents.

C4.1.3 General description of the Site

The Site comprises predominantly undeveloped land designated for the construction of the Pella Wastewater Treatment Works and associated infrastructure.

The Works generally include:

a) inlet works and night-soil discharge facilities;
b) reinforced-concrete-lined anaerobic ponds;
c) HDPE geomembrane-lined facultative, maturation and storage ponds;
d) sludge-drying beds and a composting area;
e) internal access roads and associated stormwater management;
f) erosion protection, including grouted stone pitching;
g) buildings and operational facilities;
h) fencing, gates, water storage, solar lighting and associated site infrastructure; and
i) testing, commissioning and putting the Works into operation.

The above summary is provided for context only. The complete requirements are stated in Part C3: Scope of Work, the Specifications, the drawings and the Bill of Quantities.

C4.1.4 Topography and surface conditions

The Site is generally characterised by arid, sparsely vegetated terrain. Local variations in ground level, drainage paths, erosion features, loose surface material, rock outcrops and other natural features may occur.

The Contractor shall allow for the clearing and grubbing, stripping and stockpiling of topsoil, setting out, earthworks, shaping and stormwater control necessary for completing the Works in accordance with the drawings and Specifications.

Natural drainage routes shall not be unnecessarily obstructed. Temporary drainage and erosion-control measures shall be provided throughout construction.

C4.1.5 Ground and geotechnical conditions

The available information regarding the subsurface conditions is contained in the geotechnical investigation report included in the tender documents.

Tenderers are specifically advised that excavations may encounter soil, intermediate material, rock and hard rock. The quantities and classifications reflected in the Bill of Quantities are estimates and shall be measured in accordance with the Contract and applicable Specifications.

The Site may contain materials that are dispersive, erodible or otherwise unsuitable for unrestricted use in engineered embankments. Materials shall be tested, classified, selected, processed, stabilised or disposed of as specified or instructed by the Employer's Agent.

The geotechnical information is based on investigations undertaken at particular locations. Conditions between investigation points may vary. Tenderers shall make their own reasonable interpretation of the information provided.

C4.1.6 Groundwater and surface water

Groundwater levels may vary seasonally and following rainfall or localised inflows. The Contractor shall make provision for controlling surface water and for maintaining excavations and foundation areas in a stable and workable condition.

Any dewatering required for the Contractor's construction operations shall be undertaken in accordance with the Specifications and applicable environmental requirements.

C4.1.7 Access to the Site

Access to the Site is from the existing road network serving Pella and thereafter along local access routes indicated during the compulsory clarification meeting or on the drawings.

Tenderers shall inspect the access routes and satisfy themselves regarding:

a) road condition and load limitations;
b) access for heavy construction vehicles and abnormal loads;
c) turning and manoeuvring requirements;
d) the availability of suitable delivery routes;
e) seasonal or weather-related access constraints; and
f) the protection and reinstatement of existing roads and access tracks.

The Contractor shall obtain all permits and approvals required for abnormal loads and shall repair damage caused by its construction traffic.

C4.1.8 Existing services

The positions of existing underground and overhead services shown on the drawings are based on the information available to the Employer and may not be complete or exact.

Before commencing excavation, the Contractor shall locate and verify all affected services in consultation with the relevant authorities and the Employer's Agent. Existing services shall be protected and maintained unless their alteration or removal is expressly included in the Works.

Any unidentified service encountered shall be reported immediately to the Employer's Agent before further work proceeds in the affected area.

C4.1.9 Water, electricity and temporary services

The Employer does not guarantee the availability, capacity, quality or continuity of construction water, electricity, telecommunications or other temporary services at the Site.

The Contractor shall make its own arrangements, at its own cost, for all temporary services required for executing the Works, subject to the necessary approvals. The Contractor shall not connect to or use any municipal service without prior written authorisation.

C4.1.10 Climatic conditions

The Site is situated in a hot, arid region characterised by low rainfall, high evaporation, strong solar exposure, wind, dust and substantial daily and seasonal temperature variations.

The Contractor shall allow for the effects of the prevailing climate on:

a) earthworks and moisture conditioning;
b) concrete production, placement and curing;
c) HDPE geomembrane storage, placement and welding;
d) dust suppression;
e) workforce health and safety;
f) temporary works; and
g) the construction programme.

Weather records and general climatic information do not constitute a guarantee of the conditions that will prevail during construction.

C4.1.11 Site establishment and working areas

The Contractor's site establishment, offices, storage areas, workshops, batching areas, fuel storage, personnel facilities and temporary works shall be confined to areas approved by the Employer's Agent.

The Contractor shall not assume that land outside the defined Site will be available for camps, borrow areas, spoil areas, material storage or access. Any additional land required by the Contractor shall be arranged at its own cost and shall be subject to the Employer's approval and all statutory requirements.

C4.1.12 Environmental and social conditions

The Works shall be executed in accordance with the environmental authorisation, Environmental Management Programme, applicable permits and environmental provisions of the Contract.

The Contractor shall take particular care to prevent:

a) uncontrolled erosion and sediment movement;
b) contamination of soil or water;
c) unauthorised clearing of vegetation;
d) dust and excessive noise;
e) uncontrolled disposal of spoil, waste or wastewater;
f) damage to archaeological, heritage or culturally sensitive features; and
g) unnecessary disturbance to the surrounding community.

Any suspected heritage or archaeological material encountered shall be left undisturbed and reported immediately to the Employer's Agent.

C4.1.13 Security and protection of the Works

The Contractor shall be responsible for the security of its personnel, plant, materials, temporary works and completed work from the date of commencement until the issue of the applicable completion certificate.

The Contractor shall provide all temporary fencing, access control, lighting, watchmen and other security measures necessary for the Site. The Employer does not guarantee the security of the Site or the Contractor's property.

C4.1.14 Community liaison and local conditions

The Contractor shall cooperate with the Employer, Community Liaison Officer and relevant community structures regarding access, local labour, construction activities and community-related matters.

No undertaking concerning employment, subcontracting, procurement or community benefits may be made without the Employer's prior approval. Community engagement shall not relieve the Contractor of its obligations under the Contract.

C4.1.15 Inspection of the Site

Tenderers shall attend the compulsory clarification meeting and inspect the Site and reasonably accessible surroundings before submitting their tenders.

Tenderers shall satisfy themselves regarding the visible conditions, access, available working space, transport distances, climatic conditions, sources of materials and services, and other matters that may reasonably affect their tender.

Nothing in this clause shall exclude or reduce either party's rights or obligations under the Conditions of Contract concerning unforeseeable physical conditions, incorrect Employer-supplied information or variations instructed after award.

C4.1.16 Site information forming part of the Contract

The following documents shall be read as part of the Site Information:

a) locality plan and general site layout;
b) topographical survey information;
c) geotechnical investigation report;
d) environmental authorisation and Environmental Management Programme;
e) available services information;
f) tender drawings; and
g) information issued during the clarification meeting or by formal tender addendum.

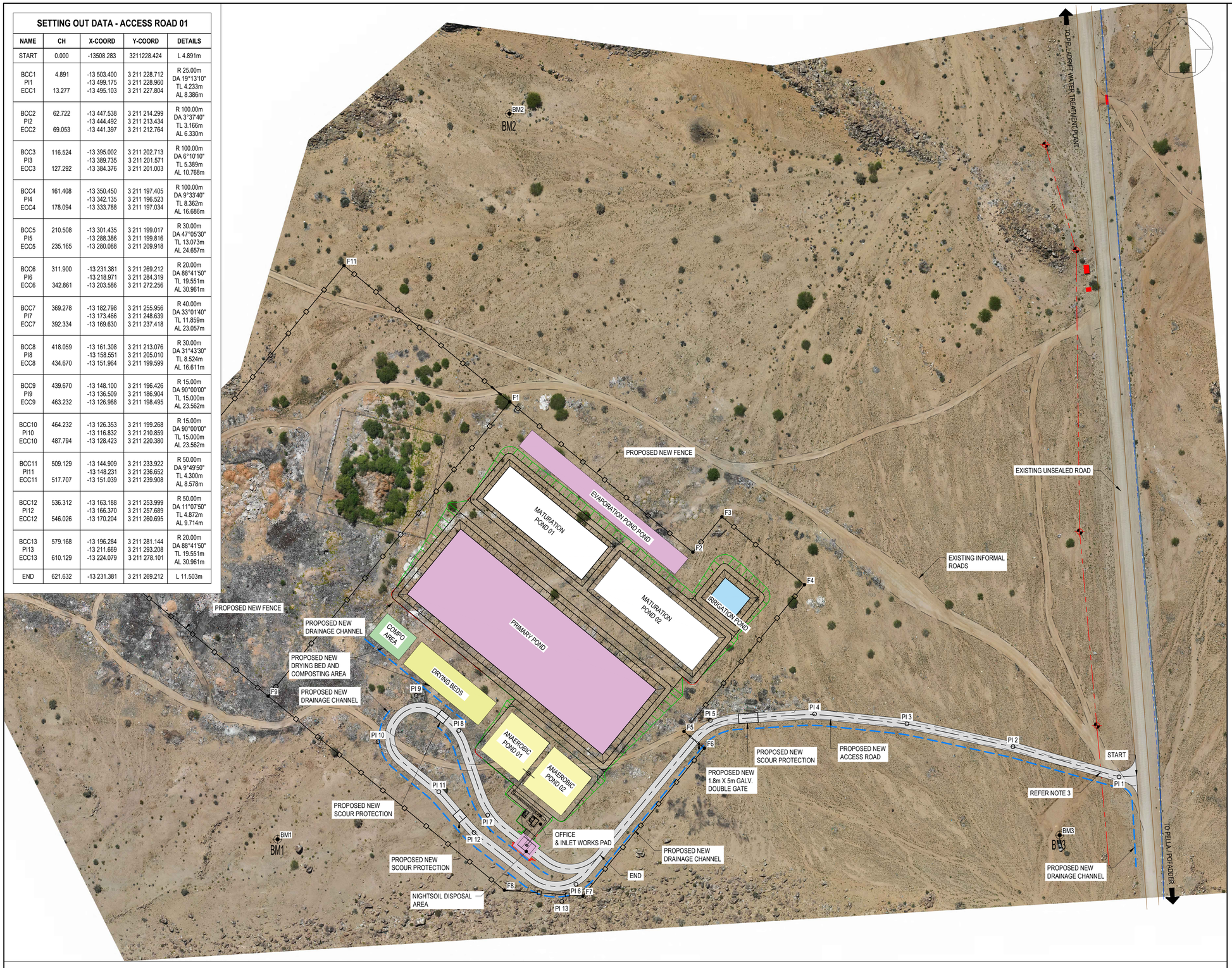
KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

ANNEXURE A

DRAWINGS

SETTING OUT DATA - ACCESS ROAD 01

NAME	CH	X-COORD	Y-COORD	DETAILS
START	0.000	-13508.283	3211228.424	L 4.891m
BCC1 PI1 ECC1	4.891 13.277	-13 503.400 -13 499.175 -13 495.103	3 211 228.712 3 211 228.960 3 211 227.804	R 25.00m DA 19°13'10" TL 4.233m AL 8.386m
BCC2 PI2 ECC2	62.722 69.053	-13 447.538 -13 444.492 -13 441.397	3 211 214.299 3 211 213.434 3 211 212.764	R 100.00m DA 3°37'40" TL 3.166m AL 6.330m
BCC3 PI3 ECC3	116.524 127.292	-13 395.002 -13 389.735 -13 384.376	3 211 202.713 3 211 201.571 3 211 201.003	R 100.00m DA 6°10'10" TL 5.389m AL 10.768m
BCC4 PI4 ECC4	161.408 178.094	-13 350.450 -13 342.135 -13 333.788	3 211 197.405 3 211 196.523 3 211 197.034	R 100.00m DA 9°33'40" TL 8.362m AL 16.686m
BCC5 PI5 ECC5	210.508 235.165	-13 301.435 -13 288.386 -13 280.088	3 211 199.017 3 211 199.816 3 211 209.918	R 30.00m DA 47°05'30" TL 13.073m AL 24.657m
BCC6 PI6 ECC6	311.900 342.861	-13 231.381 -13 218.971 -13 203.586	3 211 269.212 3 211 284.319 3 211 272.256	R 20.00m DA 88°41'50" TL 19.551m AL 30.961m
BCC7 PI7 ECC7	369.278 392.334	-13 182.798 -13 173.466 -13 169.630	3 211 255.956 3 211 248.639 3 211 237.418	R 40.00m DA 33°01'40" TL 11.859m AL 23.057m
BCC8 PI8 ECC8	418.059 434.670	-13 161.308 -13 158.551 -13 151.964	3 211 213.076 3 211 205.010 3 211 199.599	R 30.00m DA 31°43'30" TL 8.524m AL 16.611m
BCC9 PI9 ECC9	439.670 463.232	-13 148.100 -13 136.509 -13 126.988	3 211 196.426 3 211 186.904 3 211 198.495	R 15.00m DA 90°00'00" TL 15.000m AL 23.562m
BCC10 PI10 ECC10	464.232 487.794	-13 126.353 -13 116.832 -13 128.423	3 211 199.268 3 211 210.859 3 211 220.380	R 15.00m DA 90°00'00" TL 15.000m AL 23.562m
BCC11 PI11 ECC11	509.129 517.707	-13 144.909 -13 148.231 -13 151.039	3 211 233.922 3 211 236.652 3 211 239.908	R 50.00m DA 9°49'50" TL 4.300m AL 8.578m
BCC12 PI12 ECC12	536.312 546.026	-13 163.188 -13 166.370 -13 170.204	3 211 253.999 3 211 257.689 3 211 260.695	R 50.00m DA 11°07'50" TL 4.872m AL 9.714m
BCC13 PI13 ECC13	579.168 610.129	-13 196.284 -13 211.669 -13 224.079	3 211 281.144 3 211 293.208 3 211 278.101	R 20.00m DA 88°41'50" TL 19.551m AL 30.961m
END	621.632	-13 231.381	3 211 269.212	L 11.503m



LIST OF DRAWINGS

DRAWING NUMBER	DRAWING TITLE
MSD114–00–C–T–001	LOCALITY PLAN AND LIST OF DRAWINGS
MSD114–00–C–T–002	SITE LAYOUT PLAN
MSD114–00–C–T–003	TYPICAL SECTIONS
MSD114–00–C–T–004	SURFACING LAYOUT AND CROSS SECTIONS OF PONDS
MSD114–00–C–T–005	NIGHTSOIL DISPOSAL AREA & INLET WORKS: LAYOUT
MSD114–00–C–T–006	NIGHTSOIL DISPOSAL AREA & INLET WORKS: DETAILS
MSD114–00–C–T–007	DETAILS OF INLET WORKS & SHELTER BUILDING
MSD114–00–C–T–008	DETAIL OF ANAEROBIC PONDS
MSD114–00–C–T–009	DETAIL OF INLET & OUTLET STRUCTURES
MSD114–00–C–T–010	GENERAL LAYOUT – INLETS, INTERCONNECTIONS, OUTLETS AND DRYING BEDS
MSD114–00–C–T–011	TYPICAL DETAIL: CONCRETE PALISADE FENCE
MSD114–00–C–T–012	TYPICAL DETAILS: MISCELLANEOUS
MSD114–00–C–T–013	NAME BOARD DETAIL
MSD114–00–C–T–014	CONCRETE NOTES, TYPICAL ROAD CROSSING DETAIL, PIPE LINE MARKER
MSD114–00–C–T–015	MISCELLANEOUS
MSD114–00–C–T–016	PLAN AND SECTIONS: SHELTER BUILDING, STOREROOM AND ABLUTION
MSD114–00–C–T–017	ELEVATIONS: SHELTER BUILDING, STOREROOM AND ABLUTION

LEGEND:

- BENCH MARK (BM1)
- EXISTING OVERHEAD SERVICE
- EXISTING CONCRETE STRUCTURES
- EXISTING ABOVE-GROUND PIPELINE
- EXISTING INFORMAL ROAD EDGE
- EXISTING FENCE

LIST OF BENCHMARKS

NAME	Y-COORD	X-COORD	ELEVATION
BM1	-13065.017	3211261.143	456.089
BM2	-13184.681	3210886.825	446.236
BM3	-13468.571	3211259.027	456.096

(REFER NOTE 1)

BOUNDARY FENCE SETTING OUT DATA

NAME	Y-COORD	X-COORD
F1	-13184.848	3211035.459
F2	-13279.297	3211113.045
F3	-13294.283	3211094.801
F4	-13336.908	3211129.815
F5	-13274.725	3211205.513
F6	-13285.235	3211214.146
F7	-13222.568	3211290.433
F8	-13182.058	3211287.410
F9	-13060.146	3211187.265
F10	-12974.628	3211117.016
F11	-13099.330	3210965.210

(REFER NOTE 1)

GENERAL NOTES:

1. PROJECTION: TRANSVERSE MERCATOR, LO19 (WGS84).
2. FOR CORRECT SCALE, PLOT DESIGN ON A1 PAPER.
3. CONTRACTOR TO ASSESS AVAILABILITY OF VERTICAL CLEARANCE TO OVERHEAD SERVICES FOR CONSTRUCTION VEHICLES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

0 50 100 Meters

SCALE: 1:1000

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
LOCALITY PLAN AND LIST OF DRAWINGS

DRAWING CHECKS

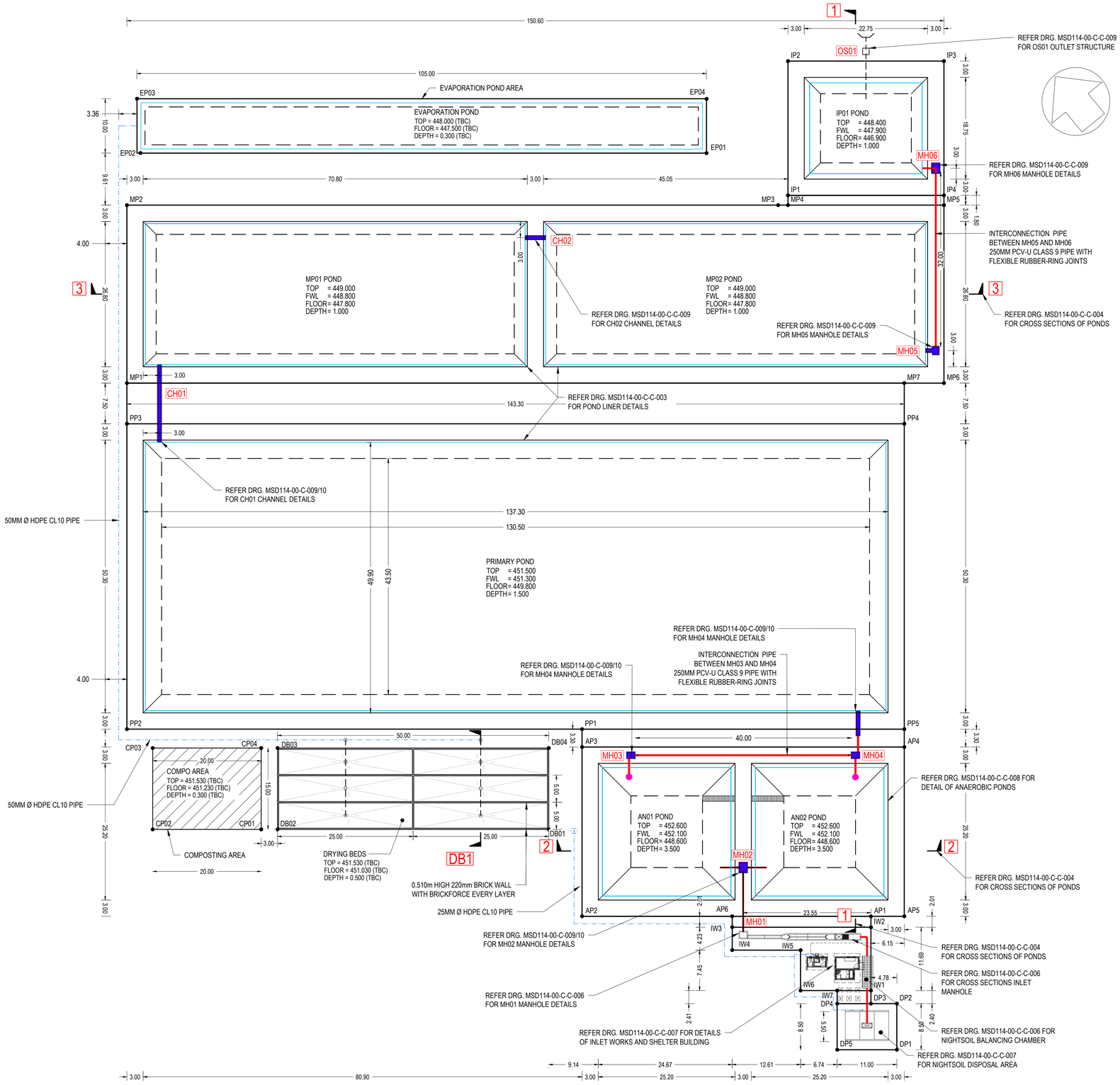
DESIGNED BY	RO
DRAWN BY	MW
DESIGNED CHECKED BY	MW
DRAWING CHECKED BY	RO

APPROVAL CONSULTANT

NAME R ODENDAAL DATE 2026/05/01
PROF REG. No. 201570256 SIGNATURE

PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	001	0

STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



DRAWING NOTE – LEVELS AND BULK EARTHWORKS:

ALL LEVELS SHOWN ON THE DRAWINGS ARE FINISHED SURFACE LEVELS, UNLESS NOTED OTHERWISE. THE CONTRACTOR SHALL REFER TO THE RELEVANT TYPICAL DETAILS TO CONFIRM THE SURFACE TO WHICH EACH LEVEL APPLIES, INCLUDING THE TOP OF CONCRETE, PAVING, STONE PITCHING OR GRAVEL.

THE BULK EARTHWORKS FORMATION LEVEL SHALL BE DETERMINED BY DEDUCTING THE TOTAL THICKNESS OF THE APPLICABLE SURFACE AND UNDERLYING LAYER BUILD-UP FROM THE FINISHED SURFACE LEVEL SHOWN.

THE CONTRACTOR SHALL VERIFY ALL LEVELS, LAYER THICKNESSES AND TYPICAL DETAILS BEFORE COMMENCING EARTHWORKS. ANY DISCREPANCY OR UNCERTAINTY SHALL BE REFERRED TO THE ENGINEER FOR CLARIFICATION BEFORE CONSTRUCTION.

LEGEND:

- POND FLOOR
- WATER SURFACE PERIMETER
- INTERCONNECTING PIPES
- ANAEROBIC OVERFLOW
- MANHOLE / CHANNEL

GENERAL NOTES:

1. PROJECTION: TRANSVERSE MERCATOR, LO19 (WGS84).
2. LIST OF SECTION ABBREVIATIONS AS FOLLOWS:
   - -- DP - DISPOSAL PAD (DUMPING PAD)
   - -- IW - INLET WORKS PAD
   - -- AP - ANAEROBIC PONDS
   - -- PP - PRIMARY POND
   - -- MP - MATURATION PONDS
   - -- IP - IRRIGATION POND
   - -- DB - DRYING BED PAD
   - -- EP - EVAPORATION POND
   - -- CP - COMPOSTING AREA PAD
   - -- TOP - TOP OF POND WALL
   - -- FWL - FINAL WATER LEVEL
   - -- FLOOR - FLOOR OF POND
   - -- DEPTH - HEIGHT OF WATER SURFACE LEVEL ABOVE FLOOR
   - -- MH - MANHOLE
3. FOR CORRECT SCALE, PLOT DESIGN ON A1 PAPER.
4. FOR BENCHMARK COORDINATE DATA, REFER TO DRG. MSD114-00-C-C-001.
5. FOR FENCING SETTING OUT DATA, REFER TO DRG. MSD114-00-C-C-001.

SETTING OUT TABLE: DISPOSAL PAD

NAME	Y-COORD	X-COORD	ELEVATION
DP1	-13195.007	3211271.246	453.300
DP2	-13200.402	3211264.678	453.300
DP3	-13196.710	3211261.645	453.300
DP4	-13191.902	3211257.695	453.300
DP5	-13186.507	3211264.264	453.300

SETTING OUT TABLE: INLET WORKS PAD

NAME	Y-COORD	X-COORD	ELEVATION
IW1	-13198.235	3211259.790	453.040
IW2	-13205.656	3211250.757	453.040
IW3	-13185.895	3211234.524	453.040
IW4	-13183.209	3211237.792	453.040
IW5	-13192.951	3211245.797	453.040
IW6	-13188.222	3211251.551	453.040
IW7	-13193.432	3211255.833	453.040

SETTING OUT TABLE: ANAEROBIC PONDS

NAME	Y-COORD	X-COORD	ELEVATION
AP1	-13206.919	3211249.219	452.600
AP2	-13165.784	3211215.408	452.600
AP3	-13185.588	3211191.299	452.600
AP4	-13231.487	3211229.004	452.600
AP5	-13211.683	3211253.112	452.600
AP6	-13187.168	3211232.974	452.600

SETTING OUT TABLE: PRIMARY POND

NAME	Y-COORD	X-COORD	ELEVATION
PP1	-13187.682	3211188.750	451.500
PP2	-13122.851	3211135.493	451.500
PP3	-13158.588	3211091.989	451.500
PP4	-13269.318	3211182.950	451.500
PP5	-13233.582	3211226.454	451.500

SETTING OUT TABLE: MATURATION PONDS

NAME	Y-COORD	X-COORD	ELEVATION
MP1	-13163.349	3211086.194	449.000
MP2	-13184.170	3211060.849	449.000
MP3	-13276.932	3211137.050	449.000
MP4	-13278.324	3211138.194	449.000
MP5	-13300.541	3211156.444	449.000
MP6	-13279.721	3211181.789	449.000
MP7	-13274.079	3211177.154	449.000

SETTING OUT TABLE: IRRIGATION POND

NAME	Y-COORD	X-COORD	ELEVATION
IP1	-13279.468	3211136.802	448.400
IP2	-13295.178	3211117.678	448.400
IP3	-13317.394	3211135.927	448.400
IP4	-13301.683	3211155.053	448.400

SETTING OUT TABLE: DRYING BED PAD

NAME	Y-COORD	X-COORD	ELEVATION
DB01	-13171.208	3211199.129	451.530
DB02	-13132.572	3211167.392	451.530
DB03	-13142.093	3211155.801	451.530
DB04	-13180.729	3211187.538	451.530

SETTING OUT TABLE: EVAPORATION POND

NAME	Y-COORD	X-COORD	ELEVATION
EP01	-13272.802	3211121.254	449.000
EP02	-13192.206	3211055.010	449.000
EP03	-13198.054	3211046.871	449.000
EP04	-13279.168	3211113.541	449.000

SETTING OUT TABLE: COMPOSTING AREA PAD

NAME	Y-COORD	X-COORD	ELEVATION
CP01	-13130.254	3211165.488	451.530
CP02	-13114.799	3211152.793	451.530
CP03	-13124.320	3211141.202	451.530
CP04	-13139.775	3211153.897	451.530

0 12 24 Meters

HOR. SCALE: 1:400

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT : KHAI-MA LOCAL MUNICIPALITY

PROJECT : PELLA WWTW

DRAWING DESCRIPTION : SITE LAYOUT PLAN

DRAWING CHECKS

DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

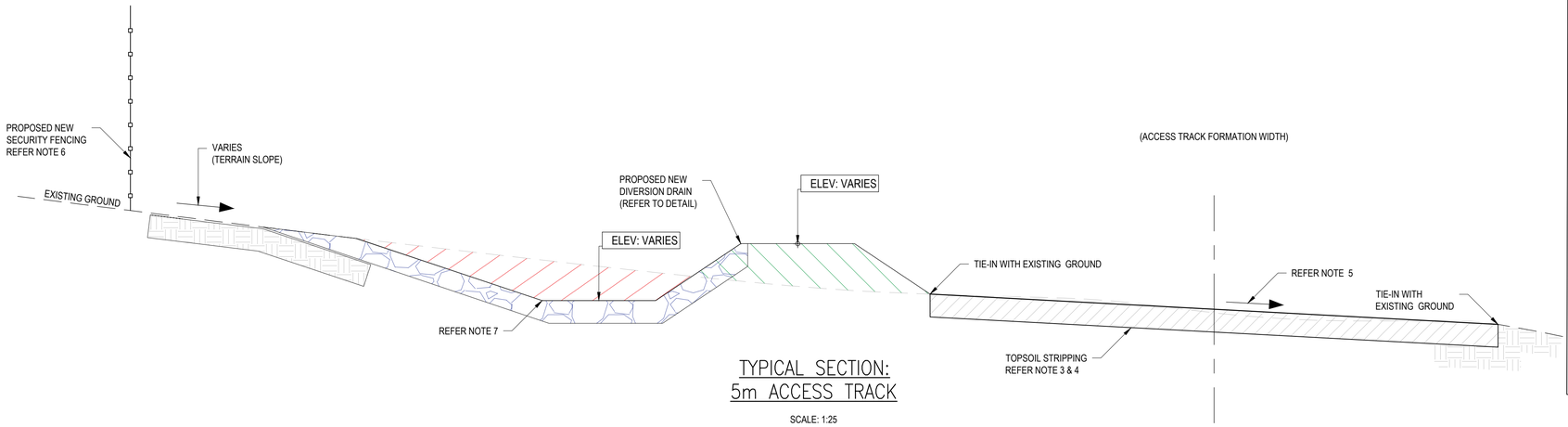
NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	002	0

STATUS: D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT

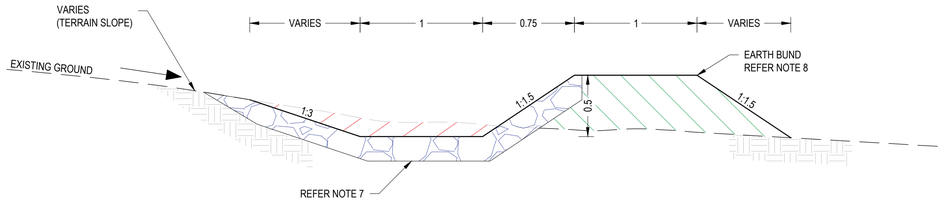
GENERAL NOTES:

1. ALL DIMENSIONS ARE IN METERS, UNLESS SPECIFIED OTHERWISE.
2. FOR CORRECT SCALE, PLOT DESIGN ON A1 PAPER.
3. TOPSOIL TO BE REMOVED TO A DEPTH OF 200 mm.
4. ROAD BED TO BE PROOF ROLLED AND SOFT AREAS ARE TO BE IDENTIFIED AND REPORTED TO THE ENGINEER ON SITE.
5. FINAL ROAD CROSS-FALL TO MATCH THAT OF THE SURROUNDING TERRAIN.
6. FOR FENCING DETAILS REFER TO DRAWING NO. MSD114-00-C-C-011.
7. 200mm GROUTED STONE PITCHING WITH CONTINUOUS NONWOVEN FILTER G5 GEOTEXTILE DIVERSION DRAIN TO INTERCEPT SURFACE RUNOFF AND DIVERT FLOWS AROUND THE PROPOSED POND STRUCTURES
8. EARTH BUND TO BE COMPACTED TO MITIGATE THE RISK OF SCOURING DURING RAINFALL EVENTS.
9. MINIMUM COVER TO REF. 193 STEEL MESH SHALL BE 50mm.
10. MINIMUM CONCRETE STRENGTH SHALL BE 25MPa AFTER 7 DAYS.
11. 160mm PERFORATED UNDER DRAIN PIPE TO BE WRAPPED IN BIDIM / GEOTEXTILE.
12. 220mm BRICK WALLS TO BE CONSTRUCTED IN A STRETCHER BOND WITH BRICKFORCE INSTALLED ON EVERY LAYER.
13. BRICK MORTAR MIX SHALL HAVE A 4:1 CEMENT / SANDRATIO.
14. INSERT BUNCHED UP CHICKEN WIRE PLUG INTO OUTLET TO MINIMISE NUISANCE BLOCKAGES.



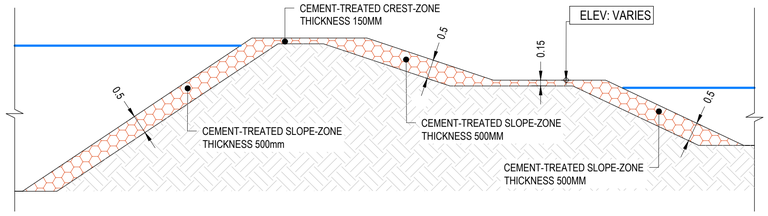
TYPICAL SECTION: 5m ACCESS TRACK

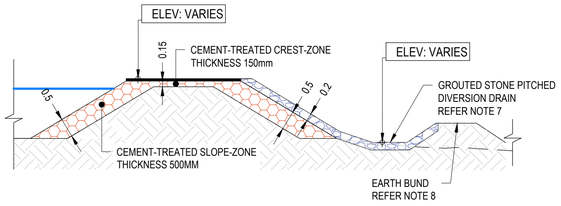
SCALE: 1:25



TYPICAL SECTION: DIVERSION DRAIN

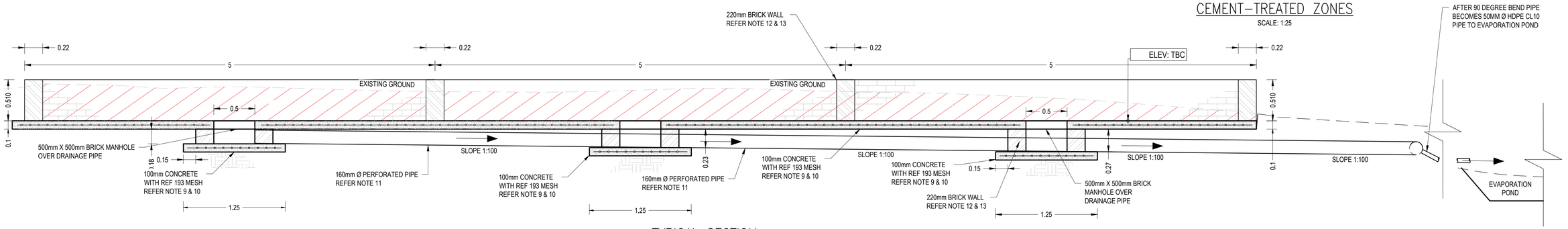
SCALE: 1:25





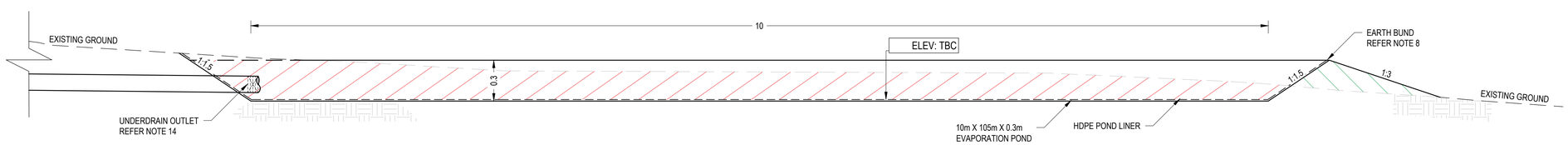
TYPICAL SECTION: CEMENT–TREATED ZONES

SCALE: 1:25



TYPICAL SECTION: DRYING BED

SCALE: 1:25



TYPICAL SECTION: EVAPORATION POND

SCALE: 1:25

0 0.75 1.5 Meters

SCALE: 1:25

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT : KHAI-MA LOCAL MUNICIPALITY

PROJECT : PELLA WWTW

DRAWING DESCRIPTION : TYPICAL SECTIONS

DRAWING CHECKS

DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

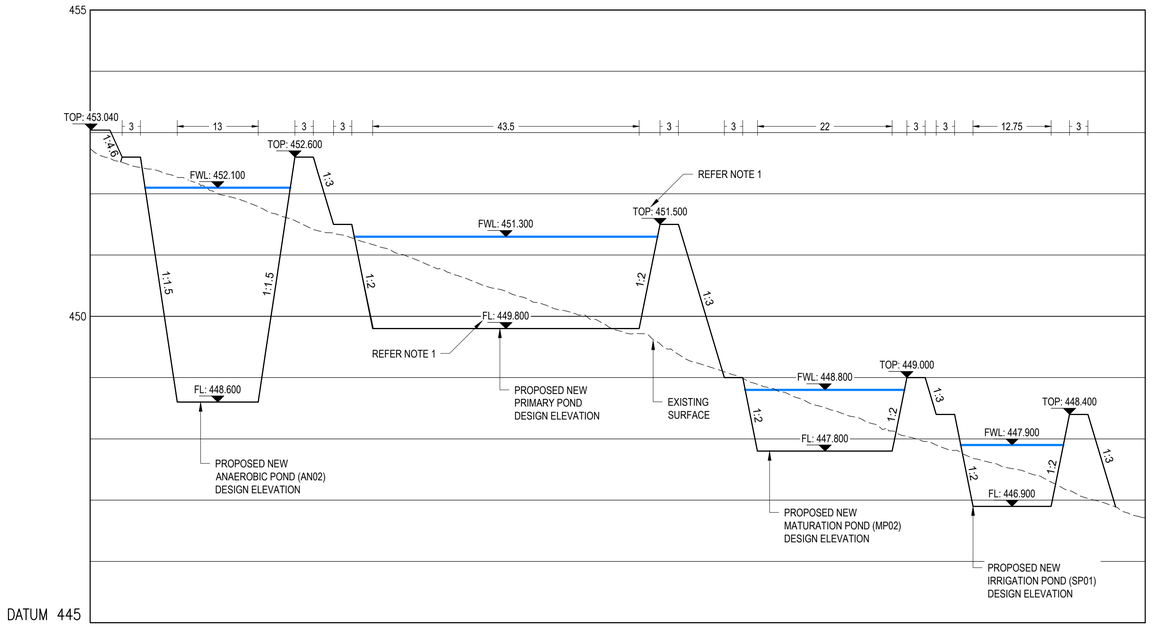
APPROVAL CONSULTANT

NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER – PHASE – DISC – STATUS – DOC NO – REV

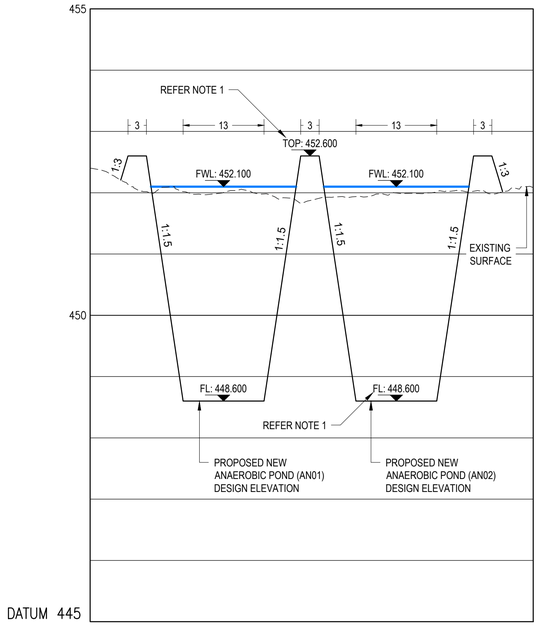
MSD114 – 00 – C – T – 003 – 0

STATUS:
D: DRAFT / **P**: PRELIMINARY / **T**: TENDER / **F**: FINAL / **C**: CONSTRUCTION / **A**: AS-BUILT, RECORD / **R**: REPORT



SECTION 1 – 1

SCALES:
HOR. = 1:500
VERT. = 1:50

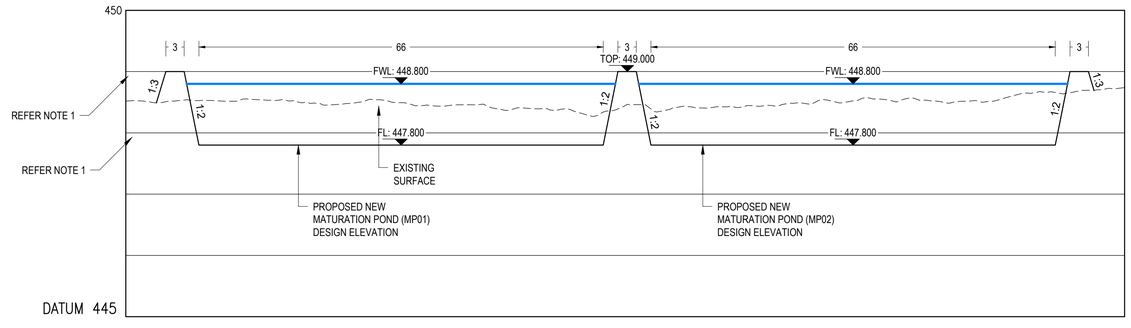


SECTION 2 – 2

SCALES:
HOR. = 1:500
VERT. = 1:50

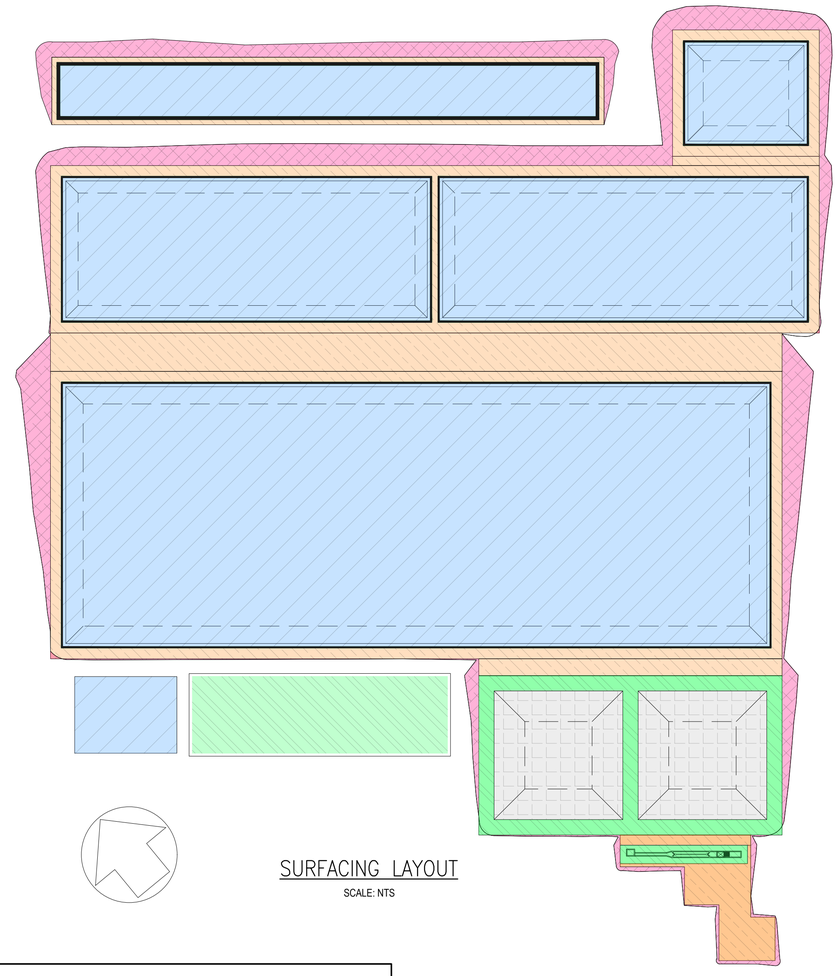
GENERAL NOTES:

1. LIST OF SECTION ABBREVIATIONS AS FOLLOWS:
   -- TOP - TOP OF POND EMBANKMENT
   -- FWL - FINISHED WATER LEVEL
   -- FL - FLOOR LEVEL
2. FOR CORRECT SCALE, PLOT DESIGN ON A1 PAPER.
3. **ADD NOTES AS REQUIRED.**



SECTION 3 – 3

SCALES:
HOR. = 1:500
VERT. = 1:50



SURFACING LAYOUT

SCALE: NTS

LEGEND:

- 2mm HDPE LINER
- NEW PROPOSED 60mm INTERLOCKING PAVING
- 150 MM THICK, 35 MPA / 19 MM REINFORCED CONCRETE LINING TO ANAEROBIC PONDS, COMPLETE WITH REF 245 MESH
- 100 MM THICK, 25 MPA / 19 MM REINFORCED CONCRETE SLABS, COMPLETE WITH REF 193 MESH
- 200mm GROUTED STONE PITCHING

0 15 30 Meters

HOR. SCALE: 1:500

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
MR. KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
SURFACING LAYOUT AND CROSS SECTIONS OF PONDS

DRAWING CHECKS

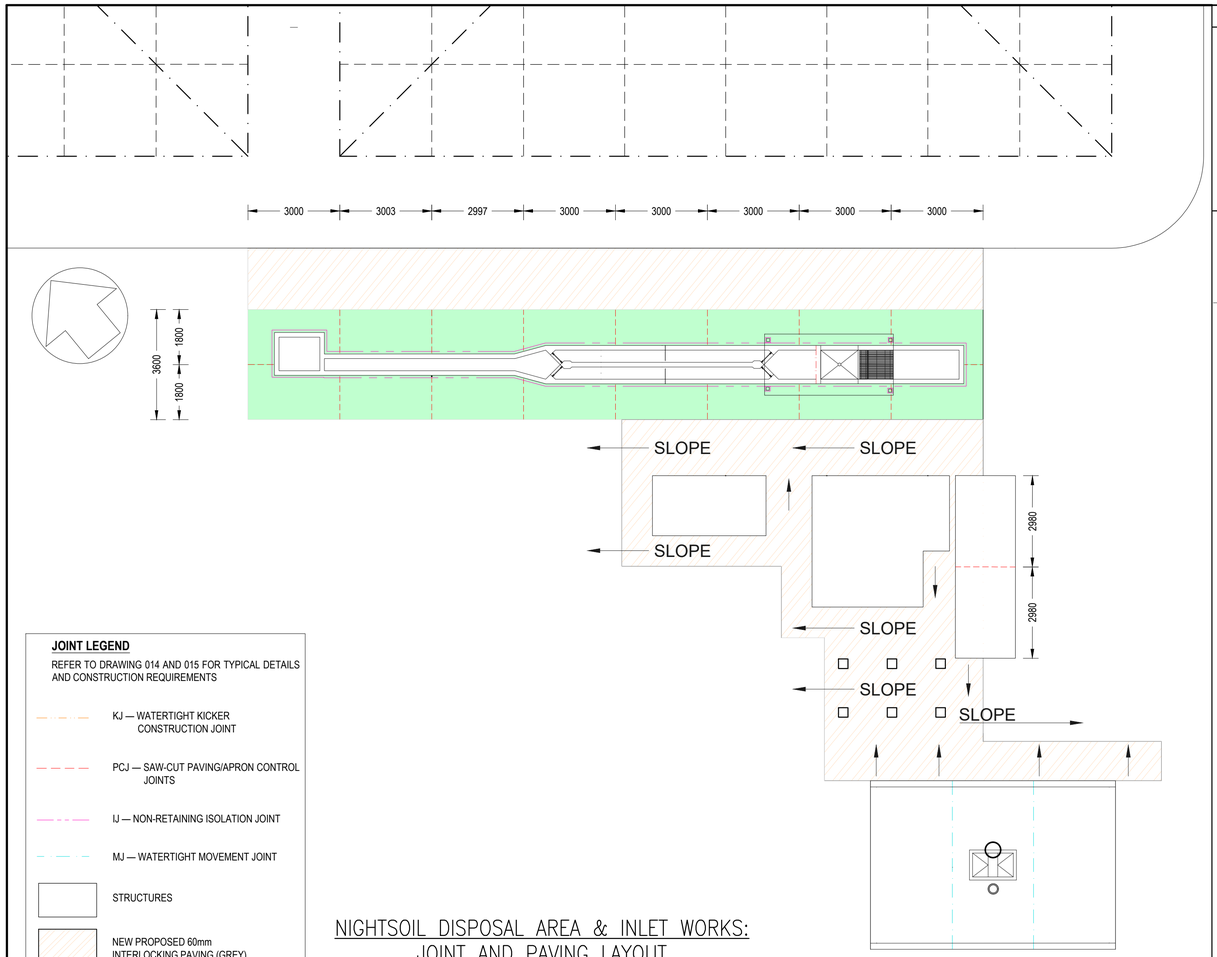
DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

NAME R ODENDAAL DATE 2026/05/01
PROF REG. No. 201570256 SIGNATURE

PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	004	0

STATUS:
D. DRAFT / P. PRELIMINARY / T. TENDER / F. FINAL / C. CONSTRUCTION / A. AS-BUILT, RECORD / R. REPORT



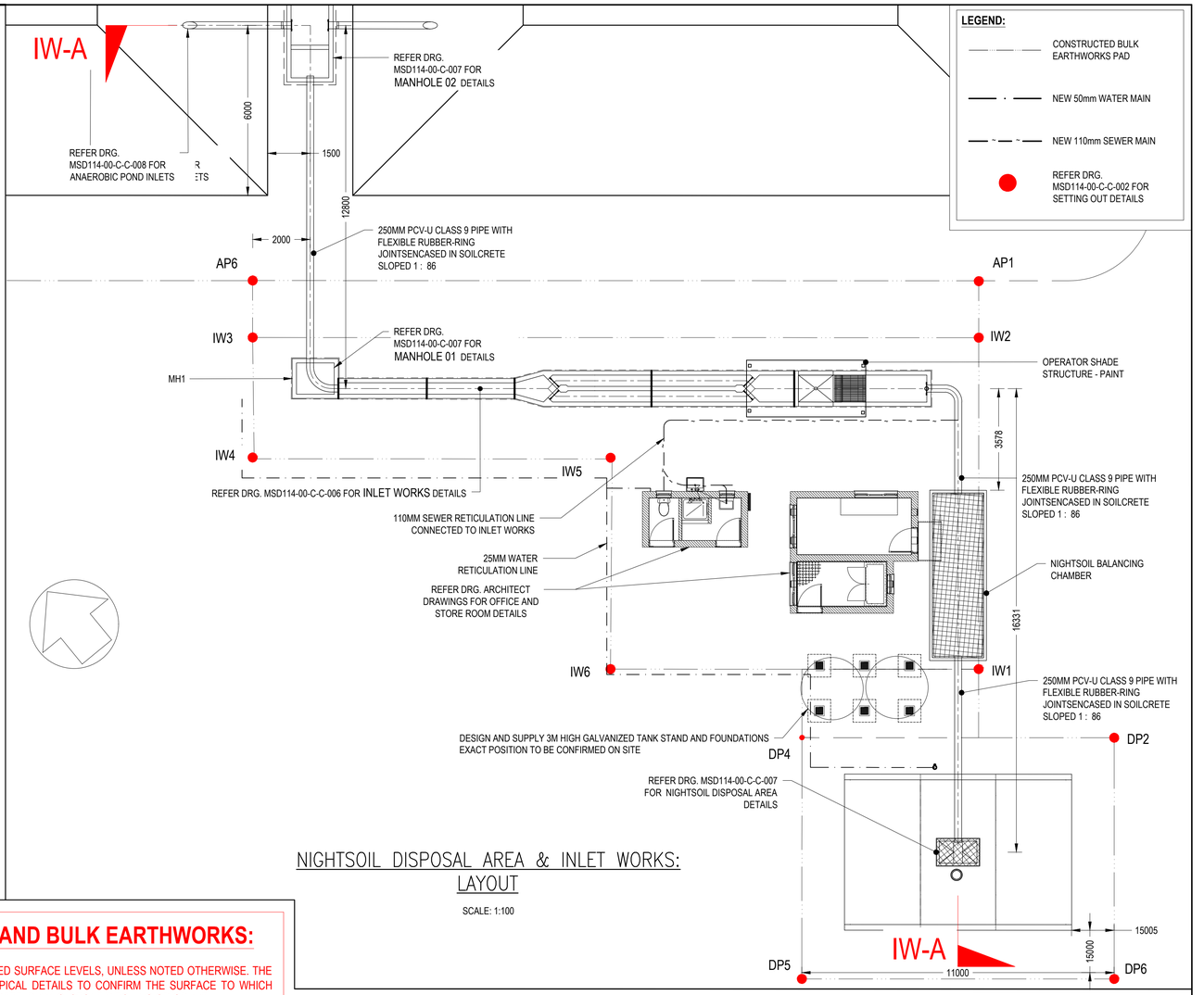
JOINT LEGEND

REFER TO DRAWING 014 AND 015 FOR TYPICAL DETAILS AND CONSTRUCTION REQUIREMENTS

- KJ — WATERTIGHT KICKER CONSTRUCTION JOINT
- PCJ — SAW-CUT PAVING/APRON CONTROL JOINTS
- IJ — NON-RETAINING ISOLATION JOINT
- MJ — WATERTIGHT MOVEMENT JOINT
- STRUCTURES
- NEW PROPOSED 60mm INTERLOCKING PAVING (GREY)
- 100 mm THICK (25 MPa/19 mm) APRON SLAB WITH REF 193 MESH MID PLACED

NIGHTSOIL DISPOSAL AREA & INLET WORKS: JOINT AND PAVING LAYOUT

SCALE: 1:100



LEGEND:

- CONSTRUCTED BULK EARTHWORKS PAD
- NEW 50mm WATER MAIN
- NEW 110mm SEWER MAIN
- REFER DRG. MSD114-00-C-C-002 FOR SETTING OUT DETAILS

NIGHTSOIL DISPOSAL AREA & INLET WORKS: LAYOUT

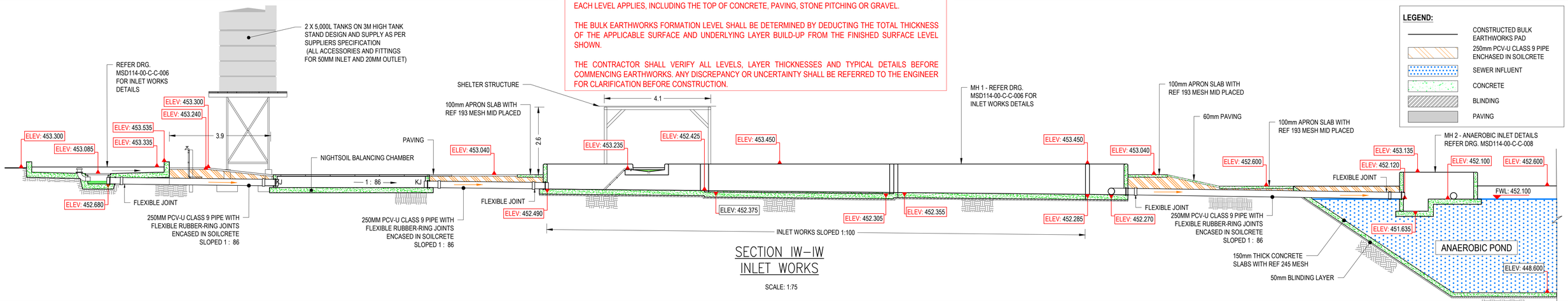
SCALE: 1:100

DRAWING NOTE – LEVELS AND BULK EARTHWORKS:

ALL LEVELS SHOWN ON THE DRAWINGS ARE FINISHED SURFACE LEVELS, UNLESS NOTED OTHERWISE. THE CONTRACTOR SHALL REFER TO THE RELEVANT TYPICAL DETAILS TO CONFIRM THE SURFACE TO WHICH EACH LEVEL APPLIES, INCLUDING THE TOP OF CONCRETE, PAVING, STONE PITCHING OR GRAVEL.

THE BULK EARTHWORKS FORMATION LEVEL SHALL BE DETERMINED BY DEDUCTING THE TOTAL THICKNESS OF THE APPLICABLE SURFACE AND UNDERLYING LAYER BUILD-UP FROM THE FINISHED SURFACE LEVEL SHOWN.

