NEC3 Term Service Contract (TSC3)

Between **ESKOM HOLDINGS SOC Ltd**
(Reg No. 2002/015527/30)

and **[Insert at award stage]**
(Reg No. _____)

for **Lab and Pilot testing of Dynamic Filtration on various Eskom wastewater supplies at various Eskom sites**

Contents:		**No of pages**
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Part C3	**Scope of Work**	**[●]**

CONTRACT No. **[Insert at award stage]**
VENDOR No.

PART C1: AGREEMENTS & CONTRACT DATA

Contents:

		No of pages
C1.1	**Form of Offer and Acceptance**	**[3]**
	[to be inserted from Returnable Documents at award stage]	
C1.2a	**Contract Data provided by the *Employer***	**[6]**
C1.2b	**Contract Data provided by the *Contractor***	**[18]**
	[to be inserted from Returnable Documents at award stage]	

C1.1 Form of Offer & Acceptance

Offer

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract for the procurement of:

Lab and Pilot testing of Dynamic filtration on various Eskom wastewater supplies at various Eskom sites

The tenderer, identified in the Offer signature block, has examined the documents listed in the Tender Data and addenda thereto 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.

Option A	The offered total of the Prices exclusive of VAT is	
	Sub total	
	Value Added Tax @ 15% is	
	The offered total of the amount due inclusive of VAT is[1]	
	(in words)	

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 including the Schedule of Deviations (if any) to the tenderer before the end of the period of validity stated in the Tender Data, or other period as agreed, whereupon the tenderer becomes the party named as the *Contractor* in the *conditions of contract* identified in the Contract Data.

Signature(s) .....

Name(s) .....

Capacity .....

For the tenderer: .....

(Insert name and address of organisation)

Name & signature of witness .....

Date .....

Tenderer's CIDB registration number: .....

[1] This total is required by the *Employer* for budgeting purposes only. Actual amounts due will be assessed in terms of the *conditions of contract*.

Acceptance

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 C1	Agreements and Contract Data, (which includes this Form of Offer and Acceptance)
Part C2	Pricing Data
Part C3	Scope of Work: Service Information

and drawings and documents (or parts thereof), which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable 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 Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

The tenderer shall within two weeks of 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 securities, 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 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 and signed original copy of this document, including the Schedule of Deviations (if any).

Signature(s) .....

Name(s) .....

Capacity .....

for the Employer

.....
(Insert name and address of organisation)

Name & signature of witness .....

Date .....

Note: If a tenderer wishes to submit alternative tenders, use another copy of this Form of Offer and Acceptance.

Schedule of Deviations to be completed by the *Employer* prior to contract award

No.	Subject	Details
1	**No deviations noted**	

By the duly authorised representatives signing this Schedule of Deviations below, the Employer and the tenderer agree to and accept this Schedule of Deviations as the only 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 confirmation, clarification or changes 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 Form shall have any meaning or effect in the contract between the parties arising from this Agreement.

	For the tenderer:	**For the Employer**
Signature		
Name		
Capacity		
On behalf of	*(Insert name and address of organisation)*	*(Insert name and address of organisation)*
Name & signature of witness		
Date		

C1.2 TSC3 Contract Data

Part one - Data provided by the *Employer*

Clause	Statement	Data
1	**General**	
	The *conditions of contract* are the core clauses and the clauses for main Option:	
		A: Priced contract with price list
	dispute resolution Option	**W1: Dispute resolution procedure**
	and secondary Options	
		X1: Price adjustment for inflation
		X2 Changes in the law
		X17: Low service damages
		X18: Limitation of liability
		X19: Task Order
		Z: *Additional conditions of contract*
	of the NEC3 Term Service Contract April 2013[2] (TSC3)	
10.1	The *Employer* is (name):	**Eskom Holdings SOC Ltd (reg no: 2002/015527/30), a state owned company incorporated in terms of the company laws of the Republic of South Africa**
	Address	**Registered office at Megawatt Park, Maxwell Drive, Sandton, Johannesburg**
	Tel No.	**[•]**
	Fax No.	**[•]**
10.1	The *Service Manager* is (name):	**Heena Madhav**
	Address	**Eskom RT&D, Rosherville**
	Tel	
	e-mail	
11.2(2)	The Affected Property is	**Eskom Power Stations – Tutuka Power Station, Duvha Power station and Kusile Power Station and any other sites which will be advised by the Employer**

[2] Available from Engineering Contract Strategies Tel 011 803 3008 Fax 086 539 1902 www.ecs.co.za

11.2(13)	The *service* is	**Lab and Pilot Testing of Dynamic Filtration on various Eskom wastewater supplies at various Eskom sites**
11.2(14)	The following matters will be included in the Risk Register	• **Adverse Weather (Rain, Wind, Hailstorm, Heatwave)** • **Scope execution activities planning needs to take into consideration the rain.** • **Industrial Action** • **Community Unrest** • **Security of equipment, materials and resources** • **Disease outbreak impact on labour force** • **Access to existing areas** • **Working at heights**
11.2(15)	The Service Information is in	**Part 3: Scope of Work and all documents and drawings to which it makes reference.**
12.2	The *law of the contract* is the law of	**the Republic of South Africa**
13.1	The *language of this contract* is	**English**
13.3	The *period for reply* is	**1 week**
2	**The *Contractor*'s main responsibilities**	**Data required by this section of the core clauses is also provided by the *Contractor* in Part 2 and terms in italics used in this section are identified elsewhere in this Contract Data**
21.1	The *Contractor* submits a first plan for acceptance within	**2 weeks of the Contract Date**
3	**Time**	
30.1	The *starting date* is.	**[●]**
30.1	The *service period* is	**30 months**
4	**Testing and defects**	**There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data**
5	**Payment**	
50.1	The *assessment interval* is	**between the 25th day of each successive month.**
51.1	The *currency of this contract* is the	**South African Rand**
51.2	The period within which payments are made is	**4 weeks.**
51.4	The *interest rate* is	**the publicly quoted prime rate of interest (calculated on a 365 day year) charged by from time to time by the Standard Bank of South Africa Limited (as certified, in the event of any dispute, by any manager of such bank, whose appointment it shall not be necessary to prove) for amounts due in Rands and**

		(ii) the LIBOR rate applicable at the time for amounts due in other currencies. LIBOR is the 6 month London Interbank Offered Rate quoted under the caption "Money Rates" in The Wall Street Journal for the applicable currency or if no rate is quoted for the currency in question then the rate for United States Dollars, and if no such rate appears in The Wall Street Journal then the rate as quoted by the Reuters Monitor Money Rates Service (or such service as may replace the Reuters Monitor Money Rates Service) on the due date for the payment in question, adjusted *mutatis mutandis* every 6 months thereafter (and as certified, in the event of any dispute, by any manager employed in the foreign exchange department of The Standard Bank of South Africa Limited, whose appointment it shall not be necessary to prove.
6	**Compensation events**	**There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data**
7	**Use of Equipment Plant and Materials**	**There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data**
8	**Risks and insurance**	
80.1	These are additional *Employer*'s risks	**1. [●]** **2. [●]** **3. [●]**
9	**Termination**	**There is no reference to Contract Data in this section of the core clauses and terms in italics used in this section are identified elsewhere in this Contract Data.**
10	**Data for main Option clause**	
A	**Priced contract with price list**	
20.5	The *Contractor* prepares forecasts of the final total of the Prices for the whole of the *service* at intervals no longer than	**2 weeks.**
	The *exchange rates* are those published in	**[●] on [●] (date)**
11	**Data for Option W1**	
W1.1	The *Adjudicator*	**the person selected from the ICE-SA Division (or its successor body) of the South African Institution of Civil Engineering Panel of Adjudicators by the Party intending to refer a dispute to him. (see www.ice-sa.org.za). If the Parties do not agree on an Adjudicator the Adjudicator will be appointed by the Arbitration**

		Foundation of Southern Africa (AFSA).
	Address	**Johannesburg**
	Tel No.	**TBC**
	Fax No.	**TBC**
	e-mail	**TBC**
W1.2(3)	The *Adjudicator nominating body* is:	**the Chairman of ICE-SA a joint Division of the South African Institution of Civil Engineering and the Institution of Civil Engineers (London) (see www.ice-sa.org.za) or its successor body.**
W1.4(2)	The *tribunal* is:	**arbitration**
W1.4(5)	The *arbitration procedure* is	**the latest edition of Rules for the Conduct of Arbitrations published by The Association of Arbitrators (Southern Africa) or its successor body.**
	The place where arbitration is to be held is	**South Africa**
	The person or organisation who will choose an arbitrator - if the Parties cannot agree a choice or - if the arbitration procedure does not state who selects an arbitrator, is	**the Chairman for the time being or his nominee of the Association of Arbitrators (Southern Africa) or its successor body.**

12 Data for secondary Option clauses

X1	**Price adjustment for inflation**	
X1.1	The *base date* for indices is	**Tender Closing date.**
	The proportions used to calculate the Price Adjustment Factor are:	**Proportion** / **linked to index for** / **Index prepared by** **0.15 fixed (non-adjustable)** / **CPI** / **Eskom** **0.85 variable** / **CPI** / **Eskom** **1.00**
X2	**Changes in the law**	**There is no reference to Contract Data in this Option and terms in italics are identified elsewhere in this Contract Data.**
X12.1(1)	The *Client* is (Name):	**Eskom Holdings SOC Ltd.**
	Address	**As above**
	Contact details	**As above**
	Telephone:	**As above**

	Fax	**As above**
	e-mail	**As above**
X17	**Low service damages**	
X17.1	The *service level table* is in	

Item	Description	Penalty
1	**Substantial Failure to comply with the service of this contract.** **Delay per day in providing the services during testing**	**Deduct 5% of the assessed invoice**
2	**Substantial Failure to comply with the service of this contract.** **Delay per day in providing the final report**	**Deduct 5% of the assessed invoice**

X18	**Limitation of liability**	
X18.1	The *Contractor*'s liability to the *Employer* for indirect or consequential loss is limited to	**R0.0 (zero Rand)**
X18.2	For any one event, the *Contractor*'s liability to the *Employer* for loss of or damage to the *Employer*'s property is limited to	**the amount of the deductibles relevant to the event**
X18.3	The *Contractor*'s liability for Defects due to his design of an item of Equipment is limited to	**The greater of** • **the total of the Prices at the Contract Date and** • **the amounts excluded and unrecoverable from the *Employer*'s insurance (other than the resulting physical damage to the *Employer*'s property which is not excluded) plus the applicable deductibles**
X18.4	The *Contractor*'s total liability to the *Employer*, for all matters arising under or in connection with this contract, other than the excluded matters, is limited to	**the total of prices of the task order issued.** **The *Contractor's* total liability for the additional excluded matters is not limited.** **The additional excluded matters are amounts for which the *Contractor* is liable under this contract for** • **loss of or damage to property (other than the *Employer*'s property, Plant and**

		Materials), • **death of or injury to a person and** • **infringement of an intellectual property right.**
X18.5	The *end of liability date* is	**One month after the end of the *service period*.**
X19	**Task Order**	
X19.5	The *Contractor* submits a Task Order programme to the *Service Manager* within	**7 days of receiving the Task Order**
Z	**The *additional conditions of contract* are**	**Z1 to Z14 always apply.**

Z1 Cession delegation and assignment

Z1.1 The *Contractor* does not cede, delegate or assign any of its rights or obligations to any person without the written consent of the *Employer.*

Z1.2 Notwithstanding the above, the *Employer* may on written notice to the *Contractor* cede and delegate its rights and obligations under this contract to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the Electricity Supply Industry.

Z2 Joint ventures

Z2.1 If the *Contractor* constitutes a joint venture, consortium or other unincorporated grouping of two or more persons or organisations then these persons or organisations are deemed to be jointly and severally liable to the *Employer* for the performance of this contract.

Z2.2 Unless already notified to the *Employer*, the persons or organisations notify the *Service Manager* within two weeks of the Contract Date of the key person who has the authority to bind the *Contractor* on their behalf.

Z2.3 The *Contractor* does not alter the composition of the joint venture, consortium or other unincorporated grouping of two or more persons without the consent of the *Employer* having been given to the *Contractor* in writing.

Z3 Change of Broad Based Black Economic Empowerment (B-BBEE) status

Z3.1 Where a change in the *Contractor's* legal status, ownership or any other change to his business composition or business dealings results in a change to the *Contractor*'s B-BBEE status, the *Contractor* notifies the *Employer* within seven days of the change.

Z3.2 The *Contractor* is required to submit an updated verification certificate and necessary supporting documentation confirming the change in his B-BBEE status to the *Service Manager* within thirty days of the notification or as otherwise instructed by the *Service Manager*.

Z3.3 Where, as a result, the *Contractor's* B-BBEE status has decreased since the Contract Date the *Employer* may either re-negotiate this contract or alternatively, terminate the *Contractor*'s obligation to Provide the Service.

Z3.4 Failure by the *Contractor* to notify the *Employer* of a change in its B-BBEE status may constitute a reason for termination. If the *Employer* terminates in terms of this clause, the procedures on termination are P1, P2 and P4 as stated in clause 92, and the amount due is A1 and A3 as stated in clause 93.

Z4 Confidentiality

Z4.1 The *Contractor* does not disclose or make any information arising from or in connection with this contract available to Others. This undertaking does not, however, apply to information which at the time of disclosure or thereafter, without default on the part of the *Contractor*, enters the public domain or to information which was already in the possession of the *Contractor* at the time of disclosure (evidenced by written records in existence at that time). Should the *Contractor* disclose information to Others in terms of clause 25.1, the *Contractor* ensures that the provisions of this clause are complied with by the recipient.

Z4.2 If the *Contractor* is uncertain about whether any such information is confidential, it is to be regarded as such until notified otherwise by the *Service Manager*.

Z4.3 In the event that the *Contractor* is, at any time, required by law to disclose any such information which is required to be kept confidential, the *Contractor*, to the extent permitted by law prior to disclosure, notifies the *Employer* so that an appropriate protection order and/or any other action can be taken if possible, prior to any disclosure. In the event that such protective order is not, or cannot, be obtained, then the *Contractor* may disclose that portion of the information which it is required to be disclosed by law and uses reasonable efforts to obtain assurances that confidential treatment will be afforded to the information so disclosed.

Z4.4 The taking of images (whether photographs, video footage or otherwise) of the Affected Property or any portion thereof, in the course of Providing the Service and after the end of the *service period*, requires the prior written consent of the *Service Manager*. All rights in and to all such images vests exclusively in the *Employer*.

Z4.5 The *Contractor* ensures that all his subcontractors abide by the undertakings in this clause.

Z5 Waiver and estoppel: Add to core clause 12.3:

Z5.1 Any extension, concession, waiver or relaxation of any action stated in this contract by the Parties, the *Service Manager* or the *Adjudicator* does not constitute a waiver of rights, and does not give rise to an estoppel unless the Parties agree otherwise and confirm such agreement in writing.

Z6 Health, safety and the environment: Add to core clause 27.4

Z6.1 The *Contractor* undertakes to take all reasonable precautions to maintain the health and safety of persons in and about the execution of the *service*. Without limitation the *Contractor*:

- accepts that the *Employer* may appoint him as the “Principal Contractor” (as defined and provided for under the Construction Regulations 2014 (promulgated under the Occupational Health & Safety Act 85 of 1993) (“the Construction Regulations”) for the Affected Property;
- warrants that the total of the Prices as at the Contract Date includes a sufficient amount for proper compliance with the Construction Regulations, all applicable health & safety laws and regulations and the health and safety rules, guidelines and procedures provided for in this contract and generally for the proper maintenance of health & safety in and about the execution of the *service*; and
- undertakes, in and about the execution of the *service*, to comply with the Construction Regulations and with all applicable health & safety laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor’s* direction and control, likewise observe and comply with the foregoing.

Z6.2 The *Contractor*, in and about the execution of the *service*, complies with all applicable environmental laws and regulations and rules, guidelines and procedures otherwise provided for under this contract and ensures that his Subcontractors, employees and others under the *Contractor’s* direction and control, likewise observe and comply with the foregoing.

Z7 Provision of a Tax Invoice and interest. Add to core clause 51

Z7.1 Within one week of receiving a payment certificate from the *Service Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice in accordance with the *Employer*'s procedures stated in the Service Information, showing the amount due for payment equal to that stated in the payment certificate.

Z7.2 If the *Contractor* does not provide a tax invoice in the form and by the time required by this contract, the time by when the *Employer* is to make a payment is extended by a period equal in time to the delayed submission of the correct tax invoice. Interest due by the *Employer* in terms of core clause 51.2 is then calculated from the delayed date by when payment is to be made.

Z7.3 The *Contractor* (if registered in South Africa in terms of the companies Act) is required to comply with the requirements of the Value Added Tax Act, no 89 of 1991 (as amended) and to include the *Employer*'s VAT number 4740101508 on each invoice he submits for payment.

Z8 Notifying compensation events

Z8.1 Delete the last paragraph of core clause 61.3 and replace with:

If the *Contractor* does not notify a compensation event within eight weeks of becoming aware of the event, he is not entitled to a change in the Prices.

Z9 *Employer's* limitation of liability

Z9.1 The *Employer's* liability to the *Contractor* for the *Contractor's* indirect or consequential loss is limited to R0.00 (zero Rand)

Z9.2 The *Contractor*'s entitlement under the indemnity in 82.1 is provided for in 60.1(12) and the *Employer*'s liability under the indemnity is limited to compensation as provided for in core clause 63 and X19.11 if Option X19 Task Order applies to this contract.

Z10 Termination: Add to core clause 91.1, at the second main bullet point, fourth sub-bullet point, after the words "against it":

Z10.1 or had a business rescue order granted against it.

Z11 Ethics

For the purposes of this Z-clause, the following definitions apply:

Affected Party means, as the context requires, any party, irrespective of whether it is the *Contractor* or a third party, such party's employees, agents, or Subcontractors or Subcontractor's employees, or any one or more of all of these parties' relatives or friends,

Coercive Action means to harm or threaten to harm, directly or indirectly, an Affected Party or the property of an Affected Party, or to otherwise influence or attempt to influence an Affected Party to act unlawfully or illegally,

Collusive Action means where two or more parties co-operate to achieve an unlawful or illegal purpose, including to influence an Affected Party to act unlawfully or illegally,

Committing Party means, as the context requires, the *Contractor*, or any member thereof in the case of a joint venture, or its employees, agents, or Subcontractors or the Subcontractor's employees,

Corrupt Action means the offering, giving, taking, or soliciting, directly or indirectly, of a good or

service to unlawfully or illegally influence the actions of an Affected Party,

Fraudulent Action means any unlawfully or illegally intentional act or omission that misleads, or attempts to mislead, an Affected Party, in order to obtain a financial or other benefit or to avoid an obligation or incurring an obligation,

Obstructive Action means a Committing Party unlawfully or illegally destroying, falsifying, altering or concealing information or making false statements to materially impede an investigation into allegations of Prohibited Action, and

Prohibited Action means any one or more of a Coercive Action, Collusive Action Corrupt Action, Fraudulent Action or Obstructive Action.

Z11.1 A Committing Party may not take any Prohibited Action during the course of the procurement of this contract or in execution thereof.

Z11.2 The *Employer* may terminate the *Contractor*'s obligation to Provide the Services if a Committing Party has taken such Prohibited Action and the *Contractor* did not take timely and appropriate action to prevent or remedy the situation, without limiting any other rights or remedies the *Employer* has. It is not required that the Committing Party had to have been found guilty, in court or in any other similar process, of such Prohibited Action before the *Employer* can terminate the *Contractor*'s obligation to Provide the Services for this reason.

Z11.3 If the *Employer* terminates the *Contractor*'s obligation to Provide the Services for this reason, the amounts due on termination are those intended in core clauses 92.1 and 92.2.

Z11.4 A Committing Party co-operates fully with any investigation pursuant to alleged Prohibited Action. Where the *Employer* does not have a contractual bond with the Committing Party, the *Contractor* ensures that the Committing Party co-operates fully with an investigation.

Z12 Insurance

Z_12_.1 Replace core clause 83 with the following:

Insurance cover 83

83.1 When requested by a Party, the other Party provides certificates from his insurer or broker stating that the insurances required by this contract are in force.

83.2 The *Contractor* provides the insurances stated in the Insurance Table A from the *starting date* until the earlier of Completion and the date of the termination certificate.

INSURANCE TABLE A

Insurance against	Minimum amount of cover or minimum limit of indemnity
Loss of or damage caused by the *Contractor* to the *Employer*'s property	The replacement cost where not covered by the *Employer*'s insurance. The *Employer*'s policy deductible as at Contract Date, where covered by the *Employer*'s insurance.
Loss of or damage to Plant and Materials	The replacement cost where not covered by the *Employer*'s insurance. The *Employer*'s policy deductible as at Contract Date, where covered by the *Employer*'s insurance.

Loss of or damage to Equipment	The replacement cost where not covered by the *Employer*'s insurance. The *Employer*'s policy deductible as at Contract Date, where covered by the *Employer*'s insurance.
The *Contractor*'s liability for loss of or damage to property (except the *Employer*'s property, Plant and Materials and Equipment) and liability for bodily injury to or death of a person (not an employee of the *Contractor*) arising from or in connection with the *Contractor*'s Providing the Service	Loss of or damage to property The replacement cost Bodily injury to or death of a person The amount required by the applicable law.
Liability for death of or bodily injury to employees of the *Contractor* arising out of and in the course of their employment in connection with this contract	The amount required by the applicable law

Z 12.2 Replace core clause 86 with the following:

Insurance by the *Employer*

86

86.1 The *Employer* provides the insurances stated in the Insurance Table B

INSURANCE TABLE B

Insurance against or name of policy	**Minimum amount of cover or minimum li of indemnity**
Assets All Risk	Per the insurance policy document
Contract Works insurance	Per the insurance policy document
Environmental Liability	Per the insurance policy document
General and Public Liability	Per the insurance policy document
Transportation (Marine)	Per the insurance policy document
Motor Fleet and Mobile Plant	Per the insurance policy document
Terrorism	Per the insurance policy document
Cyber Liability	Per the insurance policy document
Nuclear Material Damage and Business Interruption	Per the insurance policy document

Nuclear Material Damage Terrorism	Per the insurance policy document

Z13 Nuclear Liability

Z13.1 The *Employer* is the operator of the Koeberg Nuclear Power Station (KNPS), a nuclear installation, as designated by the National Nuclear Regulator of the Republic of South Africa, and is the holder of a nuclear licence in respect of the KNPS.

Z13.2 The *Employer* is solely responsible for and indemnifies the *Contractor* or any other person against any and all liabilities which the *Contractor* or any person may incur arising out of or resulting from nuclear damage, as defined in Act 47 of 1999, save to the extent that any liabilities are incurred due to the unlawful intent of the *Contractor* or any other person or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.

Z13.3 Subject to clause Z13.4 below, the *Employer* waives all rights of recourse, arising from the aforesaid, save to the extent that any claims arise or liability is incurred due or attributable to the unlawful intent of the *Contractor* or any other person, or the presence of the *Contractor* or that person or any property of the *Contractor* or such person at or in the KNPS or on the KNPS site, without the permission of the *Employer* or of a person acting on behalf of the *Employer*.

Z13.4 The *Employer* does not waive its rights provided for in section 30 (7) of Act 47 of 1999, or any replacement section dealing with the same subject matter.

Z13.5 The protection afforded by the provisions hereof shall be in effect until the KNPS is decommissioned.

Z14 Asbestos

For the purposes of this Z-clause, the following definitions apply:

AAIA means approved asbestos inspection authority.

ACM means asbestos containing materials.

AL means action level, i.e. a level of 50% of the OEL, i.e. 0.1 regulated asbestos fibres per ml of air measured over a 4 hour period. The value at which proactive actions is required in order to control asbestos exposure to prevent exceeding the OEL.

Ambient Air means breathable air in area of work with specific reference to breathing zone, which is defined to be a virtual area within a radius of approximately 30cm from the nose inlet.

Compliance Monitoring means compliance sampling used to assess whether or not the personal exposure of workers to regulated asbestos fibres is in compliance with the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.

OEL means occupational exposure limit.

Parallel Measurements means measurements performed in parallel, yet separately, to existing measurements to verify validity of results.

Safe Levels means airborne asbestos exposure levels conforming to the Standard's requirements for safe processing, handling, storing, disposal and phase-out of asbestos and asbestos containing material, equipment and articles.

Standard means the *Employer*'s Asbestos Standard 32-303: Requirements for Safe Processing,

Handling, Storing, Disposal and Phase-out of Asbestos and Asbestos Containing Material, Equipment and Articles.

SANAS means the South African National Accreditation System.

TWA means the average exposure, within a given workplace, to airborne asbestos fibres, normalised to the baseline of a 4 hour continuous period, also applicable to short term exposures, i.e. 10-minute TWA.

Z14.1 The *Employer* ensures that the Ambient Air in the area where the *Contractor* will Provide the Services conforms to the acceptable prescribed South African standard for asbestos, as per the regulations published in GNR 155 of 10 February 2002, under the Occupational Health and Safety Act, 1993 (Act 85 of 1993) ("Asbestos Regulations"). The OEL for asbestos is 0.2 regulated asbestos fibres per millilitre of air as a 4-hour TWA, averaged over any continuous period of four hours, and the short term exposure limit of 0.6 regulated asbestos fibres per millilitre of air as a 10-minute TWA, averaged over any 10 minutes, measured in accordance with HSG248 and monitored according to HSG173 and OESSM.

Z14.2 Upon written request by the *Contractor*, the *Employer* certifies that these conditions prevail. All measurements and reporting are effected by an independent, competent, and certified occupational hygiene inspection body, i.e. a SANAS accredited and Department of Employment and Labour approved AAIA. The *Contractor* may perform Parallel Measurements and related control measures at the *Contractor*'s expense. For the purposes of compliance the results generated from Parallel Measurements are evaluated only against South African statutory limits as detailed in clause Z14.1. Control measures conform to the requirements stipulated in the AAIA-approved asbestos work plan.

Z14.3 The *Employer* manages asbestos and ACM according to the Standard.

Z14.4 In the event that any asbestos is identified while Providing the Services, a risk assessment is conducted and if so required, with reference to possible exposure to an airborne concentration of above the AL for asbestos, immediate control measures are implemented and relevant air monitoring conducted in order to declare the area safe.

Z14.5 The *Contractor*'s personnel are entitled to stop working and leave the contaminated area forthwith until such time that the area of concern is declared safe by either Compliance Monitoring or an AAIA approved control measure intervention, for example, per the emergency asbestos work plan, if applicable.

Z14.6 The *Contractor* continues to Provide the Services, without additional control measures presented, on presentation of Safe Levels. The contractually agreed dates to Provide the Services, including the Completion Date, are adjusted accordingly. The contractually agreed dates are extended by the notification periods required by regulations 3 and 21 of the Asbestos Regulations, 2001.

Z14.7 Any removal and disposal of asbestos, asbestos containing materials and waste, is done by a registered asbestos contractor, instructed by the *Employer* at the *Employer*'s expense, and conducted in line with South African legislation.

