Minutes of Discussions
on the Preparatory Survey for the Project for
Construction of Secondary Schools in Zambezia Province
in the Republic of Mozambique
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed between the Ministry of Education and Human Development (hereinafter referred to as "MINEDH") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on April 20th, 2018 and in response to the request from the Government of the Republic of Mozambique (hereinafter referred to as " Mozambique") dated November 29, 2016, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Construction of Secondary Schools in Zambezia Province (hereinafter referred to as "the Project"), headed by Ms. Yumiko NISHINOIRI, JICA Mozambique Office, from November 18 to December 1, 2018.

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Maputo, November 21, 2018

Ms. Yumiko NISHINOIRI
Leader
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Japan

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ATTACHEMENT

1. Objective of the Project
   The objective of the Project is to improve the access and learning environment of the secondary education by constructing new secondary schools in Zambezia province in Mozambique, which leads to the improvement of the quality of secondary education.

2. Title of the Preparatory Survey
   Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Construction of Secondary Schools in Zambezia Province".

3. Project site
   Both sides confirmed that the four sites, Lugela, Nicoadala, Mocuba and Quelimane in Zambezia province, which is shown in Annex 1, are the candidate sites and Namacurra is the alternate site. The selection of final candidate sites would be made within the budget limitation of the Government of Japan.

4. Responsible authority for the Project
   Both sides confirmed the authorities responsible for the Project are as follows:
   The Executing Agency for the Project is the Directorate of Infrastructure and School Equipment of MINEDH (hereinafter referred to as "DIEE") under the overall coordination of the Directorate of Planning and Cooperation of MINEDH (hereinafter referred to as "DIPLAC"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization chart is shown in Annex 2.

5. Contents of the Draft Report
   After the explanation of the contents of the Draft Report by the Team, the Mozambique side agreed to its contents.

6. Components and Items of Equipment to be Covered by the Project
   Both side confirmed that the list of components and items of equipment for each candidate site, which are shown in Annex 3, are covered by the Project. The

Mozambican side understood there is a possibility to adjust the volume of components and items according to the budget limitation of the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

7. Cost estimate

Both sides confirmed that the cost estimate including the contingency described in Annex 10-1 is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, fluctuation of exchange rate, etc.

8. Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications of the Project should never be duplicated or disclosed to any third parties until all the contracts under the Project are concluded.

9. Procedures and Basic Principles of Japanese Grant

9-1 Procurement Type of Japanese Grant

The Mozambique side agreed that the Japanese Grant (for Japanese consultant and local contractors) is applied as procurement type to the Project, and that the procedures and basic principles of Japanese Grant as described in Annex 4 shall be applied to the Project. In addition, the Mozambique side agreed to take necessary measures according to the procedures as described in Annex 5.

9-2 Eligible nationality of consultant and prime contractors

The eligible nationality of consultant shall be Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons, in the case of the consultant that will contract directly with the Recipient for the implementation of the Project.

The eligible nationality of the other Suppliers shall be nationals of Mozambique or juridical persons incorporated and registered in Mozambique who have their appropriate facilities for producing or providing the products and/or services in Mozambique and actually conduct their business there, in the case of the other Suppliers that will contract directly with the Recipient for the implementation of the Project.

9-3 Flow of payment and currency of payment to prime contractors

The Mozambique side understood the flow of payment as shown in Annex 6 and confirmed to take necessary measures for the payment in a timely manner. The Mozambique explained that it will nominate "Bank of Mozambique" as the "Recipient Bank" that conclude the banking arrangement (hereinafter referred to as "the Banking Arrangement") with a bank in Japan (hereinafter referred to as "the Agent Bank").

The Mozambique side agreed that the currency for contract of prime construction and/or procurement firms is internationally traded foreign currency acceptable to JICA, that is US dollar, which will be stipulated in the Grant Agreement.

The Mozambique side understood tentative approval flow and required documents for payments to prime contractors/suppliers as Annex 7.

9-4 Bidding procedure and procurement guidelines

The bidding/selection and conclusion of contracts of the products and services covered by Grant of the Project will be conducted at Mozambique. The Mozambique side understands that the products and services covered by Grant of the Project will be procured in accordance with JICA's Procurement Guidelines for the Japanese Grants (for Japanese consultant and local contractor).

10. Timeline for the project implementation

The Team explained to the Mozambique side that the expected timeline for the project implementation is as attached in Annex 8.

11. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Mozambique side will be responsible for the achievement of agreed key indicators targeted in year 2024 and shall monitor the progress based on those indicators.

[Quantitative indicators]

- Number of classrooms utilizable continuously at target schools
- Number of pupils who learn at the classrooms constructed under the Project

[Qualitative indicators]

- It is expected to improve motivation of students for lerning by improvement of the educational environment.

- It is expected to improve motivation of girls for going to school by construction of toilets.

12. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 10-1. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in (2) 7 (During the Project Implementation) of Annex 10-1, both sides confirmed that such customs duties, internal taxes and other fiscal levies include VAT, personal income tax and corporate income tax, which shall be clarified in the bid documents by Mozambique during the implementation stage of the Project.

The Mozambique side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage. The schedule to secure the water resource for the sites is described in Annex 10-2

Both sides also confirmed that the Annex 10-1 will be used as an attachment of G/A.

13. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 9. The timing of submission of the PMR is described in Annex 8.

14. Project completion

Both sides confirmed that the Project completes when all the facilities constructed and equipment procured by the grant are in operation. The completion of the Project will be reported to JICA promptly, but in any event not later than six months after completion of the Project.

15. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Mozambique side is required to provide necessary support for the data collection.

16. Items and measures to be considered for the smooth implementation of the Project

16-1 Both sides confirmed the items and measures to be considered for the smooth implementation of the Project as follows:

16-2 The Mozambique side confirmed that when problems such as delay of construction works or procurement of equipment by contractors/suppliers arises during the implementation of the Project, the DIEE will take necessary measures in accordance with technical opinion of the consultant in a timely manner.

16-3 The Mozambique side agreed that in case the amount of the Grant, which includes the contingency, could not cover the entire works or procurement of equipment on the implementation of the Project, the Mozambique side will take necessary measures such as revising specifications, reducing the Project scope described in the Draft Report, or absorbing the cost exceeding the amount of Grant, based on technical analysis and opinions of the consultant.

16-4 The Mozambique side agreed that, even when the total amount of disbursement does not reach to the upper limit of the Grant, actual cost is less than the total amount of the Grant, the remaining amount will not be utilized to expand the scope.

17. Schedule of the Study

JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Mozambique side around March, 2019.

18. Environmental and Social Considerations

18-1 General Issues

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as C because the Project is likely to have minimal adverse impact on the environment under the Guidelines.

19. Other Relevant Issues

19-1 Schedule of the Project

The Team explained to the Mozambique side that the project schedule is

provisional and designed under the assumption that G/A is singed in March, 2019. The Mozambique side insisted on the importance to start the Project according to the current schedule because the necessary expenses have been appropriated into the initial budget for 2019 and it is necessary to open the new schools in 2022. Both side confirmed that the final shchedule of the Project will be decided by the Government of Japan.

19-2 Operation and Maintenance of School Facilities

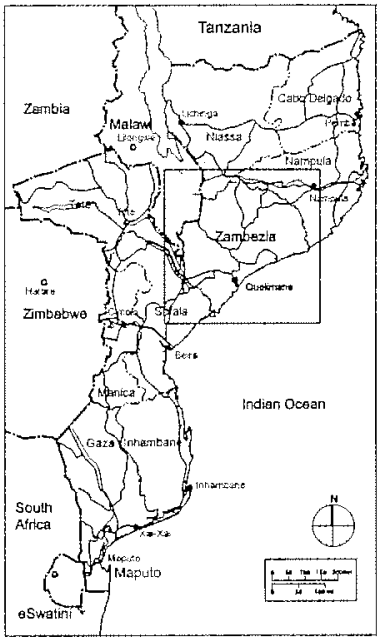
The Mozambique side shall be responsible for proper operation and maintenance of school facilities including its equipment constructed under the Project. The Mozambique side committed to assign teachers and administrative persons to the school facilities. The provisional number of teachers and administrative stafff is described in Annex 11.

Annex 1	Project Site Location Map
Annex 2	Organization Chart
Annex 3	List of Components and Items of Equipment
Annex 4	Japanese Grant (for Japanese consultant and local contractors)
Annex 5	Flow Chart of Japanese Grant Procedures
Annex 6	Financial Flow of Japanese Grant (for Japanese consultant and local contractors)
Annex 7	Tentative Approval Flow and Required Documents
Annex 8	Project Implementation Schedule
Annex 9	Project Monitoring Report (template)
Annex 10-1	Major Undertakings to be taken by the Government of Mozambique
Annex 10-2	Schedule for securing the water resource
Annex 11	Provisional Number of teachers/staffs required

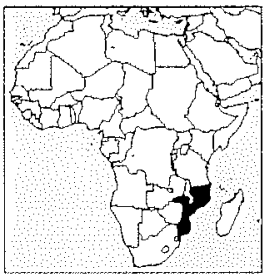
■List of the Candidate Sites and its Location Map

E1 Macovine area in Mocuba District
E2 Nangoela area in Quelimane District
E3 Licuar Secondary School in Nicoadala District
E4 Next to Alto Lugela Secondary School in Lugela District
E5 Mcucunha area in Namacurra District (Alternate site)

■Map of Mozambique

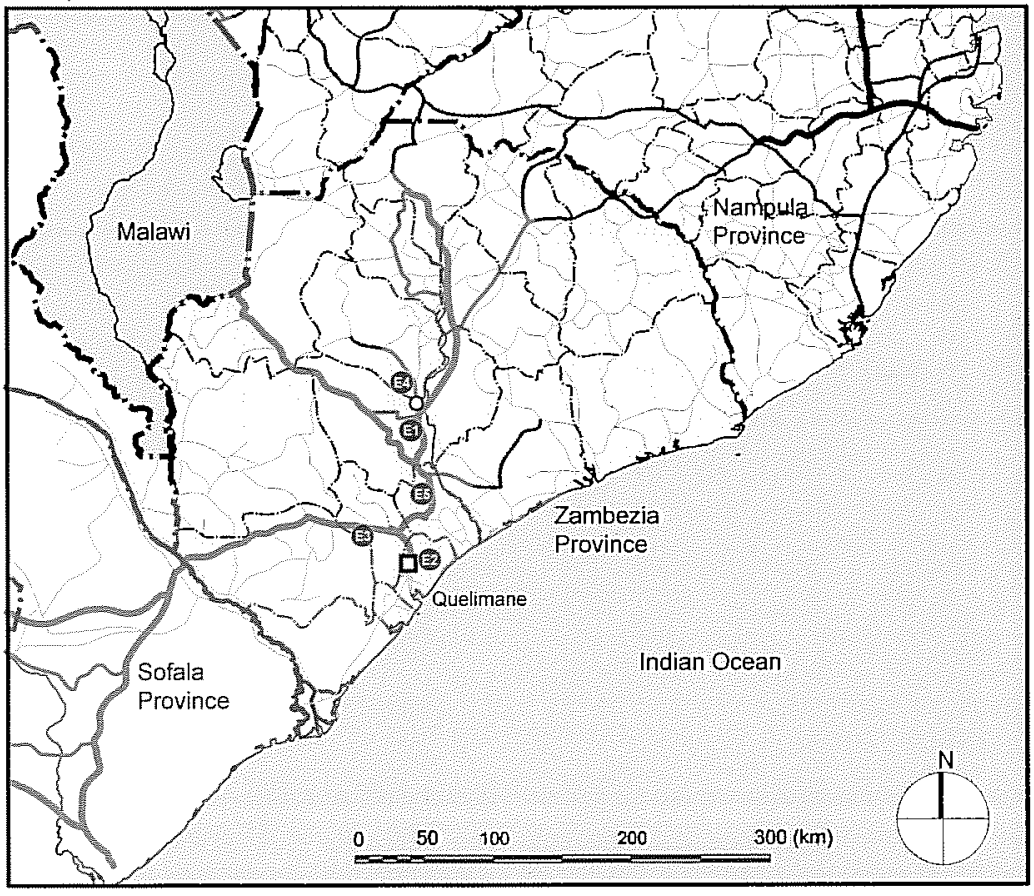


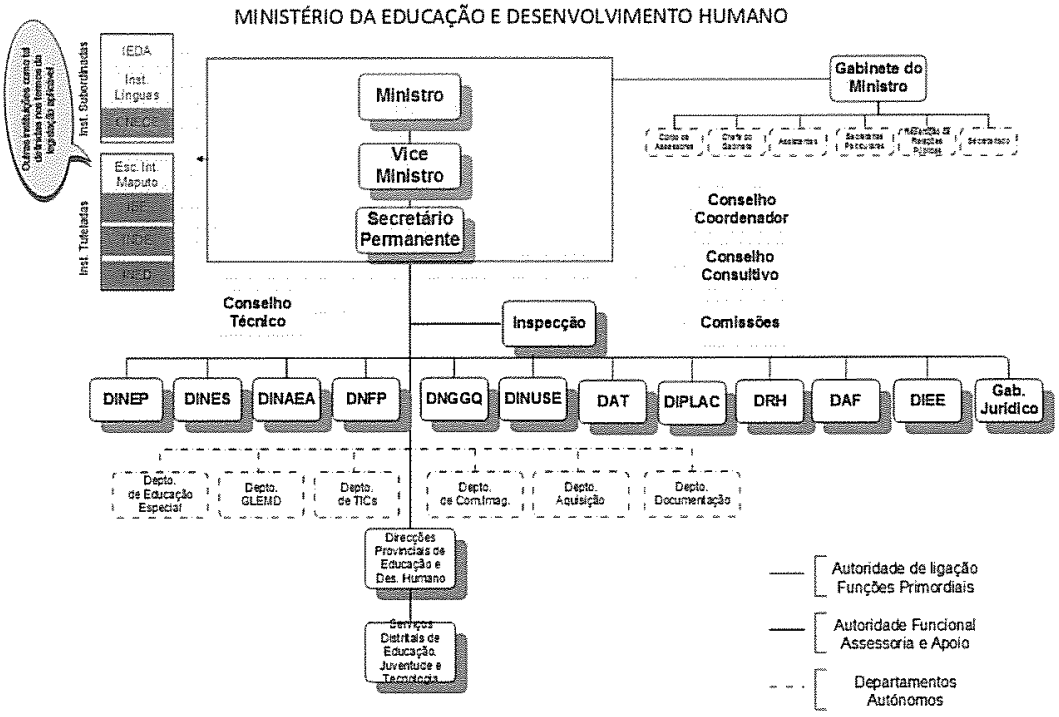
■Location of Mozambique



Legend
- Capital
- Provincial Capital
- Boundary
- Provincial Boundary
- Road
- Railway

□Map of Zambeizia Province





DNEP:	Direcção Nacional de Ensino Primário
DINES:	Direcção Nacional de Ensino Secundário
DINAEA:	Direcção Nacional de Alfabetização e Educação de Adultos
DNFP:	Direcção Nacional de Formação de Professores
DNGGQ:	Direcção Nacional de Gestão e Garantia da Qualidade
DINUSE:	Direcção de Nulrição e Saúde Escolar
DAT:	Direcção de Assuntos Transversais
DIPLAC:	Direcção de Planificação e Cooperação
DRH:	Direcção de Recursos Humanos
DAF:	Direcção de Administração e Finanças
DIEE:	Direcção de Infra-estruturas e Equipamentos Escolares
IEDA:	Instituto de Educação Aberta e à Distância
CNECE:	Conselho Nacional de Exames, Certificação e Equivalência
IBE:	Instituto de Bolsas de Estudo
INDE:	Instituto Nacional de Desenvolvimento da Educação
INED:	Instituto Nacional de Educação à Distância

List of Components and Items of Equipment

(1) Major Components of the Project

Priority order in each priority group	Candidate site	Facility							Furniture	Equipment	Facility	
		4-Classroom block	5-Classroom block	Administration and Multi-purpose block		Toilet		Guardhouse	Office furniture, educational furniture, and general furniture	Office equipment, information equipment, and scientific equipment	Gymnasium and Changing room	Staff quarter
				Administrative section	Multipurpose section	Male	Female					
1st Priority Group											2nd Priority Group	3rd Priority Group
1*	E1 Mocuba	3		1	1	1	1	1	1set	1set	1	
1*	E2 Queliname	3		1	1	1	1	1	1set	1set	1	
3*	E3 Nicoadala	3		1	1	1	1	1	1set	1set	1	(1*)1
4*	E4 Lugela		2	1	1	1	1	1	1set	1set	1	(2*)1
Alternate site												
(3*)	E5 Namacurra	3		1	1	1	1	1	1set	1set	1	

Remarks:

1. X* indicates the priority order in each Priority Group.
2. The area enclosed by the bold line indicates the components covered by the Project
3. The components indicated above could be revised and adjusted upon the result of the detail design, the results of bidding etc. during the project implementation stage.

(2) Equipment items of the Project

No.	Request No.	Equipment	E1 Mocuba	E2 Quelimane	E3 Nicoadala	E4 Lugela	Total
1	AO-1	Multifunctional Copier	1	1	1	1	4
2	AO-3	Manual biding machine	1	1	1	1	4
3	AO-5	Guillotine	1	1	1	1	4
4	IT-01	Desk-top computer	18	18	18	18	72
5	IT-02	Server	1	1	1	1	4
6	IT-04	Wireless Rooter Set	1	1	1	1	4
7	IT-05	Laser printer (monochrome)	4	4	4	4	16
8	IT-06	Laser printer	1	1	1	1	4
9	IT-07	Projector	1	1	1	1	4
10	SC-01	Experiment rod and base set	7	7	7	7	28
11	SC-02	Tape measure, 1m/1mm	7	7	7	7	28
12	SC-05	Beakers	7	7	7	7	28
13	SC-06	Measuring cylinders	7	7	7	7	28
14	SC-07	Dynamometer 1,5 – 2,0 N	7	7	7	7	28
15	SC-08	Weight holder, 10 g	14	14	14	14	56
16	SC-09	Digital stopwatch	7	7	7	7	28
17	SC-11	Holding pin	7	7	7	7	28
18	SC-15	Pulley experiment set	7	7	7	7	28
19	SC-16	Balance pan	14	14	14	14	56
20	SC-17	Set of weights 1g to 50 g	7	7	7	7	28
21	SC-20	Pressure probe	7	7	7	7	28
22	SC-23	Funnels	7	7	7	7	28

No.	Request No.	Equipment	E1 Mocuba	E2 Quelimane	E3 Nicoadala	E4 Lugela	Total
23	SC-25	Syringe	7	7	7	7	28
24	SC-29	Silicone tubing	7	7	7	7	28
25	SC-30	Alcohol burner	7	7	7	7	28
26	SC-31	Flasks	7	7	7	7	28
27	SC-34	Thermometers	7	7	7	7	28
28	SC-39	Electricity experiment board set	7	7	7	7	28
29	SC-44	Light dependent resistor, LDR3	7	7	7	7	28
30	SC-49	Multi-range meter	7	7	7	7	28
31	SC-50	Power supply: 0 – 12 V⎓, (for 220 /250 V)	7	7	7	7	28
32	SC-51	Optical lens experiment set	7	7	7	7	28
33	SC-53	Aluminium calorimeter	7	7	7	7	28
34	SC-54	Crucibles	7	7	7	7	28
35	SC-55	Petri dishes	7	7	7	7	28
36	SC-56	Pneumatic tank, 2 l	7	7	7	7	28
37	SC-58	Evaporating dish, 63 mm Ø, porcelain	14	14	14	14	56
38	SC-59	Glass tubes	7	7	7	7	28
39	SC-60	Glass stirring rods	7	7	7	7	28
40	SC-62	Angled tubes	7	7	7	7	28
41	SC-65	Dropper	7	7	7	7	28
42	SC-66	Graduated pipettes	7	7	7	7	28
43	SC-67	Pestle, porcelain, 100 mm	7	7	7	7	28
44	SC-68	Mortar, porcelain, 63 mm Ø	7	7	7	7	28
45	SC-69	Rubber tubing, i. Dia. 7 x 1,5 mm, 1 m	7	7	7	7	28
46	SC-73	Safety goggles	49	49	49	49	196
47	SC-78	Wire gauze, 160 x 160 mm	7	7	7	7	28
48	SC-79	Wire triangle with clay sleeve, 60 mm	7	7	7	7	28
49	SC-80	Spatulas	7	7	7	7	28
50	SC-82	Experiment scissors set	7	7	7	7	28
51	SC-83	Test tube holder, up to 20 mm Ø, wood	13	13	13	13	52
52	SC-84	Crucible tongs	7	7	7	7	28
53	SC-95	Test tubes	7	7	7	7	28
54	SC-96	U-Tube, 2SB 19, 160 mm, 2 side taps	7	7	7	7	28
55	SC-97	Watch glass dish, 60 mm Ø	14	14	14	14	56
56	SC-99	Glass nozzle, 8 mm Ø, angled 90°	7	7	7	7	28
57	SC-101	Test tube rack, plastic	7	7	7	7	28
58	SC-105	Heat plate	7	7	7	7	28
59	SC-106	Balance	7	7	7	7	28
60	SC-109	Jar glass, Miniature separation tank	7	7	7	7	28
61	SC-110	Narrow-neck glass bottle, 250 ml	7	7	7	7	28
62	SC-111	Burette	7	7	7	7	28
63	SC-113	Magnifier 8 x	25	25	25	25	100
64	SC-127	Monocular microscope	7	7	7	7	28

Remarks

1. In case, E5 Namacurrais included in the project, its equipment items will be same as it of the candidate site whose components includes 12 classrooms such as E1 Mocuba, E2 Quelimane and E3 Nicoadala.