THE CONTRACTOR SHALL VERIFY ALL LEVELS, LAYER THICKNESSES AND TYPICAL DETAILS BEFORE COMMENCING EARTHWORKS. ANY DISCREPANCY OR UNCERTAINTY SHALL BE REFERRED TO THE ENGINEER FOR CLARIFICATION BEFORE CONSTRUCTION.



SECTION IW–IW INLET WORKS

SCALE: 1:75

LEGEND:

- CONSTRUCTED BULK EARTHWORKS PAD
- 250mm PCV-U CLASS 9 PIPE ENCHASED IN SOILCRETE
- SEWER INFLUENT
- CONCRETE
- BLINDING
- PAVING

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
NIGHTSOIL DISPOSAL AREA & INLET WORKS: LAYOUT

DRAWING CHECKS

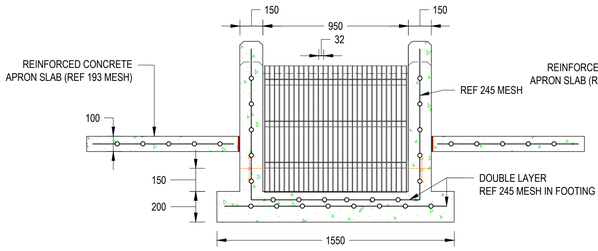
DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

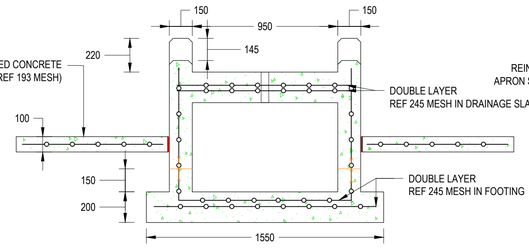
NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER	– PHASE	– DISC	– STATUS	– DOC NO	– REV
MSD114	– 00	– C	– C	– 005	– 0

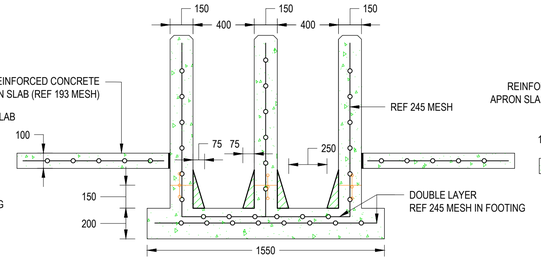
STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



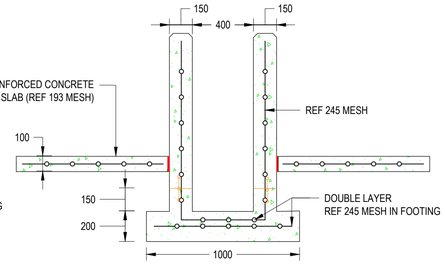
SECTION C



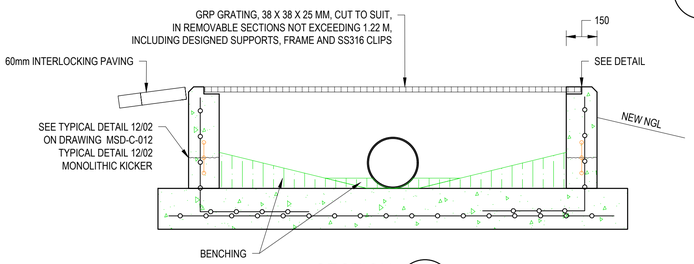
SECTION D



SECTION E



SECTION F

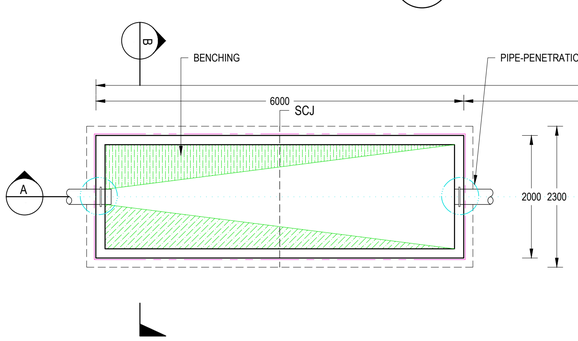


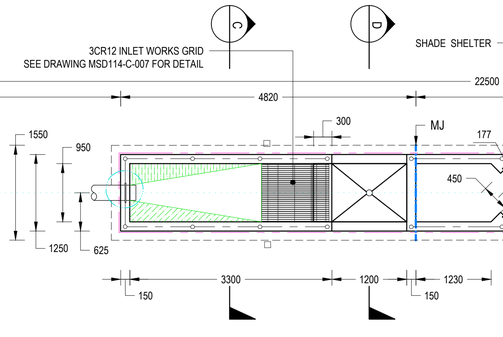
SECTION B

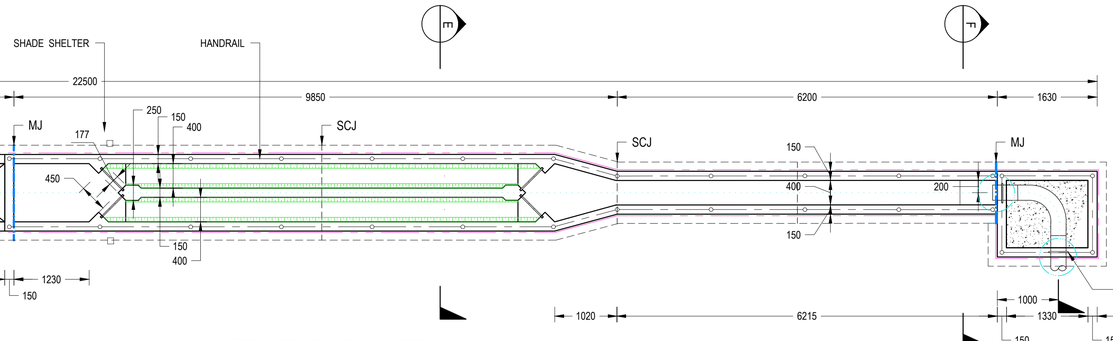
JOINT LEGEND

REFER TO DRAWING 014 AND 015 FOR TYPICAL DETAILS AND CONSTRUCTION REQUIREMENTS

- KJ — WATERTIGHT KICKER CONSTRUCTION JOINT
- SCJ — SAW-CUT CONTRACTION JOINT IN LIQUID-RETAINING CONCRETE
- MJ — WATERTIGHT MOVEMENT JOINT
- IJ — NON-RETAINING ISOLATION JOINT
- PPJ — PIPE-PENETRATION JOINT (ALL BOX OUTS IN CONCRETE SHALL BE INCLUDED IN PRICE OF SMOOTH FOR VERTICAL FORMWORK)

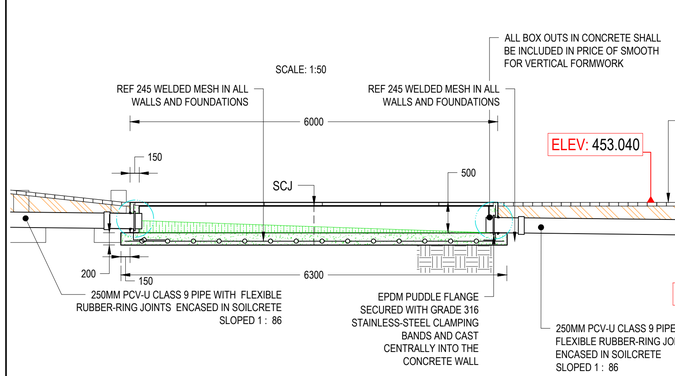




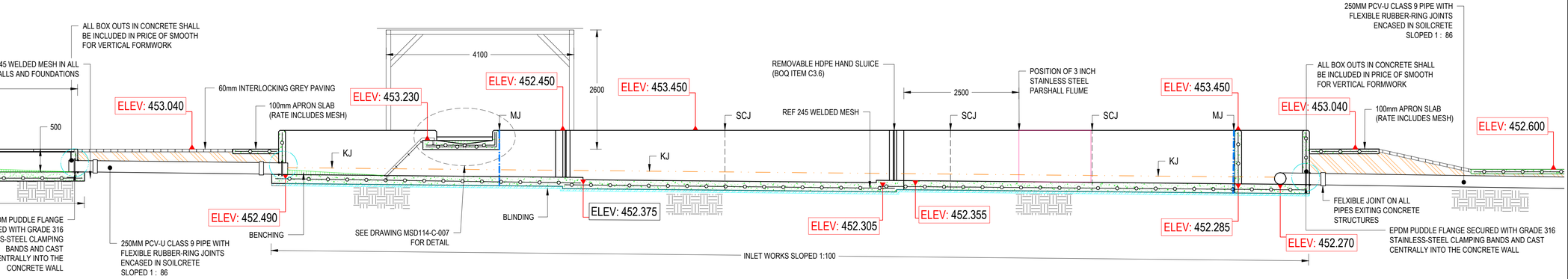


NIGHTSOIL BALANCING CHAMBER - PLAN VIEW

INLET WORKS - PLAN VIEW



NIGHTSOIL BALANCING CHAMBER - SECTION A-A



INLET WORKS - SECTION A-A

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
NIGHTSOIL DISPOSAL AREA & INLET WORKS: DETAILS

DRAWING CHECKS

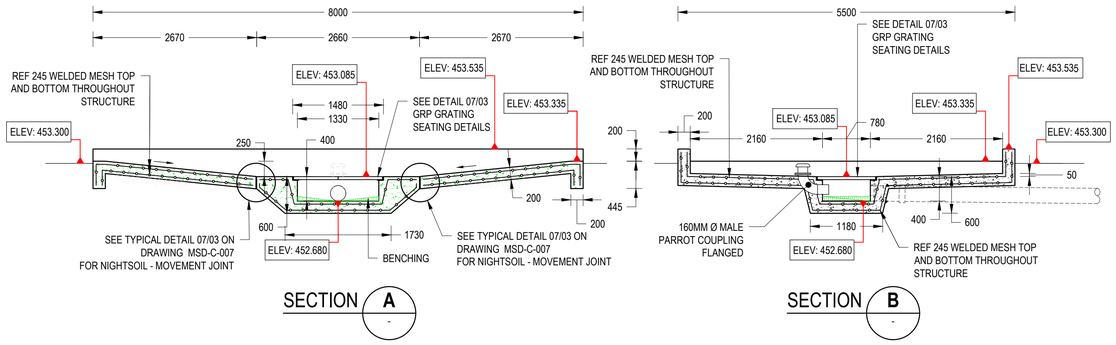
DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

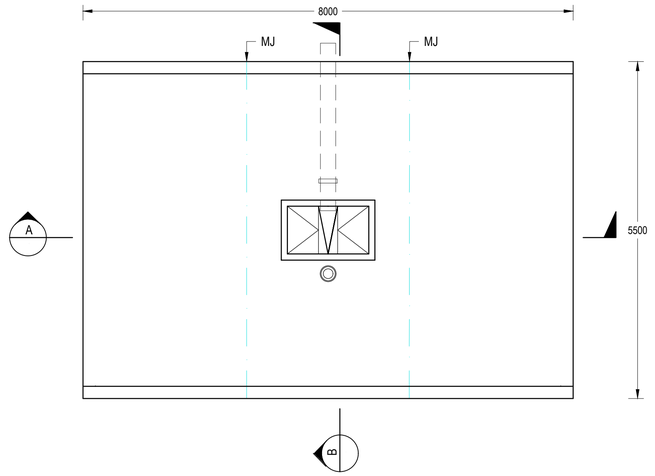
PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	006	0

STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



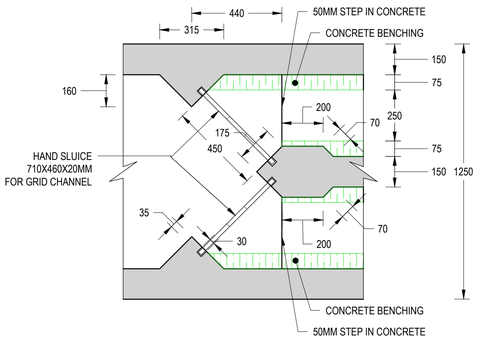
SECTION A
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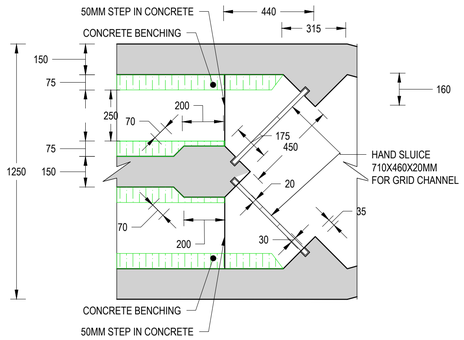
SECTION B
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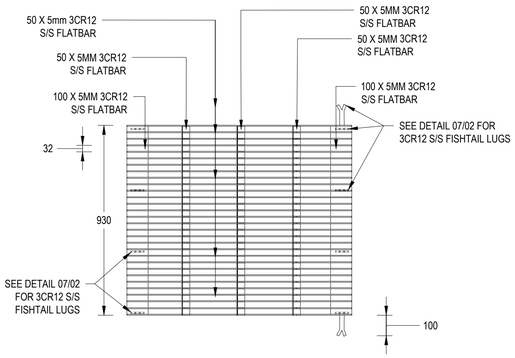
NIGHTSOIL DISPOSAL SLAB

SCALE: 1:50

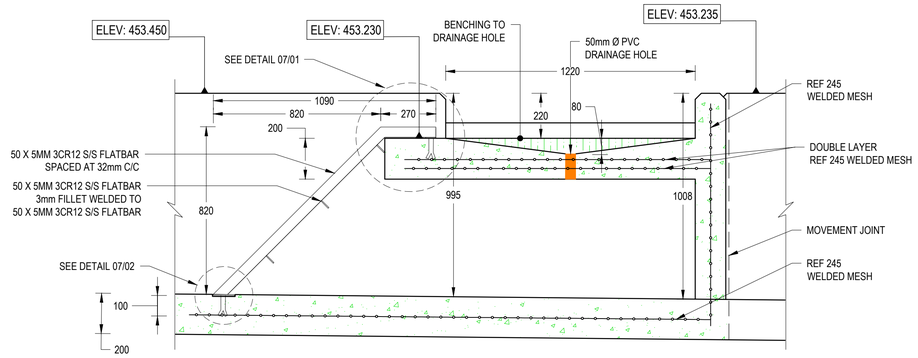




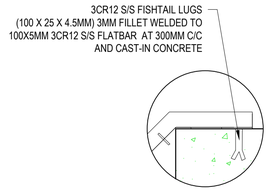
GRIT CHANNEL DEAILS



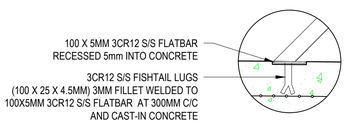
3CR12 INLET WORKS GRID



INLET WORKS MANHOLE - DETAIL



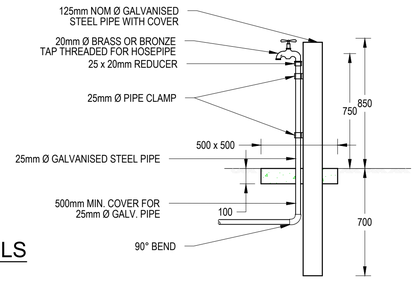
DETAIL - 07/01



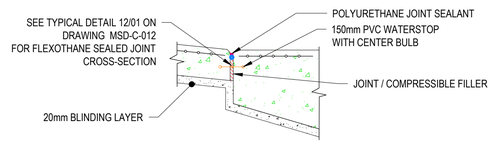
DETAIL - 07/02



DETAIL 07/03
GRP GRATING - SEATING DETAILS



STANDPIPE DETAIL



DETAIL 07/03
NIGHSOIL MOVEMENT JOINT

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
DETAILS OF INLET WORKS & SHELTER BUILDING

DRAWING CHECKS

DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

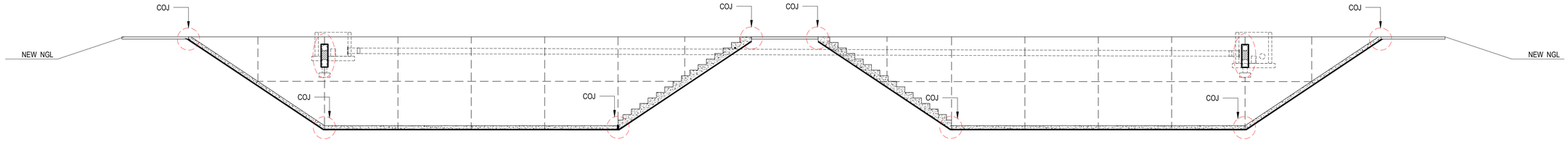
APPROVAL CONSULTANT

NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER – PHASE – DISC – STATUS – DOC NO – REV

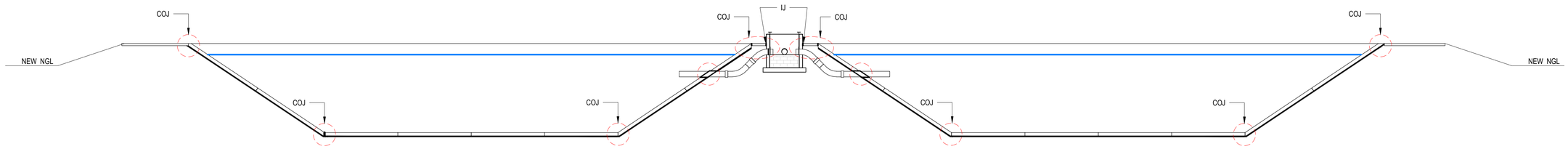
MSD114 – 00 – C – T – 007 – 0

STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



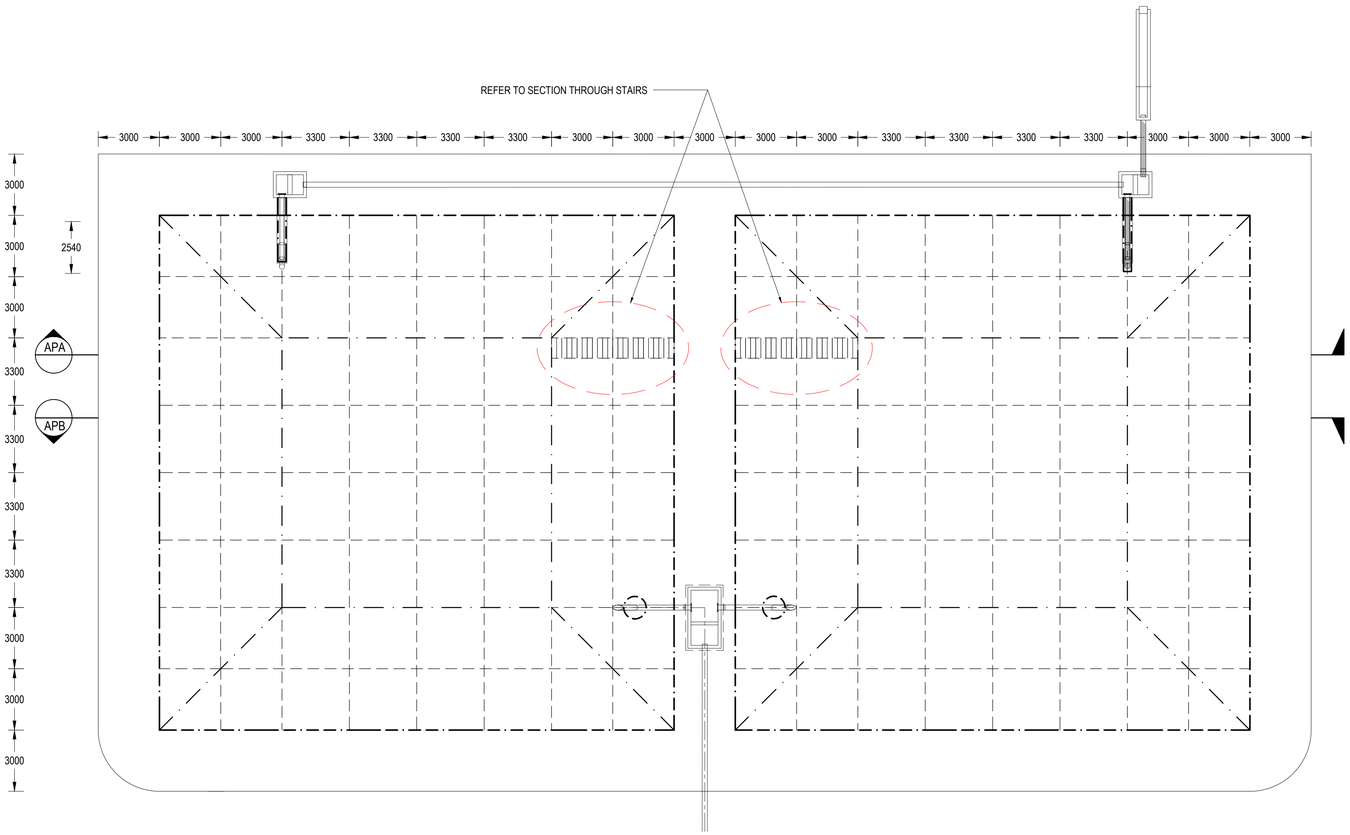
SECTION APA - APA:
ANAEROBIC POND

SCALE: 1:150



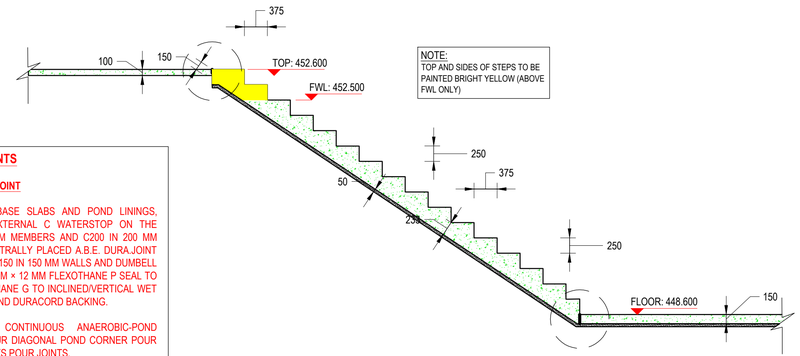
SECTION APB - APB:
ANAEROBIC POND

SCALE: 1:150



JOINT LAYOUT - ANAEROBIC POND, INLET WORKS, NIGHT SOIL AND BALANCING CHAMBER

SCALE: 1:150



NOTE:
TOP AND SIDES OF STEPS TO BE PAINTED BRIGHT YELLOW (ABOVE FWL ONLY)

SECTION THROUGH ANAEROBIC POND STEPS

SCALE: 1:50

LEGEND: ANAEROBIC POND JOINTS

COJ — WATERTIGHT CONSTRUCTION JOINT

REINFORCEMENT CONTINUOUS. IN BASE SLABS AND POND LININGS, PROVIDE A.B.E. DURA.JOINT PVC EXTERNAL C WATERSTOP ON THE DRY/EXTERNAL FACE: C150 IN 150 MM MEMBERS AND C200 IN 200 MM MEMBERS. IN WALLS, PROVIDE A CENTRALLY PLACED A.B.E. DURA.JOINT PVC DUMBELL WATERSTOP: DUMBELL 150 IN 150 MM WALLS AND DUMBELL 200 IN 200 MM WALLS. PROVIDE A 12 MM × 12 MM FLEXOTHANE P SEAL TO HORIZONTAL WET FACES OR FLEXOTHANE G TO INCLINED/VERTICAL WET FACES, WITH EPIDERMIX 326 PRIMER AND DURACORD BACKING.

COJ LOCATIONS INCLUDE THE CONTINUOUS ANAEROBIC-POND FLOOR-TO-SLOPE TOE JOINT, ALL FOUR DIAGONAL POND CORNER POUR JOINTS AND ALL PLANNED INLET-WORKS POUR JOINTS.

SCJ - SAW-CUT CONTRACTION JOINT IN LIQUID-RETAINING CONCRETE

REINFORCEMENT CONTINUOUS. INITIAL SAW CUT 3–5 MM WIDE TO ONE-THIRD OF MEMBER DEPTH; 50 MM DEEP IN 150 MM POND LINING. ROUT THE UPPER PORTION AND PROVIDE A 12 MM × 12 MM FINISHED SEALANT SECTION WITH A.B.E. DURACORD AND EPIDERMIX 326 PRIMER. USE FLEXOTHANE P ON HORIZONTAL SURFACES AND FLEXOTHANE G ON INCLINED OR VERTICAL SURFACES. NO PVC WATERSTOP, SWELLABLE WATERSTOP OR COMPRESSIBLE FILLER SHALL BE PROVIDED BELOW AN SCJ.

MJ — WATERTIGHT MOVEMENT JOINT

20 MM WIDE, FULL-DEPTH JOINT. REINFORCEMENT TERMINATES 50 MM CLEAR OF EACH JOINT FACE. PROVIDE A.B.E. DURASHEET 100 COMPRESSIBLE FILLER.

IN BASE SLABS, PROVIDE A.B.E. DURA.JOINT PVC EXTERNAL E WATERSTOP ON THE DRY/EXTERNAL FACE: E150 IN 150 MM MEMBERS AND E200 IN 200 MM MEMBERS.

IN WALLS, PROVIDE A CENTRALLY PLACED A.B.E. DURA.JOINT PVC CENTRE-BULB WATERSTOP: CENTRE-BULB 150 IN 150 MM WALLS AND CENTRE-BULB 200 IN 200 MM WALLS.

PROVIDE A FACTORY-MANUFACTURED TRANSITION BETWEEN EXTERNAL AND CENTRALLY PLACED PROFILES. SEAL THE WET FACE WITH FLEXOTHANE P ON HORIZONTAL SURFACES OR FLEXOTHANE G ON INCLINED/VERTICAL SURFACES, WITH THE APPLICABLE A.B.E. PRIMER AND BOND-BREAKING BACKING.

PPJ — PIPE-PENETRATION JOINT

PROVIDE A FACTORY-FITTED PUDDLE FLANGE OR PROPRIETARY MECHANICAL COMPRESSION SEAL COMPATIBLE WITH THE PIPE MATERIAL. PROVIDE AN A.B.E. FLEXOTHANE G FLEXIBLE WET-FACE SEAL WITH EPIDERMIX 326 TO CONCRETE AND EPIDERMIX 391 TO COMPATIBLE NON-POROUS SURFACES. SEALANT OR GROUT ALONE SHALL NOT BE ACCEPTED AS THE PRIMARY SEAL AROUND HDPE OR PVC PIPEWORK.

ANAEROBIC-POND STEPS SHALL BE CAST MONOLITHICALLY WITH THE ADJACENT POND SLOPE. NO JOINT SHALL BE PROVIDED AROUND THE STEPS.

JOINT LEGEND

REFER TO DRAWING 014 AND 015 FOR TYPICAL DETAILS AND CONSTRUCTION REQUIREMENTS

- COJ — WATERTIGHT CONSTRUCTION JOINT
- SCJ — SAW-CUT CONTRACTION JOINT IN LIQUID-RETAINING CONCRETE
- MJ — WATERTIGHT MOVEMENT JOINT
- PPJ — PIPE-PENETRATION JOINT
- IJ — NON-RETAINING ISOLATION JOINT

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
DETAIL OF ANAEROBIC PONDS

DRAWING CHECKS

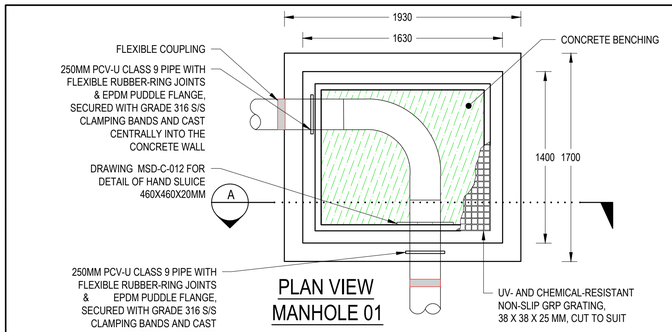
DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

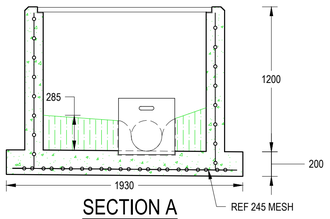
NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	008	0

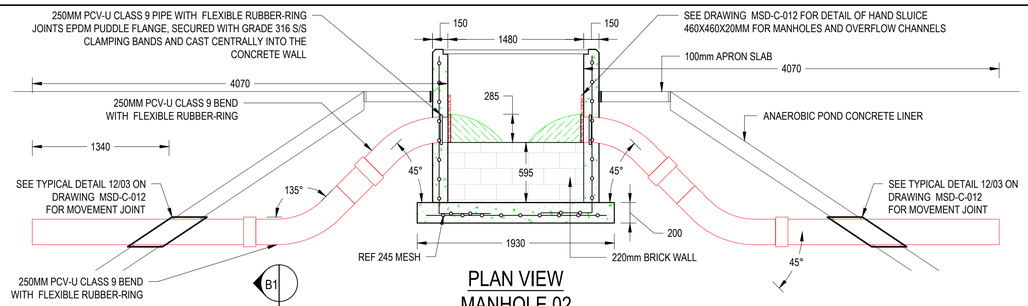
STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



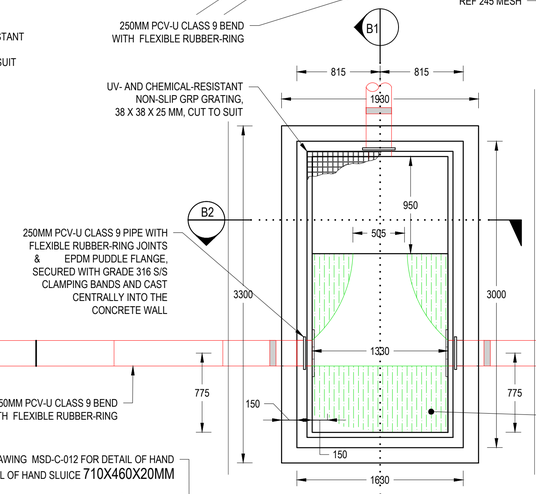
PLAN VIEW MANHOLE 01



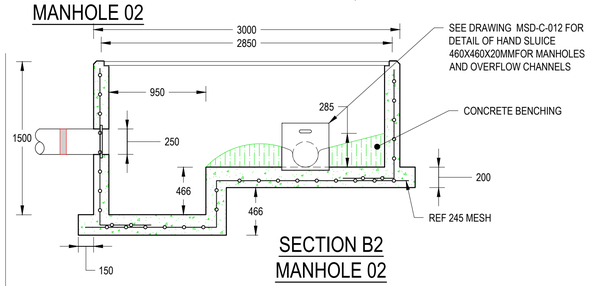
SECTION A MANHOLE 01



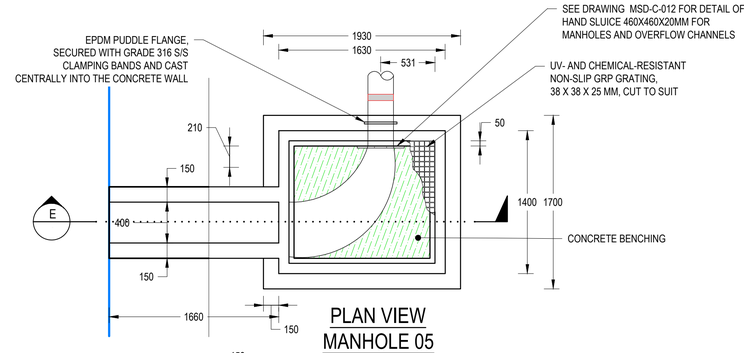
PLAN VIEW MANHOLE 02



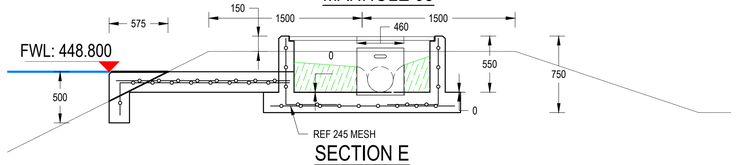
SECTION B1 MANHOLE 02



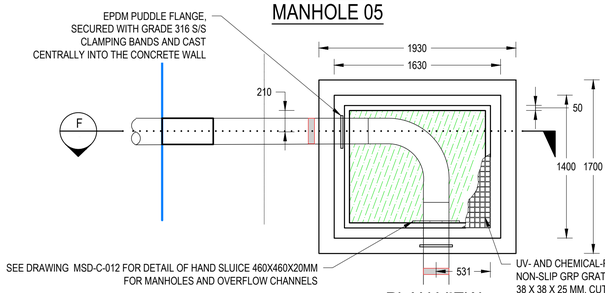
SECTION B2 MANHOLE 02



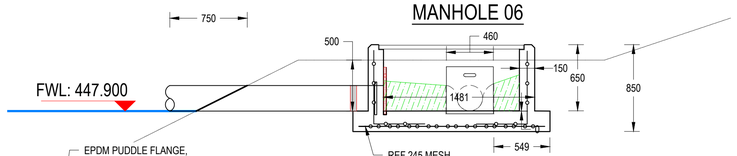
PLAN VIEW MANHOLE 05



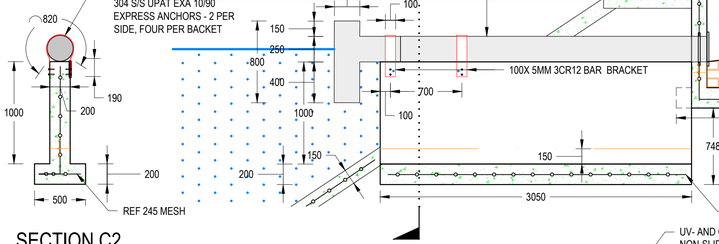
SECTION E MANHOLE 05



PLAN VIEW MANHOLE 06

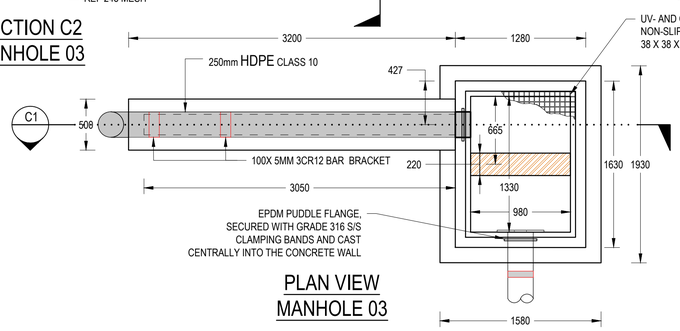


SECTION F MANHOLE 06

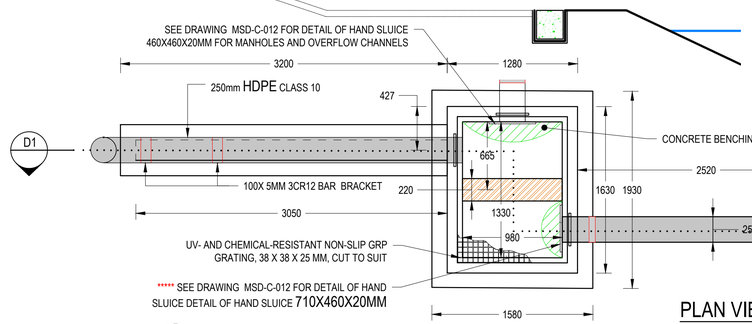


SECTION C2 MANHOLE 03

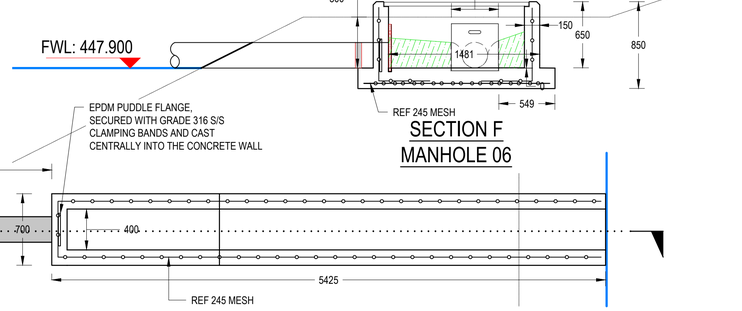
SECTION C1 MANHOLE 03

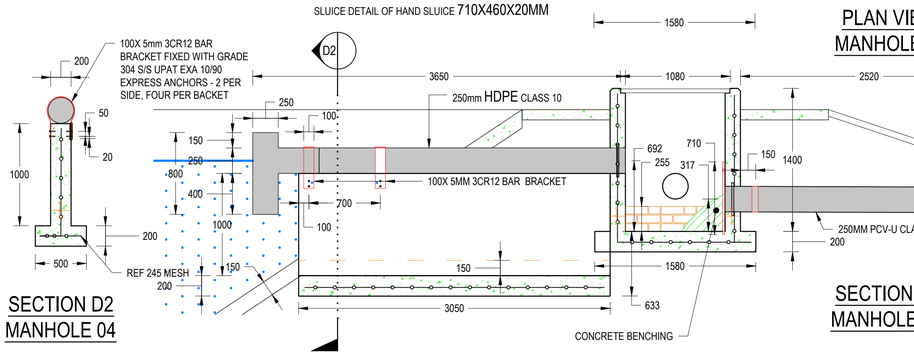


PLAN VIEW MANHOLE 03



PLAN VIEW MANHOLE 04





SECTION D2 MANHOLE 04

SECTION D1 MANHOLE 04

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT : KHAI-MA LOCAL MUNICIPALITY

PROJECT : PELLA WWTW

DRAWING DESCRIPTION : DETAIL OF INLET & OUTLET STRUCTURES

DRAWING CHECKS

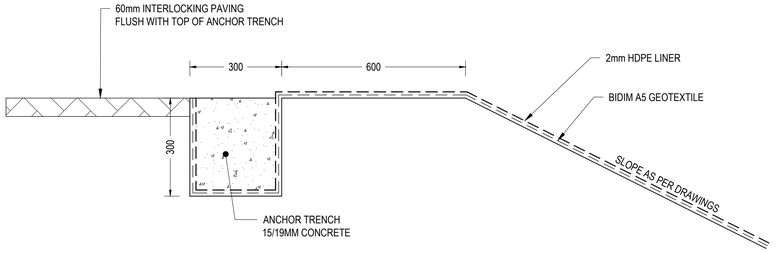
DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

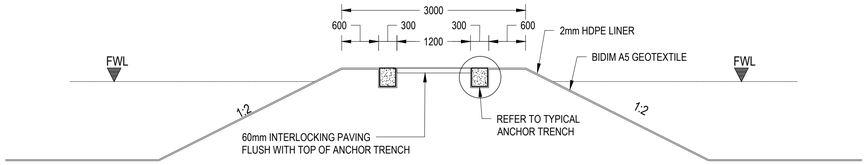
NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER	– PHASE	– DISC	– STATUS	– DOC NO	– REV
MSD114	– 00	– C	– T	– 009	– 0

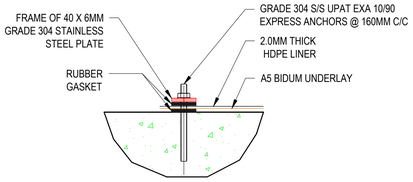
STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



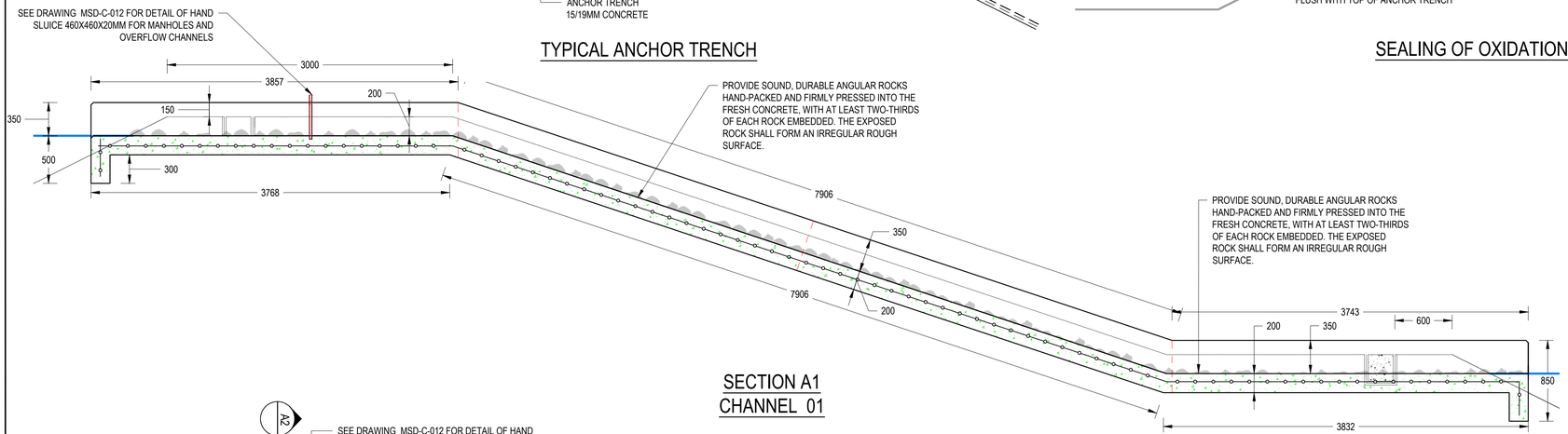
TYPICAL ANCHOR TRENCH



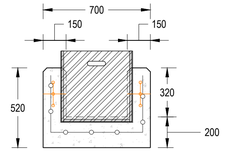
SEALING OF OXIDATION PONDS



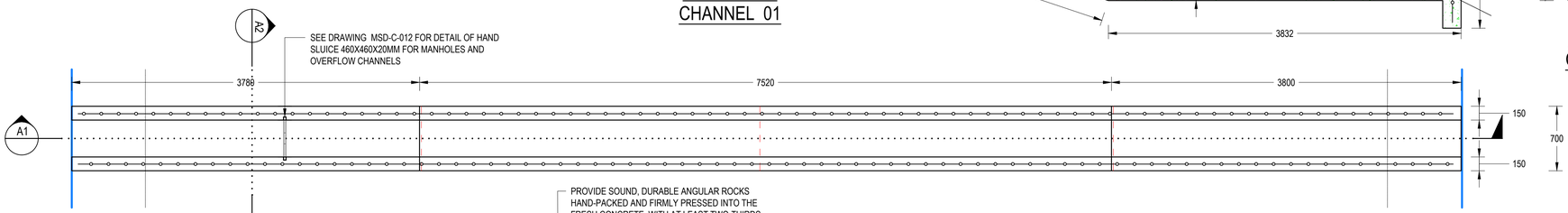
DETAIL 10/01
TYPICAL FIXING OF MEMBRANE TO CONCRETE STRUCTURES

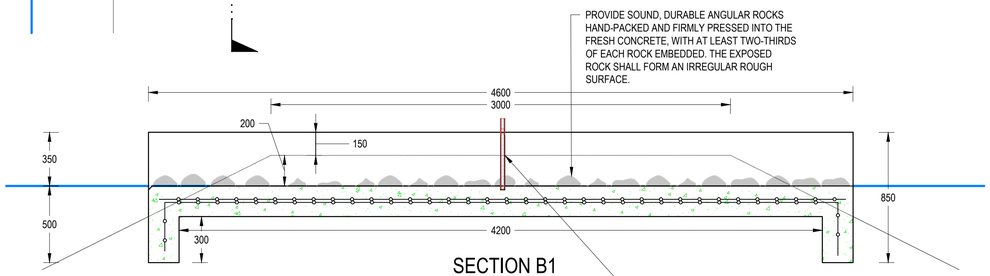


SECTION A1
CHANNEL 01

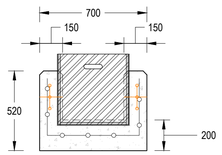


SECTION A2
CHANNEL 02

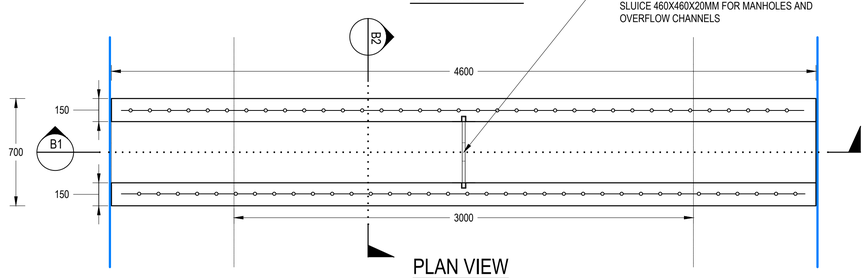




SECTION B1
CHANNEL 02

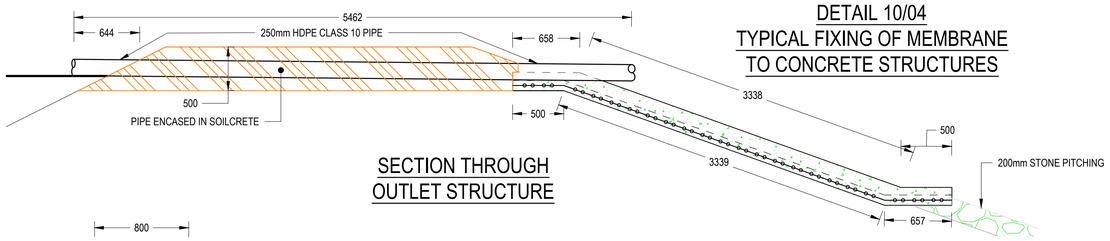


SECTION B2
CHANNEL 02

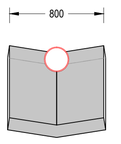


PLAN VIEW
CHANNEL 01

ALL EXPOSED PIPES SHALL BE HDPE CLASS 10



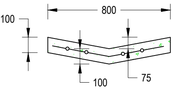
SECTION THROUGH
OUTLET STRUCTURE



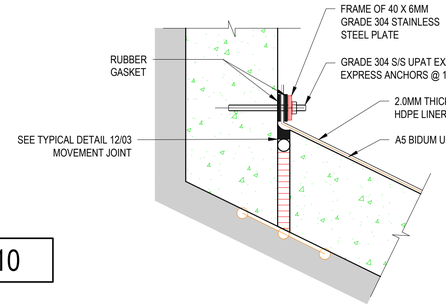
FRONT VIEW
OUTLET STRUCTURE



PLAN VIEW
OUTLET STRUCTURE



SECTION
OUTLET STRUCTURE



DETAIL 10/04
TYPICAL FIXING OF MEMBRANE TO CONCRETE STRUCTURES

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
INLETS, INTERCONNECTIONS AND OUTLETS

DRAWING CHECKS

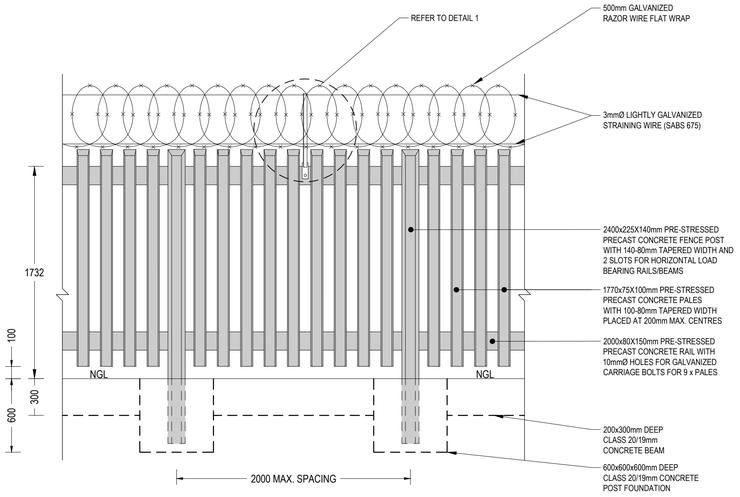
DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

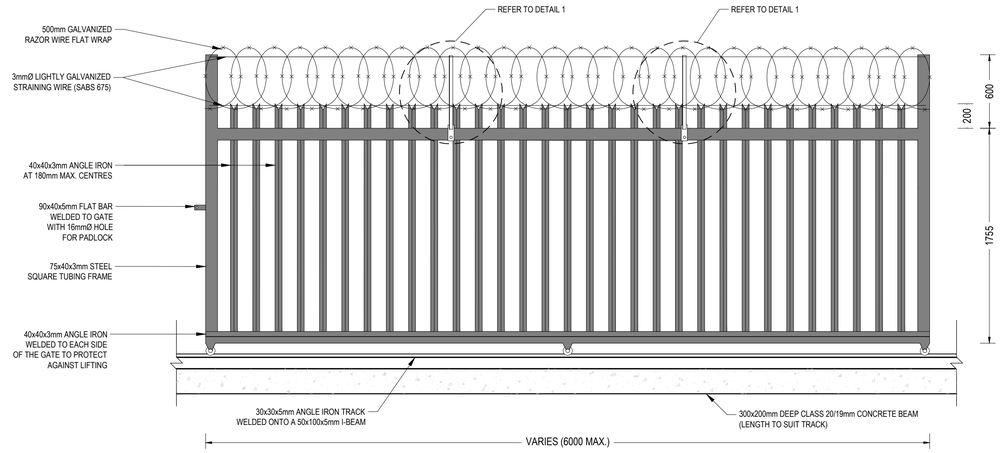
PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	010	0

STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



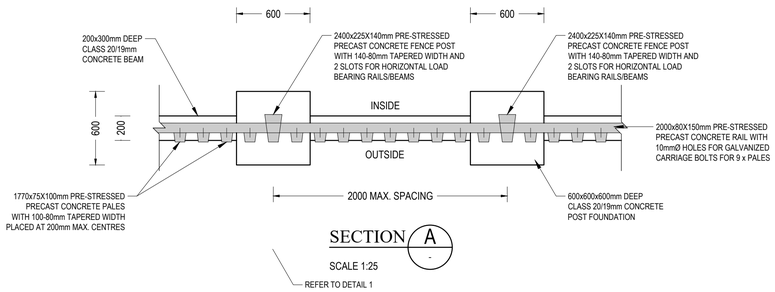
TYPICAL CONCRETE PALISADE FENCE FRONT ELEVATION

SCALE 1:25



TYPICAL SLIDING GATE DETAIL

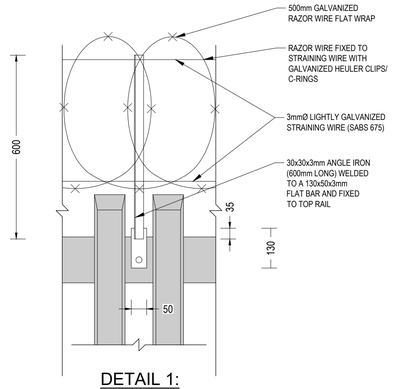
SCALE 1:25



SECTION A

SCALE 1:25

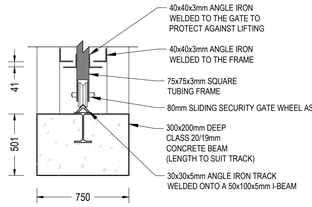
REFER TO DETAIL 1



DETAIL 1:

BARBED WIRE EXTENSION

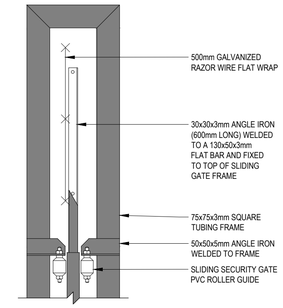
SCALE 1:10



DETAIL 2:

SLIDING SECURITY GATE TRACK

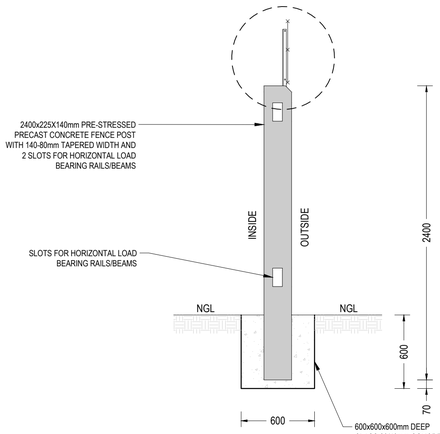
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DETAIL 3:

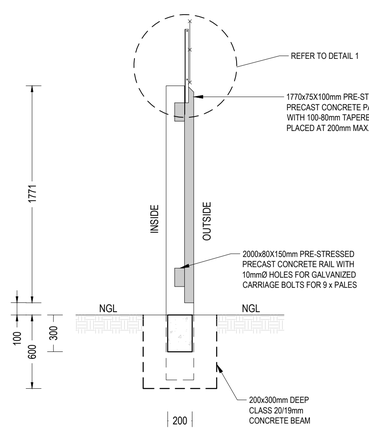
SLIDING SECURITY GATE GUIDES

SCALE 1:10



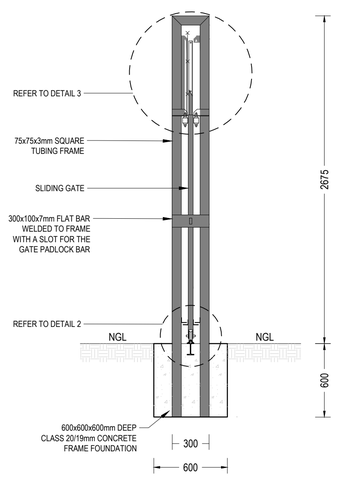
SECTION B

SCALE 1:25



SECTION C

SCALE 1:25



TYPICAL GATE POST SECTION DETAIL FOR SLIDING GATE

SCALE 1:25

0 15 30 Meters

HOR. SCALE: 1:500

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
TYPICAL DETAIL: CONCRETE PALISADE FENCE

DRAWING CHECKS

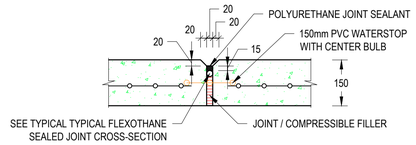
DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

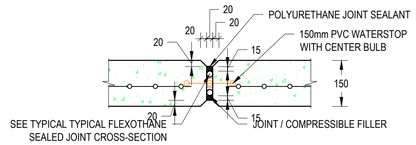
NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	011	0

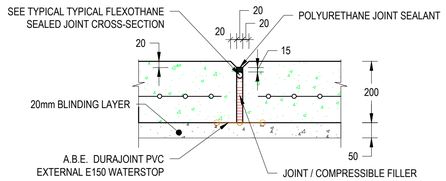
STATUS:
D: DRAFT / **P**: PRELIMINARY / **T**: TENDER / **F**: FINAL / **C**: CONSTRUCTION / **A**: AS-BUILT, RECORD / **R**: REPORT



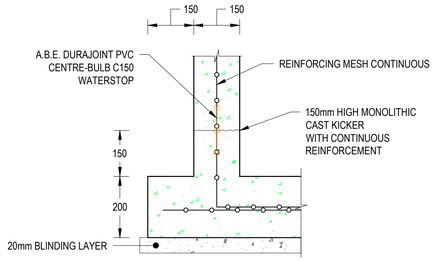
TYPICAL DETAIL 12/05
WALL JOINT BELOW GROUND LEVEL



TYPICAL DETAIL 12/04
WALL JOINT ABOVE GROUND LEVEL



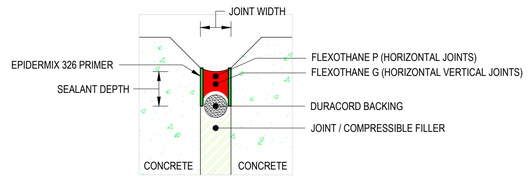
TYPICAL DETAIL 12/03
FLOOR JOINT



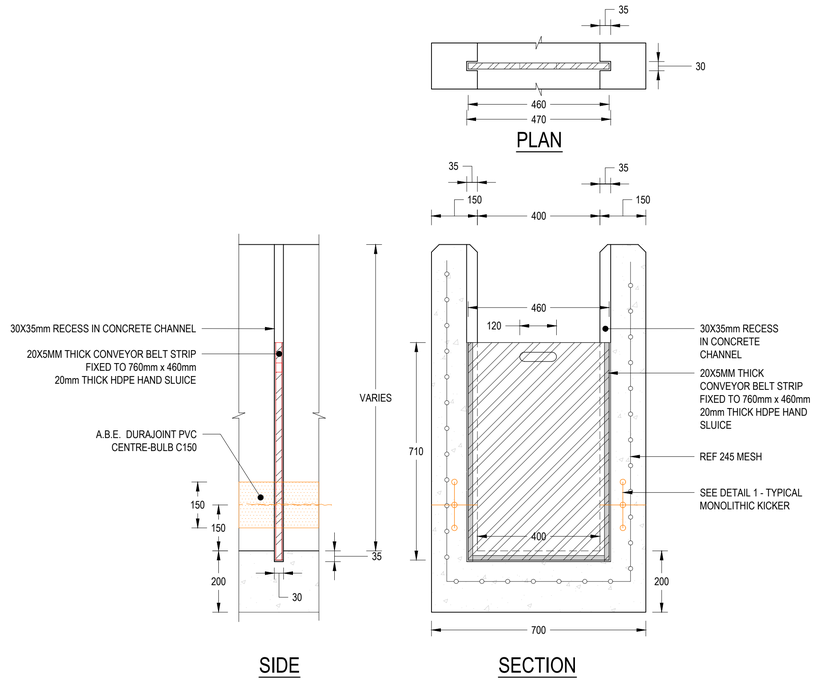
TYPICAL DETAIL 12/02
MONOLITHIC KICKER

NOTE:

- A.B.E. FLEXOTHANE P SEALANT TO HORIZONTAL JOINTS OR FLEXOTHANE G SEALANT TO VERTICAL/SLOPING JOINTS, WITH EPIDERMIX 326 PRIMER APPLIED TO BOTH CONCRETE BONDING FACES AND DURACORD CLOSED-CELL BACKING CORD.
- JOINT DIMENSIONS AND INSTALLATION SHALL COMPLY WITH THE MANUFACTURER'S REQUIREMENTS.
- PRIMER IS APPLIED ONLY TO THE TWO BONDING FACES; DO NOT PRIME THE DURACORD.
- TOOL SEALANT SLIGHTLY CONCAVE AND KEEP IT RECESSED FROM THE CONCRETE SURFACE WHERE REQUIRED.