C1.2 Contract Data

Part two - Data provided by the *Contractor*

Clause	Statement	Data
10.1	The *Contractor* is (Name): Address Tel No. Fax No.	
11.2(8)	The *direct fee percentage* is The *subcontracted fee percentage* is	**N/A%** **N/A%**
11.2(14)	The following matters will be included in the Risk Register	**1. Membrane damage will result in a delay of 2-3 weeks for the importation of a new membrane set.** **2. Operator error, resulting in damage to the equipment will result in a delay in order to get spares and make relevant repairs.** **3. Plant down time due to breakdown or any other equipment related stoppage will cause a delay** **4. Applicable environmental laws and regulations and rules, guideline and procedure i.e. EIA, WULA etc. outcomes could potentially cause a delay.** **5. Operation in a contaminated area will result in a delay** **6. Adverse Weather (Rain, Wind, Hailstorm, Heatwave)** **7. Industrial Action** **8. Community Unrest** **9. Security of equipment, materials and resources** **10. Disease outbreak impact on labour force** **11. Access to existing areas** **12. Working at heights**
11.2(15)	The Service Information for the *Contractor*'s plan is in:	
21.1	The plan identified in the Contract Data is contained in:	
24.1	The key people are: 1 Name: Job: Responsibilities: Qualifications: Experience:	

2 Name:

Job

Responsibilities:

Qualifications:

Experience:

		CV's (and further key person's data including CVs) are in .
A	**Priced contract with price list**	
11.2(12)	The *price list* is in	
11.2(19)	The tendered total of the Prices is	**R**
C	**Target contract with price list**	
11.2(12)	The *price list* is in	
11.2(20)	The tendered total of the Prices is	**R**
E	**Cost reimbursable contract**	
11.2(12)	The *price list* is in	

PART 2: PRICING DATA

TSC3 Option A

Document reference	Title	No of pages
C2.1	Pricing assumptions: Option A	21
C2.2	The *price list*	**23**

C2.1 Pricing assumptions: Option A

How work is priced and assessed for payment

Clause 11 in NEC3 Term Service Contract (TSC3) core clauses and Option A states:

Identified and defined terms 11 11.2

(12) The Price List is the *price list* unless later changed in accordance with this contract.

(17) The Price for Services Provided to Date is the total of

- the Price for each lump sum item in the Price List which the *Contractor* has completed and
- where a quantity is stated for an item in the Price List, an amount calculated by multiplying the quantity which the *Contractor* has completed by the rate.

(19) The Prices are the amounts stated in the Price column of the Price List. Where a quantity is stated for an item in the Price List, the Price is calculated by multiplying the quantity by the rate.

This confirms that Option A is a priced contract where the Prices are derived from a list of items of service which can be priced as lump sums or as expected quantities of service multiplied by a rate or a mix of both.

Function of the Price List

Clause 54.1 in Option A states: "Information in the Price List is not Service Information". This confirms that instructions to do work or how it is to be done are not included in the Price List but in the Service Information. This is further confirmed by Clause 20.1 which states, "The *Contractor* Provides the Service in accordance with the Service Information". Hence the *Contractor* does **not** Provide the Service in accordance with the Price List. The Price List is only a pricing document.

Link to the *Contractor*'s plan

Clause 21.4 states "The *Contractor* provides information which shows how each item description on the Price List relates to the operations on each plan which he submits for acceptance". Hence when compiling the *price list*, the tendering contractor needs to develop his first clause 21.2 plan in such a way that operations shown on it can be priced in the *price list* and result in a satisfactory cash flow in terms of clause 11.2(17).

Preparing the *price list*

Before preparing the *price list*, both the *Employer* and tendering contractors should read the TSC3 Guidance Notes pages 14 and 15. In an Option A contract, either Party may have entered items into the *price list* either as a process of offer and acceptance (tendering) or by negotiation depending on the nature of the *service* to be provided. Alternatively the *Employer*, in his Instructions to Tenderers or in a Tender Schedule, may have listed some items that he requires the *Contractor* to include in the *price list* to be prepared and priced by him.

It is assumed that in preparing or finalising the *price list* the *Contractor:*

- Has taken account of the guidance given in the TSC3 Guidance Notes relevant to Option A;
- Understands the function of the Price List and how work is priced and paid for;
- Is aware of the need to link operations shown in his plan to items shown in the Price List;
- Has listed and priced items in the *price list* which are inclusive of everything necessary and incidental to Providing the Service in accordance with the Service Information, as it was at the time of tender, as well as correct any Defects not caused by an *Employer's* risk;
- Has priced work he decides not to show as a separate item within the Prices or rates of other listed items in order to fulfil the obligation to complete the *service* for the tendered total of the Prices.

- Understands there is no adjustment to items priced as lump sums if the amount, or quantity, of work within that item later turns out to be different to that which the *Contractor* estimated at time of tender. The only basis for a change to the (lump sum) Prices is as a result of a compensation event.

Format of the *price list*

(From the example given in an Appendix within the TSC3 Guidance Notes)

Entries in the first four columns in the *price list* in section C2.2 are made either by the *Employer* or the tendering contractor.

If the *Contractor* is to be paid an amount for the item which is not adjusted if the quantity of work in the item changes, the tendering contractor enters the amount in the Price column only, the Unit, Expected Quantity and Rate columns being left blank.

If the *Contractor* is to be paid an amount for an item of work which is the rate for the work multiplied by the quantity completed, the tendering contractor enters the rate which is then multiplied by the Expected Quantity to produce the Price, which is also entered.

If the *Contractor* is to be paid a Price for an item proportional to the length of time for which a service is provided, a unit of time is stated in the Unit column and the expected length of time (as a quantity of the stated units of time) is stated in the Expected Quantity column.

C2.2 the *price list*

Item nr	Description	Unit	Expected Quantity	Rate	Price
1	**Compliance to Safety, Health Environmental and Quality Requirements for this contract (include prices for safety files for RT&D, Tutuka, Duvha, Kusile)**	Sum	1		
2	**Ash Water and Cooling Water Testing, Analysis and Reporting at Eskom Power Stations in Mpumalanga (per technology)**				
2.1	Lab Scale tests (including sample collection, transport, tests, and report)	Sum	5		
2.2	Supply, Installation, Commissioning and operation of the Pilot test at Tutuka for the Wastewater which contains and high levels of ash and oil	Months	4		
2.3	Supply, Installation, Commissioning and operation of the Pilot test at Tutuka for the Effluent from the Spiral Reverse Osmosis plant	Months	3		
2.4	Supply, Installation, Commissioning and operation of the Pilot test at Tutuka for Concentrated Cooling water	Months	3		
2.5	Supply, Installation, Commissioning and operation of the Pilot test at Duvha for Ash water return	Months	3		
2.6	Supply, Installation, Commissioning and operation of the Pilot test at Kusile for FGD bleedstream	Months	3		
2.7	Operation of the Pilot plant at the various sites (including *(Generator and diesel)*	Months	16		
2.8	Maintenance of the Pilot plant at the various sites	Months	16		
2.9	Sampling, Analysis and Reporting	Months	16		
2.10	Autopsy of the membranes after each test	Sum	5		
2.11	Final research report	Sum	1		
2.12	Travelling	R/km			
2.13	Accommodation	Months			

The total of the Prices R

C3.1: EMPLOYER'S SERVICE INFORMATION

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1 Description of the *service*

1.1 Executive overview

According to Eskom's Zero Liquid Effluent Discharge (ZLED) philosophy, no effluent is allowed to leave the sites. Impacted water is therefore utilised in an ever-cascading quality level until it reaches the ashing system where it is used for the slurrying and transportation of the ash and/or for dust suppression on the ash dump.

The Contractor must supply a proposal for the testing of the various wastewaters with dynamic filtration membrane processing technology. The testing will take place in two phases, first being laboratory testing to determine the optimal membrane to use and secondly pilot testing with a skid installed at the various sites.

1. Five streams will be considered for evaluation:
2. Wastewater which contains high levels of ash and oil (Tutuka Power Station)
3. Reverse Osmosis plant reject (Tutuka Power Station)
4. CCW for a sensitivity analysis) (Tutuka Power Station)
5. Ash water return (Duvha Power Station)
6. Flue Gas desulphurisation (FGD) bleedstream (Kusile Power Station)

Note: The desired water quality after treatment should be according to the specification in Table 1.

1.2 *Employer*'s requirements for the *service*.

1.2.1 Technology to be tested

Research has developed new technologies, which have not been proven on Eskom waters. These systems are classified as dynamic filtration, which generates high shear rates more efficiently than cross-flow filtration. In dynamic filtration, shear rates are generated not by a pump, but by moving parts or vibrations. These movements create the membrane shear rate necessary to maintain the filtration by vibrating the membranes. This mode of operation allows high shear rates, of the order of $1–3\times10^5\ s^{-1}$ to be generated and increases both permeate flux and membrane selectivity. Vibrating modules (i.e., Shear-Enhanced Vibrating Membrane processing technology) consist of a stack of circular membranes oscillating around a vertical shaft at its resonant frequency.

The *Contractor* must supply a proposal for the testing of the various wastewater as described above, with the dynamic filtration membrane processing technology. This technology must be versatile, and shall be able to be used with MF, NF and RO membranes. The industrial membrane area per module must be more than $120m^2$. The *Contractor* must provide proof consisting of at least three case studies, with water similar to the described streams, where this technology has been tested and installed in industrial applications in the world and has shown very successful results.

In a typical system, membranes are arranged in a plate and frame configuration. Different types of membranes (Microfiltration, Ultrafiltration, Nanofiltration, Reverse Osmosis) can be used in a module to achieve the required product quality. The system requires a pilot test protocol to obtain a right membrane material in combination with vibration to provide a stable flux.

The system must achieve high-energy efficiency by applying shear into a thin zone near the filter surface. This precise application of shear results in efficient energy conversion and very low power consumption. In these systems, nearly 99% of the total energy utilized is converted to shear at the membrane surface. The disk stack of the unit is oscillated above a torsion spring that moves the stack back and forth. The oscillation produces a shear at the membrane surface of approximately 150,000 inverse seconds, which is much higher than conventional cross-flow systems. The shear waves produced by the membrane's vibration cause solids and foulants to be lifted off the membrane surface and remixed with the bulk material flowing through the membrane stack. The system proposed must be simple and compact. The system must not depend on feed flow to induce shearing forces, the feed slurry can become extremely viscous and still be successfully dewatered. The concentrate is essentially extruded between the vibrating disc elements and exits the machine once it reaches the desired concentration level. Thus, the system must be able to run in a single pass through the system, eliminating the need for costly working tanks, ancillary equipment and associated valving.

Membrane selection is the single most important parameter that affects the quality of the separation. Other important parameters that affect system performance are pressure, temperature, vibration amplitude, and residence time. All of these elements are optimized during testing.

The testing will take place in two phases, first being laboratory testing to determine the optimal membrane to use and secondly pilot testing with a skid installed at the various sites.

The *Contractor* must sign a Non-Disclosure Agreement with Eskom. All results emanating from the trial/test form a part of Eskom's Intellectual Property (IP) and cannot be shared or published without Eskom's permission."

1.2.2 Aim of the testing

The aim of the pilot testing is to determine if the system being tested, will be able to treat the various identified streams efficiently and effectively.
The primary aims of the treatment plant are as follows:
a) It must be cost effective;
b) It must be able to recover an economically feasible maximum amount of treated water suitable for reuse;
c) It must minimise treatment process complexity and footprint; and
d) it must minimise waste handling issues.

1.2.3 Parameters to be tested

The following key parameters will be tested and the acceptance criteria for the pilot tests must be as follows:

1. The permeate produced must be of raw water quality or better (for the specific station as detailed below).
2. A maximum recovery which can be achieved must be compared to the life cycle costs of the system (membrane replacement, energy, chemicals) for the most economical solution.
3. The cleaning frequency will be evaluated and used to determine life cycle costs.
4. Determine the degree of deterioration of membrane performance over time will be evaluated and used to determine life cycle costs.

1.2.4 Laboratory scale tests

The *contractor* will be responsible to firstly do laboratory tests at the *contractors* premises. If possible, Eskom will witness the tests. The costs for the transport of the samples as well as the testing and development of the report to be included. This must be done to optimise the following:

- operating pressure,
- the type of membrane to use,
- the shear rate,
- operating temperature
- pH conditions
- flux

The equipment for the laboratory scale tests must be supplied by the *Contractor*. The testing equipment typically consists of a

- feed tank,
- permeate tank,
- concentrate tank
- manual ball valves for isolation
- feed pump
- The membrane assembly with a:
    - driving system that generates vibration,
    - membrane module,
    - torsion spring which transfers vibration to the membrane module, and
    - system for controlling vibration.

This is a typical description, but the responsibility still lies with the *contractor* to decide on the equipment required for the laboratory testing.

The *Contractor* shall use a single membrane for each test. Various membranes are tested with each waste water source to determine which membrane will be optimal. Operating pressure must be varied during the test depending on the type of membrane used, and the shear rate must also be varied.
The apparatus must be able to vibrate the membrane with a frequency of up to 60Hz and a maximum vibratory amplitude of 25.4mm (1"). The vibratory amplitude at the rim of the membrane module must be varied to evaluate the effect of vibration. All the parameters which are changed (independent variables), as well as the dependent variables (those that will change) will be tested frequently (every 5-10 minutes).
During the test, operational and performance data shall be collected by the *contractor*. An example of the variables are as follows. But the responsibility will belong to the contractor to decide on the procedure for testing.

Variables

Independent variables
- Type of membrane used
- Feed concentration

Dependent variables
- Change in flux
- Concentration of the reject stream
- Concentration of the permeate
- Removal percentage

Controlling Variables
- The feedwater pressure

The procedure which will be required for testing must be supplied to the *Employer* for acceptance. The *Contractor* must provide a cost for the laboratory testing which shall include the transportation of the water samples to the *contractors* location. A report must be produced detailing the tests experimental procedure/methodology, results and conclusions.

1.2.5 Pilot scale tests

For the pilot scale tests, the candidate membrane of choice from the lab scale tests will be configured in an element stack of approximately 15-25 membranes. However, the equipment must be mounted on a trailer, with all the cleaning equipment incorporated as well. The cleaning equipment must include the heaters for the CIP tank. The system must also be automated with loggers installed to log all the physical parameters (flow, pressure and temperature). The *Contractor* must also include resources for maintenance and operation. Chemicals required for the duration of the trial must also be provided by the *Contractor*. The *Contractor* must also supply all the spares required for the maintenance of the system, as well as the spares to address any defects on the system. These spares must be readily available within 24hrs.

The Pilot test skid must be completely independent and must not require any utilities from the *Employer*, e.g. electrical supply, or compressed air supply. All equipment required to run the pilot test skid must be supplied by the *contractor* (compressor, generator, etc.). The equipment will be situated in a very isolated area, and hence the equipment must be lockable to keep it safe from harm or theft. A new membrane needs to be installed at the start of testing for each new stream as a minimum. If replacement membranes are required during the testing, the *contractor* must make allowance for this as well.

The *Contractor* will provide a cost for the disconnection, transport and reconnection of the pilot plant as it is moved from station to station.

The water required to run the skid will be available from a nearby source, preferably within 500m. The *Contractor* must supply the pump, piping, valves and any other equipment required to supply the skid with the water, as well as to discharge the clean water back into the Eskom plant.

The testing methodology which will be required for testing must be supplied to the *Employer* for acceptance. The methodology should describe if it is required to do the test either during normal working hours or on a 24 hour, 7 days a week operation. This methodology must prove that the plant will simulate operational conditions and that the interruption in operation will not alter the results. The contractor must allow for at least one month of 24 hour operation and the rest of the testing time can be on an 8 hr day – Monday to

Friday. However, if the contractor requires testing to be 24 hours a day-7 days a week, then operational costing must be allowed for this.

Membrane cleaning concepts that would be applicable to actual plant criteria must also evaluated. The *contractor* must evaluate the efficacy of using standard commercially available cleaning chemicals versus proprietary chemicals.

In these tests, the following, as a minimum, will be tested and optimised:

- Determine the optimum operating pressure.
- Pre-treatment optimisation.
- Determine flux rates and achievable concentration with a range of operating conditions.
- Determine the maximum recovery.
- Determine the cleaning requirements and regime as well as optimisation of the cleaning protocols and chemicals.
- Determine required membrane area; and
- Determine the degree of deterioration of membrane performance over time.

The *Contractor* must also provide a cost for the autopsy of the membrane.

A report must be produced detailing the tests experimental procedure/methodology, results and conclusions. Monthly reports must be provided as the tests are ongoing. The samples for the monthly report must be analysed by a SANAS ISO 17025 accredited laboratory. After the completion of the tests on each source water, a draft report must be submitted for that specific source water. The report must also contain information with regards to the sizing of the plant for each source water, the associated capital cost as well as operating and maintenance cost for the life cycle of the plant. At the end of all the tests, a final report must be submitted no later than a month after the conclusion of the final tests. This document must consolidate all the information for the lab scale tests, pilot scale tests as well as results of the autopsy.

1.2.6 Various Feedwaters which will be tested

a. Wastewater which contains high levels of ash and oil

The dirty water dams receive the wastewater from the station. This includes all drains from the water and steam circuit, drains from the CW pipework in the units, floor-washing effluent, etc. These drains are contaminated with ash when the stations are forced to implement emergency floor ashing to clear the boiler throat prior to shutting down the unit to repair the defect. The ash is washed into the station drains and ends up in these dirty water dams. In addition to this, the water is contaminated with oil from leaks which exist on the plant. This is also washed into the station drains. The design of the system is such that this water must be treated by an oil and grit system. However, this system is only designed for certain levels of oil and grit and is usually overloaded, and hence it is not effective. As part of the ZLED philosophy, the water from this system must be returned to the cooling water system for further treatment. This excess ash then impacts the cooling water treatment system and causes frequent failures on the clarifiers bridges and stirrers.

A solution is required for this dirty water dam water which will remove all the ash and oil from the water and produce water which is of a raw water quality or better. This analysis is the dissolved species. The intention is to test the capability of the technology with regards to the removal of ash and oil. At the time of testing, the Employer will add these components to the water supply if the levels.

The typical analysis of raw water quality is as per Table 1 and Figures 1-15 below: Table 1: Raw Vaal water supplied to Tutuka Power Station

Parameter	Unit	Minimum	Maximum	Average	95th percentile
Conductivity	µS/cm	3.2	433.0	257.6	368.0
pH		4.3	9.9	7.5	8.9
m-alkalinity as $CaCO_3$	mg/kg	15.0	181.5	78.1	111.6
p-alkalinity as $CaCO_3$	mg/kg	0.0	19.1	0.4	0

Ca Hardness as $CaCO_3$	mg/kg	7.7	78.4	29.4	57.3
Mg Hardness as $CaCO_3$	mg/kg	3.8	129	43	103
Chloride	mg/kg	0.4	48	14.7	23
Potassium	mg/kg	1.7	11.8	4.1	10.0
Phosphate	mg/kg	0.0	2.0	0.7	2.0
Silicate	mg/kg	0.0	51.7	18.6	41.8
Sulphate	mg/kg	0.2	46.1	24.3	42.2
Sodium	mg/kg	5.4	32.2	16.2	29.5
Total organic carbon as C	mg/kg	0.2	68.9	18.8	38.9
Total hardness as $CaCO_3$	mg/kg	4.6	170.0	55.1	123.8
Turbidity	NTU	0	155	30.1	58.3