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal

-Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")

-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")

-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement

-Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

-Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants (contract with Japanese consultant and local contractors)

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See "Financial Flow of Grant" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of

the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) In case of Japanese consultant, the Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

c) In case of local contractors, the Japanese Grant will be disbursed when requests for disbursement are submitted by the Recipient to JICA.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", while the prime constructing firms , which enter into contracts with the Recipient, could be nationals of the recipient country or other countri(ies) if deemed it necessary.

6) Contracts and Concurrence by JICA

The contracts which the Recipient concludes shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant. The currency denominated in such contracts shall be stipulated in the G/A.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and

smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

Flow Chart of Japanese Grant Procedures

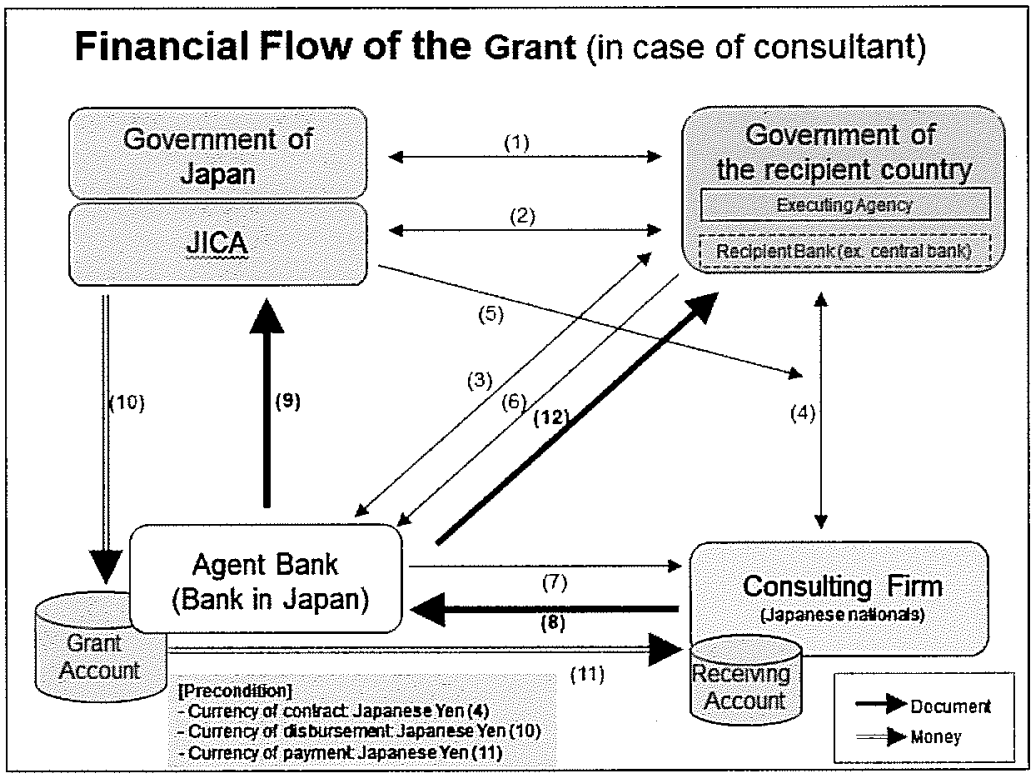
Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2)Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3)Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier	Concurrence by JICA is required Request for disbursement shall be made by the Recipient, in case of local contractor.	x		x		x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

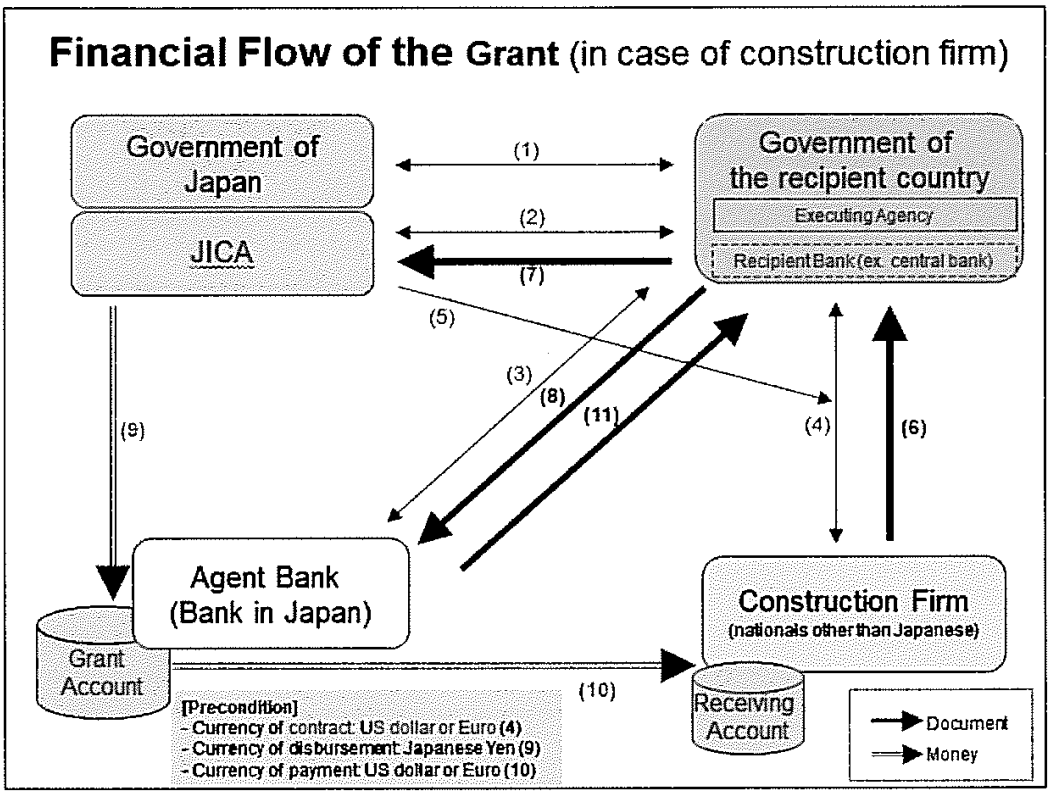
1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.

2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

Financial Flow of Japanese Project Grant
(contract with Japanese consultant and local contractors)



(1) E/N
(2) G/A
(3) Banking Arrangement/Opening an Grant Account
(4) Contract
(5) Concurrence and Verification of Contract
(6) Issuing Authorization to Pay (A/P) upon contract
(7) Notification of A/P
(8) Request for Payment
(9) Request for the Disbursement
(10) Disbursement of the Grant
(11) Payment
(12) Statement of Account

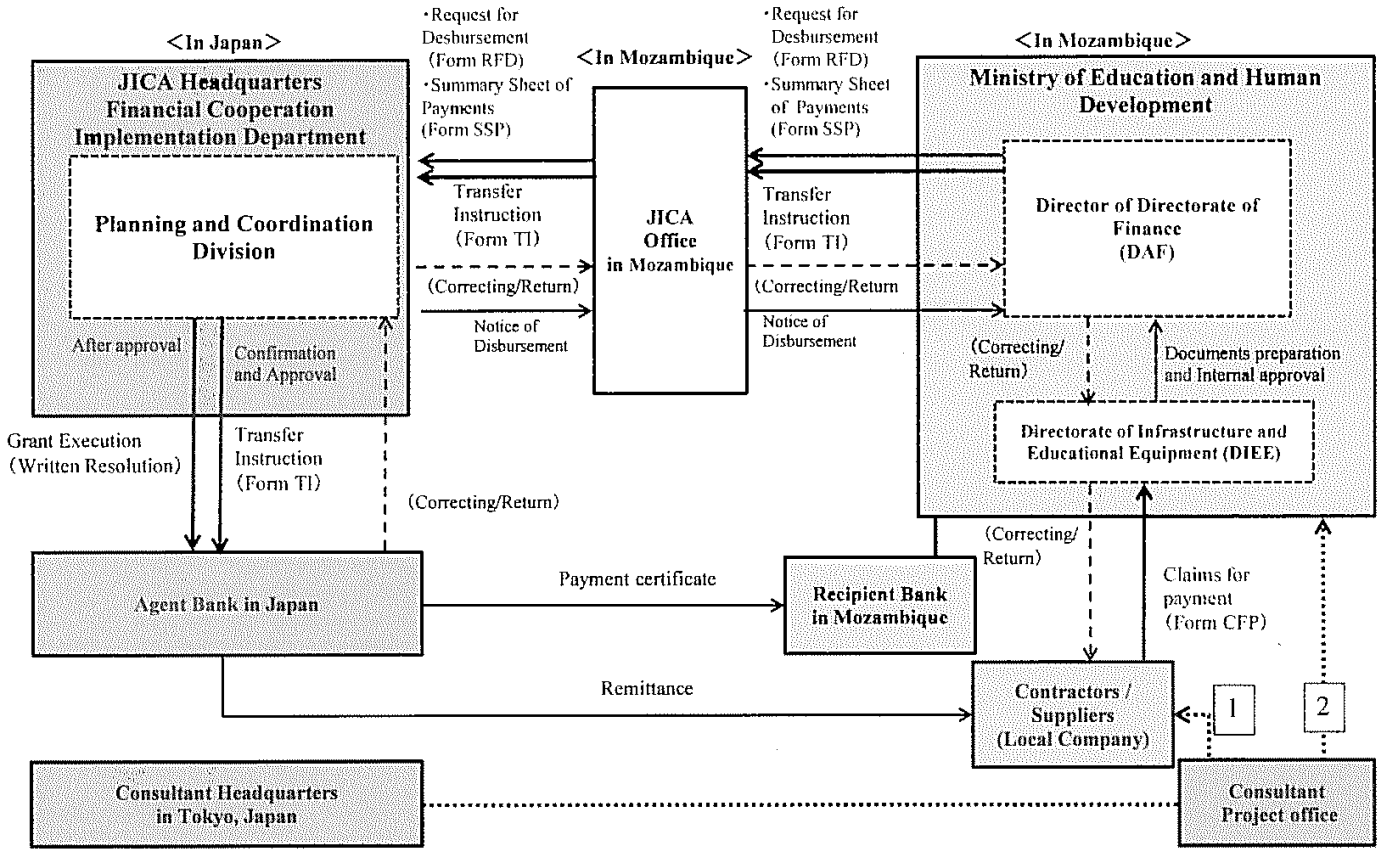


(1) E/N
(2) G/A
Submission of Evidence of Authority and Specimen Signatures from the Recipient to JICA (prerequisite for the process of no. (7))
(3) Banking Arrangement/Opening an Grant Account
(4) Contract
(5) Concurrence and Verification of Contract
(6) Request for Payment
(7) Request for Disbursement
(8) Transfer Instruction
(9) Disbursement of the Grant *
(10) Payment
(11) Statement of Account

* The amount of disbursement in Japanese Yen ((9) in above chart) shall be calculated at the Telegraphic Transfer Selling (TTS) rate quoted by the Bank in Japan two business days before the date on which the disbursement is made.

ANNEX 7

Tentative Approval flow and required documents for payments to the contractors/suppliers (local company)

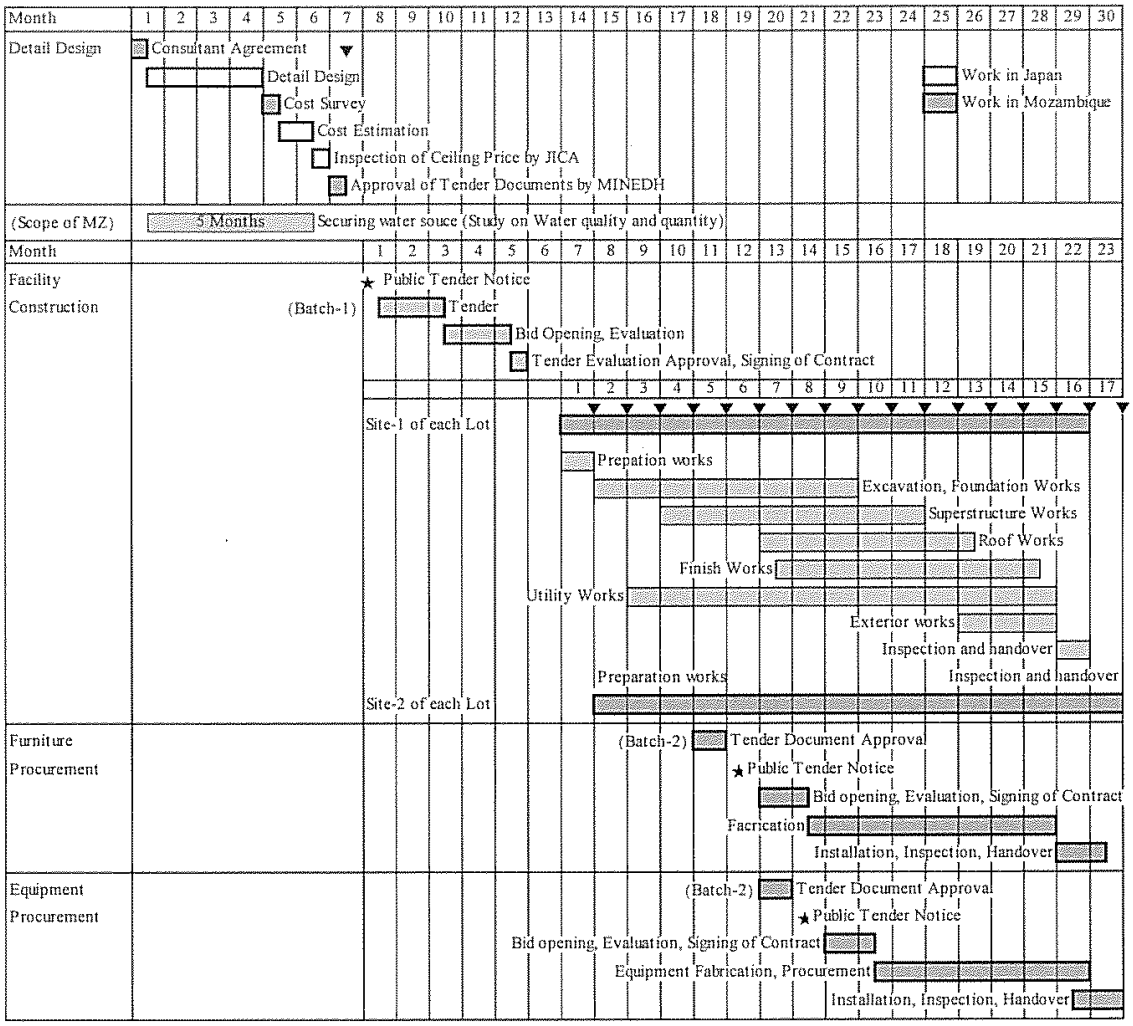


【Consultant's financial planning and payment support service】

1 Support for preparing invoice, pre-confirmation of documemts, promotion of document praparation, support for revision documents etc.

2 Promotion of approval of the Ministry(MoET), support for Request for Disbursement / Transfer Instruction, pre-confirmation of documents, promotion of document preparation, support for revision documents, etc.

Project Implementation Schedule



▼ **Timeline of PMR (Project Monitoring Report) submission**

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:
Executing Agency	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:
Line Ministry	Person in Charge (Designation) Contacts Address: Phone/FAX: Email:

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 **Executing Agency**

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 **Environmental and Social Impacts**

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 **Physical Arrangement**

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 **Budgetary Arrangement**

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (*at the time of outline design*)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):

Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

Annex 9
Attachment 6

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials
(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)
-
-
-

A-98

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Major Undertakings to be taken by the Government of Mozambique

1. Specific obligations of the Government of Mozambique which will not be funded with the Grant

(1) Before the Bidding

NO	Items	Deadline	In charge	Estimated Cost (,000 Mt)	Ref.
1	To request to securely allocate sufficient amount of budget required for 2019	July, 2018	MINEDH	[17,359]	
2	To request to securely allocate sufficient amount of budget required for 2020	July 2019	MINEDH	[19,143]	
3	To open bank account (B/A)	within 1 month after the signing of the G/A (April, 2019)	MINEDH , BoM	—	
4	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract (April 2019)	MINEDH	4	
	2) Payment commission for A/P to Bank of Mozambique	every payment for consultant	MINEDH	80	
5	To approve IEE/EIA(Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation.	within 1 month after the signing of the G/A (April 2019)	MINEDH	146	
6	To secure and clear the proposed sites for the Project	before tender notice (September 2019)	MINEDH, DPEDH		
	1) The availability of secured water source can be induced to the site(s) by the Recipient to fulfill the demand in operating facilities and utilities within the site. In case of groundwater resource from borehole, it shall be confirmed by making borehole(s) and yield tests.			2,134	
	2) The availability of Power source which can be induced to the site(s) by the Recipient to fulfil the demand in operating facilities and utilities within the site(s). It shall be confirmed in written documents by EDM			7,949	
	3) Temporary construction yard and stock yard can be allocated in or next to the site of which location is no harm to students and surrounding communities.			—	
	4) Accessible route maintained from main road to site for construction vehicles and transporters			871	
7	To obtain the planning, zoning, building permit	before tender notice (September 2019)	MINEDH DPEDH	—	
8	To clear and level the site, including demolition, removal or realign of any obstacles, not to disturb implementation of the Project	before tender notice (September 2019)	DPEDH SDEJT		
	1) Utilities (cables, pipes, poles etc.)			—	
	2) Existing facilities, shed, abandoned structures concealed.(*)			—	
	3) Trees, bush including roots (*)			66	
	4) Wastes			—	
	5) Site leveling (*)			6,079	
9	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of Tender documents (August 2019)	MINEDH		

NO	Items	Deadline	In charge	Estimated Cost (,000 Mt)	Ref.
10	To ensure smooth implementation of the bidding procedures and to bear necessary expenses relevant to the bidding procedures including, but not limited to, the following	by 1 month before tender notice (September 2019)	MINEDH		
	1) Venue			—	
	2) Arrangement of tender notice on public media			30	
	3) Setting up a tender evaluation committee			—	

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost (,000Mt)	Ref.
1	To request to securely allocate sufficient amount of budget required for 2021	July 2020	MINEDH	[57,232]	
2	To request to securely allocate sufficient amount of budget required for 2022	July 2021	MINEDH	[8]	
3	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) Payment commission for A/P to Bank of Mozambique	every payment for consultant	MINEDH	112	
	2) Remittance charge for local contractors and suppliers to Bank of Mozambique	every payment	MINEDH	111	
4	To conduct necessary procedures such as "Request for disbursement" to JICA (upon contract with construction firms and/or procurement firms (suppliers)), "Application of remittance" to Bank (upon contract with construction firms and/or procurement firms (suppliers))	during the Project	MINEDH	—	
5	To ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	during the Project	MINEDH	—	
6	1) To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work. 2) The Recipient implements this project in accordance with Regulation of the Mechanisms and Procedures of Employment of foreign Workers stipulated in Article 12 'Investment Projects' on the decree No. 37/2016, August 31, 2016. 3) The possible number of Japanese nationals and/or physical persons of third countries working under the Project are up to ten under the Article 14 'Proof Burden' on the decree No. 37/2016, August 31, 2016.	during the Project	MINEDH MTESS	—	
7	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be borne by its designated authority without using the Grant	during the Project	MINEDH MEF	11,013	
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	MINEDH	—	
9	1) To submit Project Monitoring Report	every month	MINEDH	—	
	2) To submit Project Monitoring Report	Handover (September, 2021)			

NO	Items	Deadline	In charge	Estimated Cost (,000Mt)	Ref.
	3) To submit Project Monitoring Report (final)	within 1 month after signing of Certificate of Completion for the works under the contract(s) (September, 2021)			
10	To submit a report concerning completion of the Project	within 6 months after completion of the Project - (soon after starting operation) (February, 2022)	MINEDH	—	
11	1) To construct boundary wall and gates	by the completion of the Project - (by the time of starting operation) (February, 2022)	MINEDH	40,200	
	2) To install outside stormed water drainage (if necessary)			—	
	3) To sow seed for land cover and plant trees			5,100	
	4) To install furniture, equipment, stationary and fabric which are not covered the Project.			6,240	
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)				
	1) Electricity to contract with EDM and install main power line to the designated point within the site	6 months before completion of the construction (March, 2021)	MINEDH DPEDH (EDM)	11,925	
	2) Communication lines (depend on MINEDH) to contract with service provider and install a designated modem and router to connect to communication system installed by the Project	within 1 month before completion of the construction (August, 2021)	MINEDH DPEDH Service Provider (TDM etc.)	—	
	3) Water Supply to contract with water supplier and install city water pipe and to connect to reserve tank which is installed by the Project, otherwise water from borehole shall be induced to the reserve tank within the site	6 months before completion of the construction (March, 2021)	MINEDH DPEDH, (FIPAG etc.)	1,674	
	4) Drainage (in case municipal sewer system available) to connection to municipal drainage main pipe (for storm, sewer and others) from the site	6 months before completion of the construction (March, 2021)	MINEDH DPEDH DPOPHRH	—	

(3) After the Project (after starting operation)

NO	Items	Deadline	In charge	Estimated Cost (,000Mt)	Ref.
1	To bear the following commissions to a bank in Japan for the banking services based upon the B/A				
	1) Payment commission for A/P to Bank of Mozambique	every payment for consultant	MINEDH	2	
	2) Remittance charge for local contractors and suppliers to Bank of Mozambique	every payment	MINEDH	6	
2	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	after completion of the construction (December, 2021)	MINEDH DPEDH SDEJT Each school	—	

Schedule for securing the water resource

As indicated in clause 1) of No.6 of the Table '(1) before bidding' in Annex 10-1, the availability of secured water resource, which can be supplied to the respective project sites, needs to be confirmed by the end of September 2019 as a scope of Mozambique - MINEDH.