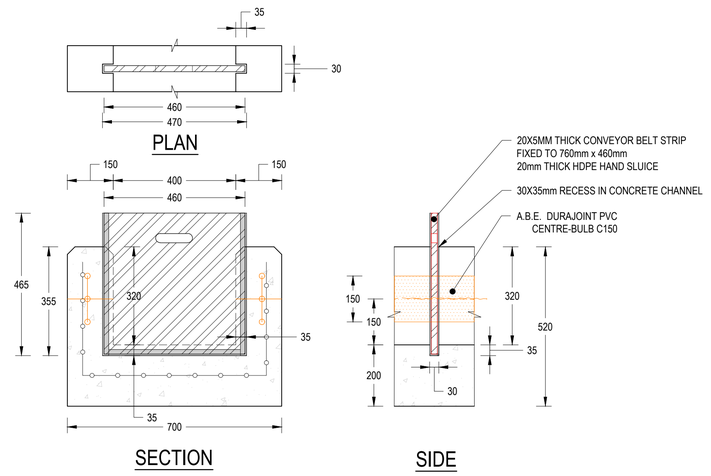
TYPICAL DETAIL 12/01
FLEXOTHANE SEALED JOINT CROSS-SECTION



DETAIL OF HAND SLUICE 710x460x20mm
FOR GRID CHANNEL
(4 OF)



TYPICAL FIXING OF MEMBRANE
TO CONCRETE STRUCTURES



DETAIL OF HAND SLUICE 460x460x20mm
FOR MANHOLES AND OVERFLOW CHANNELS
(10 OF)

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT : KHAI-MA LOCAL MUNICIPALITY

PROJECT : PELLA WWTW

DRAWING DESCRIPTION : TYPICAL DETAILS: MISCELLANEOUS

DRAWING CHECKS

DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

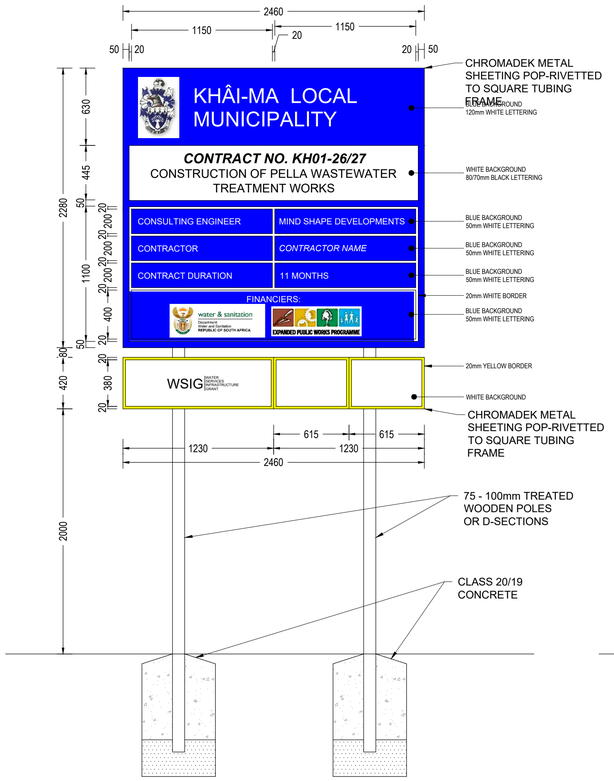
APPROVAL CONSULTANT

NAME R ODENDAAL DATE 2026/05/01

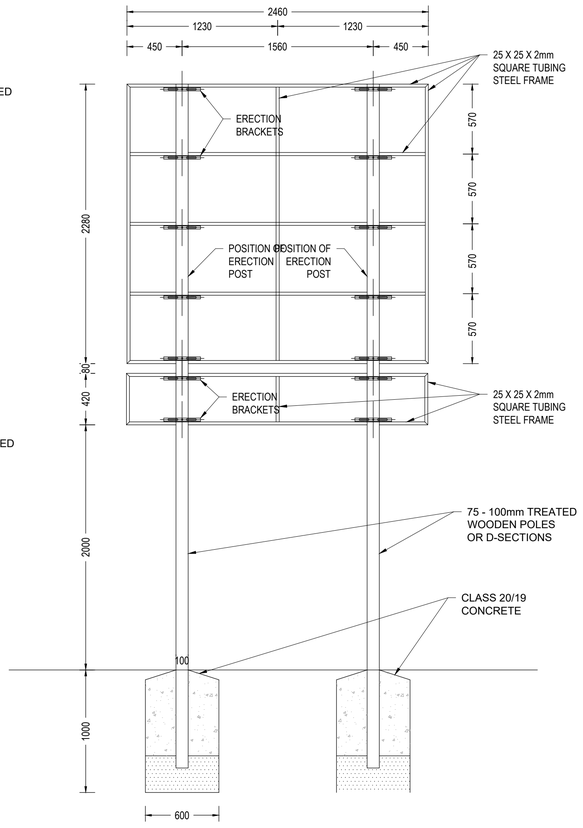
PROF REG. No. 201570256 SIGNATURE

PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	012	0

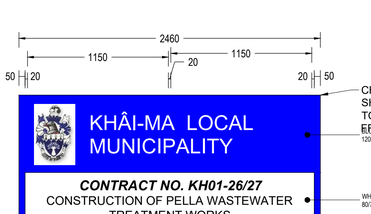
STATUS: D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT



CONTRACT BOARD DETAIL

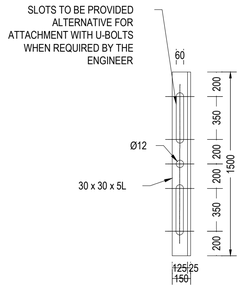


BACK VIEW

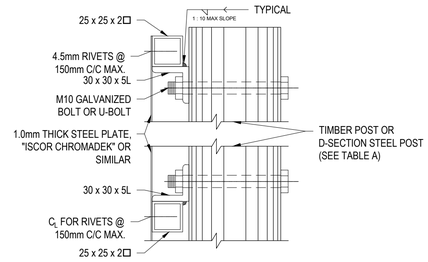


TYPICAL POST FOOTING DETAIL

TABLE A				
ERECTION DETAILS				
POST TYPE	UPRIGHT	STAY	D	B
TIMBER POST AND STAY	100mm	80mm	1000mm	800mm
TIMBER POST	180mm	-	1000mm	600mm
D SECTION STEEL POST	100mm x 4mm	-	1000mm	600mm



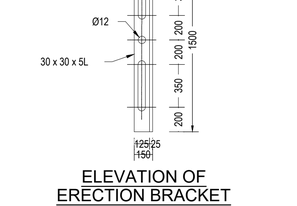
ELEVATION OF ERECTION BRACKET



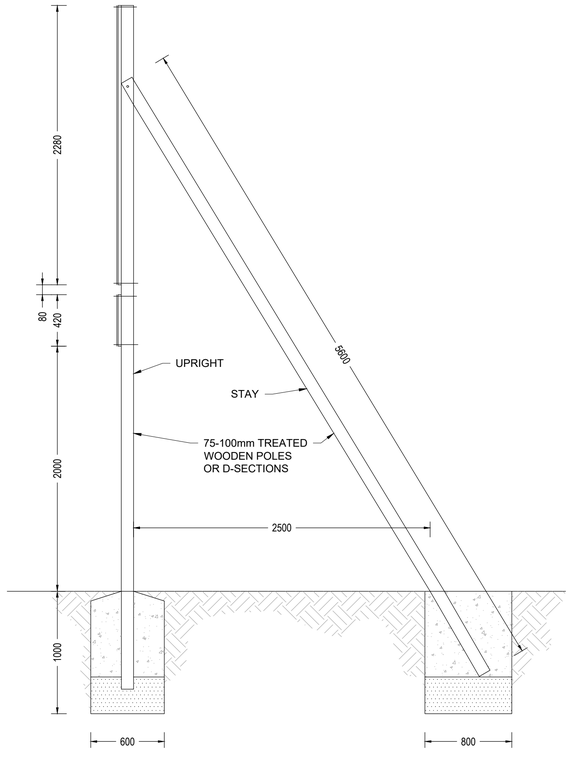
SIDE ELEVATION OF ERECTION BRACKET



SECTION A-A



PLAN VIEW



SIDE VIEW

0 15 30 Meters

HOR. SCALE: 1:500

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT : KHAI-MA LOCAL MUNICIPALITY

PROJECT : PELLA WWTW

DRAWING DESCRIPTION : NAME BOARD DETAIL

DRAWING CHECKS

DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

NAME R ODENDAAL DATE 2026/05/01

PROF REG. No. 201570256 SIGNATURE

PROJECT NUMBER	PHASE	DISC	STATUS	DOC NO	REV
MSD114	00	C	T	013	0

STATUS:
D: DRAFT / P: PRELIMINARY / T: TENDER / F: FINAL / C: CONSTRUCTION / A: AS-BUILT, RECORD / R: REPORT

GENERAL CONCRETE NOTES

1. ALL CONCRETE WORK SHALL COMPLY WITH SANS 1200 G AS VARIED BY THE PROJECT SPECIFICATIONS, THE DRAWINGS AND THE ACCEPTED METHOD STATEMENTS. ANY DISCREPANCY SHALL BE RESOLVED IN ACCORDANCE WITH THE ORDER OF PRECEDENCE STATED IN THE CONTRACT AND THE EMPLOYER'S AGENT'S WRITTEN DIRECTION.
2. CONCRETE GRADES ARE STATED AS CHARACTERISTIC COMPRESSIVE STRENGTH AT 28 DAYS / NOMINAL MAXIMUM AGGREGATE SIZE. FOR EXAMPLE, 35/19 DENOTES 35 MPA CONCRETE WITH 19 MM NOMINAL MAXIMUM AGGREGATE.
3. UNLESS A DIFFERENT GRADE IS SHOWN ON THE DRAWINGS OR SPECIFIED ELSEWHERE, USE THE FOLLOWING MINIMUM CONCRETE GRADES:

   BLINDING BELOW FOUNDATIONS, BASES AND FLOOR SLABS: 15 MPA/19 MM.

   MASS CONCRETE, NON-STRUCTURAL FILL AND MINOR PIPE ENCASEMENT: 20 MPA/19 MM.

   THRUST BLOCKS, ANCHOR BLOCKS AND UNREINFORCED FOUNDATIONS: 25 MPA/19 MM.

   CONCRETE APRONS, WALKWAYS, HARDSTANDS AND MINOR SURFACE SLABS: 25 MPA/19 MM.

   CHANNELS, OPEN DRAINS AND HEADWALLS NOT EXPOSED TO OR RETAINING SEWAGE: 25 MPA/19 MM.

   GENERAL REINFORCED-CONCRETE FOUNDATIONS, BASES, SLABS, BEAMS AND COLUMNS: 30 MPA/19 MM.

   CAST IN-SITU MANHOLES AND CHAMBERS NOT EXPOSED TO OR RETAINING RAW SEWAGE: 30 MPA/19 MM.

   MANHOLES, CHAMBERS, CHANNELS AND SUMPS EXPOSED TO OR RETAINING RAW SEWAGE: 35 MPA/19 MM.

   WATER- OR SEWAGE-RETAINING WALLS, BASES AND FLOOR SLABS: 35 MPA/19 MM.

   INLET WORKS, ANAEROBIC POND WALLS AND BASES, 60 DEGREE CONE STRUCTURES AND OTHER LIQUID-RETAINING STRUCTURES: 35 MPA/19 MM.

   PRECAST CONCRETE ELEMENTS: MANUFACTURER'S DESIGN, BUT NOT LESS THAN 30 MPA.
4. THE CONCRETE GRADE AND MEMBER THICKNESS SHOWN ON A SPECIFIC DRAWING SHALL APPLY. DISCREPANCIES BETWEEN CONTRACT DOCUMENTS SHALL BE RESOLVED IN ACCORDANCE WITH THE CONTRACTUAL ORDER OF PRECEDENCE.
5. CEMENT USED IN CONCRETE EXPOSED TO WASTEWATER, RAW SEWAGE, AGGRESSIVE GROUND CONDITIONS OR SITUATED BELOW THE DESIGN WATER LEVEL SHALL BE SULPHATE-RESISTANT CEMENT COMPLYING WITH THE APPLICABLE REQUIREMENTS OF SANS 50197.
6. CHLORIDE-BEARING ADMIXTURES SHALL NOT BE USED IN REINFORCED OR PRESTRESSED CONCRETE.
7. THE CONTRACTOR SHALL SUBMIT PROPOSED CONCRETE MIX DESIGNS, INCLUDING CEMENT TYPE, CEMENT CONTENT, WATER-CEMENT RATIO, AGGREGATE GRADING AND ADMIXTURE DETAILS, TO THE EMPLOYER'S AGENT FOR REVIEW. NO CONCRETE SHALL BE PLACED UNTIL THE APPLICABLE MIX DESIGN HAS BEEN ACCEPTED.
8. FORMWORK SHALL BE GROUT-TIGHT, RIGID, CLEAN AND STABLE.
9. MINIMUM CONCRETE COVER TO THE OUTERMOST REINFORCEMENT SHALL BE AS SHOWN ON THE DRAWINGS. WHERE NOT SHOWN, THE FOLLOWING MINIMUM COVER SHALL APPLY:

   WATER-RETAINING STRUCTURES AND WASTEWATER-CONTACT SURFACES: 50 MM.

   CONCRETE BELOW GROUND LEVEL: 50 MM.

   OTHER EXPOSED SURFACES: 40 MM.

   COVER SHOWN ON THE STRUCTURAL DETAILS SHALL NOT BE REDUCED TO ACCOMMODATE INCORRECTLY POSITIONED REINFORCEMENT.
10. REINFORCEMENT SHALL BE SUPPORTED ON APPROVED CONCRETE OR PROPRIETARY PLASTIC SPACERS. POROUS MORTAR BLOCKS, BRICKS, STONES, TIMBER AND STEEL OFFCUTS SHALL NOT BE USED AS SPACERS.
11. DEGREE OF ACCURACY II SHALL APPLY UNLESS ANOTHER TOLERANCE IS SHOWN. HYDRAULIC LEVELS, POND FLOOR LEVELS, WEIR CREST LEVELS AND OUTLET CONTROL STRUCTURES SHALL COMPLY WITH THE PROJECT TOLERANCES SHOWN ON THE DRAWINGS.
12. CONCRETE SHALL NOT BE PLACED AGAINST DISTURBED, LOOSE, SATURATED OR CONTAMINATED MATERIAL. EXCAVATIONS, FORMATION LEVELS, FOUNDING CONDITIONS AND COMPACTION SHALL BE INSPECTED AND ACCEPTED BEFORE BLINDING OR STRUCTURAL CONCRETE IS PLACED.
13. ALL PIPES, PUDDLE FLANGES, WATERSTOPS, SLEEVES, CAST-IN ITEMS AND OTHER EMBEDMENTS SHALL BE CORRECTLY POSITIONED AND SECURELY FIXED BEFORE CONCRETING. BREAKING INTO COMPLETED LIQUID-RETAINING CONCRETE SHALL NOT BE PERMITTED WITHOUT PRIOR WRITTEN APPROVAL.
14. CONCRETE TEMPERATURE AT DISCHARGE SHALL NOT EXCEED 30 °C. MATERIALS AND FORMS SHALL BE SHADED AND MIXING WATER SHALL BE CHILLED WHERE NECESSARY.
15. CURING SHALL COMMENCE IMMEDIATELY AFTER SURFACE FINISHING AND SHALL CONTINUE FOR AT LEAST 7 DAYS USING AN APPROVED CURING COMPOUND, WET HESSIAN AND POLYTHENE SHEETING, AS APPLICABLE.
16. CURING COMPOUNDS SHALL NOT BE APPLIED TO CONSTRUCTION JOINTS OR SURFACES THAT WILL RECEIVE A COATING, LINING, SCREED, SEALANT OR BONDED FINISH UNLESS COMPATIBILITY HAS BEEN CONFIRMED AND ACCEPTED.
17. DEFECTS SHALL BE MAPPED AND ASSESSED BEFORE REPAIR. HONEYCOMBING, CRACKS, DISPLACED WATERSTOPS AND LEAKING PENETRATIONS SHALL NOT BE CONCEALED. REPAIR PRODUCTS AND METHODS SHALL BE ACCEPTED AND SHALL BE COMPATIBLE WITH THE SUBSTRATE, EXPOSURE AND ANY SUBSEQUENT COATINGS.

JOINT NOTES

1. THE JOINT CODES USED ON THE DRAWINGS AND IN THE BILL OF QUANTITIES ARE:

   COJ - WATERTIGHT CONSTRUCTION JOINT AT A PLANNED POUR BOUNDARY IN LIQUID-RETAINING CONCRETE.

   KJ - KICKER/BASE-TO-WALL CONSTRUCTION JOINT.

   SCJ - SAW-CUT CONTRACTION JOINT IN LIQUID-RETAINING CONCRETE.

   MJ - WATERTIGHT MOVEMENT JOINT.

   IJ - NON-RETAINING ISOLATION JOINT ABOVE FULL WATER LEVEL.

   PCJ - SAW-CUT CONTROL JOINT IN PAVING OR APRON SLABS.

   PJ - PIPE PENETRATION JOINT THROUGH A CONCRETE WALL, BASE OR MANHOLE.
2. CASTING SEQUENCES AND JOINT POSITIONS SHALL MINIMISE RESTRAINT CRACKING AND SHALL CONFORM TO THE JOINT CODES AND LOCATIONS SHOWN ON THE DRAWINGS. UNPLANNED CONSTRUCTION JOINTS ARE PROHIBITED.
3. ALL WATERSTOPS, JOINT FILLERS, BACKING MATERIALS, PRIMERS AND SEALANTS SHALL FORM COORDINATED SYSTEMS AND SHALL BE INSPECTED BEFORE ADJOINING CONCRETE OR SEALANT IS PLACED.
4. WATERSTOPS SHALL FORM A CONTINUOUS NETWORK THROUGH SLABS, WALLS, CORNERS AND INTERSECTIONS. MITRES, T-PIECES, THREE-WAY AND FOUR-WAY INTERSECTIONS AND TRANSITIONS BETWEEN EXTERNAL AND CENTRALLY PLACED PROFILES SHALL BE FACTORY MANUFACTURED BY A.B.E.
5. SITE WELDING OF WATERSTOPS SHALL BE LIMITED TO STRAIGHT BUTT WELDS MADE WITH THE MANUFACTURER'S HEAT-WELDING EQUIPMENT BY TRAINED PERSONNEL.
6. WATERSTOPS SHALL BE CLEAN, UNDAMAGED AND SECURELY FIXED. CONCRETE SHALL BE FULLY COMPACTED AROUND ALL RIBS. FOLDED, PUNCTURED, DISPLACED OR POORLY WELDED PROFILES SHALL BE REPLACED BEFORE CONCRETING.
7. SEALANT RECESSES SHALL HAVE SOUND PARALLEL FACES AND SHALL BE MECHANICALLY PREPARED TO REMOVE LAITANCE, CURING COMPOUND, MOULD OIL AND CONTAMINATION. CLEAN WITH DRY, OIL-FREE COMPRESSED AIR AND ALLOW THE FACES TO DRY BEFORE PRIMING.
8. USE A.B.E. EPIDERMIX 326 PRIMER ON POROUS CONCRETE, A.B.E. DURACORD BACKING CORD AND A.B.E. FLEXOTHANE P ON HORIZONTAL SURFACES OR FLEXOTHANE G ON INCLINED AND VERTICAL SURFACES, AS SPECIFIED.
9. INSTALL A REPRESENTATIVE TRIAL LENGTH OF EACH JOINT TYPE. WATER TESTING OR SEWAGE EXPOSURE SHALL NOT COMMENCE UNTIL THE SEALANT HAS FULLY CURED IN ACCORDANCE WITH THE CURRENT A.B.E. PRODUCT DATA SHEET.

COJ CONSTRUCTION JOINT

1. REINFORCEMENT SHALL REMAIN CONTINUOUS THROUGH COJ.
2. IN 150 MM BASE SLABS AND POND LININGS, PROVIDE A.B.E. DURAJOINT PVC EXTERNAL C150 ON THE DRY OR EXTERNAL FACE.
3. AT FULL-DEPTH VERTICAL WALL CONSTRUCTION JOINTS, PROVIDE THE CENTRALLY PLACED A.B.E. DURAJOINT PVC DUMBELL PROFILE SHOWN ON THE ACCEPTED JOINT SHOP DRAWING. THE WATERSTOP CENTRELINE SHALL COINCIDE WITH THE JOINT AND APPROXIMATELY HALF OF THE PROFILE SHALL BE EMBEDDED IN EACH POUR.
4. PROVIDE A 12 MM X 12 MM FLEXIBLE WET-FACE SEAL USING FLEXOTHANE P ON HORIZONTAL FACES OR FLEXOTHANE G ON INCLINED OR VERTICAL FACES, WITH EPIDERMIX 326 PRIMER AND DURACORD BACKING.

KJ KICKER CONSTRUCTION JOINT

1. KICKERS SHALL BE 150 MM HIGH AND CAST MONOLITHICALLY WITH THE BASE SLAB. THE KJ SHALL OCCUR AT THE TOP OF THE KICKER.
2. REINFORCEMENT SHALL REMAIN CONTINUOUS THROUGH KJ.
3. PROVIDE A.B.E. DURAJOINT PVC EXTERNAL C150 INSTALLED VERTICALLY ACROSS THE JOINT ON THE DRY OR EXTERNAL FACE, WITH APPROXIMATELY 75 MM EMBEDDED IN THE KICKER POUR AND 75 MM EMBEDDED IN THE WALL POUR.
4. PROVIDE A 12 MM X 12 MM FLEXIBLE WET-FACE SEAL USING FLEXOTHANE P ON HORIZONTAL FACES OR FLEXOTHANE G ON INCLINED OR VERTICAL FACES, WITH EPIDERMIX 326 PRIMER AND DURACORD BACKING.

SCJ SAW CUT CONTRACTION JOINT

1. SCJ SHALL BE PROVIDED IN LIQUID-RETAINING CONCRETE AT THE POSITIONS SHOWN ON THE JOINT-LAYOUT DRAWING. REINFORCEMENT OR WELDED MESH SHALL REMAIN CONTINUOUS THROUGH SCJ.
2. MAKE THE SAW CUT AS SOON AS THE CONCRETE CAN BE CUT WITHOUT RAVELLING AND BEFORE UNCONTROLLED SHRINKAGE CRACKING OCCURS.

   INITIAL SAW-CUT WIDTH: 3-5 MM.

   SAW-CUT DEPTH: ONE-THIRD OF THE MEMBER DEPTH, BEING 50 MM IN THE 150 MM POND LINING.

   ROUTED UPPER RECESS AND FINISHED SEALANT SECTION: 12 MM X 12 MM.

   SEALANT SYSTEM: EPIDERMIX 326 PRIMER, DURACORD BACKING CORD AND FLEXOTHANE P ON HORIZONTAL SURFACES OR FLEXOTHANE G ON INCLINED AND VERTICAL SURFACES.

   NO PVC WATERSTOP, SWELLABLE WATERSTOP, JOINT FILLER, GROUT OR SEALANT SHALL BE INSTALLED IN THE DEEP NARROW PORTION OF AN SCJ.

MJ MOVEMENT JOINT

1. MJ SHALL BE 20 MM WIDE AND FULL DEPTH. REINFORCEMENT SHALL TERMINATE 50 MM CLEAR OF EACH JOINT FACE.
2. PROVIDE A.B.E. DURASHEET 100 COMPRESSIBLE FILLER AND A CONTINUOUS MOVEMENT-JOINT WATERSTOP: EXTERNAL E150 IN 150 MM BASE SLABS, EXTERNAL E200 IN 200 MM BASE SLABS, CENTRE-BULB 150 IN 150 MM WALLS AND CENTRE-BULB 200 IN 200 MM WALLS.
3. PROVIDE FACTORY-MANUFACTURED TRANSITIONS BETWEEN EXTERNAL AND CENTRALLY PLACED WATERSTOP PROFILES.
4. SEAL HORIZONTAL WET FACES WITH FLEXOTHANE P AND INCLINED OR VERTICAL WET FACES WITH FLEXOTHANE G, USING THE COMPATIBLE PRIMER AND BACKING SYSTEM.

PCJ AND IJ NON LIQUID RETAINING SLABS

1. PCJ IN 100 MM APRON SLABS SHALL DIVIDE THE SLAB INTO APPROXIMATELY SQUARE PANELS NOT EXCEEDING 3.0 M IN EITHER DIRECTION AND SHALL ALSO BE PROVIDED AT RE-ENTRANT CORNERS.
2. SAW-CUT PCJ TO ONE-THIRD OF THE SLAB DEPTH. ROUTE THE UPPER RECESS AND PROVIDE A FINISHED 12 MM X 12 MM FLEXOTHANE P SEAL WITH EPIDERMIX 326 PRIMER AND DURACORD BACKING. NO WATERSTOP SHALL BE PROVIDED.
3. REF 193 MESH SHALL TERMINATE 50 MM CLEAR OF FREE EDGES AND JOINTS AND SHALL BE SUPPORTED TO MAINTAIN THE SPECIFIED COVER.
4. THE JOINT BETWEEN THE TOP OF THE ANAEROBIC-POND CONCRETE LINING AND THE APRON SLAB SHALL BE A 15 MM FULL-DEPTH IJ WHERE THE COMPLETE JOINT IS ABOVE FULL WATER LEVEL.
5. PROVIDE A.B.E. DURASHEET 40 FILLER AND A 15 MM WIDE X 12 MM DEEP FLEXOTHANE P SURFACE SEAL WITH EPIDERMIX 326 PRIMER. NO WATERSTOP, REINFORCEMENT, DOWEL OR RIGID CONNECTION SHALL CROSS AN IJ.
6. ANY PORTION OF AN IJ BELOW FULL WATER LEVEL SHALL BE DETAILED AND CONSTRUCTED AS AN MJ.

PJ PIPE PENETRATION JOINT

1. NEW PIPES CAST THROUGH LIQUID-RETAINING CONCRETE SHALL HAVE A FACTORY-FITTED PUDDLE FLANGE COMPATIBLE WITH THE PIPE MATERIAL.
2. CORE-DRILLED OR SLEEVED PENETRATIONS SHALL HAVE A PROPRIETARY MECHANICAL COMPRESSION SEAL SIZED FOR THE PIPE AND ANNULUS.
3. PROVIDE A WET-FACE RECESS SEALED WITH FLEXOTHANE G, DURACORD AND THE APPLICABLE A.B.E. PRIMER. USE EPIDERMIX 326 ON POROUS CONCRETE AND EPIDERMIX 391 ONLY ON COMPATIBLE NON-POROUS SURFACES AFTER ADHESION HAS BEEN CONFIRMED.
4. WHERE SPECIFICALLY ACCEPTED, A RIGID ANNULUS FROM 6 MM TO 25 MM MAY BE FILLED WITH DURAGROUT CG AND PROVIDED WITH A SEPARATE FLEXIBLE WET-FACE SEAL. GROUT OR SEALANT ALONE SHALL NOT CONSTITUTE THE PRIMARY SEAL AROUND HDPE OR PVC PIPEWORK.
5. HDPE PIPE SHALL HAVE A FACTORY-WELDED PUDDLE FLANGE OR AN APPROVED MECHANICAL COMPRESSION SEAL.

ANAEROBIC POND LINING AND POUR SEQUENCE

1. EACH ANAEROBIC POND SHALL BE CONSTRUCTED IN ACCORDANCE WITH AN ACCEPTED POUR PLAN. THE CASTING SEQUENCE SHALL MINIMISE RESTRAINT CRACKING AND SHALL NOT INTRODUCE UNPLANNED CONSTRUCTION JOINTS.
2. PROVIDE A CONTINUOUS COJ BETWEEN THE POND FLOOR AND SLOPE TOE AROUND EACH POND.
3. PROVIDE FOUR DIAGONAL CORNER COJ PER POND, ONE AT EACH CORNER. REINFORCEMENT SHALL REMAIN CONTINUOUS THROUGH THESE JOINTS.
4. ALL PANEL LINES SHOWN AS SCJ SHALL BE SAW-CUT CONTRACTION JOINTS AND SHALL NOT BE TREATED AS DAILY CONSTRUCTION JOINTS.
5. POND ACCESS STEPS SHALL BE CAST MONOLITHICALLY WITH THE ADJACENT SIDE-SLOPE POUR. NO JOINT SHALL BE FORMED AROUND THE STEPS.
6. NO ADDITIONAL POND CONSTRUCTION JOINT SHALL BE INTRODUCED WITHOUT THE EMPLOYER'S AGENT'S PRIOR WRITTEN APPROVAL.

REINFORCEMENT NOTES

1. REINFORCING BARS SHALL COMPLY WITH SANS 920 AND SHALL BE HIGH-TENSILE DEFORMED Y-BARS. WELDED STEEL FABRIC SHALL COMPLY WITH SANS 1024.
2. BENDING SCHEDULES AND MILL CERTIFICATES SHALL BE SUBMITTED BEFORE REINFORCEMENT WORK COMMENCES.
3. CUTTING, BENDING, HOOKING AND SCHEDULING SHALL COMPLY WITH SANS 282, THE DRAWINGS AND THE ACCEPTED BENDING SCHEDULES.
4. REINFORCEMENT SHALL NOT BE HEATED, CUT, REBENT OR WELDED WITHOUT PRIOR WRITTEN APPROVAL.
5. BAR LAPS SHALL BE AS SHOWN ON THE DRAWINGS OR BENDING SCHEDULES. WHERE A LAP IS NOT SHOWN, THE CONTRACTOR SHALL OBTAIN THE EMPLOYER'S AGENT'S DETAIL BEFORE FIXING.
6. WELDED-MESH LAPS SHALL BE AS DETAILED AND SHALL NOT BE LESS THAN 300 MM OR ONE COMPLETE MESH APERTURE PLUS 50 MM, WHICHEVER IS GREATER. LAPS SHALL BE SECURELY TIED.
7. REINFORCEMENT SHALL BE CLEAN, FREE OF LOOSE SCALE AND CONTAMINATION, SECURELY FIXED AND INSPECTED BEFORE CONCRETE IS PLACED.

INSPECTION TESTING AND REPAIRS

1. A SIGNED PRE-POUR CHECKLIST IS REQUIRED CONFIRMING FORMWORK DIMENSIONS, CLEANLINESS AND STABILITY; REINFORCEMENT PLACEMENT AND COVER; WATERSTOPS, PUDDLE FLANGES, SLEEVES AND EMBEDDED ITEMS; CONSTRUCTION-JOINT SURFACE PREPARATION; AND THE PRE-POUR LEVEL SURVEY.
2. NO CONCRETE SHALL BE PLACED UNTIL FORMWORK, REINFORCEMENT, COVER, WATERSTOPS, PIPEWORK, EMBEDDED ITEMS, JOINTS AND POUR READINESS HAVE BEEN INSPECTED AND ACCEPTED.
3. PROVIDE AT LEAST ONE SAMPLE SET PER CONCRETE GRADE PER 10 M³ PLACED AND AT LEAST ONE SET PER CASTING DAY PER GRADE. EACH SET SHALL COMPRISE SIX CUBES: THREE FOR 7-DAY INDICATIVE TESTING AND THREE FOR 28-DAY ACCEPTANCE TESTING.
4. ALL LIQUID-RETAINING STRUCTURES SHALL BE WATER-TESTED BEFORE BACKFILLING, COATING OR COMMISSIONING.
5. ALLOWABLE WATER LOSS SHALL NOT EXCEED 1/500 OF THE AVERAGE WATER DEPTH PER DAY, EXCLUDING EVAPORATION. FAILED TESTS SHALL RESULT IN RECTIFICATION AND RETESTING BEFORE ACCEPTANCE.
6. LEAKING JOINTS, RANDOM CRACKS, DEFECTIVE PENETRATIONS OR OTHER DEFECTS SHALL BE REPAIRED AT THE CONTRACTOR'S COST USING AN ACCEPTED REPAIR SYSTEM. REPAIRS SHALL NOT BE CONCEALED BEFORE INSPECTION AND ACCEPTANCE.

PIPEWORK NOTE

1. ALL COUPLINGS, FLEXIBLE COUPLINGS, FLANGED ADAPTORS, GASKETS, BOLTS AND ASSOCIATED FITTINGS SHALL BE SUPPLIED BY THE CIVIL CONTRACTOR AND INSTALLED IN ACCORDANCE WITH THE DRAWINGS AND MANUFACTURER'S REQUIREMENTS.
2. FLANGES, PUDDLE FLANGES AND WALL COLLARS SHALL MATCH THE PIPE MATERIAL, OUTSIDE DIAMETER, PRESSURE CLASS AND DRILLING STANDARD. CONFIRM DIMENSIONS BEFORE CASTING.
3. ALL PIPEWORK AND EMBEDDED FITTINGS SHALL BE ADEQUATELY SUPPORTED AND PROTECTED AGAINST MOVEMENT OR DAMAGE DURING CONCRETING.

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
CONCRETE NOTES,
TYPICAL ROAD CROSSING DETAIL,
PIPE LINE MARKER

DRAWING CHECKS

DESIGNED BY	MW
DRAWN BY	RO
DESIGNED CHECKED BY	RO
DRAWING CHECKED BY	MW

APPROVAL CONSULTANT

NAME	R ODENDAAL	DATE	2026/05/01
PROF REG. No.	201570256	SIGNATURE	

PROJECT NUMBER	– PHASE	– DISC	– STATUS	– DOC NO	– REV
MSD114	– 00	– C	– T	– 014	– 0

STATUS:
D: DRAFT / **P**: PRELIMINARY / **T**: TENDER / **F**: FINAL / **C**: CONSTRUCTION / **A**: AS-BUILT, RECORD / **R**: REPORT

DRAWING FOR FUTURE DETAILS

0 15 30 Meters

HOR. SCALE: 1:500

MINDSHAPE DEVELOPMENTS (PTY)LTD

STATUS STAMP :

FOR TENDER PURPOSES

No.	REVISIONS	DATE
00	ISSUED FOR TENDER PURPOSES	2026/05/01

CLIENT :
KHAI-MA LOCAL MUNICIPALITY

PROJECT :
PELLA WWTW

DRAWING DESCRIPTION :
MISCELLANEOUS

DRAWING CHECKS

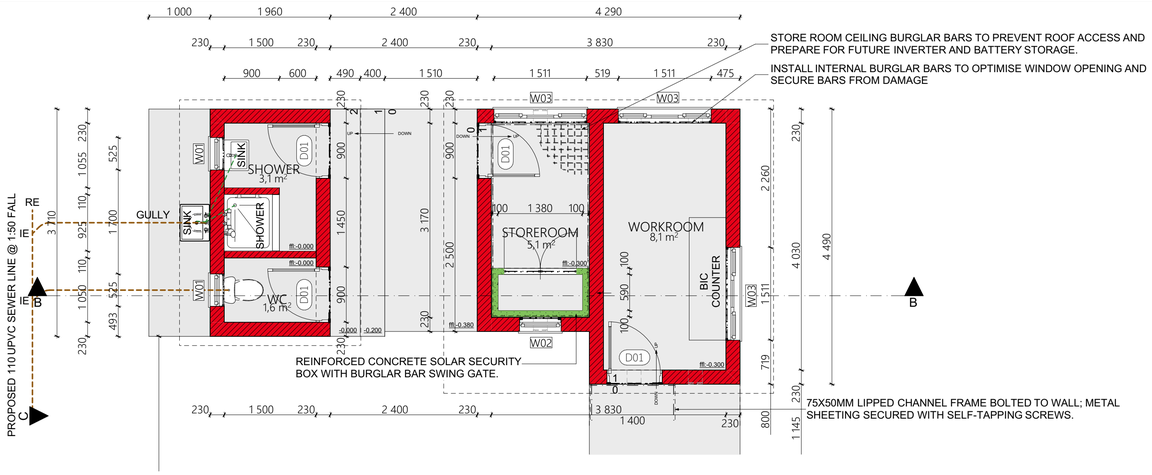
DESIGNED BY MW
DRAWN BY RO
DESIGNED CHECKED BY RO
DRAWING CHECKED BY MW

APPROVAL CONSULTANT

NAME R ODENDAAL DATE 2026/05/01
PROF REG. No. 201570256 SIGNATURE

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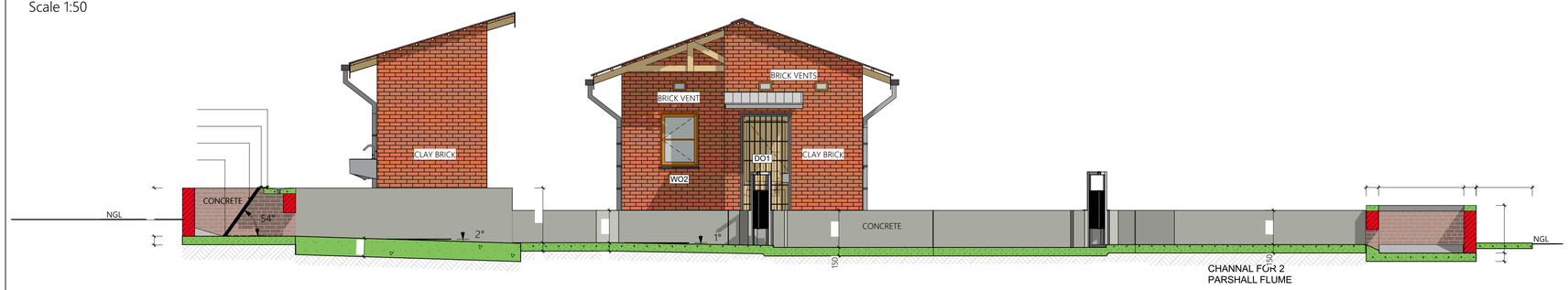
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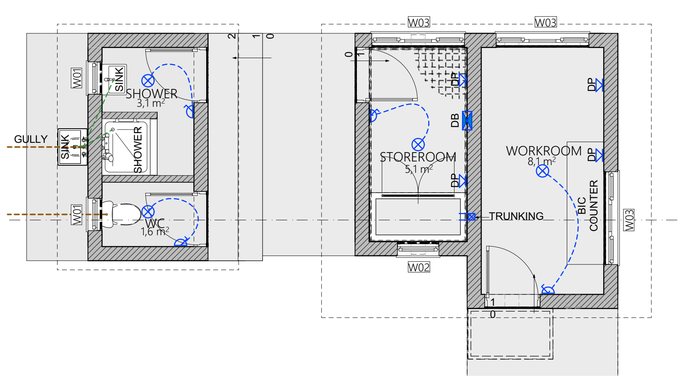
1. FLOOR PLAN
Scale 1:50



2. SECTION B
Scale 1:50



3. SECTION A
Scale 1:50



5. ELECTRICAL LAYOUT
Scale 1:50



6. 3D OVERVIEW
Scale N/A

GENERAL DRAWING NOTES

- THE DESIGN ON THIS DRAWING IS COPYRIGHT AND REMAINS THE PROPERTY OF THE ARCHITECTS.
- ALL WORK TO BE CARRIED OUT STRICTLY IN ACCORDANCE WITH MUNICIPAL REGULATIONS.
- DRAWINGS NOT TO BE SCALED. ONLY ANNOTATED DIMENSIONS TO BE USED.
- ALL RELEVANT DATUM, LEVELS, DIMENSIONS TO BE CHECKED ON SITE BEFORE COMMENCEMENT OF WORK.
- ALL DRAWINGS ARE TO BE CHECKED BY THE MAIN CONTRACTOR AND ANY DISCREPANCIES ON THE DRAWINGS OR BETWEEN THE DRAWINGS ARE TO BE REFERRED TO THE ARCHITECT
- CONTRACTOR TO CHECK ALL QUANTITIES PRIOR TO ORDERING AND MANUFACTURE.
- CONTRACTOR TO PROVIDE SHOP DRAWINGS FOR APPROVAL BY ARCHITECT PRIOR TO MANUFACTURE.

NOTES FOR ELECTRONIC DRAWINGS

- THIS DRAWING MAY BE ISSUED ELECTRONICALLY.
- PLEASE REFER ALSO TO REVISION NOTES ON THESE DRAWINGS:

GENERAL NOTES & SPECIFICATION:

All statutory requirements (National Building Regulations and Municipal by-laws) must be adhered to. Contractors are to check and verify all dimensions and levels on the building site before work commences. Figured dimensions and large scale details take preference over scaled dimensions. Refer any and all conflicting information to the architect and other responsible consultants. The design and detail on this drawing is the property of the architect and copyright is reserved.

Site Clearance:
1. Site clearance to include digging up and removing rubbish, debris, vegetation, hedges, shrubs and trees not exceeding 200mm girth.
2. Surplus material from excavations and/or stockpiles on site to be removed to a dumping site to be located by Contractor
3. Earth filling obtained by Contractor, from the excavations and/or prescribed borrow pits and to be compacted to 95% Mod AASHTO density Prescribed Density layers on filling Modified AASHTO Density tests.
4. Back excavation of vertical sides of excavation in earth for working space including backfilling compaction of surface under floors, etc. Compacting to 98% Mod AASHTO density Prescribed Density tests on filling. Soil test to be compiled by Structural Engineer.
5. Approved weed killer mixed and applied to manufacturers instructions: Under floors, etc., including forming and poisoning shallow furrows against foundation walls, etc., filling in furrows and ramming

Structure:
6. All reinforced concrete columns, foundations, beams and lintels to engineers' design and specification and in accordance to SANS 10400.
7. All reinforced retaining walls where applicable to structural engineers' design and specification.
8. Reinforced concrete Flat or Post Tensioned Slabs to engineer's design and specification.
9. PC lintels to be laid in accordance to manufacturers specification over all openings up to 3000mm (max) in accordance to SANS 10400
10. UNREINFORCED CONCRETE 9Mpa/ 19mm Concrete REINFORCED CONCRETE 25Mpa/ 19mm Concrete
FINISHING TOP SURFACE OF CONCRETE: Finishing to top surface of concrete smooth with a wood float finish.
11.All concrete stairs/ steps to comply with SANS 10400
Minimum requirements: All treads to be min 250mm & All risers to max 200mm

Movement Joints:
Two layer malthoid slip joints between horizontal concrete and brick surfaces including cement mortar bed. Saw cut joints at all construction joints.

Floors:
12. Ground floor to be 100mm thick reinforced concrete ground floor slab to engineers design on 25mm Polystyrene insulation on 250 micron USB green DPM on clean sandbed on well compacted fill
13. Screed to be 30mm on dpm to internal floors
14. Floor finishes as indicated on plan to be installed in strict accordance to manufacturers specification and to comply with SANS 10400

Waterproofing:
All waterproofing to wall and slabs to be in accordance to SANS 10400. All brick walls to include a layer of 375micron Brikgrip DPC embossed damp proof course.
Below all surface beds one layer of 250micron USB Green waterproof sheeting sealed at laps with pressure sensitive tape.
4mm Derbigum SP Waterproofing at all external concrete floors.
Joint Sealants, etc. Approved two-part polysulphide sealing compound including backing cord, bond breaker, and primer, also to be around sanitary fittings.
Please provide 10 year guarantee - as per GP Koning (OR SIMILAR APPROVED)

Walls & Wall Finishes:
Colour to Architects/ Clients specification.

Windows & Doors:
15. All windows and external doors to be powder coated aluminum
16. All glazing to comply with the requirements of SANS 0137- access doors and side lights to have safety glass. Windows lower than 500mm from floor, windows lower than 1800mm above pitch of stairs and shopfronts to be safety glass and clearly indicated as such on glass at eye level.
17. All internal doors to be semi-solid timber doors with painted finish.

Roof Insulation:
Pitched Roofs (Concealed Trusses):
- Outdoor Air Film = R-value 0.03
- General roof materials (sheeting & purlins etc) = R-value 0.35
- Sisalation thermal reflective foil over purlins = R-value 0.35
- Roof Air Space = R-value 0.18
- ISOTHERM Thermal Insulation 145mm = R-Value of 3.37
- 10mm Plasterboard Ceiling = R-value 0.06
- Indoor Air Film = R-value 0.11

Therefore total R-value for roof structure = 4.45 which is greater than the required 3.7, therefore deemed to satisfy

Solid Concrete Flat Roof (at least 100mm thick):
- Outdoor Air Film = R-value 0.03
- Rubber Synthetic Waterproofing = R-value 0.03
- 25mm Isoboard 90% RH (below waterproofing) = R-value 0.833
- 100mm Solid Concrete = R-value 0.07
- 80mm Isoboard 90% RH (fixed to slab soffit) = R-value 2.667
- 10mm Plasterboard Ceiling = R-value 0.06
- Indoor Air Film = R-value 0.11

Therefore total R-value for roof structure =3.8 which is greater than the required 3.7, therefore deemed to satisfy

Ceilings:
1. Soffit of concrete slab to be skimmed and Painted
2. Skimmed and painted Gypsum Rhinoboard ceiling fixed to 38 x 38 battens at 400mm c/c fixed between rafters. All installed in strict accordance to manufacturers specification.

Drainage:
1.Refer to internal drainage layout as per architectural plans.
2.All soil and waste pipes to be in accordance with SANS 10400.
3.All waste pipes to be 40mm dia. PVC
4.All soil pipes to be 110mm dia. PVC
5.All work to be done in accordance with SANS 10400
6.All soil and waste pipes to be ducted in walls
7.All alterations to main municipal sewer line to be to civil engineers detail design as may be required by the local authorities.
8.All Soil & Stormwater pipes running under building, driveway or patio areas to be encased in concrete for protection.
9. Heavy Duty inspection chamber covers to be provided for drainage situated within driveways

Light and Ventilation:
1.All light and ventilation to comply with SANS 10400.
2.All areas must be adequately lighted and naturally or mechanically ventilated to external air.
3.All areas artificially ventilated to comply with SABS Code of Practise 0114 Part 1 1973

Hot Water Demand:
At least 50% (volume fraction) of the annual average hot water heating requirement shall be provided by means other than electrical resistance heating including but not limited to solar heating, heat pumps, heat recovery from other systems or processes and renewable combustible fuel to comply with SANS 10400-XA
All hot water service pipes shall be clad with insulation with a minimum r-value of 1 for pipes with an internal diameter of less than 80mm OR 1.5 for pipes with an internal diameter of more than 80mm Thermal insulation, if any, shall be installed in accordance with the manufacturer's instructions. Solar water heating systems shall comply with SANS 1307, SANS 10106 and SANS 10254

Owner/Client: PELLA WWTW

Owner/Client Signature:_____

Eng. Signature_____

Arch. Signature: _____

Arch. Council no.: PAT24750991

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PROFESSIONAL ARCHITECT
PETRUS HENDRIK VAN HUYSSTEEN
16:58 PM (Africa/Johannesburg) on 08 May 2026

Project Title:
PELLA WWTW

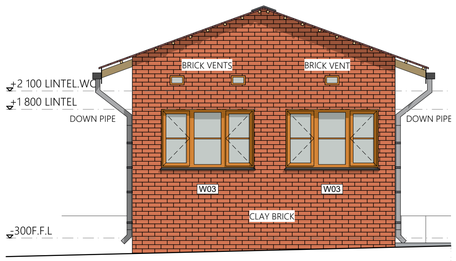
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PLAN AND SECTION

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ISSUED FOR TENDER: ☑ ISSUED FOR CONSTRUCTION: ☐ DATE ISSUE: 2026/07/06

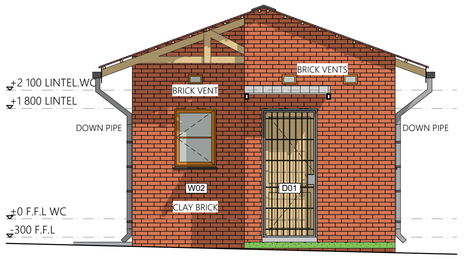
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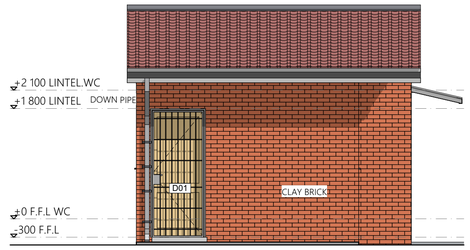




7. NORTH ELEVATION WORKROOM
Scale 1:50



8. EAST ELEVATION WORKROOM
Scale 1:50

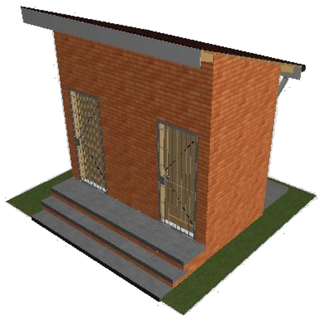




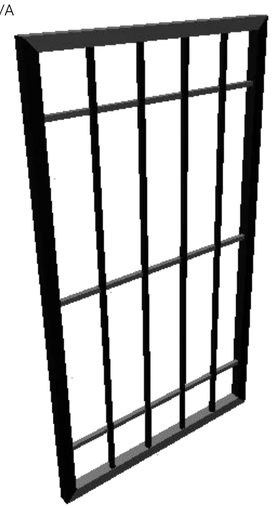
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Scale 1:50



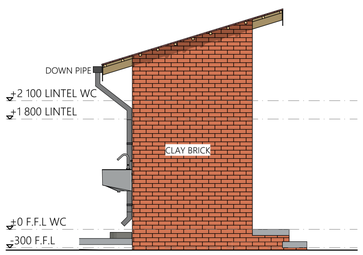
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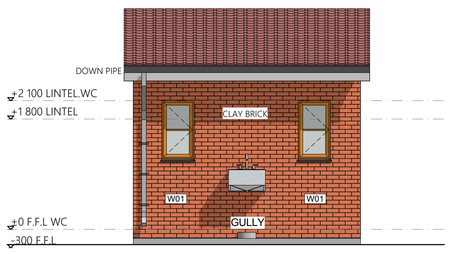


11. WORKROOM 3D'S
Scale N/A

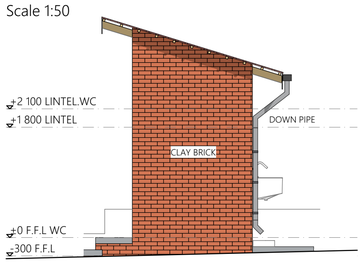


14. BATHROOM 3D'S
Scale N/A





15. WEST ELEVATION
Scale 1:50



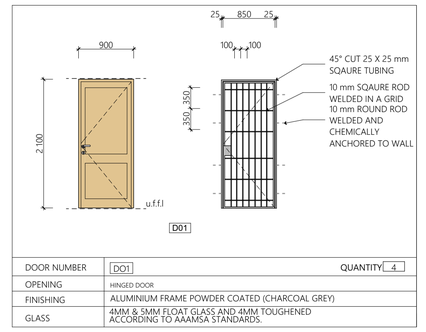
16. SOUTH ELEVATION
Scale 1:50



17. EAST ELEVATION
Scale 1:50

18. NORTH ELEVATION
Scale 1:50

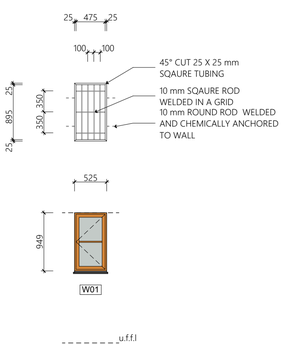
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Scale N/A



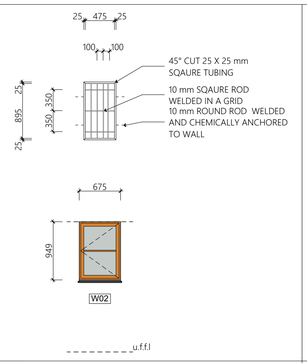
DOOR NUMBER	DO1 QUANTITY 4
OPENING	HINGED DOOR
FINISHING	ALUMINIUM FRAME POWDER COATED (CHARCOAL GREY)
GLASS	4MM & 5MM FLOAT GLASS AND 4MM TOUGHENED ACCORDING TO AAAMSA STANDARDS.

20. DOOR SCHEDULE
Scale 1:50

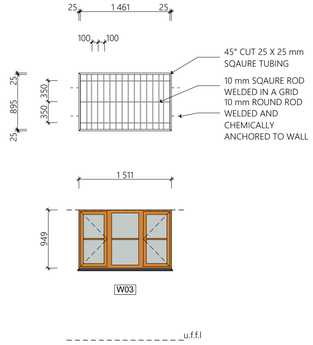
21. WINDOW SCHEDULE
Scale 1:50



WINDOW NUMBER	W01 QUANTITY 2
OPENING	WOOD 2 PANE TOP HUNG AND FIXED PANEL
FINISHING	EXTERIOR WOOD SEALER
GLASS	4MM & 5MM FLOAT GLASS AND 4MM TOUGHENED SAFETY GLASS ACCORDING TO AAAMSA STANDARDS.



WINDOW NUMBER	W02 QUANTITY 1
OPENING	CUSTOM ALUMINIUM SIDE HUNG PANEL
FINISHING	EXTERIOR WOOD SEALER
GLASS	4MM & 5MM FLOAT GLASS AND 4MM TOUGHENED SAFETY GLASS ACCORDING TO AAAMSA STANDARDS.



WINDOW NUMBER	W03 QUANTITY 3
OPENING	CUSTOM ALUMINIUM 5 SLIDING FOLDING PANEL
FINISHING	EXTERIOR WOOD SEALER
GLASS	4MM & 5MM FLOAT GLASS AND 4MM TOUGHENED SAFETY GLASS ACCORDING TO AAAMSA STANDARDS.