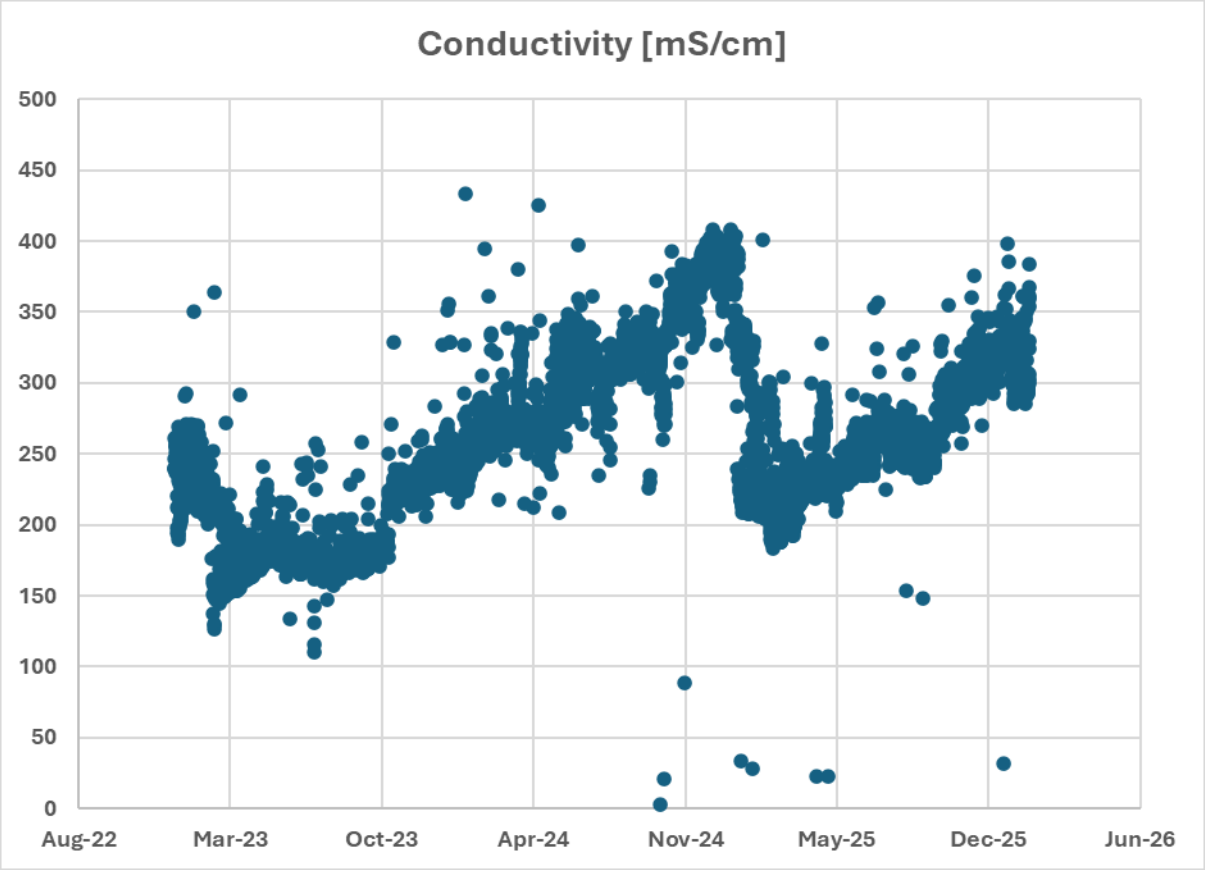


Figure 1: Raw water conductivity at Tutuka Power Station

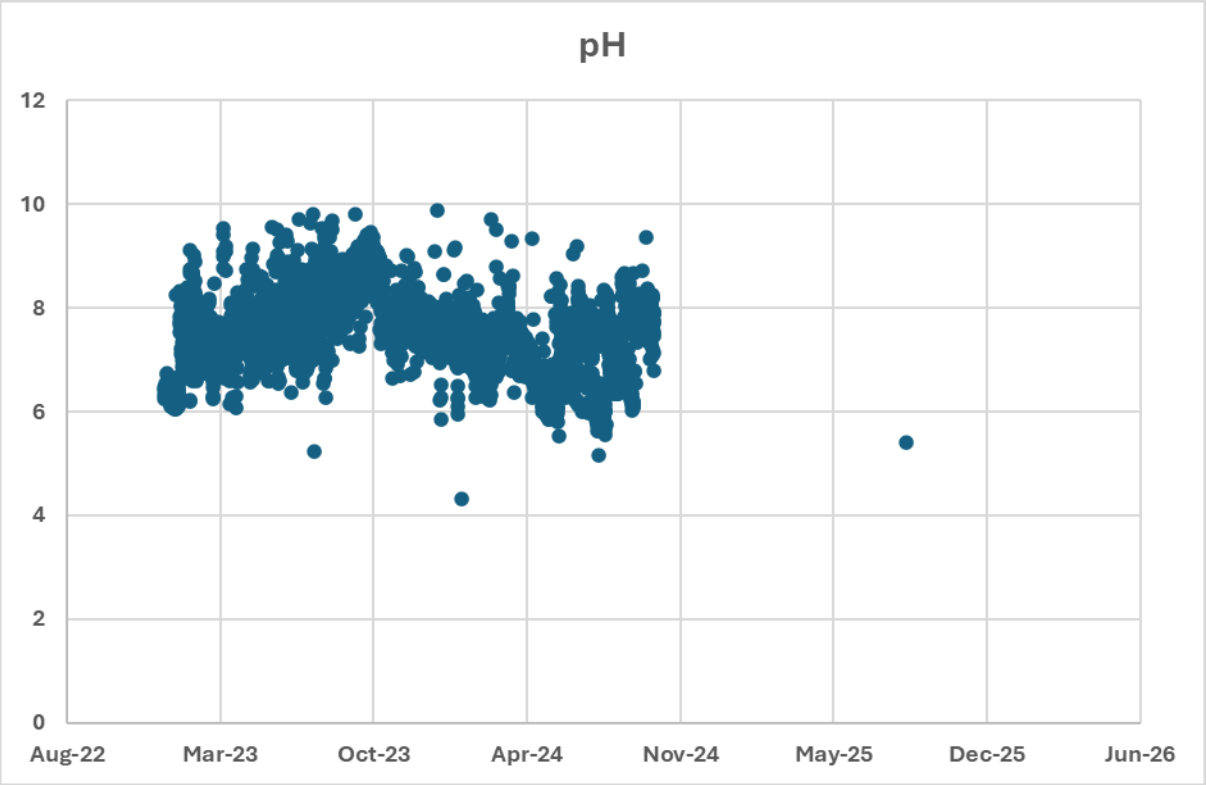


Figure 2: Raw water pH at Tutuka Power Station

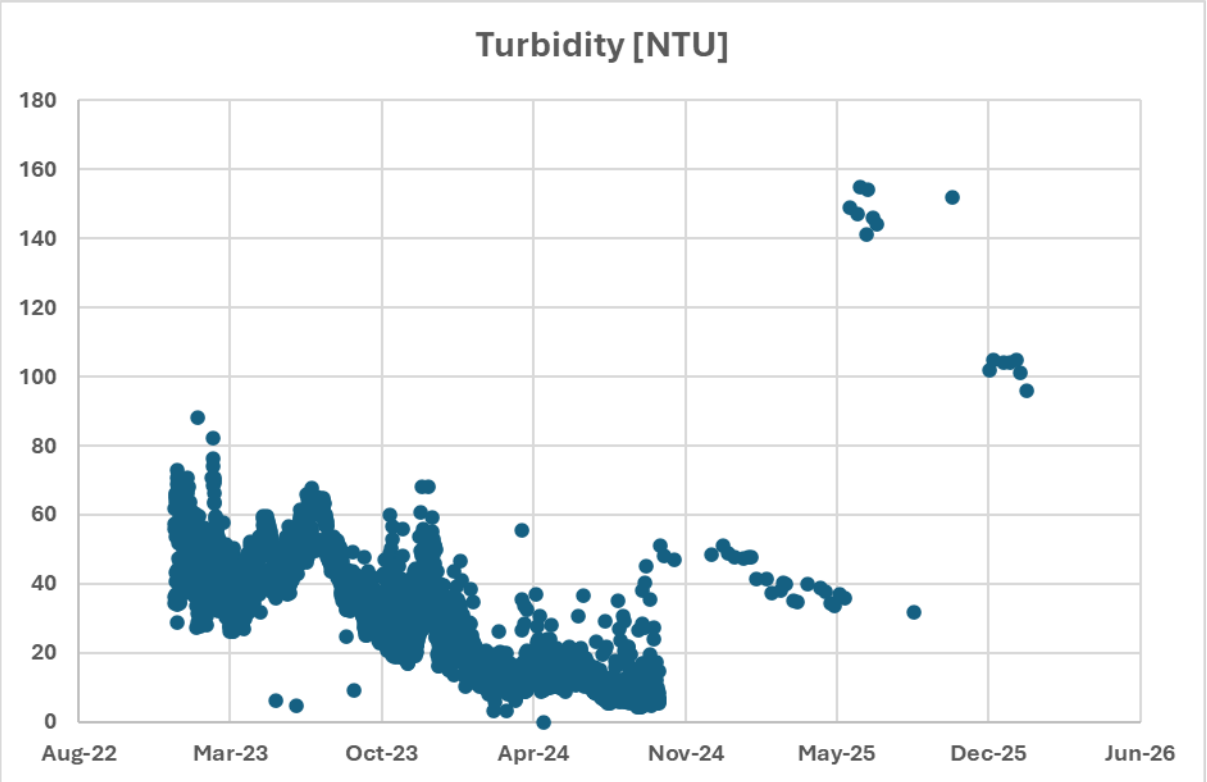


Figure 3: Raw water turbidity at Tutuka Power Station

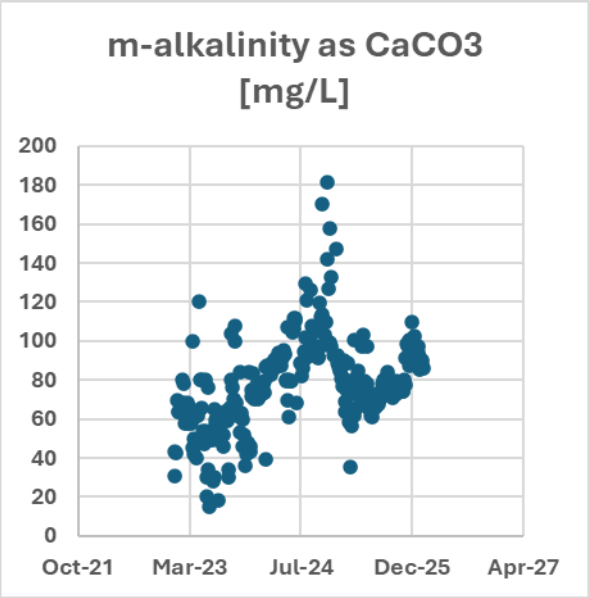


Figure 4: Raw water m-alkalinity

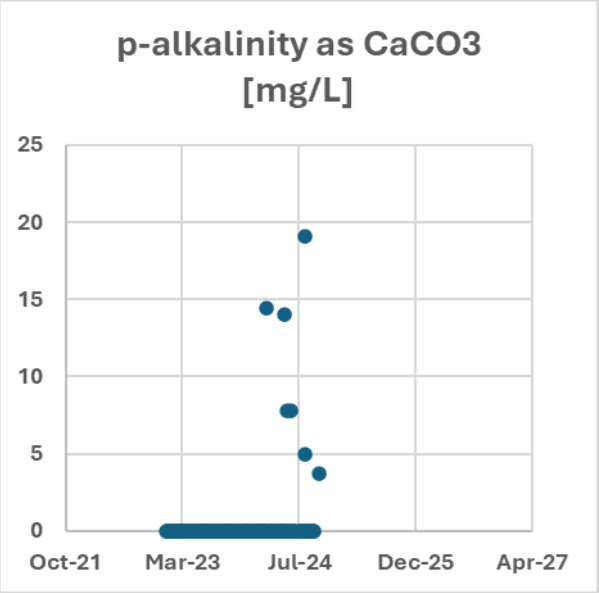


Figure 5: Raw water P-alkalinity

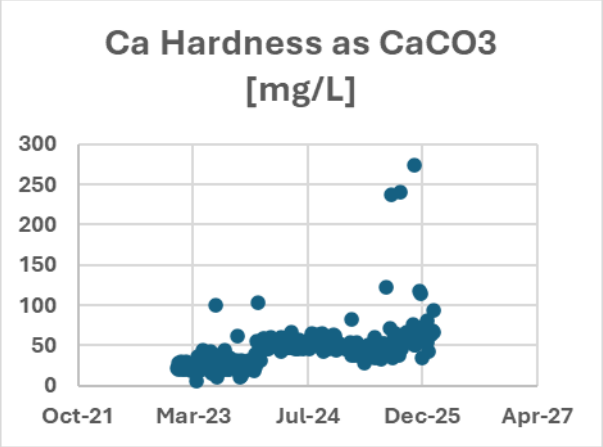


Figure 6: Raw water Ca hardness

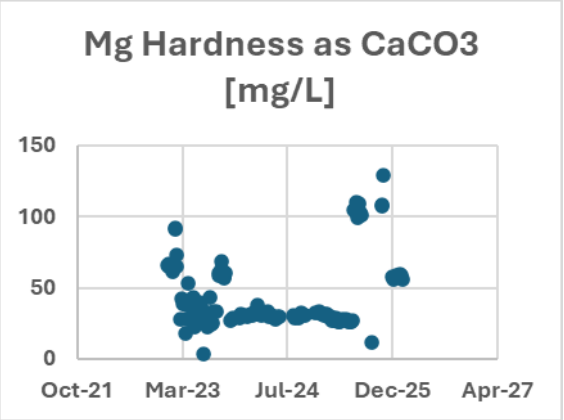


Figure 7: Raw water Mg hardness

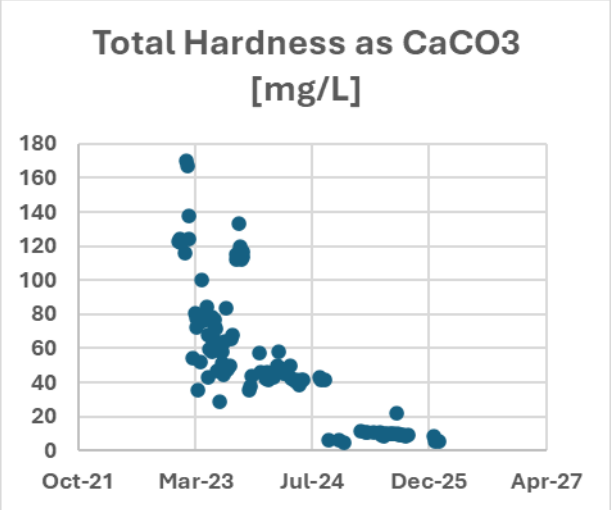


Figure 8: Raw water total hardness

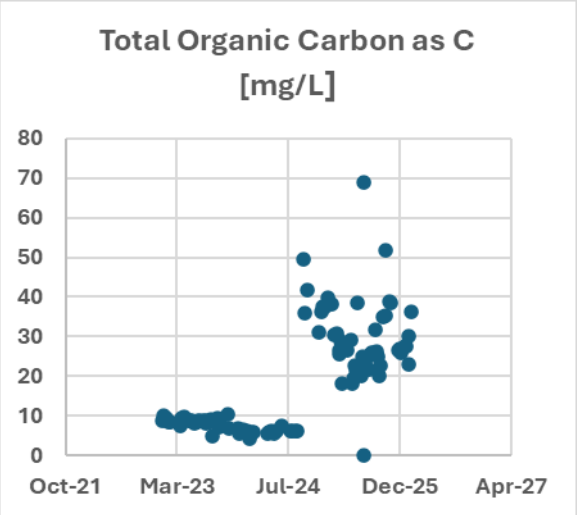


Figure 9: Raw water Total organic carbon

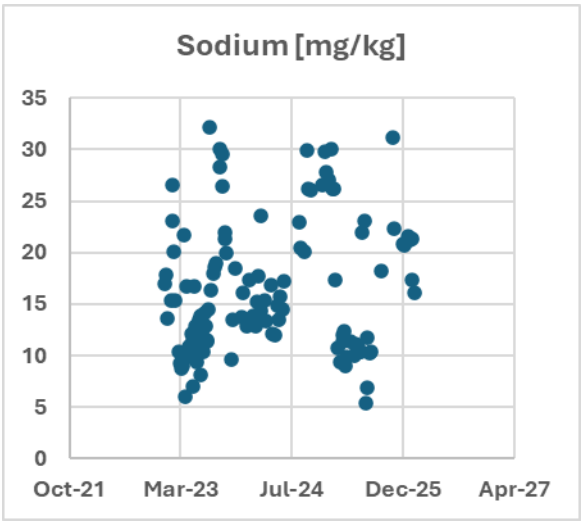


Figure 10: Raw water sodium

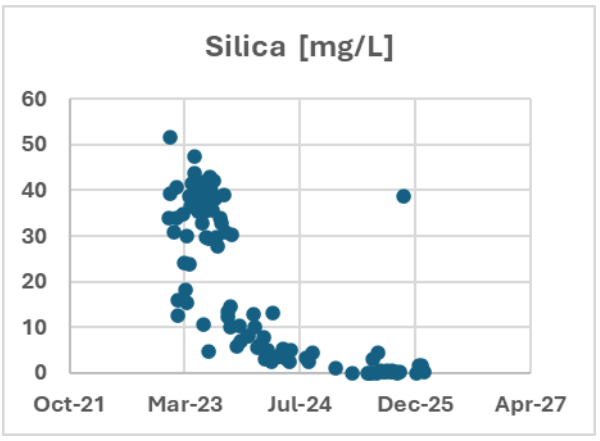


Figure 11: Raw water silica

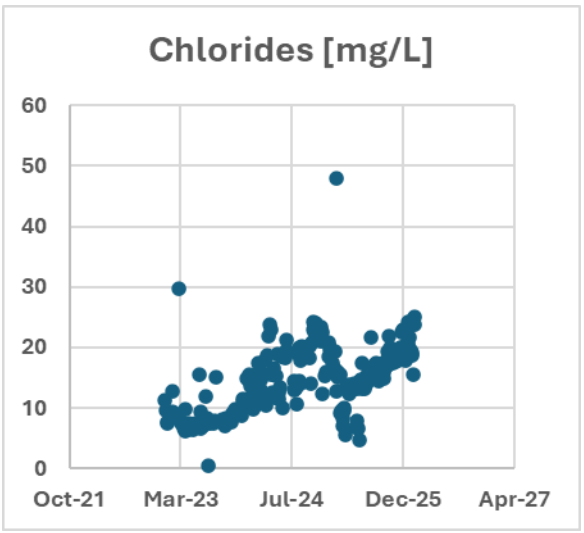


Figure 12: Raw water Chlorides

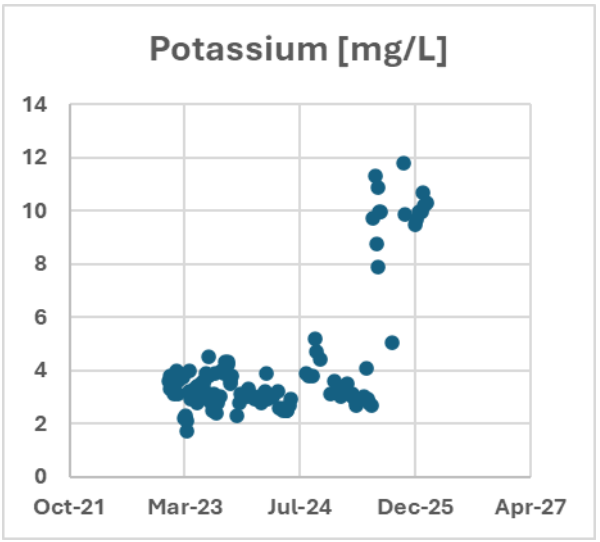


Figure 13: Raw water Potassium

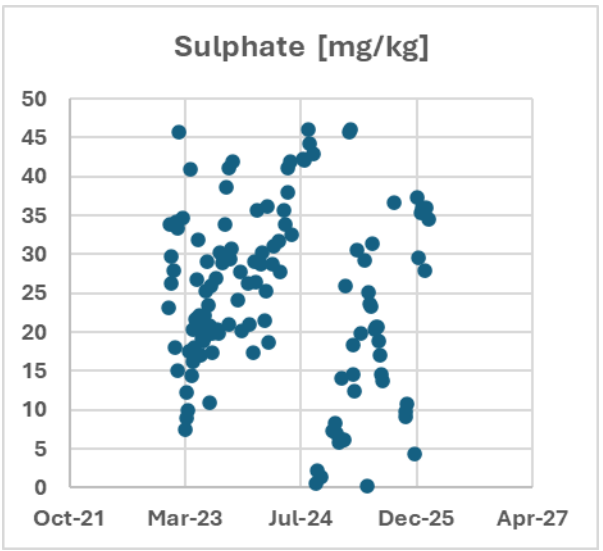


Figure 14: Raw water sulphate

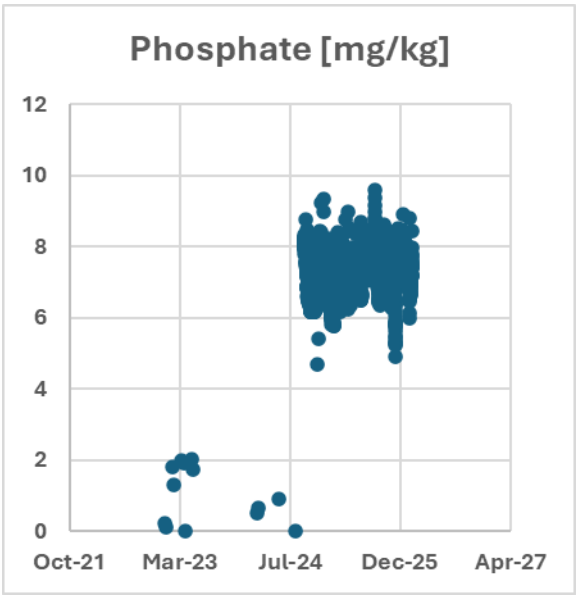


Figure 15: Raw water phosphate

The typical range of water quality in the dirty water dams is as indicated in the Table 2 and Figures 16 to 25 below:

Table 2: Wastewater which contains high levels of ash and oil (Dirty Water Dam recovery -Tutuka Power Station)

Parameter	Unit	Range	Average	95th percentile
pH	-	3.5 - 10.9	9.0	9.7
Conductivity	µS/cm	292 – 33564	9646.4	25237.9
Turbidity	NTU	1.3 – 343.0	17.9	37.9
Calcium Hardness as $CaCO_3$	mg/kg	25 – 1431.0	166.0	359.3
Magnesium Hardness as $CaCO_3$	mg/kg	26.1 – 1191	265.3	923.4
Total Hardness as $CaCO_3$	mg/kg	53.7 – 1309.0	374.2	1237.5
m-alkalinity	mg/kg	20.4 – 866.0	272.6	609.9
p-alkalinity	mg/kg	0 – 582.6	39.8	153.4
Sodium	mg/kg	58.8 - 10180	1877.3	5535.2
Potassium	mg/kg	6.9 - 214	58.7	174.7
Chloride	mg/kg	51.9 - 7726	1215.4	4645.6
Silica as SiO_2	mg/kg	0.1 – 33.9	15.1	29.4
Sulphate	mg/kg	5.6 -17000	3250.1	9396.8
FOG	mg/kg	100-5000	4682	4754

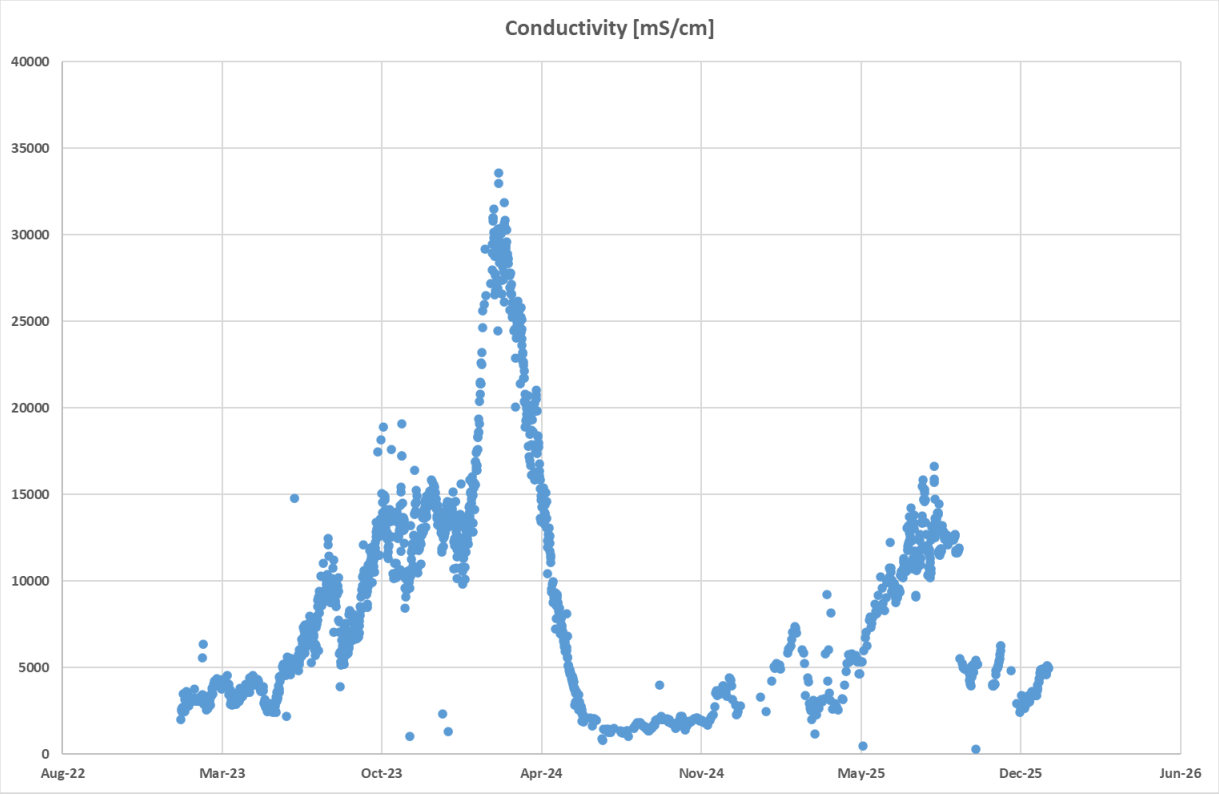


Figure 16: Dirty water dam recovery conductivity at Tutuka Power Station

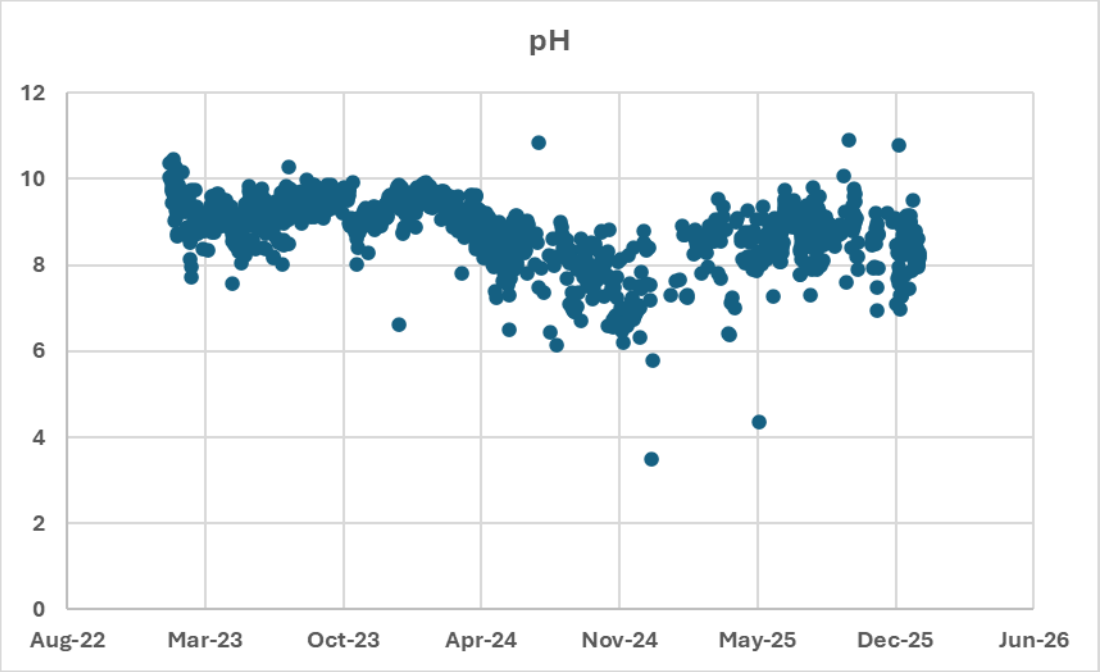


Figure 17: Dirty water dam recovery pH at Tutuka Power Station

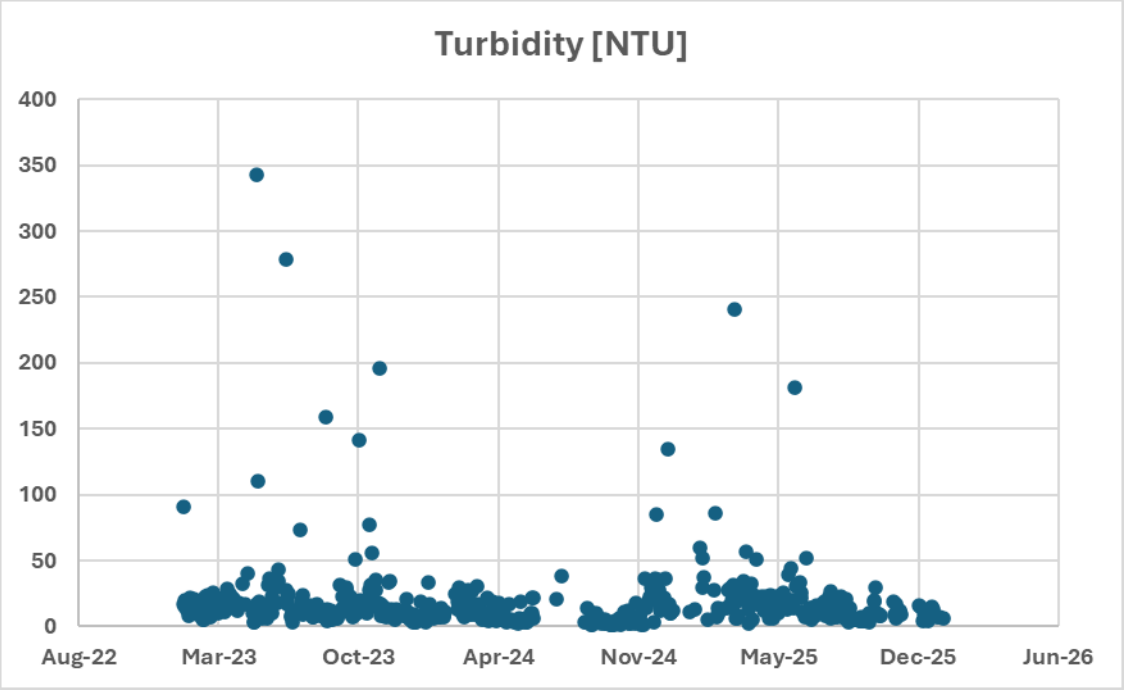


Figure 18: Dirty water dam recovery turbidity at Tutuka Power Station

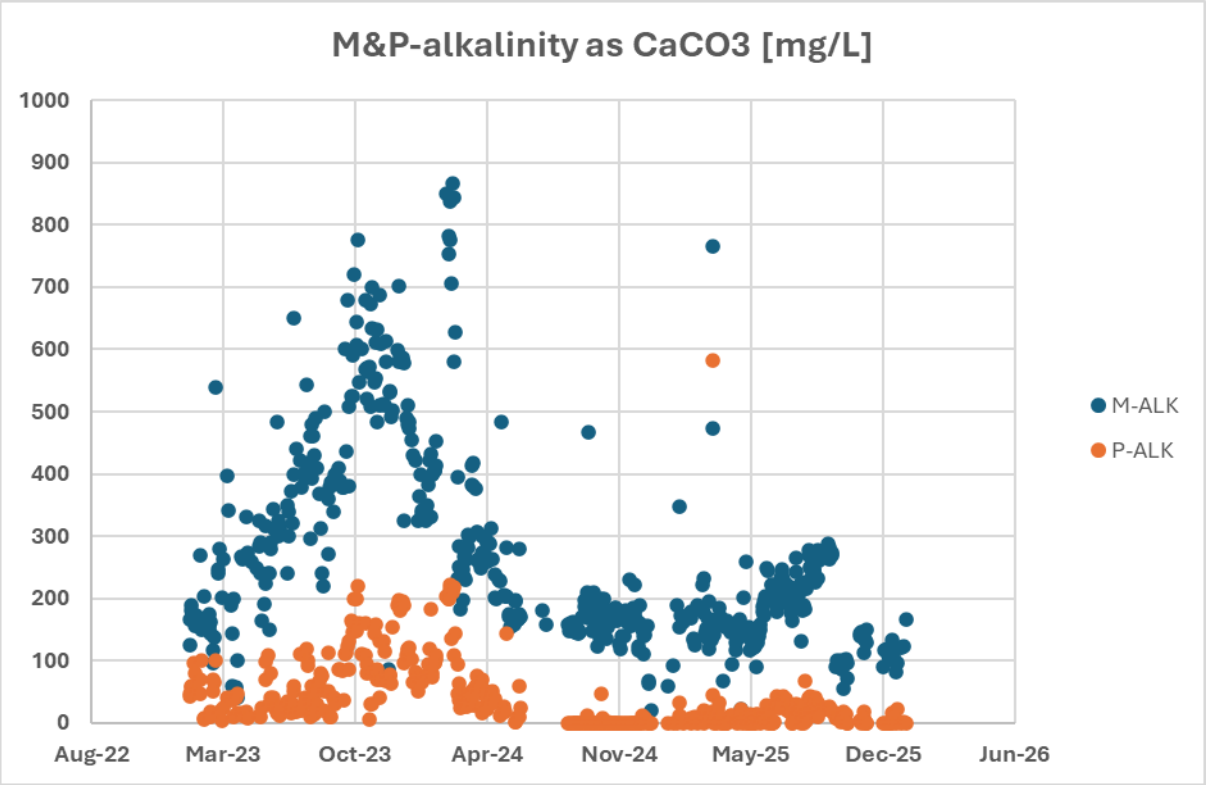


Figure 19: Dirty water dam recovery M&P alkalinity at Tutuka Power Station

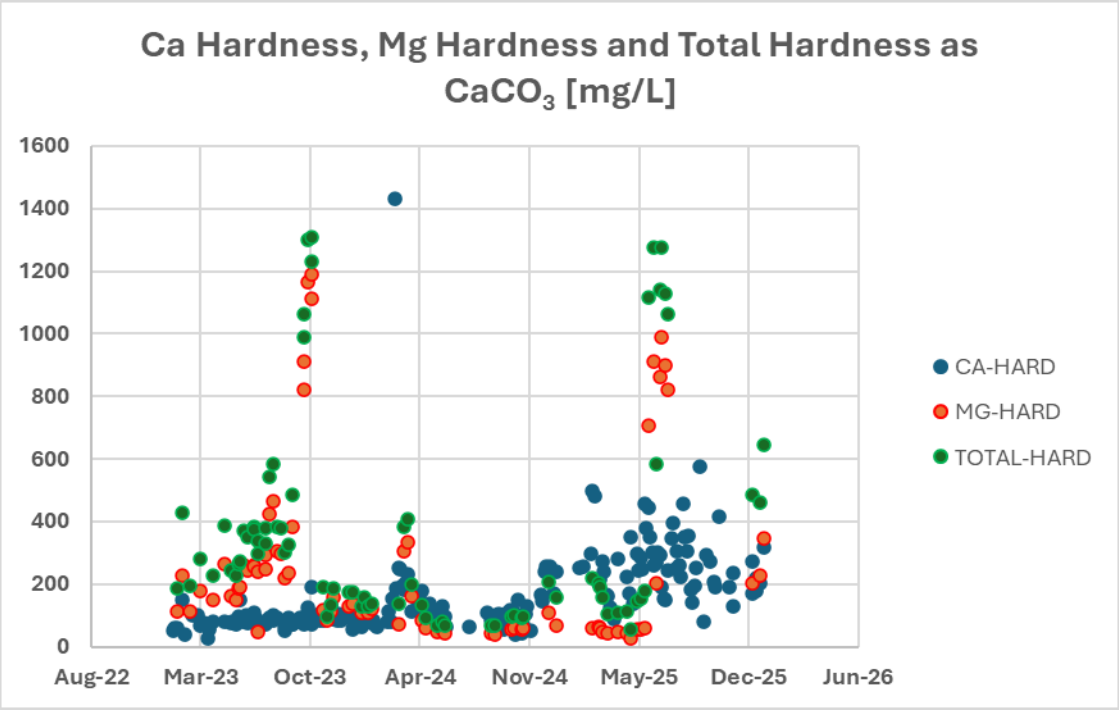


Figure 20: Dirty water dam recovery Calcium, magnesium and total hardness at Tutuka Power Station