This is indispensable for Consultant to prepare a tender document for construction of school facilities which needs to be approved by MINEDH within October 2019, reflecting the result of water resources confirmation.

In case, a secured water source of which quality and quantity sufficiently fulfil the requirements is not available for each Project site, Consultant needs to examine the feasibility of Project site change from the site having no secured water resource to the alternative site – Namacurra.

Consequently, reports at respective milestones indicated as ★ in the table below shall be submitted to Consultant in a timely manner for smooth implementation of the Project.

Table: The feasible schedule to confirm the availability of secured water resource.

No.	Process to be taken	year	2019																														
		month	March				April					May				June				July				August					September				
		day	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26	2	9	16	23	30
	G/A					☆																											
1	Completion of tender document		★4/Mar.																														
2	Approval of tender document				★18/Mar.																												
3	Tender notice								★15/Apr.																								
4	Tender document distribution																																
5	Tender opening													★15/May																			
6	Tender result evaluation, approval																																
7	Concluding contract																	★17/Jun.															
8	Mobilization																																
9	Geo-tech. survey																																
12	Interim report 1																					★15/Jul.											
10	Drilling boreholes																																
11	Water quality test																						☆	☆	☆	☆							
13	Water yield test																																
14	Interim report 2																										30/Aug.★						
15	Final report																																
16	Final report submission																											14/Sep.★					

Condition: E/N and G/A assume to be concluded in March 2019

Provisional Number of Teachers and Staff

Personnel	E1 Mocuba	E2 Quelimane	E3 Nicoadala(*1)	E4 Lugela(*1)	Total	Remarks
Head Teacher	1	1	[1]	[1]	2+[2]	
Deputy head teacher	2	2	1+[1]	1+[1]	6+[2]	
Teacher	37	37	16+[21]	7+[25]	97+[46]	
Sub-Total 1	40	40	17+[23]	8+[27]	105+[50]	
Head Administrator	1	1	[1]	[1]	2+[2]	
Technical Staff (*2)	2	2	2	2	8	Accountant, librarian
General Staff (*2)	2	2	2	2	8	Administrator x2
Supporting Staff (*2)	5	5	5	5	20	Cleaner x2, Security x2, Janitor
Sub-Total 2	10	10	9+[1]	9+[1]	38+[2]	
Total	50	50	26+[24]	17+[28]	143+[52]	

(*1): [ ] indicates the number of staff already dispatched to the existing schools

(*2): Technical staff is expected to be of Tech. Prof. em Adm Publica, General staff are expected to be of Tenico, and Supporting staff is expected to be of Auxiliar, respectively

4-3. テクニカル・ノート（現地調査 1）

The Preparatory Study for the Project for Construction of Secondary Schools

in Zambezia Province in the Republic of Mozambique

Technical note

Ministry of Education and Human Development (hereinafter referred to as "MINEDH") and the Consultant of the Preparatory study for the Project (hereinafter referred to as "Consultant") mutually agreed on followings through discussions.

1 Site selection

1.1 MINEDH will submit DUAT (Direito do Uso e Aproveitamento de Terra) and Landmine free Certificate of the following candidate project sites by May 25, 2018.

- DUAT: Quelimane district, Nicoadala district and Namacurra district
- Landmine free certificate: Quelimane district, Nicoadala district, Namacurra district and Lugela district

1.2 We confirmed that the list of the candidate site with priority order made by Mozambique Government shown in Annex1 is consistent with the decision not only by Ministry of Education and Human Development (hereinafter referred to as MINEDH) but also by Provincial Directorate of Education and Human Development of Zambezia (hereinafter referred to as DPEDHZ).

1.3 The district-wise classroom shortage against the projected number of student in the target year was analysed by two methods: one is under an assumption that the current trend of schooling will continue for the period; another is under an assumption that the enrolment rate of secondary education will be increased to the strategic target set by MINEDH. The provisional results are shown in Annex 2 and the Consultant will continue further analysis for selection and prioritization of the candidate sites, in addition to consideration of the result of geotechnical survey and topographical survey of which initial result shown in Annex 3.

1.4 Regarding the candidate site in Quelimane district, water supply has been expected to be secured by the extension of the current water network of FIPAG. However, we identified the extension plan did not existed due to water supply coverage area of FIPAG designated only in Quelimane city not extending to Quelimane district. Reflecting this situation, we confirmed that Quelimane district submit the result of a groundwater availability test in terms of quality and quantity to the Consultant by June 30, 2018. Based on the result of the test, the Consultant will examine whether the water source is appropriate or not for the proposed secondary school. In case, the water source is examined as inappropriate, the candidate site will be judged to be deleted from the list of the candidate site list for the Project.

2 The Scope of Mozambique

2.1 For securely implementing the scope of work which shall be covered by the Mozambique Government within 2019, a budget request shall be done by July 2018 by MINEDH (Items shown in Annex 4). Reflecting this context, the Consultant will examine the approximate amount as reference and submit it to MINEDH by June 20, 2018.

2.2 We confirmed MINEDH shall undertake the following works by construction works start. However, from aspects of efficiency, effectiveness, and consistency of the following works with the construction works of the Project, the Consultant will analyse the possibility to include the works which require

heavy vehicles as a part of the project.

- Site Clearance
  - Removal of existing structures, buildings including foundations and utility pipes and cables concealed
  - Realignment of utility poles and cables including underground cables and pipes (if available)
  - Tree logging and root removal
  - Waste disposal (if available)
- Access road
  - Making an access road for construction vehicles and transporters to each site – the position will be indicated by the Consultant.

2.3 Utility service connection

- Electricity supply works shall be done by Mozambique Government: Conducting electric supply cable and connect to Main switch board via transformer which will be installed by the Project.
- Water supply works shall be done by Mozambique Government: In case water source is from borehole(s), make borehole(s) and installing adequate pump(s) and pipes to conduct water to a water reserve tank which will be installed by the Project.
- Communication works shall be done by the Mozambique Government: In case internet connection is required, internet service contract shall be made with a service provider and conduct communication line(s) and modem(s) to designated points which will be indicated by the Consultant.

3 Outline Design

3.1 Facility Design

- As facility design, following points will be examined and initial outline design drawings – architectural design, structural design and utility design – will be sent to MINEDH from the Consultant by August 31, 2018 to reflect the opinions raised by MINEDH on them for further consideration.
- [Architectural Design]
  - Classroom capacity shall be 48 students (8 students x 6 rows) per room fulling with 45 students for ESGI indicated in the '*Diploma Ministerial 61-2003 de 11 de Junho de 2003*'.
  - Desk and chair for general classroom shall be 2-seater desk and chair (one-piece) type to enable excessive number of students flexibly to be accommodated.
  - Library room especially reading area shall be examined to expand for facilitating self-learning and group work, etc.
  - Laboratory will be planned as a multi-purpose classroom.
  - Staff quarters which are indispensable to allocate adequate teachers from other regions will be examined of its possibility to be included in the Project.
  - For physically challenging students, minimum requirements indicated in the '*Decreto 53-2008 de 30 de Dezembro de 2008*' and followings shall be taken into account.
    - The entrance doors shall be wider than 1,000mm
    - Toilet booth for physically challenging students shall be placed inside washroom for multi-purpose use for all
- [Structural Design and Utility Design]
  - The principle of design standards will follow those applied to the previous Secondary School

Construction Project in Nampula Province. However, some improvement and modifications shall be considered from lessons learnt.

3.2 Equipment Design

Equipment list was prepared according to the standard procurement list for a secondary school (ESG1&2) made by MINEDH. Equipment which is needed for ESG1 rather than ESG2 is prioritized. The priority of consumables is low (C) because it will be difficult to include them in the project. Following points will be examined in planning Equipment design.

Then initial outline Equipment design will be sent to MINEDH from the Consultant by August 31, 2018 to reflect the opinions raised by MINEDH on them for further consideration.

- Criteria for selection and priority of equipment
  - ✧ The equipment is necessary for the implementation of the curriculum
  - ✧ The equipment is necessary for the school management
  - ✧ The school contains enough rooms/spaces for the equipment to be installed
  - ✧ The school has no difficulty to keep using and maintain the equipment
  - ✧ The teachers/staff has no difficulty to use the equipment
  - ✧ The equipment can be purchased in Mozambique
  - ✧ The equipment is along with Mozambique Government's priority
  - ✧ The equipment is along with Japanese Government's assistance policy
- Equipment priority list

  (Shown in Annex 5)

May 8, 2018, Maputo

Ms. Antuia Mogne SOVERANO	Mr. Kaname HYODO
Director	Project Manager
Directorate of Planning and Cooperation	the Consortium of
Ministry of Education and Human Development	Matsuda Consultants International Co., Ltd.
Republic of Mozambique	and INTEM Consulting inc.

Annex 1

List of the candidate sites with priority order made by Mozambique side

Priority	District	Location
1	Mocuba	Macovine area
2	Quelimane	Nangoela area
3	Nicoadala	Licuar Secondary School
4	Lugela	Next to Alto Lugela Secondary School
5	Namacurra	Macucunha area

Annex 2: The district-wise classroom shortage (Provisional)

Scenario A: In case the trend in enrollment of ESG1・ESG2 keeps pace with the average increase of the last five years (2013~2017)

		No. of students (2017)*1	Annual increase *2	Projected no. of students (2023) *3	Required no. of classes*4	Required no. of classrooms	Existing no. of permanent classrooms (2017)	Classroom shortage	Student/ Classroom*5
Zambezia Province	ESG1	84,327	-1.3%	78,055	1,735	867	611	256	64
	ESG2	32,888	9.2%	65,502	1,638	819	456	363	72
Mocuba	ESG1	8,265	-2.1%	7,264	161	81	49	32	74
	ESG2	4,004	7.4%	7,127	178	89	49	40	73
Quelimane	ESG1	17,877	-2.3%	15,566	346	173	94	79	83
	ESG2	8,630	20.8%	29,256	731	366	136	230	108
Nicoadala	ESG1	6,320	1.8%	7,027	156	78	46	32	76
	ESG2	2,702	19.4%	8,568	214	107	35	72	122
Lugela	ESG1	1,353	-2.1%	1,192	26	13	17	(4)	35
	ESG2	472	-0.3%	634	16	8	12	(4)	26
Namacurra	ESG1	4,170	-2.0%	3,688	82	41	37	4	50
	ESG2	1,779	6.0%	3,217	80	40	32	8	50

*1 Reference: Aproveitamento Escolar 2017

*2 The average annual increasing rate from 2013 to 2017 was applied

*3 According to new education system currently under discussion, ESG 2will consist of 3 grades instead of 2 grades from 2023. Reflecting this, the student number of 12rd (highest) grade in ESG 2 was identified by the following formula: "the number of G12" x "the average transition rate from G11 to G12"

*4 The number student per class is applied 45 in ESGI, 40 in ESGII according to 'Diploma Ministerial 61-2003 de 11 de Junho de 2003'.

*5 Student-Classroom Rate was identified from the following formula, taken into account the school would be managed in double shifts: "The expected student number in 2023" / "the number of classroom in 2017" x 0.5

Scenario B: In case the target enrolment rate stipulated in ESSG (2009-2015) is achieved in 2023

	School age population ,projected for 2023 *3		Enrollment 2023 *4	Required no. of classes*5	Required no. of classrooms	Existing no. of permanent classrooms (2017)	Classroom shortage	Student/ Classroom*6
Zambezia Province	ESG1(Age 12-14)	460,068	322,048	7,157	3,578	611	2,967	264
	ESG2(Age 15-17)	386,459	135,261	3,382	1,691	456	1,235	148
Mocuba	ESG1(Age 12-14)	35,635	24,945	554	277	49	228	255
	ESG2(Age 15-17)	29,268	10,244	256	128	49	79	105
Quelimane	ESG1(Age 12-14)	30,361	21,253	472	236	94	142	113
	ESG2(Age 15-17)	27,121	9,492	237	119	136	(17)	35
Nicoadala	ESG1(Age 12-14)	15,689	10,982	244	122	46	76	119
	ESG2(Age 15-17)	13,375	4,681	117	59	35	24	67
Lugela	ESG1(Age 12-14)	15,548	10,884	242	121	17	104	320
	ESG2(Age 15-17)	10,693	3,743	94	47	12	35	156
Namacurra	ESG1(Age 12-14)	30,207	21,145	470	235	37	198	286
	ESG2(Age 15-17)	28,938	10,128	253	127	32	95	158

*1 Figures are retrieved from Population Census 2007. However, Maquival locality was incorporated to Quelimane District from Nicoadala District. Accordingly we adjusted the population in Quelimane and Nicoadala districts, using the ratios of the total population as of 2007 in Maquival locality to it in Nicoadala district, and to it in Quelimane district, respectively.

*2 Population of each district in 2023 was identified from the population in 2017 and the expected increasing rate based on the Population census 2007. Furthermore, regarding the school-age population, it was identified from the proportion of age cohort population in 2007

*3 We identified the school-age population in 2023, using the proportion of age cohort population in 2007. In conducting this analysis, we took into account the new education system under discussion which proposes that the entrant age of ESG1 be changed from 13 to 12.
(e.g. "the age cohort population of 12 to 14" = "the age cohort population from 10 to 14" x 3/5)

*4 The number of school enrolment (ESG I) was identified from the following formula: "School age cohort population" x "70%". In case of ESGII, "35%" was applied, based on the objectives set in ESSG 2009-2015.

*5 The number student per class is applied 45 in ESGI, 40 in ESGII according to 'Diploma Ministerial 61-2003 de 11 de Junho de 2003'.

*6 Student-Classroom Rate was identified from the following formula, taken into account the school would be managed in double shifts: "The expected student number in 2023" / "the number of classroom in 2017" x 0.5

Annex 3: Site survey result (provisional)

	District	Lugela	Nicoadala	Namacurra	Mocuba	Quelimane
	Name of Site	next to Alto Lugela Seconday School	Licuar Secondary School	Macucunha area	Macovine area	Nangoela area
Site condition	Area (○>3ha>×)	○ Approx. 6.1ha (currently under precise surveying)	○Approx. 1.4ha +(1.65ha for temporary use during construction) (currently under precise survying)	○ Approx. 4.0ha (currently under precise surveying)	○ Approx. 3.3ha (currently under precise surveying)	○ Approx. 4.9ha (currently under precise surveying)
	Geo technical characteristics	○ Clay and Silt (currently under Geotechnical surveying)	○ Sand: (currently under Geotechnical surveying)	○Sand (currently under Geotechnical surveying)	○ Sand (currently under Geotechnical surveying)	△ Sand, water table undergound seems relatively high. (currently under Geotechnical surveying)
	Land use	○Cultivation area in school for school activities, it can be shifted to other vacant space	○Bush, cultivation area in the surrounding area	○Bush, cultivation area in the surrounding area	○cultivation area in the surrounding area	○Bush
	Structures and obstacles	○ Shed for guard house for school, it can be demolished. (currently under precise surveying)	△Some trees (currently under precise surveying)	△Some trees (currently under precise surveying)	○N/A (currently under precise surveying)	○N/A (currently under precise surveying)
Accessibility	Distance from Quelimane City to the site (km) and the distance from neaby main road to the site (km)	◎ 129.5km from Quelimane city, the access road facing the site was paved in the last year. Alto Lugela Secondary School is operating next to the site.	◎37Km from Quelimane EN7 (Paved road), 1.2km from EN7 (clay road) : EP Licuar operating adjacent to the site	○49.5km from Quelimane city EN7 (paved road)、 110m from EN7 shall be maintained as an access road to the site	○111.7km from Quelimane city EN104 (Paved road) 1.95km from EN104 to the site. 38m shall be maintained as an access road to the site	◎17km from Quelimane city EN470 (paved road) 2.3km from EN470 to the site (unpaved). 100m shall be maintained as an access road
Utility	Electric supply	Distance from the nearest middle tension electric city supply point to the site is 1km	Distance from the nearest middle tension electric city supply point to the site is 0.2km	Distance from the nearest middle tension electric city supply point to the site is 0.3km	Distance from the nearest middle tension electric city supply point to the site is 0.8km	Electric supply to the area including the site is planned to completed by November 2018
	Water supply	△ a borehole is available in the existing secondary school (its hand pump was broken 2 months ago) Borehole(s) is required	△ Borehole(s) is required	△ Borehole(s) is required	○ Borehole(s) is required Plan for making a borehole is available	△X water supply has been expected to be secured by the extension of the current water network of FIPAG. However, the Consultant identified the extension plan did not existed due to water supply coverage area of FIPAG. Groundwater contains salt in the area, it seems difficult to secure reliable water source.
	Consideration by DPEDH	if boreholes are required DPEDH would raise an appraisal report to UNICEF				
Assistance	Duplication of assistance	○ N/A	○ N/A	○ N/A	○ N/A	○ N/A (Note: ESG Quelimane under constrction is Qulimane city not Quelimane district)

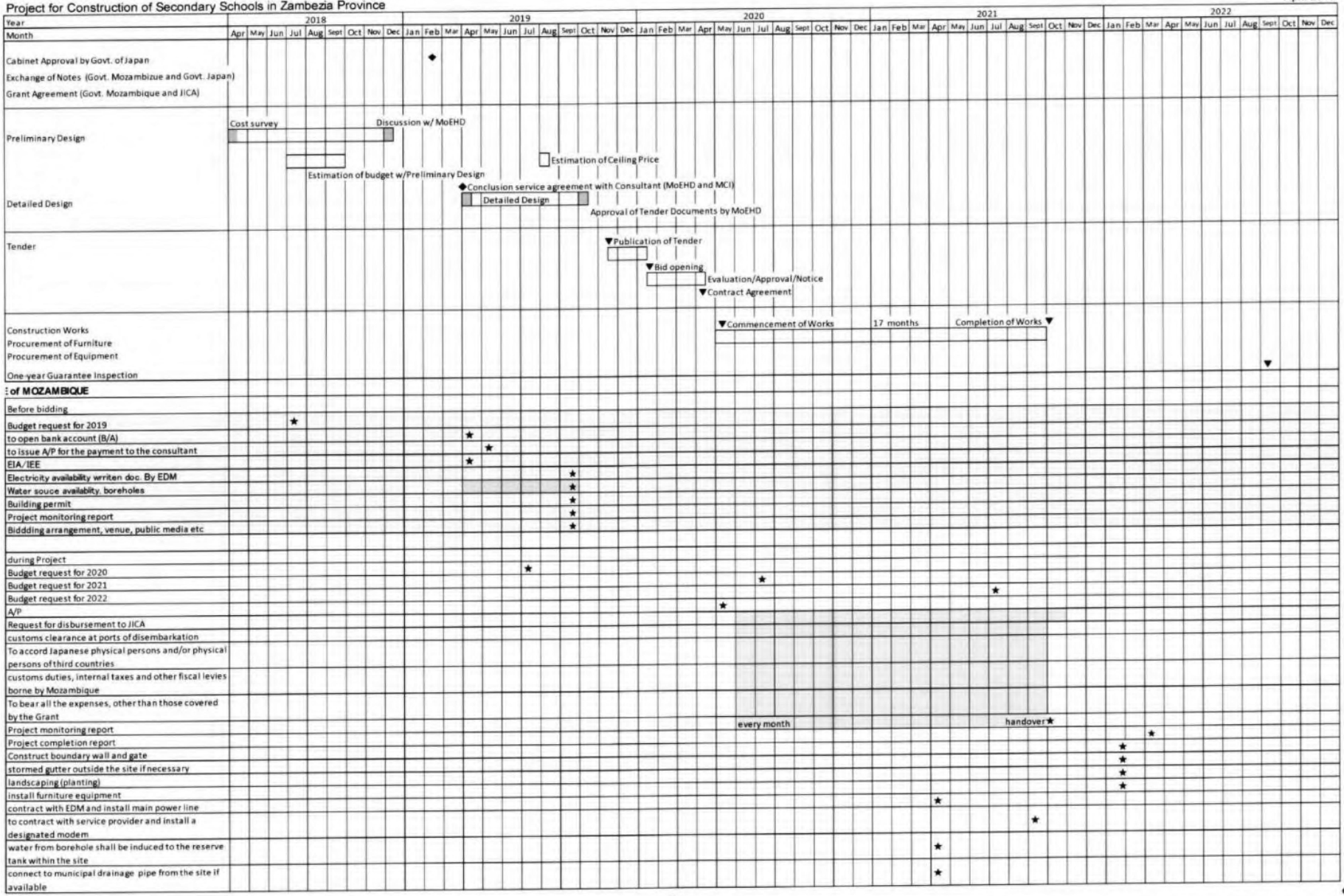
Annex 4: The Scope of Mozambique

No	Items to be implemented before bidding	Deadline	In charge
1	To request to securely allocate sufficient amount of budget required for 2019 (required amount will be proposed by the Consultant, by June 20, 2018, as reference)	July 2018	MINEDH
2	To open a bank account (B/A)	Within 1 month after the signing of the G/A (Expected to be April 2019)	MINEDH, Bank of Mozambique
3	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	Within 1 month after the signing of the contract (Expected to be April 2019)	MINEDH
4	To approve IEE/EIA (Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation.	Within 1 month after the signing of the G/A (Expected to be April 2019)	MINEDH
5	To secure and clear the proposed sites for the Project 1) The availability of secured water source can be induced to the site(s) by the Recipient to fulfil the demand in operating facilities and utilities within the site. In case of groundwater resource from borehole, it shall be confirmed by making borehole(s) and yield tests 2) The availability of Power source which can be induced to the site(s) by the Recipient to fulfil the demand in operating facilities and utilities within the site(s). It shall be confirmed in written documents by EDM 3) Temporary construction yard and stock yard can be allocated in or next to the site of which location is no harm to students and surrounding communities 4) Accessible route maintained from main road to site for construction vehicles and transporters	Before notice of the bidding document (Expected to be September, 2019)	MINEDH, DPEDH
6	To obtain the planning, zoning, building permit	Before notice of the bidding document (Expected to be September, 2019)	MINEDH DPEDH
7	To clear and level the site, including demolition or realign of any obstacles, not to disturb implementation of the Project 1) Utilities (cables, pipes, poles, etc.) 2) Existing facilities, shed, abandoned structures concealed. 3) Trees, bush including roots 4)Wastes	before notice of the bidding document (Expected to be September, 2019)	DPEDH SDEJT
8	To submit a Project Monitoring Report (with the result of Detail Design)	Before preparation of bidding documents (Expected to be September, 2019)	MINEDH
9	To ensure smooth implementation of the bidding procedures and to bear necessary expenses relevant to the bidding procedures, including, but not limited to, the following 1) Venue 2) Arrangement of tender notice on public media 3) Setting up a tender evaluation committee	By 1 month before tender notice (Expected to be September, 2019)	MINEDH