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Site Clearance:
1. Site clearance to include digging up and removing rubbish, debris, vegetation, hedges, shrubs and trees not exceeding 200mm girth.
2. Surplus material from excavations and/or stockpiles on site to be removed to a dumping site to be located by Contractor
3. Earth filling obtained by Contractor, from the excavations and/or prescribed sources and to be compacted to 95% Mod AASHTO density Prescribed Density tests on filling Modified AASHTO Density test.
4. Back excavation of vertical sides of excavation in earth for working space including backfilling compaction of surface under floors, etc. Compacting to 98% Mod AASHTO density Prescribed Density tests on filling. Soil test to be compiled by Structural Engineer.
5. Approved weed killer mixed and applied to manufacturers instructions: Under floors, etc., including forming and poisoning shallow furrows against foundation walls, etc., filling in furrows and ramming

Structure:
6. All reinforced concrete columns, foundations, beams and lintels to engineers' design and specification and in accordance to SANS 10400.
7. All reinforced retaining walls where applicable to structural engineers' design and specification.
8. Reinforced concrete Flat or Post Tensioned Slabs to engineer's design and specification.
9. PC lintels to be laid in accordance to manufacturers specification over all openings up to 3000mm (max) in accordance to SANS 10400
10. UNREINFORCED CONCRETE 9Mpa/ 19mm Concrete REINFORCED CONCRETE 25Mpa/ 19mm Concrete
FINISHING TOP SURFACE OF CONCRETE: Finishing to top surface of concrete smooth with a wood float finish.
11.All concrete stairs/ steps to comply with SANS 10400
Minimum requirements: All treads to be min 250mm & All risers to max 200mm

Movement Joints:
Two layer matthrod slip joints between horizontal concrete and brick surfaces including cement mortar bed. Saw cut joints at all construction joints.

Floors:
12. Ground floor to be 100mm thick reinforced concrete ground floor slab to engineers design on 25mm Polystyrene insulation on 250 micron USB green DPM on clean sandbed on well compacted fill
13. Screed to be 30mm on dpm to internal floors
14. Floor finishes as indicated on plan to be installed in strict accordance to manufacturers specification and to comply with SANS 10400

Waterproofing:
All waterproofing to wall and slabs to be in accordance to SANS 10400. All brick walls to include a layer of 375micron Brikgrip DPC embossed damp proof course.
Below all surface beds one layer of 250micron USB Green waterproof sheeting sealed at laps with pressure sensitive tape.
4mm Derbigum SP Waterproofing at all external concrete floors.
Joint Sealants, etc. Approved two-part polysulphide sealing compound including backing cord, bond breaker, and primer, also to be around sanitary fittings.
Please provide 10 year guarantee - as per GP Koning (OR SIMILAR APPROVED)

Walls & Wall Finishes:
Colour to Architects/ Clients specification.

Windows & Doors:
15. All windows and external doors to be powder coated aluminium
16. All glazing to comply with the requirements of SANS 0137- access doors and side lights to have safety glass. Windows lower than 500mm from floor, windows lower than 1800mm above pitch of stairs and shopfronts to be safety glass and clearly indicated as such on glass at eye level.
17. All internal doors to be semi-solid timber doors with painted finish.

Roof Insulation:
Pitched Roofs (Concealed Trusses):
- Outdoor Air Film = R-value 0.03
- General roof materials (sheeting & purlins etc) = R-value 0.35
- Sisalation thermal reflective foil over purlins = R-value 0.35
- Roof Air Space = R-value 0.18
- ISOTHERM Thermal Insulation 145mm = R-Value of 3.37
- 10mm Plasterboard Ceiling = R-value 0.06
- Indoor Air Film = R-value 0.11

Therefore total R-value for roof structure = 4.45 which is greater than the required 3.7, therefore deemed to satisfy

Solid Concrete Flat Roof (at least 100mm thick):
- Outdoor Air Film = R-value 0.03
- Rubber Synthetic Waterproofing = R-value 0.03
- 25mm Isoboard 90% RH (below waterproofing) = R-value 0.833
- 100mm Solid Concrete = R-value 0.07
- 80mm Isoboard 90% RH (fixed to slab soffit) = R-value 2.667
- 10mm Plasterboard Ceiling = R-value 0.06
- Indoor Air Film = R-value 0.11

Therefore total R-value for roof structure =3.8 which is greater than the required 3.7, therefore deemed to satisfy

Ceilings:
1. Soffit of concrete slab to be skimmed and Painted
2. Skimmed and painted Gypsum Rhinoboard ceiling fixed to 38 x 38 battens at 400mm c/c fixed between rafters. All installed in strict accordance to manufacturers specification.

Drainage:
1.Refer to internal drainage layout as per architectural plans.
2.All soil and waste pipes to be in accordance with SANS 10400.
3.All waste pipes to be 40mm dia. PVC
4.All soil pipes to be 110mm dia. PVC
5.All work to be done in accordance with SANS 10400
6.All soil and waste pipes to be ducted in walls
7.All alterations to main municipal sewer line to be to civil engineers detail design as may be required by the local authorities.
8.All Soil & Stormwater pipes running under building, driveway or patio areas to be encased in concrete for protection.
9. Heavy Duty inspection chamber covers to be provided for drainage situated within driveways

Light and Ventilation:
1.All light and ventilation to comply with SANS 10400.
2.All areas must be adequately lighted and naturally or mechanically ventilated to external air.
3.All areas artificially ventilated to comply with SABS Code of Practise 0114 Part 1 1973

Hot Water Demand:
At least 50% (volume fraction) of the annual average hot water heating requirement shall be provided by means other than electrical resistance heating including but not limited to solar heating, heat pumps, heat recovery from other systems or processes and renewable combustible fuel to comply with SANS 10400-XA
All hot water service pipes shall be clad with insulation with a minimum r-value of 1 for pipes with an internal diameter of less than 80mm OR 1.5 for pipes with an internal diameter of more than 80mm Thermal insulation, if any, shall be installed in accordance with the manufacturer's instructions. Solar water heating systems shall comply with SANS 1307, SANS 10106 and SANS 10254

Owner/Client: Pella WWTW

Owner/Client Signature:_____

Eng. Signature_____

Arch. Signature: _____

Arch. Council no.: PAT24750991

VANHUYSSTEENDESIGNS

PROFESSIONAL ARCHITECT
PETRUS HENDRIK VAN HUYSSTEEN
16:58 PM (Africa/Johannesburg) on 08 May 2026

Project Title:
PELLA WWTW

date : 2026/07/06 | scale : AS SHOWN
drawn : PH. Van Huyssteen

Drawing Description:
ELEVATION

Sheet size: A1

ISSUED FOR TENDER: ☑ ISSUED FOR CONSTRUCTION: ☐ DATE ISSUE: 2026/07/06

Job No. ...
Drawing No. MSD114-T-017
Rev. 0

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

ANNEXURE B

GEOTECHNICAL INVESTIGATION

GEOCALIBRE
GEOTECHNICAL CONSULTANCY

TECHNICAL REPORT

Oxidation Ponds at Pella Wastewater Treatment Works

Khâi-Ma Local Municipality- Northern Cape Province

Basic Geotechnical Investigation and Materials Assessment

Prepared for
Mind Shape Developments

Date
13/04/2026

Overseen by
Kevin Coertzen (Pri.Sci.Nat)

GEOCALIBRE
GEOTECHNICAL CONSULTANCY

Technical Report

GC26/108

13 April 2026

Oxidation Ponds at Pella Wastewater Treatment Works

Khâi-Ma Local Municipality - Northern Cape Province

Project Details

Project Title	Oxidation Ponds at Pella Wastewater Treatment Works
Client	Mind Shape Developments
Local Municipality	Khâi-Ma Local Municipality- Namakwa District- Northern Cape Province
Level of Investigation	Basic Near Surface Geotechnical Site Investigation and Materials Assessment
Report Number	GC26/108
Report Version	Version 1- Final Report

Report Compilation and Signatory

Fieldwork, Data Analysis and Report Compilation		
Cole Herbig BSc (Hons) Engineering Geology (UP) Candidate Natural Scientist (140216) *Email: cole@geocalibre.co.za*	Digitally signed: 13/04/2026 Signature	13/04/2026 Date
Report Review and Signatory		
Kevin Coertzen Professional Natural Scientist (400011/17) NHBRC Competent Person (Barcode 3000179078) *Email: kevin@geocalibre.co.za*	Digitally signed: 13/04/2026 Signature	13/04/2026 Date

Report Distribution List

Date	Name	Institution	Version	Format
13/04/2026	Riaan Odendaal	Mind Shape Developments	Version 1 Final Report	PDF.

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1. Project Introduction

1.1. Background

This report describes the results of the **Basic Near Surface Geotechnical Site Investigation and accompanying Materials Assessment** conducted in support of the planned lined oxidation ponds to be constructed adjacent to the Pella Waste Disposal Site- located approximately 2.5 km north west of the town of **Pella**. The site falls under the jurisdiction of the Khâi-Ma Local Municipality of the greater Namakwa District Municipality, Northern Cape Province of South Africa.

The on-site materials were assessed in terms of their reusage as embankment material in the construction of the proposed lined oxidation ponds forming part of the greater Pella Wastewater Treatment Works (WWTW).

The basic near surface site investigation was undertaken in order to assess the engineering geological character of the site, focussing on the geotechnical properties which will affect the overall development potential of the parcel of land in question.

1.2. Terms of Appointment

GeoCalibre Geotechnical Consultancy was appointed by *Mind Shape Developments* to undertake the required geotechnical study.

GeoCalibre is an independent professional geotechnical firm with no vested interest in the project, other than remuneration for work associated with the compilation of this report.

The information presented in this document is based on the information supplied by the Client prior to the commencement of the investigation; therefore, GeoCalibre Geotechnical Consultancy (Pty) Ltd shall not be held liable for, and is indemnified against all actions, claims, demands, losses, liabilities, costs, damages and expenses prompted by, or in connection with, inaccurately relayed information pertaining to the site/development.

1.3. GeoCalibre- Company Background and Information

GeoCalibre is a specialist geotechnical consulting firm made up of a team of qualified professional geo-practitioners. The firm was established out of a love for the industry and an urge to define a new calibre of professional consulting.

GeoCalibre uses advanced scientific methods to create accurate and reproducible geotechnical models; successfully guiding the implementation of site-specific design precautionary measures/engineering solutions. The methodology followed throughout the investigative process accounts for the nature and location of the development as well as adhering to the standards of our practice (SANS and SAICE).

Investigations undertaken by GeoCalibre are overseen by suitably qualified Engineering Geologists *professionally registered* (Pr.Sci.Nat) with the South African Council of Natural Scientific Professions (SACNASP)- in accordance with all the relevant and required procedures and legislations.

GeoCalibre's employees are also members of the South African Institute for Engineering and Environmental Geologists (SAIEG).

1.4. Codes of Practise and Investigative Standard

The investigation was carried out according to the following standard practice codes and guidelines:

- Guidelines for Urban Engineering Geological Investigations (SAIEG & SAICE, 1997) for urban development.
- Site Investigation Code of Practice put forward by the Geotechnical Division of SAICE (2010).
- Applicable technical specification documents of South Africa (SANS, TRH, TMH, COLTO/COTO and SAPEM).
- Laboratory testing undertaken by a SANAS Accredited facility.

SANS 10400 and the guideline and specification documents by the South African Institute of Engineering and Environmental Geologists and South African Institution for Civil Engineers, AEG/SAIEG/SAICE (2002), were also consulted.

1.5. Appointed Level of Study and Limitations

The project team opted to undertake a **basic near surface geotechnical study** entailing excavations by means of a TLB-type light mechanical excavator at predetermined locations identified by the design team.

This basic assessment guides the project team on attributes such as site excavatability, permeability and material re-usage in embankment construction. Due to the nature of the planned structures and required level of study, geotechnical/engineering material attributes relating to structural design (consolidation/bearing capacity etc.) and pavement assessment (extensive CBR testing) are generally excluded.

The results of this level of assessment provide an overview of the geotechnical character of the site, as well as listing prominent adverse geotechnical characteristics which may impact future land-use. This initial phase will provide the foundation for a conceptual geotechnical model of the area, enabling informed planning for the subsequent studies where necessary. This investigation did not include the assessment of any potential environmental hazards, or groundwater impacts that may be present, or ensue from the construction.

Geological conditions are seldom uniformly developed, and there may be areas where site conditions vary locally from those described and assessed in this report. The presented geotechnical model is based on a database of available information, on-site soil profiles and the results from soil laboratory tests. Parcels of land within the developmental area which are free of excavations are modelled through interpolation and extrapolation of known testing locations, to identify problem issues of a geotechnical nature on which this report is based. Variances in soil and rock quality and quantity from those predicted may be encountered during construction and these should be recorded.

The contents of this report are valid as of the date of preparation. However, changes in the condition of the site can occur over time as a result of either natural processes or human activity. If a substantial lapse of time occurs between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions.

In addition, advancements in the practice of geotechnical engineering and engineering geology and changes in applicable practice codes may affect the validity of this report.

The exact designs of the future structures and related attributes were not defined at the time of this study, with this basic near surface investigation utilising typical attributes of structures of this nature to guide discussions.

1.6. Information Sources

- **Geological Series Map:**
  - Geological Series Map 2918 Pofadder; scale 1:250 000 (digital format)
- **Hydrogeological Data:**
  - SADC Groundwater Information Portal (SADC GIP)
  - Hydrogeological Series Map 2718 Upington/Alexander Bay (2001); scale 1 : 500 000 (digital format)
  - Electronic Maps of the Water Management Areas and Drainage Regions in South Africa- DWAF [Department of Water Affairs and Forestry]- 1996 and 1999 (www.dwa.gov.za).
- **Topocadastral maps:**
  - 2919 Aa; scale 1:50 000 (digital format)
- **Remote Sensing Information:**
  - Google Earth Pro ™
  - Elevation Heat Map; Online Resource
  - Planet GIS Northern Cape Cadastral Land Layer (2025)
- **Provided by the Client:**
  - Site location and proposed trenching locations
- **Available geotechnical reports:**
  - Numerous geotechnical reports from the region compiled by Kevin Coertzen (Pri.Sci.Nat and MSAIEG)

1.7. Scope of the Investigation

A basic near surface geotechnical site investigation was carried out by GeoCalibre across the footprint of the development in question.

The aim of the overall site investigation can be summarised as follows:

- Establishment of a **regional geological**, **geomorphological** and **geo-technical** model for the site.
- Identify any potential **geohazards**.
- To delineate the **succession of strata** (soil and rock) underlying the site; with the identification of problematic **physical, chemical** and **mechanical** characteristics which may influence the multi land-use development.
- To quantify the **in situ mechanical properties** of the soft materials underlying the site; specifically with regards to the proposed future developments.
- To compute the **excavatability properties** of the on-site materials.
- To assess shallow **groundwater** patterns.
- To evaluate the **reusage potential** of the materials underlying the site.
- Assign accurate and applicable **broad site classifications** and to aid the development moving forward through the formulation of a basic near surface geotechnical model for the site under investigation.
- To aid the development moving forward through the formulation of an **accurate geotechnical model** for the site under investigation.

The results of this level of assessment provide an overview of the geotechnical character of the site, as well as listing prominent adverse geotechnical characteristics which may impact future land-use and finally serving as specialist input as part of future EIA/land planning processes.

The investigation excludes the following aspects, where applicable:

- Dolomite stability or undermining investigations.
- Detailed hydrological, hydropedological, hydrogeological, pedological, flood line, or wetland delineation studies.
- Geophysical, resistivity, or corrosion studies.
- Borehole drilling and/or rock strength analysis.
- Detailed slope stability assessment.
- Geohydrological/geo-environmental surveys.
- Design level studies for future structures.

1.8. Investigative Methodology

The investigation is undertaken in a number of stages in order to achieve the aims discussed above. The investigative phases are as follows:

- **Stage 1: Introduction and Regional Assessment of the Site**
- **Stage 2: Near Surface Geotechnical Site Investigation**
- **Stage 3: Data Assessment and Report Compilation**

1.8.1. Stage 1: Introduction and Regional Assessment of the Site

The collation and evaluation of all the available topographic, geo-morphological and geological data across the investigated site and its surroundings. This assessment is done using available regional maps and remote sensing images. This section of the report includes a description and summary of the site's nature, based on existing literature, and is supplemented with the compilation of a series of base maps.

1.8.2. Stage 2: Geotechnical Analysis- Engineering Geological Investigation

Site Walkover

Following the completion of the desktop stage defined above, the GeoCalibre undertook a site walkover exercise across the parcel of land in question.

The objective of the walkover was to verify and refine the desktop findings through direct observation and targeted field assessment and in so doing aid in the definition of the planned future actions.

The site walkover covered the following basic aspects:

- A systematic physical walkover and visual inspection of the site;
- Visual inspection of observable soil/rock exposures;
- View major geomorphological features, drainage lines, seepage zones, and potential instability indicators;
- Verification of access/mobility constraints and suitable positions for future intrusive investigations.

Trenching and Sampling

The field work stage of the investigation was conducted by GeoCalibre in February 2026. A total of **SEVENTEEN (17) test pits** were excavated using a TLB-type light mechanical excavator (Volvo BL71B) across the investigated area. Test pits were distributed across the site at predetermined locations identified by the client based on specific requirements of the design team.

The succession of soil layers exposed within the test pits were logged and a series of detailed photographs were taken of the different layers.

Disturbed and bulk samples were taken of the material deemed to be important to the proposed development. Laboratory testing commenced on the samples collected during the field work phase of the investigation.

Laboratory Testing

Standard foundation indicator and soil compaction tests were conducted by Tzaneen Lab (**SANAS Accredited**) on disturbed and bulk soil samples.

These tests were undertaken to determine the composition of the underlying soils (i.e., the relative percentages of gravel, sand, silt and clay) and to evaluate the basic suitability of the materials for the reuse in the proposed construction.

The following tests were conducted:

I. Particle-size Distribution (SANS 3001: GR1) and Atterberg limits (Liquid Limit, Plasticity Index and Linear Shrinkage)- (SANS 3001: GR10/11)

II. Maximum Dry Density versus Optimum Moisture Content (SANS 3001: GR30)

III. Californian Bearing Ratio versus Compaction Effort (MOD AASHTO method) (SANS 3001: GR40)

IV. Double hydrometer- indication of material dispersivity (chemical testing)

V. pH and Electrical Conductivity (EC)

1.8.3. Stage 3: Data Assessment and Report Compilation

The investigation concluded with the compilation of a technical report detailing the methodology utilised during the study and the summarised results obtained. This includes a potential geotechnical evaluation of the site based on the cumulative results of the basic near surface investigation.

1.9. Development within 1:100 year-flood lines

Detailed hydrological, hydropedological, hydrogeological, pedological, flood line, or wetland delineation studies were not part of this investigation scope and should be addressed by competent professionals. If the site or a portion thereof is situated within the 1:100-year flood line, or has been delineated as a wetland, it is the prerogative of the competent person to overwrite the recommendations for such portions and development exclusion should comply with the relevant acts and as per the environmental specialist input.

2. Description of the Environment

2.1. Site Location and Description

The **study area** for this investigation is seen to fall within the far north western portion of the Northern Cape Province of South Africa- proximal to the international border with the country of Namibia. On a more localised scale, the area in question is located approximately 40 km north west of the town of Pofadder- situated along the National Road 14 (N14)- within the vicinity of the remote town of **Pella.**

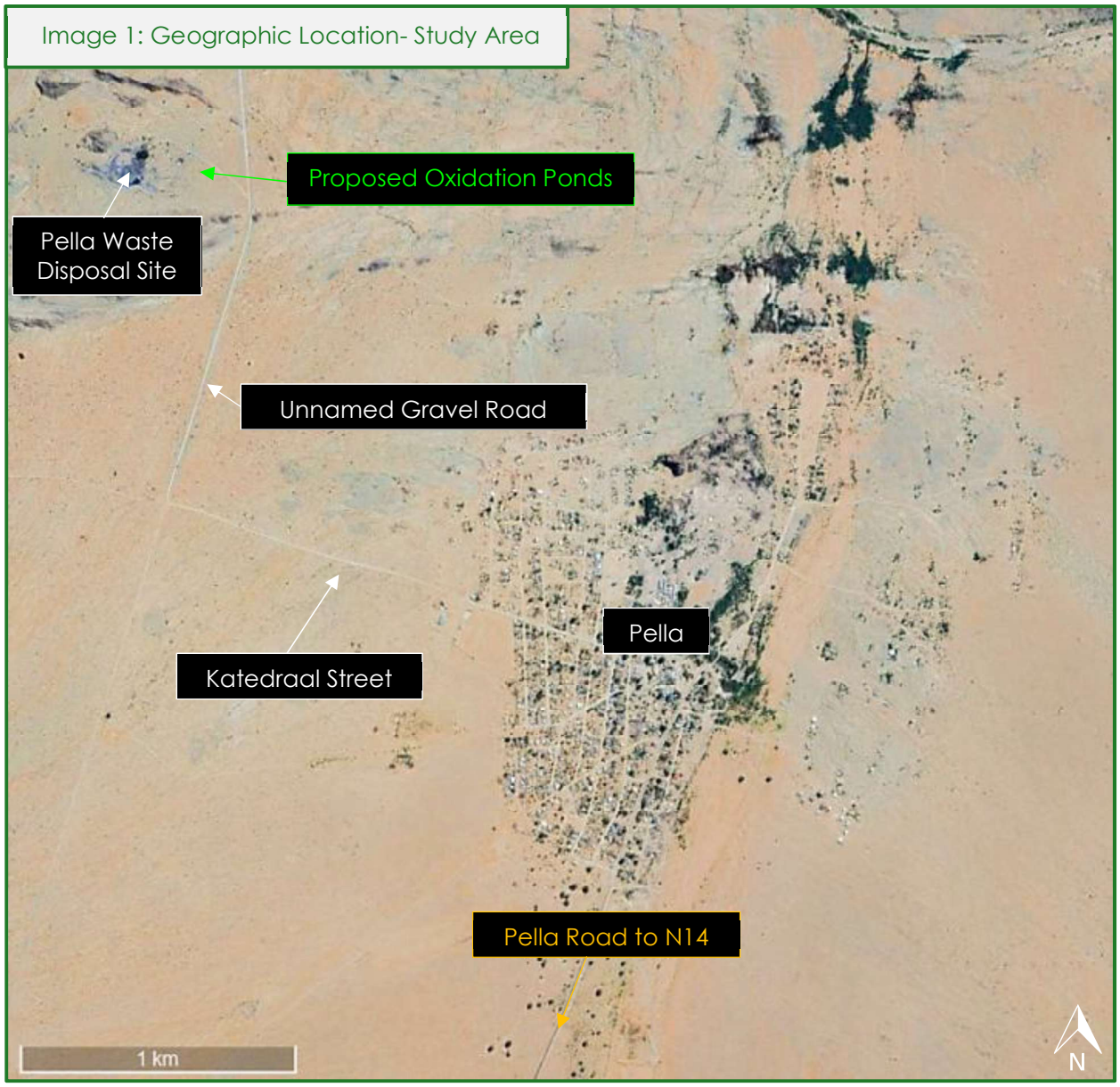
More specifically, the site forming the focal point of this investigation is situated approximately 2.5 km north west of Pella- directly adjacent to the Pella Waste Disposal Site. The site falls under the jurisdiction of the Khâi-Ma Local Municipality of the greater Namakwa District Municipality.

The site for this investigation is located at the following coordinates:

Latitude: 29.016818° S **Longitude:** 19.136367° E

Refer to Image 1 below which depicts the location of the study area.

Image 1: Geographic Location- Study Area



As depicted on Image 1, the site is easily accessible from the gravel roadway extending in a north westerly direction from Pella- demarcated as **Katedraal Street** within the town- followed by an **unnamed gravel road** extending in a general **northerly direction** towards the international border. This unnamed gravel road extends along the eastern border of the site and forms the **main access point** to the investigated area.

Once on site, various informal gravel roadways- typically extending towards the Pella Waste Disposal Site (forming the western boundary of the investigated area)- can be utilised to traverse the site. The boundary of the site is **not distinctly demarcated** on ground level attributed to its mainly undeveloped nature.

Although undeveloped, the site was noted to exhibit a **partially reworked surface** attributed to on-going human activities across the local setting. Excluding the aforementioned informal roadways, the site was seen to host scattered dumped landfill and building rubble materials. Based on basic visual assessments these materials typically include- but are not limited to- domestic waste, building rubble and old tyres. The dumped materials are visible on available satellite imagery. As discussed in the sections to follow in this report, based on the trenching phase of this investigation (scattered excavations), the landfill materials are **restricted to surficial occurrences**.

The site was primary investigated to examine both the **excavatability** of the subterrain as well as the **reusability of the on-site materials** in **embankments construction** forming the proposed oxidation ponds of the greater Pella Wastewater Treatment Works (WWTW). Based on initial discussion with the client, the earthfill embankments forming the future oxidation ponds are to be lined, therefore only a basic indication of the permeability of the on-site materials has been inferred. With this being said, the structural integrity, stability, and erosion resistance of the embankments and their immediate surrounds remain critical design and construction considerations.

The photo series to follow displays the various observations made by the field team during the site walkover phase of this basic geotechnical investigation.














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Basic Geotechnical Study-

Oxidation Ponds at Pella WWTW

Site Observations

MINDSHAPE DEVELOPMENTS (PTY) LTD

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2.2. Topography

Topography is based on elevation profiles from the available remote sensing information and basic field observations. This does not substitute land survey data. Topography and regional hydrology (e.g., steep slopes, very flat slopes, defined drainage features, and rapid changes in slope) affect the distribution of ground as it affects the weathering, erosion, transport, and deposition of materials. As such, it provides a valuable indication of possible changes in subsurface ground and water conditions but also affects the stability of slopes and the direction of surface runoff.

The regional setting is seen to display an undulating surface morphology with an assortment of irregularly shaped ridges/elevated terrain, separated by low lying valley landforms. This assortment is a result of past plutonic processes in combination with the variability portrayed in the underlying bedrock geology. The inherent variability/flaws within the lithologies are exposed through erosional processes, with alternating water ways following zones of weakness in the rock masses. The low-lying areas- between variably shaped ridges- are frequently filled over time with transported sediments of varying shapes and sizes (quaternary aged sediments).

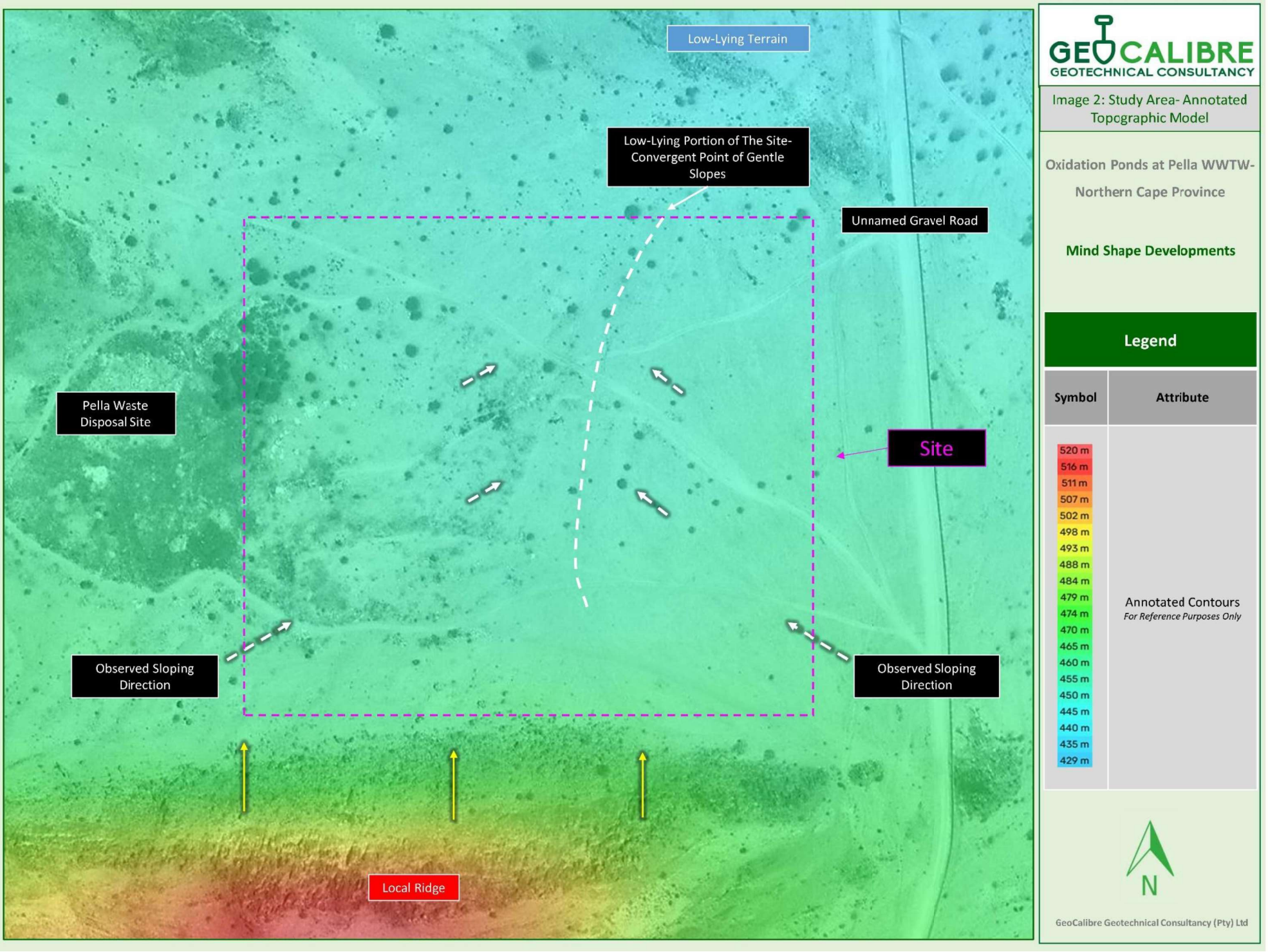
As seen in the annotated topographic map overleaf (Image 2), the site is situated directly north of a steeply sloping local ridge with its central axis extending in an overall east/west direction (red, orange and yellow colours). The orientation and extent of the mapped high-lying terrain directly impact the geomorphological nature of the site in question.

The natural slopes (yellow arrows) extend from this elevated feature towards the surrounding low-lying terrain situated in an overall northerly direction. Once off the immediate **steep sloping flanks** of the local ridge, the topography displays an **abrupt reduction** in **declivity,** characterized by uniform and continuous surficial morphology as evident by the continuous light blue colour on Image 2.

Although not clearly visible on the annotated topographic model, based on the site observations of the field team, the low-lying terrain can be characterised by **gentle slopes** extending from the **comparatively elevated terrain** situated to the **south east, south and south west**, respectively. The local slopes diverge from the secondary elevated features- gently **converging** across the site (white dotted arrows) and intersect at the **approximate midpoint of the site** (white dotted line).

As a whole, the degree of sloping was observed to increase with a reduction in surface elevation across the site's footprint.

Refer to Image 2 overleaf which graphically depicts the topographic nature of the site and its immediate surrounds.


Low-Lying Terrain
Low-Lying Portion of The Site- Convergent Point of Gentle Slopes
Unnamed Gravel Road
Pella Waste Disposal Site
Site
Observed Sloping Direction
Observed Sloping Direction
Local Ridge
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Image 2: Study Area- Annotated Topcgraphic Model
Oxidation Ponds at Pella WWTW- Northern Cape Province
Mind Shape Developments
Legend
Symbol
Attribute
520 m
516 m
511 m
507 m
502 m
498 m
493 m
488 m
484 m
479 m
474 m
470 m
465 m
460 m
455 m
450 m
445 m
440 m
435 m
429 m
Annotated Contours
For Reference Purposes Only
N
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Consequently, the natural topographic nature of the site can be characterised by **overall gentle slopes** (natural) typically extending from the comparatively higher lying areas to the **south east and south west**, **converging** upon the **approximate central axis of the investigated area**. A surface elevation of ~461 meters above mean sea level (MAMSL) is recorded along both the comparatively elevated terrain to the south east and south west- decreasing to a surface elevation of ~446 MAMSL along the low-lying convergence point- northern portion of the site (as calculated using Google Earth PRO tm).

Localised variations in slope were observed across the site, attributed to the presence of small-scale anomalies of both natural and anthropogenic origin. Historical surface reworking has disrupted the continuity and gradient of the natural slopes across the footprint, thereby influencing the inherent drainage characteristics and resulting in the development of topographic irregularities.

Based on the available information, the proposed development will include the rehabilitation of the site surface within, and immediately surrounding, the planned future pond areas.

2.3. Drainage

The drainage characteristics of the study area are broadly reflective of the topographic setting described in Section 2.2. The local ridge, as annotated on Image 2, is interpreted to function as the primary local watershed, with minor topographic irregularities (comparatively elevated terrain to the south east and south west) acting as secondary drainage partitions. Natural drainage patterns within the immediate area have likely been modified resulting from past and on-going anthropogenic activities (proximity to the Pella Waste Disposal Site and the continuous use thereof).

Across the site's footprint, the predominantly gentle slopes promote drainage primarily in the form of **low-energy surface runoff** (sheet flow). Stormwater is expected to migrate from the surrounding elevated terrain and **converge** toward the central portion of the site and ultimately drain further downslope to the north. As a result, much of the site is likely to experience elevated levels of **surface water infiltration** into the underlying soils, rather than rapid runoff, which in turn promotes localized **ponding and fluctuating moisture conditions** following infrequent precipitation events.

The anthropogenic and/or natural reworking of the site's surface and its immediate surrounds will result in local variations of surface water flow- both rate and direction. Emphasis will need to be placed on remoulding the surface of the site understanding that the continuity and manipulation of the topography and associated drainage play a pivotal role in the longevity and sustainability of the development as a whole.

According to the available information (Topocadastral Map 2919Aa - Figure 3), no natural drainage features are mapped to traverse the site.

The site falls within the **Quaternary Catchment Area D81G**, which forms part of the local **T'Goob se Laagte River** Catchment Area of the greater Orange River Catchment Area and associated Water Management Area.

2.4. Regional Climate and Climate Classification

Climate determines the mode and rate of **weathering** of the in situ materials as well as influences on the **performance** of the asset following construction, including future **maintenance** and **rehabilitation** needs.

Where applicable, the climatic classification systems listed below can be used together with surface temperature indices and the available data on minimum, maximum and mean annual precipitation.

Due to the location of the site, it is anticipated to exhibit a climatic regime broadly comparable to that of **Pofadder.** Based on the hydrogeological series map: 2718 Upington/Alexander Bay (2001), the area receives between approximately **0 and 100 mm** of rainfall per annum. Pofadder receives the lowest rainfall (0mm) in January and the highest (11mm) in March. The average midday temperatures for Pofadder range from 17.5 °C in July to 31.4 °C in January. The region is the coldest during July when the mercury drops to 2.3 °C on average during the night, reflecting the pronounced seasonal temperature variation characteristic of the region.

According to Koppen and Geiger climate classification, the climate is classified as **hot desert climate (BWh)** and **Temperate Interior** (SANS 204-2)**.**

The effect of climate on the weathering process (i.e., soil formation) is determined by the **climatic N value** defined by Weinert, 1980. The N-value is calculated as 12 times the January evaporation divided by the annual precipitation and indicates whether an area is predominantly moisture-surplus (N < 5) or moisture-deficit (N > 5).

The Climatic N-Value (Weinert, 1980) for the area is deemed to be **greater than 50**; therefore, **physical/mechanical disintegration** of the parent rocks in the regional setting is deemed the principal mode of weathering. This mode of weathering favours the formation of an abundance of rocky fragments occurring within the soil matrix.

2.5. Vegetation and Biotic Activity

Input from qualified specialists in co-dependent reports (e.g. botanical or environmental) shall supersede the discussion points below where applicable.

The study area is located within the **Great and Upper Karoo Bioregion** of the Nama Karoo Biome (Mucina and Rutherford, 2006).

As noted during the fieldwork phase of the study, the vegetation across the investigated site is predominantly composed of sparse grass cover with intermittent thorny shrubs and bushes separated by pockets of bare soil.

In the exposed profiles, the degree of organic material and biotic activity was seen to decrease with an increase in depth with the major root system reaching an average depth of approximately **0.10 m** (topsoil) below natural ground level. Traces of fine sized roots were present in the remaining soft materials. Pockets of decomposed organic matter were seen to be present at depth across the site, with the decomposition of the organic material resulting in a reduction of volume and the formation of voids.

Where required, the natural vegetation will need to be modified in the early stages of the construction. Regarding bioengineering, the natural vegetation cover protects the slope from erosion (run-off and rain splash) and serves as an anchoring mechanism to reduce the possibility of shallow seated instabilities. The removal of vegetation will decrease erosion resistance, can result in the formation of highly compressible zones of voided soils and may result in changes in both moisture conditions and degree of weathering of the surrounding soils. Such areas should be treated as zones of possible risk and should be dealt with accordingly in the design.

Attributed to the remote nature of the site and low density of surrounding settlements, localised biological nests and/or insect tunnels were encountered across the site. The exact depth of the biological tunnelling is not known, with individual features varying in sizes. Where required, termiticide treatment/pest control can be considered by the design team within the guidelines of the local environmental legislation. In addition, established root networks and biological activity create preferential drainage paths or "macropores." If these features are not properly excavated and replaced with compacted pioneer layers, they can lead to internal soil erosion or piping.

3. Regional Geological and Hydrogeological Setting

3.1. Introduction

The regional geology provides geological context to the anticipated distribution of geological material and how these can affect the distribution of lithologies (rock types) with different chemical, mineralogical, structural, and mechanical properties. Bedrock refers to the rock directly underlying the site and, when exposed to surface, is referred to as an outcrop. Bedrock can be underlain by other rock types at shallow depths and is usually overlain by residual soils derived of its in situ weathering and transported soils deposited from other positions.

3.2. Regional Stratigraphic Setting

3.2.1. Geological Series Map 2918 Pofadder

According to the available geological information (geological series map: 2918 Pofadder), the study area is underlain by the following prominent **geological units** (Figure 2):

1. "**Q-s2**"**- Sand, scree, rubble, sandy soil** of Quaternary Period
2. "**N-p**"- Pegmatite (not associated with a specific geological group on available information sources).
3. "**Nsm**"- Yellow-brown- to grey-weathering biotite-hornblende augen **gneiss** associated with the **Swartmodder Gneiss**
4. Multiple interconnected and related geological units predominately comprised of metamorphic rocks including **quartzite, schist and gneiss** associated with the **Droë boom Group**:
    a. "**Kpe**"- White to grey, medium grained, granular to glassy **quartzite** grading to feldspathic **quartzite**. In places conglomeratic and ferruginous of the Pella Formation.
    b. "**Kgu**"- Dark-grey, coarse grained, biotite-sillimanite **gneiss**, dark-brown biotite **schist** and coarse-to medium- grained biotite-hornblende **gneiss** of the Guadom Formation.
    c. "**Klo**"- Dark-grey to green, fine- to medium-grained calc-silicate **gneiss**, quarzitic calc-silicate **gneiss**, biotite **gneiss** and amphibolite of the Longsiekvlei Formation.

The metamorphic rocks of the region are associated with the Namaqua–Natal orogenic belt. The age of the bedrock indicates the likelihood of highly disturbed bedrock including the presence of extensive jointing, hydrothermal veins, and a large degree of weathering. As such, it is predicted that highly variable bedrock, ranging from undisturbed competent rock to highly fractured and weathered incompetent rock, could be encountered.

3.2.2. Geological Mapping and Site Exposures

Following the trenching phase of the project, it was established that the investigated area is blanketed by young unconsolidated sediments of the Quaternary Period- interpreted to be of **alluvial origin.** The upper extent of the blanketing deposits was seen to be **organic-rich**- profiled as topsoil. Below the alluvium, the investigated area is **underlain by residual soil** exhibiting a granular nature with pockets of the original rock fabric**.**

The overall comparable visual appearance of the soil and weathered bedrock below the site is associated with the physical breakdown of the material relating to the arid climate of the site.

Although final excavation depths were typically dependent on the requirements of the design team, the underlying rock mass was not excavatable by means of TLB-type light mechanical excavator. The majority of excavations were terminated due to difficult excavation (DE) conditions within dense/very dense residual soil. Identification of the underlying rock mass was limited to outcrops, exposures along the base of excavations and inferences made based on the exposed residual soil. Due to the observed distinctive alternating dark and light bands exposed in the residuum the site is interpreted to be predominately underlain by **gneiss.**

It should be noted that the analysis of the on-site materials is limited to the excavatable extent of the soil profile (exposed soft materials) and in some cases the required excavation depths as defined by the design team. Therefore, the nature and associated properties of the soil/rock below the final excavation depths are unknown and can be more accurately defined during the excavation of deep service trenches/bulk excavations.

3.2.3. Quaternary Sediments- Alluvium

Quaternary sediment deposits are extensive throughout the study area- the prevalence of which can be linked to the region's geomorphology.

The sediments blanketing the site are interpreted to be comprised of **alluvial soils** due to the proximity of the site to the Orange River and associated non-perennial river systems. Although profiled as alluvium, there is a high probability that the material may be comprised of a mixture of alluvium, windblown sands and localised colluvial deposits. These young deposits consist of **multiple cycles** of deposition resulting from varying transport mechanisms.

Alluvium is a general name for sediments which have been deposited by river and stream systems during different depositional times. The properties of the alluvium can vary substantially and are dependent on three dominant factors, including- the geology within the catchment area, the depositional nature of the river system, as well the competence of the river (Chapter 8, Brink, 1979).

This material has been transported by natural agents during relatively recent geological times and have not undergone lithification into a sedimentary rock. Furthermore, due to their age and shallow occurrence- these deposits may lack essential pre-consolidation characteristics.

3.2.4. Gneiss (Interpreted to be associated with the Swartmodder Gneiss or Droë boom Group)

Following geological field mapping and the assessment of the exposed soil profiles- the site is interpreted to be underlain by **gneissic bedrock.** Given the nature of the project and climate of the region, minor fluctuations in underlying geology as indicated on the relevant geological maps (gneiss vs quartzite vs schist) are not anticipated to have any discernible influence on the planned future development.

Gneiss is a metamorphic rock formed due to high temperatures and pressures acting on existing sedimentary or igneous rocks. During the formation of gneisses, minerals of similar composition and density are squeezed together, forming **alternating dark and light bands known as gneissic banding.** Furthermore, extreme temperatures and pressures may cause portions of the rock to melt, resulting in irregular dark and light bands similar to gneissic banding. Rocks that have undergone partial melting are generally referred to as **migmatites**.

The banded character of the gneiss can be subdivided into **three distinct zones** based on mineral composition and overall colour. The irregular **dark bands** are known as **melanosomes** and consist of mostly **mafic minerals**. The contrasting **light bands** are known as **leucosomes** and predominantly consist of **felsic minerals**. Lastly, the **mesosome** represents the unaltered parent rock or portions of the rock that have not undergone partial melting.

As mentioned above, the **melanosome** is characterised as the **dark bands** of minerals generally seen to be rich in magnesium and iron such as biotite, amphibole, garnet, cordierite, orthopyroxene, clinopyroxene and olivine. The metamorphic/mafic minerals of which these bands are mostly comprised of are **highly susceptible to chemical decomposition** under the right conditions. Therefore, these bands routinely weather to soil-like completely weathered rock.

The **mesosome** represents the portion of rock **intermediate** in colour between the leucosome and melanosome, which generally depicts the unmodified portions of the parent rock in migmatites. Due to the mesosome consisting of comparatively more equal portions of mafic and felsic minerals, these portions of the rock mass will general be more resistant to weathering than melanosomes and less resistant than leucosomes.

The leucosome describes the **irregular light bands of felsic minerals** generally seen to be rich in aluminium, sodium, and potassium such as quartz and feldspar. The light-coloured minerals that form these bands are chemically stable and are far more **resistant to weathering** than their dark-coloured counterparts- and associated elevated rock hardness.

In conclusion, the **banded character** of the gneiss leads to a variable weathering profile, where less weathered, moderately hard core-stones or bands may occur within a soil-like material. Quartz-rich zones will also undergo less weathering than its mica-rich counterpart. The orientation of these bands (i.e., vertical or horizontal) may also lead to the occurrence of deeply weathered zones within generally less weathered material. This undulating weathering profile results in a **variable bedrock topography,** which in turn will negatively affect both the **continuity of excavatability** and the **movement of fluids** across the site.

3.3. Dolomitic Land and Sinkhole Formation

Information received from the Council for Geosciences and the available regional geological sheets indicate that the site is <u>not</u> characterised by soluble rocks such as dolomite or limestone. Therefore, the study area does <u>not</u> reflect any risk for the formation of sinkholes or subsidence caused by the presence of water-soluble rocks, and as such is **<u>not</u> deemed "*dolomitic land*".**

3.4. Mineral Deposits and Undermined Ground

According to the geological maps and accompanied explanation, **no** specific mineral deposits are present on site.

3.5. Seismic Risk

Seismic risk is defined as the probability of an **earthquake** occurring in a given area and in a certain interval of time that exceeds a certain threshold of intensity, magnitude or peak ground acceleration. South Africa is known for its relative seismic stability.

The peak ground acceleration is the maximum acceleration of the ground shaking during an earthquake. According to the Council for Geoscience **(Kijko et al., 2003)** the regional seismic hazard in the project area can be defined as **low**, exhibiting a 10% probability of a seismic event with a peak ground acceleration **less than 0.100 g** within a period of 50 years and a **natural peak ground acceleration** of approximately **0.050 g** within a period of 50 years.

The seismically active areas in South Africa are broadly divided into two groups in SABS 0160 (1989)- updated in SANS 10160-4 (2017)- namely those where seismic activity is due to natural seismic events (Zone 1 areas), and those where it is predominantly due to mining activity (Zone 2 areas). According to the available data sheets, the site does **not** fall within either Zone 1 or Zone 2.

Lastly, according to the **Modified Mercalli Scale** (MMS), the local area is interpreted to fall within the **"VI"** seismic intensity zone, with a 10% probability of being exceeded at least once in a period of 50 years.

3.6. Prominent Geological Structures

Regional maps indicate a complex geological setting with multiple lithologies of various ages and their associated geological contacts. Although regionally variable, no geological structures are mapped to traverse the site.

As a note, the various metamorphic lithologies are mapped to dip between 15 and 55 degrees in a generally northerly direction towards the Orange River (localised dipping direction to the north east and north west).

Accurate geological mapping is based on surficial outcrops and aeromagnetic data (regional geophysical data), either of which are not feasible in a geological setting of this nature. Sediment deposits blanket geological structures, with their extensive nature and thickness obscuring traceable geophysical patterns and evidence. The possible occurrence of any dykes or linear features traversing the site can be identified during bulk/continuous excavations, with an adaption of the ground model where required.

3.7. Hydrogeological Setting

Hydrogeological regions are areas in which the properties of sub-surface water, or groundwater, are broadly similar in geology, climate and topography. Hydrogeology is the branch of geology that deals with the distribution and movement of water beneath the earth's surface.

The findings of a detailed hydrological survey- conducted by a competent specialist- overwrites the information presented below (where applicable). No site-specific hydraulic conductivity tests or borehole searches were undertaken, for this reason, the static rest level and chemistry of the ground water cannot be discussed. If required, a detailed hydro census can be conducted to determine/model the permanent groundwater table depth, location and quality underlying the study area. Additional to this process, monitoring boreholes/piezometers can be installed across the development area to examine ground water patterns seasonally.

According to the available hydrogeological information (hydrogeological series map: 2718 Upington/Alexander Bay (2001)), the study area is mainly underlain by **Intergranular and Fractured Aquifers** of low to moderate yield with **medium potential (d2)-** an average borehole yield class of **0.1 - 0.5 median l/s** can be expected**.** The bedrock underlying the study area at depth represents an intergranular and fractured aquifer where groundwater rest level occurs within fractures and in-between the individual grains of the bedrock at depth. Intergranular interstices are secondary of nature.

Enhanced groundwater recharge, and related localized seepage, may occur within the fractured bedrock surrounding geological features (e.g., geological contacts, dyke intrusions and/or faults).

According to the available information, large scale groundwater abstraction does not take place surrounding the investigated site.

Regions of higher rainfall have better water quality than areas of lower rainfall. This would imply that poorer quality groundwater is stagnant and gradually increases in salinity, while areas with better quality groundwater are more regularly recharged.

The groundwater **quality** is deemed to be between **70 and 300 mS/m.**

4. Geotechnical Site Evaluation

4.1. Introduction

The project team elected to undertake a **basic near-surface geotechnical investigation** comprising trial excavations using a TLB-type light mechanical excavator across the footprints of the proposed ponds. This level of assessment provides an indication of key geotechnical characteristics such as excavatability, permeability, and the suitability of in-situ materials for potential reuse in embankment construction. Given the nature of the proposed structures, detailed structural design parameters (e.g. bearing capacity and consolidation behaviour) and extensive pavement-related testing (including CBR assessments) fall outside the scope of this study.

The geotechnical model is based on available background information, observed soil profiles, and laboratory test results, with areas not directly investigated inferred through interpolation of known data points. While this approach provides a reasonable representation of subsurface conditions, variability may be encountered during construction and should be documented as it arises. The findings reflect site conditions at the time of investigation and may require review should conditions change or if a significant period elapses prior to construction.

The exact designs of the future ponds- and related attributes- were not defined at the time of this study, with this basic near surface investigation utilising typical attributes of structures of this nature to guide discussions. Based on initial discussion with the client, the earth fill embankments and basin forming the future oxidation ponds are to be lined.

4.2. Slope Stability, Drainage and Erosion

4.2.1. Discussion and General Design Considerations

The cumulative **developments orientation** in relation to the natural slopes will impact the rate and associated energy of the overland flow. Based on the supplied information, the development will include the bulk earthworks required to modify the site's surface within and immediately surrounding future infrastructure. For this reason, small scale topographic anomalies should have little to no impact on the final development.

The design and implementation of **fit-for-purpose site modification and drainage measures** are essential for the stability and longevity of the development. Additionally, future anthropogenic attributes will influence natural infiltration, shallow throughflow and run-off rates. Importance should be placed on drainage and stormwater control measures to avoid instabilities, focused infiltration, surface water ponding and erosion.

4.2.2. Natural Gentle Slopes- Ponding and Infiltration

As defined in Section 2, the site exhibits an overall **gentle sloping surface morphology,** with an overall increase in declivity with a decrease in surface elevation across the footprint. The mapped low degree of sloping will result in **low energy surface run-off (sheet-flow),** with stormwater flowing from the high lying portions, draining towards the low-lying central and northern portions of the site. This lowered degree of sloping accentuates **surface water ponding** and **fluctuating moisture conditions** following precipitation events.

Compaction of the upper extent of the natural soil profile during the initial phase of construction will exacerbate surface water ponding and result in slow infiltration into the soil profile during infrequent precipitation events. Moreover, surface water ponding and focused infiltration- and associated temporary perched water tables- are further exacerbated in areas where bulk earthworks are to be employed as part of the initial phase of construction.

Infiltrating water is expected to migrate laterally through the upper permeable subsurface horizons, converging toward the low-lying central to northern portions of the site. This accumulation of groundwater within the subsoils may influence their engineering behaviour, particularly in terms of strength and stiffness, and should be considered in the planning and execution of earthworks and drainage measures. Furthermore, attention must be given to **site contouring** in these areas to ensure an effective gradient is achieved so that ponding does not occur, and the draining of water is efficient to minimise erosion and damage to the downslope areas.

4.2.3. Converging Natural Slopes and Erodibility of Soil

According to the *Erodibility Potential of Soils in South Africa* map published by the Department of Human Settlements, the site is located within the region of MEDIUM (value= 9 to 15) erodibility potential.

In addition, the blanketing soils are deemed to be **erodible** classifying as a **SM/SC** type material according to the USCS- with some of the natural materials deemed to be **highly dispersive**.

Across the footprint of the site, the natural risk for erosion is reduced attributed to the mapped gentle slopes in combination with the limited annual precipitation.

With this said, localised erosional landforms were encountered across the site, exhibiting a shallow depth and limited lateral footprint with a predominate N/S orientation. These features are associated with irregular/infrequent precipitation events and may have been amplified by the past anthropogenic reworking across the site (compacted areas forming part of roadways/footpaths etc.).

In addition, the modification of the site's surface- generally including the compaction of the topsoil- will result in poor drainage characteristics and the possibility of channelized/concentrated surface water flow- indicating that the risk of erosion may be anthropogenically exacerbated (existing landforms may be amplified) and may need to be re-assessed. Furthermore, addressing the **convergence** of surface water upon the site is key to the stability of the development as a whole. Convergent high-energy flow upon the site from the surrounding high-lying terrain elevates the rate/energy of surface water flow- increasing the risk of erosion and overall instability.

For this reason, an interpreted overall **intermediate risk of erosion** is anticipated across the site. Inadequate temporary erosion and drainage control measures could result in significant damage across the development footprint.

Lastly, a maintenance regime should be put in place to periodically assess the nature of the development for a set period following the construction. Areas showing visible deformation should be modified accordingly, in order to avoid further deformation and/or permanent damage.

4.2.4. Natural Slope and Future Cutting Stability

Detailed stability assessments of existing- and future- deep cuttings did not form part of the scope of this investigation. With this said, **no natural** slope instabilities or inherent ground instability signs such as tension cracks, etc. were evident during the site walkover and basic visual inspection. The probabilities of any mass movement events (landslides, mudslides, debris flows, rock falls, rockslides, etc.) occurring across the site in its natural/current state are remote.

The final layout of the development is not known, but based on the natural slopes prior to modification, specialised methods for the stabilisation of limited cuts into the existing slopes are not deemed necessary across the site. As a guide, where deep cuts/thick fills are implemented to modify the site's surface, cut/fill embankments will need to be adequately sloped, modified or stabilised- and vegetated where possible- to ensure long-term stability.

4.3. Trenching

The field work phase of the investigation was conducted by GeoCalibre in February 2026. A total of **SEVENTEEN (17) test pits** were excavated using a TLB-type light mechanical excavator across the cumulative development area- with test pits excavated at predetermined locations identified by the client based on specific excavation requirements (Figure 5). The succession of soil layers exposed within the test pits were logged by GeoCalibre and a series of detailed photographs were taken of the different layers.

An ***Engineering Geologist*** supervised the excavation of the trial pits. The description of soil profiles is done according to SANS 633:2012 and describes the moisture, colour, consistency, structure, (soil) texture and origin.

The soil profile is described according to the following parameters:

- **Moisture** dictates the colour and consistency of soils, indicates how and where water moves and the depth to perched water systems.
- **Colour** indicates the oxidizing or reducing state of soils and assist in the identification of minerals in completely weathered to fresh rock.
- **Consistency** is separated between cohesive and granular as the drainage and permeability affects the soil's shear strength.
- **Structure** describes any relict features from rock or soil and those that form through packing, soil and rock structures, seepage, reworking and biotic action.
- **Texture** is the abundance of different grain sizes in soils and is described by means of field test.
- **Origin** is the formation of the soil by means of transport or weathering.

Disturbed and bulk samples were taken of the material deemed to be important to the proposed development.

4.4. Generalized Ground Profile

Note: this description is based on field observations and does **not** reflect the results of any laboratory tests.