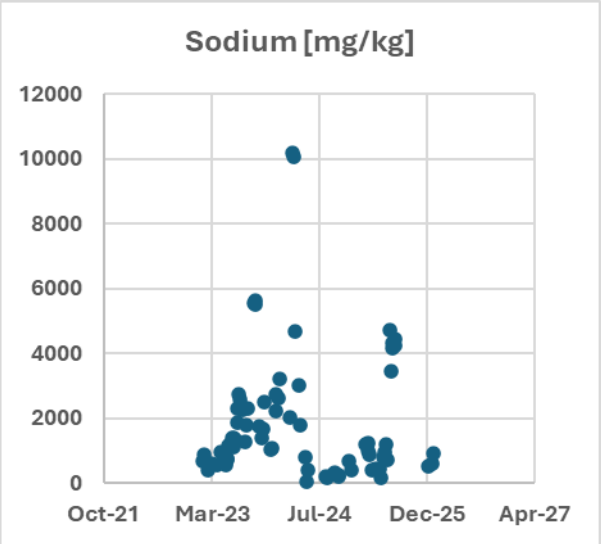


Figure 21: Dirty water recovery Sodium

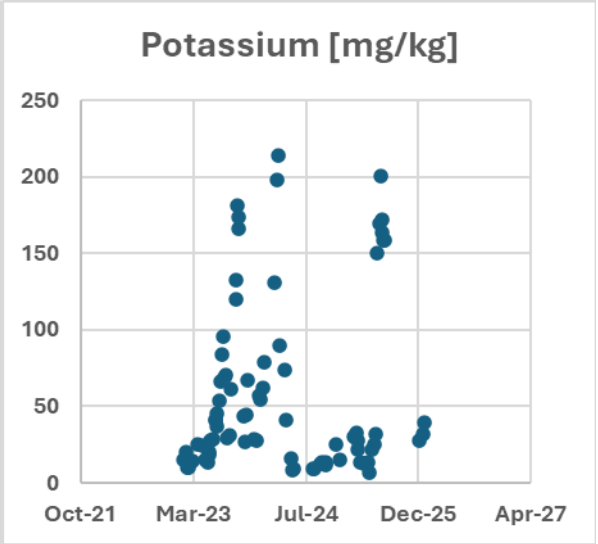


Figure 22: Dirty water recovery Potassium

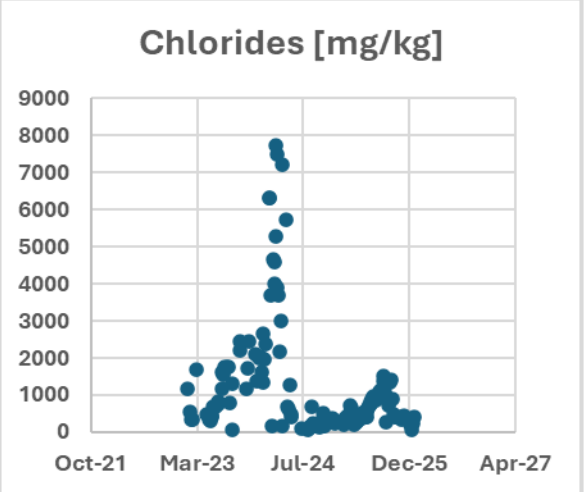


Figure 23: Dirty water recovery chlorides

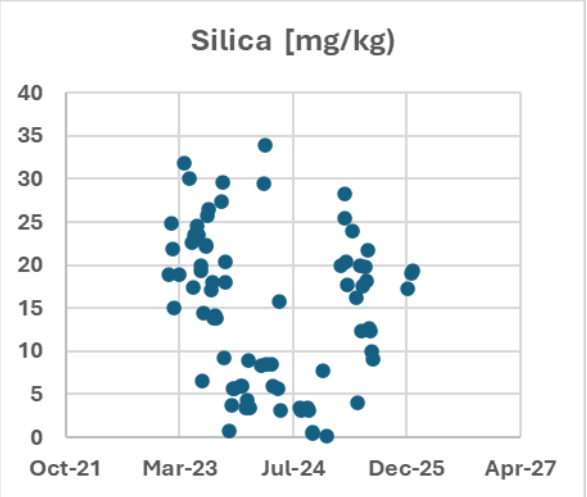


Figure 24: Dirty water recovery silica

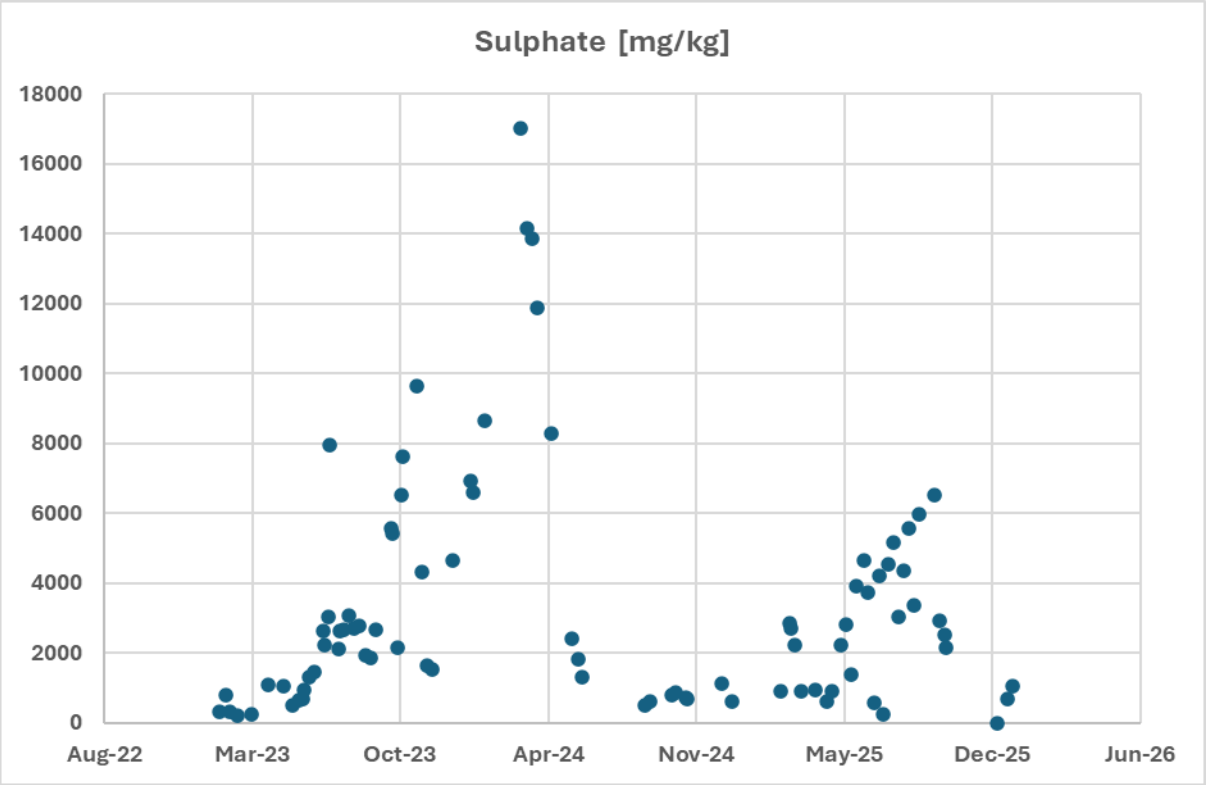


Figure 25: Dirty water recovery Sulphate

The water that is recovered must be of a quality similar to raw water quality in Table 1 or better. The water to be treated (i.e. the DWD recovery stream) is predominantly a mixture of clay, sand and coal in water. The indicative dry base ash of a DWD sample is 63%. The typical particle size of the solids in the water is between 0.25 µm – 794.33 µm.

b. Ash water – high pH

Many of the stations have problems with very high levels of water in the ash system. Reverse osmosis plants have been built at some of the stations to treat this water. These reverse osmosis plants are problematic as a result frequent scaling. A solution is required for the treatment of this high salinity, high pH water. The intention is to test the capability of the technology with regards to the removal of ash. At the time of testing, the Employer will add these components to the water supply if the levels are too low.

The typical water quality for treatment from the ash dams at Duvha is as indicated in the Figures 26-32 and Table 3 below:

Table 3: Ash water return (Duvha Power Station)

Parameter	Unit	Range	Average	95th percentile
pH	-	7.99 – 12.48	11.14	12.12
Conductivity	µS/cm	760 - 4707	2171.78	3626.15
Turbidity	NTU	0.251-12.3	2.61	6.8
Calcium Hardness as $CaCO_3$	mg/kg	260-1784	853.1	1410.2
Magnesium Hardness as $CaCO_3$	mg/kg	10 – 600	168.32	224.8
Total Hardness as $CaCO_3$	mg/kg	397 – 1970	1013.587	1556.1

Parameter	Unit	Range	Average	95th percentile
m-alkalinity	mg/kg	32.3 – 741.8	236.2	562.08
p-alkalinity	mg/kg	16.1 – 727.5	219.92	544.69
Sodium	mg/kg	46.77 – 277	146.69	191.85
Ammonium	mg/kg	0 – 0.85	0.17	0.35
Nitrate	mg/kg	0 – 42.4	4.73	13.9
Phosphate	mg/kg	0.005 – 5.6	0.91	4.3
Potassium	mg/kg	4,94 – 315	37.64	43.76
Chloride	mg/kg	0.63 – 307	96.07	165.2
Fluoride	mg/kg	0 – 112	1.29	2.49
Sulphate	mg/kg	330 – 1724	682.76	994.2
TOC as C	mg/kg	0.762 – 12.8	2.14	3.29