Implementation Schedule (Provisional)

Project for Construction of Secondary Schools in Zambezia Province

April 2018



Annex 5: Equipment priority list (Provisional)

No.	Request No.	Item (English)	Qty(*2)	Priority (*1)
1	AO-1	Multifunction Copier Machine	1	A
2	AO-2	Digital Duplicator Machine	1	A
3	AO-3	Manual binding machine	1	A
4	AO-4	Electrical binding machine	2	C
5	AO-5	Guillotine	1	A
6	AO-6	Fax machine	1	C
7	AO-7	Safety box	1	C
8	AO-8	Flipchart	3	C
9	AO-9	Flipchart pads	7	C
10	AO-10	Office Stapler	10	C
11	AO-11	Heavy stapler	3	C
12	AO-12	Office punch	10	C
13	AO-13	Heavy punch	3	C
14	AO-14	Staples for heavy stapler	10	C
15	AO-15	Staples for office stapler	3	C
16	AO-16	Binding rings 6 mm	150	C
17	AO-17	Binding rings 12 mm	500	C
18	AO-18	Binding rings 16 mm	250	C
19	AO-19	Binding rings 22 mm	100	C
20	AO-20	Cardboard	1000	C
21	AO-21	Transparent covers	1000	C
22	AO-22	Shredder	2	C
23	SP-01	Basketball hoops (set)	1	A
24	SP-02	Basketballs	10	A
25	SP-03	Ball Volleyball	10	A
26	SP-04	Soccer ball	10	A
27	SP-05	Net and support poles for Volleyball	1	A
28	SP-06	Football goals (set)	1	A
29	SP-07	Whistles	4	A
30	SP-08	Pump for ball (manual)	3	A
31	SP-09	Manual Air Compressor	2	C
32	SP-10	Stopwatch	2	A
33	IT-01	PC Computer Desk	32	A
34	IT-02	Server	1	A
35	IT-03	Note Book / Laptop Computer	2	A
36	IT-04	Wireless Rooter	4	A
37	IT-05	Black Laser Printer	4	A
38	IT-06	Laser printer	1	A
39	IT-07	Projector	1	A
40	IT-08	Power extensions	10	C
41	CL-01	Metallic garbage bucket with lid	5	C
42	CL-02	Toilet brush and holder	20	C
43	CL-03	Wastebasket (Bin)	15	C
44	CL-04	Manual grass cutter	10	C
45	CL-05	Set of gardening shears	5	C
46	CL-06	Garden rake	10	C
47	CL-07	Garden rotary sprinkler	5	C
48	CL-08	Water hoses and connecting accessories	4	C
49	AU-01	Sound amplifier with microphone	1	A
50	AU-02	Stereo system	1	A
51	SC-01	Experiment rod and base set	5	A
52	SC-02	Tape measure, 1m/1mm	5	B
53	SC-03	Plate with scale	5	B
54	SC-04	Overflow vessel	5	C
55	SC-05	Beakers	5	B
56	SC-06	Measuring cylinders	5	B
57	SC-07	Dynamometer 1.5 – 2.0 N	10	A
58	SC-08	Weight holder, 10 g	10	B

No.	Request No.	Item (English)	Qty(*2)	Priority (*1)
59	SC-09	Digital stopwatch	5	A
60	SC-10	Vernier calipers	5	B
61	SC-11	Holding pin	5	A
62	SC-12	Coupling plug	5	C
63	SC-13	Friction block	5	C
64	SC-14	Dynamometer 2 – 3 N	10	A
65	SC-15	Pulley experiment set	5	A
66	SC-16	Balance pan	10	A
67	SC-17	Set of weights 1g to 50 g	5	A
68	SC-18	Round tin	5	B
69	SC-19	Lead shot	5	B
70	SC-20	Pressure probe	5	B
71	SC-21	Double pipe support	5	B
72	SC-22	Plastic tubes	5	B
73	SC-23	Funnels	5	A
74	SC-24	Pump model	5	C
75	SC-25	Syringe	20	C
76	SC-26	Capillary tubes	5	A
77	SC-27	Stopper with hole	5	A
78	SC-28	Connector	5	B
79	SC-29	Silicone tubing	20	B
80	SC-30	Alcohol burner	5	A
81	SC-31	Flasks	5	A
82	SC-32	Soluble coloring	5	B
83	SC-33	Ascending tube, 40 cm	5	B
84	SC-34	Thermometers	5	A
85	SC-35	Pair of radiation sensors	5	B
86	SC-36	Blade wheel with bearing	5	A
87	SC-37	Knitting needle	5	B
88	SC-38	Bimetallic strip	5	B
89	SC-39	Electricity experiment board set	5	A
90	SC-40	Cupper , d = 0,2 mm, l = 100 m	5	B
91	SC-41	Iron wire, d = 0,2 mm, l = 100 m	5	B
92	SC-42	Bar Magnet 60x13x5mm	10	A
93	SC-43	U Shaped Magnet 30 x 30 mm	5	A
94	SC-44	Light dependent resistor, LDR3	10	B
95	SC-45	Plotting compass	25	B
96	SC-46	Pocket compass	25	A
97	SC-47	Elektrode set	5	B
98	SC-48	Elektroscope S	5	C
99	SC-49	Multi-range meter	10	A
100	SC-50	Power supply: 0 – 12 V≅, (for 220 /250 V)	5	A
101	SC-51	Optical lens experiment set	5	A
102	SC-52	Heat insulating container	5	C
103	SC-53	Aluminium calorimeter	5	C
104	SC-54	Crucibles	5	B
105	SC-55	Petri dishes	5	A
106	SC-56	Pneumatic tank, 2 l	5	C
107	SC-57	Cover plate	5	C
108	SC-58	Evaporating dish, 63 mm Ø, porcelain	10	B
109	SC-59	Glass tubes	5	A
110	SC-60	Glass stirring rods	5	A
111	SC-61	Gas delivery tube, 8 mm Ø	10	C
112	SC-62	Angled tubes	5	C
113	SC-63	Distillation bridge	5	C
114	SC-64	Joint clip, steel	10	C
115	SC-65	Dropper	5	A
116	SC-66	Graduated pipettes	5	A
117	SC-67	Pestle, porcelain, 100 mm	5	C
118	SC-68	Mortar, porcelain, 63 mm Ø	5	C
119	SC-69	Rubber tubing, i. Dia. 7 x 1,5 mm, 1 m	5	C
120	SC-70	Rubber bellows	5	C

No.	Request No.	Item (English)	Qty(*2)	Priority (*1)
121	SC-71	Rub stoppers	5	C
122	SC-72	Silicon stopper, 16/21/25 mm,SB19,1 hole	5	C
123	SC-73	Safety goggles	5	B
124	SC-74	Universal pH-Indicator paper, roll	10	A
125	SC-75	Pair of cables, 50 cm, red and blue	10	C
126	SC-76	Incandescent lamp 6 V/0,3 W	5	C
127	SC-77	Lamp socket, E10	5	C
128	SC-78	Wire gauze, 160 x 160 mm	5	A
129	SC-79	Wire triangle with clay sleeve, 60 mm	5	B
130	SC-80	Spatulas	5	A
131	SC-81	Deflagrating spoon, 420 mm	5	A
132	SC-82	Experiment scissors set	5	C
133	SC-83	Test tube holder, up to 20 mm Ø, wood	10	A
134	SC-84	Crucible tongs	5	A
135	SC-85	Magnesia trough	10	C
136	SC-86	Mouth blow pipe	5	C
137	SC-87	Crocodile clip	10	C
138	SC-88	Flat trough	5	C
139	SC-89	Copper plate	10	C
140	SC-90	Zinc plate	5	C
141	SC-91	Iron plate	5	C
142	SC-92	Nickel plate	10	C
143	SC-93	Aluminium plate	5	C
144	SC-94	Carbon plate	10	C
145	SC-95	Test tubes	5	A
146	SC-96	U-Tube, 2SB 19, 160 mm, 2 side taps	5	B
147	SC-97	Watch glass dish, 60 mm Ø	25	A
148	SC-98	Rod electrode, carbon, stopper and plug	10	B
149	SC-99	Glass nozzle, 8 mm Ø, angled 90°	10	C
150	SC-100	Fermentation tube	5	C
151	SC-101	Test tube rack, plastic	25	A
152	SC-102	Flame test glass, 50 x 50 mm	5	C
153	SC-103	Dialysis hose with 2 glass parts	5	C
154	SC-104	Gas burner	5	A
155	SC-105	Heat plate	5	C
156	SC-106	Balance	5	A
157	SC-107	Rubber bulbs (10 pieces)	5	C
158	SC-108	Gauzes, set of 3, 20 x 20 cm	5	C
159	SC-109	Jar glass, Miniature separation tank	5	C
160	SC-110	Narrow-neck glass bottle, 250 ml	5	C
161	SC-111	Burette	5	A
162	SC-112	Miniature clamp, 0 ... 25 mmØ	5	C
163	SC-113	Magnifier 8 x	25	C
164	SC-114	Plastic box for 25 microscopic slides	5	C
165	SC-115	Instrument to demonstration binaural audition	5	C
166	SC-116	Tactile bristle	5	C
167	SC-117	Coloured pen	5	C
168	SC-118	Cold-feeler	5	C
169	SC-119	Tactile circle	5	C
170	SC-120	Laboratory knife, stainless steel	5	C
171	SC-121	Paintbrush, size_No 2	5	C
172	SC-122	Weighing dish, 40 mmØ, 30 mm high	5	C
173	SC-123	pH-Universal paper, roll	5	C
174	SC-124	pH Universal paper, refill	5	C
175	SC-125	Wooden turnings, 10 pieces	5	C
176	SC-126	Folded filter, 185 mmØ, (100 pieces)	5	C
177	SC-127	Monocular microscope	5	A
178	SC-128	Preparation case for 25 preparations	5	C

*1 A: Equipment that is indispensable for the curriculum and operation of the school
B: Equipment that is deemed necessary but not as exigent as "priority A"
C: Equipment that is deemed necessary but not as indispensable as "priority A and B"

*2 Quantities are for each school. Quantities may change according to the design of the school.

4-4. テクニカル・ノート（現地調査 2）

The Preparatory Study for the Project for Construction of Secondary Schools
in Zambezia Province in the Republic of Mozambique

Technical note

Ministry of Education and Human Development (hereinafter referred to as "MINEDH") and the Consultant of the Preparatory study for the Project (hereinafter referred to as "Consultant") mutually agreed on followings through discussions.

1 Water supply issues on site selection

1.1 Despite a certain liability shown on the letter of ref. No. 549/DIR/DIEE-MINEDH/2018, the Consultants regretfully informed MINEDH that it was found difficult to obtain a sufficient quantity and quality of water from a deep borehole (not a shallow well) in the Nangoela area Quelimane district due to soil characteristics based on the information of Provincial Directorates of Education and Human Development Zambezia (hereinafter referred to as "DPEDHZ") gained from Quelimane District planning and Infrastructure service.

Reflecting this, DPEDHZ proposed an alternative water supply plan by extension of the current water network of FIPAG, which currently supplies water only within the jurisdiction of Quelimene City, with all means in collaboration with MINEDH, line provincial directorates, and the Quelimene District to realise this project in the Nangoela area site.

Consultant explained and MINEDH recognised that project site shall change to the site in Namacurra district should a reliable water resource for sufficient water supply to the Nangoela site secured by well examined technical reports not be submitted to the Consultant from MINEDH by the end of August 2019, according to Annex 10-2 of the Minutes of Discussion signed on November 21, 2018 between MINEDH and JICA preparatory study team.

1.2 To enable the Consultant to clarify whether any possibility of water supply from a deep borehole is still available or not, and to determine the possibility of alternative water supply by extension of the current water supply network to the Nangoela site, MINEDH agreed to submit followings to the Consultant by January 31, 2019, and to inform his/her decision that which water source – from a deep borehole or from the current water network of FIPAG – to be conducted to the site.

1. Any reports or other reference documents showing the underground water and geo-technical characteristics of the Nangoela area;
2. A master plan of water supply network extension to the Nangoela area, if available;
3. Overall implementation schedule and budget allocation plans, in case the master plan is available;
4. If the master plan is available, a letter of FIPAG indicating his intension of water supply network extension to the Nangoela area site, and its water supply capacity per day and the diameter of water supply pipe whether it fulfills the required amount of water in a school – 36m3/day or not.

December 4, 2018, Maputo

Ms. Antuía Mogne SOVERANO	Mr. Kaname HYODO
Director	Project Manager
Directorate of Planning and Cooperation	the Consortium of
Ministry of Education and Human Development	Matsuda Consultants International Co., Ltd.
Republic of Mozambique	and INTEM Consulting inc.

4-5. MINEDH DIPLAC からのレター1

REPULIC OF MOZAMBIQUE
MINISTERY OF EDUCATION AND HUMAN DEVELOPMENT
DIRECTORATE OF INFRASTRUCTURES AND SCHOOL EQUIPMENT

Mr. Kaname HYODO
Project Manager
The Consortium of
Matsuda Consultants International Co.Ltd
and INTEM Consulting Inc.

Note Ref. N° 549 /DIR/DIEE-MINEDH/2018 Maputo, August 20, 2018

Project: the Project for the Construction of Secondary Schools in Zambezia Province
Re. Water analysis report for Nangoela Site in Quelimane District

Dear Sir.

Reflecting the letter received on July 12 2018 (Ref No. MCI-MINEDH-180812), we can delightfully report you that the water source of the borehole adjacent to the Project candidate site – Nangoela area – in Quelimane district was analysed as reliable for potable water. Based on the water analysis, we can assume that water source in the area will be induced to the site for water supply fulfils WHO standards. Consequently, we recommend you to consider the site having a significant educational demand to be a project site as you analysed.

Sincerely yours

The National Director

Antonino Alberto Grachane
(Education Specialist)

c.c.
Ms. Antuia Mogne SOVERANO, Director, Directorate of Planning and Cooperation, MINEDH
Ms. Yumiko NISHINOIRI, Mr. Shinya KIMURA, JICA Mozambique Office

ANNEX1: Borehole location
ANNEX2: Water Analysis report of the Borehole
ANNEX3: Provisional Translation of ANNEX 2
ANNEX4: Technical comments on the FIPAG water analysis report
ANNEX5: Provisional Translation of ANNEX 4

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO DA EDUCAÇÃO E DESENVOLVIMENTO HUMANO
DIRECÇÃO DE INFRAESTRTUTURAS E EQUIPAMENTOS ESCOLARES

Sr. Kaname HYODO
Gestor de projecto
Consórcio de
Matsuda Consultants International Co. Ltd
e INTEM Consulting Inc.

Nota N°349DIR/DIEE-MINEDH/2018

Maputo, 20 de 08 de 2018

Assunto: Projecto de Construção de Escolas Secundárias na Província de Zambézia
Relatório de análise de água do local de construção de Nangoela, Distrito de Quelimane

Prezados Senhores

Relativo à nota recebida a 12 de julho de 2018, com a Ref No. MCI-MINEDH-180812, temos o prazer de informar a V. Excias. que a fonte de água do furo adjacente ao local proposto para o projecto - área de Nangoela - no distrito de Quelimane foi analisada como água potável confiável para consumo humano. Com base na análise da água, assumimos que a fonte de água na área será usada para o local dado que o abastecimento de água cumpre com os padrões da OMS. Consequentemente, recomendamos que V. Excias. considerem o local com uma demanda educacional significativa para ser um local de projecto conforme analisado.

Atenciosamente

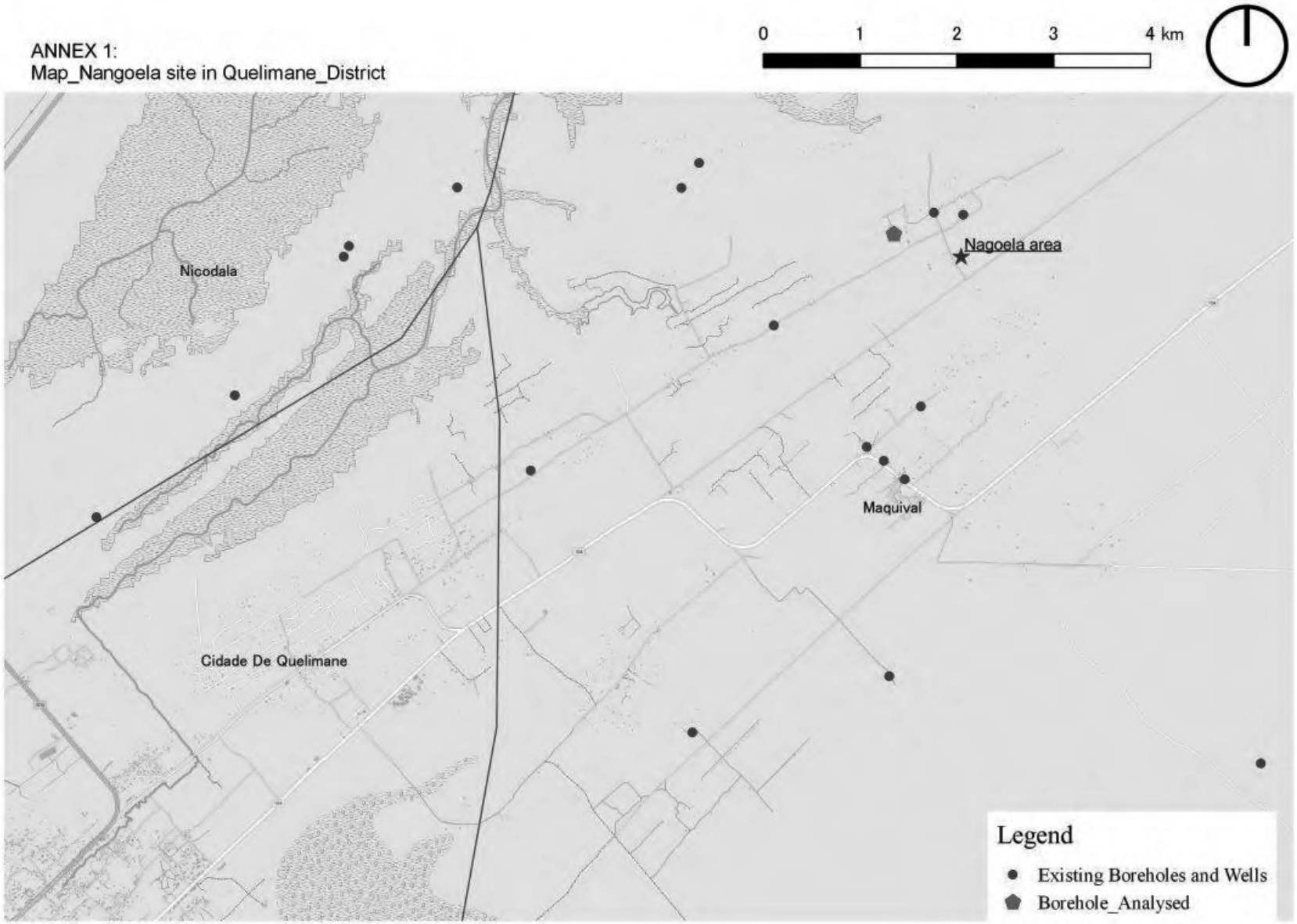
O Director nacional

Antonino Alberto Grachane
(Especialista de educação)

c.c.
Sra. Antuia Mogne SOVERANO, Directora, Direcção de Planificação e Cooperação, MINEDH
Sra. Yumiko NISHINOIRI, Sr. Shinya KIMURA, Escritórios da JICA em Moçambique

ANEXO 1: Localização do furo
ANEXO 2: Relatório de análise da água do furo
ANEXO 3: Tradução interina do ANNEXO 2
ANEXO 4: Observações Técnicas do Relatório do Relatório de água da FIPAG
ANEXO 5: Tradução interina do ANNEXO 4

ANNEX 1:
Map_Nangoela site in Quelimane_District



ANNEX 2: Water Analysis report of the Borehole

FIPAG
FUNDO DE INVESTIMENTO E PATRIMÓNIO DO ABASTECIMENTO DE ÁGUA
Quelimane

BOLETIM DE ANÁLISE DE ÁGUA

Proveniência -------**Maquival- Nhagoele (Furo)**
Data e hora da colheita ----------
Data e hora de chegada no laboratório -------- 31/07/2018, 10:00 Horas

CARACTERÍSTICAS ORGANOLÉPTICAS E FÍSICAS

Cor – Incolor, **Sabor**-Insipido,Cheiro----Inodoro,**Temperatura**— 24,6°c

Turvação----- 0,26, NTU, **pH** --- 6,9, **Depósito** -- Auresente

Condutividade eléctrica a 25°c ------ 401 (µmhos/ cm)

ANÀLISES QUÍMICAS

ANIÕES	mg/l	CATIÕES	mg/l
Cloreto (Cl^-)	70,90	Cálcio (Ca^{2+})	11,62
Carbonato (CO_3^{2-})	30	Magnésio (Mg^{2+})	4,63

Ferro (mg/l Fe^{2+}) ----------0,08
Dureza total (mg/l) ---------- 50
Sólidos totais dissolvidos -TDS- (mg/l) -----226

ANALISES MICROBIOLOGICAS

Inoculação dia 31/07/2018	
Coliformes Totais 37°c 24h	1
Coliformes Fecais 44°c 24h	0
E. Coli 37°c 24h	0

JUÍZO

Própria: De acordo com os resultados da segunda analise, a água analisada corresponde aos critérios nacionais de potabilidade recomendados pela OMS (Organização Mundial da Saúde).