4.4.1. Introduction

Following the trenching phase of the project, it was established that the site is blanketed by transported sediments interpreted to be of **alluvial origin**. Overall, multiple layers of alluvium were encountered based on minor variances in properties. The upper extent of the subsurface was seen to be organic-rich and profiled as **topsoil.**

Underlying this organic-rich layer, the subsurface was typically comprised of transported sediments dominated by sand with the incorporation of subordinate amounts of gravels- profiled as **fine alluvium**- or a transported layer dominated by gravel and cobble-sized particles within a matrix of finer sandy material- profiled as **coarse alluvium.**

The combined transported horizons were further underlain by granular residual materials deemed to be derived from the underlying gneissic bedrock due to the observed distinctive alternating dark and light bands. The underlying residuum was profiled as **residual gneiss**. The underlying residuum displayed a granular nature with varying amounts of gravels and cobbles with these larger particles typically representing pockets of weathered bedrock. The overall comparable visual appearance of the soil and weathered bedrock below the site is associated with the physical breakdown of the material relating to the arid climate of the site.

The transition between the blanketing transported sediments and underlying residuum was seen to be undulating and variable- generally attributed to the irregular weathering profile typically associated with gneissic terrains.

The majority of excavations were terminated due to **difficult excavation** (DE) within **dense/very dense residual soil**. As a result of the minimal exposure of weathered bedrock in the conducted excavations (along the based of a handful of excavations) the exact properties of the underlying rock mass are not known. For this reason, the properties of the underlying rock mass and their impact on the future operations cannot accurately be commented on and can be assessed during follow-up investigations or during bulk excavations- with an adaption of the geotechnical ground model where required.

Lastly, the surface of the site is **littered by anthropogenic materials** predominantly comprised of **domestic waste and building rubble**. Based on the available trenching information, these materials are **limited to surficial occurrences**. These materials have been dumped intermittently across the site- the extent of these problematic materials is visible on satellite imagery. Noteworthy accumulations of surficial fill are indicated on Image 3.

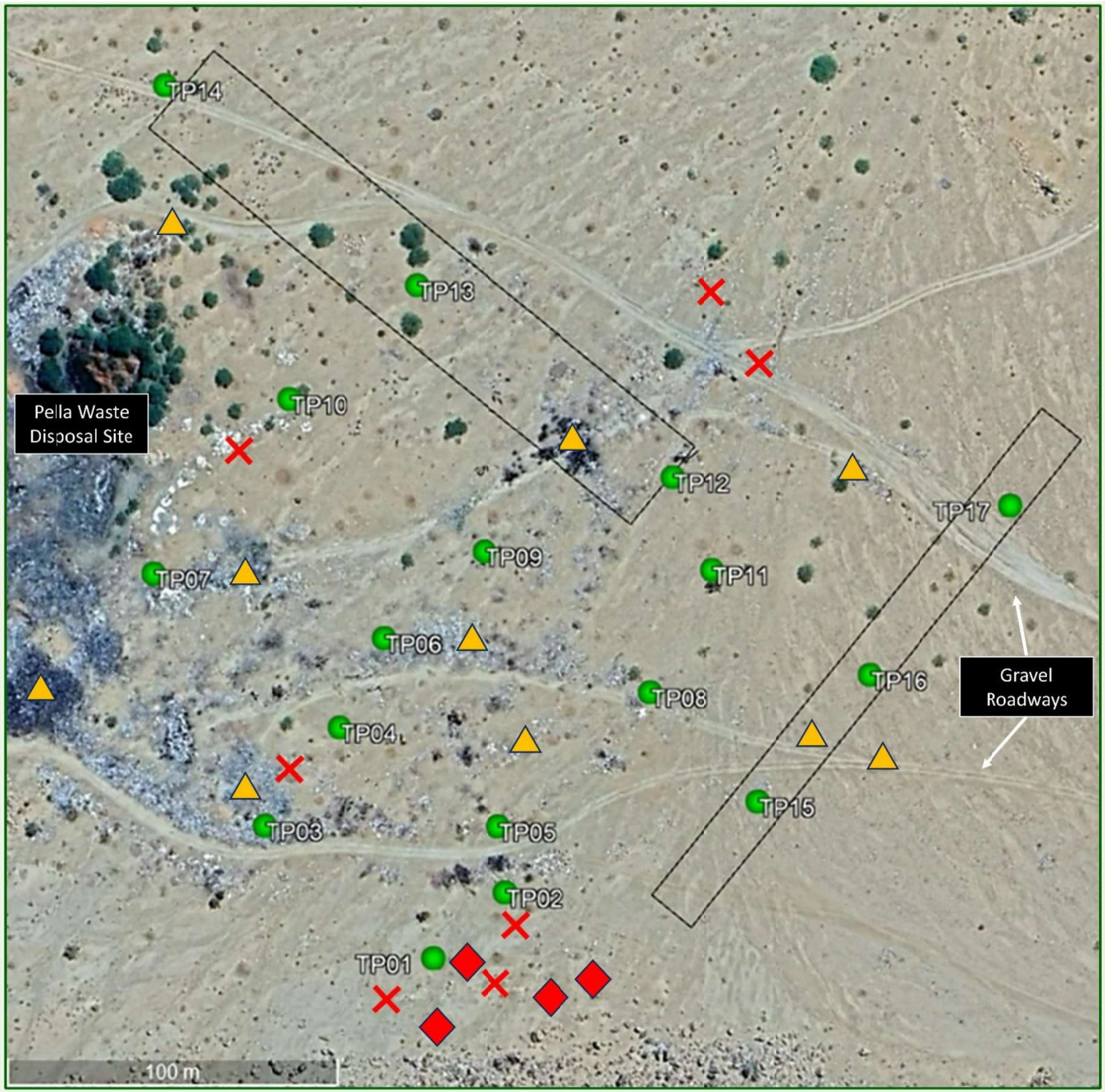
Detailed soil profile logs are included in **Appendix A.**

Refer to Table 1 overleaf which depicts the summarised ground profile for the site. Following this table, Image 3 depicts the testing locations across the site.

Table 1: Summarised Ground Profile

Summarised Ground Profile																	
	Topsoil			Transported Sediments						Residual Gneiss			Excavation Character					Excavation Stability
				Fine Alluvium			Coarse Alluvium											
Test Pit	From	To	Thickness (m)	From	To	Thickness (m)	From	To	Thickness (m)	From	To	Thickness (m)	Minimum	Maximum	Average	Termination Conditions	Termination Material	
TP1	0,00	0,13	0,13	-	-	-	-	-	-	0,13	1,20	1,07	-	-	**1,20**	R	WGB	Stable
TP2	0,00	0,08	0,08	-	-	-	0,08	0,58	0,50	0,58	1,10	0,52	-	-	**1,10**	R	WGB	Stable
TP3	0,00	0,19	0,19	-	-	-	-	-	-	0,19	0,56	0,37	-	-	**0,56**	R	WGB	Stable
TP4	0,00	0,12	0,12	-	-	-	0,12	0,79	0,67	0,79	0,98	0,13	-	-	**0,98**	R	WGB	Stable
TP5	0,00	0,07	0,07	-	-	-	0,07	0,33	0,26	0,33	0,85	0,52	0,79	0,90	**0,85**	R	WGB	Stable
TP6	0,00	0,05	0,05	0,05	0,35	0,30	-	-	-	0,35	1,20	0,85	-	-	**1,20**	R	WGB	Stable
TP7	0,00	0,10	0,10	-	-	-	0,10	0,90	0,80	0,90	1,50	0,60	-	-	**1,50**	DE	RG	Stable
TP8	0,00	0,09	0,09	-	-	-	0,09	0,36	0,27	0,36	1,20	0,84	1,16	1,23	**1,20**	R	WGB	Stable
TP9	0,00	0,07	0,07	-	-	-	-	-	-	0,07	1,19	1,12	-	-	**1,19**	R	WGB	Stable
TP10	0,00	0,08	0,08	-	-	-	0,08	0,26	0,18	0,26	0,92	0,66	-	-	**0,92**	R	WGB	Stable
TP11	0,00	0,10	0,10	0,10	0,54	0,44	-	-	-	0,54	0,69	0,15	-	-	**0,69**	DE	RG	Stable
TP12	0,00	0,05	0,05	0,05	0,23	0,18	-	-	-	0,23	1,72	0,49	-	-	**0,72**	R	WGB	Stable
TP13	0,00	0,07	0,07	0,07	0,35	0,28	-	-	-	0,35	0,69	0,34	0,50	0,88	**0,69**	R	WGB	Stable
TP14	0,00	0,15	0,15	-	-	-	0,15	0,71	0,56	-	-	-	0,58	0,83	**0,71**	R	WGB	Stable
TP15	0,00	0,06	0,06	0,06	0,66	0,60	-	-	-	0,66	1,76	1,10	-	-	**1,76**	DE	RG	Stable
TP16	0,00	0,14	0,14	0,14	1,47	1,33	-	-	-	1,33	1,88	0,55	1,85	1,90	**1,88**	DE	WGB	Stable
TP17	0,00	0,10	0,10	0,10	0,90	0,80	0,90	1,85	0,95	1,85	2,40	0,55	-	-	**2,40**	ES	RG	Stable

Notes:
- Thickness refers to the exposed thickness of each soil horizon (meters)
- All depths displayed in meters (m)
- Horizon depths displayed in the table are average measured values
- Excavation conditions: R-Refusal; DE - Difficult Excavation; ES- Excavation Stopped
- Materials: RG- Residual Gneiss; WGB- Weathered Gneissic Bedrock



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Image 3: Testing Locations and Basic Site Observations

Basic Geotechnical Study-
Oxidation Ponds at Pella WWTW

Mind Shape Developments

Legend

Symbol	Attribute
—	Preliminary Layout Received From The Client
●	Test Pit (As Identified By The Client)
✕	Outcrops
▲	Notable Fill- Building Rubble/ Landfill
◆	Surficial Boulders

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The ground profiles across the site can be **generally summarised** as follows:

4.4.2. Anthropogenic Materials- Surficial Landfill

The site has been **partially disturbed/remoulded** through anthropogenic processes- predominantly attributed to its proximity to the Pella Waste Disposal Site. The exact history of the area is not known as well as the potential occurrence of subsurface anomalies below the investigated parcel of land.

The surface of the site was observed to host scattered landfill materials- typically comprised of dumped building rubble (bricks, concrete and tiles) and foreign materials/waste products (plastic and old tyres for example).

Where encountered, the **mechanics** of these combined anthropogenic materials are predicted to be **variable** as a result of the variable nature of the particles (waste or soil), anthropogenic contamination, the variable interaction between individual particles and finally the evolution/reworking of the material over time. These combined attributes result in the anthropogenic materials exhibiting **indeterminate**- and somewhat **unpredictable**- **mechanical properties**.

Additionally, the thickness and occurrence of the anthropogenic materials is anticipated to be highly variable- both laterally across the surface of the site as well as thickness below the surface.

As for the removal of relict infrastructure, it is strongly recommended that this material be **selectively mined** and **removed/treated** from within the footprint of the proposed development (extent determined by the design engineer). Where necessary- relict depressions, services, subsoil tanks etc should be removed within the footprint of planned future structures, with the resulting excavations to be backfilled in controlled layers of suitable material in order to create level/stable surface conditions.

Since no anthropogenic materials were encountered in the excavated test pits, these materials have been omitted in the table and associated analysis to follow.

4.4.3. Blanketing Transported Sediments- Topsoil, Fine Alluvium and Coarse Alluvium

The unaltered portions of the site are blanketed by naturally occurring transported sediments- deemed to be primarily of an alluvial origin- which exhibit minor fluctuations in properties- predominantly colour, structure and texture.

As a whole, three main transported horizons were identified and profiled as **topsoil**, **fine alluvium** and **coarse alluvium**, respectively. The combined transported soils were seen to display an overall low in situ consistency, granular/ non-cohesive and voided nature. Due to their age and shallow occurrence- these transported deposits may **lack** essential pre-consolidation characteristics. This will result in additional consolidation/collapse settlement upon saturation and loading.

Organic-rich Topsoil

The major root zone was typically limited to the upper extent of the subsurface with only localised roots noted in materials at depth. The overall limited thickness of the topsoil can be attributed to the sparse vegetation cover as well as the limited root network of the grasses/shrubs/bushes scattered across the site.

The **topsoil** was described as follows: *slightly moist, light creamy or light orangey brown, **loose, pinholed, silty sand or silty coarse sand with abundant, minor or traces of fine gravels**. abundant, minor or traces of fine roots; biological activity; surficial landfill.*

The **topsoil** was seen to extend from surface to depths of between **0.05 and 0.10 m** below the existing ground level (E.G.L.)- exhibiting an **average exposed thickness** of **0.10 m.**

Fine Alluvium

The fine alluvium was encountered intermittently across the site and was noted to host a reduced amount of over-sized particles compared to the remaining on-site materials. The fine alluvium was encountered in 7/17 excavations conducted across the site.

Where encountered, the **fine alluvium** was profiled as: *slightly moist, light creamy or orangey brown, mottled grey or white, speckled white, **loose, pinholed, silty coarse sand with abundant, minor or traces of sub-rounded, sub-angular or fine gravels** minor or traces of fine roots in the upper extent; traces of calcrete nodules at the base; biological activity.*

The **fine alluvium** was seen to extend from below the topsoil to depths of between **0.23 and 1.47 m** below the E.G.L.- exhibiting an **average exposed thickness** of **0.36 m.**

Coarse Alluvium

This material horizon consists of randomly orientated, shaped and sized clasts (heterogeneous composition) with an overall **loosely packed and poorly sorted nature**. The coarse alluvium was encountered in 8/17 excavations conducted across the site.

Where encountered, the **coarse alluvium** was profiled as: *slightly moist, light creamy or light orangey brown, **loose, pinholed or matrix supported, silty sand or silty coarse sand with abundant gravels or sub-angular gravels and cobbles in a matrix of silty sand,** traces of fine roots; **heterogeneous composition and poorly sorted nature; variable exposure**; localised rapid transition onto weathered gneissic bedrock at the base; cobbles increasing with depth.*

As a note, the coarse alluvium exposed in test pit TP17 was observed to exhibit an abundant amount of pedogenic inclusions in the form of calcrete nodules and profiled as calcified coarse alluvium. This horizon has been included in the coarse alluvium column in Table 1 due to its localised occurrence and interpreted overall comparable engineering material characteristics to the prolific coarse alluvium with respect to the planned development.

The **coarse alluvium was** seen to extend from below the topsoil to depths of between **0.26 and 1.85 m** below the E.G.L.- exhibiting an **average exposed thickness** of **0.32 m.**

4.4.4. Residual Gneiss

In almost all of the test pits, the blanketing transported sediments were interpreted to be underlain by **residual gneiss**. The residuum has formed from the weathering of the in situ bedrock material to the point where the material will behave/respond as a **soil**.

As mentioned in the start of this section, due to the arid nature of the region, the residuum has formed through **physical disintegration** of the bedrock/parent material. As a result of this- including minimal chemical alteration- the residual soil and weathered bedrock share many physical traits, including an overall similar visual appearance in situ.

Based on the characteristics mentioned above, differentiation between granular residual soil and weathered bedrock proved challenging. Excluding in situ properties, demarcation between the residuum and weathered bedrock during this study was further evaluated based on the excavatability of the material and texture once spoiled.

The residual gneiss displayed **relict gneissic banding** (alternating dark and light bands) as well as a distinctive **micaceous lustre** with biotite flakes/plates observable with the naked eye. Once excavated, the residuum exhibits a **gravelly texture** with intermittent **cobble-sized particles,** typically exhibiting a platy shape. Furthermore, these larger particles of weathered bedrock generally display a **friable nature** and are crushed into finer particles with relative ease under soft blow of the geological pick.

Furthermore, the residuum was seen to host varying **amounts of pedogenic inclusions/staining** with this attribute typically visible on larger particles of gravels and cobbles. The occurrence of pedogenic materials can be directly linked to the morphology of the area. Due to the gentle sloping nature of the site, the processes of surface water ponding and infiltration will be favoured over surface water runoff (sheet flow). Following infiltration, the underlying impermeable rock mass results in the development of a temporary perched water table- with conditions now favourable for the formation of pedogenic material.

The **residual gneiss** was described as: *slightly moist, light grey or light translucent grey, blotched brown, mottled white, banded black and white, micaceous lustre, speckled white**, **medium dense with dense zones or dense**, **relict gneissic banding**, **silty gravel or silty platy gravel with minor cobbles**, traces of fine roots in the upper extent; **calcification staining on gravels and cobbles**, **irregular weathering profile with pockets of weathered bedrock**; rapid or gradual transition to weathered bedrock at the base; infiltration zones; minor or traces of calcrete nodules.*

The **residuum** was seen to extend from below the transported deposits to depths of between **1.06 and 2.40 m** below the E.G.L.- displaying an exposed average thickness of **0.56 m.**

The vast majority of excavations were terminated due to Difficult Excavation (DE) conditions in dense/very dense residual soil. Due to the hard nature of the bedrock (where encountered), the implemented mode of excavation (TLB) was generally not sufficient to unearth the rock mass with refusal occurring along the **undulating rock-soil interface**.

Due to the irregular weathering profile of the underlying gneiss rock mass, the residual materials are anticipated to display a variable and undulating relationship with its parent material- fluctuations over short distances should be anticipated (residual soil versus weathered rock). This variation will be more pronounced in long/continuous bulk deep excavations.

As alluded to above, as a result of the limited excavatability of the rock mass, accurate characterization of the lithology was not possible and cannot be discussed in detail. For this reason, the properties of the underlying rock mass and their impact on the future operations cannot accurately be commented on and can be assessed during follow-up investigations or during bulk excavations- with an adaption of the geotechnical ground model where required.

4.5. Groundwater and Shallow Seepage

4.5.1. Introduction and Discussion

No site-specific borehole searches were undertaken. For this reason, the static rest level and chemistry of the ground water cannot be discussed. If required, a detailed hydro census can be conducted across the site to determine/model the permanent ground water table depth, location and quality underlying the site. This, however, does not fall within the scope of this investigation.

Without knowledge on the depth to permanent groundwater in the region- it is not possible to comment on the occurrence of permanent groundwater flow within/below the weathered bedrock. It is therefore assumed that the natural permanent groundwater level on site is below the zone of influence (light structures/pipeline construction). This, however, does not fall within the scope of this investigation.

The vadose zone refers to the earth materials between the land surface and groundwater table. The influence of the vadose zone on engineering development should not be discounted and, together with knowledge of the hydrogeology, can inform about subsurface flow mechanisms and flow paths which may influence the proposed development. Additional to this, one should note that disruption of the site materials will affect the properties of the vadose zone, and that subsurface hydrology will differ during the project life cycle.

Depending on the residual weathering products and the texture of the transported materials, the surface soils may have highly variable permeability. This, in conjunction with changes in land cover and regional groundwater levels, may result in localised zones of increased infiltration or runoff, areas associated with water ponding on surface and/ or groundwater movement possibly mimicking surface topography. Note should, therefore, be taken that local hydrology may be highly variable.

Managing surface water across the contract will play a pivotal role in reducing ponding, erosion as well as limiting the volumes of sub-surface flow. Additional to the considerations listed above, a **maintenance regime** and ongoing performance testing should be put in place to monitor the nature of the system over its design life. As a side note, if the constructed water bearing structures are not properly constructed/maintained resulting in unforeseen leakages, the additional influx of water into the subterrain will impact their associated mechanical properties.

4.5.2. Measured Ground Water Occurrences

No ground water seepage or permanent water table was encountered during the fieldwork phase of the investigation.

As discussed in the section to follow, considering the pedogenic formations and site geomorphology, temporary shallow seepage/fluctuating moisture conditions can be expected in the following infrequent precipitation events.

4.5.3. Fluctuating Moisture Conditions

As a result of the sites declivity, the predominant runoff across the footprint will occur as low energy sheet wash following the topography.

During infrequent rainfall events, the upper sandy/granular materials will allow **infiltration** and **lateral** groundwater movement (uncompacted materials). Following infiltration, it is predicted that **elevated volumes** of **shallow groundwater throughflow** may occur- converging upon the lower-lying central to northern portions of the site. This typically manifests as a weak, relatively **short-lived perched water table** associated with **slight groundwater seepage** present directly after a precipitation event.

In addition, should infiltration take place in the high-lying areas surrounding the site, it is predicted that elevated volumes of shallow ground water throughflow may occur- converging upon the mapped low-lying terrain. The rate and volume of the flow is predicted to fluctuate with fluctuations in the intensity of local rainfall events (expected to be notably low).

As a note, the naturally occurring on-site materials were seen to host discolouration (speckles, mottles and/or patches) and varying amounts of calcrete nodules. These systems result from soils periodically reaching saturation from infiltrating water, shallow interflow or rising subsurface waters. These pedogenic inclusions indicate the periodic occurrence of **fluctuating moisture conditions** after precipitation events.

The evidence for fluctuating moisture conditions was typically encountered within the **upper 1 meter** of the profile across the footprint.

4.5.4. General Design Considerations

The rainfall of the region is notably low, and no groundwater seepage or permanent water table was encountered during the fieldwork phase of the investigation. For these reasons, groundwater-related risks to the proposed lined oxidation ponds are considered **low** at the basic-investigation level. The following general considerations are offered for the design team at this stage:

- During construction and after development, shallow perched water systems may develop further due to stormwater management practices, localised infiltration and site modification practices (cut-to-fill preparation, compaction of the topsoil etc.). Design should incorporate the likelihood of enhanced shallow seepage resulting from these practices.
- Good site drainage measures on surface must be implemented to prevent moisture changes, which may add to the development of temporary perched groundwater tables.

- Subsurface drainage measures are not deemed necessary as a default at the basic-study level and should only be considered if the detailed design identifies a specific localised concern.
- The final layout of the development and related earthworks/pond configurations are not known at this stage. Considering the evidence for temporary seasonal fluctuating moisture conditions at the time of this study, the design team can consider mitigation measures focused on ensuring the stability and integrity of lined systems- an attribute which can be discussed with GeoCalibre following the definition of the future actions.
- For the proposed lined subsurface structures, buoyancy and uplift pressures should be accounted for during the detailed design phase. While a detailed seepage and uplift analysis falls outside the scope of this basic study, the design team should confirm during detailed design whether the pond invert levels, in combination with the anticipated shallow perched moisture, warrant any localised design provisions. Given the arid setting, this is expected to be a minor design consideration rather than a controlling one and should be refined by the project's geohydrologist where deemed necessary.
- Should bulk excavations be undertaken immediately following a rare high-intensity rainfall event, short-term dewatering of open trenches may be required; this must be carried out in accordance with the project's HSE protocols.

4.6. Site Excavatability and Bedrock/Pedocrete Outcrops

4.6.1. Introduction

Excavatability is a measure of material to be excavated/dug/mined with conventional excavation equipment, such as a bulldozer with rippers, mechanical excavator, or other grading equipment.

Profiles were described in **restricted** trenches excavated by means of **TLB- type light mechanical excavator with a 300 mm rock bucket.**

This study focused, in part, on achieving predefined excavation depths at specific target locations as defined beforehand by the design team.

Although a handful of excavations were stopped/terminated at the required depths as defined by the design team, the majority of excavations were terminated due to **difficult excavation conditions (DE)** in dense/very dense residual soil at depths- shallower than the target depth- with a further limited number of excavations undergoing refusal on weathered gneissic bedrock.

Based on the available trenching data, the **average** excavation depth across the site was approximately **0.87 m-** with individual excavations ranging between **0.71m and 2.40m** below the E.G.L. For this reason, the excavation type to an **average** depth of **0.87 m** below the existing ground level is deemed to be **SOFT Excavation** (SANS 10400G/SANS1200D).

4.6.2. Rock- and/or Pedocrete Outcrops

Sporadic gneissic outcrops were identified across the site with the majority of features located within the southern portion of the site- proximal to the neighbouring local ridge.

Similarly, scattered surficial boulders were observed within the vicinity of the bordering local ridge. Identified outcrop and surficial boulder locations are illustrated on Image 4 at the end of this section.

These combined features are expected to have an impact on the overall **continuity of the excavatability** across the site.

It is recommended that the exact location and visible extent of anomalies (outcrops, large cobbles, dumped fills etc.) be mapped by the surveyor for the amalgamation into the site's regional earthworks model. Anomalies will need to be broken down and moved in a controlled manner- aligned with the HSE protocols of the development.

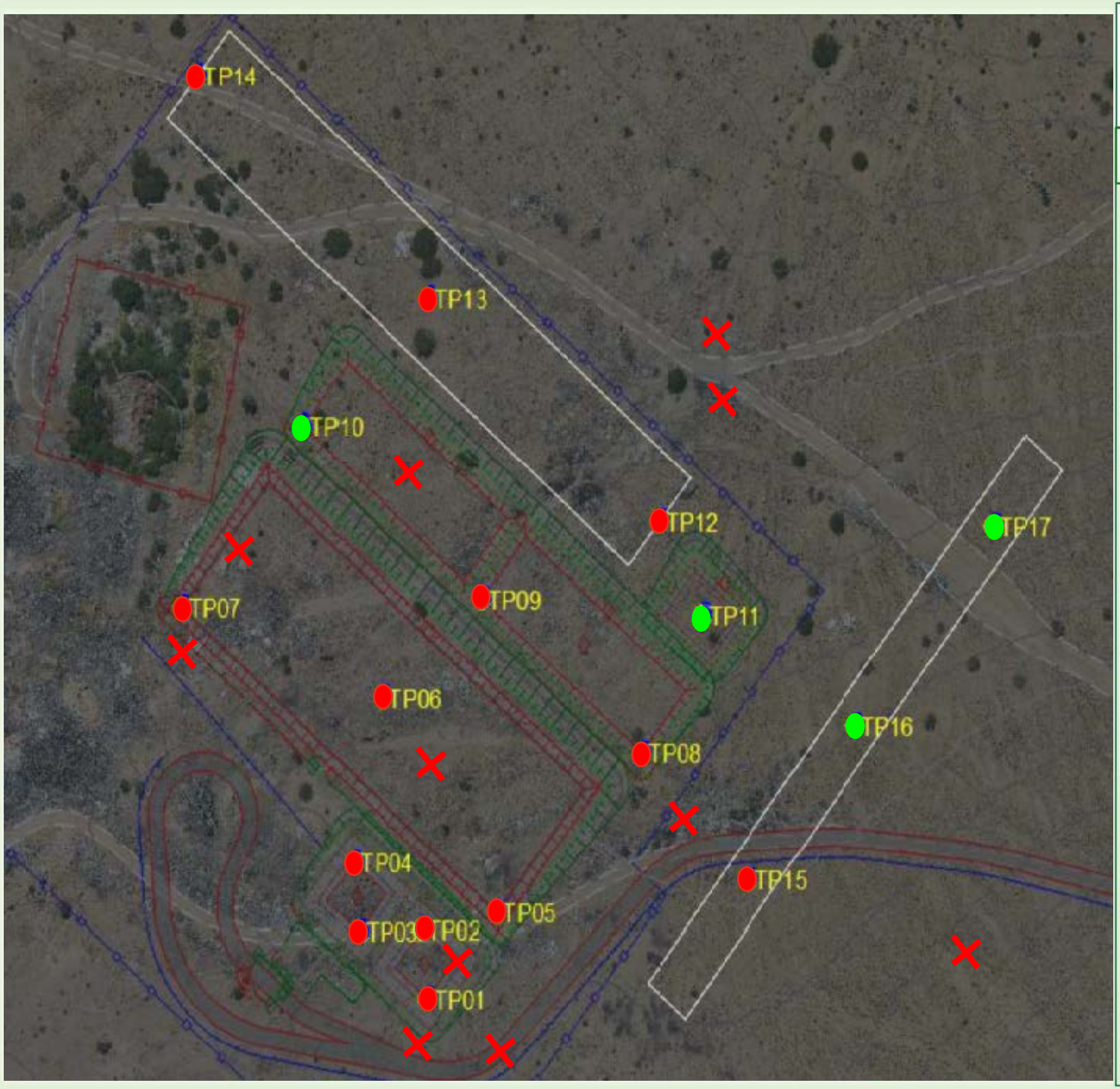
4.6.3. Excavatability- TLB Type Light Mechanical Excavator

In summary, 6/17 excavations reached the target design depth (green pins on Image 4) with the remaining 11/17 excavations falling short of the required target depths as presented by the design team (red pins on Image 4). The overall fluctuating excavation depths allude to the variability of the subsurface both in terms of in-situ characteristics of the soft materials and depth to bedrock.

Additionally, the final termination conditions have been evaluated according to a basic scoring system as defined below (for easy reference):

- **Termination class 1**- excavation stopped (achieved the required target depth).
- **Termination class 2**- excavation terminated due to gradual slow advance/**difficult excavations** conditions generally relating to dense/very dense **soil**. Prolonged excavation by means of TLB-type light mechanical excavator is envisaged to result in a gradual increase in excavation depth despite a low penetration/excavation rate. Use of heavy earth moving equipment recommended in these areas to increase achievable depths.
- **Termination class 3**- Refusal of the TLB- type light mechanical excavator. Further excavation into the subsurface may require the use of specialist excavation methods.

Image 4 overleaf visually depicts the final excavation depths achieved at the predefined locations. Green pins denote locations where the required depth was achieved, while red pins indicate shallower final excavation depths than specified. Following Image 4, Table 2 summarises the final excavation depths at each defined location including the difference in actual and required depths. The final excavation conditions are further evaluated according to the basic scoring system defined above.



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Image 4: Basic Site Excavation Model

Basic Geotechnical Study- Oxidation Ponds at Pella WWTW

Mind Shape Developments

Legend

Symbol	Attribute
——	Preliminary Layout Received From The Client
●	Required Excavation Depth **Reached**
●	Required Excavation Depth **Not Reached**
✕	Outcrops
◆	Surficial Boulders

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Table 2: Excavation Summary and Termination Conditions

Table 2: Excavation Summary and Termination Conditions								
Test Pit Location Data				Excavation Data				Notes
Test Pit Number (As defined by the client)	Location		Elevation (meters above mean sea level)	Required Test Pit Depth (As defined by the client)	Final Excavation Depth with TLB (m)	Difference between actual and required depths	Termination class	Excavation Conditions and Termination Material
	Latitude (South)	Longitude (East)						
TP1	29.01784	19.13564	456	3,70	1,20	-2,50	3	Refusal (R) on Weathered Gneissic Bedrock
TP2	29.01766	19.13586	455	3,10	1,10	-2,00	23	Refusal (R) on Weathered Gneissic Bedrock
TP3	29.01748	19.13511	455	3,50	0,56	-2,94	3	Refusal (R) on Weathered Gneissic Bedrock
TP4	29.01721	19.13535	454	3,20	0,98	-2,22	3	Refusal (R) on Weathered Gneissic Bedrock
TP5	29.01748	19.13584	454	1,50	0,85	-0,65	2	Refusal (R) on Weathered Gneissic Bedrock
TP6	29.01697	19.13549	453	1,50	1,20	-0,30	3	Refusal (R) on Weathered Gneissic Bedrock
TP7	29.01679	19.13477	455	1,50	1,50	0,00	2	Difficult Excavation (DE) in residual Gneiss
TP8	29.01784	19.13564	452	1,50	1,20	-0,30	2	Refusal (R) on Weathered Gneissic Bedrock
TP9	29.01673	19.13580	452	1,00	1,19	0,19	3	Refusal (R) on Weathered Gneissic Bedrock
TP10	29.01631	19.13518	452	1,50	0,92	-0,58	3	Refusal (R) on Weathered Gneissic Bedrock
TP11	29.01678	19.13652	451	1,00	0,69	-0,31	2	Difficult Excavation (DE) in residual gneiss
TP12	29.01652	19.13639	450	2,00	1,72	-0,28	2	Refusal (R) on Weathered Gneissic Bedrock
TP13	29.01599	19.13559	450	2,00	0,69	-1,31	3	Undulating final excavation depth ranging between 0.49m and 0,69m. Refusal (R) on Weathered Gneissic Bedrock
TP14	29.01544	19.13479	451	2,00	0,71	-1,29	3	Undulating final excavation depth ranging between 0,538 and 0,71 m. Refusal (R) on Weathered Gneissic Bedrock
TP15	29.01742	19.13666	453	2,00	1,76	-0,24	2	Difficult Excavation (DE) in residual gneiss
TP16	29.01707	19.13701	452	2,00	1,88	-0,12	3	Undulating final excavation depth ranging between 1,85 and 1,90 m. Difficult Excavation (DE) in residual gneiss
TP17	29.01660	19.13746	451	2,00	2,40	0,40	1	Excavation Stopped (ES) in residual gneiss.

Notes:

All GPS co-ordinates are extracted from Garmin Oregon 600 and elevation data from Google Earth PRO

All test pits excavated via a TLB- type light mechanical excavator with a 300 mm rock bucket.

Termination class 1- excavation stopped (achieved the required target depth).

Termination class 2- excavation terminated due to gradual slow advance/difficult excavations conditions generally relating to dense/very dense soil. Prolonged excavation by means of TLB-type light mechanical excavator is envisaged to result in a gradual increase in excavation depth despite a low penetration/excavation rate. Use of heavy earth moving equipment recommend in these areas to increase achievable depths.

Termination class 3- Refusal of the TLB- type light mechanical excavator. Further excavation into the subsurface may require the use of specialist excavation methods.

4.6.4. Excavation Notes- Weathered Gneissic Bedrock

Where encountered, the underlying gneissic bedrock was not excavatable by means of TLB-type light mechanical excavator with refusal occurring along the undulating rock-soil interface. As a result of the limited exposure along the base of a handful of excavations and scattered outcrop locations, accurate characterization of the rock mass and associated discontinuity properties which would impact excavation classification was not possible- with the rippability of deeper materials requiring further footprint specific investigations depending on the depth of construction.

In rock masses, excavatability is governed by the shear strength of both the intact rock and the discontinuities separating them. Fluctuating excavation conditions correlate to the depth, spacing and degree of fracturing of the rock mass. The ability of the excavation equipment to excavate fractured rock masses depends on the capacity of the equipment to grip/penetrate fractures and "rip" the bedrock. In smooth rock masses with limited fractures, suitable areas for the equipment to grab a hold of are minimal, resulting challenging excavation conditions. Furthermore, in confined excavations, the number of exposed joints is limited, impacting the continuity and degree of excavatability.

The physical and mineralogical nature of gneiss leads to the formation of an undulating bedrock topography. These sub-surface features are expected to have an impact on the overall continuity of the excavatability across the site, with pockets of deeper soils being present between pinnacles of comparatively shallow rock- this variability can take place over a very short distance.

It is predicted that the bedrock underlying the site will require **hard rock excavation** to unearth. Cognisance should be taken of the fact that the depth to bedrock might vary between the trial pits (known points). Its inherent excavatability is predicted to fluctuate over short distances because of varying degrees of weathering/induration and spacing of discontinuities.

The final layout of the development is not known (including associated earthworks); however, allowance should be made for HARD Excavation- the exact method of which is dependent on the required final working levels, available equipment and the local environment.

The client/contractor should familiarise themselves with the excavation characteristics of the on-site materials and with equipment to be considered for the bulk excavations. Depending on the planned depth of the construction, infill investigation can be undertaken in this regard making use of the available plant.

4.7. Trench/Bulk Excavation Stability and Excavation Safety

Excavation and stability issues relate to erodibility, excavatability, slopes and seismicity and is judged in combination with other parameters influencing stability of cuttings, excavations, slopes and the like.

Across the site, excavations generally remained **stable** for a period of at least 1 hour with little or no over break or collapse occurring. However, it must be noted that stability is highly time-dependent and may degrade rapidly following prolonged saturation or exposure.

It is envisaged that temporary shallow trenches/cuttings (up to 1.5 m deep) will remain stable under dry conditions, provided they are monitored periodically. Conversely, deep or bulk excavations required for the ponds will necessitate formal sloping, stepping, or temporary stabilisation to ensure safe working conditions and structural integrity.

As a note, deep excavations into weathered gneissic bedrock (not exposed during this investigation) may exhibit a regional metamorphic fabric as indicated on availed geological maps- mapped to dip between 15 and 55 degrees in a generally northerly, north easterly and north westerly direction. These features may represent weak zones that are prone to failure parallel to the direction of dip. Therefore, it is recommended that excavations be adequately sloped (approximately 60 to 75 degrees) or stabilised to reduce the risk of instabilities. Instability is predicted to be in the form of localised rock block failure, necessitating the removal or stabilisation of unstable rock blocks.

All workings within and surrounding bulk excavations must strictly adhere to SANS 10400: Part G (Excavations) and Regulation 13 of the Construction Regulations (2014). The following considerations are generally highlighted in this regard:

- The provisions of the Occupational Health and Safety Act of 1993, SANS 10400 and Construction Regulations (most recent edition) must be followed in the excavations and workings therein.
- In accordance with Regulation 13(1), the contractor must appoint a competent Excavation Supervisor in writing to oversee all excavation work.
- All excavations should be inspected by a competent person (engineer or geo-professional with relevant training and experience) at least once a day and after every blasting operation (if present), after an unexpected fall of ground, and following any rain event.
- The presence of groundwater seepage at depth could weaken the inherent strength of the soil material, leading to localized slumping or liquefaction failure of the trench sidewalls. This necessitates vigilance during and after rainfall events, including regular inspection of excavation flanks, preferably by a suitably trained safety officer/geo-practitioner, with the implementation of suitable precautionary measures (e.g., sloping/shoring and dewatering) to protect the lives of workers, as well as equipment, in areas where seepage occurs or as recommended by the competent person.
- Surface runoff and sheet wash must be diverted away from excavation flanks using berms or cut-off drains to prevent erosion and saturation of the sidewalls.
- Bulk excavations may need to be dewatered between and following infrequent precipitation events because of water temporarily perching upon the underlying less permeable materials/rock at depth.
- No load, excavated material, plant, or equipment may be placed or moved near the edge of an excavation where it is likely to cause a collapse. A safe distance must be maintained as specified by the competent person.

4.8. Engineering and Material Characteristics

4.8.1. Introduction and Sampling

The engineering material properties of the soil samples were measured in laboratory conditions as per accredited testing procedures.

Standard foundation indicator, compaction tests and soil chemistry tests were conducted by Letaba Lab (**SANAS Accredited**) on disturbed and bulk soil samples. These tests were undertaken in order to determine the composition of the underlying soils (i.e., the relative percentages of gravel, sand, silt and clay) and to evaluate the suitability of the materials for the reuse in the proposed construction.

This section focuses on the identification and assessment of the soil properties which will influence the proposed construction.

The sampling which took place during this investigation was based on the required level of study, in situ geotechnical properties of the exposed soil horizons as well as the nature of the development.

The sampling process **excluded** the following inclusions:

- Oversized particles
- Organic materials
- Anthropogenic contamination

4.8.2. Bulk and Disturbed Samples- Laboratory Test Results

The soil testing which was conducted across the site can be subdivided into three broad categories, as follows:

- **Foundation Indicator Tests**

  Atterberg limits (Liquid Limit, Plasticity Index and Linear Shrinkage) and Particle-size Distribution

- **Compaction Tests**

  Maximum Dry Density versus Optimum Moisture Content and Californian Bearing Ratio versus Compaction Effort (MOD AASHTO method)

- **Soil Chemistry Tests**

  pH and EC analysis (corrosivity) as well as double hydrometers as an indication of material dispersivity.

The results presented in the summaries to follow are as received from the accredited testing facility. Although the summaries have been annotated, **no** amendments have been made to the results themselves.

The table to follow summarises the results of the soil tests conducted on the various sampled materials.

Table 3: Laboratory Test Results Summary

Combined Laboratory Summary- Basic Geotechnical Study- Oxidation Ponds at Pella WWTW

Sample Number	Test Pit	Depth (m)	Sampled Material	Particle Size Distribution: Standard Sieves SANS 3001-GR1 Cumulative percentage passing					Particle Size Distribution: Hydrometer Analysis SANS 3001-GR3			Grading Characteristics		Atterberg Limits SANS 3001-GR10 (%)			Compaction Test Results Mod AASHTO Method		Interpreted CBR Values SANS 3001-GR40 Mod AASHTO Method				Material Classification			Dispersivity Indicators		Heave
				37,5 mm	20 mm	2,00 mm	0,425 mm	0,075 mm	0,05 mm	0,005 mm	0,002 mm	Grading Modulus (GM)	Effective Size (D_{10})	LL	PI	LS	MDD (kg/m³)	OMC (%)	100%	95%	93%	90%	COLTO	US Highway	USCS	Double Hydrometer Results (%)	Inferred Classification	
P1 (12414/1)	TP16	0,14 - 1,33	Fine Colluvium	99	97	82	38	19	11,4	5,5	3,9	1,6	0,029	-	SP	1,0	1964	5,1	78	31	22	12	G6	SM	A-1-b	67,0	Highly Dispersive	LOW
P2 (12414/2)	TP11	0,54 - 0,69	Residual Gneiss	96	93	44	12	5	4,3	2,7	1,6	2,4	0,253	-	SP	0,8	2074	5,1	100	14	10	5	G8	SP	A-2-5	53,0	Highly Dispersive	LOW
P3 (12414/3)	TP02	0,08 - 0,58	Coarse Alluvium	99	97	48	19	11	7,5	3,9	1,7	2,2	0,066	24	5	2,2	2124	6,9	45	17	12	7	G8	SW/SM/SC	A-2-5	-	-	LOW
P4 (12414/4)	TP03	0,19 - 0,56	Residual Gneiss	93	91	45	17	8	5,6	1,9	1,3	2,3	0,109	23	5	2,5	2014	6,0	33	16	12	8	G8	SW/SM/SC	A-2-5	-	-	LOW
P5 (12414/5)	TP04	0,12 - 0,79	Coarse Alluvium	91	79	42	24	11	8,3	3,8	2,2	2,2	0,066	21	4	2,0	-	-	-	-	-	-	N/A	SW/SM/SC	A-2-5	76,0	Highly Dispersive	LOW
P6 (12414/6)	TP09	0,09 - 1,19	Residual Gneiss	98	96	46	16	7	4,7	2,4	1,0	2,3	0,137	-	SP	0,9	-	-	-	-	-	-	N/A	SW/SM	A-2-5	-	-	LOW
P7 (12414/7)	TP13	0,07 - 0,69	Mixed Fine Alluvium and Residual Gneiss	99	97	53	21	11	7,9	3,1	2,1	2,1	0,067	-	SP	1,3	2161	6,6	22	10	7	4	G9	SW/SM	A-1-b	67,0	Highly Dispersive	LOW
P8 (12414/8)	TP14	0.15 - 0,71	Coarse Alluvium	100	100	70	31	12	10,5	5,7	3,3	1,9	0,039	-	SP	1,2	2168	6,8	29	13	9	5	G9	SW/SM	A-1-b	-	-	LOW
P9 (12414/9)	TP10	0,08 - 0,92	Mixed: Coarse Alluvium and Residual Gneiss	99	98	59	21	11	8,0	3,7	2,8	2,1	0,068	28	5	2,3	2031	7,5	24	11	8	5	G9	SW/SM/SC	A-1-b	98,0	Highly Dispersive	LOW
P10 (12414/10)	TP07	0,10 - 1,50	Mixed: Coarse Alluvium and Residual Gneiss	99	92	59	26	14	9,8	5,7	4,4	2,0	0,051	22	4	2,0	2068	6,9	42	16	11	6	G8	SM/SC	A-1-b	-	-	LOW

Notes:

1. Atterberg Limits: Liquid Limit (LL), Plasticity Index weighted (PI), Linear Shrinkage (LS)- Atterberg Limits measured on material passing the <0,425 mm sieve
2. Compaction Test Results; percentage compaction of MDD (MOD AASTHO Method); CBR of 13.344 kN
3. MDD- Maximum Dry Density; OMC- Optimum Moisture Content
4. Combined material classification as calculated and presented by SANAS Accredited Facility
5. Heave: Potential expansiveness (acc. Van Der Merwe, 1964)

4.8.3. Laboratory Test Results- Summary and Discussion

Combined On-site Materials- Transported and Residual Soil

The blanketing soft materials were seen to exhibit an overall similar granular nature and corresponding measured engineering material properties with respect to the planned development. The materials have been grouped in the summary to follow with minor variations highlighted where deemed necessary.

The results for the combined natural materials can be summarised as follows:

- In total, the blanketing materials were **sampled ten (10) times** across the planned oxidation ponds.
  - The transported soils were sampled **four (4) times**.
  - Residual soils were sampled **three (3) times.**
  - Lastly, **three (3) mixed samples** were created in order to determine the measured engineering properties of the materials once mixed during excavation and ensuring processes.
- The **natural materials** grade as **coarse sand/gravel** with a grading modulus ranging between **1.6 and 2.4** (average of 2.1)
  - The grading modulus of the combined transported soils ranged from 1.6 to 2.2.
  - The grading modulus of the sampled residual material ranged from 2.3 to 2.4.
  - The grading modulus of the mixed samples of transported and residual material ranged from 2.0 to 2.1.
- The combined materials exhibit a low plasticity, low linear shrinkage values and an overall LOW potential for heave (acc. Van Der Merwe, 1964).
  - Measured PI values range from **slightly-plastic** (SP) to **5.**
- Clay percentages (<0.002 mm) are low in the site's subsoils- ranging from 1.0 to 4.4% (average of 2.4%). Furthermore, between 12 and 38% (average of 23%) of the on-site materials pass the 0.425 mm sieve.
- TRB Class is A-1-b and A-2-5.
- Typical Unified Soil Classes (USCS) for this material are **SM, SP, SW/SM/SC, SW/SM, and SM/SC**. Inferred attributes summarised as follows:
  - **Silty sand (SM)-** drainage will range from fair to impervious, and a low compressibility can be expected once compacted. Moreover, these materials typically display good compaction characteristics and classify as **reasonably stable embankment material**.
  - **Clayey sand (SC)-** drainage will be poor (impervious), and a low compressibility can be expected once compacted. Moreover, these materials typically display good/fair compaction characteristics and classify as **reasonably stable embankment material**.

- **Well graded sand (SW)-** drainage will be poor (impervious), and a low compressibility can be expected once compacted. Moreover, these materials typically display good/fair compaction characteristics and classify as **reasonably stable embankment material**.
- **Poorly graded sand (SP)-** drainage will be excellent, and a low compressibility can be expected once compacted. Moreover, these materials typically display good compaction characteristics and classify as **reasonably stable embankment material**.

- The Maximum Dry Density (MDD) ranges between **1964 and 2168 kg/m^3** (average: 2076 kg/m^3) at an Optimum Moisture Content (OMC) of between **5.1 and 7.5%** (average: 6.4%) (Mod AASHTO Method).
- The Interpreted CBR Values at 90% relative compaction to the MDD range between **4 and 12** (average: 7), increasing to between **22 and 100** (average: 47) at 100 % MDD (Mod AASHTO Method).
- Summarised COLTO 1998 Classification:
  - **G9- 3 of 8 samples**;
  - **G8- 4 of 8 samples**;
  - **G6- 1 of 8 samples** (fine alluvium)
- Lastly, based on the available double hydrometer readings the sampled **materials** are deemed to be **highly dispersive** with double hydrometer readings ranging from 53.0 to 98.0 %.

4.8.4. Soil Corrosion Discussion

As a brief introduction, soil corrosion is an electrochemical process whereby complex chemical reactions between the soil and the contacting metal result in the formation of corrosion products and deterioration of the metal. The severity of corrosion that can be caused by a particular soil type is dependent on a variety of factors, including the soil's chemical properties, environmental conditions and the properties of the metal in contact with the soil.

Corrosion is a natural redox (reduction-oxidation) reaction that converts a refined metal to its more chemically stable state. Three components must be present for corrosion to occur: an anode (the buried metal in contact with the soil), a cathode (oxygen) and an electrolyte (the moisture found in the soil). The degree of corrosiveness and the rate of corrosion differ between different soil types and properties (Nanan, 2018).

A detailed corrosion assessment was not undertaken to classify the on-site materials. As part of this analysis, some of the soil samples were tested for pH and electrical conductivity (EC) to serve as a basic index/high-level screening for corrosiveness. These results and other indicators of aggressiveness to steel and concrete (corrosivity) are shown in Table 4 overleaf.

Table 4: Soil Chemistry Test Results

Soil Chemistry Test Results- Basic Geotechnical Study- Oxidation Ponds at Pella WWTW						
Sample Number	Test Pit	Depth (m)	Sampled Material	Corrosivity Indicators		
				Profiled In-Situ Moisture	pH	EC (S/m)
P1 (12414/1)	TP16	0,14 - 1,47	Fine Alluvium	Slightly Moist	7,9	0,016
P2 (12414/2)	TP11	0,10 - 0,69	Residual Gneiss	Slightly Moist	8,1	0,020
P5 (12414/5)	TP04	0,12 - 0,79	Coarse Alluvium	Slightly Moist	7,5	0,031
P7 (12414/7)	TP13	0,07 - 0,69	Mixed Fine Alluvium and Residual Gneiss	Slightly Moist	8,0	0,017
P9 (12414/9)	TP10	0,08 - 0,92	Mixed: Coarse Alluvium and Residual Gneiss	Slightly Moist	7,7	0,028
Notes:	1. Material origin as per soil profile description.					
	2. Moisture as per soil profile description or natural moisture content.					
	3. Percentage clay, pH, and EC (Electrical Conductivity) as per laboratory results.					
	4. pH and EC (Electrical Conductivity) serve as a basic index/high-level screening for corrosiveness					

Table 5: Reference Table- Influences of the Corrosiveness of Soils to Steel and Concrete

PARAMETER	→ INCREASING AGGRESSIVENESS OR CORROSIVENESS OF SOILS →					
EC (S/m)	**<0.0050: Essentially non-corrosive**	**<0.0100: Mildly corrosive**	**<0.0200: Moderately corrosive**	**<0.0333: Corrosive**	**<0.1000: Highly corrosive**	**>0.1000: Extremely corrosive**
Soil type	**Sand and gravel generally have lower EC: Generally less corrosive**			Clay generally has higher EC: Generally more corrosive		
Saturation	**<40% or 100%: Generally not aggressive to mildly corrosive**				60-85%: Maximum expected corrosion rates	
pH	**Soils with neutral pH are generally not very corrosive**			Very acidic or alkaline: corrosive to steel Acidic (pH < 5.5): likely corrosive to concrete		

Based on the combined results presented in Table 4- when compared to the applicable references (Table 5)- the materials which underlie the site are deemed to be corrosive. It is advisable not to use steel pipes and engineering measures must be implemented to protect portions of the structure which will come into prolonged contact with soil or the soil-water interface.

These methods may include but are not limited to the following:

- Barrier coatings, sealers and membrane-type coatings (resins, epoxies, emulsions) applied to the concrete surface.
- Concrete reinforcement/steel coatings including nickel, stainless steel and zinc (i.e., galvanisation).

- Cathodic protection or other electrochemical means.
- Overlays including Portland cement, latex-modified concrete and polymer concrete.
- Addition of corrosion inhibitors and admixtures to the concrete.
- Adequate site drainage measures to avoid soil saturation.

4.8.5. Inferred Material Properties Unified Soil Classification System

As part of this assessment several engineering material properties can be **inferred**- to be confirmed/measured in follow-up studies where required. Inferred figures are extracted from the data base available on geotechdata.info.

The Unified Soil Classification System (USCS) is a soil classification system used in engineering and geology to describe the texture and grain size of a soil. The classification system can be applied to most unconsolidated materials and is represented by a two-letter symbol. The demarcated result can be used to infer a wide range of soil properties and characteristics.

The sampled soils classified as: **SP, SM, SC and SW.**

The following inferred parameters/attributes can be used in **preliminary designs**:

1. Typical values of **soil friction angle (degrees)**
    a. SP Soils: 27 to 39
    b. SM Soils: 27 to 34
    c. SC Soils: 30 to 40
    d. SW Soils: 33 to 43
2. Typical values of **soil cohesion (kPa)**
    a. SW/SP Soils: 0
    b. SM Soil: 20 to 50
    c. SC Soils: 5 to 20
3. Typical values of **soil permeability (m/s)**
    a. SC Soils: $5.5x10^{-9}$ to $5.5x10^{-6}$
    b. SM Soils: $1x10^{-8}$ to $5x10^{-6}$
    c. SW Soils: $1x10^{-8}$ to $1x10^{-6}$
    d. SP Soils: $2.55x10^{-5}$ to $5.35x10^{-4}$

Numerous additional inferences can be made based on the available laboratory test results and associated data bank of information. Additional properties can be presented on the request of the project team.

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

ANNEXURE C

ENVIRONMENTAL MANAGEMENT PROGRAMME

Environmental Management Programme

UPGRADE OF PELLA WASTEWATER TREATMENT WORKS, NORTHERN CAPE PROVINCE.

Khâi-Ma Local Municipality

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Applicant	Khâi-Ma Local Municipality
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Site area	Pella

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ENVIRONMENTAL MANAGEMENT PROGRAMME

in terms of the

National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended &
Environmental Impact Assessment Regulations 2014

Stakeholder Review & Comment

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Acronyms

Acronym	Description
BAR	Basic Assessment Report
CA	Competent Authority
DAERL	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries and the Environment
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMG	Environmental Management Group (Pty) Ltd
EMPr	Environmental Management Programme
ESO	Environmental Site Officer
GNR	Government Notice Regulation
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
KMLM	Khâi-Ma Local Municipality
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act No. 107 of 1998
PM	Project Manager
PPE	Personal Protective equipment
PPP	Public Participation Process
PSDF	Provincial Spatial Development Framework
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework

Glossary

Alien Vegetation	Undesirable plant growth which shall include but not be limited to; all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien shall be those plant species that show the potential to occupy in number, any area within the defined construction area and which are declared to be undesirable.
Aspect	Element of an organisation's activities, products or services that can interact with the environment.
Auditing	A systematic, documented, periodic and objective evaluation of how well the environmental management plan is being implemented and is performing with the aim of helping to safeguard the environment by facilitating management control which would include meeting regulatory requirements. Results of the audit help the organisation to improve its environmental policies and management systems.
Built environment	Physical surroundings created by human activity, e.g. buildings, houses, roads, bridges and harbours.
Contamination	Polluting or making something impure.
Corrective (or remedial) action	Response required addressing an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.
Cumulative Impact	The impact of an activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities or undertakings in the area.
Degradation	The lowering of the quality of the environment through human activities, e.g. river degradation, soil degradation.
Direct impact	Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and re generally obvious and quantifiable.
Ecology	The scientific study of the relationship between living things (animals, plants and humans) and their environment.
Ecosystem	The relationship and interaction between plants, animals and the non-living environment.
Environment	The surroundings within which humans exist and that could be made up of - • the land, water and atmosphere of the earth; • micro-organisms, plant and animal life; • any part or combination of the two points mentioned above and the interrelationships among and between them; and • the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being
Environmental aspect	Any component of a contractor's construction activity that is likely to interact with the environment.
Environmental impact	The change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity

Environmental authorisation	Written statement from the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform, that records its approval of a planned development.
Hazardous waste	Waste, even in small amounts that can cause damage to plants, animals, their habitat and the well-being of human beings, e.g. waste from factories, detergents, pesticides, hydrocarbons, etc.
Indirect impact	Indirect changes that may occur as a result of an activity. These types of impacts include all potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
Land use	The use of land for human activities, e.g. residential, commercial, industrial use.
Mitigation	Measures designed to avoid, reduce or remedy adverse impacts

1. Introduction and background

1.1 Scope

Environmental Management Group (EMG) (Pty) Ltd, as independent environmental managers and impact assessors has been appointed by **Mind Shape Developments (Pty) Ltd** on behalf of **Khâi-Ma Local Municipality** to compile and submit an Environmental Management Programme (EMPr) under the National Environmental Management Act (NEMA) No. 107 of 1998, for the **proposed upgrade of the Wastewater Treatment Works (WWTW) in Pella, Northern Cape** as part of the Environmental Authorisation (EA) Process.