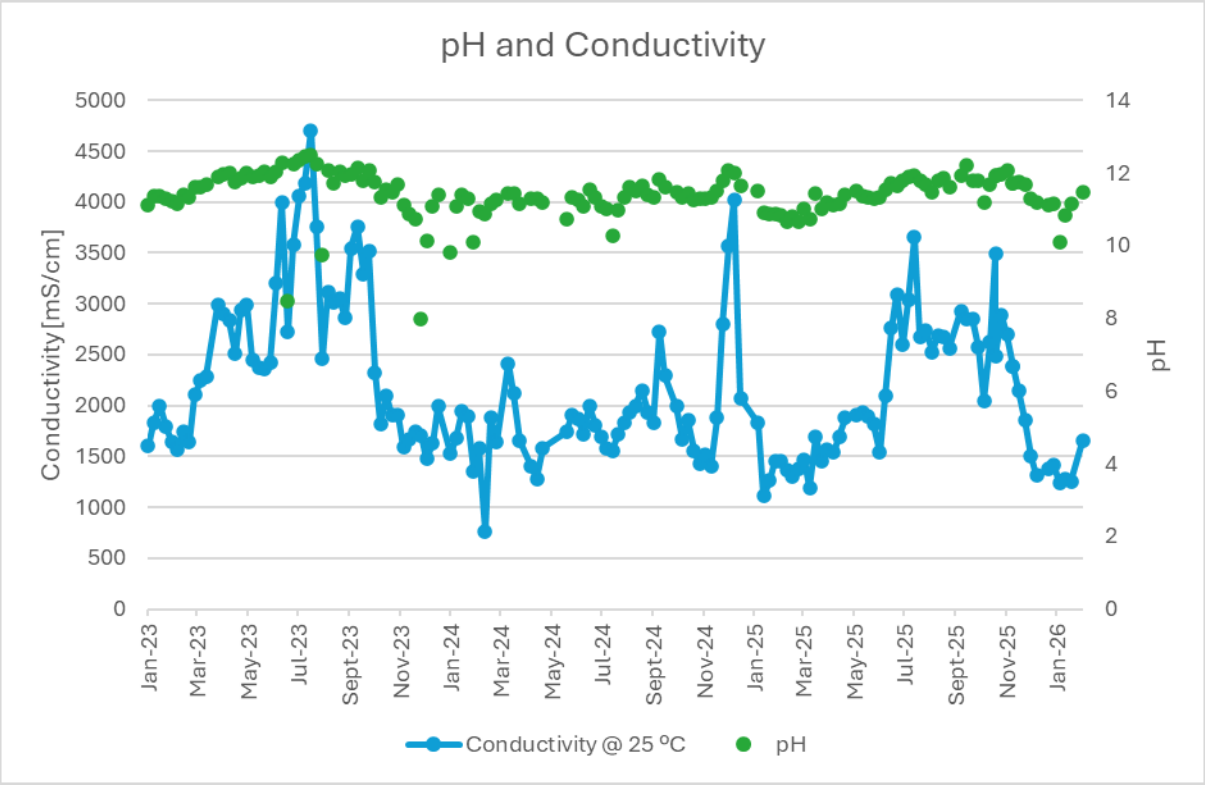


Figure 26: Duvha Ash Water pH and Conductivity

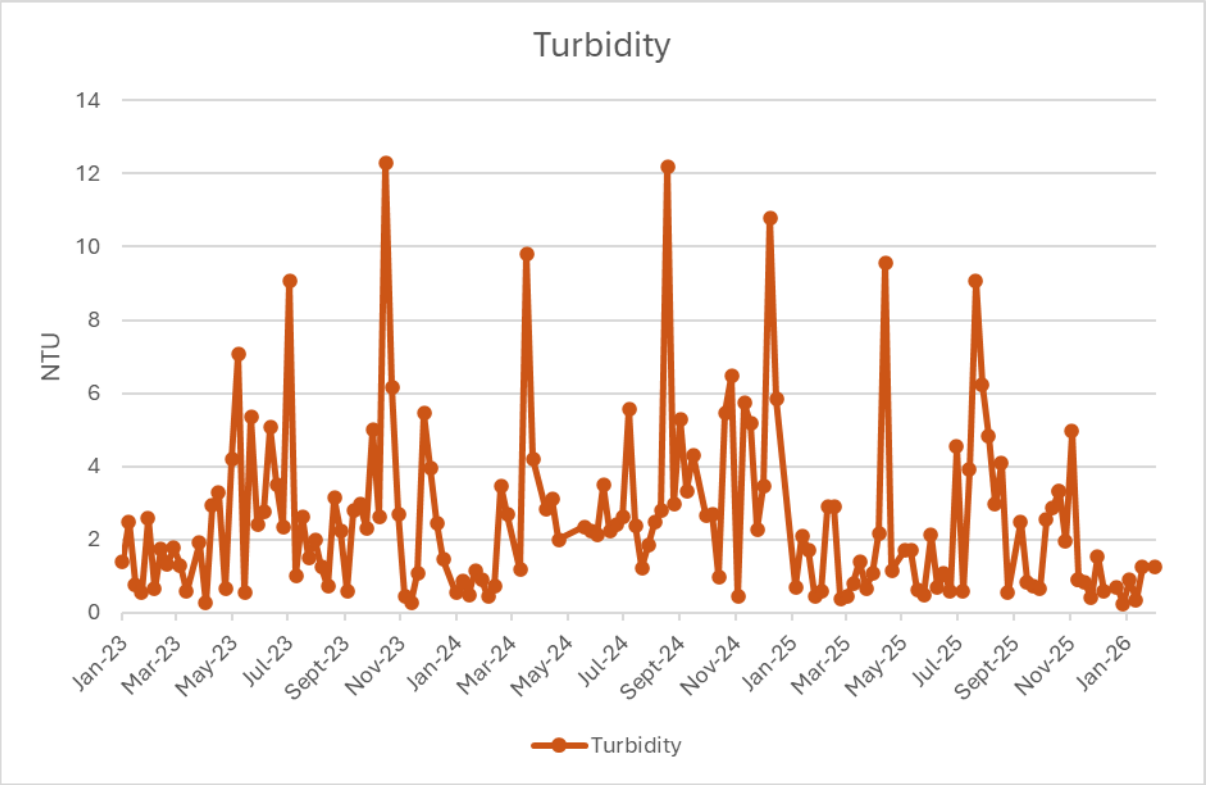


Figure 27: Duvha Ash Water Turbidity

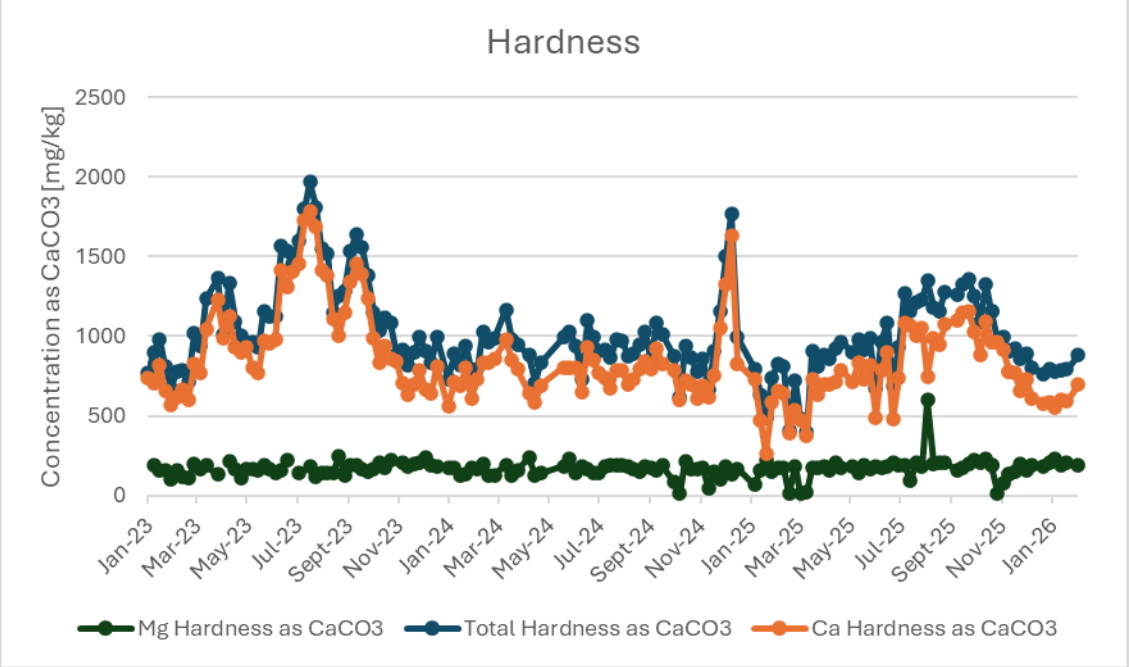


Figure 28: Duvha Ash Water Hardness

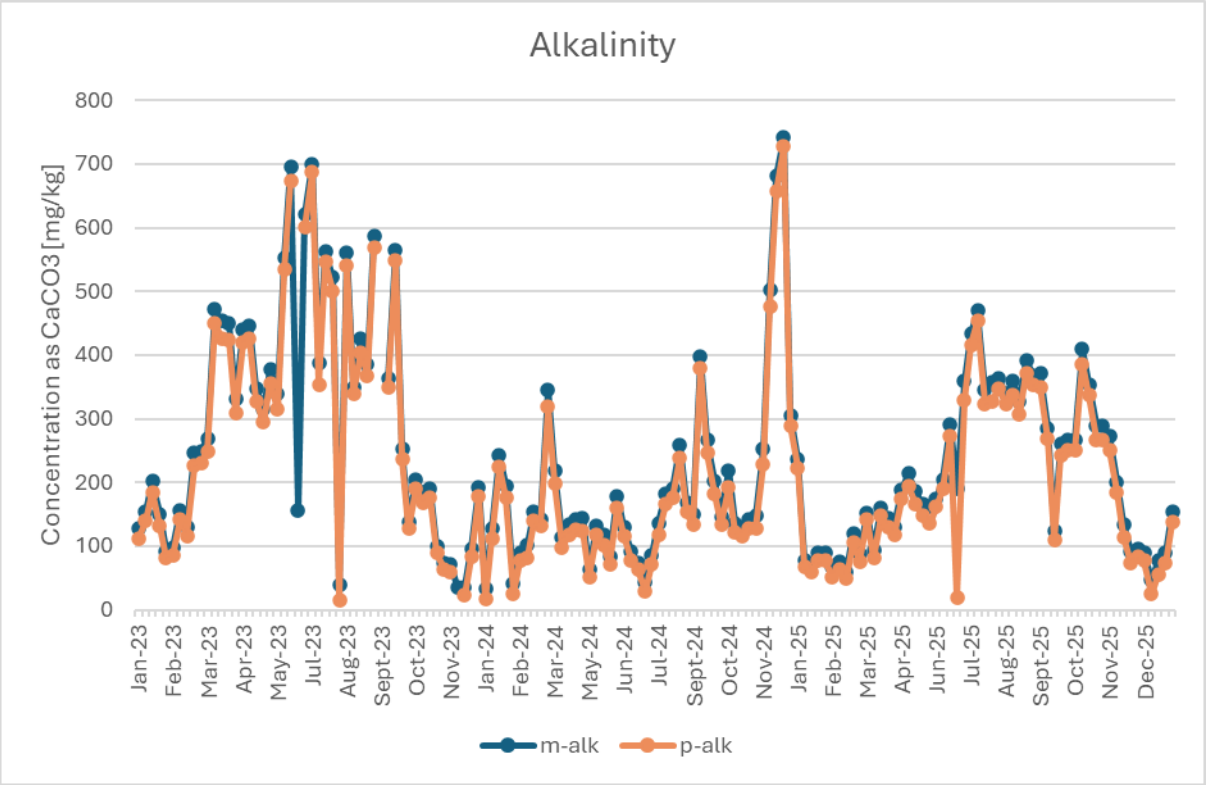


Figure 29: Duvha Ash Water Alkalinity

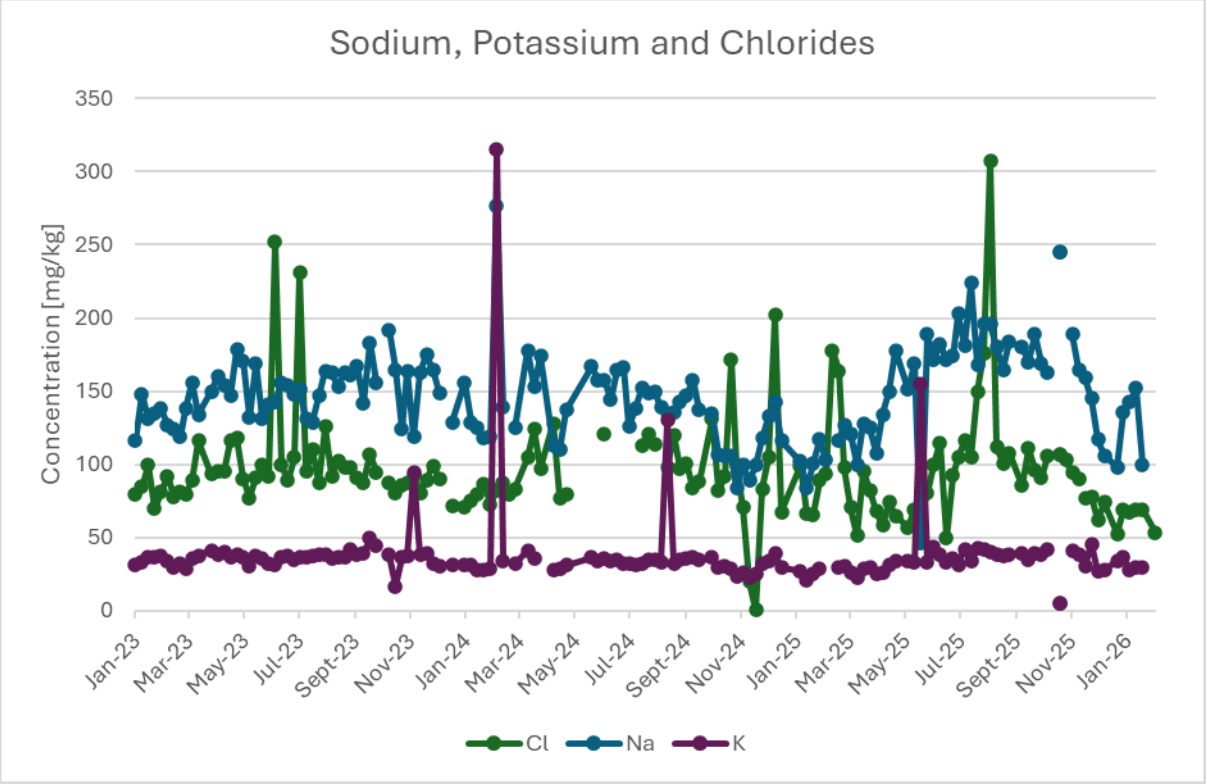


Figure 30: Duvha Ash Water Sodium, Chlorides and Potassium

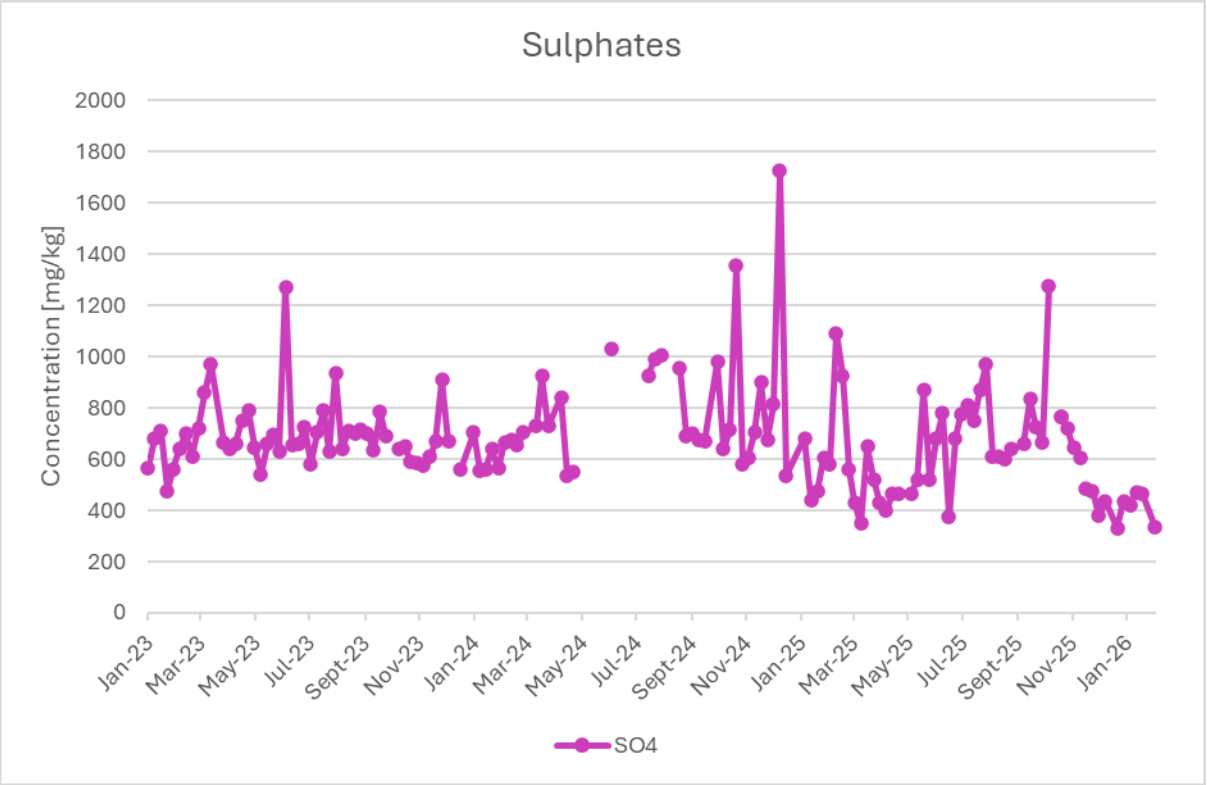


Figure 31: Duvha Ash Water Sulphates

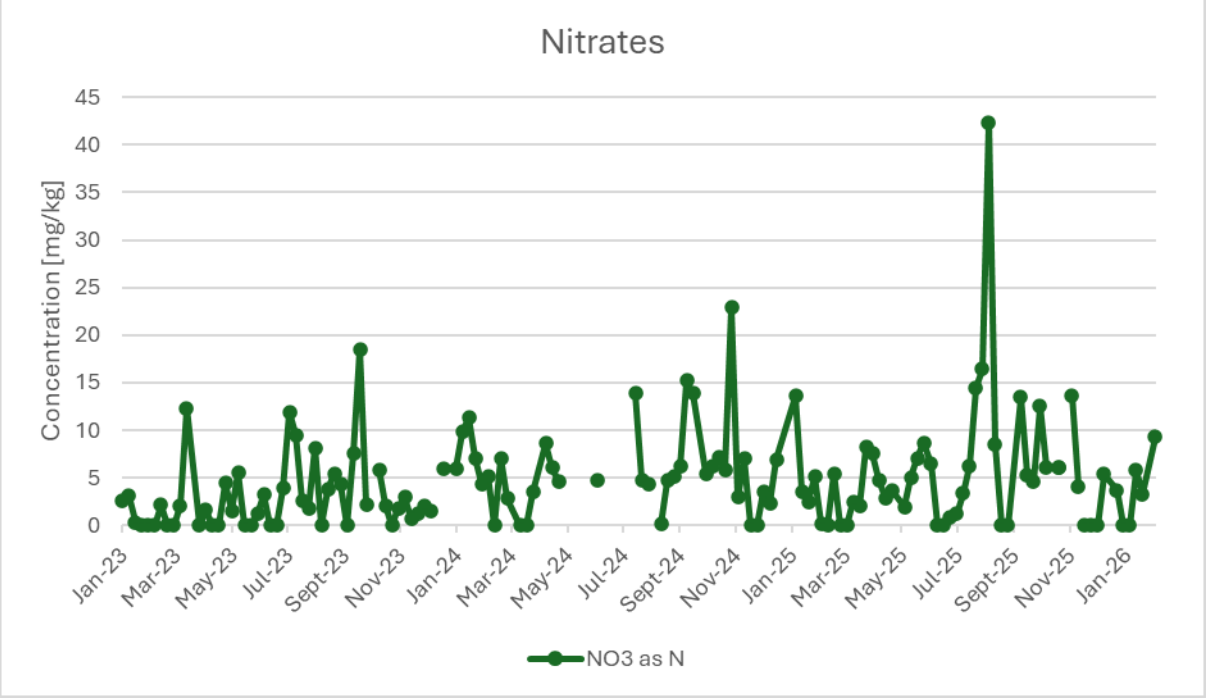


Figure 32: Duvha Ash Water Nitrates

c. FGD bleedstream

In a drive to reduce the particulate emissions at the newly built power stations, flue gas desulphurisation plants have been built at Kusile and the intention is for another to be built at Medupi. However, the bleedstream from this water has to be treated further. Thermal crystallisation is one of the techniques being utilised to treat this water. This plant has been installed at Kusile. However, it is a very cost intensive plant

with extremely high capital and operating costs. An alternative solution must be investigated which could treat this water.
The typical range of water quality for treatment is not known as yet since the analysis of these streams are still in progress. However, the chemical analysis as per the design is in the table below. The table below refers to the design parameters for the plant.

Table 4: Designed chemical parameters for the Bleedstream from the FGD plant (Kusile Power Station)

PARAMETER	CONCENTRATION [mg/L ion] BEFORE PRE-TREATMENT
Chloride	30,000
Sulfate	1,500 - 8,000
Sulfite	<20
Nitrate	100 – 1,500
Fluoride	30 – 200
Calcium	4,000 – 20,000
Magnesium	200 – 5,600
Sodium	75 – 1,200
Iron	30 – 400
Aluminum	50 – 800
Arsenic	0.05 – 3.0
Boron	20 – 40
Boron (as HBO_3)	
Cadmium	0.04 – 0.5
Cobalt	0.05 – 0.4
Chromium Total	0.3 – 5.0
Copper	0.1 – 0.85
Mercury	0.05 – 0.8
Nickel	0.2 – 6.0
Lead	0.1 – 3.0
Selenium	0.2 – 1.0
Vanadium	0 – 2.4
Zinc	5 – 10
Ammonium	<10 – 100
Ammonia	
COD	100 – 150
pH	4 – 7
TSS	300 – 10,000
Bicarbonate	
Silica	
TOC	

However, the samples from the plant have been tested and certain parameters are less than the designed parameters. Refer to the table below for the last set of samples. Since the intention is to test the water to the design parameters of the plant, the contractor must make allowance for recycle of the concentrate stream in order to cycle up the ions.

Table 5: Chemical operational parameters for the Bleedstream from the FGD plant (Kusile Power Station)

PARAMETER	UNITS	CONCENTRATION [mg/L ion] BEFORE PRE-TREATMENT
Total Alkalinity (pH>4.5)	mg CaCO3/L	60.2
Bicarbonate Alkalinity	mg CaCO3/L	60.2
Carbonate Alkalinity	mg $CaCO_3$/L	0.00
M Alkalinity	mg $CaCO_3$/L	60.2

(8.3>pH>4.5)		
P Alkalinity (pH>8.3)	mg $CaCO_3$/L	0.00
Conductivity (Laboratory)	mS/cm	2560
pH (Laboratory)		6.69
Total Hardness	mg $CaCO_3$/L	13215
Calcium Hardness	mg $CaCO_3$/L	2068
Magnesium Hardness	mg $CaCO_3$/L	11147
Total Dissolved Solids (TDS)	mg/L	17779
Suspended Solids (TSS)	mg/L	5528
Temperature	°C	21.0
Chemical Oxygen Demand (COD)	mg O_2/L	4000
Ammonia and Ammonium	mg N/L	
Calcium	mg Ca/L	828
Chloride	mg Cl/L	1004
Magnesium	mg Mg/L	2707
Nitrate and Nitrite (TON)	mg N/L	4.14
Potassium	mg K/L	136
Sodium	mg Na/L	1369
Silicon	mg Si/L	34.5
Sulphate	mg SO_4/L	9008
Aluminium	mg Al/L	1.33
Antimony	mg Sb/L	
Arsenic	mg As/L	0.06
Barium	mg Ba/L	0.10
Beryllium	mg Be/L	0.01
Boron	mg B/L	68.8
Bromide	mg Br/L	
Cadmium	mg Cd/L	0.002
Chromium	mg Cr/L	0.01
Cobalt	mg Co/L	0.10
Copper	mg Cu/L	0.01
Fluoride	mg F/L	71.7
Iron	mg Fe/L	0.09
Lead	mg Pb/L	0.23
Lithium	mg Li/L	6.86
Total Manganese	mg Mn/L	
Manganese	mg Mn/L	2317
Mercury	mg Hg/L	0.003
Molybdenum	mg Mo/L	0.08
Nickel	mg Ni/L	0.84
Selenium	mg Se/L	1.21
Strontium	mg Sr/L	1.29
Tin	mg Sn/L	0.04
Vanadium	mg V/L	0.96
Zinc	mg Zn/L	0.41

d. Effluent from the Spiral Reverse Osmosis plant

The resin regeneration and reverse osmosis effluent is sent to the neutralisation sump. From this sump it is further sent for co-disposal with the ash. Legislation passed in 2013, states that brine with a high salt content (TDS>5%), cannot be co-disposed with the ash from 2021 onwards.

Hence, a solution is required to treat this water instead of the co-disposal with ash.

The typical range of water quality for treatment of the SRO brine is as per table and Figures 40-52 below when the plant was last in service.

Table 6: SRO brine (Tutuka Power Station)

		Tutuka SRO brine		
Parameter	**Unit**	**Range**	**Average**	**95th percentile**
pH	-	2.5 - 9.1	6.9	8
Conductivity	µS/cm	5.6 – 35373	29393	34192.8
Turbidity	NTU	0.2 – 2.7	0.7	1.3
Calcium Hardness as $CaCO_3$	mg/kg	20 - 1580	828	1560.7
Magnesium Hardness as $CaCO_3$	mg/kg	61.4 - 5178	2515.8	5155.9
Total Hardness as $CaCO_3$	mg/kg	109 - 6678	3343.8	6065.2
m-alkalinity	mg/kg	0 – 968.2	351.7	793.1
p-alkalinity	mg/kg	0 – 32.5	0.6	0
Sodium	mg/kg	172 - 13500	5103.9	8593.4
Potassium	mg/kg	11.6 - 709	287.5	450.3
Chloride	mg/kg	0 - 5463	3700.3	5201.2
Sulphate	mg/kg	559 - 106840	34744.2	98032.5
Silica as SiO2	mg/kg	1.9 - 85	46.9	83
COD	mg/kg	633 -2302	1073.1	1955.2