O Analista
Ricardo António

O Chefe De Laboratório
FIPAG
Oliveira Lombrança

ANNEX 3: Provisional Translation of ANNEX 2

FIPAG

FUNDO DE INVESTIMENTO E PATRIMÓNIO
DO ABESTECIMENTO DE ÁGUA

Quelimane

WATER ANALYSIS REPORT

Source: **Maquival-Nhagoele (Borehole)**
Date and Time of Collection:
Date and Time of Arrival at Laboratory: 31 July 2018, 10:00 hrs

ORGANOLEPTIC AND PHYSICAL CHARACTERISTICS

Color: colorless, **Taste**: insipid, **smell**: odorless, **Temperature**: 26,6°c
Turbidity.... 0,26 NTU, **pH**.....6,9, Reservoir.....None
Electrical Conductivity at 25°c.....401 (umhos/cm)

CHEMICAL ANALYSIS

Anions	mg/l	Cations	mg/l
Chlorite (Cl^-)	70,90	Calcium (Ca^2+)	11,62
Carbonate (CO3^2	30	Magnesium (Mg^2+)	4,63

Iron (mg/l Fe^2+).....0,08
Total hardness (mg/l).....50
Total dissolved solids-TDS-mg/l.....226

Microbiological Analysis

Inoculation 31st July 2018	
Total Coliforms 37°c 24h	1
Fecal coliforms 44°c 24h	0
E. Coli 37°c 24h	0

JUDGEMENT

Proper: According to the results of the second analysis, the water corresponds to the national drinking standards recommended by the WHO (World Health Organization).

The Analyst **The Head of the Laboratory**

Ricardo António Oliveira Lembrança

ANNEX 5: Provisional Translation of ANNEX 4

Re: FW: Water tests of Nangoela District of Quelimane

Subject:

Opinion on the results of water analysis bulletins processed at FIPAG - Quelimane

1. The laboratory results of the Maquival Nhangoela hole and well water analysis and according to the Mozambican Law for water from untreated sources recommends a microbiological analysis:

a) The research of fecal coliforms and the maximum admissible limit of 10 colonies. In both sources the presence of fecal coliforms was not detected. In this context, the water is within the recommended parameters, which is considered appropriate for human consumption from the microbiological point of view;

b) As far as total coliforms are concerned, they are non-pathogenic bacteria and, in the case of untreated water, their presence is admissible, since they do not represent a health risk, although it is recommended to disinfect water with chlorine or its derivatives (certainty) or boiling or filtration;

2. For chemical analysis

In addition to the analyzed parameters, it is recommended to search for contaminants (Ammonia, Nitrites and Nitrates) recommended in the regulation on the quality of water for human consumption (MISAU 2004), so that the sources can be used as water for human consumption.

We are of opinion that the process advances.

However

• It is recommended to search for chemical contaminants;

• That water before use is disinfected with chlorine or derivatives to eliminate microorganisms (and regarding the well);

• Re-evaluate sources (monthly).

Best Regards

Nivalda

ANNEX 4: Technical comments on the FIPAG water analysis report

Re: FW: Testes de água de Nangoela Distrito de Quelimane

há 14 minutos às 16:05

De nivalda lazaro para 3 destinatários

Dra boa tarde

Assunto

Parecer sobre os resultados dos boletins de análise de água processadas no FIPAG – Quelimane

1. Os resultados laboratoriais da análise de água do furo e do poço de Maquival Nhangoela e segundo a Legislação Moçambicana para águas de fontes não tratadasrecomenda para análise microbiológica:

a) A pesquisa de *coliformes fecais* e o **limite máximo admissível e de 10 colónias**. Nas duas fontes não foi detectado a presença de *coliformes fecais* neste contexto a água está dentro dos parâmetros recomendados o que se considera **própria para o consumo humano** do ponto de vista microbiológico;

b) No que concerne aos *coliformes totais*, são bactérias não patogénicas e tratando-se de água não tratada é admissível a sua presença, pois não representam risco para a saúde, embora se recomente a desinfecção da água com cloro ou seus derivados (certeza) ou fervura ou filtração;

2. Para análise química

Além dos parâmetros analisados, para que as fontes possam ser usadas como é água para consumo humano recomenda- se a pesquisa de **contaminantes químicos** (Amoniaco, Nitritos e Nitratos) preconizados no regulamento sobre a qualidade de água para o consumo humano (MISAU 2004);

Somos de parecer que o processo avance.

No entanto

- Recomenda-se a pesquisa dos contaminantes químicos;
- Que a áqua antes do uso seja desinfectada com cloro ou derivados para eliminação de microrganismos (no que diz respeito ao poço);
- Fazer nova avaliação das fontes (mensal).

Cpts

Nivalda

No dia 15 de agosto de 2018 às 14:53, Silvestre Nhachengo <nhachengo@hotmail.com> escreveu:

Recebido

REPUBLIC OF MOZAMBIQUE

GOVERNMENT OF ZAMBÉZIA PROVINCE

PROVINCIAL DIRECTORATE OF EDUCATION AND HUMAN DEVELOPMENT

UNIT OF INFRASTRUCTURES AND SCHOOL EQUIPMENT

To

MINEDH DIEE

Maputo

Ref. 1152/DPEDHZ/CEE900

Quelimane, August 24, 2018

Subject: Construction of a water borehall for the future Nangoela Secondary School – Quelimane District

Yours Excelency

As part of the Nangoela ESG construction program in the district of Quelimane, the Provincial Directorate of Education and Human Development of Zambezia, hereby declare that it has assumed responsibility for the construction of the Water borehole, which in turn, will be included in the 2019 plan.

Without further issues at the moment, our cordial greetings

The director

Aldo Mussossa

University Assistant

REPÚBLICA DE MOÇAMBIQUE
GOVERNO DA PROVÍNCIA DA ZAMBÉZIA
DIRECÇÃO PROVINCIAL DA EDUCAÇÃO E DESENVOLVIMENTO HUMANO
UNIDADE DE CONSTRUÇÕES E EQUIPAMENTOS ESCOLARES

Ao:

MINEDH -DIEE

Maputo

Nota nº 1152/**DPEDHZ/UCEE** 900

Quelimane, aos 24 de Agosto de 2018

Assunto: **Construção de Furo de Água na Futura ESG de Nangoela- Distrito de Quelimane**

Exmo Senhores,

No âmbito do programa de construção da ESG de Nangoela no distrito de Quelimane nomeadamente, a **Direcção Provincial de Educação e Desenvolvimento Humano da Zambezia**, vem por meio desta comunicar que assumira a responsabilidade da construção do **Furo de água**, que por sua vez, estará incluso no **plano 2019**.

Sem mais assuntos de momento, as nossas cordiais saudações

O Director Provincial

Aldo Mussossa
/Assistente Universitario/

4-6. MINEDH DIPLAC からのレター2

REPULIC OF MOZAMBIQUE
MINISTERY OF EDUCATION AND HUMAN DEVELOPMENT
DIRECTORATE OF PLANNING AND COOPERATION

Mr. Kaname HYODO
Project Manager, The Consortium of
Matsuda Consultants International Co. Ltd
and INTEM Consulting Inc.
hyodokaname@matsuconco.p

Note Ref. N° /MINEDH/DIPLAC/DP/___/2019 Maputo, February 07, 2019

Project : The Project for Construction of Secondary Schools in Zambezia Province.
Re. Water source for Nangoela Site in Quelimane District

Dear Sir,

Regarding the water supply situation for the Nangoela Secondary School Project in the city of Quelimane, Zambézia province, the Ministry of Education and Human Development (MINEDH), after consultations and coordination with the relevant institutions of the province, namely Provincial Directorate of Education and Human Development, Provincial Directorate of Public Works, Housing and Water Resources, District Planning and Infrastructure Services, District Youth Education and Technology Services and FIPAG - Quelimane Operational Area.

From the technical work carried out, which consisted in the survey of the previous results of aquifer research and the opening of mechanical holes and laboratory analyzes of water wells between the Nangoela zone and Zalala beach, it was concluded that:

(i) The hydrogeological characteristics of the region envisaged for the implementation of school infrastructure indicate (based on studies carried out on samples taken from 3 water wells in the area) that water salinity levels, ie aquifers able to supply water to the school in volumes sufficient for the school's operation are brackish, although they are within the parameters recommended by WHO;

Av. 24 de Julho 167 – Telefone nº 21491748 – Fax nº 21492196 – Caixa Postal 34 – EMAIL: SPmined.gov

(ii) The opening of manual holes with a depth of not more than 10 meters (given the high water table of the area), suggested by the province, is not recommended since in this condition the holes could not guarantee sufficient water for the functioning of the school, in addition to the same water contain a certain degree of contamination.

(iii) A more practical alternative, proposed by the province, would be to choose to expand the line or conduct of FIPAG, from the extension that supplies the new Central Hospital of Quelimane. This option, which seems most feasible from the point of view of final result (quality and quantity of water), will require the mobilization of large amounts of resources for investment (which the province does not have), taking into account that it will be necessary to install a plumbing system with about 8 km away.

In this context, the Ministry of Education and Human Development hereby, and as it was agreed, communicate to Your Excellencies that, since there are no conditions for the supply of water to the future Nangoela Secondary School, that guarantee the supply of water for the functioning of the school, we agree to the replacement of this construction site by the district of Namacurra.

Sincerely Yours,

Antuia Mogue Soverano
The National Director

C/c:
Mr. Antonino GRACHANE, Director, Directorate of Infraestruture and School Equipment
Ms. Yumiko NISHINOIRI, Sr. Shinya KIMURA, JICA Mozambique Office

Av. 24 de Julho 167 – Telefone nº 21491748 – Fax nº 21492196 – Caixa Postal 34 – EMAIL: SPmined.gov

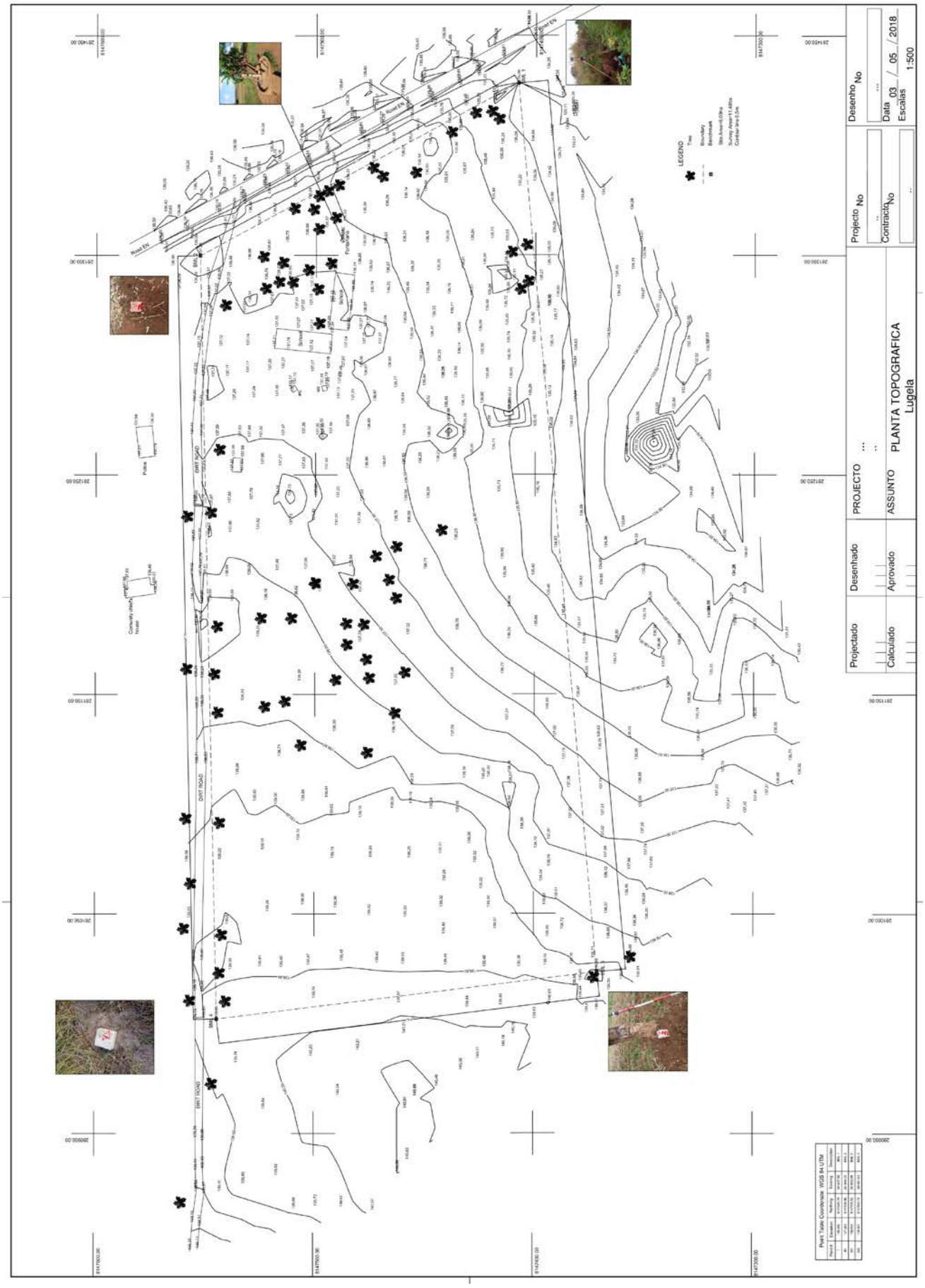
5　参考資料／入手資料リスト

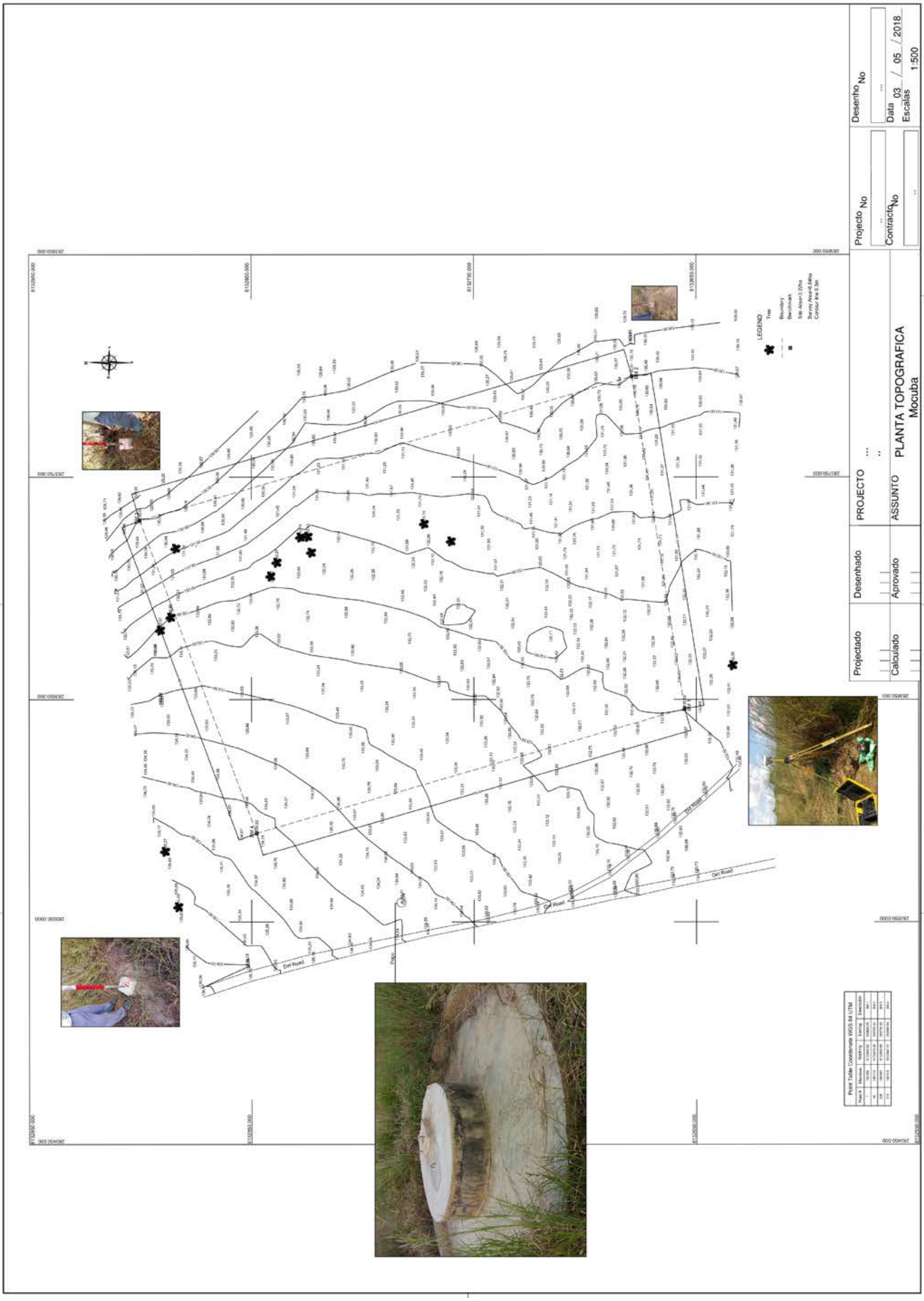
	資料名	発行年	種類	発行者・著作者
1	Proposta de Lei de Revisão da Lei nº 6/92, de 6 de Maio - Lei do Sistema Nacional de Educação (05.05. 2017) 教育基本法案（1992 年 5 月 6 日改訂省令第 6/92 号改訂案）2017 年 5 月 5 日版	2017	電子データ	MINEDH
2	Education Strategic Plan 2012-2016	2012	電子データ	MINED
3	Plano Operacional 2015-2018 do Plano Estratégico da Educação 2012-2019 教育戦略計画 2012-2019- 実施計画 2015-2018	2015	電子データ	MINEDH
4	Plano Operacional 2016-2019 do Plano Estratégico da Educação 2012-2019 教育戦略計画 2012-2019- 実施計画 2016-2019	2016	電子データ	MINEDH
5	Estratégia do Ensino Secundário Geral 2009 - 2015 中等一般教育戦略 2009-2015	2009	電子データ	MINED
6	Programa de Actividades (PdA), MINEDH - 2018 教育人間開発省 2018 年度活動計画	2018	電子データ	MINEDH
7	Manual de Procedimentos: Programa de Apoio Directo às Escolas- Ensino Secundário 2017 ADE（学校直接支援）2017 年中等教育運営マニュアル	2017	電子データ	MINEDH
8	Levantamento Escolar / Annual School Survey 2014, 2015, 2016, 2017,2018	2014~ 2018	電子データ	MINED/MINEDH
9	Aproveitamento Escolar / Annual School Results 2013, 2014, 2015, 2016, 2017	2014~ 2018	電子データ	MINED/MINEDH
10	Aproveitamento Escolar (Esino Privado) / Annual School Results (Private Education) 2015, 2016, 2017	2016~ 2018	電子データ	MINEDH
11	Calendario Escolar a vigorar no Ano Lectivo 2018 2018 年度学校運営予定表	2017	電子データ	MINEDH
12	Estatuto Orgãnico do Ministério da Educação e Desenvolvimento Humano 教育人間開発省の組織体制について	2015	電子データ	Interministral Commission of Public Administration
13	Regulamento do Ensino Secundário Geral (Diploma Ministerial n.º 61/2003) 中等一般教育に係る規則	2003	電子データ	MINED
14	Relatório Financeiro e de Progresso do FASE- Fundo de Apoio ao Sector da Educação 2015, 2016, 2017, 2018(06) FASE（教育セクター支援基金）財務・進捗報告書	2015~ 2018	電子データ	MINEDH
15	Agenda 2025- The Nation's Vision and Strategies	2003	電子データ	Committee of Counsellors
16	Plano Quinquenal do Governo 2015-2019 政府 5 か年計画 2015-2019	2015	電子データ	Government of Mozambique
17	Proposta de Plano Económico e Social para 2018 2018 年度経済社会計画案	2017	電子データ	Government of Mozambique
18	Relatório de Execução do Orçamento do Estado Jan-Dez de 2013, 2014, 2015, 2016, 2017 国家予算執行報告書 1-12 月	2014~ 2018	電子データ	Government of Mozambique
19	ORÇAMENTO DO ESTADO para 2012, 2013,, 2014,2015, 2016, 2016 revisão, 2017, 2018 国家予算書	2011~ 2017	電子データ	Government of Mozambique