This document is compiled in accordance with the Integrated Environmental Management (IEM) philosophy which aims to achieve a desirable balance between conservation and development (DEAT, 1992). IEM is a key instrument of the NEMA (Act No. 107 of 1998). NEMA promotes the integrated environmental management of activities that may have a significant effect on the environment, while IEM prescribes a methodology for ensuring that environmental management principles are fully integrated into all stages of the development process. It advocates the use of several environmental management tools that are appropriate for the various levels of decision-making. One such tool is an Environmental Management Programme (EMPr). The IEM guidelines encourage a pro-active approach to sourcing, collating and presenting information in a manner that can be interpreted at all levels. The basic principles underpinning IEM are that there be:

- informed decision-making;
- accountability for information on which decisions are taken;
- accountability for decisions taken;
- a broad meaning given to the term environment (i.e. one that includes physical, biological, social, economic, cultural, historical and political components);
- an open, participatory approach in the planning of proposals;
- consultation with interested and affected parties;
- due consideration of alternative options;
- an attempt to mitigate negative impacts and enhance positive aspects of proposals;
- an attempt to ensure that the 'social costs' of development proposals (those borne by society, rather than the developers) be outweighed by the 'social benefits' (benefits to society as a result of the actions of the developers);
- democratic regard for individual rights and obligations;
- compliance with these principles during all stages of the planning, implementation and decommissioning of the proposals (i.e. from 'cradle to grave');
- and the opportunity for public and specialist input in the decision-making process.

The Environmental Impact Assessment (EIA) Regulations that took effect in December 2014 regulate the procedures and criteria for the submission, processing, consideration and decision on applications for environmental authorisation of listed activities.

The general principles contained within this document apply to the **planning, construction** and **operational phase** activities regarding the proposed development.

1.2 Project Description

The proposed development entails the upgrade of the existing wastewater pond that is inadequate and unofficial. This informal pond has a surface area of approximately 750m², an estimated average depth of 2m, and a hydraulic capacity of around 1500m³. The pond experiences seepage losses and evaporation, resulting in no effluent output.

The existing pond and surrounding area that is currently experiencing illegal dumping will be cleaned and backfilled.

The proposed WWTW is designed for an Average Dry Weather Flow of 300.72 kℓ/day (0.3 Mℓ/day). The WWTW has been designed to accommodate future population growth in a period of 20 years, which is 3 758 people by 2044. The proposed development will consist of the following:

- 1x Inlet works
- 2x anaerobic ponds
- 1x facultative pond
- 2x maturation ponds
- 1x storage pond
- 3x sludge drying beds
- 1x evaporation area
- 1x composting area

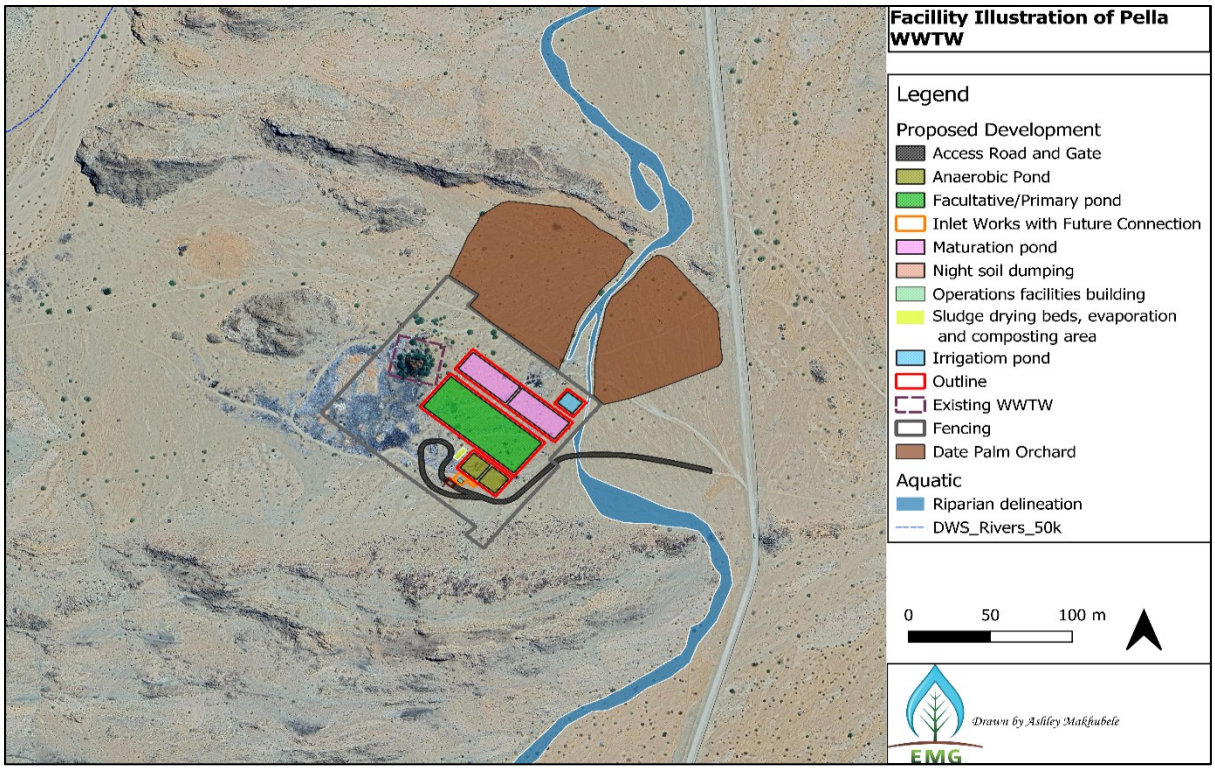


Figure 1: *Facility illustration of the proposed Pella WWTW*

Inlet works

The inlet works for the wastewater treatment facility is an integral component of the pre-treatment process. This pre-treatment stage involves the removal of large solid debris as well as grit (detritus) to prevent interference with downstream treatment processes. A new night soil dumping area will be constructed, accompanied by a grit channel equipped with manual screens.

Large solids (screenings) will be separated from the incoming sewage using a hand-raked bar screen. The grit channels play a crucial role in removing grit from the influent sewage. The channels are designed for ease of operation and maintenance; a labourer can clear accumulated grit with a shovel. Two channels are provided to facilitate continuous operation and maintenance. When one channel becomes full of grit, it can be isolated while the second channel remains operational. The grit channel effectively removes grit when a flow velocity of 0.3 m/s is maintained along its length

Anaerobic ponds

New Anaerobic ponds will be designed to promote the growth of bacteria that decompose organic matter without the presence of oxygen. These ponds are effective in removing a significant portion of solid organic matter, which settles at the bottom due to the steadiness of the wastewater. Light suspended matter floats on the surface, forming scum that supports the anaerobic conditions. Properly designed anaerobic ponds can remove more than 50% of organic matter from sewage.

Facultative pond

A new facultative pond will be built for wastewater treatment. These ponds promote the growth of bacteria and algae, which together degrade organic matter. Bacteria can break down organics in both anaerobic and aerobic conditions, hence the term "facultative." A well-designed pond can reduce organics to about 50-70 mg/l.

Maturation ponds

New maturation ponds represent the final stage in the selected treatment process. Two maturation ponds, each with an approximate retention time of seven days, will be constructed. The primary function of these ponds is to achieve bacterial die-off in the water due to inhospitable conditions. The quality of the final effluent is dependent on the number of maturation ponds, which will be arranged in series to ensure the necessary retention time is achieved.

Storage pond

A storage pond will be constructed to hold the final effluent. The final effluent will be used to irrigate the proposed palm orchard or surrounding vineyards.

Sludge drying beds

Sludge that will be generated at the Pella WWTW will originate from the anaerobic and facultative oxidation ponds. Due to the long sludge age and inherent stabilisation achieved within pond systems, the sludge is classified as stabilised wastewater sludge in terms of TT 261/06. Three sludge drying beds will be constructed Sludge dewatering will be achieved using conventional open sand sludge drying beds, which are appropriate for small oxidation pond systems and recommended by TT 261/06 and the Water Research Commission (WRC) Process Design Manual for Small Wastewater Treatment Works.

Evaporation area

Drainage liquor generated during the drying process will be directed to a dedicated lined evaporation area located within the WWTW footprint. The evaporation area will be fully impermeable and sized to accommodate all drainage liquor generated during a desludging event, with no infiltration to ground or discharge to the environment. Estimated drainage liquor per desludging event is approximately 13 m^3, generated intermittently over several weeks.

Composting area

Following drying, sludge will undergo further stabilisation through composting prior to agricultural reuse, as required by TT 261/06. Composting will be undertaken using windrow composting, with dried sludge mixed with carbon-rich bulking materials such as manure, crop residues, or wood chips at a ratio of approximately 1:2 to 1:3 (sludge to bulking agent). Subject to chemical and microbiological compliance testing in accordance with TT 261/06, composted sludge will be made available to local farmers or used in the planned communal date palm farm for use as soil conditioner under controlled conditions. Application will be nutrient-limited and subject to buffer distances and crop restrictions.

Lining

A 2mm High-Density Polyethylene (HDPE) Lining will be used for lining the facultative ponds, maturation ponds, evaporation area, and composting area.

Date Palm orchard

A Date Palm Orchard will be developed to support the proposed development. The orchard will ensure that the final effluent is reused efficiently.

Supporting infrastructure for this development will include:

- A change room
- Ablution facilities
- Small office
- Storeroom
- Gravel access road

Table 1: *Infrastructure components*

Components	Area	Volume per day
Anaerobic pond 1	561.70 m^2	187.95
Anaerobic pond 2	561.70 m^2	187.95
Facultative pond 1	6756.80 m^2	301
Maturation pond 1	1820 m^2	122.5
Maturation pond 2	1820 m^2	122.5
Irrigation pond	280.60 m^2	231.8
Sludge drying beds	75 m^2	0.0074
Composting area	50 m^2	n/a
Evaporation area	25 m^2	7.13 mm
Date Palm orchard	47 700 m^2	231.8
Fenced area	57 100 m^2	n/a

The development footprint of the fenced WWTW area is 5.71 ha, while the date palm orchard is 4.77 ha. The total development footprint is therefore 10.48 ha. This upgrade will ensure that the treatment facility produces a final effluent that meets the General Limits Criteria as regulated by the Department of Water and Sanitation (DWS).

2. Role players and responsibility matrix

For the EMPr to be successfully implemented, all the role players involved in the project need to co-operate. For this to happen, role players must clearly understand their roles and responsibilities in the project, must be professional, form respectful and transparent relationships, and maintain open lines of communication.

Table 2: *Functions and Responsibilities of Project Team*

Key	Function	Responsibility
P	Proponent	Proponent is ultimately accountable for ensuring compliance to the EMPr. The Environmental Control Officer (ECO) must be contracted by the Proponent (full time or part time depending on the size of the project) as an independent appointment to objectively monitor implementation of relevant environmental legislation and conditions of the EMPr for the project. The Proponent is further responsible for providing and giving mandate to enable the ECO to perform responsibilities. The developer must ensure that the ECO is integrated as part of the project team.
CE	Consulting Engineer	Contracted by the developer to design and specify the project engineering aspects. Generally, the engineer runs the works contract. The CE may also fulfil the role of Project Manager (PM) on the proponent's behalf (See PM).

PM	Project Manager	The Project Manager has over-all responsibility for managing the project, contractors, and consultants and for ensuring that the environmental management requirements are met. The CE may also act as the PM. All decisions regarding environmental procedures must be approved by the PM. The PM has the authority to stop any activity in contravention of the EMPr in accordance with an agreed warning procedure.
ER	Engineers Representative	The consulting engineer's representative on site has the power/mandate to issue site instructions and in some instances, variation orders to the contractor, following request by the Environmental Officer (EO) or ECO. The ER oversees site works, liaison with Contractor and ECO.
EO/EM	Environmental Officer / Environmental Manager	Appointed by the Consulting Engineers as their environmental representative on site. The EO is not independent but must rather act on behalf of the consulting engineers with the mandate to enforce compliance under the project contract, which must include the EMPr. The EO has the directive to issue non-conformance and hazard certificates. Furthermore, in terms of accepted industry practice the EO could issue the equivalent of a "cease works" instruction only in exceptional circumstances where serious environmental harm has been or is about to be caused i.e. in cases of extreme urgency and then only when the ER is absent. The EO must form part of the project team and be involved in all aspects of project planning that can influence environmental conditions on the site. On certain types of projects, such as linear developments (fences, roads, etc), the EO must also be the liaison between the contractor and landowners. The EO must attend relevant project meetings, conduct daily inspections to monitor compliance with the EMPr, and be responsible for providing reports and feedback on potential environmental problems associated with the development to the project team and ECO. The EO must convey the contents of this EMPr to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce.

		The EO must be suitably experienced with the relevant qualifications and preferably competent in construction related methods and practices.
ECO	Environmental Control Officer	An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of Environmental Authorisations (EAs), and the EMPr for the project. The ECO must be on site prior to any site establishment and must endeavour to form an integral part of the project team. The ECO must be proactive and have access to specialist expertise as and when required, these include botanists, ecologists, etc. Furthermore, the ECO must also have access to expertise such as game capture, snake catching, etc. The ECO must conduct audits on compliance to relevant environmental legislation, conditions of EA, and the EMPr for the project. The size and sensitivity of the development, based on the EIA, will determine the frequency at which the ECO will be required to conduct audits. (A minimum of a monthly site inspection must be undertaken). The ECO must be the liaison between the relevant authorities and the project team. The ECO must communicate and inform the developer and consulting engineers of any changes to environmental conditions as required by relevant authoritative bodies. The ECO must ensure that the registration and updating of all relevant EMPr documentation is carried out. The ECO must be suitably experienced with the relevant environmental management qualifications and preferably competent in construction related methods and practices. The ECO must handle information received from whistle blowers as confidential and must address and report these incidences to the relevant Authorities as soon as possible. On small projects where no EO is appointed, the ECO must convey the contents of this EMPr to the Contractor site team and discuss the contents in detail with the Contractor as well as undertake to conduct an induction and an environmental awareness training session prior to site handover to all contractors and their workforce.
C	Contractor	The principal contractor, hereafter known as the 'Contractor', is responsible for implementation and compliance with the requirements of the EMPr and conditions of the EAs, contract and relevant environmental legislation. The Contractor must

		ensure that all sub-contractors have a copy of and are fully aware of the content and requirements of this EMPr. The contractor is required, where specified, to provide Method Statements setting out in detail how the management actions contained in the EMPr will be implemented.
ESO	Environmental Site Officer	The ESO is employed by the Contractor as his/her environmental representative to monitor, review and verify compliance with the EMPr by the contractor. This is not an independent appointment; rather the ESO must be a respected member of the contractor's management team. Dependent on the size of the development, the ESO must be on site one week prior to the commencement of construction. The ESO must ensure that he/she is involved at all phases of the constriction (from site clearance to rehabilitation).
A	Lead Authority	The authority is the relevant environmental department that has issued the EA. The authority is responsible for ensuring that the monitoring of the EMPr and other authorisation documentation is carried out, this will be achieved by reviewing audit reports submitted by the ECO and conducting regular site visits.
OA	Other Authorities	Other authorities are those that may be involved in the approval process of an EMPr. Their involvement may include reviewing EMPrs to ensure the accuracy of the information relevant to their specific mandate. Other authorities may be involved in the development, review or implementation of an EMPr. For example, if a specific development requires a water use licence for the relevant national authority, then that authority should review and comment on the content of the section pertaining to that mandate.
EAP	Environmental Assessment Practitioner	The definition of an environmental assessment practitioner in Section 1 of NEMA is "*the individual responsible for the planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management plans or any other appropriate environmental instruments introduced through regulations".*

3. Activities covered by the EMPr

3.1 Planning stage

The project planning stage consists of layout design surveying and ensuring that all plans and required contracts, permits/ licenses and agreements are set in place.

3.2 Construction phase

The construction phase will start after the relevant authorisations are granted. The construction phase involves earthwork, structure development, service provision and finishing. This phase includes:

- Establishment of construction camp and equipment yards;
- Transportation of construction material and other resource inputs;
- Use of construction equipment on site;
- Storage of input materials and disposal of waste generated;
- Physical clearance for the constructional purpose of the WWTW and the date palm orchard;
- Rehabilitation of the disturbed areas through:
    - Top-soiling and re-vegetation of areas disturbed by construction.

3.3 Operational phase

The operational phase of the WWTW encompasses all routine and non-routine activities associated with the functioning, maintenance, management of the facility post-construction, and compliance with environmental regulations. The following activities are covered under this phase:

- **Influent Reception and Distribution:** Continuous inflow of raw wastewater into the oxidation pond system, including flow regulation and distribution to ensure optimal retention times.
- **Biological Treatment Processes:** Natural treatment of wastewater through aerobic and facultative microbial activity, supported by sunlight, algae, and wind-driven aeration within the pond system.
- **Effluent Discharge:** Controlled release of treated effluent from the final maturation pond into the storage pond.
- **Sludge Accumulation Monitoring:** Periodic assessment of sludge build-up within the ponds and planning for desludging operations when necessary to maintain treatment efficiency.
- **Vegetation and Algae Management:** Monitoring and control of excessive algal blooms and emergent vegetation along pond embankments to prevent clogging, odour, and vector breeding.
- **Odour and Vector Control:** Implementation of measures to minimise odour emissions and control mosquito and fly populations, particularly during warmer months.

- **Maintenance of Inlets:** Routine inspection and repair of inlet structures, and flow control mechanisms to prevent erosion, leakage, or hydraulic short-circuiting.
- **Routine Maintenance and Servicing:** Scheduled inspections, cleaning, equipment servicing, and minor repairs to ensure optimal plant performance.
- **Waste Management:** Proper handling and disposal of screenings, grit, and any other solid waste generated during pre-treatment or maintenance activities.
- **Orchard Irrigation:** Application of treated effluent from the storage pond to the designated orchard through controlled drip irrigation systems.
- **Routine monitoring:** Monitoring of effluent quality to ensure compliance with Department of Water and Sanitation (DWS) reuse standards, scheduling of irrigation to optimize soil moisture and nutrient uptake, and implementation of safeguards such as buffer periods before harvest. This includes monitoring of flow rate and pressure in the inlet and distributions across the zones.
- **Routine maintenance:** Visual inspection of leaks, broken emitters or ponding, and inspection of filters
- **Health and Safety Compliance:** Enforcement of occupational health and safety protocols for operational personnel, including safe access to ponds and use of Personal Protective Equipment (PPE).
- **Emergency Preparedness:** Procedures for responding to incidents such as pond overflow, structural failure, or contamination events that may pose environmental or public health risks.
- **Regulatory compliance** in terms of Environmental Authorisation.
- **Stormwater management:** Procedures for controlling and directing stormwater runoff within the facility through designated drainage systems to prevent flooding, erosion, and the ingress of stormwater into treatment units, thereby minimizing the risk of contaminated runoff impacting surrounding soil and surface water resources.

4. Scope of the EMPr

4.1 Legal requirements of the EMPr

4.1.1 NEMA and EIA Regulations

In Appendix 4 of the NEMA Environmental Impact Assessment (EIA) Regulations 2014 (as amended) specifies the requirements of an EMPr. The table below serves as a map of how the requirements detailed in Appendix 4 have been adhered to.

Table 3: *Requirements of an Environmental Management Programme as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended)*

Requirements	Reference
Details of the Environmental Assessment Practitioner (EAP) who prepared the EMPr and evidence of that EAP's expertise to prepare the EMPr, including a curriculum vitae	**APPENDIX H**
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	**SECTION 1**
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental	**APPENDIX A**

sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	
A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed, and mitigated as identified through the environmental impact assessment process for all phases of the development, including: *(i) Planning and design* *(ii) Pre-construction activities* *(iii) Construction activities* *(iv) rehabilitation of the environment,* *(v) where relevant, operational activities* *(vi) and if applicable, post-closure*	**SECTION 7**
A description of proposed impact management actions, identifying the specific manner in which the impact management outcomes will be achieved, and must, where applicable, include actions to: *(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation* *(ii) comply with any prescribed environmental management standards or practices* *(iii) comply with any applicable provisions of the Act regarding closure, if applicable*	**SECTION 7**
An indication of the persons who will be responsible for the implementation of the impact management actions	**SECTION 2 & 7**
The time periods within which the impact management actions must be implemented	**SECTION 7**
The frequency of monitoring the implementation of the impact management actions	**SECTION 4 & 7**
The mechanism for monitoring compliance with the impact management actions	**SECTION 4 & 7**
A program for reporting on compliance, taking into account the requirements prescribed by the regulations	**SECTION 4**
An environmental awareness plan describing the manner in which: *i. the applicant intends to inform his or her employees of any environmental risk which may result from their work* *ii. risks must be dealt with in order to avoid pollution or the degradation of the environment*	**SECTION 4**

4.1.2 Relevant legislation

There are several legal and policy documents that govern the planning, development, operation, and maintenance of the proposed Pella Wastewater Treatment Works and

associated infrastructure. These instruments establish the environmental, water-use, land use, heritage, and occupational health and safety requirements applicable to the project. An overview of the primary legislation applicable to the project, along with its relevance to the proposed activities, is provided in Table 4 below.

Table 4: *Legislation applicable to the project*

Listing Notices of the EIA Regulations, 2014, as amended	**Description of project activity**
GN R.327 Listing Notice 1 Activity 19: *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse*	The proposed WWTW structures and associated irrigation area cross an existing drainage line on site. The construction of these structures will require excavation within the drainage line, resulting in the removal and movement of approximately 25 cubic metres of material from a watercourse. This exceeds the 10 cubic metre limit stipulated in GN R.327 Listing Notice 1 Activity 19.
GN R.327 Listing Notice 1 Activity 27: *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation*	The proponent proposes to clear 10.48 ha of land for the purpose of the Wastewater Treatment Works (WWTW) and the date palm orchard.
GN R.324 Listing Notice 3 Activity 12 (g) (ii): *The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* *(g) Northern Cape* *(ii) Within critical biodiversity areas identified in bioregional plans*	The development footprint is located within Critical Biodiversity Area (CBA) 1 as identified in systematic biodiversity plans. The development will entail the clearance of 10.48 ha and will therefore exceed the threshold clearance of 300 sqm of indigenous vegetation.
GN R.324 Listing Notice 3 Activity 14 (ii) (a) (c) (g) (ii) (bb) (ff): *The development of—*	The development has a footprint larger than 10 square meters and will occur within a watercourse. The development will entail a development area of approximately 10.48 ha with the infrastructure of the

(ii) infrastructure or structures with a physical footprint of 10 square metres or more; *where such development occurs—* *(a) within a watercourse;* *(c) if no development setback has been adopted, within 32 metres of a watercourse.* *g. Northern Cape* *(ii) Outside urban areas:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	oxidation ponds and date palm orchard each being larger than the 10sqm threshold. The development will occur within a watercourse and within 32 m of a watercourse. Moreover, the proposed site is within the SANParks Protected Area Expansion Strategy and is located within CBA 1 category in the Northern Cape.

4.1.3 Statutory and other applicable legislation

The contractor and applicant/manager are deemed to have made themselves conversant with all legislation pertaining to the environment, including national, provincial and local government ordinances, which may be applicable to the contract.

4.1.4 General

The planning, construction and operational activities will be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the contractor and applicant/manager as to their duties in the fulfilment of the project objectives, with reference to the prevention and mitigation of environmental impacts caused by construction and operational activities associated with the project. The contractor and applicant/manager should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications, then the latter shall prevail.

4.2 Objectives of the EMPr

The specific objectives of this EMPr are:

- To provide explicit operational guidelines and environmental monitoring requirements during the construction and operational phases so that activities are done in environmentally responsible and sustainable manner.
- To benefit the host communities, minimise the impacts on the environment and to ensure the health and safety of the community by creating a development that eliminates unacceptable health hazards and ensures public and animal safety.
- To enable proponent and its contractors to use resources efficiently and effectively during the project lifecycle in order to reduce wastage and thereby reduce associated negative environmental impacts. In addition, the aim is also to handle waste streams responsibly and apply the 'reduce, re-use and recycle' principle, wherever possible.
- To leave areas disturbed by construction in a rehabilitated, stable, non-polluting and tidy condition.

4.3 Principles of the EMPr

This EMPr is compiled using the following concepts and implementation requirements so that the higher principles of sustainable development are realised:

- **Continuous improvement**: The project proponent (or implementing organisation) must commit to review and to continually improve environmental management, with the objective of improving overall environmental performance.
- **Broad level of commitment:** A broad level of commitment is required from all levels of management as well as the workforce in order for the development and implementation of this EMPr to be successful and effective.
- **Accountability:** A strong sense of accountability should be maintained by the proponent, contractor and sub-contractor to prevent any party from distancing itself from commitments made to the EMPr.
- **Flexible and responsive:** The implementation of the EMPr must respond to new and changing circumstances, i.e. rapid short-term responses to problems or incidents. The EMPr is a dynamic "living" document and thus regular planned review and revision of the EMPr must be carried out.
- **Integration across operations:** This EMPr must integrate across existing line functions and operational units such as health, safety and environmental departments in a company/project. This is done to change the redundant mindset of seeing environmental management as a single domain unit.
- **Legislation:** It is understood that any development project during its construction phase is a dynamic activity within a dynamic environment. The Developer, Engineer, Contractor and Subcontractor must therefore be aware that certain activities conducted during construction may require further licensing or environmental approval, e.g. river or stream diversions, bulk fuel storage, waste disposal, etc. The Contractor must consult the ER, ESO and/or ECO (as applicable) on a regular basis in this regard.

4.4 Administration of Environmental Obligations

4.4.1 Appointment of an Environmental Site Officer (ESO)

For the purposes of implementing the conditions contained herein, the contractor shall submit to the engineer for approval the appointment of a nominated representative of the contractor as the ESO for the contract. The request shall be given, in writing, at least fourteen days before the start of any work clearly setting out reasons for the nomination, and with sufficient detail to enable the engineer to make a decision. The engineer will, within seven days of receiving the request, approve, reject or call for more information on the nomination. Once a nominated representative of the contractor has been approved, he/she shall be the ESO and shall be the responsible person for ensuring that the provisions of the EMPr are complied with during the life of the contract. The engineer will be responsible for issuing instructions to the contractor where environmental considerations call for action to be taken. The ESO shall submit regular written reports to the engineer, but not less frequently than once a month. The engineer shall have the authority to instruct the contractor to replace the ESO if, in the engineer's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the EMPr or this specification. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required.

4.4.2 ESO Administration

Before the contractor begins each construction activity, the ESO shall give to the engineer a written statement setting out the following:

- The type of construction activity.
- Locality where the activity will take place.
- Identification of the environmental aspects and impacts that might result from the activity.
- Methodology for impact prevention for each activity or aspect.
- Methodology for impact containment for each activity or aspect.
- Emergency/disaster incident and reaction procedures.
- Treatment and continued maintenance of impacted environment.

The contractor may provide such information in advance of any or all construction activities provided that new submissions shall be given to the engineer whenever there is a change or variation to the original.

The engineer may provide comment on the methodology and procedures proposed by the ESO, but he shall not be responsible for the contractor's chosen measures of impact mitigation and emergency/disaster management systems. However, the contractor shall demonstrate at inception and at least once during the contract that the approved measures and procedures function properly.

4.5 Communication Procedures on site

Each of the books described below must be available in duplicate, with copies for the ER, ESO and ECO or alternatively an agreement could be reached to use a single system. These books

should be available to the authorities for inspection or on request. Contractor's meeting minutes must reflect environmental queries, agreed actions and dates of eventual compliance. These minutes form part of the official environmental record.

4.5.1 Site instruction entries

The Site Instruction Book entries will be used for the recording of general site instructions as they relate to the works on site. It will also be used for the issuing of stop work orders for the purposes of immediately halting any activities of the contractor in lieu of the environmental risk that they may pose.

4.5.2 ESA diary entries

The purpose of these entries will be to record the comments of the ESA as they relate to activities on the site.

4.5.3 Training

The designated ESO must be conversant with all legislation pertaining to the environment applicable to this contract and must be appropriately trained in environmental management and must possess the skills necessary to impart environmental management skills to all personnel involved in the contract. The contractor shall ensure that adequate environmental training takes place. All employees shall have been given an induction presentation on environmental awareness. Where possible, the presentation needs to be conducted in the language of the employees. The environmental training should, as a minimum, include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities.

In the case of permanent staff, the contractor shall provide evidence that such induction courses have been presented. In the case of new staff (including contract labour) the contractor shall inform the engineer when and how he intends concluding his environmental training obligations.

5. Record Keeping

All records related to the implementation of this management plan (e.g. site instruction book and method statements) must be kept together in an office where it is safe and can be retrieved easily. These records should be kept for a minimum of two years during the construction phase

and inevitably during the operational phase and should at any time be available for scrutiny by any relevant authorities.

It is recommended that photographs are taken of the site **prior to**, **during** and **immediately after construction** as a visual reference. These photographs should be stored with other records related to this EMPr.

5.1 Compliance and penalties

The contractor shall act immediately when a notice of non-compliance is received, and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register, and the response noted with the date and action taken. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define how the environment is managed; therefore, any avoidable non-compliance, dependant on severity, shall be considered sufficient grounds for contact to be made with relevant provincial or national authorities. The responsible provincial or national authorities shall ensure compliance and impose penalties relevant to the transgression as allowed for within its statutory powers.

5.1.1 Environmental Incidents and complaints register

The contractor is required to document all environmental incidents occurring on site in a dedicated Environmental Incident Register, which must be maintained at the site office. Systematic recording of such incidents facilitates the identification of recurring patterns and underlying causes, thereby contributing to the continuous improvement of environmental management practices on site. All recorded incidents must be formally submitted to the Engineer, with the ESO/EO included in the correspondence. The following information must be documented:

- Time, date, location and nature of the incident;
- Corrective actions taken and by whom;
- Comments on the cause of the incident; and
- Signature.

Where remediation is deemed necessary, the PM, in collaboration with the ESO, shall identify and approve appropriate corrective measures.

The contractor must further record any complaints (pertaining to environmental aspects) received from the affected parties in complaints register kept on site. The lodged complaint must be brought to the attention of the PM/engineer and the ESO/EO must be copied in the correspondence. The PM/engineer in consultation with the ESO/EO will respond accordingly. The following information will be recorded:

- Time and date of the complaint;
- Name and contact details of the lodger of complaint;
- Location and nature of the complaint;

- Corrective actions taken and by whom;
- Signature.

5.2 Report availability

Copies of this EMPr must be kept at the construction site office and must be accessible to all senior contract personnel. All personnel working on the project shall be required to familiarise themselves with the contents of this document.

The following list of additional documentation must be kept on site:

- Environmental authorisation;
- Water use license;
- Flora permits / licenses;
- Physical access plan;
- Way leaves, letters of agreements, etc;
- Incident reports;
- Complaints registers;
- Records of all remediation/rehabilitation activities;
- Copies of ECO reports;
- Awareness training materials;
- Service receipts and a waste manifest; and
- Environmental method statements.

5.3 Emergency procedures

The contractor, in coordination with the ESO/EO and the design team, shall develop emergency response procedures aligned with the contractor's construction methodology and the approved design specifications. These procedures must be capable of immediate implementation in the event of an emergency. Designated personnel must receive appropriate training to execute the procedures effectively and must be equipped with the necessary materials, tools, and suitable personal protective equipment (PPE). The following emergency procedures should be addressed by the contractor as a minimum requirement:

- Use of hazardous materials and substances;
- Hydrocarbon and emergency spills;
- Contamination of watercourses from spills;
- Contamination of soils from spills;
- Accidents to employees; and
- Fires.

The procedures need to include:

- Names of key emergency responsible personnel;
- Personnel responsibilities and contact details;

- Contact details of emergency services;
- The location of on-site information on hazardous materials, including Material Safety Data Sheet (MSDS) and spill containment material;
- Procedure to follow to minimise damage and control the emergency; and
- Instructions and contact details for notifying the PM, engineer, local council and nearby residents if necessary.

6. Management of aspects

6.1 Specialist recommendations

The following specialist studies were undertaken for the proposed development:

6.1.1 Terrestrial Biodiversity Impact Assessment

The vegetation on site is severely degraded due to past and current major negative ecological impacts such as the development of the existing WWTW, ongoing waste disposal and the burning thereof. As such, the site is found to be in poor ecological functioning and exhibits a very poor species richness.

The vegetation of the proposed development is barren, and severely degraded, with few native species remaining. The vegetation observed on site shares little to no compositional or structural similarities with the Eastern Gariep Rocky Desert vegetation type. Thus, the vegetation on site disagrees with the vegetation type description (Mucina and Rutherford, 2006). Additionally, it was found that the vegetation is not a good representative of the habitat and therefore does not meet the requirements to be classified as a CBA 1 area. Therefore, the vegetation observed on site does not agree with the findings of the DFFE screening tool report.

No floral SCC or nationally protected species were observed within the proposed development area. Two provincially protected flora were observed within the proposed development area. Despite no confirmed occurrences of these species, there is a probability that some protected species or SCC may occur in areas unaffected by disturbances. However, the likelihood remains low.

The study area's ecological sensitivity is of medium sensitivity. However, the environmental impact assessment in terms of habitat and floral components is expected to be very low, with or without mitigation measures. Thus, the commencement of the proposed development is not expected to influence the environment drastically negatively at the site. However, these influences will be permanent, and care must be taken to minimise the long-term effect of the development on the environment.

6.1.2 Aquatic Impact Assessment

The surface water of the surrounding area is dominated by a small drainage line, which, being directly affected by the WWTW, drains northwards and forms part of a larger, more prominent ephemeral watercourse, T'Goob se Laagte, forming a direct tributary of the Orange River.

T’Goob se Laagte, which is situated more than 500 metres from the site, is therefore unlikely to be directly affected by the WWTW. However, the small drainage line is directly affected by the WWTW and irrigation area and may therefore still have an indirect impact on downstream areas.

The small drainage line consists of a single channel draining from south to. The drainage line, which is approximately 2.3 km long, originates along the large ridge immediately to the south of the site and flows into T’Goob se Laagte, approximately 2 km downstream of the WWTW. In addition, a small portion of the WWTW and a large portion of the irrigation area will be situated within the drainage line, thus resulting in the diversion and disruption of any surface flow within it. Furthermore, the existing waste disposal site also results in significant disturbance of the drainage line, with refuse dumping being common within it, while several dirt track crossings also disrupt its natural flow pattern. This should therefore significantly decrease the anticipated impact of the new WWTW and irrigation area on the drainage line, as it has already been heavily modified. However, should the WWTW be managed as a closed system and the irrigation area accommodate adequate flow through it, this will limit the impact on downstream areas. This is particularly likely, given the arid climate of the area, which limits surface runoff significantly. The proposed WWTW and irrigation area should therefore ensure suitable management to prevent downstream impacts. The drainage line itself is quite small with a poorly defined channel of approximately 1 metre in width, though becoming more prominent immediately downstream of the site. The drainage line is clearly ephemeral in terms of flow and will drain by means of flash floods only after heavy rainfall events (which will occur only very rarely).

In conclusion, impact to watercourses and resource quality small and easily mitigated, thus it is rated Low risk.

6.1.3 Palaeontological and Heritage Impact Assessment

The proposed development area is underlain by palaeontological insignificant lithologies of the Namaqua-Natal Metamorphic Complex, including exposures of Bushmanland Group rocks and Precambrian granites. Valley-floor sediments comprise geologically recent, gritty to gravelly brown topsoils formed from weathered bedrock and Quaternary aeolian sands.

A systematic pedestrian survey confirmed that the more developed superficial deposits along gullies and drainage lines hold a very low likelihood of containing palaeontological heritage resources. The area is therefore not considered paleontologically sensitive. No above-ground evidence of Stone Age archaeological material, prehistoric structures, rock art, marked graves, or other heritage features was identified within the proposed development footprint. The field assessment similarly revealed no buildings older than 60 years, no culturally significant material, and no in situ archaeological deposits. Subsurface archaeological potential is assessed as low, and the occurrence of significant buried artefacts is considered unlikely.

In conclusion, no further heritage mitigation is required, provided that all construction and associated activities remain strictly confined to assessed development footprint.

7. Environmental mitigation specifications for impacts

7.1 Planning/Pre-construction phase

7.1.1 Design and Planning

<table>
<tr><td colspan="3">Impact management outcome:
To ensure the design of the WWTW infrastructure takes the environment into account, and contracts and programmes are in place.</td></tr>
<tr><td colspan="3">Management strategies:

• Assimilate requirements of the EMPr in design and construction management, giving special attention to the impact ratings and suggestions of specialists.
• Ensure all necessary permits, licenses are in place before site establishment commences.
• Construction of new premises must not commence before the plans of the premises and associated specifications have been approved. Compliance with infrastructure requirements should be ensured.
• Any new services system must be designed according to the minimum requirements of the Local Municipality, relevant by-laws and DWS's minimum requirements.
• The developer must provide all contractors with a copy of the EMPr.
• The EMPr must be included as part of the tender documentation thereby making it part of the enquiry document to make the recommendations and constraints, as set out in this document, enforceable under the general conditions of contract.
• A copy of this EMPr must be available on site. The Contractor must ensure that all the personnel on site, sub- contractors and their team, suppliers, etc. are familiar with and understand the specifications contained in the EMPr.</td></tr>
<tr><td>Monitoring Responsible person: EO/ESO/Contractor/Project manager</td><td colspan="2">Monitoring Responsible person: ECO/EO/ESO</td></tr>
<tr><td>Method of implementation</td><td>Frequency</td><td>Evidence of compliance</td></tr>
<tr><td>• Design meets objectives and does not degrade the environment.
• Compile a permits and licences register; obtain and file all approvals (e.g., WUL where applicable, protected species permits);</td><td>• Once-off.</td><td>• Environmental audits by the ECO should be conducted and filed on-site.
• Copies of permits/licences in environmental file.
• ECO verification note/audit record.
• Site establishment sign-off.</td></tr>
</table>

Brief contractor on permit conditions; ensure copies are available on site.		

7.1.2 Appointments and duties of project team

Impact management outcome: To ensure that necessary appointments are made and roles and responsibilities are assigned.		
Management strategies: The Developer must appoint an independent ECO who must monitor the contractor's compliance with the EMPr. The contact details for the ECO must be completed on a pro-forma and a copy kept on site. This document must be made available to the approving authority on request. Before construction activities commence, role players must have a clear indication of their role in the implementation of this EMPr as indicated in Section 2. Subcontractor(s) contracts with the principal contractor must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMPr. Conduct an initial project briefing/induction with the project team.		
Monitoring Responsible person: EO/ESO/Contractor/Project manager	**Monitoring Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of compliance**
Appoint a competent project team (including Project Manager, ECO, Contractor, etc) with clearly defined roles and responsibilities in writing. Ensure all appointments comply with relevant legislation, contract requirements, and environmental authorisation conditions. Prepare and maintain appointments register, including letters of appointment.	Once-off prior to start; As new appointments are made Update as required	Appointments register including all key project personnel must be filed and kept on site. Copies of signed letters of appointment and acceptance of duties. Induction and project briefing records (including attendance registers) must be filled on-site. Updated appointment records where changes to personnel occur.

• Communicate roles, responsibilities, and reporting lines to all team members prior to commencement of works. • Conduct an initial project briefing/induction to ensure the team understands environmental obligations, permit conditions, and EMPr requirements. • Update appointments and responsibilities as required throughout the project lifecycle, ensuring all changes are formally documented and communicated.		

7.1.3 Method statement

Impact management outcome: To ensure Method Statements are drafted and provided before construction commences.		
Management strategies: • As required, certain method statements for all environmentally sensitive aspects of the work must be provided by the contractor. All activities which require method statements may only commence once the method statements have been approved by the Engineer and or ECO as applicable. • Where applicable, the contractor must provide job-specific training on an ad hoc basis when workers are engaged in activities, which require method statements.		
Monitoring Responsible person: EO/ESO/Contractor/Project manager	**Monitoring Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of compliance**
• Identify all activities requiring method statements (e.g., site establishment, vegetation clearing, earthworks, handling of hazardous substances, working near watercourses). • Contractor to prepare detailed, activity-specific method statements describing procedures, equipment, materials,	• Once-off prior to start; update as required	• Site file containing copies of all method statements accessible on site. • Records of review and approval by the Engineer and ECO (sign-off sheets or correspondence). • Toolbox talk/induction records. • ECO audit reports.

environmental controls, and mitigation measures. - Ensure method statements address all relevant EMPr requirements, permit conditions, and legal obligations. - Submit method statements to the Engineer and Environmental Control Officer (ECO) for review and approval prior to commencement of the relevant activities. - Communicate approved method statements to all relevant site personnel through toolbox talks and inductions. - Keep approved method statements on site at all times. - Review and update method statements as required where site conditions or scope of work changes.		

7.1.4 Establishment of office/camp sites

Impact management outcome: It is important to ensure that the setup of the construction area does not result in excessive environmental degradation and that construction activity is carried out in a manner that minimises environmental impact.
Management strategies: - Choice of site for the Contractor's camp requires the Project Manager's **and ECO** permission and must take into account location of local residents. - Site establishment shall take place in an orderly manner, and all amenities shall be installed at Camp sites before the main workforce moves onto site. - A method statement is required from the Contractor at appointment stage that includes the layout of the camp, management of ablution facilities and wastewater management. - The size of the construction camp should be kept to a minimal size. - Fencing of the campsite and construction area shall be suitably secured to prohibit casual access and promote the safety of staff and on-site persons. - No unauthorised pedestrian or vehicular access shall be allowed into fenced off-limits areas. - Fencing shall be kept neat at all times. The contractor shall be responsible for the maintenance of all fences.

- If temporary fencing is removed temporarily for the execution of work, the contractor shall reinstate it as soon as practicable.
- Breaches in the fencing must be repaired immediately.
- The purpose of the fenced areas is to control construction, and personnel activity within the designated areas and limit unauthorised access.
- No fences or gates that provide access to the site/construction campsite may be cut, lowered, removed or damaged in any way.
- All unattended trenches/ excavations should be demarcated or fenced off.
- All construction activities should be restricted to the authorised areas, and no disturbance shall occur outside of these areas.
- Vehicles and machinery will be maintained to such an extent as to not produce excessive noise and keep within the manufactures noise limitations.
- In cases where facilities are linked to existing sewerage structures, all necessary regulatory requirements concerning construction and maintenance should be adhered to. The facilities must comply with the National Water Act requirements.
- Adequate signage must be provided, and the area must be appropriately secured.
- All formal documentation should be kept at the site office and be made available during monthly audits.
- Adequate parking must be provided for site staff and visitors. This should not inconvenience or serve as a nuisance to neighbours.
- The contractor must attend to drainage of the camp site to avoid standing water and / or sheet erosion.
- Suitable control measures over the Contractor's yard, plant and material storage to mitigate any visual impact of the construction activity must be implemented.
- The contractor is responsible for providing all sanitary arrangements for his and the sub-contractors team. A minimum of one chemical toilet must be provided per 15 persons.
- If mobile chemical toilets become required, the following must be ensured:
  - Locations of where the chemical toilets are to be placed should be communicated and approved by the EAP/ECO.
  - Toilets are located no closer than 100 m to any watercourse or water body.
  - Toilets are secured to the ground to prevent them from toppling due to wind or any other cause.
  - Toilets are placed on the flat ground.
  - No spillage occurs when the toilets are cleaned or emptied, and the contents are managed in accordance with the EMPr.
  - Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out. Toilets are emptied before long weekends and workers' holiday
- Sanitary arrangements must be to the satisfaction of the ECO. The contractor must keep the toilets in a clean, neat and hygienic condition. Toilet paper dispensers must be provided in all toilets. It is the responsibility of the Contractor to ensure all toilets have been supplied with and have an available supply of toilet paper at all times.
- An agreement with a toilet service provider must be undergone to acquire the necessary facilities and services.

- Toilets provided by the contractor must be easily accessible and a maximum of 50 m from the works area to ensure they are utilised. All toilets will be located within the contractor's camp. Should toilets be needed elsewhere, their location must first be approved by the ECO.
- The contractor must ensure that toilets are moved with the labour force.
- The Contractor shall inform all site staff of the use of supplied ablution facilities, and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.
- All formal documentation should be kept at the site office and be made available during monthly audits. This includes:
  - All environmental induction/ awareness training documents.
  - Environmental complaints register/ I&AP register.
  - Environmental emergency procedures.
  - Records of all environmental incidents.
  - A formal agreement with a toilet service provider.
  - Waste management plan and disposal register.
  - Stormwater action plan.
  - The environmental management plan (EMPr).
  - Approved Environmental Authorisation
  - Method Statements.
- The contractor will be responsible for his own security arrangements and shall comply will all site security instructions.

Monitoring Responsible person: EO/ESO/Contractor/Project manager	**Monitoring Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of compliance**
- Construction activities beyond the construction area should be prohibited. - Locations of the construction yard should be approved by the ECO/EAP before establishment. - The number of staff will be ascertained before the commencement of the construction activities to the best of the contractor's abilities, and the relevant resources should be allocated to the staff. - Environmental file with formal documentation must be kept on site and always be available.	- The majority of documents should be compiled before site establishment. - The fencing of the construction yard should be established before the commencement of construction. - The on-site EO/ESO's site visit should take place bi-weekly. - Toilet agreements and the planning of their locations should take place before the commencement of construction activities.	- Environmental file containing all relevant documentation - The toilet service agreement and a regularly updated register of sanitary waste disposal should be kept in the environmental file. - The environmental incidents register should be kept in the environmental file. - Environmental monthly audits by the ECO. - Photographic records.

• An agreement with a toilet service provider must be undergone to acquire the necessary facilities and services. • Locations of where the chemical toilets are to be placed should be communicated and approved by the EAP/ECO. • Site inspection with focus on the environmental conditions should be conducted regularly by the EO/ESO. • A record of all environmental incidents must be kept in the environmental file. • Waste disposal slips should be filed on-site and to the EO/ECO's standard.	• Any environmental incidents should be recorded as soon as they are encountered. • Environmental audits by the independent ECO should take place monthly.	

(For the purpose of the mitigation measures and the implementation thereof, the implementation of the mitigation measures contained within the EMPr <u>remains the sole responsibility of the holder of the EA</u>. However, with guidance from the ECO to the implementing agent / contractor and Holder, the management outcomes will be achieved.)

7.2 Construction phase

7.2.1 Social environmental issues

Impact management:
It is important to minimize any negative perception, by taking proactive measures to prevent any social conflicts or social gaps and to develop a positive attitude within the community of the project.

Management strategies:

- Ensure that all site personnel have a basic level of environmental awareness training.
- Training should be undertaken by a party such as the ECO who has sufficient expertise and knowledge of environmental issues.
- Transparent fair recruitment and procurement practices. The contractor chosen should maximize the involvement of local communities in construction and support activities, to the extent possible, based on available skill levels. Whenever possible, training programmes that will benefit both construction stage skills requirements and long-term employment demand should be developed.
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.
- Priority should be given to the local suppliers of goods and services, which meet requirements of project procurement as far as is possible. In order to optimize the opportunities for local businesses to supply goods and services to the project, the contractor must do a survey of the capabilities of the goods and services that are locally available that are of an acceptable standard and quality and a survey of the capabilities of local construction companies and identify opportunities for local suppliers.
- A public complaint register, and system should be in place to ensure that community complaints are clearly investigated and adequate remedial taken should be instituted.
- Adequate notification should be done to people residing close to where construction activities are taking place especially if they are to be affected by them. In addition, there should be a system of compensation for any damages to infrastructure that may occur.
- It is the contractor's responsibility to provide the site officer with environmental training and to ensure that the site officer has sufficient understanding to pass this information onto the construction staff.
- Environmental awareness posters should be erected on site.
- Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitised to any potential hazards associated with their tasks.
- Unsocial activities such as consumption or illegal selling of alcohol, drug utilisation or selling and prostitution on site shall be prohibited. Any persons found to be engaged in such activities should receive disciplinary or criminal action taken against them.
- Secure the site in order to reduce the opportunity for criminal activity in the locality of the construction site.
- Security personnel and skeleton staff must be supplied with adequate protective clothing, ablution facilities, water and refuse collection facilities, facilities for cooking and heating so that open fires are not necessary.

- The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations.
- The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc.
- Each worker should be required to abide by a Code of Conduct which will limit unsavoury activities in local towns and communities and restrict certain behaviours in the work sites and accommodation.

Monitoring Responsible person: ECO/EO/ESO	**Monitoring Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of compliance**
• Construction areas should be demarcated with tape. Any trenches or open excavations should be cordoned off with netting when inactive. • The contractor is responsible for appointing staff based on fair recruitment practices, and prioritisation should be made to competent individuals within the local community. • Public notification should be made available, in an accessible language, to inform the local community of the commencement of construction activity. • A public complaints register must be compiled, printed out and kept in the environmental file on site in case of any public complaints.	• Any new staff shall receive the same relevant training before they commence with duties. • In the incidence in which there is a period of inactivity of greater than 1 month, re-induction training shall be provided. • Environmental audits by the ECO should take place monthly. • Signage and demarcation should be erected continually throughout the project life cycle.	• An environmental file comprising of the EMPr, Emergency response plan, Fire action plan, emergency contacts and relevant registers must be filed within a file and kept in the construction yard. • The environmental file should be inspected every month by the ECO. • Monthly Environmental audits by the ECO should be conducted and filed on-site. • A register of trained personal and training content must be kept in the environmental file. • A register should be drawn up of any subsequent training (such as reinduction, toolbox talks etc.) and kept in the environmental folder.

7.2.2 Stockpile and Soil Management

Impact management:
Topsoil is conserved, maintained, and reused. it is imperative that careful attention is given to the handling of soils from trenching, to stockpiling and backfilling. This would ensure minimal soil loss through erosion, reduced deterioration of soil quality and would subsequently assist in rehabilitative measures.

Management strategies:

- Exposed soils and slopes must be immediately stabilised with the use of erosion blankets or mulch.
- Immediately after any section of trench is backfilled or any earthworks are completed, the area must be stabilised.
- No stockpiling of soil for more than 4 weeks. Thereafter, monthly cleanups of stockpile vegetation regrowth should be implemented.
- Topsoil (upper 200 – 300 mm) must be stripped, stockpiled (< 2 metres) and re-spread within 3 months to maintain seed-bank integrity.
- Soil stockpiles shall not be higher than 2.5 m or stored for a period longer than one year. The slopes of soil stockpiles shall not be steeper than 1m vertical to 2.5m horizontal.
- No vehicles shall be allowed access onto the stockpiles after they have been placed.
- Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation.
- Dust and erosion of topsoil from runoff must be minimised through appropriate watering and the avoidance of transporting and placing topsoil in areas exposed to high wind or excessively rainy conditions.
- Topsoil stockpiles should be protected, located in flat areas where run-off will be minimised and sediment recoverable, stored out of drainage pathways.
- The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This can include the use of erosion control fabric or grass seeding.
- The contractor shall devise a soil conservation and stockpiling plan, to be approved by the ECO and Engineer, which shall detail:
  - ➢ Stockpile sizes, layout and form;
  - ➢ Means of erosion (wind and water) prevention for stockpiles;
  - ➢ The rehabilitation measures to be taken for the area occupied by the temporary stockpile;
  - ➢ A generic schedule of soil replacement for areas where work has been completed. Soil replacement should preferably run in parallel (where feasible) with the construction process; and
  - ➢ Soil erosion prevention measures for general site use.
- All woody and herbaceous biomass arising from the site clearance should be reused on site in rehabilitation efforts, as far as possible. This may include chipped mulch or brush packing of previously disturbed areas, provide no alien invasive materials are present, for the ECOs approval.
- Topsoil should be stockpiled separately from other soil material and be reused appropriately during rehabilitation.
- Alien vegetation growing on stockpiles must be eradicated. Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use.
- Photographic record must be kept of the topsoil stockpiles.

Responsible person: ECO/EO/ESO	**Monitoring Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**

• A sufficient amount of erosion blankets must be obtained prior to vegetation clearance. • Stockpile locations must be communicated and confirmed with the ECO. • Construction workers must be trained on stockpile condition requirements. • Erosion blankets must be inspected on a daily basis. • Site inspection with focus on the environmental conditions should be conducted regularly by the EO/ESO. • A record of all environmental incidents must be kept in the environmental file.	• Inspection must take place daily. • Environmental audits by the ECO should take place monthly.	• Monthly inspections must be done by the ECO during which the condition of stockpiles is also assessed. • Photographic record. • Clean stockpiles. • Topsoil stored away from other soil.

7.2.3 Fauna and flora

Impact management: Fauna and flora are negatively impacted by the clearance of vegetation, disturbance and gathering/ hunting of flora and fauna by workers.
Management strategies: • Habitat disturbance and vegetation clearance should be restricted to the authorised area. • Removal of indigenous vegetation should be kept to a minimum • As far as is possible, vegetation should be retained to prevent any unnecessary loss of species as well as to prevent soil erosion. • Cleared vegetation should be mulched for use in rehabilitation. • Restore disturbed areas using indigenous species. • If possible, schedule construction outside of migratory seasons to minimise disruption. • Should any SCC be located during construction activities, construction should be halted, and a qualified Botanist should be contacted to perform a search and rescue operation. • All staff should be trained on SCC/protected species, observations of SCC/protected species and the reporting procedure. • Removal or relocation of the SCC is prohibited without the appropriate permits. • The contractor or ECO must educate all staff undertaking the work on the best practice methods and environmentally sensitive areas (general dos and don'ts).

- Environmental induction training and awareness must include aspects dealing in safety with wild animals into and on site. Focus on animals such as snakes and other reptiles that often generate fear by training workers how to move safely away and to whom to report the sighting. Workers should also be informed where snakes most often hide so that they can be vigilant when lifting stones, etc.
- No illicit fires may be allowed during construction.
- No harvesting of plant material should be allowed.
- Hunting/gathering/trapping of fauna by construction workers must not be permitted.
- Limit access routes and vehicle movement to designated paths to prevent habitat fragmentation.
- No off-roading or reckless driving should be allowed.
- Access to and from the development area should be either via existing roads or within the construction zone.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
- An alien invasive species management plan must be drafted if the need for such management emerges.
- Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use.
- Post-development open areas should be revegetated and kept free of exotic plant species by way of an alien and invasive management plan (AIMP).
- Quarterly alien and invasive species monitoring should take place according to the AIMP.
- Limit the removal of vegetation in CBA areas.
- Activities within the CBA area must be strictly limited to what is absolutely required for the development.
- Low-impact development techniques must be utilised.
- Littering should be prohibited.
- Retain natural trees, shrubbery and grass species wherever possible to reduce the chances of erosion.
- Equipment used should be washed down before coming on site, and before leaving to avoid transporting seeds (invasive species) or plant diseases to or from site.
- Establish a designated wash bay area that is not located on open surfaces and is preferably situated away from watercourses.

Responsible person: EO/ESO	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**

• Induction (and reinduction of staff) should include: ➢ Identifying dangerous snakes and reptiles ➢ Procedures when encountering dangerous animals. ➢ If SCC species are observed in the premises. • Contact details of reptile catchers should be obtained prior to the commencement of construction. • Contact information of Botanist and Avifaunal specialist should readily be available on-site. • Demarcations of trenches and excavations shall be inspected every day to ensure that they are still erect. • Site inspection with focus on the environmental conditions should be conducted regularly by the EO/ESO. • A record of all environmental incidents must be kept in the environmental file.	• Any new staff shall receive the same relevant training before they commence with duties. • In the incidence in which there is a period of inactivity of greater than 1 month, re-induction training shall be provided. • The EO/ESO's site inspections should take place weekly. • Any incidents should be recorded as soon as they are encountered. • Environmental audits by the ECO should take place monthly. • Quarterly site inspection for exotic species.	• The environmental incidents register should be kept in the environmental file. • Record of re/induction training should be kept in the environmental file along with the contents of the training. • Environmental audits by the ECO. • Photographic record. • Minimal impact on flora and fauna observed.

7.2.4 Alien invasive species

Impact management: Encroachment, increase, and spread of alien invasive species may occur due to Vehicle movement and distribution of alien invasive plant species.
Management strategies: • All barren/unvegetated spaces cleared during construction, which also includes the creation of topsoil stockpiles should be kept clear of vegetation.