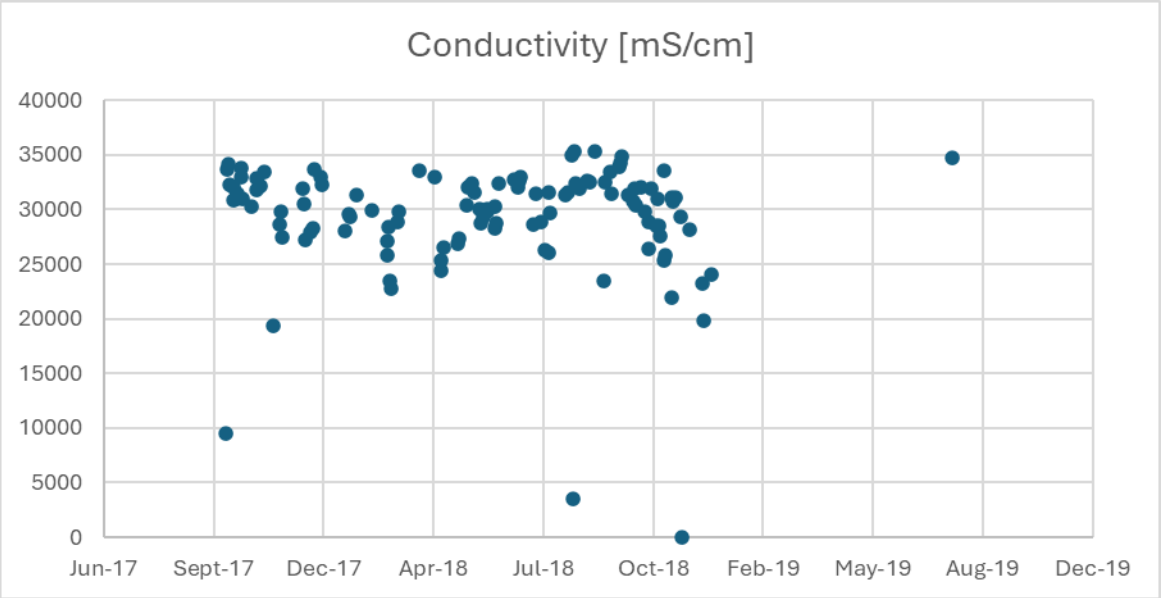


Figure 33: Tutuka SRO brine conductivity

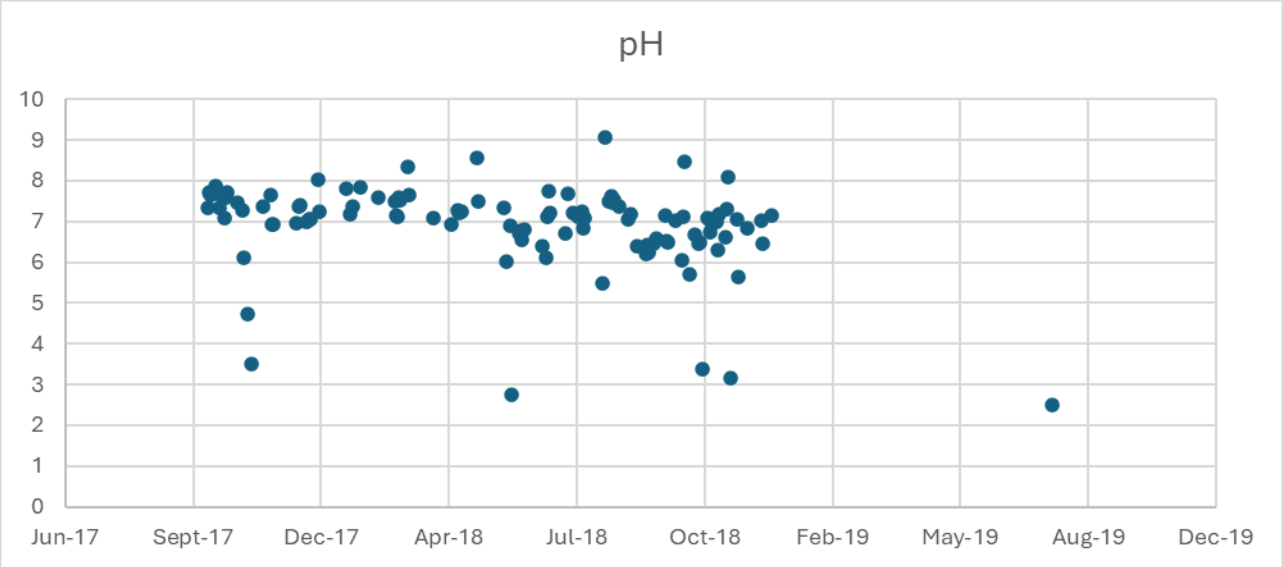


Figure 34: Tutuka SRO brine pH

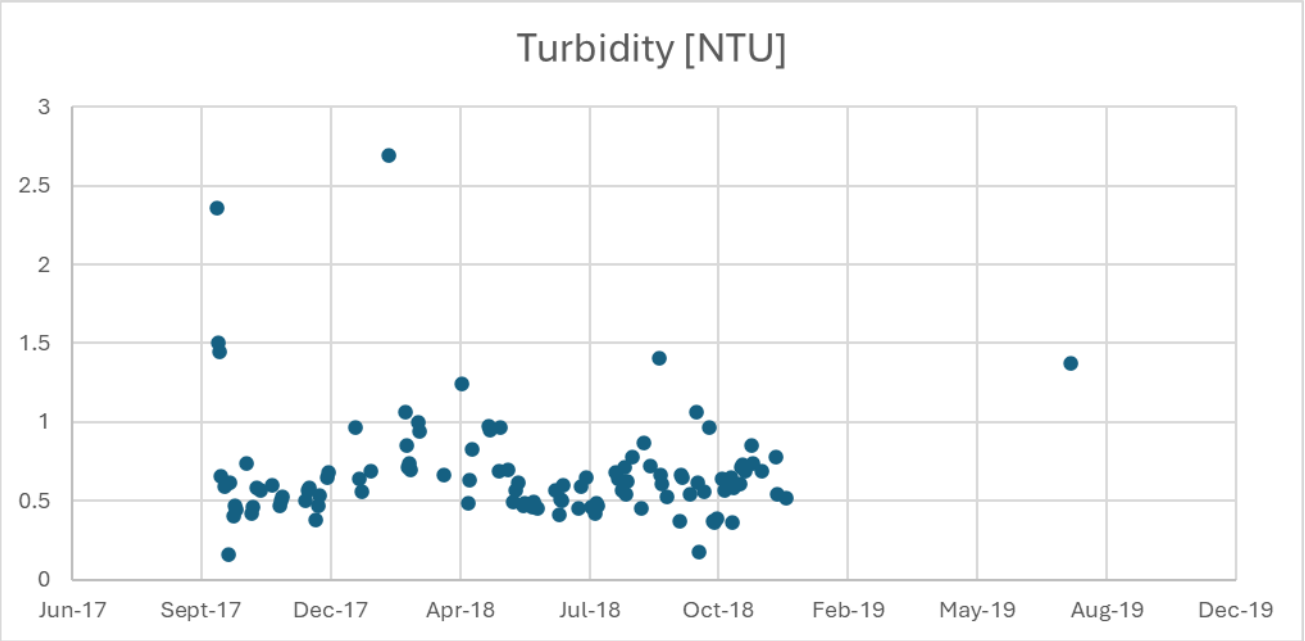


Figure 35: Tutuka SRO brine turbidity

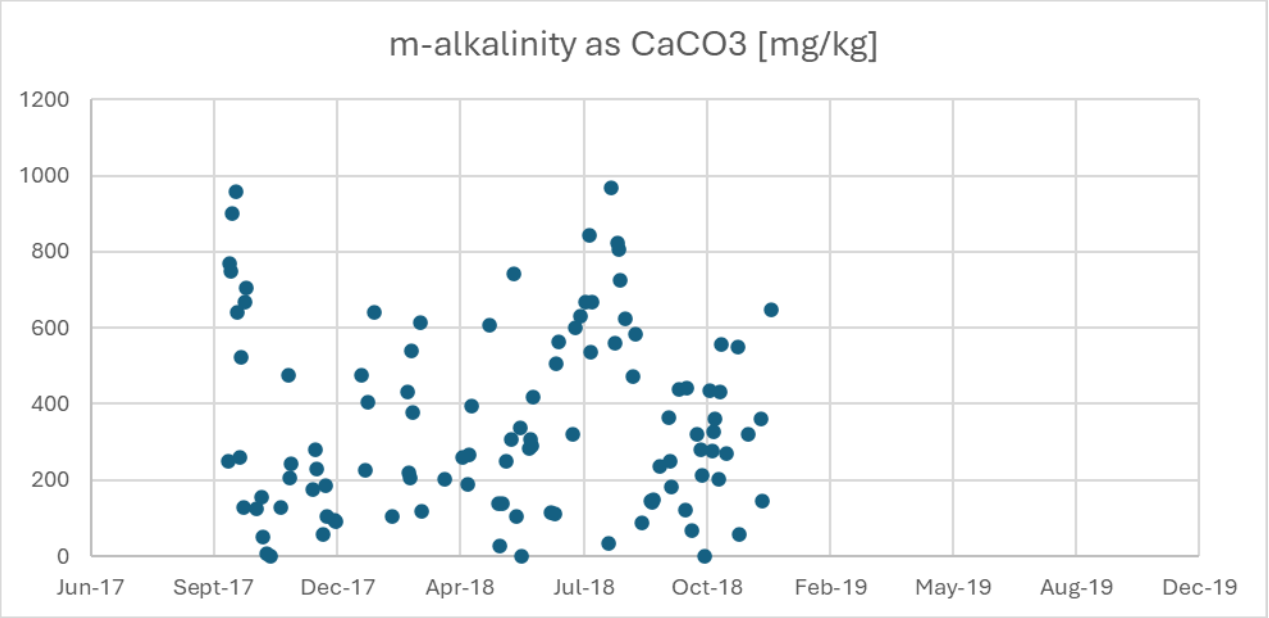


Figure 36: Tutuka SRO brine m-alkalinity

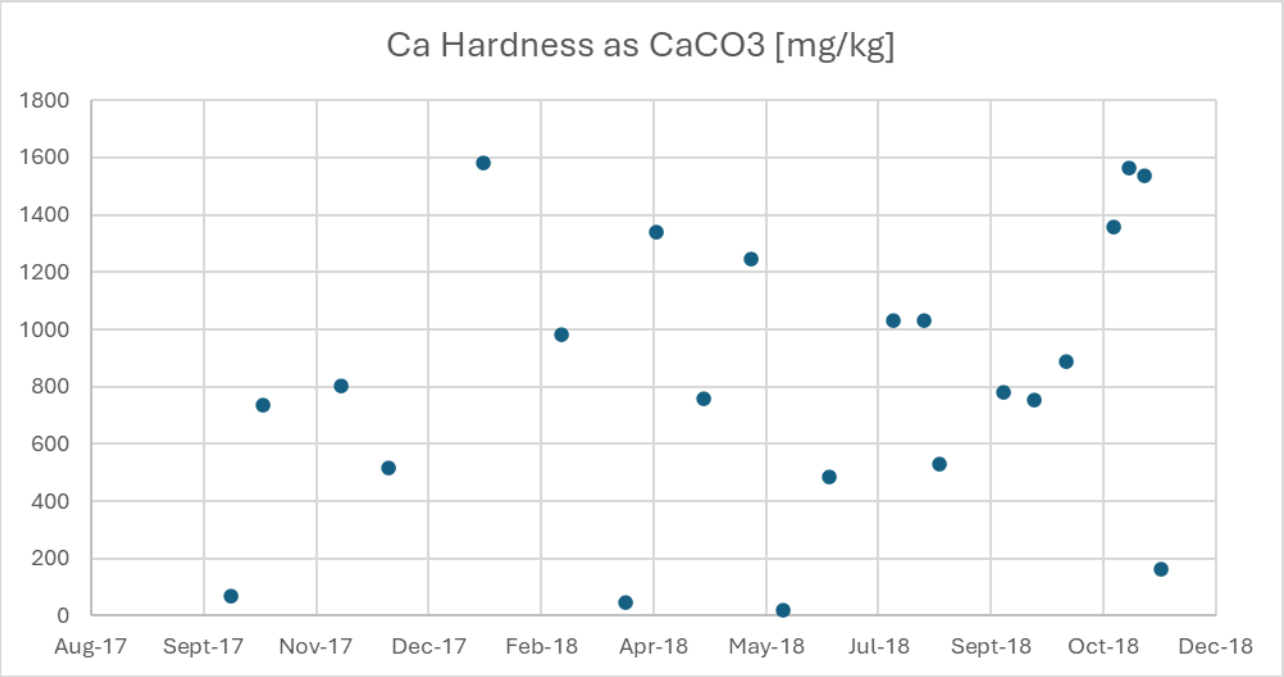


Figure 37: Tutuka SRO Calcium hardness

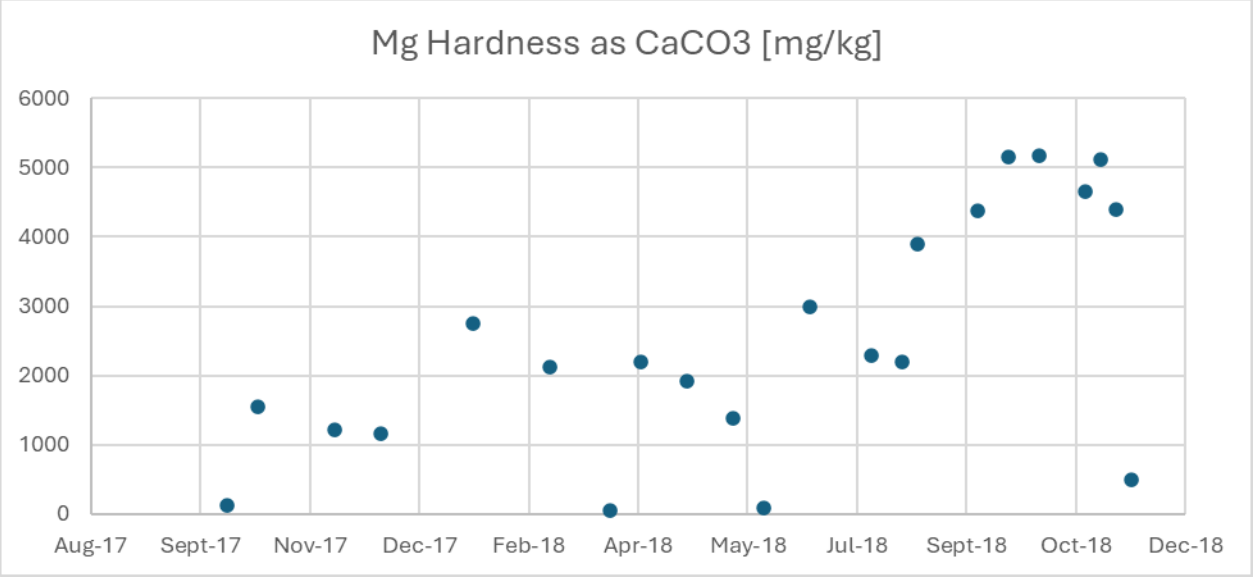


Figure 38: Tutuka SRO brine magnesium hardness

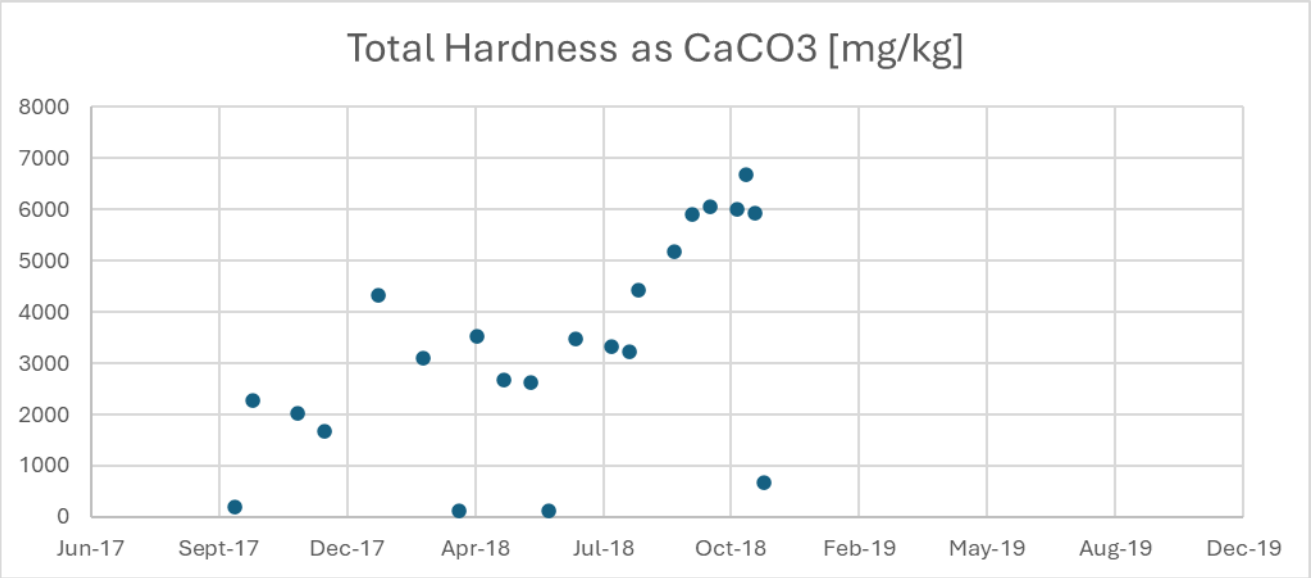


Figure 39: Tutuka SRO total hardness

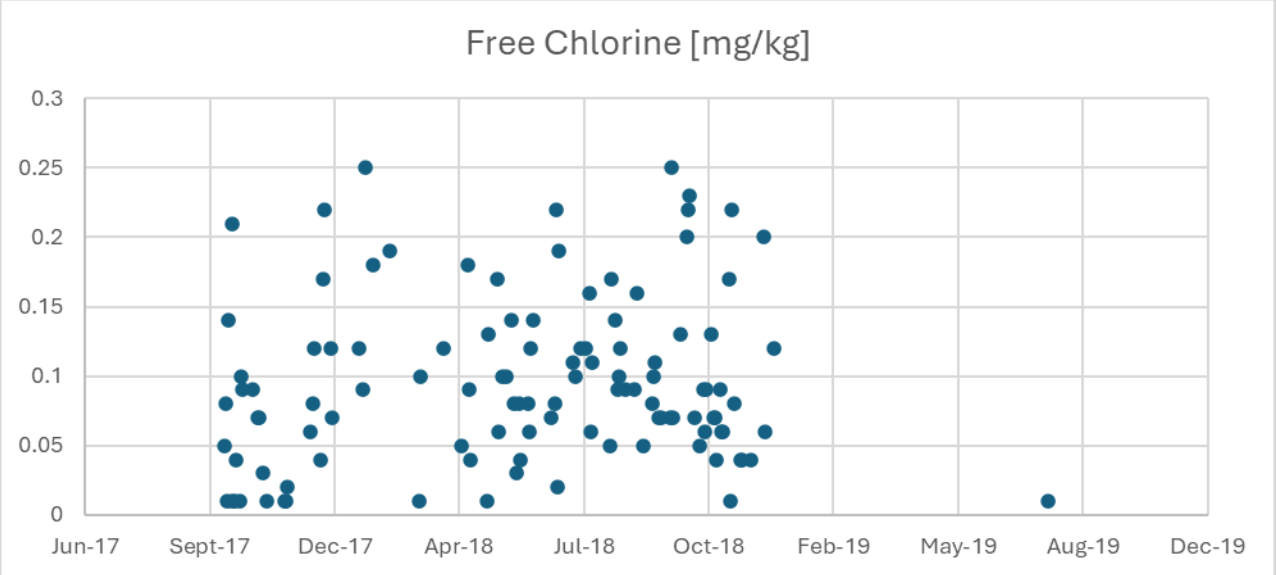


Figure 40: Tutuka SRO brine Free chlorine

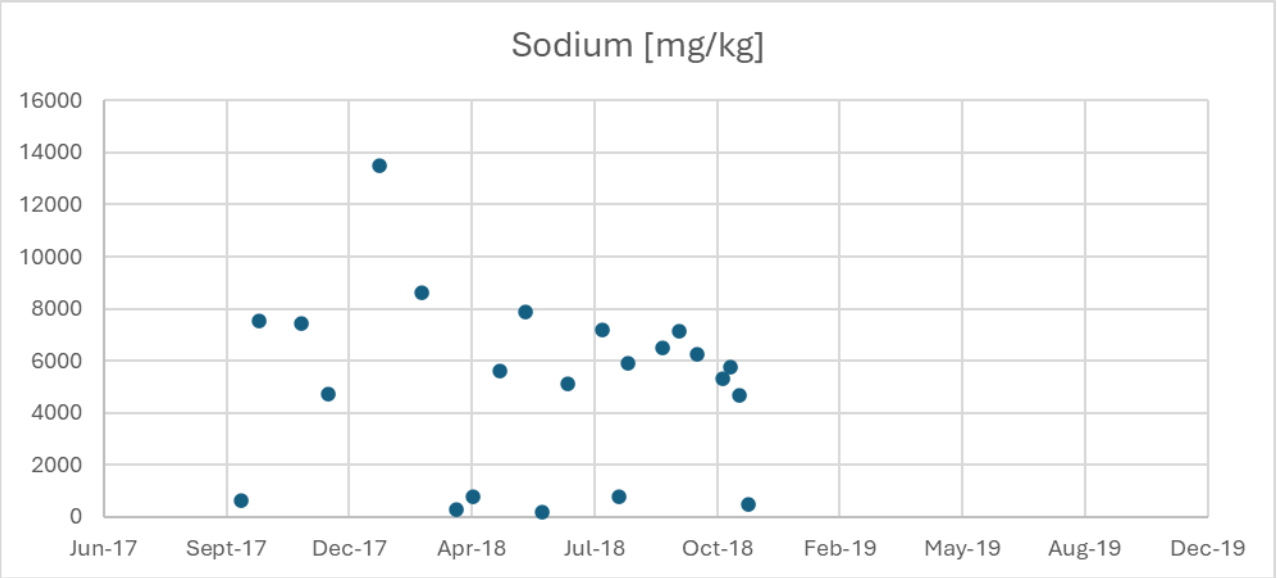


Figure 41: Tutuka SRO sodium concentration

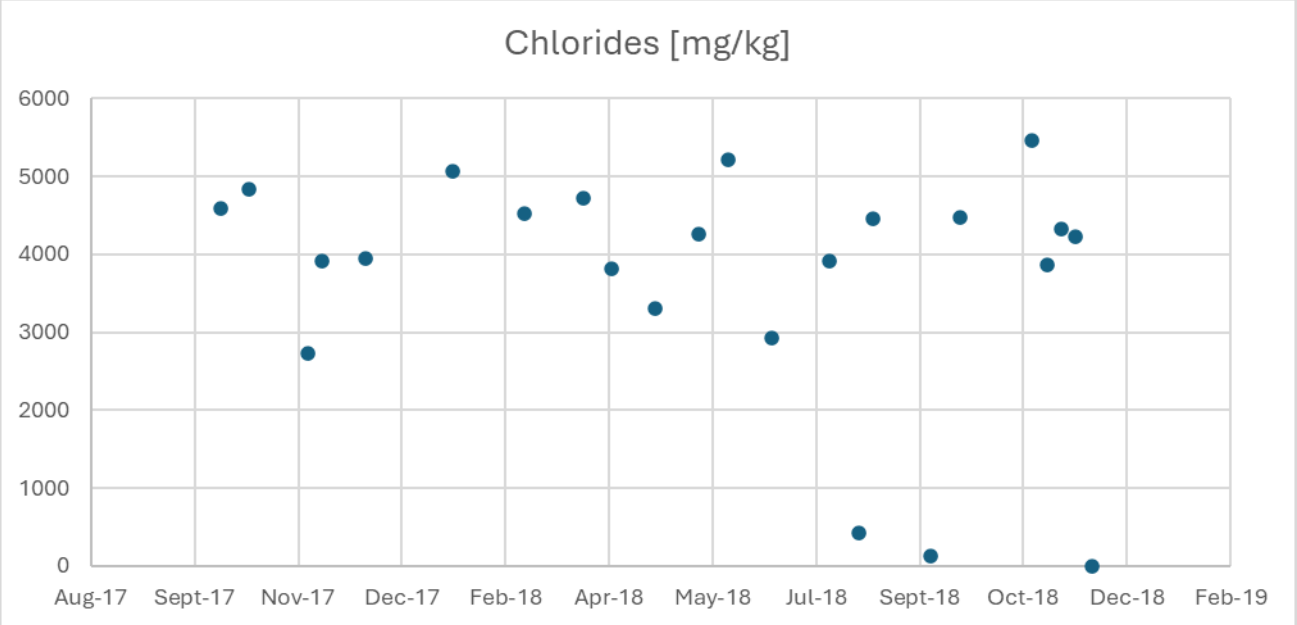


Figure 42: Tutuka SRO chlorides concentration

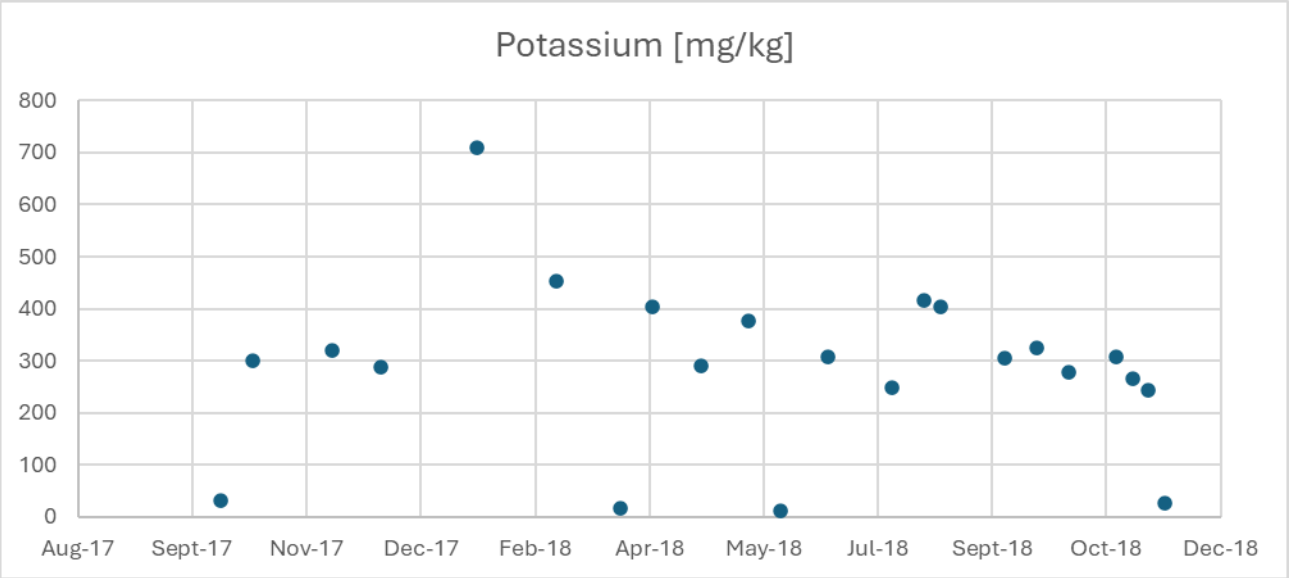


Figure 43: Tutuka SRO potassium concentration

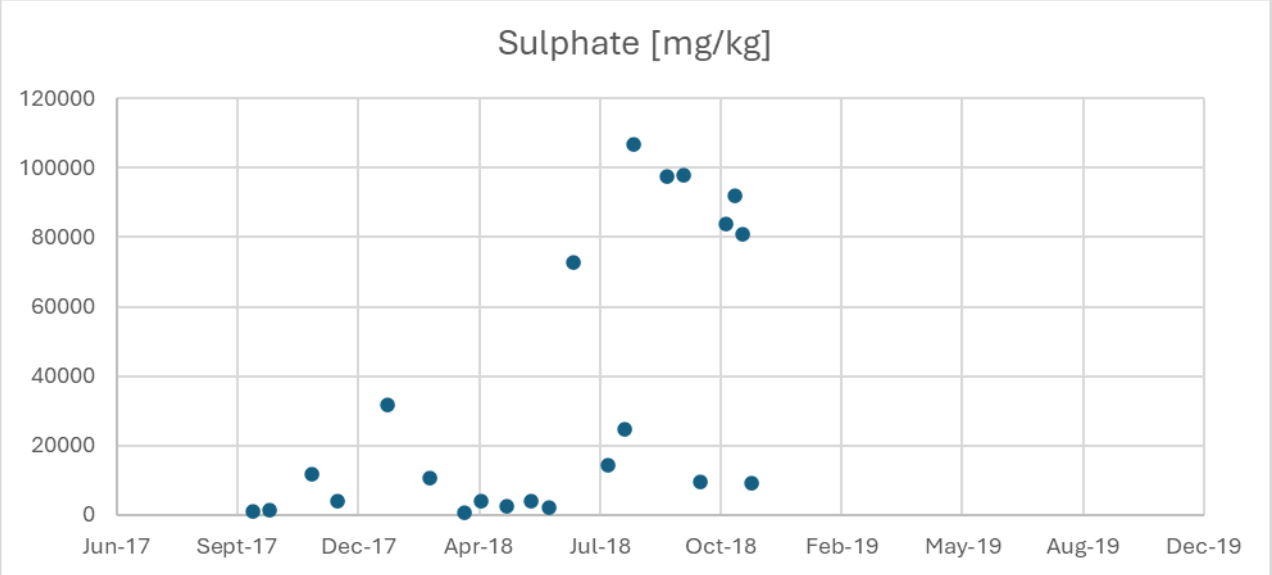


Figure 44: Tutuka SRO sulphate concentration

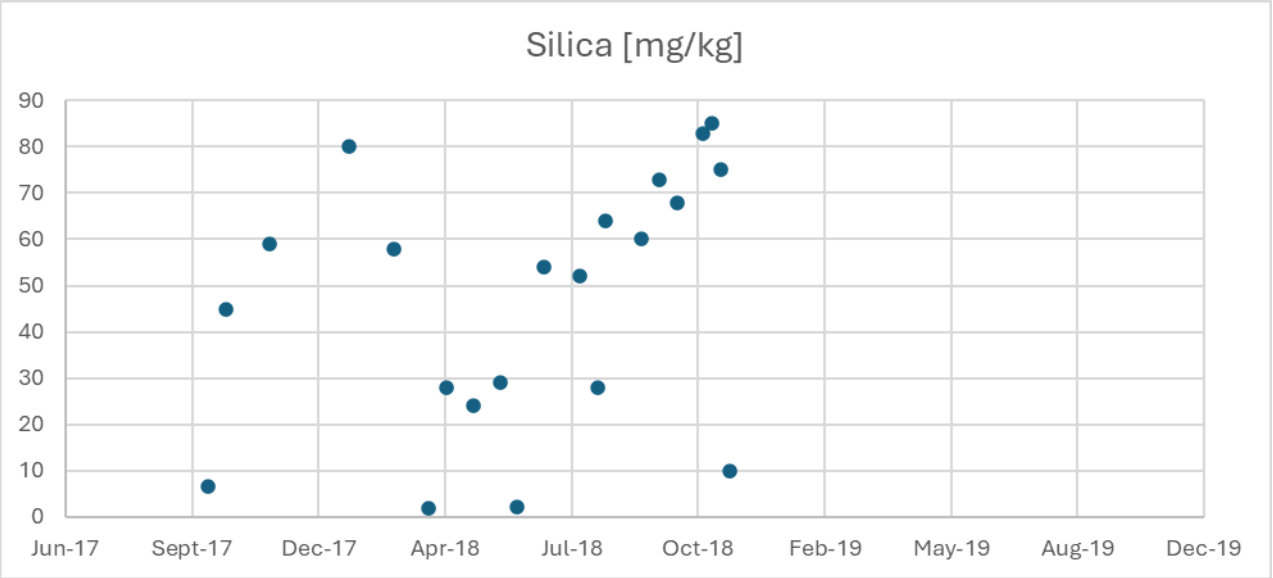


Figure 45: Tutuka SRO silica concentration

e. Concentrated Cooling Water (CCW) sidestream / blowdown

Water from the concentrated cooling water system is blown down when the water quality is out of specification with respect to the limits in the Eskom Cooling Water Chemistry standard. There are times when the water cannot be blown down because of high water levels in the ash system. The water then concentrates out of specification which exacerbates the scaling potential of the water and results in scaling of the cooling water system. Currently, lime softening treatment has been employed at many stations to treat the concentrated cooling water on a side stream. These plants have however been found to be problematic and are often out of service. Since this water is not as saline as the other waters being tested, this stream will be tested for sensitivity analysis purposes.

The typical range of water quality for treatment from the CCW at Tutuka is as indicated in the tables and figures below:

Table 7: Concentrated Cooling water (Tutuka Power Station)

		Tutuka CW East		
Parameter	**Unit**	**Range**	**Average**	**95th percentile**
pH	-	6.69 – 12.01	8.86	9.61
Conductivity	µS/cm	12.8 - 52700	12431.72	38210
Turbidity	NTU	2.38 - 270	46.86	121
CCPP as $CaCO_3$	mg/kg	4.7 – 170	45.16	93.25
Calcium Hardness as $CaCO_3$	mg/kg	0 –1951	302.45	895.15
Magnesium Hardness as $CaCO_3$	mg/kg	0.9 – 2990	206.33	370.06
Total Hardness as $CaCO_3$	mg/kg	37.7 - 2890	625.83	1887
m-alkalinity	mg/kg	28.7 – 1894	405.58	1043.9
p-alkalinity	mg/kg	0 – 601	44.41	212.38

		Tutuka CW East		
Sodium	mg/kg	22.9 - 5816	1519.51	5198
Potassium	mg/kg	5 - 325	97.62	262.9
Chloride	mg/kg	20.2 – 5080	642.38	1809
Sulphate	mg/kg	41.3 – 9179	1874.33	5049.45
Nitrates	mg/kg	0.53 – 35.1	11.78	29.82
Phosphates	mg/kg	0.01 – 2430	110.63	571
Silicate at SiO_2	mg/kg	0.01 - 132	36.16	87.6
TOC	mg/kg	0.03 - 106	30.66	76.46