	資料名	発行年	種類	発行者・著作者
20	Plano Estratégico de Desenvolvimento do Distrito de Mocuba 2014-2020 モクバ郡開発戦略計画 2014-2020	2014	電子データ	District Government of Mocuba
21	PERIFIL DO DISTRITO de Lugela, Mocuba, Namacurra, Nicoadala, Edição 2014 郡の概要 2014 年版- ルジェラ郡、モクバ郡、ナマクラ郡、ニコアダラ郡	2014	電子データ	Ministério da Administração Estatal (国家行政省)
22	DIVULGAÇÃO OS RESULTADOS PRELIMINARES IV RGPH 2017 第 4 回国勢調査（CENSUS2017）速報	2018	電子データ	INE（国立統計局）
23	Projecções Anuais da População Total, Urbana e Rural, dos Distritos da Província da Zambézia, 2007 – 2040 ザンベジア州郡別都市/地方別 2007-2040 年人口推計	2010	電子データ	INE（国立統計局）
24	Bidding Documents: Construction of Secondary Schools in Mecufi, Metuge, Chiulugo, Alto-Molocue and Milange メクフィ、メトゥゲ、チウルゴ、アルトモロクエ、ミランジェ中学校建設に係る入札図書	2012	電子データ	DIPLAC/MINED
25	Bidding Documents: Procurement of Works for Construction of Manica Secondary School in Gaza Province ガザ州マニカ中学校建設工事に係る入札図書	2007	電子データ	DIPLAC/MINED
26	DOCUMENTO DE CONCURSO：Contratação de Serviços de Consultoria para Fiscalização das Obras de Construção da Escola Secundária de Quelimane キリマネ中学校建設工事施工監理業務契約に係る入札図書	2014	電子データ	DIPLAC/MINED
27	DOCUMENTO DE CONCURSO : Fornecimento de Mobiliário para Salas de Aula e Serviços Relacionados para 4 Escolas Secundárias na Província de Manica マニカ州 4 中学校における教室家具と関連サービスの調達に係る入札図書	2014	電子データ	DIPLAC/MINED
28	DOCUMENTO DE CONCURSO : Fornecimento de Equipamento, Mobiliário e Serviços Relacionados para Escolas Secundárias Província de Zambézia ザンベジア州中学校における機材・家具及び関連サービス調達に係る入札図書	-	電子データ	DIPLAC/MINEDH
29	Regulamento de Contratação de Empreitada de Obras Públicas, Fornecimento de Bens e Prestação de Serviços ao Estado (Decreto n.º 5/2016) 公共事業及び物品・サービスの国家調達に係る規則	2016	電子データ	Government of Mozambique
30	Regulamento de Construção e Manutenção dos Dispositivos Técnicos de Acessibilidade, Circulação e Utilização dos Sistemas de Serviços e Lugares Públicos à Pessoa Portadora de Deficiência Física ou de Mobilidade Condicionada 身体障害者の公共施設・サービス利用、アクセスのための建設・維持管理に係る技術基準	2008	電子データ	Government of Mozambique
31	2015 年 1 月 23 日時点の洪水による被災域と被災人口地図 Estimated Number of People Affected by Flood, 23 January 2015	2015	Versão Electrônica	WFP
32	2015 年 2 月時点の洪水による被災の復旧に係る影響評価 Mozambique 2015 Damage Assessment and Early Recovery / Sustainable Reconstruction Priorities – Joint Rapid Assessment Following the January – February 2015 Hydro – Meteorological Events in the Central and Northern Regions	2015	Versão Electrônica	Government of Mozambique, Worldbank et al.
33	ハザードマップ（サイクロン・ 豪雨・干ばつ・地震） Zoneamento de Ciclones, Zoneamento de Cheias, Zoneamento de Secas, Zoneamento Sísmico	2014	Versão Electrônica	UN-Habitat Mozambique, Worldbank, GFDRR: Global Facility for Disaster Reduction and Recovery

6. その他資料

6-1. 敷地測量図





PLANTA TOPOGRAFICA
Mocuba
Projectado
Desenhado
Calculado
Aprovado
PROJECTO
ASSUNTO
Projecto No
Contracto No
Desenho No
Data 03 / 05 / 2018
Escalas 1:500
LEGEND
Dirt Road
Poço
Point Table Coordenate WGS 84 UTM


Point Tacite Coordinate WGS 84 UTM
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Tree
Boundary
Benchmark
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Survey Area=9.08ha
Contour line 0.5m
High Voltage Line
DIRT ROAD
DIRT ROAD
Projectado
Desenhado
PROJECTO
...
Calculado
Aprovado
ASSUNTO
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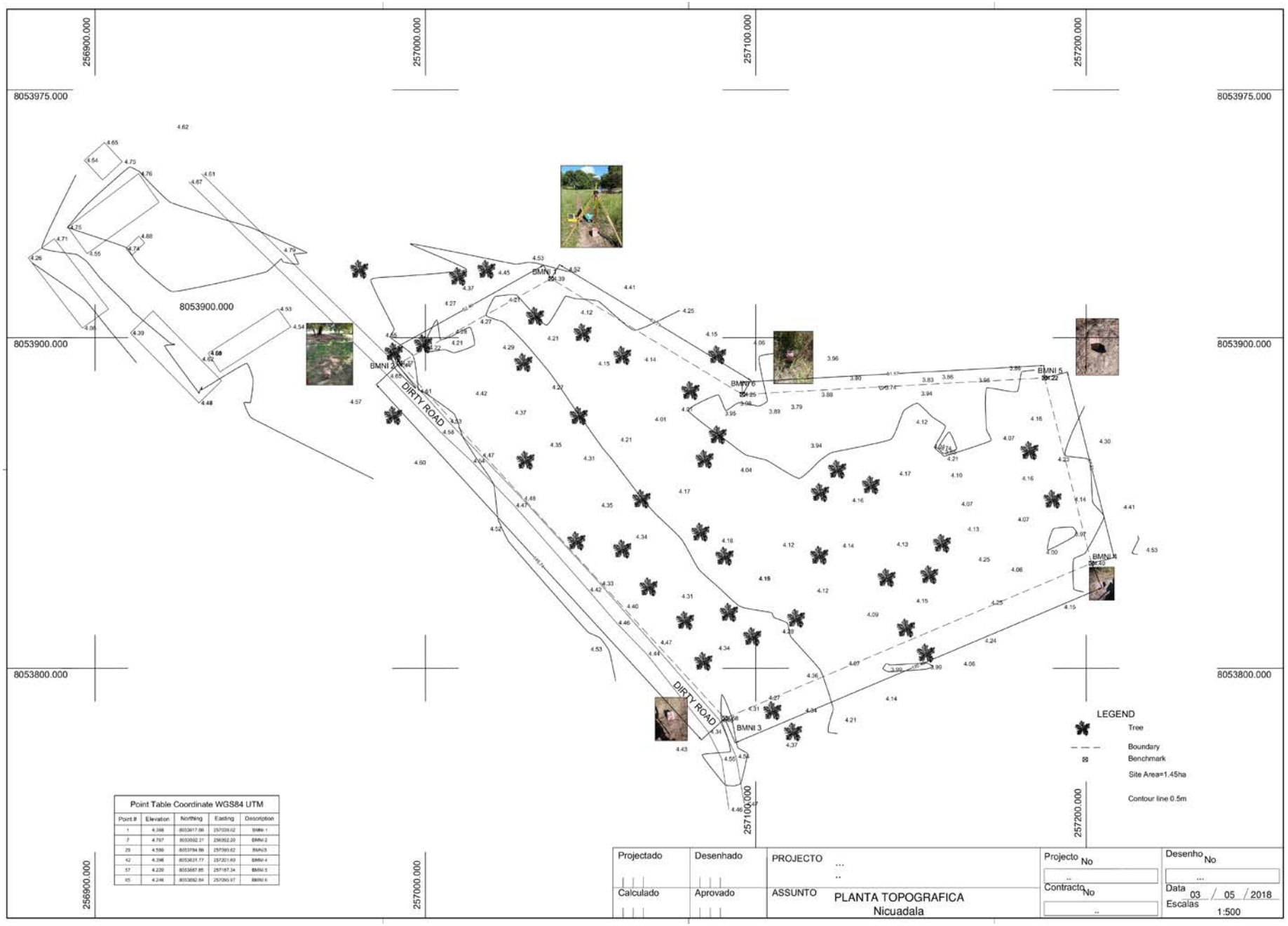
Namacura
Projecto No
Contracto No
Desenho No
Data 03 / 05 / 2018
Escalas 1:500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BMNI 1
BMNI 2
BMNI 3
BMNI 4
BMNI 5
BMNI 6
DIRTY ROAD
DIRTY ROAD
LEGEND
Tree
Boundary
Benchmark
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Contour line 0.5m
Point Table Coordinate WGS84 UTM
Point # | Elevation | Northing | Easting | Description
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7 | 4.767 | 8053892.21 | 256952.20 | BMNI 2
29 | 4.580 | 8053784.86 | 257080.62 | BMNI3
42 | 4.396 | 8053631.77 | 257201.60 | BMNI 4
57 | 4.230 | 8053687.85 | 257187.34 | BMNI 5
65 | 4.246 | 8053682.84 | 257080.97 | BMNI 6
Projectado
Desenhado
Calculado
Aprovado
PROJECTO
ASSUNTO
PLANTA TOPOGRAFICA
Nicuadala
Projecto No
Contracto No
Desenho No
Data 03 / 05 / 2018
Escalas 1:500


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BM2.2
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Projectado
Desenhado
Calculado
Aprovado
PROJECTO
ASSUNTO
PLANTA TOPOGRAFICA
Quelimane
Projecto No
Contracto No
Desenho No
Data 03 / 05 / 2018
Escalas 1:500

Project for Construction of Secondary Schools in Zambézia Province In Mozambique

Geotechnical Investigation *(Final Report)*

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July 2018

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Partner

Project for Construction of Secondary Schools in Zambézia Province In Mozambique

Geotechnical Investigation *(Final Report)*

Report Prepared for

Matsuda Consultants International Co., Ltd.

Report Prepared by

VF GeoNat CONSULTORIA & PROJECTOS

July 2018

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CONTENTS

1 INTRODUCTION

1.1 GENERAL

The purpose of this report is to present reliable, specific and detailed information about the physical and mechanical properties within the investigated area for the proposed new secondary schools in the districts of Lugela, Mocuba, Namacurra, Nicoadala and Quelimane in Zambézia Province . This report is prepared upon the request of Matsuda Consultants International Co., Ltd and includes the final results of the geotechnical site investigation, the laboratory tests and conclusions & recommendations.

1.2 PURPOSE AND SCOPE OF WORK

The purpose of this site investiagtion was to determine the existing soil profiles and engineering charateristics of the subsurface conditions at the sites, establish the implications of such properties on design works and make recommendations on the foundations of the proposed structures and to provide the designer with comments on the following:

- geotechnical design parameters which will be required for a safe and economic design and excavation of the engineering works, such as the soil bearing capacity, expected foundation settlement, side slope stability, hydrological conditions at the site and other special recommendation which depends on the site nature.
- Site seismity characters, groundwater conditions and soil retaining parameters.

The investigation was undertaken in general accordance with our cost proposal. In order to assess the geotechnical implications on the proposed developments and provide recommendations for design and constructions of the proposed schools, the following services were provided:

- A reconnaissance of the surface characterirstics of the sites. This included a literature review of the available maps and reports relevant to the sites.

- A subsurface exploration of the sites including 5 SPT in each site at 1,5 m interval and 2 Inspection pits prepared before the commencement of the Work at sites. The drilling was conducted by VF GeoNat Consultoria & Projectos.

1.3 FIELD INVESTIGATION PROGRAM & IN-SITU TESTING

1.3.1 DRILLING AND SPT TESTS

A Garmin GPS was used to setup test pit positions. The number and disposition of the borings was a such as to reveal any major changes in thickness, depth or properties of the strata to be affected by the expected works and immediate surroundings. As per the terms of reference drilling works were done in 5 drilling points in each of the 5 project sites in accordance with ASTM D 2113 Standards. Boring was conducted by VF GeoNat using Hanfa HF-130 drilling rig down to 10 meters. SPT tests were undertaken every 1,5 meters depth. Soil logging and sampling, was conducted as the SPT advanced. Appendix C presents the SPT test results.

The SPT tests involved advancing a standard split-barrel sampler of 18 inches into the bottom of a borehole by dropping a 63.5kg hammer from a height of 760 mm. The number of blows required to advance the sampler for each of three 6-inch increments was recorded. The sum of the number of blows for the second and third increments was taken as the Standard Penetration Value, also called N-value (blows per foot). Standard Penetration Tests were performed in accordance with ASTM D 2113.

1.3.2 SAMPLING

Soil samples were collected from the borings for identification, classification, and geotechnical engineering characterization.

Split-Barrel sampling method was used in conjunction with the Standard Penetration Test to collect samples. The sampler is a 2-inch (50.8 mm) (O.D.) split barrel which is driven into the soil with a 140-pound (63.5 kg) hammer dropped from a height of 30 inches (760 mm). After it has been driven 18 inches (450 mm), it is withdrawn and the sample removed. The samples were immediately examined, logged and placed in sample jar for storage. The split barrel samples are considered disturbed samples and can be used for moisture content, gradation and Atterberg Limits tests, and for visual identification. Samples were collected every 1.5 metres after SPT test. A total of 23 disturbed samples were collected in the project areas as indicated in the Table 1. The reduction of the number of samples in relation to the contracted 30 was related to the adequacy of the work and alignments during the field visit.

Intact soil samples for strength testing were collected using thin-walled Shelby tube sampler, in full accordance with procedures for thin-walled tube sampling of soil as described in ASTM D-1587. Undisturbed samples were collected only in 3 points due to the high water table and the grain size characterists of the materials as the soils are generally sandy and very loose. After intact samples were collected, Shelby tubes were labelled and the ends sealed with tight-fitting plastic caps and electrical tape. Disturbed and relatively undisturbed (intact) soil samples were adequately stored and transported to the laboratory. Table 1 presents the type of samples collected in every site.

Table 1. Summary of type of samples collected in each site for laboratory tests

Sampling Depth (m)	Lugela BH01	Mocuba BH03	Namacurra BH02	Nicoadala BH01	Quelimane BH01
1.5	x	x	x	x	x
3	x	#	x	x, #	x, #
4.5	x	x	x	x	x
6	x		x	x	x
7.5	x			x	x
9				x	x

x – Disturbed (23 samples); # - Undisturbed (3 samples)

1.3.3 WATER PERCOLATION TEST

This test was conducted in accordance with the guidelines recommended in the request for proposal.

1.4 LABORATORY TESTING

As mentioned in section 1.3.2 soil samples were collected for laboratory analysis. The samples were taken from SPT and Shelby to make two categories, disturbed and undisturbed, respectively. The disturbed samples, 23 in total containing up to 5 kg each were submitted to Geoma for laboratory tests including atterberg limits, sieve analysis, moisture content and specific gravity for geotechnical soil classification. The undisturbed samples, 3 in total, were taken to the Geocontrole Laboratory. Due to the conditions of the samples 1 was submitted to triaxial test (Quelimane sample) and 2 to shearbox test (Mocuba and Nicoadala samples). Laboratory results are presented in the Appendix D.

Particle Size Analysis: Particle size analyses were performed in general accordance with ASTM D422, and were used to supplement visual soil classifications.

Pit Number	Location	Depth to Water Table (m)
NM - PT02	Nicoadala	1
QL - PT01	Quelimane	> 2m
QL - PT02	Quelimane	> 2m

2 SITES DESCRIPTION

2.1 LOCATION OF PROJECT SITES

2.1.1 LUGELA

The project area is located in a rural area of Lugela District, 12 km North of Mocuba City. As indicated in the Figure 1 the site lays close to the N229, main road connecting Mocuba to Lugela. The area is relatively inclined with altitude varying between 147 and 151m. This area has a tropical climate. The summers are much rainier than the winters in Lugela. The climate here is classified as Aw (Savanna Biome - Wet Tropical Climate) by the Köppen-Geiger system. Based on statistics of the last 30 years it was possible to identify climatic factors that characterize Lugela. The temperature average is 24.7 °C; The average annual rainfall is 1588 mm. The least amount of rainfall occurs in September with 21 mm, while the greatest amount of precipitation occurs in January, with an average of 291 mm. The temperatures are highest on average in November, at around 27.3 °C. The lowest average temperatures in the year occur in June, when it is around 21.0 °C.

Atterberg Limits: ASTM D4318 specifications were used to determine the liquid and plastic limits and the plasticity index of the selected soil samples.

Moisture Content: ASTM D2116 was used to determine natural moisture content of selected soil samples.

Triaxial Compression Tests. Strength parameters of soils by triaxial compression was done according to the ASTM D4767. The test consist of three points for plotting a Mohr failure envelope and determining the strength parameters. This test included initial and final moisture content tests, specific gravity, initial and final void ratio, initial and final degrees of saturation, initial and final unit weights (densities), visual textural description, cohesion, plot of Mohr circles and envelope, and sketch of failure. When Mohr's circles have been plotted and a line cannot be constructed tangent to three circles, an additional test will be performed at increased consolidation pressure. Alternatively Shear Box Tests may be used.

Shear Box Test. A direct shear test is a laboratory test used to measure the shear strength properties of soil or rock material, or of discontinuities in soil or rock masses. The test was performed using the ASTM D 3080.

1.5 TEST PITS LOGGING

Two test pits with the dimentions 1.5m x 1.5m to a depth of 2.0m were programmed for each site for description of the soil conditions. The required depth was reached in Lugela and Quelimane while the high water table prevented the reach of the 2 meters in Mocuba, Namacurra and Nicoadala. No samples were collected due to high water table. Because of that, soil samples were collected from the soils taken from SPT. Table 2 presents the depth to water table in each test pit.

Table 2. Depth to water table in Mocuba, Namacurra and Nicoadala in relation to the ground surface

Pit Number	Location	Depth to Water Table (m)
LU - PT01	Lugela	> 2m
LU - PT02	Lugela	> 2m
MB - PT01	Mocuba	1.35
MB - PT02	Mocuba	1.2
NC - PT01	Namacurra	1
NC - PT02	Namacurra	0.9
NM - PT01	Nicoadala	1.3

Figure 1. Location map of the Lugela project site

2.1.2 MOCUBA

The project area is located South of Mocuba City close to the N104 main road connecting Quelimane and Mocuba (Figure 2). Mocuba has a tropical climate. When compared with winter, the summers have much more rainfall. The climate here is classified as Aw (Savanna Biome - Wet Tropical Climate) by the Köppen-Geiger system. Based on statistics of the last 30 years it was possible to identify climatic factors that characterize Mocuba. The temperature here averages 24.9 °C. In a year, the average rainfall is 1214 mm. The driest month is September, with 13 mm of rainfall. In January, the precipitation reaches its peak, with an average of 252 mm. The warmest month of the year is November, with an average temperature of 27.9 °C. At 20.3 °C on average, July is the coldest month of the year. The difference in precipitation between the driest month and the wettest month is 239 mm. The variation in annual temperature is around 7.6 °C.