- The works shall be cleared of alien vegetation as identified by the ESO and ECO. An effort must be made to remove the entire root system where after the plant shall be left to dry out on a hard surface that will not facilitate the germination of seed.
- Cleared alien and invasive vegetation should be burned within a controlled area (such as a metal drum) or removed from site and taken to a registered waste facility.
- Equipment brought in for development activities must be thoroughly cleaned pre arrival to avoid the accidental introduction of alien invasive species.
- An alien and invasive management plan should be drafted and implemented.
- Alien and invasive species monitoring and eradication must take place quarterly.

Responsible person: EO/ESO	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**
- Monitoring of construction and operational areas should be undertaken by the EO/ESO to ensure that alien invasive species are not introduced or allowed to proliferate. - Prior to commencement of construction, the site should be surveyed to identify existing alien invasive species, and appropriate eradication measures (mechanical removal or approved herbicide application) should be implemented. - Should alien invasive species be observed during stripping, grubbing, or stockpiling activities, immediate removal and disposal at a licensed facility must be undertaken to prevent spread. - Regular site inspections with a focus on vegetation management should be conducted by the EO/ESO to ensure compliance with the Alien and Invasive Species Regulations under NEMBA. - An alien and invasive management plan should be drafted and implemented.	- The initial alien invasive species survey must be conducted before construction activities commence. - The ESO must be on site to monitor vegetation clearance activities whenever they take place. - The ESO's site inspections with a focus on alien invasive species should take place weekly. - Eradication measures (mechanical removal or herbicide application) must be implemented immediately upon detection of invasive species and supplemented as demand arises. - Any alien invasive species incidents or management actions must be recorded as soon as they are encountered. - Alien and invasive species monitoring and eradication must take place quarterly.	- A record of all alien invasive species management actions, including removal, treatment, and disposal, must be kept in the environmental file. - Environmental audits by the ECO. - Photographic record. - Little to no alien invasives on site.

A record of all alien invasive species management actions, including removal, treatment, and disposal, must be kept in the environmental file.		

7.2.5 Soil erosion

Impact management: Construction activities will require the removal of vegetation cover, potentially resulting in soil erosion and subsequent impacts on surface water quality due to uncontrolled rainwater run-off.
Management strategies: Implement an adequate stormwater and erosion management measures. Limit clearance to within the demarcated areas for development. Limit vegetation removal to essential areas only. Areas which are not planned to be constructed within two (2) months must not be cleared so as to reduce risk of erosion. Install sediment control measures (e.g., silt fences, sediment traps) prior to any earthworks to prevent runoff into adjacent watercourses. The topsoil is regarded as the top 300 mm of the soil profile irrespective of the fertility appearance. Strip and stockpile topsoil separately for later use in rehabilitation; ensure stockpiles are protected from wind and water erosion. Topsoil is to be stripped when it is in as dry a condition as far as possible in order to prevent compaction. The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process. As far as is possible, vegetation should be retained to prevent soil erosion. Cleared indigenous vegetation should be mulched for use in rehabilitation. This is of utmost importance due to the aridity of the region. Revegetate disturbed areas promptly after construction phase, using indigenous plant species. All barren/unvegetated spaces cleared during construction, which also includes the creation of topsoil stockpiles should be kept clear of vegetation. Topsoil should not be accidentally mixed with waste or other contaminants. Scarification of compacted soil should be performed during rehabilitation. Scarification of compacted soil should be performed during rehabilitation. Weed eradication must be initiated at the construction site prior to construction and continued until rehabilitation. Monitor erosion control structures frequently and after heavy rains.

- Implement an adequate stormwater and erosion management measures.
- Avoid topsoil compaction by restricting heavy machinery movement to designated access routes.
- The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This can include the use of erosion control fabric or grass seeding.
- If possible, construction activities must be scheduled for the dry winter months to decrease the risk of erosion during heavy thunderstorms.
- Regular inspection of the footprint and access routes is required to identify erosion, sediment build-up, or preferential flow pathways; corrective actions should be implemented immediately to maintain surface stability.
- Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is reestablished to conditions which are as natural as possible.
- Sedimentation must be minimised with appropriate measures.
- Bare areas must be covered with geotextiles or revegetated to prevent sediments eroding into the watercourses.
- Disturbed areas must be adequately rehabilitated concurrently with, or as soon as practicably possible after, construction.
- In the event that natural revegetation is too slow, an appropriate seed mix, approved by the EAP, must be acquired and utilised to revegetate the area.
- A construction method statement must be compiled and available on site. It must include methods to avoid unnecessary disturbance and prevent material being washed downslope into the drainage line.

Responsible person: EO/ESO/Contractor	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**
- Monitoring of stripping and grubbing activities should take place by the EO/ESO to ensure that no excessive clearance takes place. - The topography should be assessed before construction, and the proper channels to facilitate stormwater drainage should be implemented. - Should it be found that erosion of the stockpiles is taking place, soil stabilisation technologies such as erosion blankets should be implemented.	- The implementation of drainage plans must be prepared before construction activities commence. - The ESO must be on site to monitor clearance activities when they take place. - The ESO's site inspections should take place weekly. - Erosion blankets must be acquired in advance where they are anticipated to be required and supplemented as demand arises.	- Environmental audits by the ECO. - Photographic records of cleared areas, eradication activities, and follow-up monitoring should be maintained. - Ground conditions appear stable.

• Site inspection with focus on the environmental conditions should be conducted regularly by the EO/ESO • A record of all environmental incidents must be kept in the environmental file.	• Any incidents should be recorded as soon as they are encountered.	

7.2.6 Surface and ground water quality

Impact management:
Poor chemical storage and poor waste management practices may lead to the contamination of water sources. Sewage, sanitary effluent and contaminated wastewater runoff have the potential to adversely affect the quality of receiving water bodies unless properly managed.

Management strategies:

- Monitoring and eradication of exotic weeds and invasive species on and around the WWTW should be implemented.
- The drainage line downstream of the site should constantly be monitored for erosion.
- Prevent contamination of water resources by ensuring all fuel, oil, and chemical storage areas are bunded and located away from water bodies.
- Any effluents containing oil, grease or other industrial substances must be collected in a suitable receptacle and treated prior to discharge or removed from the site for appropriate disposal at a recognised facility.
- An adequate storm water management system which should mainly consist of a low berm around the entire perimeter of the WWTW should be implemented.
- Chemical toilet facilities or other approved toilet facilities should be sited in such a way that they do not cause water or other pollution.
- In the event of pollution caused as a result of construction activities, the contractor, according to section 20 of the National Water Act, 1998 (Act No. 36 of 1998) is responsible for all costs incurred by organisations called to assist in pollution control and/or to clean up polluted areas.
- Potable water must, wherever possible, not be used as a means of dust suppression, and alternative measures must be sourced. The use of 'grey' water must be investigated as an alternative. The contractor will be responsible to source this water and obtain the required approvals to utilise this water for the purpose of dust suppression.
- The disturbance caused by construction will also cause susceptible conditions for further establishment of exotics. It is therefore recommended that weed eradication be initiated at the construction site prior to construction and continued until rehabilitation has been completed.
- When excavating through any of the watercourses, the upper 30 cm, or topsoil, should be removed together with the vegetation and stored as sods on the site.

- Where topsoil is perceived to be absent, a seedbank will still be present even if this may only be a few centimetres thick and should still be retained as this will greatly aid in successful rehabilitation.
- The construction site must be inspected for erosion. This is particularly relevant for the banks and steep slopes of affected watercourses. Where erosion is evident this must be remedied.
- Where steep banks occur, and erosion is evidently problematic it is recommended that geotextiles be utilised to stabilise soils. Available options include contouring, berms, gabions and geotextile netting.
- Disturbed areas around the watercourses should be adequately rehabilitated concurrently with the construction process.
- Excavated rock may not be left in heaps and must be removed or distributed evenly over the terrain to represent a natural environment.
- Compacted areas must be ripped.
- The necessary authorisations must be acquired from DWS for the construction of the WWTW that will affect the watercourses in the area. Any water that is used which does not emanate from Municipality supplies must be registered and authorised by the DWS prior to usage commencement.
- The contractor shall promote responsible water use by all personnel.
- The wash water (grey water) collected from the cleaning of equipment on-site should not be left standing for long periods of time as this promotes parasite and bacterial proliferation.
- Grey water should be recycled:
    - Used for dust suppression;
    - Used (reused) to clean equipment.
- Grey water that is not recycled should be removed on a regular basis.
- Washing of personnel or any equipment should not be allowed on site. Should it be necessary to wash construction equipment these should be done at an area properly suited and prepared to receive and contain polluted waters.
- Ensure comprehensive rehabilitation and monitoring of the rehabilitation.

Responsible person: EO/ESO/Proponent/Consulting engineer	**Responsible person: ECO/EO/ESO/EAP**	
Method of implementation	**Frequency**	**Evidence of Compliance**
An adequate storm water management system which should mainly consist of a low berm around the entire perimeter of the WWTW should be implemented.	Management plans must be implemented prior to commencement of the construction activities. The EO/ESO's site inspections should take place weekly.	The environmental incidents register should be kept in the environmental file. Mitigation measures might need to be added to the EMPr at the discretion of the contacted EAP/ECO. Environmental audits by the ECO.

• All drainage areas must be identified and avoided in the placement of site offices, drainage paths and storage areas. • The locations of the site office and placement of areas where there is potential for contamination (batching areas, toilets) must be determined and abide by the stipulated buffer zones and no-go areas before construction commences. • The contact details of contamination remediation experts must be obtained and kept in the environmental file before construction commences. • In the incidence of groundwater or surface water contamination, reports documenting corrective actions and further mitigation measures should be compiled. • Site inspection with a focus on the environmental conditions should be conducted regularly by the EO/ESO. • A record of all environmental incidents must be kept in the environmental file.	• Any incidents should be recorded as soon as they are encountered. • Environmental audits by the ECO should take place monthly.	• Photographic Record • Surface hydrology remains functional.

7.2.7 Altering & impeding watercourses

Impact management: Alteration/Impeding of the flow regimes (volumes and peak flow), which directly impacts the ecological functionality and integrity of the drainage line.
Management strategies: • A construction method statement must be compiled and available on site. It must include methods to avoid unnecessary disturbance and prevent material being washed downslope into the river. • The layout of the WWTW should exclude the drainage line and ensure it maintains flow past the site. • The drainage line should be retained as a natural channel within the irrigation area.

- An adequate storm water management system which should mainly consist of a low berm around the entire perimeter of the WWTW should be implemented. The berm should however not cross over the drainage line but should allow it to still flow past the WWTW and maintain connection to the downstream areas.
- Monitoring of the project activities is essential to ensure the mitigation measures are implemented. Compliance with the mitigation recommendations must be audited by a suitably qualified independent Environmental Control Officer with an appropriately timed audit report.
- All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable.
- Construction must have contingency plans for high rainfall events during construction.
- The contractor or ECO must educate all staff undertaking the work on the best practice methods and environmentally sensitive areas (general dos and don'ts).

Responsible person: EO/ESO/Proponent/Contractor/project manager	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**
• The stormwater management plan must be drawn up by a qualified registered engineer prior to the commencement of activities. • All drainage areas must be identified and avoided in the layout and placement of site offices, drainage paths and storage areas. • Site inspection with a focus on the environmental conditions should be conducted regularly by the EO/ESO. • A record of all environmental incidents must be kept in the environmental file.	• Management plans must be implemented prior to commencement of the construction activities. • The EO/ESO's site inspections should take place weekly. • Any incidents should be recorded as soon as they are encountered. • Environmental audits by the ECO should take place monthly.	• The environmental incidents register should be kept in the environmental file. • Mitigation measures might need to be added to the EMPr at the discretion of the contacted EAP/ECO. • Environmental audits by the ECO. • Photographic Record. • Surface hydrology remains functional.

7.2.8 Historical archaeological and heritage impacts

Impact management: Graves and archaeological material may be discovered during construction activities.
Management strategies:

- Strictly confine the development to the assessed development footprint.
- Should any graves or archaeological material be discovered during site clearance and construction, the construction should be ceased, and a Heritage Specialist should be contacted.
- If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA DAU (Boitshepo Motsodisa/bmotsodisa@sahra.org.za) must be alerted as persection 35(3) of the NHRA.
- If unmarked human burials are uncovered, the SAHRA DAU (Boitshepo Motsodisa/bmotsodisa@sahra.org.za) must be alerted immediately as per section 36(6) of the NHRA.
- If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

Responsible person: EO/ESO/Proponent/Contractor	**Responsible person: ECO/EO/ESO/EAP**	
Method of implementation	**Frequency**	**Evidence of Compliance**
- Keep respective heritage authorities contact information on-site. - Toolbox talks; on-site training	- Before construction commences. - Environmental audits by the ECO should take place monthly. - Induction on what type of historical items may be found and how to manage the situation.	- Photographic records, should there be a chance of finding.

7.2.9 Air quality, noise and vibrations

Impact management:
The main sources of impact on air quality, noise and vibration are mobilisation of equipment, land clearing and earthworks during the construction phase.

Management strategies:

- Only well-maintained vehicles and equipment should be operated on-site, and all machinery should be serviced regularly during the construction stage.
- Avoiding unnecessary simultaneous noisy activities.
- No amplified music shall be allowed at the site.
- Selecting 'quiet' construction equipment and working method and avoiding unnecessary revving and hooting.
- Providing ear protection for activities that are likely to create noise in order to protect worker's health and safety.
- In terms of noise impact for various increases over the ambient, the National Noise Regulations define an increase of 7dB as "disturbing". Noise levels during construction must therefore be kept within 7dB of the baseline data.
- All construction vehicles must be in a good working order to reduce possible noise pollution.
- Development should remain within the authorised area.
- Limit the amount of vegetation clearance.
- Avoid clearing activities during high wind conditions where dust dispersion may impact nearby communities or sensitive receptors.
- Regular inspection and scheduled maintenance of all equipment to ensure that construction vehicles are in good condition, are utilising fuel efficiently and do not smoke.
- Periodically watering the bare surfaces and excavations during construction to keep the dust level down.
- Optimisation of working schedule and work to help minimise several material vehicle mobilization trips.
- Slowing down the vehicles carrying the construction materials, by enforcing speed limit of 30 km/h, to reduce dust generation.
- Normal working hours for operation will be kept to 08:00 - 17:00.
- Properly wrapping the material truck containers with cover to avoid dust spreads on windy days and prohibiting transport of over loaded trucks.
- All forms of dust pollution must be managed in terms of the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965).
- Providing and using the safety equipment such as dust mask for employees who work near the dusty location such as the heavy equipment operators.

Responsible person: EO/ESO/Proponent/Contractor	**Responsible person: ECO/EO/ESO/**	
Method of implementation	**Frequency**	**Evidence of Compliance**
Consideration should be given to minimise noise as far as possible in terms of planning construction activities as well as choice of equipment.	The frequency with which the equipment must be maintained must be determined by the contractor/	A complaints register must be kept in the environmental file, which must be updated in the incidence of complaints.

• Regular maintenance of machinery must be implemented. • Staff must be instructed to abide by the noise minimisation mitigations in this EMPr during induction training. • Site inspection with focus on the environmental conditions should be conducted regularly by the EO/ESO, which should be timed with construction activities to ensure that the EO/ESO remains aware of the general conditions during construction. • A record of all environmental incidents must be kept in the environmental file. • Dust suppression should take place. • Construction on windy days should consider excessive dust generation and how it affects the environment.	EO/ESO in correspondence with the mechanic. • The EO/ESO's environmental condition site visit should take place at least weekly. • Any incidents should be recorded as soon as they are encountered. • Environmental audits by the ECO should take place monthly.	• The environmental incidents register should be kept in the environmental file. • Environmental audits by the ECO. • Photographic record. • Minimal dust generation, noise, or vibrations are evident.

7.2.10 Waste management

Impact management: It is important to manage waste production and handling to prevent environmental contamination strategically.
Management strategies: • The contractors must provide and maintain a method statement for "solid waste management". The method statement must provide information on the proposed licensed facility to be utilised and details must be kept of record keeping for auditing purposes. • Waste must be separated into recyclable and non-recyclable waste, and must be separated as follows: ➢ Hazardous waste: including (but not limited to) old oil, paint, etc., ➢ General waste: including (but not limited to) construction rubble. • Establish designated waste collection and temporary storage areas prior to site establishment. • Any illegal dumping of waste should not be tolerated, this action will result in a fine and if required further legal action will be taken. This aspect must be closely monitored and reported on; proof of legal dumping must be able to be produced on request. • Sufficient closed containers must be strategically located around the construction site to handle the amount of litter, wastes, rubbish, debris, and builder's waste generated on the site. • Bins must be clearly marked for ease of management. • All refuse bins must have a lid secured so that animals or humans cannot gain access.

- Waste should be regularly removed from the site to a registered landfill site. Waste should be transported any an enclosed truck.
- Ensure daily clean ups after construction
- Subcontractor(s) contracts must contain a clause to the effect that the disposal of all construction-generated refuse / waste to an officially approved dumping site is the responsibility of the subcontractor in question and that the subcontractors are bound to the management activities stipulated in this EMPr. Proof of this undertaking must be issued to the ECO.
- All solid and chemical wastes that are generated must be removed and disposed of at a licensed waste disposal site. The contractor is to provide proof of such to the ECO.
- Chemical containers and packaging brought onto the site must be removed for disposal at a suitable site.

Responsible person: EO/ESO/Proponent/Contractor	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**
• A waste management system should be organised by the contractor and EO/ESO in which the waste production pathway is traced from production to disposal, and provisions to ensure that all sufficient utilities and agreements are in place to prevent the spillage of any waste into the environment. This must be done before construction commences. The waste management system must also consider the volume and frequency of waste production, so that waste is not produced in excess of what can be cleared. • Lidded waste receptacles for the different types of waste must be provided on site and emptied frequently to prevent the overflow of waste. • An agreement with subcontractors must be undergone to ensure that they abide by the restrictions on waste disposal outlined in the EMPr.	• The waste management pathway must be established prior to construction activity. • Suitable waste receptacles should be obtained prior to the commencement of construction activities. • Documentation should record the activities related to waste removal of the previous month. • The EO/ESO's environmental condition site visit should take place at least weekly. • Any incidents should be recorded as soon as they are encountered. • Environmental audits by the ECO should take place monthly.	• Waste registers documenting the volume, date and location of waste disposal for both general and hazardous waste kept in the environmental file. • The environmental incidents register should be kept in the environmental file. • Environmental audits by the ECO. • Photographic record. • Site is maintained in a clean condition.

• Site inspection with a focus on the environmental conditions should be conducted regularly by the ESO. • A record of all environmental incidents must be kept in the environmental file.		

7.2.11 Visual Impact

Impact management: Temporary alteration of landscape appreciation and visual deterioration may occur due to construction, generation of construction debris / waste, temporary waste storage areas and removal of vegetation and stockpiles.		
Management strategies: • Construction debris should be removed regularly and not allowed to pile up. • A designated construction waste area should be established. • All domestic waste and construction debris should be removed and transported to a registered waste landfill site. • A Complaints register needs to remain on site in which all complaints raised by the general public is to be filed. • Construction should finish as quickly as possible.		
Responsible person: EO/ESO/Proponent/Contractor/project manager	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**
• Construction activities beyond the construction area should be prohibited. • Locations of the construction yard should be approved by the ECO/EAP before establishment. • Environmental file with formal documentation must be kept on site and always be available.	• The EO/ESO's site visit should take place bi-weekly. • Toilet agreements and the planning of their locations should take place before the commencement of construction activities. • Any environmental incidents should be recorded as soon as they are encountered.	• Environmental file containing all relevant documentation • The toilet service agreement and a regularly updated register of sanitary waste disposal should be kept in the environmental file. • The environmental incidents register should be kept in the environmental file. • Environmental monthly audits by the ECO. • Photographic records.

• Locations of where the chemical toilets are to be placed should be communicated and approved by the EAP/ECO. • Site inspection with focus on the environmental conditions should be conducted regularly by the EO/ESO. • A record of all environmental incidents must be kept in the environmental file.	• Environmental audits by the ECO should take place monthly.	• The site is neat and orderly.

7.2.12 Contamination of land

Impact management: The primary source of impact on the contamination of land is associated with the potential of spills of chemicals and leachable construction materials as well as the improper disposal of general waste. To ensure that the land is not contaminated during such activities the following procedures should be implemented.
Management strategies: • The contractor must provide method statements for the **"handling & storage of oils and chemicals"** and **"emergency spills procedures".** • Material Safety Data Sheets (MSDS) should be kept for all hazardous materials on site. • The storage areas shall be securely fenced and appropriately marked to indicate the goods in the storage. Material Safety Data Sheets should be kept for all hazardous materials on site. • All hazardous substances and stocks such as diesel, oils, detergents, etc., shall be stored in areas with impervious flooring such as concrete and properly bunded. • Storage areas must display the required safety signs depicting "no smoking", "No Naked lights" and "Danger". Containers must be clearly marked to indicate contents as well as safety requirements. • The contractor should ensure that drip pans, and other impervious surfaces, shall be installed in such storage areas with a view to prevent soil and water pollution. • The surface area of the drip trays will be dependent on the vehicle and must be large enough to catch any hydrocarbons that may leak from the vehicle while standing. • All used oils, grease or hydraulic fluids shall be placed in appropriate impervious containers, and these containers will be removed from the site on a regular basis for disposal at a licensed disposal facility or sent for recycling/reuse with a registered facility. • No vehicles may be serviced on site.

- Residues from machinery maintenance and other sources contaminated with hazardous waste should be stored in proper containers that avoid seepage to ground.
- The mixing of concrete must only be done at specifically selected impervious areas to contain run-off into soils, drainage lines and natural vegetation.
- Cleaning of cement mixing and handling equipment must be done using proper cleaning trays.
- The waste management strategy on the construction site should be hinged on the waste hierarchy model of 'reduce, reuse and recycle' waste to reduce the ultimate impact on the environment.
- Volatile waste items such as plastic bags, cement bags, etc. should be temporarily stored in a suitable manner as to prevent it from being dispersed via wind.
- Waste should be regularly removed from the site to a registered landfill.
- All waste management strategies employed by the contractor should comply with environmental / waste management legislation.
- Spill kits must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. Spill kits must be made up of material/product that is in line with environmental best practice.
- Spills should be cleaned up immediately by removing the spillage together with the polluted soil and by disposing of them at a recognised facility.
- The contractor should develop and comply to an on-site specific waste management plan.
- No waste may be buried in an on-site waste pit.
- Construction workers should be sensitised to dispose of waste in a responsible manner and not to litter. Workers should be informed during toolbox talks.
- Seepage into lower soil strata should be prevented by lining the stormwater network.
- The contractors must provide and maintain a method statement for **"cement and concrete batching"**. The method statement must provide information on proposed storage, washing & disposal of cement, packaging, tools and plants.
- The visible remains either of concrete, solid, or from washings, must be physically removed immediately or disposed of as waste to a registered landfill site.
- In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water and Sanitation (DWS) must be informed immediately.

Responsible person: EO/ESO/Foreman	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**

• A waste management system should be organised by the contractor and EO/ESO in which the waste production pathway is traced from production to disposal, and provisions to ensure that all sufficient utilities and agreements are in place to prevent the spillage of any waste into the environment. This must be done before construction commences. The waste management system must also consider the volume and frequency of waste production, so that waste is not produced in excess of what can be cleared. • Monitoring of potential waste should be implemented. • Any waste observed in any form during the inspections should be collected and stored (appropriate to its type) and promptly removed from site. • All staff and personnel must be instructed and educated in proper waste disposal methods for the different potential types of waste produced. • Site inspection with focus on the environmental conditions should be conducted regularly by the EO/ESO. • A record of all environmental incidents must be kept in the environmental file.	• The ESO's site inspections, which should include inspecting for waste should take place weekly. • Any incidents should be recorded as soon as they are encountered. • Environmental audits by the ECO should take place monthly.	• The environmental incidents register should be kept in the environmental file. • An updated waste register. • Monthly environmental audits. • Environmental audits by the ECO. • Photographic record. • No signs of spills, leaks, or soil contamination.

7.2.13 Health and Safety

Impact management: The primary source of health and safety impacts during construction is associated with the use of heavy machinery, working at heights, excavation activities, and the handling of construction materials.
Management strategies:

• The Contractor shall be responsible for the protection of the public and public property from any dangers associated with the construction and operation of the road activities. • All contractors must ensure that they have received occupational health and safety training in terms of the Occupational Health and Safety Act, 1985 (Act 85 of 1993). • All contractors are to operate within the construction regulations of the Occupational Health and Safety Act, 1985 (Act 85 of 1993). • All contractors are to comply with the Occupational Health and Safety Act, 1985 (Act 85 of 1993). • Employees and operations during the construction phase must comply to all the requirements of the Occupational Health and Safety Act, 1985 (Act 85 of 1993). • Training of workers on health and safety must be conducted. • There must be an emergency and site evacuation plan kept on site as well as a licensed driver in case of an emergency • Workers and visitors must wear Personal Protective Equipment (PPE) at all times • All work should be handled in accordance with the Occupational Health and Safety Act, 1993 and adequate safety precautions taken, and suitable sanitation facilities provided in line with the requirements of the Occupational Health and Safety Act. It is the duty of the contactor to ensure that all protective measures against accidents are done. • Any works/activities which may pose a hazard to humans and/or domestic animals are to be protected or cordoned off and, if appropriate, warning signage erected. • Appropriate security is to be provided at the site to protect equipment and provide for a safe construction site and work areas. • Any damage caused because of the construction activities shall be repaired to the satisfaction of the project manager and owner. • The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the National Building Regulations. • The contractor must ensure that all emergency procedures are in place prior to commencing work. Emergency procedures must include (but not be limited to) fire, first aid, chemical spills, contamination of the ground, accidents to employees, use of hazardous substances and materials, etc. • The contractor must ensure that lists of all emergency telephone numbers / contact persons are kept up to date and that all numbers and names are posted at relevant locations throughout the construction site. • Consider additional security measures, such as cameras or alarms, to deter unauthorized access of vandalism. • The nearest emergency service provider must be identified during all phases of the project as well as its capacity and the magnitude of accidents it will be able to handle. The contact details of this emergency centre, as well as the police and ambulance services must be available at prominent locations around the construction site and the construction crew camps.	
Responsible person: EO/ESO/Proponent/Contractor	**Responsible person: ECO/EO/ESO/Health and Safety Officer**

Method of implementation	Frequency	Evidence of Compliance
• All staff must receive training to meet their required responsibilities. • Construction areas should be demarcated with tape. Any trenches or open excavations should be cordoned off with netting when inactive. • Site offices and construction yard must be fenced off with a lockable gate to prevent casual access and ensure safety. • The construction yard and site should be kept neat and clear of construction and general waste, and construction materials should be neatly stored within the construction yard. • Signage indicating construction activities, speed limits, must be erected during construction. • Each worker should be required to abide by a Code of Conduct which will limit unsavoury activities in local towns and communities and restrict certain behaviours in the work sites and accommodation.	• Any new staff shall receive the same relevant training before they commence with duties. • In the incidence in which there is a period of inactivity of greater than 1 month, re-induction training shall be provided. • Environmental audits by the ECO should take place monthly. • Signage and demarcation should be erected continually throughout the project life cycle.	• An environmental file comprising of the EMPr, Emergency response plan, Fire action plan, emergency contacts and relevant registers must be filed within a file and kept in the construction yard. • A register of trained personal and training content must be kept in the environmental file. • A register should be drawn up of any subsequent training (such as reinduction, toolbox talks etc.) and kept in the environmental folder. • Contents of training and toolbox talks should be kept in the environmental folder and be accessible to workers. • The environmental incidents register should be kept in the environmental file. • The environmental file should be inspected every month by the ECO. • Monthly Environmental audits by the ECO should be conducted and filed on-site. • Photographic records.

7.2.14 Handling of emergencies

Impact management: Emergency incidents, while inherently risky, can result in greater secondary impacts.
Management strategies: • The contractor should identify all situations that can lead to emergency situations and provide response strategies. The situations should include fire, first aid and major chemical spill.

- Construction must have contingency plans and measures available to contain impacts caused during high rainfall events during the construction phase.
- Contact details of all departments/ service providers to be contacted in case of an emergency shall be made available to employees.
- An Emergency Response Action Plan (ERAP) must be compiled and approved by the contractor and EO/ESO. This must address accidents, potential spillages, and fires in line with relevant legislation.
- Equipment for dealing with emergencies such as spill kits, firefighting equipment, first aid boxes etc. shall be made available and personnel properly trained in its use.
- All staff on site should be informed and trained on how to handle emergency situations and emergency drills/ rehearsals should be conducted periodically to ensure that staff are prepared.
- Fires will only be allowed in facilities especially constructed for this purpose within fenced Contractor's camps. Wood, charcoal or anthracite are the only fuels permitted to be used for fires. The contractor must provide sufficient wood (fuel) for this purpose.
- Fires within the designated areas must be small in scale so as to prevent excessive smoke being released into the air.
- The contractor must designate a smoking area for the labour force so as to prevent unanticipated incidents of veld fires.
- No wood is to be collected, chopped or felled for fires from private or public property as well as from no-go or sensitive areas within the site and any surrounding natural vegetation.
- Establish procedures for dealing with emergencies related to fence damage, breaches, or other safety incidents.
- All emergencies/ incidents should be reported and distributed to the relevant parties.

Responsible person: EO/ESO/Proponent/Contractor/project manager	**Responsible person: ECO/EO/ESO/**	
Method of implementation	**Frequency**	**Evidence of Compliance**

• The contractor should be in communication with the EO/ESO to identify the nearest Fire Protection Agency and any other departments relevant to the handling and containment of emergencies. • The contact details of all identified departments must be kept in an accessible location to all workers. • A record of all environmental incidents must be kept in the environmental file.	• The contact details of all relevant departments should be obtained before the commencement of construction. • The EO/ESO's site inspections should take place weekly. • Any incidents should be recorded as soon as they are encountered. • Environmental audits by the ECO should take place monthly.	• The public complaints register should be kept in the environmental file. • The environmental incidents register should be kept in the environmental file. • Environmental audits by the ECO. • Photographic record.

7.2.15 Rehabilitation

Impact management: In order to mitigate the inevitable direct and indirect impacts associated with the construction of the proposed development it is necessary to ensure that a practice of constant minimisation of negative impacts and active rehabilitation of completed or affected areas or resources is implemented and monitored.
Management strategies: • Rehabilitation should take place wherever possible throughout the construction phase. • On completion of operations, all temporary buildings, structures or objects on the camp/office site shall be demolished and removed. • On completion of operations, the areas shall be cleared of any contaminated soil, which must be dumped as per the waste management plan. • All infrastructure, equipment, plant, temporary housing and roads and other items used during the construction period will be removed from the site and rehabilitated if necessary. • Waste material of any description, including receptacles, scrap, rubble and tyres, will be removed entirely from the area and disposed of at a registered waste disposal facility. It will not be permitted to be buried or burned on the site. • Topsoil previously stored shall be spread evenly to its original depth over the whole area. • Where soils have been compacted owing to traffic (including foot traffic), the surfaces shall be scarified or ripped to aerate and promote infiltration of water. • Disturbed areas should be left in a safe and stable manner. Preventative measures may be necessary to construct adequate drainage structures including ditches and other structures to facilitate the movement of surface water.

- Photographs of the camp and office sites, before and during the construction and after rehabilitation, shall be taken at selected fixed points and kept on record.
- Proliferation of alien and invasive species is expected in disturbed areas, particularly as these species are already noted to be present within the study site. An alien and invasive management plan should be drafted and implemented. Alien and invasive species monitoring and eradication must take place quarterly and continue for one year after the completion of the development.
- Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use.
- Once construction is completed, all construction waste and debris must be cleared from the site.
- Complete rehabilitation of disturbed areas within 30 days of practical completion.
- Complete earthworks and seeding within 30 days of practical completion.
- At least 80% vegetative cover should be achieved on all rehabilitated surfaces within 1 year of completion of construction, with a preference for indigenous species dominance.
- If a reasonable assessment indicates that the reestablishment of vegetation is unacceptably slow, there may be a need for the soil to be analysed and any deleterious effects on the soil arising from the construction operation to be corrected, and the area to be seeded with a seed mix to the EAP's specifications.
- Following construction, it is important to stabilise any steep, bare areas on the slope and banks via geotextiles and/or revegetation.
- Erosion features that have developed within the aquatic habitat due to the project are required to be stabilised. This may also include the need to deactivate any erosion head cuts/rills/gullies that may have developed.

Responsible person: EO/ESO/Proponent/Contractor/project manager	**Responsible person: ECO/EO/ESO**	
Method of implementation	**Frequency**	**Evidence of Compliance**
- A rehabilitation procedure should be discussed between the applicant, contractor and EO/ESO. - Timelines for rehabilitation should be established in line with timelines for the pipeline to ensure that rehabilitation occurs as soon as practicably possible. - Site inspection with focus on the environmental conditions should be conducted regularly by the ESO.	- Rehabilitation should commence and take place concurrently with construction wherever possible. - The EO/ESO's site inspections should take place weekly. - Any incidents should be recorded as soon as they are encountered. - Environmental audits by the ECO should take place monthly.	- The environmental incidents register should be kept in the environmental file. - The public complaints register should be kept in the environmental file. - Environmental audits by the ECO. - Photographic record.

An alien and invasive management plan should be drafted and implemented. A public complaints register must be compiled, printed out and kept in the environmental file on site in case of any public complaints. A record of all environmental incidents must be kept in the environmental file.		

(For the purpose of the mitigation measures and the implementation thereof, the implementation of the mitigation measures contained within the EMPr remains the sole responsibility of the holder of the EA. However, with guidance from the ECO to the implementing agent / contractor and Holder, the management outcomes will be achieved.)

7.3 Operational phase

7.3.1 Soil erosion

Impact management: Soil erosion may occur due to inadequate storm management measures.		
Management strategies: Regularly inspect stormwater infrastructure and clear debris to maintain functionality during heavy rainfall events. Conduct routine inspections to identify early signs of erosion, such as rills, gullies, or sediment buildup. All observed erosion issues should be rectified immediately. Maintain landscaped areas to ensure continuous root structure and canopy cover, which improves infiltration and reduces surface runoff velocity. Ensure that there is compliance with all national, regional and local legislation with regards to the disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substance or materials.		
Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
Site inspection with focus on the environmental conditions should be conducted regularly by the proponent.	Stormwater infrastructure should be monitored after rainfall events. Routine inspections must be conducted weekly. Erosion blankets must be acquired in advance where they are anticipated to be required and supplemented as demand arises.	Ground conditions appear stable.

7.3.2 Alien invasive species

Impact management: There may be potential re-establishment of alien invasive species due to inadequate management.
Management strategies: Exotic flora may not be introduced for landscaping purposes.

- Identified alien invasive species need to be removed manually. The removal of these species should be in line with relevant municipal and provincial procedures, guidelines and recommendations.
- Cleared alien and invasive vegetation should be burned within a controlled area (such as a metal drum) or removed from site and taken to a registered waste facility
- The removed alien invasive vegetation should be immediately disposed correctly and should not be kept on site for prolonged period
- Native species, and preferably species naturally occurring in the area should be used.
- Regularly monitor the emergence of alien species.

Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
• Should alien invasive species be observed, immediate removal and disposal at a licensed facility must be undertaken to prevent spread. • Regular site inspections with a focus on vegetation management should be conducted.	• The proponent's site inspections with a focus on alien invasive species should take place regularly. • Eradication measures (mechanical removal or herbicide application) must be implemented immediately upon detection of invasive species and supplemented as demand arises.	• A record of all alien invasive species management actions, including removal, treatment, and disposal. • Little to no alien invasives on site.

7.3.3 Waste management

Impact management:
It is important to manage waste production and handling to prevent environmental contamination strategically.

Management strategies:

- Provide clearly marked bins for general and recyclable waste at all operational areas.
- Domestic waste should be collected in designated bins, separated into recyclable and non-recyclable categories, and disposed at a licensed landfill site.
- Train staff on waste segregation.
- Screenings and grit must be stored in a sealed container and must be disposed at a licensed landfill site.
- Sludge must be composted and made available to local farmers or used in the planned communal date palm farm for use as a soil conditioner under controlled conditions.
- Conduct regular site clean-ups.

• Promote waste minimisation. • Maintain a waste register detailing quantities, types, disposal methods, and service providers. • Any hazardous waste must be put in a separate bin and disposed of at a registered waste management facility that specifically deals with handling of hazardous waste.		
Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
• Lidded waste receptacles for the different types of waste must be provided on site and emptied frequently to prevent the overflow of waste. • Sealed containers for grit and screenings must be provided for and emptied frequently.	• Suitable waste receptacles should be obtained prior to the commencement of operational activities. • Sealed containers should be obtained prior to the commencement of operational activities. • Site clean-ups should be conducted regularly.	• Waste registers documenting the date and location of waste disposal for both general and hazardous waste • Site is maintained in a clean condition.

7.3.4 Air quality

Impact management: Foul odour may emanate from the oxidation ponds due to poor management.		
Management strategies: • Maintain aerobic conditions by promoting algae growth. • Use pH control agents if necessary to stabilize pond chemistry and inhibit odor-generating reactions. • Monitor sludge accumulation and schedule regular desludging to prevent anaerobic conditions. • Conduct routine inspections for signs of odor, pond imbalance, or equipment failure. • Maintain good housekeeping to prevent ammonia build up. • Enforce speed limit of 30km/h and optimisation of working schedule to reduce vehicle mobilisation. • Only well-maintained trucks should be operated on-site, and they should be serviced regularly during the operational phase.		
Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**

• Maintain all treatment units and associated infrastructure to minimise the generation and release of air pollutants and odours. • Identify potential sources of air emissions (e.g., inlet works, sludge handling, chemical storage) and implement appropriate mitigation measures. • Implement good housekeeping practices, including regular removal of screenings and sludge, prompt cleaning of spillages, and proper waste handling to prevent odour generation. • Store chemicals and hazardous substances in designated, well-ventilated areas with appropriate containment and handling procedures. • Service vehicles to minimise exhaust emissions. • Train operational staff on air quality management, odour control measures, and emergency response procedures.	• Inspection of infrastructure should occur weekly. • Maintenance and repairs as required. • Continuous implementation of good housekeeping.	• Inspection records must be kept on site. • Maintenance records for all treatment units.

7.3.5 Ground and surface water

Impact management: The overflow, spills and leaks of the ponds may occur due to poor management of the WWTW.
Management strategies: • Ensure that the WWTW does not exceed its capacity which may result in sewage overflow into the drainage line. • The drainage line should be excluded and retained within the irrigation area, to maintain its natural function. • Use HDPE lining for facultative ponds, maturation ponds, evaporation area, and composting area to prevent seepage. • Implement a sludge handling plan that includes safe drying, storage, and disposal or reuse in accordance with the National Waste Management Strategy. • Ensure that the staff is trained on spill response protocols, including bunded chemical storage and containment kits. • Ensure regular inspections for signs of leaks. • Regular maintenance of the ponds should be ensured to prevent leaks. • Maintain a leak logbook documenting inspection dates, findings, actions taken, and follow-up.

- An adequate storm water management system which should mainly consist of a low berm around the entire perimeter of the WWTW should be implemented.
- Optimise fertiliser application to prevent nutrient runoff into watercourses.
- Implement water-efficient irrigation system to reduce excess water use and minimise runoff, which carry pollutants.
- Where possible, adopt organic farming practices to reduce the use of synthetic chemicals that can pollute watercourses.
- Safely store agrochemical, including fertilisers, herbicides, and pesticides in secure, weatherproof facilities to prevent accidental spills or leaks into watercourses.
- Monitoring and eradication of exotic weeds and invasive species on and around the WWTW should be implemented and maintained throughout the operation of the WWTW.
- A monitoring programme should be followed to quantify impacts and recommend mitigation to minimise impacts on the drainage line at the site as well as the downstream system. Such monitoring should also consider groundwater quality monitoring downstream of the site.
- The drainage line downstream of the site should constantly be monitored for erosion, especially where the runoff generated by the irrigation area may result in erosion of the drainage channel.

Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
- Maintain all treatment ponds to prevent leaks, spillages, and contamination of ground and surface water resources. - Ensure all wastewater treatment ponds function optimally to meet required effluent discharge standards at all times. - Regularly inspect ponds and pipelines for leaks, cracks, or failures, and implement immediate repairs where defects are identified. - Implement stormwater management measures. - Ensure proper handling, storage, and disposal of sludge, screenings, and other waste to prevent leachate generation and water contamination. - Store chemicals and hazardous substances in bunded, impermeable areas with sufficient capacity and spill containment measures.	- As per licence conditions. - After significant rainfall. - Inspection of infrastructure: Weekly. - Maintenance and repairs: as required.	- Effluent discharge records and laboratory analysis results. - Monitoring records for influent and effluent. - Inspection and maintenance records for ponds, pipelines and infrastructure. - Sludge and waste handling/disposal records.

• Monitor influent and effluent, in accordance with licence/permit conditions. • Regular quality testing of final effluent prior to irrigation.		

7.3.6 Alteration of hydrology and flow regime

Impact management: Alteration/Impeding of the flow regimes (volumes and peak flow), which directly impacts the ecological functionality and integrity of the drainage line.		
Management strategies: • The drainage line should be excluded and retained within the irrigation area, to maintain its natural function. • Measures to contain impacts caused during high rainfall events must be planned for and available for use. • The WWTW should be operated as a closed system to ensure that the WWTW does not exceed its capacity. • An adequate storm water management system which should mainly consist of a low berm around the entire perimeter of the WWTW should be implemented. The berm should however not cross over the drainage line but should allow it to still flow past the WWTW and maintain connection to the downstream areas.		
Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
• Ensure that treated effluent discharge complies with applicable discharge standards and does not exceed the hydraulic capacity of the receiving environment. • Maintain all ponds, berms, and irrigation infrastructure to prevent leakages, overtopping, or uncontrolled releases into the drainage line. • Implement controlled irrigation practices to avoid over-irrigation, ponding, and subsequent runoff into the drainage line. • Install and maintain stormwater infrastructures.	• Routine inspections: Weekly • Monitoring of drainage line: After significant rainfall. • Maintenance activities: as required • During irrigation cycles.	• Inspection checklists and maintenance logs for ponds, irrigation systems, and stormwater infrastructure. • Water quality monitoring records. • Incident reports and corrective action records. • Surface hydrology remains functional.

Monitor flow patterns and erosion within the drainage line and implement corrective measures (e.g., erosion control structures, revegetation) where required.		

7.3.7 Surface soil contamination

Impact management: Contamination of surface soil due to potential of spills of chemicals and untreated wastewater.		
Management strategies: Ensure that wastewater is treated prior to reuse of irrigating the orchard. Regular sampling of treated effluent to ensure compliance with reuse standards before irrigation. Apply effluent at rates aligned with crop water requirements to prevent over-saturation and leaching. Apply matured compost at agronomically appropriate rates to orchard soils to avoid nutrient overload or salinity build-up. Balance effluent reuse with supplementary fertiliser inputs to avoid nutrient overload. Conduct routine testing of effluent for salinity, nutrient build-up, and heavy metals to detect early signs of contamination. Establish controlled composting site with impermeable bases.		
Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
Ensure that treated effluent used for irrigation complies with applicable standards to prevent accumulation of contaminants (e.g., nutrients, salts, pathogens) in the soil. Implement controlled irrigation practices to avoid over-application, runoff, and ponding. Maintain all treatment infrastructure to prevent leaks, spills, and overflows onto surrounding soils. Proper handling, storage, and disposal of sludge in designated, lined, and approved areas to prevent soil contamination.	Routine inspections: Weekly Monitoring of drainage line: After significant rainfall/monthly. Maintenance activities: as required During irrigation cycles.	Inspection checklists and maintenance logs for infrastructure. Spill/incident reports and records of corrective actions taken. Records of effluent quality used for irrigation. No signs of spills, leaks, or soil contamination.

Implement spill prevention and response procedures, including the availability of spill kits and staff training. Undertake rehabilitation of any contaminated or disturbed areas.		

7.3.8 Health and safety

Impact management: Health and safety impacts during operation is associated with handling of hazardous chemicals and wastewater.		
Management strategies: Conduct induction training for all personnel. Workers and visitors must wear Personal Protective Equipment (PPE) at all times. A lockable storeroom must be designated to store hazardous chemicals. The First Aid kit should be kept on site at all times. Provide site signs warning and informing workers and visitors about different hazards on site. There must be an emergency and site evacuation plan kept on site in case of an emergency.		
Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
Comply with the requirements of the Occupational Health and Safety Act, 1993 and associated regulations. Develop and implement a site-specific Health and Safety Plan. Provide appropriate personal protective equipment (PPE). Ensure safe handling, storage, and use of hazardous substances. Install and maintain safety signage, access control measures, and emergency response equipment (e.g., fire extinguishers and first aid kits).	Continuous implementation of health and safety measures. Servicing of safety equipment (e.g., fire extinguishers, first aid kits): as per manufacturer specifications or at least annually. Training and toolbox talks: During induction of new personnel. In the incidence in which there is a period of inactivity of greater than 1 month, re-induction training shall be provided.	Records of PPE issuance and usage. Training records, attendance registers, and induction documentation. Incident/accident reports and records of corrective actions taken. Maintenance and servicing records of safety equipment.

Maintain good housekeeping practices to prevent slips, trips, falls, and exposure to contaminants. Establish emergency response procedures for incidents. Provide training and awareness programmes for all personnel on health and safety risks, emergency procedures, and incident reporting.		

7.3.9 Employment opportunities

Impact management: The impact is positive, therefore does not require any mitigation measures.		
Management strategies: There should be transparent fair recruitment and procurement practices. Local residences should be prioritised in the recruitment process. The proponent should maximise the involvement of local communities in the operation and support activities, to the extent possible, based on available skill levels. Whenever possible, training programmes that will benefit long-term employment demand should be developed. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.		
Monitoring Responsible person: Proponent	**Monitoring Responsible person: Proponent**	
Method of implementation	**Frequency**	**Evidence of compliance**
Prioritise the employment of suitable individuals from local communities for operational, maintenance, and support roles, where skills are available. Ensure fair and transparent recruitment processes in line with applicable labour legislation. Promote equal employment opportunities.	Recruitment activities: as required, based on operational needs and staff turnover.	Employment records indicating number of staff employed, including local hires. Contracts and procurement records demonstrating use of local suppliers.

(For the purpose of the mitigation measures and the implementation thereof, the implementation of the mitigation measures contained within the EMPr remains the sole responsibility of the holder of the EA. However, with guidance from the ECO to the implementing agent / contractor and Holder, the management outcomes will be achieved.

8. Method Statements

The Contractor shall submit written **Method Statements** for all environmentally sensitive aspects of the work. It should be noted that Method Statements must contain sufficient information and detail to mitigate the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him / her to undertake the works. Work shall not commence until Method Statements have been put in place.

9. Proposed mechanisms for monitoring compliance against the environmental management program and reporting thereon

9.1 Auditing and monitoring

The implementation of the provisions and/or management measures contained in the EMPr will be subjected to monitoring and review to ensure compliance. Reference is made to routine monitoring to verify, assess and report on compliance with the relevant provisions of the EMPr, according to a set performance criterion, provided for in this EMPr. Attention should specifically be given to the monitoring of aspects related to the bio-physical, cultural/heritage and social environment(s).

The ECO must conduct, (at a frequency as determined by the Department and stipulated in the relevant Environmental Authorization (EA), or at the discretion of the PM where no frequency is prescribed) independent environmental audits on the requirements of the EMPr and the EA.

9.2 Non-compliance

It may not always be possible to carry out the mitigation measures as stipulated in this EMPr which may result in future non-compliance. Penalties for non-compliance need to be discussed with the Contractor on appointment. The Contractor must make every effort to ensure that staff members comply with the EMPr and enforce non-compliance penalties. Allowances must be made for the contractor to rectify all non-compliances, prior to issuance of penalties/fine.

The Contractor is deemed NOT to have complied with the EMPr if:

a. Within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of the EMPr confirmed and verified by the ECO;
b. Environmental damage ensues due to non-compliance of EMPr requirements;
c. The Contractor/Employees fails to comply with corrective or other instructions issued by the Developer/Owner within a specific time, and
d. The Contractor fails to respond adequately to complaints from the public in line with requirements of this EMPr.

9.3 Measurement and Payment

It is understood that environmental requirements included in this EMPr will entail costs over and above those of the civil requirements. These include, but are not limited to, the provision for:

- Mitigation and enhancement actions;
- Training and environmental awareness requirements;
- Monitoring;
- Auditing; and
- Corrective actions.

The proponent must recognise this and make provision for it in the budget allocations as well as the tender process. Costing for management action should be done with inputs and advice from appropriate technical members of the project team and relevant EAP who have knowledge of the management actions being recommended as well as practical experience in implementing similar measures and techniques.

”A lump sum must be allocated for the management of “Environmental Specifications” where it is not possible to cost specifically for the requirements of the EMPr.”

10. Conclusion

The EMPr has been developed to provide a comprehensive framework for mitigating potential environmental impacts associated with the proposed development. It identifies potential environmental risks associated with the development and prescribes mitigation and monitoring measures to prevent, reduce, or manage adverse impacts on the biophysical and socio-economic environment.

Implementation of the EMPr is mandatory and binding on all contractors, subcontractors, and personnel involved in the project. The success of this programme will depend on effective communication, ongoing environmental awareness training, and rigorous monitoring and auditing procedures. Roles and responsibilities have been clearly defined to facilitate accountability and ensure that corrective actions are promptly undertaken where necessary.

The EMPr must be treated as a living document, subject to regular review and amendment in response to site-specific conditions, audit findings, and changes in legal or technical requirements. Through diligent application of this EMPr, the WWTW project can proceed in a manner that is environmentally responsible, socially acceptable, and aligned with the principles of sustainable development. The commitment to environmental stewardship, as demonstrated through this EMPr, reflects the proponent’s dedication to sustainable development and responsible resource management.



ANNEXURE D

KHÂI-MA LOCAL MUNICIPALITY

PREFERENTIAL PROCUREMENT POLICY

KHAI-MA LOCAL MUNICIPALITY

PREFERENTIAL PROCUREMENT POLICY

APPROVED BY COUNCIL ON (DATE): _____31 MAY 2024_____

COUNCIL RESOLUTION NR: _____

IMPLEMENTATION DATE: ___1 JULY 2024_____

PREFERENTIAL PROCUREMENT POLICY adopted in terms of section 2 of the Preferential Procurement Policy Framework Act, No. 5 of 2000 and the Preferential Procurement Regulations, 2022

PREAMBLE

WHEREAS the Khai-Ma Local Municipality aims to improve the quality of life of the local community and to free the potential of each person within a framework of facilitating service delivery, through effective governance and the Council considers the need for transparent procedures that give the effect to the principle of preferential procurement.

AND WHEREAS local economic development plays a crucial role in creating a prosperous, equitable, stable and democratic society and the overall national vision of economic development is one of decent work and living standards for all in the context of qualitative improved equality in ownership, skills and access to opportunities.

NOW THEREFORE the Council of the Khai-Ma Local Municipality resolves in terms of section 2 of the Preferential Procurement Policy Framework Act, No. 5 of 2000 that the principles embodied in the Preferential Procurement Regulations, 2022 are herewith integrated into the Khai-Ma Local Municipality's Preferential Procurement Policy to form the basis of the evaluation criteria for quotations and competitive tenders.

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1. Definitions

In this policy, unless the context indicates otherwise, a word or expression to which a meaning has been assigned in the Act must bears the same meaning, and:

"Acceptable Tender"	mean any tender which, in all respects, complies with the specification and conditions of tender as set out in tender document
"all applicable taxes"	includes Value-Added Tax, Pay-as-you-Earn, Income Tax, Unemployment Insurance Fund Contributions and Skills Development Levies;
"black designated groups"	has the meaning assigned to it in the codes of good practice issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;
"black people"	has the meaning assigned to it in section 1 of the Broad-Based Black Economic Empowerment Act;
"Comparative price"	means the price after the factors of a non-firm price and all unconditional discounts that can be utilised have been taken into consideration;
"Contract"	means the agreement that results from the acceptance of a tender by the Khai-Ma Municipality;
"designated group"	means- (a) black designated groups; (b) black people; (c) women; (d) people with disabilities; or (e) small enterprises, as defined in section 1 of the National Small Enterprise Act, 1996 (Act No. 102 of 1996); (f) Black Youth (g) Military veterans (h) Black people living in rural or underdeveloped areas or townships
"designated sector"	means a sector, sub-sector or industry or product designated in terms of National Treasury and DTI Directives.
"Disability"	means in respect of a person, a permanent means, in respect of a person, a permanent impairment of a physical, intellectual, or sensory function, which results in restricted, or lack of, ability to perform an activity in the manner, or within the range, considered normal for a human being.
"EME"	means an exempted micro enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;
"Firm price"	is the price that is only subject to adjustments in accordance with the actual increase or decrease resulting from the change, imposition, or abolition of customs or excise duty and any other duty, levy, or tax, which, in terms of a law or regulation, is binding on the contractor and demonstrably has an influence on the price of any supplies, or the rendering costs of any service, for the execution of the contract;
"Functionality"	means the measurement according to predetermined norms, as set out in the tender documents, of a service or commodity that is designed to be practical and useful, working or operating, taking into account, among other factors, the quality, reliability, viability and durability of a service and the technical capacity and ability of a tenderer;

“Historically disadvantaged individual (HDI)”	means a South African citizen – (1) who, due to the apartheid policy that had been in place, had no franchise in national elections prior to the introduction of the Constitution of the Republic of South Africa,1983 (Act No 110 of 1983); and / or (2) who is a female; and / or (3) who has a disability: Provided that a person who obtained South African citizenship on or after the coming to effect of the Interim Constitution, is deemed not to be an HDI.
“Highest acceptable tender”	means a tender that complies with all specifications and conditions of tender and that has the highest price compared to other tenders.
“Large Enterprises”	is a company with an annual turnover in excess of R50 million.
“Local area”	means the local suppliers and/or service providers that operate within the Municipal area, the district boundaries, and the Northern Cape.
“Lowest acceptable tender”	means a tender that complies with all specifications and conditions of tender and that has lowest price compared to other tenders.
“Market Analysis”	means a technique used to identify market characteristics for specific goods or services
“Municipality”	The Khai-Ma Local Municipality;
“National Treasury”	means the National Treasury established by section 5 of Public Finance Management Act.
"Non-firm prices"	means all prices other than "firm" prices;
“Objective Criteria”	for the purpose of section of 2(1)f of the procurement Act must be criteria other than the additional to criteria relating to equity ownership by HDI’s or whether or not a bidder was located in a particular province or municipal area
“organ of state”	The definition of organ of state in section 1 of the Act in paragraph (a) to (e) includes- • a national or provincial department as defined in the Public Finance Management Act, 1999; • a municipality as contemplated in the Constitution; • a constitutional institution as defined in the Public Finance Management Act; • Parliament; • a provincial legislature. Paragraph (f) of the definition of organ of state in section 1 of the Act includes any other institution or category of institutions included in the definition of “organ of state” in section 239 of the Constitution and recognised by the Minister by notice in the Government Gazette as an institution or category of institutions to which the Act applies. Government Notice R. 501 of 8 June 2011 recognises, with effect from 7 December 2011, all public entities listed in Schedules 2 and 3 to the Public Finance Management Act, 1999, as institutions to which the Act applies. Note should be taken of notices issued from time to time in terms of paragraph (f) of this definition. The application of these Regulations is also subject to applicable exemptions approved in terms of section 3 of the Act.
"Person"	includes reference to a juristic person;
“Policy”	means the Preferential Procurement Policy of the Khai-Ma Local Municipality
“price”	means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;

“QSE”	means a qualifying small business enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;
"Rand value"	means the total estimated value of a contract in Rand, calculated at the time of the tender invitation;
“Region”	means the district and/or Namakwa District Municipality.
“rural area”	means- (a) a sparsely populated area in which people farm or depend on natural resources, including villages and small towns that are dispersed through the area; or (b) an area including a large settlement which depends on migratory labour and remittances and government social grants for survival, and may have a traditional land tenure system;
“Specific goals”	means specific goals as contemplated in section 2(1)(d) of the Act which may include contracting with persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of race, gender and disability including the implementation of programmes of the Reconstruction and Development Programme as published in Government Gazette No. 16085 dated 23 November 1994;
“Stipulated minimum threshold”	means the minimum threshold stipulated in terms of National Treasury and DTI Directives.
"Tender"	means a written offer in the form determined by Khai-Ma Local Municipality in response to an invitation to provide goods or services through price quotations (below R300 000.00, VAT inclusive), competitive tendering process or any other method envisaged in legislation;
“Tender for income-generating contracts”	means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions.
"the Act"	means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000);
“treasury”	has the meaning assigned to it in section 1 of the Public Finance Management Act, 1999 (Act No. 1 of 1999); and
“Youth”	has the meaning assigned to it in section 1 of the National Youth Development Agency Act, 2008 (Act No. 54 of 2008).