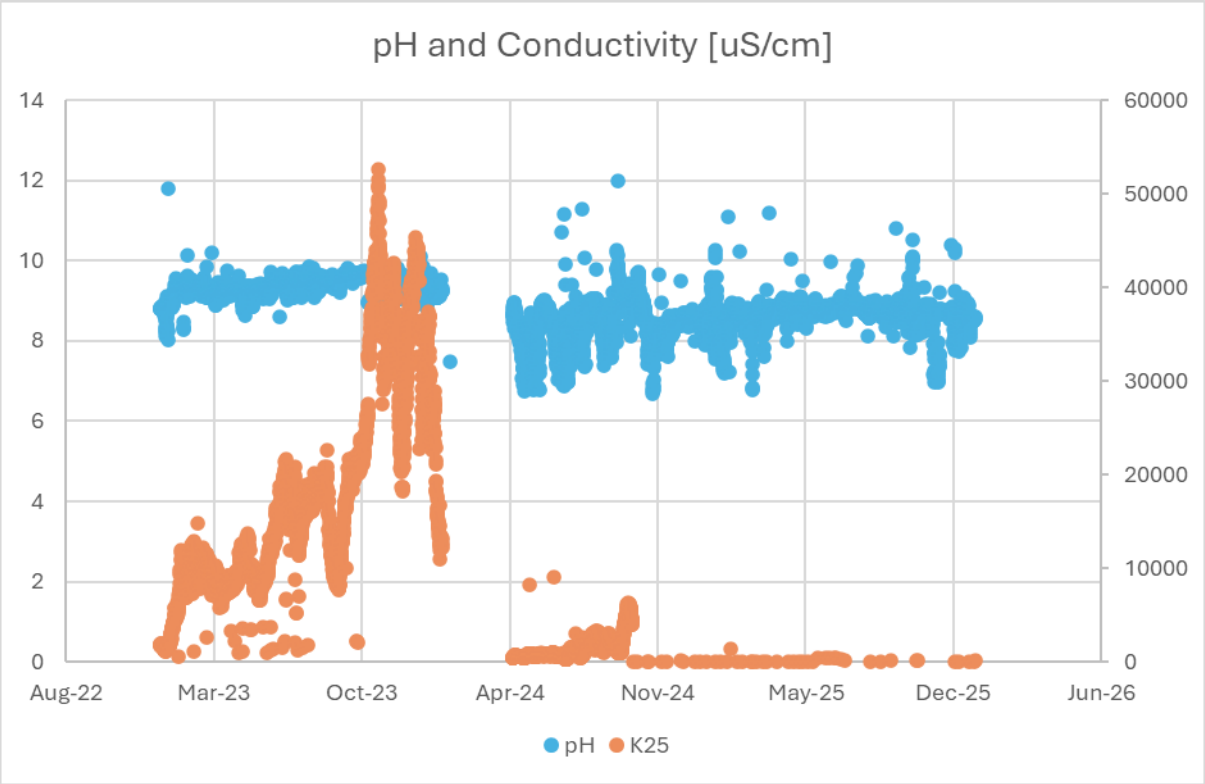


Figure 46: Tutuka Cooling water East pH and Conductivity

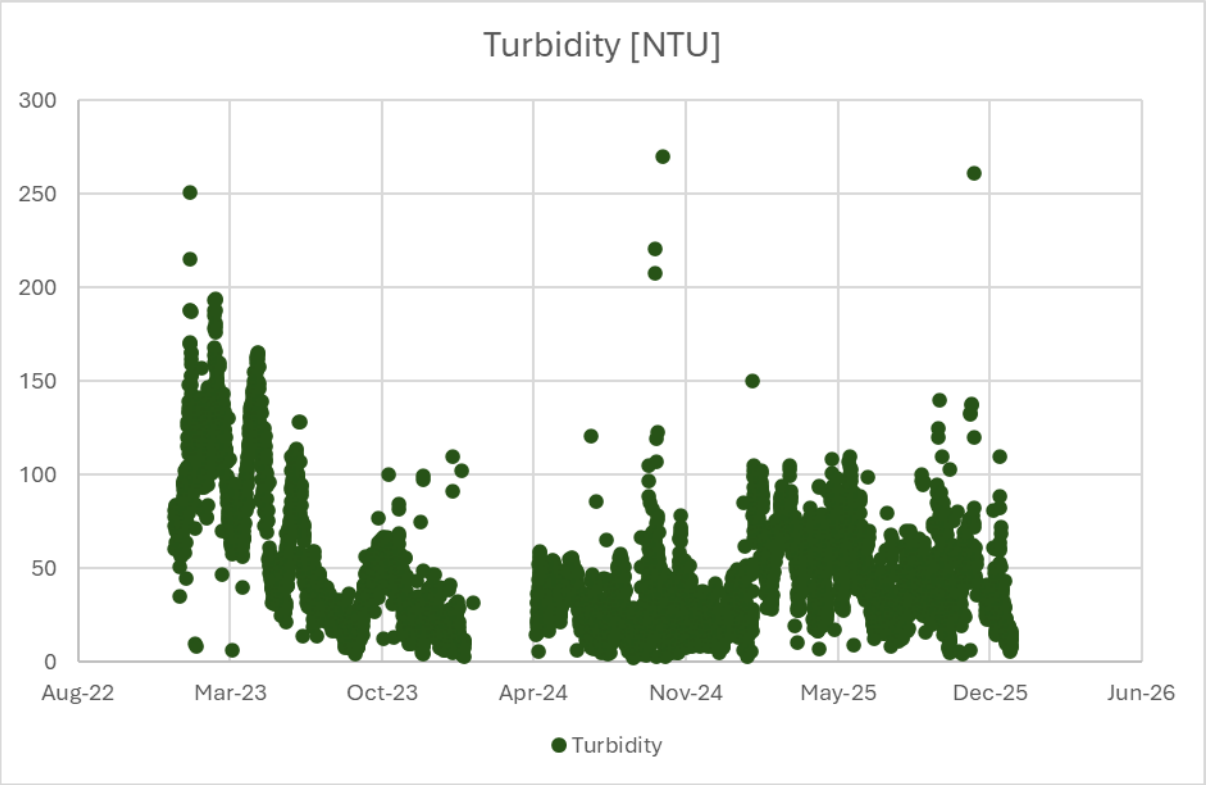


Figure 47: Tutuka Cooling water East Turbidity

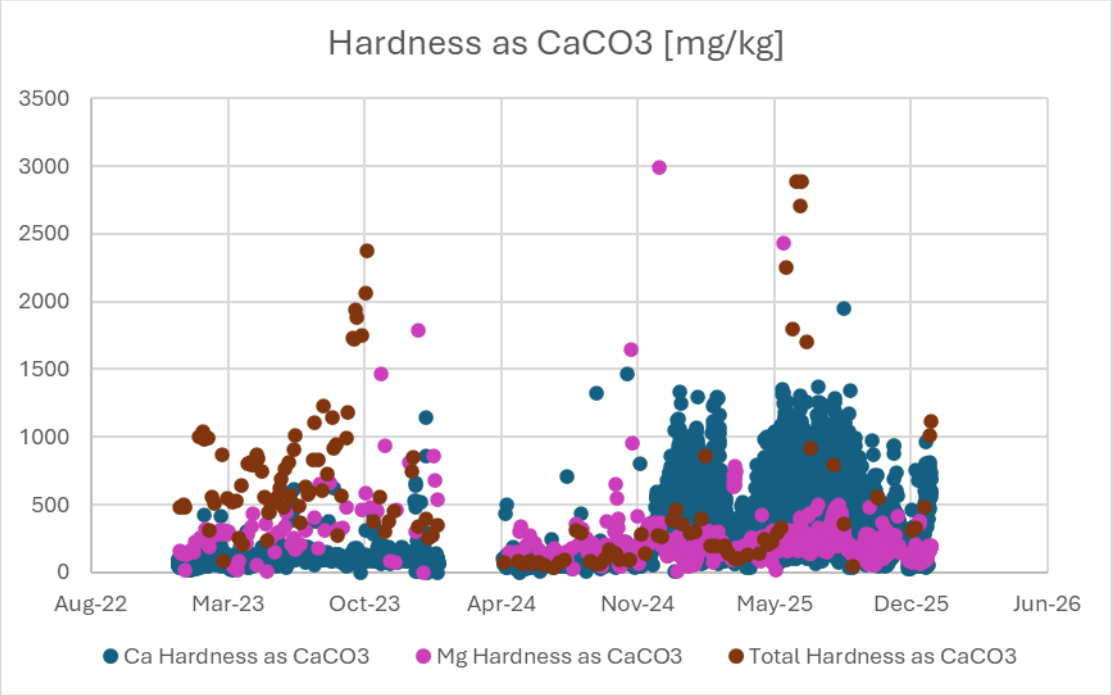


Figure 48: Tutuka Cooling water East Hardness

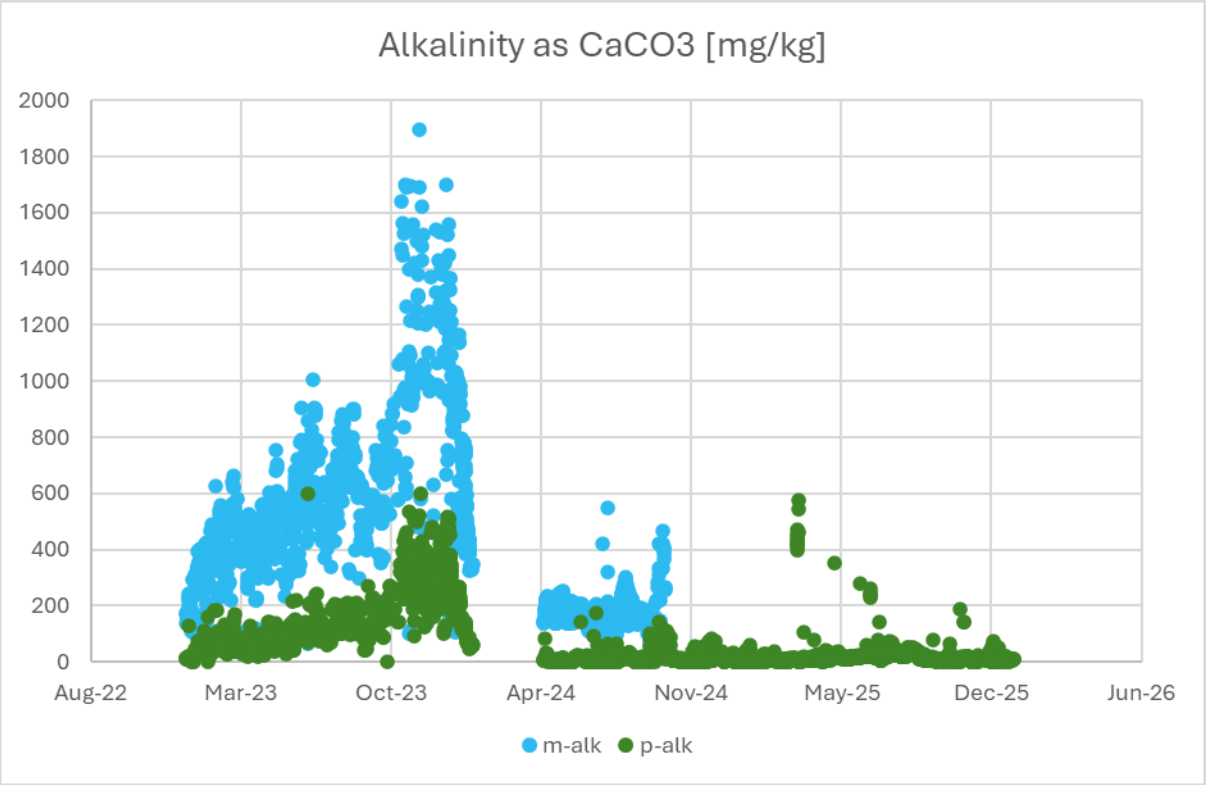


Figure 49: Tutuka Cooling water East Alkalinity

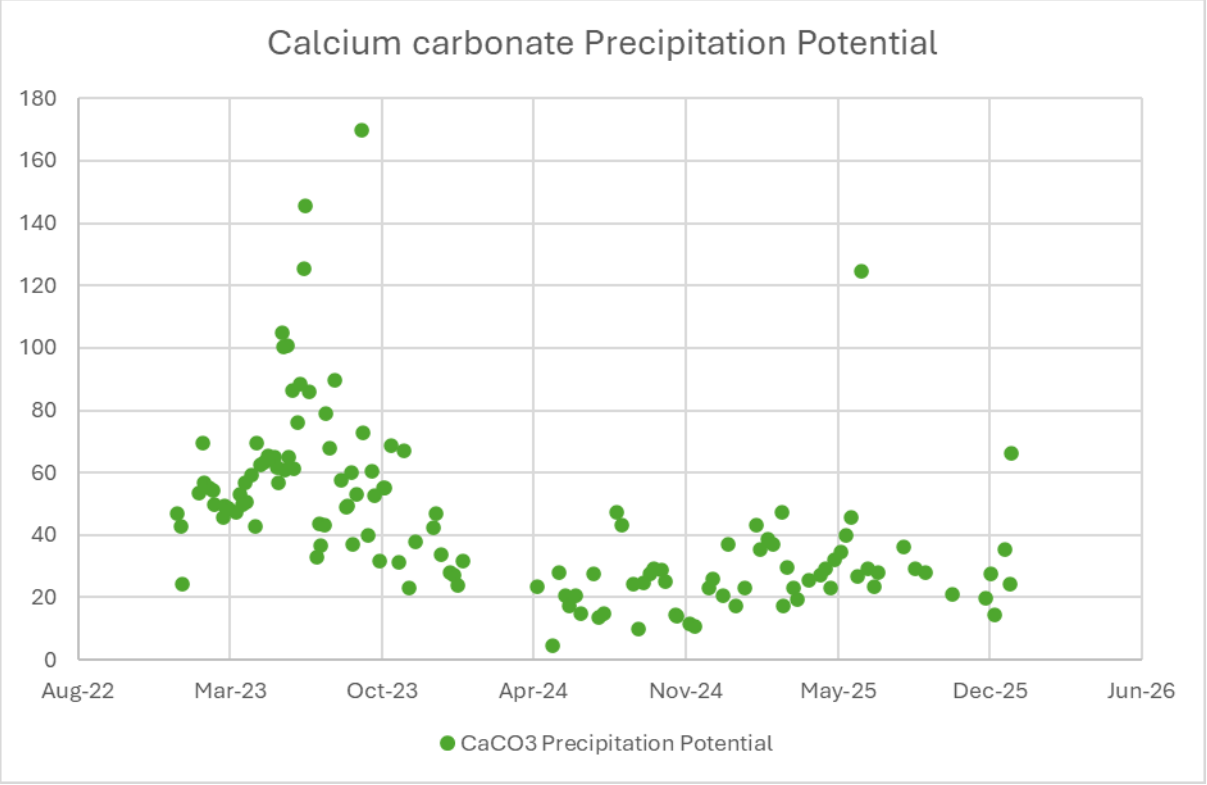


Figure 50: Tutuka Cooling water East Calcium carbonate precipitation potential

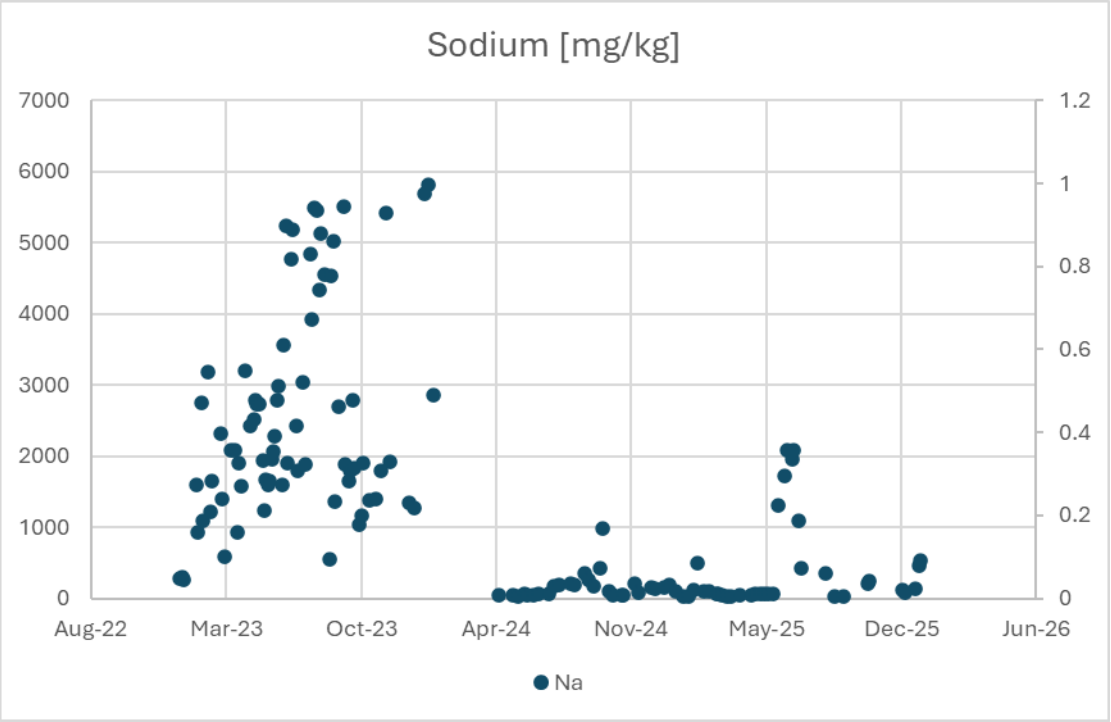


Figure 51: Tutuka Cooling water East Sodium

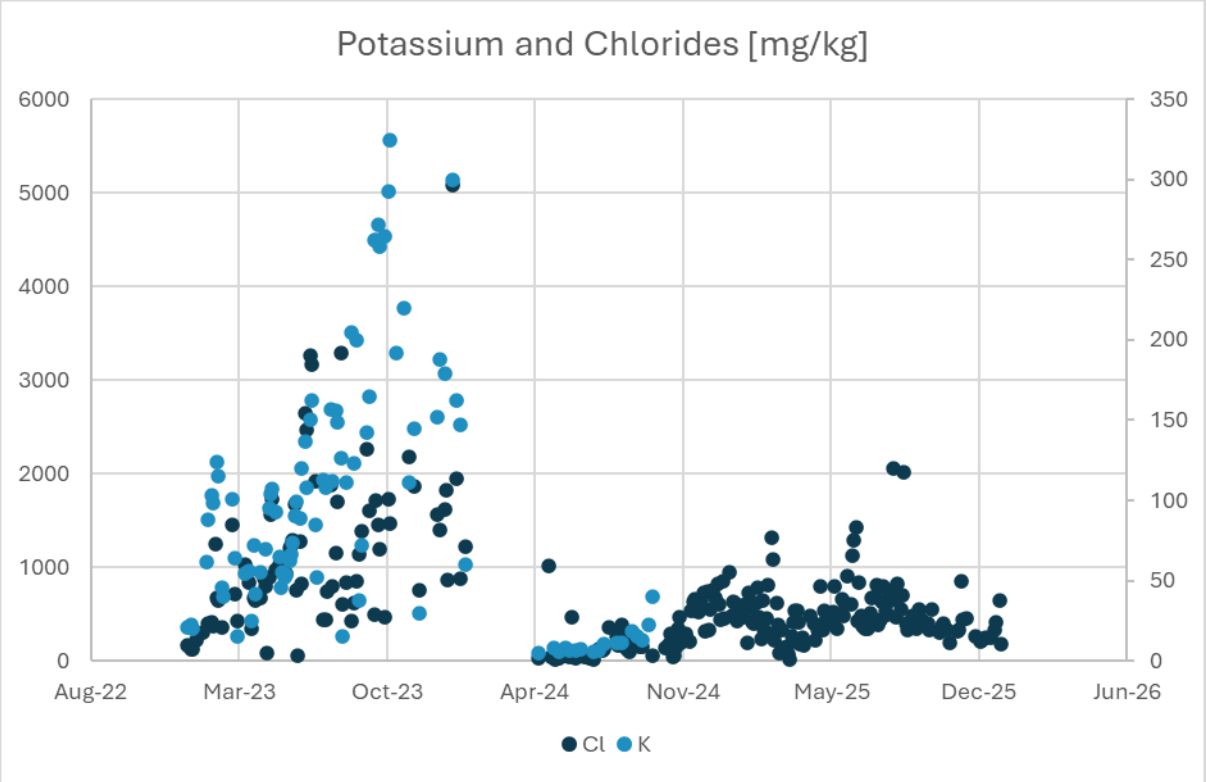


Figure 52: Tutuka Cooling water East Chlorides and Potassium

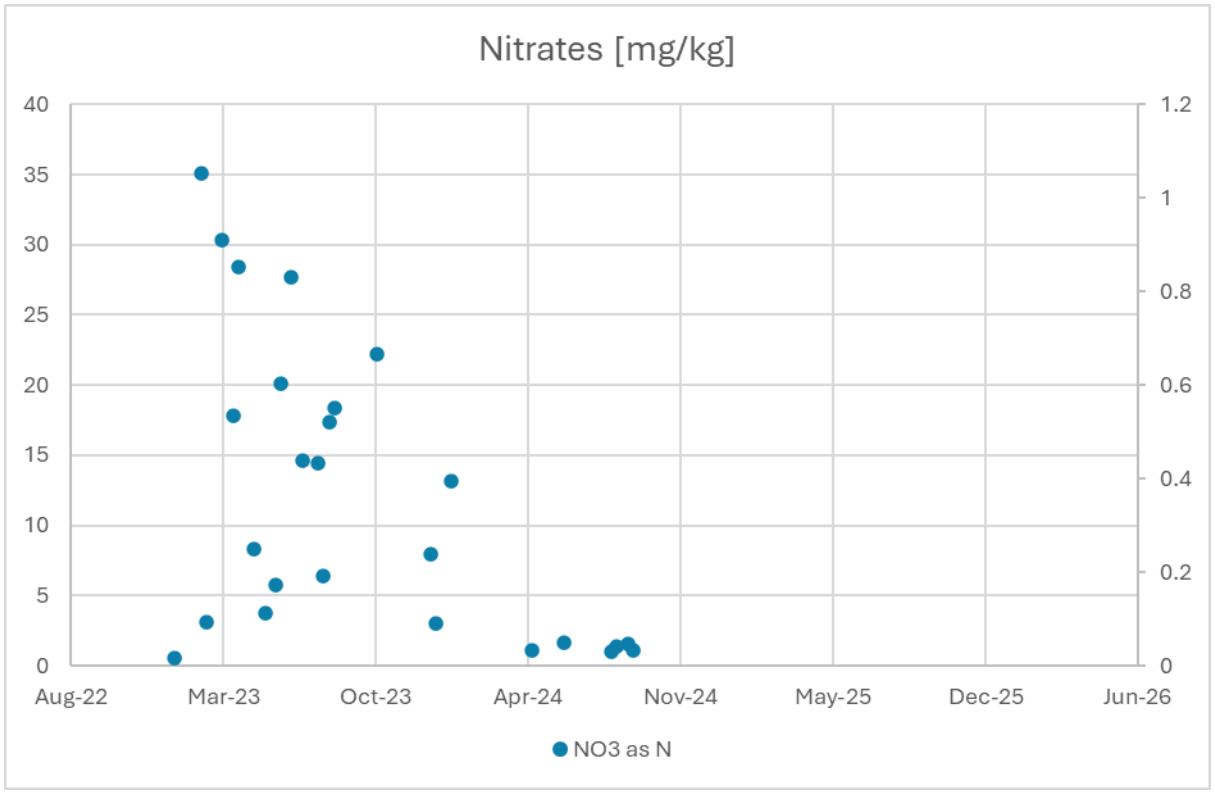


Figure 53: Tutuka Cooling water East Nitrates

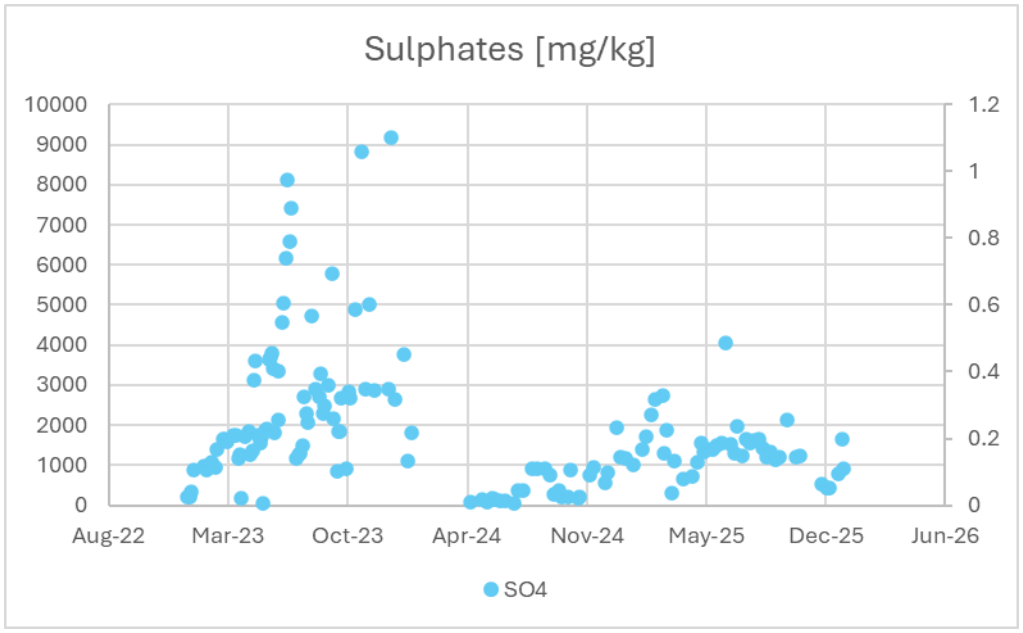


Figure 54: Tutuka Cooling water East Sulphates

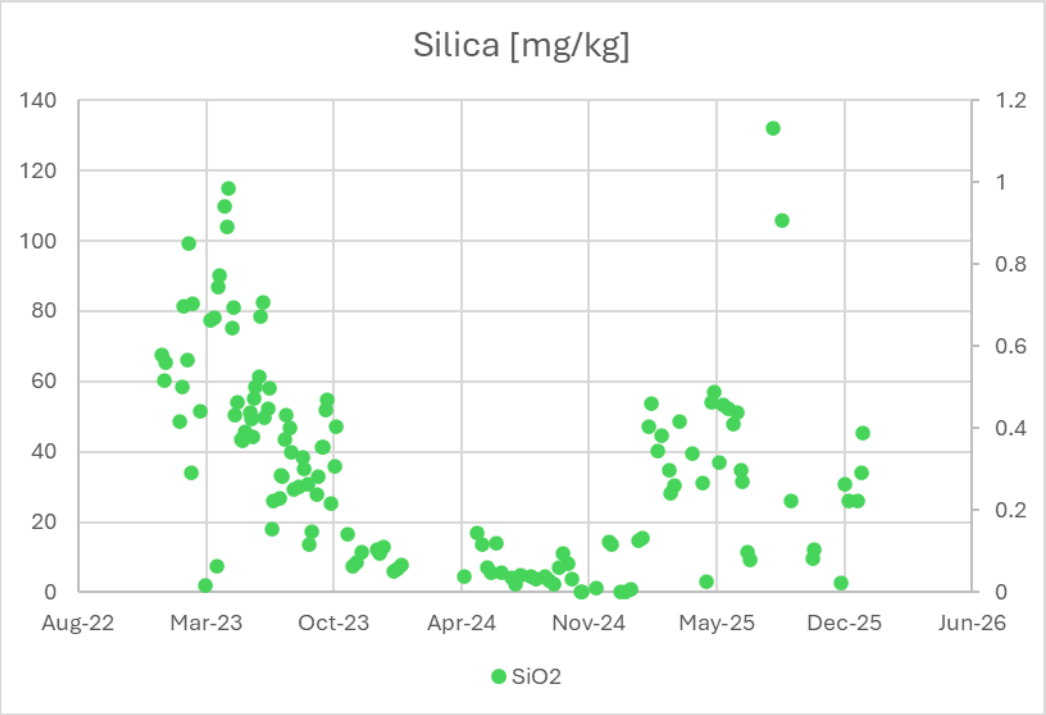


Figure 55: Tutuka Cooling water East Silicates

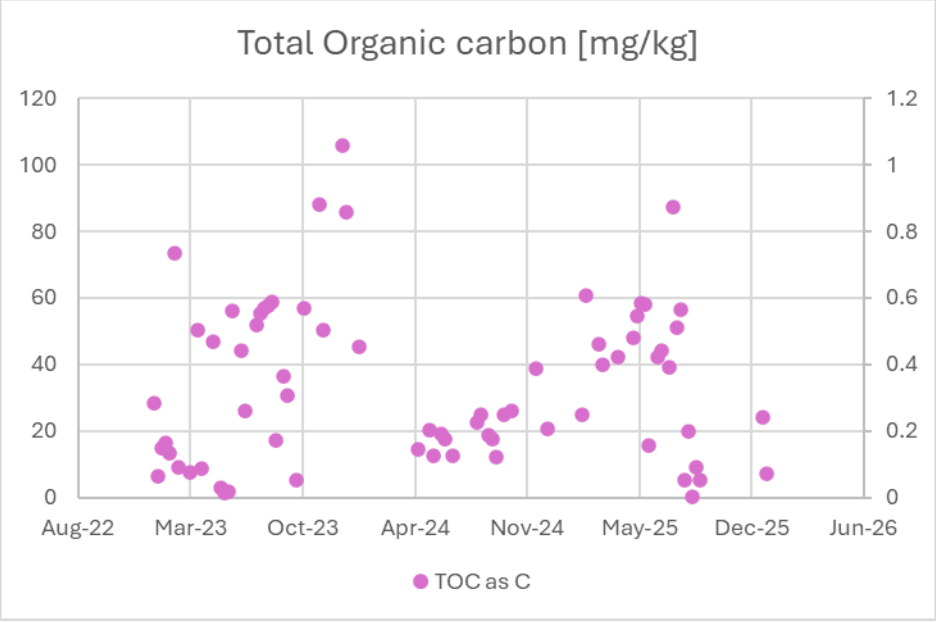


Figure 56: Tutuka Cooling water East Total organic carbon

2 PLANT BATTERY LIMITS

The plant battery limits will be different for the different source waters to the plant.

a. **<u>Wastewater which contains high levels of ash and oil (Tutuka Power Station)</u>**

The source water to the plant will be taken from the sump, which normally feeds the submersible pumps. The permeate will be collected in a tank and will be re-used for the cleans. The rest of the permeate will be fed back to the sump which feeds the clean water return pumps. The concentrate

produced will be collected and discharged as per the procedure on the station when dredging the dams, or into the brine concentrate sump. The Employer will use the analysis of the brine (concentrate) stream to decide where it must be discharged.

Submersible pump house

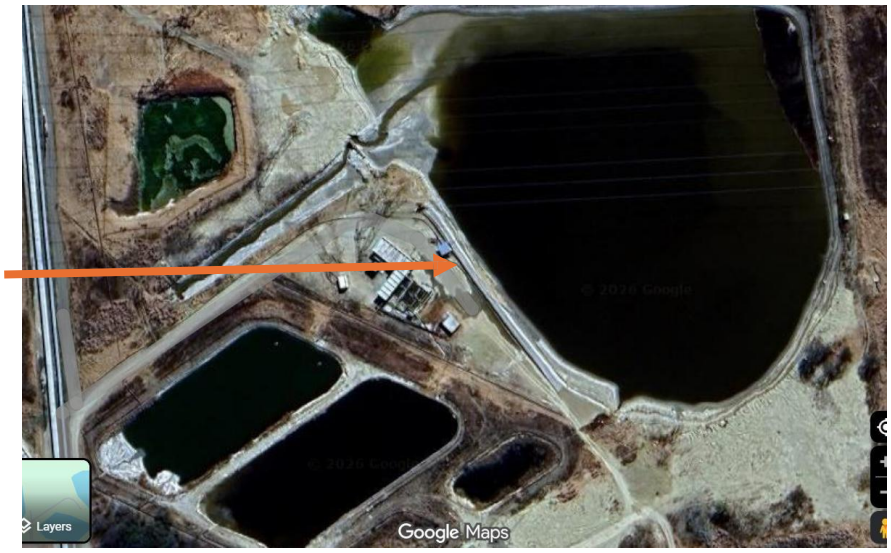


Figure 57: Google map of the Dirty water dams at Tutuka



Figure 58: Picture of the Submersible screw pump house at the Dirty water dams at Tutuka

- A google maps screenshot of the area is as per Figure 57.
- The link for the google maps location for the low level dams is as follows: https://www.google.com/maps/place/26%C2%B046'13.7%22S+29%C2%B021'30.7%22E/@-26.7704789,29.3559445,17z/data=!3m1!4b1!4m4!3m3!8m2!3d-26.7704789!4d29.3585194?hl=en&entry=ttu&g_ep=EgoyMDI2MDUyMC4wIKXMDSoASAFQAw%3D%3D

b. Ash water return (Duvha Power Station)

The source water will be taken directly from the AWR dam. The permeate will be collected in a tank and will be re-used for the cleans. The rest of the permeate will be fed back to the dam for the period of the test. The Employer will use the analysis of the brine (concentrate) stream to decide where it must be discharged.

- This source is still available from either the low-level dams or the high-level dams. Alternatively, the water supply can be taken from the AWR pumps or the Sluice booster pumps as per Figure 59: Schematic of the AWR system at Duvha.
- The link for the google maps location for the low-level dams is as follows: https://maps.app.goo.gl/a1aNdULu63s3Umcb8. A google maps screenshot of the area is as per Figure 60 below.
- The link for the google maps location for the high-level dams is as follows: https://maps.app.goo.gl/wik5ZMVfFbcxT4TZ8. A google maps screenshot of the area is as per Figure 61 below.

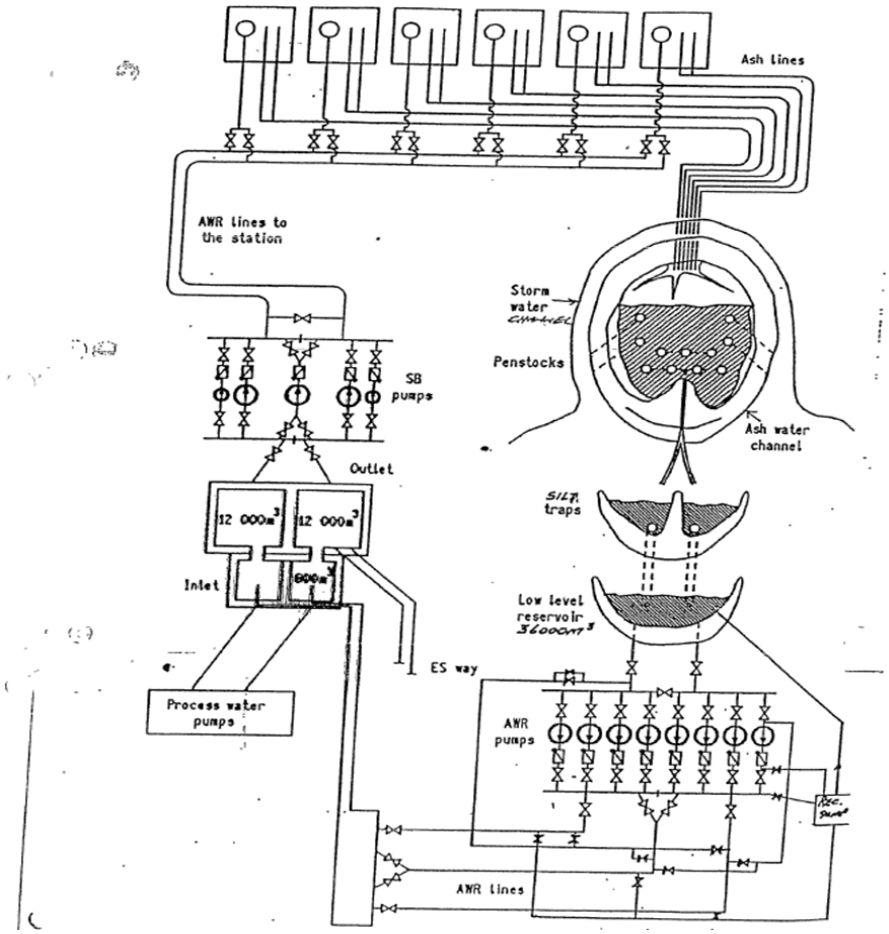


Figure 59: Schematic of the AWR system at Duvha



Figure 60: Google map of the Low level dams at Duvha



Figure 61: Google map of the High level dams at Duvha

c. <u>Flue Gas desulphurisation (FGD) bleedstream (Kusile Power Station)</u>

The source water will be taken directly from the wastewater storage tank itself or on the discharge. The permeate will be collected in a tank and will be re-used for the cleans. The rest of the permeate will be fed to the process drain recovery sump if the quality is better than raw water quality, otherwise station drains. The Employer will use the analysis of the brine (concentrate) stream to decide where it must be discharged.