Figure 2. Location map of the Mocuba project site

2.1.3 NAMACURRA

The Namacurra project site is located some 4 km North of Namacurra Village (Figure 3). It is located along the EN7 road heading to Mocuba. This city has a tropical climate. When compared with winter, the summers have much more rainfall. According to Köppen and Geiger, this climate is classified as Aw (Savanna Biome - Wet Tropical Climate). Based on statistics of the last 30 years it was possible to identify climatic factors that characterize Namacurra. The average temperature in Namacurra is 25.8 °C. Precipitation here averages 1206 mm. The least amount of rainfall occurs in October. The average in this month is 13 mm. In January, the precipitation reaches its peak, with an average of 264 mm. The temperatures are highest on average in November, at around 28.3 °C. At 22.4 °C on average, July is the coldest month of the year. The variation in the precipitation between the driest and wettest months is 251 mm. The variation in annual temperature is around 5.9 °C.

Figure 4. Location map of the Nicoadala project site

2.1.5 QUELIMANE

It is the administrative capital of the Zambezia Province and the province's largest city, and stands 25 km (16 mi) from the mouth of the Rio dos Bons Sinais. The project site is located in the outskirts of Quelimane, NW, alongside the EN470 (Figure 5).

Quelimane has a tropical climate. In winter, there is much less rainfall than in summer. This climate is considered to be Aw (Savanna Biome - Wet Tropical Climate) according to the Köppen-Geiger climate classification. Based on statistics of the last 30 years it was possible to identify climatic factors that characterize Quleimane. The average temperature in Quelimane is 25.3 °C. About 1346 mm of precipitation falls annually. The driest month is September, with 16 mm of rainfall. Most precipitation falls in January, with an average of 251 mm. The warmest month of the year is January, with an average temperature of 28.1 °C. In July, the average temperature is 21.0 °C. It is the lowest average temperature of the whole year. The difference in precipitation between the driest month and the wettest month is 235 mm. The average temperatures vary during the year by 7.1 °C.

Figure 3. Location map of the Namacurra project site

2.1.4 NICOADALA

The project site is located in the middle of the Nicoadala city along the N7 road heading to Namacurra and Quelimane. Nicoadala's climate is classified as tropical. The summers are much rainier than the winters in Nicoadala. The climate here is classified as Aw (Savanna Biome - Wet Tropical Climate) by the Köppen-Geiger system. Based on statistics of the last 30 years it was possible to identify climatic factors that characterize Nicoadala. The average temperature in Nicoadala is 25.5 °C. About 1194 mm of precipitation falls annually.

Precipitation is the lowest in September, with an average of 15 mm. The greatest amount of precipitation occurs in January, with an average of 249 mm. At an average temperature of 28.0 °C, November is the hottest month of the year. The lowest average temperatures in the year occur in July, when it is around 21.7 °C. Between the driest and wettest months, the difference in precipitation is 234 mm. The variation in temperatures throughout the year is 6.3 °C.

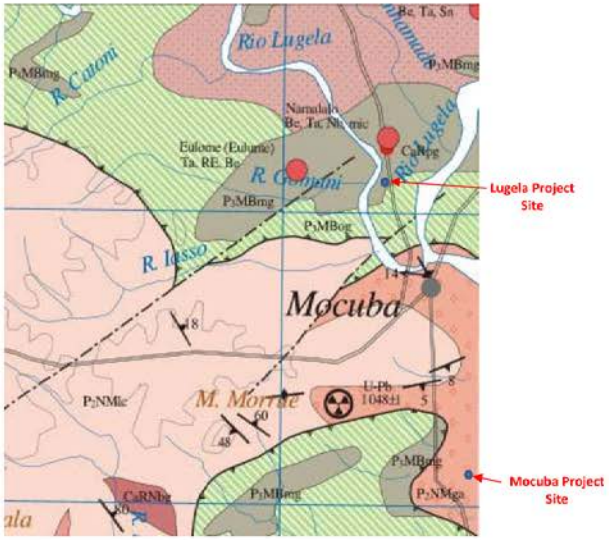


Figure 6. Sketch geological ma the Lugela region (Nurconsult, 2007)

The Mocuba site is on the Augen Gneiss with local enclaves of Charnockite and Migmatite (P_2NMga). A pink, *augen*-bearing, granulite facies granitic gneiss is found as boulders and *Inselbergs*. In some places, the rock is associated with mylonite, which is well banded, having an alternation of pink, granitic and dark grey, biotite-rich bands, and laminae on a millimetre- to centimetre-scale.

2.2.2 NAMACURRA, NICOADALA AND QUELIMANE

Namacurra, Nicoadala and Quelimane project areas fall in the area covered by the sketch map presented in Figure 7.

The Quelimane's project area falls in a Colluvium (Qc) deposit from Quaternary (Figure 7). This deposit occur in patches within the coastal zone and its deposition is only partly controlled by endogenic forces exercised during continued rift/drift/dispersal of Gondwana and development of the Mozambique Basin. Colluvial deposits are formed by debris of the crystalline basement, Karoo volcanics and from other Phanerozoic rocks. More important parameters governing Quaternary deposition are, however, exogenic processes, notably significant sea level fluctuations due to the alternation of glacial and intraglacial episodes. In the project area alluvial mud of fluvial-marine origin (Qst) deposits along some

Figure 5. Location map of the Quelimane project site

2.2 GEOLOGIC SETTING

2.2.1 LUGELA AND MOCUBA

According to the published geological map covering the Lugela and Mocuba project areas the stratigraphy of the Lugela site consists of two proterozoic formations in the Mugeba Complex (Figure 6). The Mafic Granulitic gneiss (P_2MBmg) covers the project area with almost no exposure in the surface. Adjacent to the area are the Allochthonous mylonites (P_2MBog). They are overlain by quartzo-feldspathic granulitic gneisses of the Mugeba Complex and underlain by migmatitic gneisses and leucogneisses and granitic leptynites of the Molócuè Group. These high-strain rocks form the base of the Mugeba klippe. The mylonites are fine-grained, dark grey, well-banded, biotite-rich rocks. Only few outcrops of this unit are observed and indicated a very strongly foliated to mylonitic, streaky, very fine-grained, pinkish, leucocratic, biotite-bearing quartz-feldspar gneiss. The gneiss is leucocratic relatively homogeneous with a regular planar fabric defined by cm-scale thin (<1 mm thick) biotitic blebs and streaks along with some minor grain-size variations.

littoral areas, dark grey to black marine mud deposits are found. They have high clay contents and are deposited by frequent seawater floods.

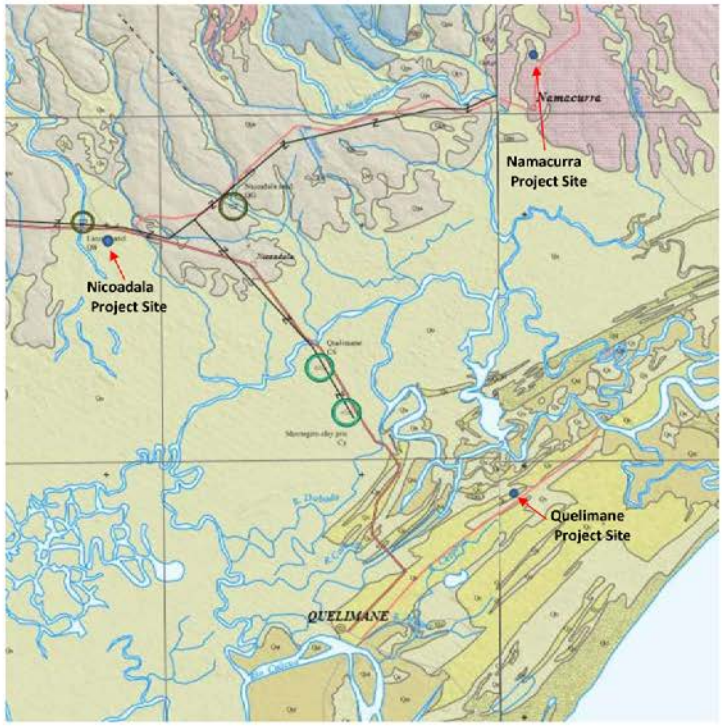


Figure 7. Sketch geological map of Namacurra, Nicoadala and Quelimane project areas (GTK CONSORTIUM 2006)

The Namacurra and Nicoadala project areas are under the alluvium, sand, silt and gravel (Qa) deposit, underlying featureless flat lands, are composed of fluvial sand, silt and gravel. In alluvial flats they generally show fining-upwards with conglomerates at the base, covered by intermediate sandy and surface argillaceous deposits. In this respect they differ from mass flow deposits, including alluvial fans and 'wash-out' deposits that may show only incipient or no granoclassification.

Alluvial deposits also include deltaic deposits found near the mouth of large rivers and their tributaries and form vast plains cut by an irregular hydrographic network of active and abandoned channels.

Alternating beds of clay and sand are found in depth. Along rivers they form banks and shoals due to the natural meandering behaviour of rivers in flat terrains. They are composed of dark grey to black clay and manifest periodic and frequent flooding. Alluvial deposits produce relatively fertile soils.

3 GEOTECHNICAL PROPERTIES

3.1 SOIL CLASSIFICATION

Classification of the soils that occur at the site was based on results from sieve analysis and atterberg limits tests presented in Table 1. Plots of grain size distribution of the soils are shown in the Appendix D.

The Unified Soil Classification System (ASTM D-2487) was used to assign group symbols and group names based on results from sieve analysis and Atterberg limits. The criteria for using such system are presented in the Appendix E. The laboratory testing results confirm that the soils from the project area comprise essentially fine grained soils as the clay and silt content are high.

Lugela

The fines content reduces with depth and the surface layer is very rich in clay and silt with more than 70% being classified as lean clay with sand (CL group). Clayey sand (SC and SC-SM) are the transition to the lower silty sand (SM) layers. Soils of the CL group show good to fair compaction characteristics, medium compressibility and potential expansion properties, have no drainage, are impervious but give good stability as a fill material.

Mocuba

The fines content increase with depth and the lower part of the drilled depth is composed by a very consistent rocky material similar to the one found in the test pit MB-PT02 up to a depth of 0.35 m and in the MB-PT01 up to a depth of 1.35m. This material was described as ferruginous concretion, composed mainly by fine o medium sand, brown in colour.

Sample Nr.	Sampling Depth (m)	LL	PL	PI	LS	Fines (Silt & Clay) (%)	Sand (%)			Gravel	Group Symbol	Group Name
							Fine	Medium	Coarse			
NAMACURRA BH-02	4,5	25	16	9	4,8	17,48	17,07	60,98	3,12	1,35	SC	Clayey Sand
NAMACURRA BH-02	6	30	20	10	4,6	12,75	15,01	55,91	11,45	4,88	SC	Clayey Sand
NAMACURRA BH-02	7,5	Very stiff material										
NAMACURRA BH-02	9	Very stiff material										
NICOADALA BH-01	1,5	31	18	13	6,8	34,27	33,19	21,77	6,46	4,31	SC	Clayey sand
NICOADALA BH-01	3	21	14	7	3,5	54,64	33,99	9,08	1,32	0,97	CL-ML	Sandy silty clay
NICOADALA BH-01	4,5	35	21	14	6,6	63,91	28,94	6,78	0,37	0	CL	Sandy lean clay
NICOADALA BH-01	6	28	17	11	5,2	62,2	32,79	4,69	0,32	0	CL	Sandy lean clay
NICOADALA BH-01	7,5	NP	NP	NP	NP	21,24	72,82	4,87	0,37	0	SM	Silty sand
NICOADALA BH-01	9	33	21	12	5,7	53,14	31,45	11,8	0,9	2,71	CL	Sandy lean clay
QUELIMANE BH-01	1,5	NP	NP	NP	NP	8,84	90,77	0,32	0,07	0	SP-SM	Poorly-graded sand with silt
QUELIMANE BH-01	3	NP	NP	NP	NP	6,94	92,79	0,27	0	0	SP-SM	Poorly-graded sand with silt
QUELIMANE BH-01	4,5	NP	NP	NP	NP	8,76	90,87	0.17	0,2	0,17	SP-SM	Poorly-graded sand with silt
QUELIMANE BH-01	6	NP	NP	NP	NP	13,48	85,76	0,15	0,19	0,42	SM	Silty sand
QUELIMANE BH-01	7,5	NP	NP	NP	NP	16,34	81,42	0,56	0,24	1,44	SM	Silty sand
QUELIMANE BH-01	9	NP	NP	NP	NP	12,27	85,02	0,77	0,53	1,41	SM	Silty sand

3.2 INDEX PROPERTIES

Table 2 presents the main index properties of the soils encountered in the investigated sites.

Table 4. Summary of index properties of the project areas

Sample Nr	Group Symbol	Sampling Depth	Specific Gravity	Moisture Content (%)	Dry Unit Weight (KN/m3)	Saturated Unit Weight (KN/m3)
Lugela						
LUGELA BH-01	CL	1,5	2,4	27,9	23,52	23,53
LUGELA BH-01	SC	3	1,84	43,2	18,03	18,04
LUGELA BH-01	SC-SM	4,5	2,38	39,9	23,32	23,33
LUGELA BH-01	SM	6	2,45	40	24,01	24,02
LUGELA BH-01	SM	7,5	2,48	30	24,30	24,31
Mocuba						
MOCUBA BH-03	SP-SM	1,5	2,31	18,6	22,64	22,65
MOCUBA BH-03	CH	3	2,7	24,4	26,46	26,47
MOCUBA BH-03	SM	4,5	2,89	27,6	28,32	28,33

Namacurra

The fines content reduces with depth but with a slight presence of gravel at lower levels. Due to the fines content the soils in this borehole are classified as Clayey Sand (SC). Soils of the SC group show good to fair compaction characteristics, slight to medium compressibility and potential expansion properties, have poor drainage and are impervious and give reasonable stability as a fill material.

Nicoadala

High fines content increasing downward with a slight presence of gravel at upper levels. The soil profile starts with Clayey Sand (SC) on topo due to the fines content followed by Sandy silty clay (CL-ML) and Sandy lean clay (CL). The top layer (SC) which will carry the foundations of the building show good to fair compaction characteristics, slight to medium compressibility and potential expansion properties, have poor drainage and are impervious and give reasonable stability as a fill material.

Quelimane

The Quelimane soils are NP as demonstrated by the low fines content. The soils are Poorly-graded sand with silt (SP-SM) in the first r meters and Silty sand (SM) in the lower levels. The Poorly-graded sand with silt (SP-SM) show good compaction characteristics, almost none to slight compressibility and potential expansion properties, have good drainage and highly permeable and are reasonably stable when dense when used as a fill material.

Table 3. Summary of grain size distribution and Atterberg limits testing results and USCS

Sample Nr.	Sampling Depth (m)	LL	PL	PI	LS	Fines (Silt & Clay) (%)	Sand (%)			Gravel	Group Symbol	Group Name
							Fine	Medium	Coarse			
LUGELA BH-01	1,5	45	30	15	8,2	71,3	14,19	12,77	1,74	0	CL	Lean clay with sand
LUGELA BH-01	3	32	22	10	4,6	48,42	31,37	16,99	3,22	0	SC	Clayey sand
LUGELA BH-01	4,5	26	21	5	2,6	40,49	46,45	10,37	1,65	1,04	SC-SM	Silty, clayey sand
LUGELA BH-01	6	26	23	3	1,9	38,57	39,16	16,35	4,99	0,93	SM	Silty sand
LUGELA BH-01	7,5	24	22	2	1,0	25,15	25,35	16,69	26,47	6,34	SM	Silty sand
LUGELA BH-01	9	Very stiff material										
MOCUBA BH-03	1,5	NP	NP	NP	NP	7,33	47,58	45,09	0	0	SP-SM	Poorly graded sand with silt
MOCUBA BH-03	3	71,7	23,7	48		50,4	17,5	30,4	1,7	0	CH	Sandy fat clay
MOCUBA BH-03	4,5	37	24	13		24,28	35,58	31,53	3,25	5,36	SM	Silty sand
MOCUBA BH-03	6	Rocky material										
MOCUBA BH-03	7,5	Rocky material										
NAMACURRA BH-02	1,5	27	15	12	5,5	20,83	29,07	49,22	0,88	0	SC	Clayey Sand
NAMACURRA BH-02	3	35	19	16	7,3	28,3	20,34	50,17	1,19	0	SC	Clayey Sand

Sample Nr	Group Symbol	Sampling Depth	Specific Gravity	Moisture Content (%)	Dry Unit Weight (KN/m3)	Saturated Unit Weight (KN/m3)
MOCUBA BH-03	Rocky material					
MOCUBA BH-03	Rocky material					
Namacurra						
NAMACURRA BH-02	SC	1,5	2,05	23,2	20,09	20,10
NAMACURRA BH-02	SC	3	2,65	23	25,97	25,98
NAMACURRA BH-02	SC	4,5	2,79	22,3	27,34	27,35
NAMACURRA BH-02	SC	6	2,78	18,2	27,24	27,25
Nicoadala						
NICOADALA BH-01	SC	1,5	2,39	24,8	23,42	23,43
NICOADALA BH-01	CL-ML	3	2,61	20,3	25,58	25,59
NICOADALA BH-01	CL	4,5	2,2	20,9	21,56	21,57
NICOADALA BH-01	CL	6	2,61	19,6	25,58	25,59
NICOADALA BH-01	SM	7,5	2,03	22,6	19,89	19,90
NICOADALA BH-01	CL	9	1,66	24,8	16,27	16,28
Quelimane						
QUELIMANE BH-01	SP-SM	1,5	2,35	32,2	23,03	23,04
QUELIMANE BH-01	SP-SM	3	2,49	32,2	24,40	24,41
QUELIMANE BH-01	SP-SM	4,5	2,36	31	23,13	23,14
QUELIMANE BH-01	SM	6	4,47	31,3	43,81	43,82
QUELIMANE BH-01	SM	7,5	2,04	33	19,99	20,00
QUELIMANE BH-01	SM	9	2,26	34	22,15	22,16

3.3 SOIL EXPANSIVE POTENTIAL

The expansive potential of a soil depends upon its clay content, the type of clay mineral, its chemical composition and mechanical character. To assess soil expansion caused by increase in water content Kantey and Brink (1952) suggests that a material is potentially expansive if it exhibits the following properties: clay content >12 %, plasticity index > 12%, liquid limit > 30 % and linear shrinkage > 8%.

Based on above stated criteria and the laboratory results conducted on the upper soil layer from the project sites, the Lean clay with sand (CL) found in Lugela should be considered expansive. Soil samples from other sites do not satisfy the criteria.

3.4 STANDARD PENETRATION TEST

A total of 5 SPTs were carried out in each project site area totalizing 50 m (Figure 8). The SPT logs are presented in Appendix C. They were used to determine the soil profile in the project area described in Section 4.1.

Figure 8. Drilling and SPT test done in the field

3.5 GROUND WATER CONDITIONS/OBSERVATIONS

The water level meter was used to measure the depth to groundwater tables with reference to the ground surface. The groundwater level was not crossed in the Lugela and Quelimane project sites. The test pits intercepted the water table at depths close to the surface which prevented the reach of the planned 2 meters in Mocuba, Namacurra and Nicoadala (Figure 9). Table 4 indicates the depth to water table suggesting that major concern will the construction in Namacurra and Nicoadala.

Figure 10. Test pit opened for the percolation test (left) and pre-soaked pit for the percolation test.

Table 5. Depth to water table in relation to ground surface

Pit Nr	Location	Depth to Water Table (m)
LU - PT01	Lugela	> 2m
LU - PT02	Lugela	> 2m
MB - PT01	Mocuba	1.35
MB - PT02	Mocuba	1.2
NC - PT01	Namacurra	1
NC - PT02	Namacurra	0.9
NM - PT01	Nicoadala	1.3
NM - PT02	Nicoadala	1
QL - PT01	Quelimane	> 2m
QL - PT02	Quelimane	> 2m

Table 6. Percolation test results for 75% full to 25% full (i.e. a depth of 150mm)

	Vp (sec/mm)	
	Perc 1	Perc 2
Mocuba	23,10	21,30
Lugela	36,78	34,17
Nicodala	7,54	9,43
Namacurra	12,07	16,89
Quelimane	3,83	4,93

Figure 9. Shallow water table intercepted in Namacurra project site (left) and Nicoadala site (right)

Percolation test was undertaken in two points per project site (Figure 9). A box 30x30x30 cm was opened from the surface of 1m hole. The water percolation rate was determined by the time in seconds for the water to seep away from 75% full to 25% full (i.e. a depth of 150mm). The results indicate that Lugela and Mocuba project sites present the highest percolation rate is observed with an average of 35 and 22 mm/sec while the lowest is observed in Quelimane and Nicoadala with 4 and 8 sec/mm. Table 5 gives the percolation rate of the each site. Field records are presented in the Appendix F.