2. Introduction

The Constitution of the Republic of South Africa, 1996, provides in sections 152(1)(c) and 152(2) that local government must promote social and economic development and that the municipality must strive within its financial and administrative capacity, to achieve the objects set out in subsection 152(1).

The Constitution provides in section 217 that an organ of state must contract for goods or services in accordance with a procurement system which is fair, equitable, transparent, competitive, and cost

effective and to implement a policy to grant preferences within a framework prescribed by National Legislation.

The Broad-Based Black Economic Empowerment Act, 2003 provides in section 10 that every organ of state and public entity must apply any relevant code of good practice issued in terms of the Act in (b) developing and implementing a preferential procurement policy.

The Preferential Procurement Policy Framework Act, 2000 (Act 5 of 2000)-[PPPFA] was promulgated by the Minister in response to the Constitutional provision and allow for a Municipality to develop a preferential procurement policy and to implement such policy within the PPPFA framework.

Section 2 (1) (d) (i) and (ii) of the Preferential Procurement Policy Framework Act, 2000 refers to specific goals which may include:

(i) contracting with persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis of race, gender or disability.
(ii) implementing the programmes of the Reconstruction and Development Programme (RDP) as published in Government Gazette 16085 dated 23 November 1994.

The RDP (1994), as basis for development in South Africa, was meant to provide a holistic, integrated, coherent socio-economic policy that is aimed at mobilising people and resources to work towards the upliftment of the material and social conditions of local communities to build sustainable livelihoods for these communities.

In terms of Section 2 (1)(d)(ii), the following activities may be regarded as a contribution towards achieving the goals of the RDP, in addition to the awarding of preference points in favour of HDIs (published in Government Gazette No. 16085 dated 23 November 1994):

(i) The promotion of South African owned enterprises.
(ii) The promotion of export orientated production to create jobs.
(iii) The promotion of SMMEs.
(iv) The creation of new jobs or the intensification of labour absorption.
(v) The promotion of enterprises located in a specific province for work to be done or services to be rendered in that province.
(vi) The promotion of enterprises located in a specific region for work to be done or services to be rendered in that region.
(vii) The promotion of enterprises located in a specific municipal area for work to be done or services to be rendered in that municipal area.
(viii) The promotion of enterprises located in rural areas.
(ix) The empowerment of the work force by standardising the level of skill and knowledge of workers.
(x) The development of human resources, including by assisting in tertiary and other advanced training programmes, in line with key indicators such as percentage of wage bill spent on education and training and improvement of management skills; and
(xi) The upliftment of communities through, but not limited to, housing, transport, schools, infrastructure donations, and charity organisations.

3. Application of the policy

- This policy applies to all procurement of goods and services by means of a tender as defined in paragraph 1 above.

- This policy does not apply to public auctions or any other sale or lease of assets where it is not practical to apply a system of preference.

- This policy must be applied concurrently with other legislative prescripts and other policies that regulates the procurement of goods and services by the municipality.

4. Purpose, Objectives and General Requirements

1. **The purpose of this policy is to:**
   a) Provide for categories of preference in awarding of bids.
   b) Provide for the advancement of persons or categories of persons disadvantaged by unfair discrimination; and
   c) Clarify the mechanisms how the above items in paragraph 4 1 (a) and (b) will be implemented.

2. **The objectives to be achieved through this policy is to:**
   a) Promote local labour and/ or promotion of enterprises located in the municipal area.
   b) Promote Small Medium and Micro Enterprises (SMME's), Joint Ventures, Consortiums, and partnerships.
   c) Implement recognised best procurement practises through effective planning, strategic purchasing, and contract management.

3. **The general requirements:**
   a) Any specific goal required for consideration in the bidding process must be clearly determined by the Bid Specification Committee and be defined in the bid documentation, considering prescriptions of the Construction Industry Development Board [CIDB] in respect of construction related contracts.

Table 1: The revised CIDB threshold – effective **16 January 2023** in term of implementation of the SPM

Grade	**Range of tender values, inclusive of VAT**	
	Greater than:	**Less than or equal to:**
1	R0.00	R500 000
2		R1000 000
3		R3000 000
4		R6000 000
5		R10 000 000
6		R20 000 000
7		R60 000 000
8		R200 000 000
9		No Limit

   b) Outputs required will be quantified and will form part of the contractual arrangement upon awarding of the contract.

5. Identification of preference point system

1. The Municipality must, in the tender documents, stipulate —
   a) the applicable preference point system as envisaged in paragraph 6,7, 8 or 9;
   b) and any specific goal as envisaged in section 2(1)(d) and (e) of the Preferential Procurement Act.
2. If it is unclear whether the 80/20 or 90/10 preference point system applies—
   a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that then the highest acceptable tender will be used to determine the applicable preference point system; or
   b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that then the lowest acceptable tender will be used to determine the applicable preference point system.

6. Tenders to be evaluated on Functionality

1. The municipality must state in the tender documents if the tender will be evaluated on functionality.
2. The evaluation criteria for measuring functionality must be objective.
3. The tender documents must specify-
   i) the evaluation criteria for measuring functionality;
   ii) the points for each criteria and, if any, each sub-criterion; and
   iii) the minimum qualifying score for functionality
4. The minimum qualifying score for functionality for a tender to be considered further-
   i) must be determined separately for each tender; and
   ii) may not be so-
   iii) low that it may jeopardise the quality of the required goods or services; or
      - high that it is unreasonably restrictive.
5. Points scored for functionality must be rounded off to the nearest two decimal places.
6. A tender that fails to obtain the minimum qualifying score for functionality as indicated in the tender documents is not an acceptable tender.
7. Each tender that obtained the minimum qualifying score for functionality must be evaluated further in terms of price and the preference point system and any objective criteria envisaged in Section 2(1) (f) of PPPFA 2000.

7. 80/20 preference point system for acquisition of goods or services with Rand value equal to or below R50 million

1) The following formula must be used to calculate the points out of 80 for price in respect of a invitation for a tender with a Rand value above R2000 **up to** R50 million inclusive of all applicable taxes:

$$Ps = 80 \left(1 - \frac{(Pt - Pmin)}{Pmin}\right)$$

Where;

Ps = Points scored for price of tender under consideration.

Pt = Price of tender under consideration; and

Pmin = Price of lowest acceptable tender.

2) A maximum of 20 points may be awarded to a tenderer for the specified goals for the tender.

3) The points scored for the specific goal must be added to the points scored for price and the total must be rounded off to the nearest two decimal place.

4) Subject to section 2(1)(f) of the Act, the contract must be awarded to the tenderer scoring the highest points.

8. 90/10 preference point system for acquisition of goods or services with Rand value above R50 million

1) The following formula must be used to calculate the points out of 90 for price in respect of an invitation for tender with a Rand value above R50 million, inclusive of all applicable taxes:

$$Ps = 90\left(1 - \frac{(Pt - Pmin)}{Pmin}\right)$$

Where;

Ps = Points scored for price of tender under consideration;

Pt = Price of tender under consideration; and

Pmin = Price of lowest acceptable tender.

2) A maximum of 10 points may be awarded to a tenderer for the specified goals for the tender.

3) The points scored for the specific goal must be added to the points scored for price and the total must be rounded off to the nearest two decimal places.

4) Subject to section 2(1)(f) of the Act, the contract must be awarded to the tenderer scoring the highest points.

9. 80/20 preference points system for tenders for income-generating contracts with Rand value equal to or below R50 million

1) The following formula must be used to calculate the points for price in respect of an invitation for tender for income-generating contracts, with a Rand value equal to or below R50 million, inclusive of all applicable taxes:

$$Ps = 80\left(1 + \frac{Pt - Pmax}{Pmax}\right)$$

Where-

Ps = Points scored for price of tender under consideration;

Pt = Price of tender under consideration; and

Pmax = Price of highest acceptable tender.

2) A maximum of 20 points may be awarded to a tenderer for the specific goal specified for the tender.

3) The points scored for the specific goal must be added to the points scored for price and the total must be rounded off to the nearest two decimal places.

4) Subject to section 2(1)(f) of the Act, the contract must be awarded to the tenderer scoring the highest points.

10. 90/10 preference point system for tenders for income-generating contracts with Rand value above R50 million

1) The following formula must be used to calculate the points for price in respect of a tender for income-generating contracts, with a Rand value above R50 million, inclusive of all applicable taxes:

$$Ps = 90\left(1 + \frac{Pt - Pmax}{Pmax}\right)$$

Where;

Ps = Points scored for price of tender under consideration;

Pt = Price of tender under consideration; and

Pmax = Price of highest acceptable tender.

2) A maximum of 10 points may be awarded to a tenderer for the specific goal specified for the tender.

3) The points scored for the specific goal must be added to the points scored for price and the total must be rounded off to the nearest two decimal places.

4) Subject to section 2(1)(f) of the Act, the contract must be awarded to the tenderer scoring the highest points.

11. Points for specific goals to promote economic development

1. The tendering conditions will stipulate the specific goals, as contemplated in section 2(1)(d)(ii) of the Preferential Procurement Policy Framework Act, be attained.

2. A maximum of 20 points (80/20 preference points system) or 10 (90/10) preference points system), will be allocated for specific goals. These goals are:

   a. contracting with persons, or categories of persons, historically disadvantaged by unfair discrimination on the basis **race**.
   b. the promotion of enterprises located in the **local area** (phased in approach to be applied for other RDP goals)

1. Regarding paragraph 12.2 (a) 50% of the 20/10 points will be allocated to promote this goal and points will be allocated in terms of the sworn affidavit as provided by the service provider/supplier.

Therefore, points for specific goals will be allocated as follows:

Specific Goal	**Number of points for Preference [80 / 20]**	**Number of points for Preference [90/10]**
Local Supplier	10	5

Proof of Evidence to submit to claim preference points:

- Where the tenderer is the owner of the property or the business: A Municipal account registered in the name of the tenderer not older than 3 months must be submitted.

- Where the tenderer is not the owner of the property of the business, a valid lease Agreement signed by both parties must be submitted.

- Where the tenderer does not comply to bullet 1 or 2, An Sworn Affidavit must be submitted, stating reason to why not having a Municipal account.

- Please note a tenderer who fail to submit these documents will not claim points for locality.

HDI –Unfairly discriminated by race	Achievement level	Total number of points that may be claimed [80/20]	Total number of points that may be claimed [90/10]
	100% Black Owned	10	5
	75%-99% Owned	8	4
	60%-74% Owned	6	3
	51%-59% Owned	3	2
	0%-50% Owned	0	0

2. A tenderer must submit proof of HDI through a sworn affidavit,
3. CIPC registration document, CSD report, Certified ID copies of directors and
4. BBB-EE certificate or sworn affidavit

5. A tenderer failing to submit sworn affidavit is a non-compliant contributor to HDI may not be disqualified, but-

a) may only score points for price; and
b) scores 0 points out of 10 for HDI status level of contributor, which is in line with section 2 (1) (d) (i) of the Act, where the supplier or service provider did not provide proof thereof.

6. Regarding paragraph 10.2 (b) 50% of the 20/10 points will be allocated to promote this goal. Points will be allocated as follows:

Local area of supplier	Number of Points for Preference	
	80/20	90/10
Within the boundaries of the Khai-Ma Local Municipality	10	5
Within the boundaries of Namakwa District Municipality	6	3
Within the boundaries of the Northern Cape	4	2
Outside of the boundaries of the Northern Cape	0	0

7. Any specific goal for which a point may be awarded, must be clearly specified in the invitation to submit a tender.

8. Procurement up to R30 000 will be limited to the application of goals as per paragraph 12.2 (a) and 12.3 above.

9. A tenderer failing to submit proof of required evidence to claim preferences for other specified goals, which is in line with section 2 (1) (d) (ii) of the Act.

a) may only score in terms of the 80/90-point formula for price; and

b) scores 0 points out of 20/10 of the relevant specific goals where the supplier or service provider did not stipulate.

10. The preference points scored by a tenderer must be added to the points scored for price.

11. The points scored must be rounded off to the nearest two decimal places.

12. The contract must be awarded to the tenderer scoring the highest points.

12. Criteria for breaking deadlock in scoring

1. If two or more tenderers score an equal total number of points, the contract must be awarded to the tenderer that scored the highest points for specific goals.

2. If two or more tenderers score an equal total number of points, the objective criteria in addition to those contemplated in paragraphs (d) and (e) justify the award to the tenderer that scored the highest points in terms in accordance with section 2(1)(f) of the Act.

3. If two or more tenderers score equal total points in all respects, the award must be decided by the drawing of lots.

13. Award of contracts to tenderers not scoring highest points

A contract may be awarded to a tenderer that did not score the highest points only in accordance with section 2(1)(f) of the Act.

14. Remedies

1. If a Municipality is of the view that a tenderer submitted false information regarding a specific goal, it must-

a) inform the tenderer; accordingly, and
b) give the tenderer an opportunity to make representations within 14 days as to why the tender may not be disqualified or, if the tender has already been awarded to the tenderer, the contract should not be terminated in whole or in part—

2. After considering the representations referred to in paragraph 12 (1)(b), the Municipality may—

a) if it concludes that such false information was submitted by the tenderer—
   i) disqualify the tenderer or terminate the contract in whole or in part; and
   ii) f applicable, claim damages from the tenderer.

15. Performance management

The specific goals achieved through the application of the Preferential Procurement Framework Act, 2000 will be monitored in terms of the elements embedded in the Supply Chain Management Policy.

16. Repeal of policy

1. This Policy repeal all previous preferential procurement policies of the municipality in its entirety.
2. Any tender advertised before the date referred to in paragraph 16 must be dealt with in terms of the Preferential Procurement Regulations, 2022.

17. Short title and commencement

This part of the policy is called the Preferential Procurement Policy of the Khai-Ma Local Municipality. This policy will come into effect on **1 September 2024** and will be reviewed at least annually by way of a Council resolution.

Policy was reviewed and approved by council on **31 May 2024**

KHÂI-MA LOCAL MUNICIPALITY
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

ANNEXURE E

BASELINE RISK ASSESSMENT

BASELINE RISK ASSESSMENT
BID NO.: KH01-26/27
CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS

1. Objective

The objective of this baseline risk assessment is to identify the foreseeable occupational health and safety hazards arising from the design, construction, testing, commissioning and handover of the Pella Wastewater Treatment Works, and to establish the minimum controls to be incorporated into planning and execution.

The assessment applies the hierarchy of controls: eliminate hazards where reasonably practicable, then reduce exposure through substitution, engineering and administrative controls, with personal protective equipment used as the final layer of protection.

This baseline assessment informs the Client's health and safety specification and design controls. It does not replace the Principal Contractor's site-specific health and safety plan, construction risk assessments, method statements, safe work procedures or daily task instructions.

1.1 This assessment has been prepared with reference to the Occupational Health and Safety Act, 1993 (Act 85 of 1993), the Construction Regulations, 2014, and other applicable regulations, including the Regulations for Hazardous Chemical Agents, 2021, Regulations for Hazardous Biological Agents, 2022, Ergonomics Regulations, 2019, General Safety Regulations, Driven Machinery Regulations, Electrical Installation Regulations and Noise-Induced Hearing Loss Regulations, each as amended.

1.2 The assessment shall be reviewed before commencement and at least every six months, and immediately after any design, scope, sequence, method, workforce, plant, material or site-condition change; after an incident or significant near miss; or when monitoring shows that controls are ineffective. The Contractor shall continuously review task risk assessments as construction progresses.

2. 2. Scope of Work

The extent of the works is as follows:

The scope is the development of a baseline risk assessment that addresses all risks pertaining to occupational health and safety as affected by the construction work.

The scope of work for the CONSTRUCTION OF PELLA WASTEWATER TREATMENT WORKS (OXIDATION PONDS).

The Contractor shall provide all management, supervision, labour, materials, plant, and equipment necessary to execute the following activities:

- Site establishment, construction access, survey control, setting out, clearing and preparation of the Site;
- Bulk excavation, cut-to-fill operations, foundation preparation, engineered pond embankments, layerworks and final trimming;
- One inlet works incorporating the required channels, screening, grit handling, flow-control and flow-measurement facilities, together with a dedicated night-soil disposal area and shelter;
- Two reinforced-concrete-lined anaerobic ponds, including inlet and outlet structures, joints, waterstops and associated pipework;
- One Primary Facultative Pond and Two Secondary Maturation Ponds lined with 2.0 mm HDPE geomembrane and protective geotextile as specified and shown;
- One Treated-Effluent Storage Pond, including the specified lining system, inlet, outlet, overflow and drainage arrangements;
- Interconnecting gravity pipelines, fittings, chambers, valves, sluices, penetrations, supports and marker systems;

- Sludge drying beds, underdrainage, filtrate return arrangements, composting area and associated hardstanding;
- Stormwater diversion, collection and discharge measures, including channels, berms, culverts and 100 mm thick hand-packed stone pitching grouted with cement mortar where shown;
- Gravel access roads, internal circulation, turning areas and road drainage;
- An operator's facility comprising an office, store, change room and ablutions, complete with finishes, plumbing, drainage and fittings;
- Solar-powered security/flood lighting complete with foundations, poles, batteries, controls and protection;
- 2.1 m high security fencing, gates and all associated posts, stays and concrete footings;
- A 10 000 litre water tank installed on a 3 m high support stand, including foundations, pipework, valves and fittings;
- Project name board, safety signage, pipeline markers and permanent identification;
- Environmental protection, dust control, erosion control, rehabilitation and final site clearance; and
- Testing, commissioning, operator training, performance demonstration, defects correction, as-built information, operating and maintenance manuals, and handover of the complete facility.

Also refer to the scope of work as per Bill of Quantities in tender document.

3. 3. Risk Analysis Method

The risk analysis considered all the tasks as described in the safe work procedures developed for this specific operation.

3.1 The risk analysis included:

a. Description of the task/system under analysis.

b. Evaluation of each risk by determining the probability of recurrence and severity of each event.

c. Evaluation of current and planned controls, barriers and safeguards.

d. A selected team of personnel were involved to conduct this, on the job, task analysis to determine baseline risk assessment.

4. 4. Determination of Levels of Risk

a. Risks associated with each step in the operational process were considered.

b. The following factors were considered and rated in accordance with the effect it would have on the items described below, should the event occur:

- Threat to the health and safety of a worker.
- Severity of the event.
- Likelihood of the event happening.
- Event consequence.

A risk level was attributed to each event in the following manner:

Low risk = 1-6
Medium risk = 7-15
High risk = 16-25

5. Risk Ranking & Calculation of risk

5.1 Risk Ranking:

CONSEQUENCE:
Fatality, life-threatening event or permanent disability - 5
Major injury or irreversible health effect - 4
Lost-time injury or reversible occupational illness - 3
Minor injury requiring treatment - 2
First-aid case or negligible health effect - 1

PROBABILITY:
Almost certain / frequent - 5
Likely / has occurred on similar work - 4
Possible - 3
Unlikely - 2
Rare - 1

5.2 Calculation of Risk:

Consequence x Probability = Initial Risk Ranking (refer to the risk matrix).

6. Evaluation of Results

High initial risks require immediate design or planning attention. The activity may not commence until an activity-specific risk assessment, method statement and safe work procedure demonstrate that the risk has been reduced as low as reasonably practicable and the required controls, competence, equipment and emergency arrangements are in place.

Control effectiveness shall be verified through inspections, occupational hygiene monitoring where indicated, supervision and consultation with workers. Residual risk shall be recorded in the Contractor's task risk assessment. Work shall stop when conditions differ from the assessment or controls are absent or ineffective.

7. Abbreviations

HIRA - Hazard Identification and Risk Assessment
SWP - Safe Work Procedure
PTW - Permit to Work
DSTI - Daily Safe Task Instruction
SDS - Safety Data Sheet
HBA / HCA - Hazardous Biological Agent / Hazardous Chemical Agent

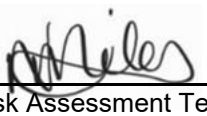
8. Assessment Team

The following people were involved in establishing the relevant task groups and analysis.

- N Miles - Risk Assessment Team Leader

9. Task Specific-Risk Assessment

Before each activity starts, the Contractor's appointed competent risk assessor shall prepare and communicate a task-specific risk assessment based on the approved method and actual site conditions. High-risk work requires formal authorisation and verification of controls before commencement. The assessment shall be reviewed when conditions change and after incidents or significant near misses.



Risk Assessment Team Leader

RISK ASSESSMENT TITLE / TASK	**BASELINE RISK ASSESSMENT**
PROJECT NAME	Construction of Pella Wastewater Treatment Works (Oxidation Ponds)
START DATE	To be confirmed by the commencement instruction
RISK ASSESSMENT REFERENCE NO	KH01-26/27
END DATE	11 months from commencement
REVISION STATUS	01
REVISION DATE	30 July 2026
BRIEF DESCRIPTION OF WORK/ACTIVITY	Construction, testing, commissioning and handover of the Pella Wastewater Treatment Works, including oxidation ponds and associated civil, building, mechanical and electrical works.

REQUIRED AND EXISTING CONTROL MEASURES	Available		Adequate		REMARKS
	Yes	No	Yes	No	
Project scope, programme, construction sequence and site layout to be approved and communicated before work starts.	✓				Confirm through approved H&S Plan.
Activity method statements and safe work procedures required for earthworks, excavations, concrete, lifting, HDPE lining, work at height, confined spaces, electrical work, commissioning and tie-ins.	✓				Approve before relevant activity.
Site induction; daily safe task instructions; HIRA, excavation, plant, lifting, temporary works, work-at-height, liner welding, HBA/HCA, confined-space, first-aid and emergency training as applicable.	✓				Competence and attendance records required.
Permit to excavate; confined-space entry; hot work; electrical isolation/lockout; lifting plan; work at height; live sewer tie-in and commissioning permits as applicable.	✓				Permit issuer and close-out records required.
Plant, vehicles, lifting gear, scaffolds, ladders, fall-arrest equipment, portable electrical tools, gas detectors, fire equipment, PPE and first-aid registers.	✓				Pre-use and statutory inspections required.
Emergency, rescue, traffic, environmental, waste, spill, severe-weather, public-protection and site-security arrangements.		✓			Test arrangements through inspections and drills.

PROBABILITY LEGEND		CONSEQUENCE / INJURY / LOSS	
5	Almost certain / frequent	5	Fatality, life-threatening event or permanent disability
4	Likely / has occurred on similar work	4	Major injury or irreversible health effect
3	Possible	3	Lost-time injury or reversible occupational illness
2	Unlikely	2	Minor injury requiring treatment
1	Rare	1	First-aid case or negligible health effect

RANKING					
	5	4	3	2	1
5	25	20	15	10	5
4	20	16	12	8	4
3	15	12	9	6	3
2	10	8	6	4	2
1	5	4	3	2	1

HIGH RISK = 16-25 | **MEDIUM RISK = 7-15** | **LOW RISK = 1-6** | **PROB:** Probability | **CON:** Consequence

BASIC PPE REQUIRED FOR TASK	☑ **HARD HAT**	☑ **OVERALL**	☑ **EAR PROTECTION**	DUST MASK / RESPIRATOR
	☑ **SAFETY GLASSES**	☑ **SAFETY FOOTWEAR**	☑ **GLOVES**	☑ **REFLECTIVE VEST**
	☑ **SPECIALIZED PPE**	FALL PROTECTION / LIFE JACKET / CHEMICAL PPE AS REQUIRED		
ADDITIONAL REFERENCES TO TASK	☑ **METHOD STATEMENT**	☑ **SDS**	☑ **PLANNED TASK OBSERVATION**	☑ **SAFE WORK PROCEDURE**
	☑ **WORK INSTRUCTION**	☑ **DAILY SITE TASK INSTRUCTION**	☑ **PERMIT TO WORK**	-

Step No	Activity	Task	Potential Hazards	Risks	Initial Risk			Suggested Control Measures
	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	RANK	Minimum controls to be implemented and verified before the activity may commence
1	Pre-construction and mobilisation	Management and appointments	Persons appointed without verified competence or authority	Unsafe work, regulatory non-compliance and work stoppage	3	5	15	Verify competence and experience; make all OHSA and Construction Regulations appointments in writing; keep acceptances and proof in the H&S file; provide adequate supervision for every work front.
1	Pre-construction and mobilisation	Health and safety planning	Work starts without approved H&S plan, activity method statements or task risk assessments	Uncontrolled exposure to project hazards	4	5	20	Principal Contractor to submit a site-specific H&S plan based on the Client specification and this BRA; approve activity method statements and task risk assessments before work; communicate controls to the workforce.
1	Pre-construction and mobilisation	Induction and communication	Workers, visitors or subcontractors not informed of current hazards	Injury, illness or unauthorised entry into hazardous areas	4	5	20	Site-specific induction before entry; daily safe task instruction; toolbox talks after changes or incidents; maintain training and attendance records; visitors to be escorted and issued required PPE.
1	Pre-construction and mobilisation	Medical fitness	Employees not medically fit for assigned construction work	Illness, loss of control or inability to perform emergency actions	3	5	15	Valid task-specific medical certificates issued by an occupational health practitioner; apply medical surveillance for HBA, HCA, noise, ergonomics, confined-space and fall-risk exposure where indicated.
1	Pre-construction and mobilisation	Emergency preparedness	Delayed response at a remote construction site	Escalation of injury, fire, spill or rescue event	3	5	15	Site emergency plan with tested communication and evacuation arrangements; trained first aiders and stocked first-aid boxes; emergency contacts and route to medical facility displayed; conduct drills, including excavation, confined-space and water rescue scenarios.
1	Pre-construction and mobilisation	Site access and security	Unauthorised public, children or animals enter the site	Contact with plant, excavations, ponds, materials or temporary works	4	5	20	Secure perimeter fencing and controlled gates from establishment; warning signage in suitable local languages; maintain barriers around open excavations and water; provide security and community liaison; close and secure the site after hours.

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1	Pre-construction and mobilisation	Offloading plant, containers and materials	Unstable lifting setup, failed lifting gear or persons under suspended loads	Crushing or struck-by injury	4	5	20	Approved lifting/offloading method; competent operator and lifting team; certified and inspected lifting equipment; firm level setup; exclusion zone and tag lines; no person beneath a suspended load.
1	Pre-construction and mobilisation	Construction traffic	Reversing vehicles, blind spots and uncontrolled interaction with pedestrians	Person struck or vehicle collision	4	5	20	Approved traffic management plan; segregated walkways and one-way routes where practicable; trained banksmen; reversing alarms, lights and mirrors/cameras; speed limits; pre-use vehicle inspections; high-visibility clothing.
1	Pre-construction and mobilisation	Fuel and plant storage	Fuel leak, ignition source or insecure storage	Fire, burns, environmental contamination and property damage	3	5	15	Bunded and locked fuel storage; compatible fire extinguishers; no smoking and controlled ignition sources; drip trays and spill kits; refuel on designated impermeable area; inspect hoses and containers; trained spill response.
2	Survey, setting out and existing services	Service locating and permit to excavate	Unknown underground electrical, water or sewer services	Electrocution, flooding, contamination or service interruption	4	5	20	Obtain service records and written clearances; scan and prove services by safe trial holes; mark services; issue permit to excavate; maintain minimum approach distances; stop work when unidentified services are found.
2	Survey, setting out and existing services	Work near overhead services	Plant boom, load or vehicle approaches overhead conductors	Electric shock, fire or service damage	3	5	15	Confirm line voltage and safe clearance with service owner; install goalposts and warning signs; appoint spotter; restrict plant height and route; isolate or relocate where required; brief operators before work.
2	Survey, setting out and existing services	Survey activities	Survey personnel working in plant routes or on uneven terrain	Struck-by incident, slip or fall	3	4	12	Coordinate survey and plant movements; use high-visibility PPE; establish exclusion zones; maintain radio contact with operators; use safe access routes and stop plant when personnel enter blind spots.
2	Survey, setting out and existing services	Remote and natural site hazards	Snakes, scorpions, insects and unstable natural ground	Bite, sting, allergic reaction or fall	3	4	12	Inspect work areas and stored materials; maintain housekeeping and vegetation control; prohibit handling of wildlife; provide suitable boots and gloves; brief staff on response and emergency transport arrangements.
3	Clearing, grubbing and site preparation	Mechanical clearing	Persons within operating radius of excavator, loader or brush-cutting equipment	Struck-by or entanglement injury	4	5	20	Competent operators; pre-use checks; barricaded plant operating zone; banksman where visibility is restricted; guards fitted; stop equipment before personnel enter the zone.
3	Clearing, grubbing and site preparation	Dust-generating work	Airborne soil and respirable crystalline silica from dry surfaces	Respiratory irritation or occupational disease; reduced visibility	4	4	16	Wet suppression and controlled speeds; minimise drop heights; maintain haul roads; assess HCA exposure and undertake monitoring where indicated; suitable RPE selected and fit-tested; hygiene and medical surveillance as required.

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3	Clearing, grubbing and site preparation	Vegetation removal	Dry vegetation, sparks or hot plant surfaces	Veld or site fire	3	5	15	Fire prevention plan; remove combustibles from hot-work areas; service plant and control exhaust contact; provide extinguishers and water; monitor fire-danger conditions; no uncontrolled burning.
3	Clearing, grubbing and site preparation	Hand tools and brush cutters	Defective tools, flying particles and excessive noise	Cuts, eye injury or hearing damage	3	4	12	Competent users; guards and handles in place; pre-use inspections; maintain safe separation; eye, face, hand and hearing protection; noise risk assessment and monitoring where indicated.
4	Bulk earthworks, pond excavation and embankments	Excavation of ponds and structures	Collapse of unsupported or unsuitable excavation faces	Burial, crushing or entrapment	4	5	20	Competent person to assess ground and excavation method; batter, bench, shore or support faces; inspect before each shift and after rain or disturbance; prohibit work below unstable faces; record excavation inspections.
4	Bulk earthworks, pond excavation and embankments	Open excavations and steep edges	Persons or plant fall into pond or structural excavation	Serious injury or fatality	4	5	20	Physical edge protection and robust barriers at access routes and exposed edges; warning signs and lighting; safe stand-off distances for plant; controlled crossings; fall protection where collective measures cannot eliminate the risk.
4	Bulk earthworks, pond excavation and embankments	Plant on slopes and embankments	Overturning due to slope, soft ground or edge failure	Operator or nearby person crushed	4	5	20	Engineer-approved earthworks sequence and safe slope limits; competent operators; maintain edge stand-off; assess bearing capacity; use seat belts and rollover protection; prohibit unsafe side-slope travel; banksman where required.
4	Bulk earthworks, pond excavation and embankments	Simultaneous earthmoving operations	Collision between scrapers, trucks, compactors and excavators	Crushing, collision or property damage	4	5	20	Activity-specific traffic plan and radio protocol; separate work zones; designated loading and dumping points; one-way movement where practicable; banksmen; speed control and positive communication before approach.
4	Bulk earthworks, pond excavation and embankments	Spoil and material placement	Loads, spoil or equipment placed too close to excavation edge	Edge failure, falling material or plant overturning	4	5	20	Define and enforce stand-off distances based on depth and ground conditions; place spoil on stable ground; provide stop blocks where required; inspect edges; remove loose material.
4	Bulk earthworks, pond excavation and embankments	Layerworks and compaction	Pedestrian contact with compactors or rollers	Crushing or struck-by injury	4	5	20	Exclude pedestrians from compaction zone; competent operators; reversing controls and banksman; defined access routes; stop plant before testing or survey personnel enter the layer.
4	Bulk earthworks, pond excavation and embankments	Layerworks and compaction	Noise, hand-arm or whole-body vibration	Hearing damage, discomfort or musculoskeletal injury	3	4	12	Noise and ergonomics risk assessments; maintained low-vibration plant; exposure-time control and job rotation; hearing protection zones; suitable seating; occupational hygiene monitoring and medical surveillance where required.

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4	Bulk earthworks, pond excavation and embankments	Embankment construction	Poorly compacted, over-steep or saturated fill becomes unstable	Slope failure affecting workers, plant or completed works	3	5	15	Construct to approved drawings and earthworks specification; control moisture, layer thickness and compaction; geotechnical/Engineer inspections and testing; restrict traffic on incomplete slopes; repair erosion immediately.
4	Bulk earthworks, pond excavation and embankments	Stormwater and water ingress	Runoff enters excavations or erodes unfinished embankments	Flooding, collapse, isolation of workers or environmental damage	4	5	20	Install diversion berms and temporary drains early; maintain dewatering capacity; daily weather monitoring; suspend work during unsafe rainfall/runoff; provide safe escape routes; inspect after storms.
4	Bulk earthworks, pond excavation and embankments	Work in high temperatures and sun	Heat stress, dehydration and UV exposure	Illness, reduced concentration or loss of control	4	4	16	Heat-stress plan; potable cool water and shaded rest area; acclimatisation and work/rest regime; schedule heavy work outside peak heat; buddy monitoring; sun protection and emergency response.
4	Bulk earthworks, pond excavation and embankments	Adverse weather	Lightning, strong wind or dust storm	Electric shock, loss of control, airborne material or poor visibility	3	5	15	Weather monitoring and defined stop-work triggers; secure loose materials and plant; stop lifting, liner deployment and exposed work in strong wind; withdraw to safe shelter during lightning; restart only after inspection.
5	Pipelines, trenches, chambers and valves	Trench excavation	Trench side collapse or unstable adjacent structures	Burial, crushing or entrapment	4	5	20	Excavation design and daily inspection by competent person; batter, shore or shield; control surcharge and vibration; safe spoil setback; no entry into an unsupported excavation; emergency procedure.
5	Pipelines, trenches, chambers and valves	Trench access and crossings	Unsafe entry, fall into trench or blocked escape route	Fall injury or inability to escape	3	5	15	Provide secured ladders or stair access at suitable intervals; guarded crossings; barricades and lighting; keep access clear; no jumping across trenches; inspect access daily.
5	Pipelines, trenches, chambers and valves	Pipe delivery and laying	Pipes roll, swing or shift during unloading and placement	Crushing of hands, feet or body	4	5	20	Chock and stack pipes securely; certified lifting accessories and suitable lifting points; tag lines; exclusion zone; competent operator/banksman; no hands beneath suspended or unsupported pipes.
5	Pipelines, trenches, chambers and valves	Pipe cutting and jointing	Rotating tools, sharp edges, hot surfaces or flying particles	Cuts, eye injury or burns	3	4	12	Approved procedure; guarded and inspected tools; stable support; trained operators; eye/face, hand and hearing protection; control hot work and ignition sources.
5	Pipelines, trenches, chambers and valves	Manholes and chambers	Entry into confined space with oxygen deficiency, toxic or flammable atmosphere	Asphyxiation, poisoning or fire	4	5	20	Avoid entry where practicable; confined-space risk assessment and permit; isolate and lock out flows/energy; test and continuously monitor atmosphere; ventilate; trained attendant; communication and retrieval/rescue system; no lone work.

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5	Pipelines, trenches, chambers and valves	Testing pipelines	Stored pressure, failed plugs or uncontrolled release during air/water testing	Impact injury, flooding or property damage	4	5	20	Engineer-approved test method; rated and restrained plugs/fittings; calibrated gauges; establish exclusion zone in line with end caps; gradual pressurisation and controlled depressurisation; inspect joints from a safe position.
5	Pipelines, trenches, chambers and valves	Connection to existing sewer	Contact with sewage, sharps or contaminated aerosols	Infection or occupational illness	4	4	16	HBA risk assessment; isolate/bypass flow where practicable; permit and hygiene procedure; waterproof gloves/boots, face and splash protection; cover cuts; washing and decontamination facilities; appropriate medical surveillance and immunisation advice by OHP.
5	Pipelines, trenches, chambers and valves	Backfilling and compaction	Worker remains in trench while plant places or compacts material	Crushing, entrapment or contact with plant	4	5	20	Clear trench before mechanical backfill/compaction; banksman and positive communication; controlled sequence; suitable compaction equipment; maintain supports until safe removal; inspect service alignment before covering.
6	Reinforced concrete structures	Formwork and temporary works	Inadequate design, erection, support or premature striking	Formwork collapse and crushing	4	5	20	Temporary works designer and competent supervisor appointed; approved drawings and method; inspect foundations, props, ties and access before loading; control pour rate; formal permit to load and strike; exclude unauthorised alterations.
6	Reinforced concrete structures	Reinforcement installation	Exposed starter bars and protruding reinforcement	Puncture or impalement injury	3	5	15	Eliminate exposed ends by design/sequence where practicable; cap or cover protruding bars with approved protection; barricade restricted zones; maintain access and housekeeping.
6	Reinforced concrete structures	Cutting and bending reinforcement	Shear points, sharp ends, flying fragments and manual handling	Cuts, crush injury, eye injury or strain	3	4	12	Guarded bending/cutting equipment; trained operators; stable workbench and exclusion zone; mechanical aids/team lifts; gloves, eye and foot protection; maintain tools.
6	Reinforced concrete structures	Lifting reinforcement and formwork	Unbalanced or poorly rigged load	Falling load or crush injury	4	5	20	Lift plan for complex/heavy loads; competent lifting team; certified lifting points and accessories; tag lines; exclusion zone; secure panels against wind and overturning; no person beneath loads.
6	Reinforced concrete structures	Concrete pumping and placing	Burst line, coupling failure or hose whip	Impact injury or cement exposure	4	5	20	Inspect and secure lines/couplings; restrain end hose; competent pump operator and placing team; exclusion around pipeline bends; controlled start/stop communication; depressurise before clearing blockage.
6	Reinforced concrete structures	Handling wet cement and concrete	Skin or eye contact with alkaline cement	Chemical burn, dermatitis or eye injury	4	4	16	HCA assessment and current SDS; waterproof gloves/boots, long clothing and eye/face protection; prevent concrete entering boots/gloves; clean water and eyewash; wash promptly; no kneeling in wet concrete.

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6	Reinforced concrete structures	Work at pond walls and structure edges	Unprotected fall edge or opening	Serious fall injury or fatality	4	5	20	Plan permanent guarding into construction sequence; install compliant temporary edge protection and covers; fall-protection plan and rescue procedure; approved anchor points and fall arrest only where collective protection is not practicable.
6	Reinforced concrete structures	Scaffolds and access platforms	Incorrect erection, overloading or missing components	Collapse or fall from height	4	5	20	Comply with approved scaffold system and SANS 10085 where applicable; competent erector and inspector; stable base, ties, guardrails and toe boards; scaffold tag and daily pre-use check; control loading and access.
6	Reinforced concrete structures	Ladders	Damaged, unsecured or incorrectly positioned ladder	Fall from height	3	5	15	Use scaffold/platform for sustained work; inspect and register ladders; secure top and base; correct angle and extension; maintain three points of contact; prohibit carrying heavy items while climbing.
6	Reinforced concrete structures	Precast covers and embedded items	Heavy cover or component shifts during positioning	Crushing of hands/feet or falling object	3	5	15	Use designed lifting points and suitable mechanical lifting aid; verify weight and lifting capacity; use tag lines and hands-off positioning tools; exclusion zone; secure item against movement after placement.
7	HDPE geomembrane and geotextile lining	Anchor trench preparation	Collapse, open trench or loose edge material	Entrapment, fall or struck-by injury	3	5	15	Batter/support trench as required; barricade and provide safe access; keep spoil and rolls clear of edge; inspect before work; backfill progressively after approved installation.
7	HDPE geomembrane and geotextile lining	Handling liner rolls	Roll movement, failed lifting attachment or pinch points	Crushing or hand injury	4	5	20	Manufacturer-approved spreader bar/core attachment; competent operator and banksman; chock stored rolls; exclusion zone; tag lines and pinch-point awareness; no person under suspended rolls.
7	HDPE geomembrane and geotextile lining	Deployment in wind	Large sheet catches wind and moves uncontrollably	Workers dragged, struck or thrown; liner damage	4	5	20	Liner contractor wind-speed limits and stop-work criteria; weather monitoring; deploy manageable panels with adequate ballast; clear escape routes; no deployment during gusty/unsafe conditions.
7	HDPE geomembrane and geotextile lining	Work on lined slopes	Smooth liner, steep gradient or loose geotextile	Slip or fall down slope	4	5	20	Approved access and work sequence; limit persons on slope; clean, dry footwear and liner; temporary lifelines/fall restraint where required; prohibit work on wet or excessively windy slopes; rescue plan.
7	HDPE geomembrane and geotextile lining	Hot wedge and extrusion welding	Hot surfaces, molten polymer and heated tools	Burn injury or fire	3	4	12	Trained and authorised welders; guarded and maintained welding equipment; heat-resistant gloves and suitable clothing; hot-tool stands; fire extinguisher; controlled cooling and storage.

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7	HDPE geomembrane and geotextile lining	Liner welding and preparation	Fumes, smoke or solvent/cleaner vapours	Respiratory or eye irritation	3	4	12	Use only approved products with SDS; maximise natural ventilation; prohibit uncontrolled solvents; HCA assessment; suitable eye protection and RPE where assessment requires; keep ignition sources controlled.
7	HDPE geomembrane and geotextile lining	Movement on completed liner	Loose tools, sharp footwear or unprotected equipment damages liner	Trip/fall and loss of containment integrity	3	3	9	Soft-soled clean footwear; tool control and protective mats; designated walk routes; no vehicle/plant on liner unless approved; immediate inspection and repair of damage; housekeeping.
7	HDPE geomembrane and geotextile lining	Seam testing	Pressurised air channel, vacuum box or electrical testing equipment	Stored-energy, electrical or trip injury	3	4	12	Manufacturer-approved test procedure; trained technician; calibrated and inspected test equipment; pressure limits; controlled release; dry electrical connections and cable management; record results.
7	HDPE geomembrane and geotextile lining	Connections and penetrations	Work in narrow structures or below suspended pipework	Confined-space exposure, falling object or crush injury	3	5	15	Assess whether confined-space controls apply; isolate flows; safe access and ventilation; support pipework independently; lifting exclusion zone; competent supervision and rescue provision.
8	Inlet works, night-soil facility and sludge areas	Open channels, chambers and water-retaining structures	Unprotected edge or opening	Fall, drowning or serious injury	4	5	20	Install permanent guardrails, covers and safe access as construction progresses; use temporary edge protection until permanent systems are complete; secure openings; provide rescue equipment near water during testing/operation.
8	Inlet works, night-soil facility and sludge areas	Screens, gratings and metalwork	Sharp edges, dropped gratings and pinch points	Cuts, crush injury or fall through opening	3	4	12	Deburr and cap edges; mechanical handling for heavy gratings; secure covers immediately; gloves and safety footwear; barricade opening during installation; verify load rating and seating.
8	Inlet works, night-soil facility and sludge areas	Contact with sewage or sludge	Hazardous biological agents, sharps and contaminated surfaces	Infection, illness or skin/eye exposure	4	4	16	HBA risk assessment and exposure control plan; avoid direct contact and aerosols; waterproof PPE and face protection; handwashing, showers and decontamination; prohibit eating in contaminated zone; safe sharps procedure; medical surveillance where indicated.
8	Inlet works, night-soil facility and sludge areas	Sewage gases	Hydrogen sulphide, methane or oxygen-deficient atmosphere in channels/chambers	Poisoning, asphyxiation or fire	4	5	20	Treat enclosed or poorly ventilated spaces as confined spaces; gas test before and during work; ventilate and isolate inflows; intrinsically safe equipment where required; attendant, communication and rescue system; no lone work.
8	Inlet works, night-soil facility and sludge areas	Night-soil discharge	Vehicle movement, splashing and uncontrolled discharge	Person struck, biological exposure or spill	3	5	15	Controlled one-way vehicle access and wheel stops; operator remains within designated safe zone; splash screens and hose/connection control; washdown point draining to treatment system; signage, hygiene and spill response.

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8	Inlet works, night-soil facility and sludge areas	Cleaning and washdown	Wet slippery surfaces and contaminated spray	Slip, fall or biological exposure	4	4	16	Non-slip surfaces and drainage; low-splash cleaning method; segregate area; waterproof PPE with face protection; protect electrical equipment; clean from safe position; wash and disinfect tools.
9	Stormwater, stone pitching and access roads	Handling rock and stone	Heavy, irregular or sharp material	Hand/foot injury or musculoskeletal strain	4	3	12	Mechanical handling where practicable; select manageable stone sizes; team lifting and ergonomic assessment; stable gloves and safety boots; keep hands clear during placement.
9	Stormwater, stone pitching and access roads	Stone pitching on slopes	Loose stone, unstable footing or work below other workers	Slip, falling object or crush injury	3	5	15	Work from stable benches in a controlled sequence; exclude persons below active placement; secure loose stone; safe access; use fall restraint where required; inspect slope after rain.
9	Stormwater, stone pitching and access roads	Mortar and grouting	Cement dust and wet mortar contact	Respiratory, skin or eye injury	3	4	12	Wet mixing or controlled mixer; HCA/SDS controls; gloves, long clothing, eye protection and suitable RPE; washing and eyewash facilities; maintain housekeeping.
9	Stormwater, stone pitching and access roads	Road and culvert construction	Plant interaction, open culverts and unstable excavations	Collision, fall or excavation injury	4	5	20	Traffic management and exclusion zones; safe excavation controls; barricade culverts/openings; competent operators and banksmen; provide temporary access and maintain public route safety.
9	Stormwater, stone pitching and access roads	Temporary drainage	Erosion, wash-away or uncontrolled discharge during storm	Slope failure, flooding or environmental harm	3	5	15	Install diversion and erosion controls before exposing large areas; inspect after rainfall; stabilise outlets; maintain silt controls; keep emergency material and pumps available; repair damage promptly.
10	Operator building, tank, solar lighting and fencing	Masonry and finishes	Manual handling, silica dust and defective hand tools	Strain, respiratory exposure, cuts or eye injury	3	4	12	Mechanical aids/team lifts; wet cutting and dust extraction; HCA assessment for silica and cement; inspected tools; eye, respiratory, hand and foot protection; good housekeeping.
10	Operator building, tank, solar lighting and fencing	Roof and elevated building work	Open edge, fragile surface or falling tools	Fall from height or struck-by injury	4	5	20	Fall-protection plan and rescue procedure; compliant scaffold/edge protection; assessed roof access; secured tools and exclusion zone below; competent supervision; stop work in strong wind.
10	Operator building, tank, solar lighting and fencing	Construction of 3 m tank stand	Temporary instability or incorrect erection sequence	Structural collapse or fall	4	5	20	Engineer-approved design and erection method; temporary bracing; verify foundations and connections; competent supervision and hold-point inspections; edge protection and fall controls; prohibit loading before written approval.
10	Operator building, tank, solar lighting and fencing	Lifting and installing water tank	Tank swings, deforms or falls during lift	Crushing, fall or structural damage	4	5	20	Lift plan based on confirmed mass and wind limits; approved lifting points/spreader; competent lifting team; exclusion zone and tag lines; inspect stand and connections; fill only after approval.

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10	Operator building, tank, solar lighting and fencing	Installing solar poles and panels	Pole/panel dropped or contacts overhead service	Crushing, fall or electric shock	3	5	15	Confirm service clearances; approved lifting/erection method; controlled exclusion zone; fall protection for elevated work; secure panels against wind; competent installers and inspection before release.
10	Operator building, tank, solar lighting and fencing	Batteries and DC equipment	Short circuit, arc, battery electrolyte or incorrect polarity	Burn, eye injury, fire or electrical damage	3	5	15	Manufacturer instructions and SDS; isolate and cover terminals; insulated tools and eye/hand protection; ventilation and secure enclosure; correct fusing; no ignition sources; competent installer.
10	Operator building, tank, solar lighting and fencing	Electrical installation and energisation	Live conductors, damaged temporary supply or absent earth leakage protection	Electric shock or fire	4	5	20	Registered/competent electrical personnel; isolate, lock out and verify dead; compliant temporary distribution with earth leakage; daily portable-tool checks; weatherproof connections; issue required certificate of compliance before use.
10	Operator building, tank, solar lighting and fencing	Security fencing and gates	Sharp wire, post-hole excavations, welding and unstable gate components	Cuts, falls, burns or crush injury	3	4	12	Cap/barricade post holes; gloves and eye protection; hot-work controls; mechanically handle gates; brace until concrete reaches strength; secure sharp wire ends; keep public outside work zone.
10	Operator building, tank, solar lighting and fencing	Plumbing and drainage	Open pipework, wet floors and contaminated connection points	Slip, cut or biological exposure	3	4	12	Isolate existing services; HBA controls for sewer connections; protect openings; non-slip access and housekeeping; inspect/test before concealment; use suitable gloves and eye protection.
11	Hazardous substances, hot work and waste	Hazardous chemical agents	Unlabelled products or missing safety information	Incorrect handling, exposure or incompatible storage	3	4	12	Maintain HCA inventory and current SDS; GHS-compliant labels; HCA risk assessment and training; substitute less hazardous products where practicable; compatible locked storage; exposure monitoring and medical surveillance where indicated.
11	Hazardous substances, hot work and waste	Fuel, oil and lubricants	Leak, spill, vapour or ignition	Fire, skin exposure or soil/water contamination	3	5	15	Bunded storage and drip trays; inspect containers/hoses; keep away from drains and ignition; suitable extinguishers and spill kits; trained response; remove contaminated material to authorised disposal.
11	Hazardous substances, hot work and waste	Hot work, cutting and welding	Flame, sparks, fumes and hot metal	Fire, burn, eye injury or respiratory exposure	4	5	20	Hot-work permit; clear/cover combustibles; fire watch and extinguishers; ventilation/fume control; welding screens; competent welder; correct eye, face, hand and body protection; inspect area after completion.
11	Hazardous substances, hot work and waste	Gas cylinders	Cylinder falls, valve damage, incompatible storage or flashback	Fire, explosion or impact injury	3	5	15	Secure upright cylinders; valve caps during transport; separate incompatible gases; flashback arrestors and inspected hoses; leak tests; move with trolley; keep away from heat and confined spaces.

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11	Hazardous substances, hot work and waste	General and hazardous waste	Poor segregation, sharp waste or illegal disposal	Cuts, infection, fire or environmental harm	3	4	12	Waste management plan; labelled covered containers; segregate hazardous, contaminated and sharp waste; licensed transport/disposal where required; retain disposal records; daily housekeeping; prohibit burning/burying.
11	Hazardous substances, hot work and waste	Portable tools and electrical leads	Damaged guards, cables or uncontrolled use	Cut, entanglement, electric shock or fire	3	5	15	Competent users; pre-use checks and formal registers; guards and dead-man controls; earth leakage protection; keep leads dry and routed away from traffic/water; tag and remove defective equipment immediately.
12	Testing, commissioning and operation interfaces	Filling ponds and hydraulic testing	Deep water, steep lined slopes and unprotected edges	Fall into water and drowning	4	5	20	Commissioning plan and controlled filling sequence; complete guardrails/fencing/access before filling; restrict access; provide life rings, reach poles and rescue plan; no lone work; inspect embankments and liner during filling from safe routes.
12	Testing, commissioning and operation interfaces	Work near filled ponds	Slippery liner or wet concrete surfaces	Slip, fall into water or inability to exit	4	5	20	Prohibit walking on wet liner; physical barriers and designated access; non-slip platforms and stairs; rescue equipment and trained team; adequate lighting; work in pairs.
12	Testing, commissioning and operation interfaces	Introduction of sewage	HBA exposure through splash, aerosol or contaminated surfaces	Infection or occupational illness	4	4	16	Commissioning HBA risk assessment; controlled flow introduction; hygiene zoning and decontamination; waterproof PPE and face protection; washing/shower facilities; medical surveillance and immunisation advice by OHP where indicated.
12	Testing, commissioning and operation interfaces	Chambers and flow-control structures	Sewage gases or oxygen deficiency	Poisoning or asphyxiation	4	5	20	No entry without confined-space permit; isolate flows; atmosphere testing and continuous monitoring; ventilation; attendant and retrieval system; rescue equipment and trained rescue team.
12	Testing, commissioning and operation interfaces	Valves, sluices and gates	Unexpected movement, pinch points or high operating force	Crush, hand injury or strain	3	4	12	Guard pinch points; verify correct installation and mechanical stops; use specified operating tools; controlled commissioning sequence; ergonomic assessment; keep non-essential persons clear.
12	Testing, commissioning and operation interfaces	Electrical and solar energisation	Unexpected energisation or incorrect circuit	Electric shock, arc or fire	4	5	20	Formal energisation and lockout/tagout procedure; competent authorised person; verify insulation, earthing, polarity and protection; controlled access; update labels and as-built information; certificate of compliance.
12	Testing, commissioning and operation interfaces	Operator training and handover	Operator unfamiliar with hazards, controls or emergency systems	Unsafe operation, delayed response or public exposure	3	5	15	Provide practical training on process, HBA/HCA, confined spaces, electrical isolation, fall/water rescue, PPE, sampling and emergency response; issue O&M manuals and registers; verify competency and sign handover.

Step No	Activity	Task	Potential Hazards	Risks	Initial Risk			Suggested Control Measures
	List activity steps	List task steps	Potential dangers that could cause harm. List the potential hazards	Potential Risks due to Hazard	PROB	CON	RANK	Minimum controls to be implemented and verified before the activity may commence
12	Testing, commissioning and operation interfaces	Permanent safety features	Missing guardrails, covers, fencing, signage, lighting or rescue equipment	Falls, drowning, unauthorised access or unsafe maintenance	4	5	20	Pre-handover safety inspection against drawings, OHSA duties and Client specification; complete permanent edge protection and safe access at inlet works, chambers, pond interfaces and elevated platforms; secure all ponds; rectify defects before operation.
13	Demobilisation and close-out	Disconnecting temporary services	Uncontrolled electrical, water or sewer energy	Electric shock, flooding or contamination	3	5	15	Approved isolation and disconnection method; authorised competent persons; lockout/tagout and verify isolation; cap and identify services; update records; obtain required certificates.
13	Demobilisation and close-out	Loading plant, containers and surplus material	Failed lifting gear, unstable loads or people in loading zone	Falling load, crush injury or road incident	4	5	20	Lift/loading plan; certified equipment and competent operators; exclusion zone and tag lines; secure and inspect loads; roadworthy vehicles; comply with abnormal-load requirements where applicable.
13	Demobilisation and close-out	Traffic leaving site	Mud, debris, unsecured loads or uncontrolled public-road entry	Vehicle collision or injury to road users	3	5	15	Clean wheels and road surface; secure loads; traffic marshal at site exit; warning signs; roadworthy checks; comply with speed and route restrictions.
13	Demobilisation and close-out	Final reinstatement	Open holes, unstable ground, waste or incomplete barriers remain	Public injury, environmental damage or unsafe operation	4	5	20	Close and compact excavations; remove temporary works and waste; reinstate drainage and erosion protection; complete fencing, covers, guardrails and signage; joint close-out inspection; hand over H&S file and outstanding-risk register.