- The google maps screenshot is as per Figure 63.

- The link for the tanks at the plant is as follows: https://maps.app.goo.gl/K3piiJcTKvWsAXzq7



Figure 62: Photo of the wastewater storage tank and pumps

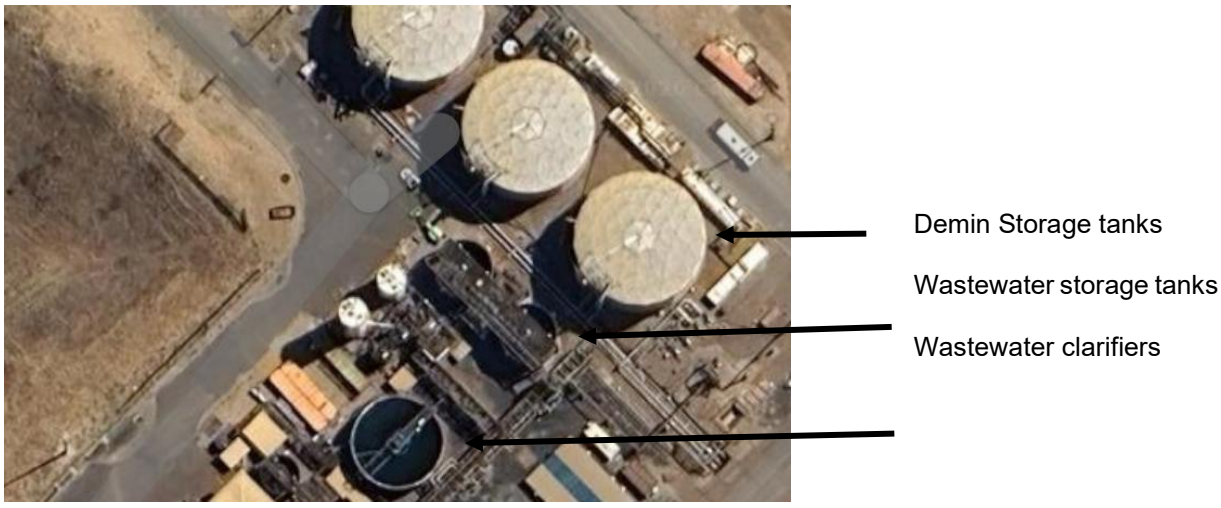


Figure 63: Google maps image of the area

d. Effluent from the neutralisation sump (ENS) (Tutuka Power Station)

The source water to the plant will be taken from the effluent neutralisation sump. The permeate will be collected in a tank and will be re-used for the cleans. The rest of the permeate will be fed back to the cooling water return launders. The Employer will use the analysis of the brine (concentrate) stream to decide where it must be discharged.

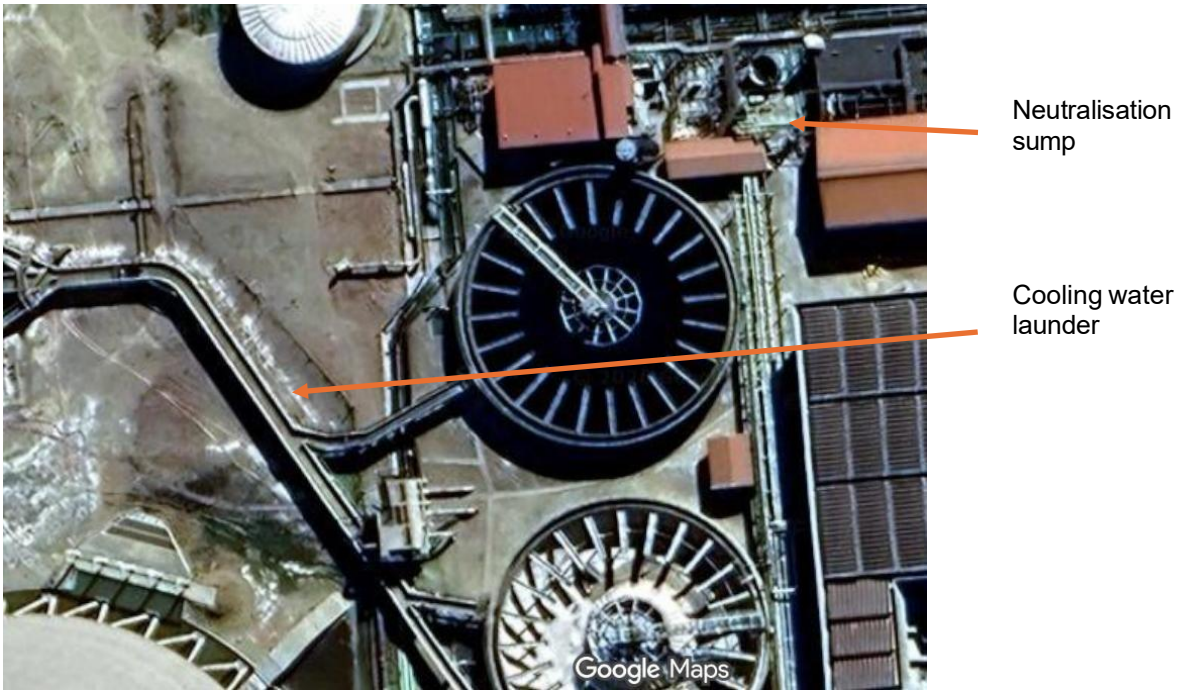


Figure 64: Google map of the Effluent neutralisation sump and cooling water launder at Tutuka



Figure 65: Picture of the effluent pump house at Tutuka

- A google maps screenshot of the area is as per Figure 64.
- The link for the google maps location for the effluent neutralisation sump is as follows: https://www.google.com/maps/place/26%C2%B046'36.3%22S+29%C2%B020'54.5%22E/@-26.7767554,29.3459091,653m/data=!3m1!1e3!4m4!3m3!8m2!3d-26.7767554!4d29.348484?hl=en&entry=ttu&g_ep=EgoyMDI2MDUyMC4wIKXMDSoASAFQAw%3D%3D.

e. Concentrated cooling water (Tutuka Power Station)

The source water to the plant can be taken from the Cooling water launders. The permeate will be collected in a tank and will be re-used for the cleans. The rest of the permeate will be fed back to the cooling water return launders after the take-off point. The Employer will use the analysis of the brine (concentrate) stream to decide where it must be discharged.

- The google maps screenshot is as per Figure 64.
- The link for the google maps location for the effluent neutralisation sump is as follows: https://www.google.com/maps/place/26%C2%B046'34.7%22S+29%C2%B020'52.6%22E/@-26.7769387,29.3453682,653m/data=!3m1!1e3!4m4!3m3!8m2!3d-26.7763066!4d29.3479539?hl=en&entry=ttu&g_ep=EgoyMDI2MDUyMC4wIKXMDSoASAFQAw%3D%3D



Figure 66: Picture of the CW launders and ponds at Tutuka

3 MODES OF OPERATION

The testing rig must be fully automated with an integrated logger to log the physical parameters. However, the rest of the operating and sampling will be done by the *contractor*.

4 LABORATORY TESTING

The Contractor must perform daily analysis for the monitoring of the plant and on a monthly basis the samples must be taken to a SANAS ISO 17025 accredited laboratory for analysis. The requirement is daily analysis of at least the feed, concentrate and permeate throughout the entire period of testing. The daily sample should be a composite sample from the operations during the day. Refer to the table below for the minimum required parameters.

Analysis required			
pH	TOC	Beryllium	Strontium
Conductivity	FOG	Boron	Zinc
“P” alkalinity	Chloride	Cadmium	Calcium

“M” alkalinity	Fluoride	Cobalt	Magnesium
Turbidity	Nitrates	Chromium	Sodium
Total hardness	Nitrates	Copper	Potassium
Calcium hardness	Sulphates	Iron	Nickel
Magnesium hardness	Silica	Phosphate	Lead
TDS	Aluminium	Manganese	Barium
TSS	COD	Ammonium	

The wastewater which contains oil (tutuka water from the wastewater dam) will require Fats, oils and grease (FOG) analysis to be done.

It should be noted that the stream from the FGD bleedstream is concentrated and will need special treatment during sampling and analysis. The contractor must sample and analyse as per the requirements in EPRI technical report 1013347: FGD Chemistry and Analytical Methods Handbook Volume 1 and 2 - Chemical and Physical Test Methods (Revision 2).

5 DURATION OF THE TEST

An estimated schedule for the duration of the tests is as per the Table below.

No.	Activity	Duration	Person Responsible
1.	Contract award		Eskom
2.	Lab scale tests	4-6 weeks	Contractor
3.	Pilot testing Oil and grit water	4 months	Contractor
4.	Pilot testing ENS water	3 months	Contractor
5.	Pilot testing FGD bleedstream water	3 months	Contractor
6.	Pilot testing AWR water	3 months	Contractor
7.	Pilot testing of CW	3 months	Contractor
8.	Review of results and compilation of the report	1 month	Contractor
9.	Review the report and accept	1 month	Eskom

5.1 Interpretation and terminology

The following abbreviations/word/phrases are used in this Scope Document.

Abbreviation	Meaning given to the abbreviation
AWR	Ash water return
CCW	Concentrated Cooling Water

CW	Cooling water
ENS	Effluent neutralisation sump
FGD	Flue gas desulphurisation
MF	Microfiltration
NF	Nanofiltration
RO	Reverse Osmosis
TDS	Total dissolved solids
TSS	Total suspended solids
UF	Ultrafiltration
ZLED	Zero Liquid Effluent Discharge

6 Management strategy and start up.

6.1 The *Contractor*'s plan for the *service*

The *Contractor* shall provide, the scope execution plan which complies to the requirements of this scope.

The plan shall define all the activities, timelines and deliverables for executing the requirements of the service.

6.2 Management meetings

Meetings will be held between the Employer, the Contractor and any other co-opted members. The Contractor will be represented at each meeting by appropriate members of its staff. All meetings will be chaired by the Project Manager.

The venue for these meetings will be as determined by the Service Manager. The Project Manager will prepare and issue the minutes of these meetings.

All meetings shall be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register shall not be used for the purpose of confirming actions or instructions under the contract as these shall be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

A summary of the planned meetings is provided in Table 2.

2.2.1 Kick Off Meeting

Kick-off meeting will be held within 1 week after the award of the contract. This meeting will cover Project implementation, the Scope of work, and Schedule. This will give the Contractor an opportunity to discuss all matters related to carrying out their responsibilities.

2.2.2 Progress Meetings

Weekly progress meetings will be held covering progress to date on the execution of the scope of works, and all associated risks, risk impact and risk mitigation.

2.2.3 Ad-hoc Meetings

Ad-hoc meetings to discuss any matters related to the execution of the scope of work on an as-and-when required basis upon request from the Employer or the Contractor.

2.2.4 Meetings of a Specialist Nature

Meetings of a specialist nature may be convened as specified elsewhere in this Works Information or if not so specified by persons and at times and locations to suit the Parties, the nature and the progress of the

works. Records of these meetings shall be submitted to the Project Manager by the person convening the meeting within five days of the meeting.

Table 10: Planned Meetings

Title and purpose	***Approximate time & interval***	***Location***	***Attendance by:***
Kick off meeting: Covering Project implementation, the Scope of work, Schedule and Safety File Requirements. This will give The *Contractor* an opportunity to discuss all matters related to carrying out their responsibilities.	Once-off, shortly after award of the contract. Date, time and duration to be confirmed upon award of contract.	Eskom Research, Testing & Development Offices, Lower Germiston Road, Rosherville, or MS Teams	*Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*.
Progress meetings: Covering progress to date on the execution of the scope of works, and all associated risks, risk impact and risk mitigation.	Weekly. Day, time and duration to be confirmed and agreed upon at kick off meeting.	Remotely via Microsoft Teams or in-person at Eskom Research, Testing & Development.	*Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*.
Adhoc meetings	As-and-when required. Date, time and duration to be confirmed.	Remotely via Microsoft Teams or in-person at Eskom Research, Testing & Development	*Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*.
Meetings of Specialist Nature	As-and-when required. Date, time and duration to be confirmed.	Remotely via Microsoft Teams or in-person at Eskom Research, Testing & Development	*Employer*, *Supervisor*, *Contractor* and others as determined by the *Project Manager*.

6.3 *Contractor*'s management, supervision and key people

The contractor provides all the resources and competent technical people to execute the scope of this contract.

6.4 Provision of bonds and guarantees

N/A

6.5 Documentation control

The contactor shall prove all the service reports in electronic format.

6.6 Invoicing and payment

Within one week of receiving a payment certificate from the *Service Manager* in terms of core clause 51.1, the *Contractor* provides the *Employer* with a tax invoice showing the amount due for payment equal to that stated in the *Service Manager*'s payment certificate.

The *Contractor* shall address the tax invoice to

_____
and include on each invoice the following information:

Name and address of the *Contractor* and the *Service Manager;*
The contract number and title;

Contractor's VAT registration number;
The *Employer*'s VAT registration number 4740101508;
Description of service provided for each item invoiced based on the Price List;
Total amount invoiced excluding VAT, the VAT and the invoiced amount including VAT;
(add other as required)

Add procedures for invoice submission and payment (e. g. electronic payment instructions)

6.7 Contract change management

If there are any changes to the Contractor's plan, it will be the Contactors responsibility to inform the Employer of such change. Any changes shall be agreed upon in writing between both the Contractor and Service Manager.

6.8 Records of Defined Cost to be kept by the *Contractor*

N/A

6.9 Insurance provided by the *Employer*

Refer to clause 8 Contract Data (Part one – Data provided by the Employer). For all Employer Insurance related queries, contact:

- Cluster Manager
- Eskom Insurance Management Services
- Eskom Holdings SOC Ltd
- Megawatt Park
- 011 800 2714

6.10 Things provided at the end of the *service period* for the *Employer*'s use.

The contactor provides the technical report at the end of the service.

6.11 Management of work done by Task Order

Task order will be issued by the Service Manager.

In the event that the services are not required anymore, the Service Manager will inform the Contractor in advance.

7 Health and safety, the environment and quality assurance

7.1 Health and safety risk management

.
The Contractor and his employees shall comply with the relevant Eskom policies, standards, procedures, and other statutory regulatory requirements and specifications. The Contractor complies fully to the requirements of the Occupational Health and Safety Act of 1993.

7.2 Environmental constraints and management

The Contractor shall construct and/ or implement all the necessary environmental protection measures in each area before any production work will be allowed to proceed. The Employer may suspend the Works at any time in terms the Conditions of Contract should the Contractor, in the Employer's opinion, fail to implement, operate or maintain any of the environmental protection measures adequately.

Environmental management is concerned not only with the results of the Contractor's operations to carry out the Works but also, and most importantly, with the way his operations are carried out. It is thus a requirement that the Contractor shall comply with the environmental requirements. The Contractor shall comply with all relevant laws, environmental legislation and regulations, conditions of environmental approvals, environmental management plans, and Employers Policies and Procedures.

The Contractor shall comply with the environmental criteria and constraints stated in the Employer's SHE specification.

The Contractor ensures that all goods, services or Works supplied in terms of the Contract comply with all applicable environmental legislation.
The Contractor is responsible to keep the work area clean of any rubble. All waste introduced and/or produced on the Employer's premises by the Contractor for this contract, is handled in accordance with the minimum requirements for the Handling and Disposal of Hazardous Waste in terms of Government Legislation as proclaimed by the Department of Water Affairs and Forestry and Eskom environmental requirements including Eskom Environmental waste management procedure 32-245.

Where required, the Employer provides special colour coded bins for refuse disposal. The Employer will empty these bins.

The Contractor ensures that all workers under his control strictly adhere to the correct use of refuse bins.

7.3 Quality assurance requirements

The Contractor complies with the Eskom Quality Requirements Standards.

- The Contractor and all sub-Contractors to comply with the Employer's quality requirements including those listed in the Employers specification document called "Supplier Quality Management Specification" number 240-105658000
- Certification to ISO 9001 is a mandatory requirement for this contract. The Contractor uses the QMS for all phases of the Project. The Contractor provides evidence of a fully implemented QMS within its own organisation. The Employer may at his sole discretion carry out an audit on any supplier; sub-supplier's or Subcontractor's QMS for acceptance.

8 Procurement

The Contractor is responsible for all procurement of materials required for the installation.

and commissioning of the Works.

The Contractor must:

- Ensure that all equipment and materials are inspected. The Contractor must also inform the Service Manager to arrange for the Eskom representatives to inspect the equipment and materials before it is delivered to Site.
- Ensure that all the relevant factory tests are conducted on the equipment and that these tests are witnessed by both the Contractor as well as Eskom representatives.
- Submit calibration certificates to the Service Manager for all equipment used for testing.

The Contractor will provide all the critical spares for the plant as part of the Works.

8.1 People

8.1.1 Minimum requirements of people employed

People providing the works will have been declared competent in writing to carry out the works. They will abide by all the rules and regulations as set out by Employer. They are prohibited from being or going to any other site other than the one where the work is being executed.

8.1.2 BBBEE and preferencing scheme

Eskom's policy is to maximise purchases from Black or Black Empowering Enterprises (BEE's) whether Black Woman-owned, small or Large Black or Black empowering suppliers. The purpose is to promote entrepreneurship in black communities and give black business access to the mainstream of business opportunity.

8.1.3 Accelerated Shared Growth Initiative – South Africa (ASGI-SA)

The *Contractor* complies with and fulfils the *Contractor's* obligations in respect of the Accelerated and Shared Growth Initiative - South Africa in accordance with and as provided for in the *Contractor*'s ASGI-SA Compliance Schedule stated below

.

[Insert the agreed ASGI-SA Compliance Schedule here]

The *Contractor* shall keep accurate records and provide the *Service Manager* with reports on the *Contractor*'s actual delivery against the above stated ASGI-SA criteria. [Elaborate on access to and format of records and frequency of submission etc.]

The *Contractor*'s failure to comply with his ASGI-SA obligations constitutes substantial failure on the part of the *Contractor* to comply with his obligations under this contract.

8.2 Subcontracting

8.2.1 Preferred subcontractors

None

8.2.2 Subcontract documentation, and assessment of subcontract tenders

a) The Contractor submits the proposed contract data for each subcontracting for acceptance to the Service Manager.
b) The Contractor prepares a subcontracting document as according to the NEC Contract.
c) The Contractor takes note that their Subcontractors Safety Files will be accepted by the Contractor's Safety Manager before it is handed to the Employer's SHE practitioner/Officers for verification of compliance before any work commences.

a) Proof of acceptance by the Contractor Safety Manager needs to be in the Safety file when handed over to Employer's SHE Practitioners for verification.

8.2.3 Limitations on subcontracting

a) The Contractor does not sub-contract more that 25% of the contract value to another enterprise that does not have equal or higher B-BBEE status level, unless the intended sub-contractor is an Exempted Micro Enterprise that has the capability and ability to execute the sub-contract.
b) In relation to a designated sector, the Contractor will not be allowed to sub-contract in such a manner that the local production and content of the overall value is reduced below the stipulated minimum threshold (Percentage of the specific contract).
c) The Contractor does not subcontract with his subsidiary companies as this may be interpreted as subcontracting with himself and / or using their subsidiaries for fronting. Where the Contractor subcontracts with a subsidiary this must be declared in tender documents.

8.2.4 Attendance on subcontractors

N/A

8.3 Plant and Materials

8.3.1 Specifications

The Contractor is required to submit a comprehensive Quality Management System (QMS) for all phases of the project. This QMS must comply with the requirements of 240-105658000. The Contractor and all of the Contractor's suppliers must hold a compliance certificate for their QMS to the requirements of ISO 9001:2015. The Employer reserves the right to conduct any audits in this regard.
Documents are to be submitted for review by the Employer after the Contract Date and before commencement of work.
The Contractor must submit a detailed Quality Manual and Quality Control Plan which will be reviewed and accepted/rejected by Eskom.

All Plant and Materials are supplied new, and of materials most suited to the particular intended duty, including parts subjected to or affected by high operating temperature and/or pressure.

Plant and Material protection is suitable for the Site environmental conditions to which they are exposed.

8.3.2 Correction of defects

The Service Manager issues the defects certificate at the later defect date and the end of the last defect correction period. The Employer's right in respect of the defect which the supervisor has not found and notified are not affected by the issue of the defect certificate.
The Contractor contacts the Service Manager to gain access to the site to correct defects.

8.3.3 *Contractor*'s procurement of Plant and Materials

The Contractor is responsible for all procurement of materials required for the construction, installation and commissioning of the Works. The Contractor must:

- Ensure that all equipment and materials are inspected. The Contractor must also inform the Project Manager to arrange for the Eskom representatives to inspect the equipment and materials before it is delivered to Site.
- Ensure that all the relevant factory tests are conducted on the equipment and that these tests are witnessed by both the Contractor as well as Eskom representatives.
- Submit calibration certificates to the Project Manager for all equipment used for testing.

8.3.4 Tests and inspections before delivery

Eskom and its representatives will carry out inspections at their own discretion. All inspections and testing are to be performed in accordance with the QCP developed by the Contractor and accepted by Eskom and its representatives. A factory release inspection does not release the Contractor from their obligations.

8.3.5 Plant & Materials provided "free issue" by the *Employer*

None

8.3.6 Cataloguing requirements by the *Contractor*

None

9 Working on the Affected Property

The contractor complies to Eskom Safety, Health Environmental and Quality procedures**.**

9.1 *Employer*'s site entry and security control, permits, and site regulations

The *Contractor* shall be responsible for the planning and arrangement, of the Site to ensure safe, secure andefficient progress of the *Works* throughout the entire Project duration.

All the Contractor's employees are to attend a mandatory site safety induction course before they are allowed to work on site. It is the responsibility of the Contractor to ensure that all of their staff has attended the induction. The Contractor must compile their own safety file which has to be approved by Eskom's safety officer. This file must be approved before the Contractor may attend the safety induction course.

The *Contractor* must provide a list of all employees, along with the dates and times of arrival, at least 2 days prior to arrival on site.

All individuals entering Eskom Power Station will be subject to alcohol testing daily. No person found to be intoxicated will be admitted on the premises. All Covid-19 protocols must be followed by all individuals prior to entering and throughout their entire duration on Site. It is the responsibility of the *Contractor* to ensure that their staff is compliant.

9.2 People restrictions, hours of work, conduct and records

a) The Limited Access Register (LAR) will used where applicable by the Eskom personnel who are in charge of the plant. It is used to maintain control over the individuals in the plant as well as activities taking place on the plant that are not covered by the Plant Safety Regulation and Operating Regulations for High Voltage Systems.
b) The Project Manager or Supervisor will accompany the Contractor for the first instance of working under the LAR of the specific plant area. Thereafter, the Contractor is expected to know and abide the rules and regulations which are set out.
c) The works must be executed under normal working hours should there be overtime requirements, the contractor must submit a request to work overtime to the project manager for acceptance.
d) *Contractor* keeps records of his people on Site, including those of his/her Subcontractors which the Project Manager or Supervisor have access to at any time. These records may be needed when assessing compensation events.

9.3 Health and safety facilities on the Affected Property

Local Safety Procedures

The Contractor must abide by all Local Safety Procedures, available from Eskom on request.

9.4 Environmental controls, fauna & flora

a) No fauna or flora will be collected or removed from any farm by any visitor without written permission of the landowner, in which case cognizance will be taken of appropriate provincial legislation pertaining to fauna and flora.
b) Under such cases Eskom Holding's ethical policies and guidelines will be strictly applied.

9.5 Cooperating with and obtaining acceptance of Others

a) The *Contractor* shall co-operate with others in obtaining and providing information which they need in connecting with the works.

b) The *Contractor* shall share the working area with others in executing the works.
The contractor cooperates with others in obtaining and providing information which they need in connection with the works.

9.6 Records of *Contractor*'s Equipment

a) The Contractor's attention is drawn to the applicable regulation framed under the Occupational Health and Safety Act, 1983 (Act No. 6 of 1983)
b) When working in built-in areas, the contractor shall provide and use suit able and effective silencing devices for pneumatic tools and other plant would otherwise cause a noise level exceeding 85 Db(A) during excavation and other works.
c) Alternatively, the Contractor shall by means barriers, effectively isolate the source of any such noise in order to comply with the said regulation.

9.7 Equipment provided by the *Employer*

The employer will not provide any equipment.

9.8 Site services and facilities

9.8.1 Provided by the *Employer*

a) Toilet Facilities
- The Employer provides the Contractor access to existing toilet facilities at the power stations.

b) Catering Facilities
- The Contractor is not allowed to use the Employer's dining facilities, unless a specific agreement has been made between the Contractor and Eskom Catering and Accommodation Services (ECAS).
- The contractor must make provision for all meals. Certain sites do have take-away facilities that the contractor can use at the own cost.

c) Medical Facilities
- The Contractor provides a First Aid service to his employees and subcontractors. In the case where these prove to be inadequate, like in the event of a serious injury, the Employer's Medical Centre and facilities will be available.
- Outside the Employer's office hours, the Employer's First Aid Services are only available for serious injuries and life-threatening situations.
- The Employer recovers the costs incurred, in the use of the above Employer's facilities, from the Contractor

9.8.2 Provided by the *Contractor*

The contractor should provide facilities they deem necessary in executing the work. This must be discussed with the Service Manager prior to commencement of work.
The Contractor shall supply all the necessary equipment and material required to execute the works and proper eating facilities for their employees.

9.9 Control of noise, dust, water and waste

Earplugs should be worn if excessive noise will be generated by machinery. Dust masks will be worn to prevent dust inhalation. Waste produced must be managed through the Site Specific Waste Management Procedures.

9.10 Hook ups to existing works

a) The Contractor must inform the service manager and the engineer if a need arises of hooking up on existing work.
b) The project engineer will then verify the safe use of any existing structure as a support.

9.11 Tests and inspections

9.11.1 Description of tests and inspections

Performance/Functionality tests after Completion
Eskom Quality department together with the Service Manager, Engineer and Contractor will sign off the works as having met all the requirements as set out in the works information after completion.

9.11.2 Materials facilities and samples for tests and inspections

N/A