Figure 11. Ferruginous concretion found in the surface layers in Mocuba

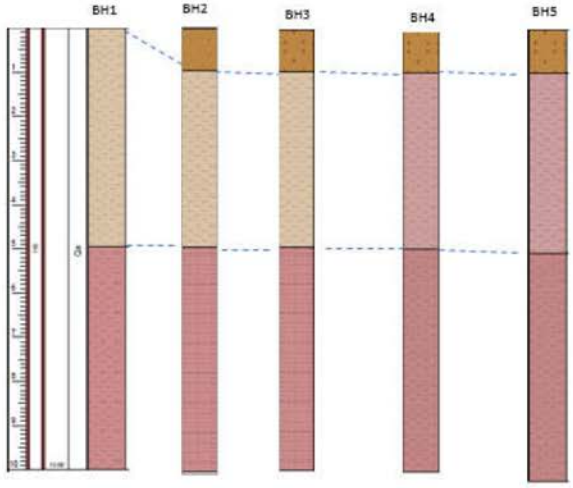


Figure 12. Correlation of the soil profiles in the Lugela project area

4 GEOTECHNICAL DESIGN PARAMETERS

4.1 SOIL PROFILE

Two inspection pits per project site were opened to identify the ground characteristics of the upper layers. Due to the high water table the expected depth was not reached in Mocuba, Namacurra and Nicoadala. Typical soil profile include the organic topsoil evidenced by the agricultural activity and the presence of vegetation. The greatest peculiarity is recorded in Mocuba where the surface layer is a ferruginous concretion, composed mainly by fine o medium sand, brown in colour (Figure 11). Profiles of the inspection pits are presented in the Appendix B.

SPT sounding were used to determine the soil profile in the project sites up 10 meters in all project sites. These field results were complemented by laboratory tests and to allow proper correlation one borehole per site was fully sampled at the depth of every SPT sounding. The low variability of the layers in each site was a determinant in the selection criteria for the sampling borehole. The first borehole opened in each site was always the one chosen for the sampling.

Correlations of SPT logs with soil classification results indicates that 3 soil layers are observed in Lugela (Figure 12).

Topsoil: Red Fine SAND with muddy and organics on top. This was classified as Lean clay with sand (CL). Occur as the uppermost layer of varying thickness between 0 – 1.0m. The texture is sub-angular.

Clayey sand: This has group symbol SC and is characterized by reddish medium and, intercalated with some muddy clay. The thickness of this layer is 4.0m.

Silty sand: Grayish brown, Silty Sand (SM), intercalated with fine sand and intensely altered gneiss. This soil type starts at 5 m depth and continues until at least the 10m, the maximum drilled depth. The layer is rich in clay but with more consistent characteristics as demonstrated by the SPT tests (Appendix C).

The soil profile in Mocuba project site up to 10 meters is characterized by 4 layers (Figure 13):

Topsoil: Light brown Overburden with organic on top. This was classified as Poorly graded sand with silt (SP-SM). Occur as the uppermost layer of varying thickness between 0 – 1.0m. The texture is sub-angular.

Sand: This has group symbol SP-SM to SM and is characterized by white, to brown loose medium SAND, moderately silty. The thickness of this layer varies from 3.5 to 4.5m.

Light grey to brown silty sand: Grey to brown, Silty Sand (SM), intercalated with muddy CLAY and with high altered gneiss. This soil type starts at 4.5 m depth and continues until 7.5m.

Weathered and altered GNEISS to soil: Rocky material from 7.5 m to at least 10 m the maximum drilled depth.

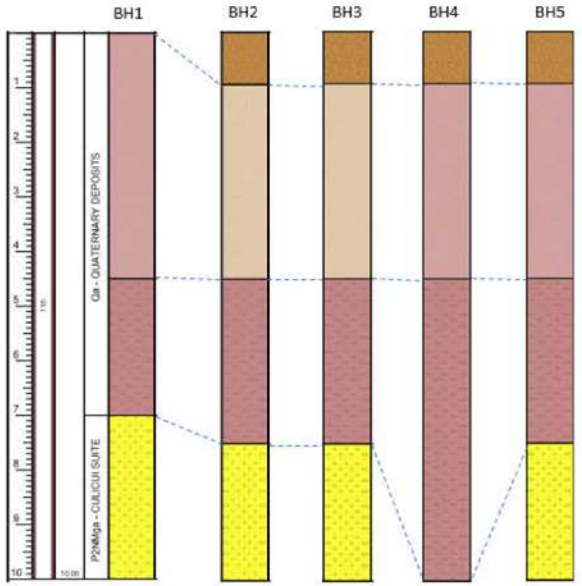


Figure 13. Correlation of the soil profiles in the Mocuba project area.

The soil profile in Namacurra project site up to 10 meters is characterized by 4 layers (Figure 14):

Topsoil: Light brown Overburden with organic on top. This was classified as Poorly graded sand with silt (SP-SM). Occur as the uppermost layer of varying thickness between 0 – 1.0m. The texture is sub-angular.

Sand: This has group symbol SP-SM to SM and is characterized by white, to brown loose medium SAND, moderately silty. The thickness of this layer varies from 3.5 to 4.5m.

Light grey to brown silty sand: Grey to brown, Silty Sand (SM), intercalated with muddy CLAY and with high altered gneiss. This soil type starts at 4.5 m depth and continues until 7.5m.

Weathered and altered GNEISS to soil: Rocky material from 7.5 m to at least 10 m the maximum drilled depth.

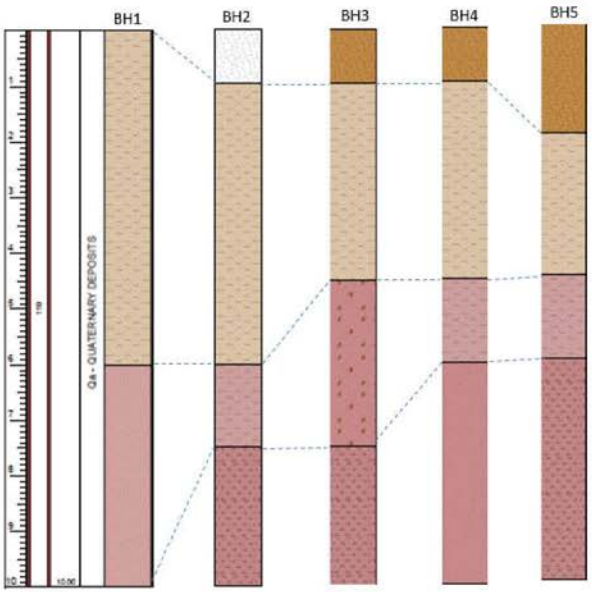


Figure 14. Correlation of the soil profiles in the Namacurra project area.

The soil profile in Nicoadala project site up to 10 meters is characterized by 3 layers (Figure 15):

Fine sand: This layer has light grey to brown fine SAND, slightly with silt with the group symbol SM (Silty sand). The thickness of this layer is between 5 to 10m.

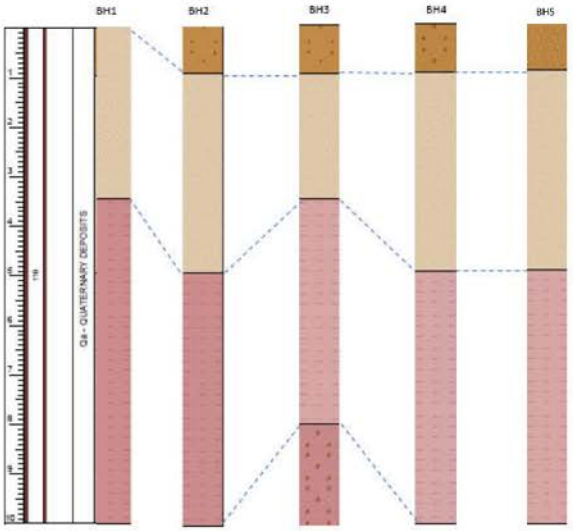


Figure 16. Correlation of the soil profiles in the Quelimane project area.

4.2 SHEAR STRENGTH PARAMETERS

Only 3 sites have soil characteristics that allowed recovering of undisturbed soil samples for triaxial test during SPT operations. Delays in the laboratory test results led to a decision to use SPT data as alternative for bearing capacity calculations. As presented in the appendix C, SPT blow counts vary between 3 and 60. The softer soils are found in Namacurra and Quelimane project sites where the blow counts at 1.5 depth was 5 and 6 respectively anticipating inadequate ground conditions.

From the SPT results combined with visual description and laboratory results from soil classification plus checking the correlation in Table 7 the shear strength parameters were derived for each project site which should be used as a design value (Table 8). The depth of 1.2m below ground surface was

Topsoil: Light brown to greyish fine to clayey sand with organic material on top. This was classified as clayey sand (SC). Occur as the uppermost layer of varying thickness between 0 – 2.0m. The texture is sub-angular.

Sandy Silty Clay: This layer with the group symbol CL-ML to CL is grayish to dark green in colour and is characterized by muddy clay intercalations in a sandy silty material. The thickness of this layer is between 2 to 7.5m.

Light brown sand intercalated with silt: light brown sand with silt intercalations (CL), the thickness of this material varies from is soil type starts at 4.5 m depth and continues until 7.5m.

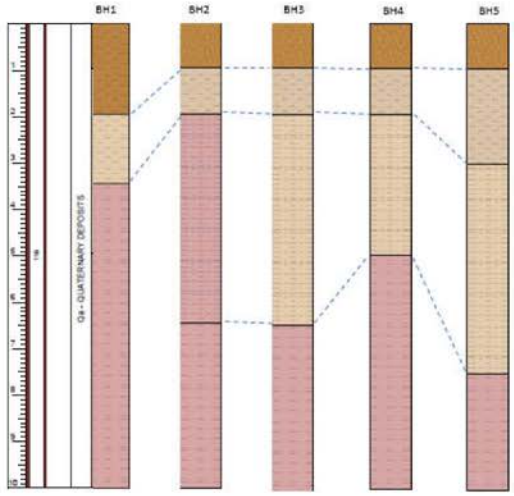


Figure 15. Correlation of the soil profiles in the Nicoadala project area.

The soil profile in Quelimane project site up to 10 meters is characterized by 3 layers (Figure 16):

Topsoil: Greyish to brown fine sand with organics on top. It was classified as poorly-graded sand with silt (SP-SM). Occur as the uppermost layer of varying thickness between 0 – 1.0m with a large pack of 3m at BH1.

Brown fine sand: This layer is characterized by light brown sand material, Poorly-graded sand with silt (SP-SM). It can be found from 2 to 5 m depth.

$$q_{ult} = Cu' N_c + \sigma'_D Nq + 0.5\,\gamma' B N_\gamma$$

Where: q_{ult} – ultimate bearing capacity; N_c, N_q and N_γ are Bearing Capacity Coefficients; Cu' – effective soil cohesion; γ - Unit Weight of the soil; σ'_D – Vertical effective stress at depth z of footing below the ground surface; and B - Width of footing.

Table 9. Calculation of soil bearing capacity under ULS and SLS

		Depth z (m)	Width B (m)	ϕ (°)	Cu (kPa)	Corrected parameters			Nc	Nq	Nγ	q_{ult} (kPa)
						ϕ (°)	Cu' (kPa)	γ' (kN/m)				
Lugela	ULS	0,9	1	35	95,76	35	95,76	23,52	57,8	41,4	43,7	6925,20
	SLS	0,9	1	35	95,76	31,5	95,76	23,52	40,4	25,3	23,7	4682,97
Mocuba	ULS	0,9	1	30	0	30	0	22,64	37,2	22,5	20,1	685,99
	SLS	0,9	1	30	0	27,3	0	22,64	29,2	15,9	12,5	465,48
Namacurra	ULS	0,9	1	28	0	28	0	20,09	31,6	17,8	14,6	468,50
	SLS	0,9	1	28	0	25,5	0	20,09	25,1	12,7	9,2	322,04
Nicoadala	ULS	0,9	1	30	0	30	0	23,42	37,2	22,5	20,1	709,63
	SLS	0,9	1	30	0	27,3	0	23,42	29,2	15,9	12,5	481,52
Quelimane	ULS	0,9	1	28	0	28	0	23,03	31,6	17,8	14,6	537,06
	SLS	0,9	1	28	0	25,5	0	23,03	25,1	12,7	9,2	369,17

The results indicate that the soil bearing capacity for ULS condition considering the assumed soil parameters and groundwater table will be 6925,20kPa for Lugela, 685,99 KPa for Mocuba, 468,50 KPa for Namacurra, 709,63 KPa for Nicoadala and 537,06 KPa for Quelimane.

According to the bearing capacity criterion the allowable stress design is expressed as:

$$q_a = \frac{q_{ult}}{F}$$

Where: q_a = allowable bearing capacity; q_{ult} = ultimate bearing capacity; F = factor of Safety.

The required factor of safety, F, depends on the type of structure, the type of soil and other factors, and typically is between 2.0 and 3.5. Low factors of safety might be used for non-critical structures on sandy soils with extensive site characterization, while high factors of safety would more often be used for critical structures on clayey soils with minimal site characterization. The bearing capacity values given in Table 4 are to be divided by appropriate factor of safety. Assuming F = 3 the allowable stress design values will be the ones presented in Table 10. Lugela presents the equivalent allowable bearing capacity with 2,308.40 Kpa and the lowest values are found in Namacurra and Quelimane with 156,17 KPa and 179,02KPa respectively. Similarly, if the same factor of safety is used for the parameters

assumed as the depth for the strip footings of 1.0m width. It should be noted here that the soil of Lugela was classified as cohesive, very stiff, so the respective section should be observed.

Table 7. Estimated values of soil friction and cohesion based on uncorrected Standard Penetration Test (SPT) blow counts, taken from Karol (1960)

Soil Type and SPT Blow Counts		Undisturbed Soil	
		Cohesion (psf)	Friction Angle (°)
Cohesive soils			
Very soft	(<2)	250	0
Soft	(2–4)	250–500	0
Firm	(4–8)	500–1,000	0
Stiff	(8–15)	1,000–2,000	0
Very stiff	(15–30)	2,000–4,000	0
Hard	(>30)	4,000	0
Cohesionless soils			
Loose	(<10)	0	28
Medium	(10–30)	0	28–30
Dense	(>30)	0	32
Intermediate soils			
Loose	(<10)	100	8
Medium	(10–30)	100–1,000	8–12
Dense	(>30)	1,000	12

Table 8. Shear strength parameters derived from the SPT results for each project site

	Angle of internal friction ϕ (°)	Cohesion C_u (kPa)
Lugela	35	95.76
Mocuba	30	0
Namacurra	28	0
Nicoadala	30	0
Quelimane	28	0

4.3 ULS AND SLS DESIGN BEARING PRESSURE

Two design lines are followed for determining bearing pressure, namely Ultimate Limit State (ULS) and Serviceability Limit State (SLS). Calculations were performed only for the upper layer, since this is the one that will receive the load of the infrastructure.

ULS calculations were carried out for the depth of 0.9m below ground surface assuming strip footings of 1.0m width. Soil strength parameters were obtained from STP results test and normalized for Ultimate Limit State, Category I (Table 9) and then the ultimate bearing capacity computed using the following Terzaghi (1943) expression for continuous footing:

presented in Table 10 the allowable stress design value will be vary from 2308,40 kPa in Lugela to 156,17KPa in Namacurra.

Table 10. Allowable bearing capacity assuming factor of Safety of 3

		Depth z (m)	q_{ult} (kPa)	q_a = allowable bearing capacity assuming factor of Safety=3
Lugela	ULS	0,9	6925,20	2308,40
	SLS	0,9	4682,97	1560,99
Mocuba	ULS	0,9	685,99	228,66
	SLS	0,9	465,48	155,16
Namacurra	ULS	0,9	468,50	156,17
	SLS	0,9	322,04	107,35
Nicoadala	ULS	0,9	709,63	236,54
	SLS	0,9	481,52	160,51
Quelimane	ULS	0,9	537,06	179,02
	SLS	0,9	369,17	123,06

The same procedure was used for design calculations of bearing capacity leading to unacceptable loss of serviceability (SLS) as presented in Table 9, for the depth of 0.9m below ground surface and strip footing's width of 1.0m. The difference in values of ULS and SLS is inherent to the procedure for calculation in accordance with Eurocode 7. In case, the correction factors recommended by the Eurocode 7 procedure states that for those friction angles the correction factor for ULS is 1.1 while the correction factor for SLS is 1.0.

The soil bearing pressure under SLS (Serviceability Limit State) defines the performance criterion for serviceability and corresponds to conditions beyond which specified service requirements resulting from the planned use are no longer met. For the assumed conditions of failure mechanism (Eurocode 7) the soil bearing capacity results under SLS are presented in Table 10. Special attention to the allowable stress design for Namacurra and Quelimane which have less than 150 KPa.

4.4 ANGLE OF REPOSE

The angle of repose or the critical angle of repose, of a granular material is the steepest angle relative to the horizontal plane which a material can be piled without slumping or the surface material sliding.

In cohesive soils the angle of repose will varies from 40 to 50 degrees while for cohesionless soils it ranges from 30-35°. These data can also be used for design purposes.

4.5 SITE SEISMIC DESIGN

Based on Idriss & Boulanger (2004) method liquefaction potential for the conditions prevailing at the proposed construction sites was assessed assuming an earthquake moment magnitude M=7.5. The calculations suggest that the soils from the sites are not liquefiable.

Criteria for evaluating liquefaction potential include assessment of soil type for its ability to liquefy during an earthquake, presence of groundwater, cyclic stress ratio (CSR), cyclic resistance ratio (CRR) and Factor of Safety. If the CSR induced during the earthquake is greater than the CRR determined from SPT data it is likely that liquefaction will occur, and vice-versa.

For seismic design purposes in accordance with EN 1998-1:2004, the soils from the construction site are classified as ground type D. The classification is based on NSPT values and site description which suggests shear wave velocity will be lower than 180 m/s.

5 REFERENCES

Norconsult (2007) Sheet explanation: 1039 Muidine, 1040 Palma, 1134 Ponta Messuli, 1135 Lupilichi, 1136 Milepa, 1137 Macalange, 1138, Negomano, 1139 Mueda, 1140 Moçimboa da Praia, 1234, Metangula, 1235 Macaloge-Chiconono, 1236 Mavago, 1237 Mecula, 1238 Xixano, 1239 Meluco, 1240 Quissinga-Pemba, 1334 Meponda, 1335 Lichinga, 1336 Majune, 1337 Marrupa, 1338 Namuno, 1339 Montepuez, 1340 Mecufi, 1435 Mandimba, 1436 Cuamba, 1437 Malema, 1438 Ribáuè-Mecuburi, 1535 Insaca, 1536 Gurué, 1635 Milange, 1636 Lugela-Mocuba. Maputo, 796 p.

Mahmoud, M. A. A. N. (2013) . Reliability of using standard penetration test (SPT) in predicting properties of silty clay with sand soil. International Journal Of Civil And Structural Engineering. Vol. 3, No 3, ISSN 0976 – 4399.

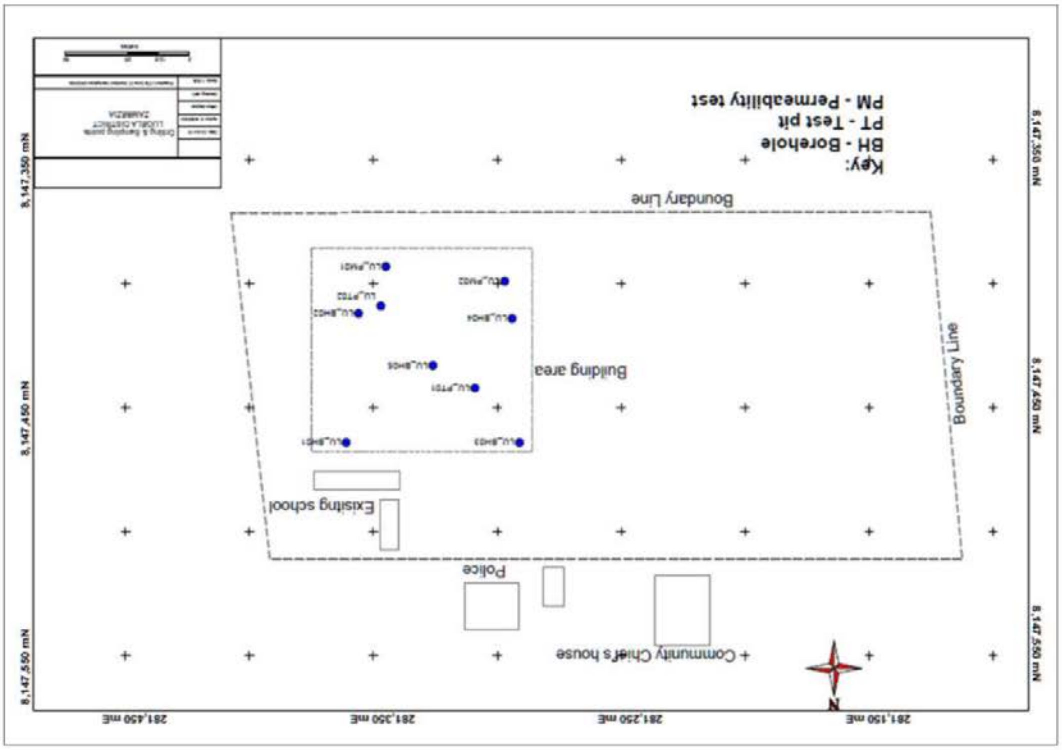
ROGERS, J. D (2006). Subsurface Exploration Using the Standard Penetration Test and the Cone Penetrometer Test. Environmental & Engineering Geoscience, Vol. XII, No. 2, pp. 161–179.

Meyerhof, G. (1956). Penetration tests and bearing capacity of cohesionless soils. J Soils Mechanics and Foundation Division ASCE, 82(SM1).

6 LIST OF APPENDICES

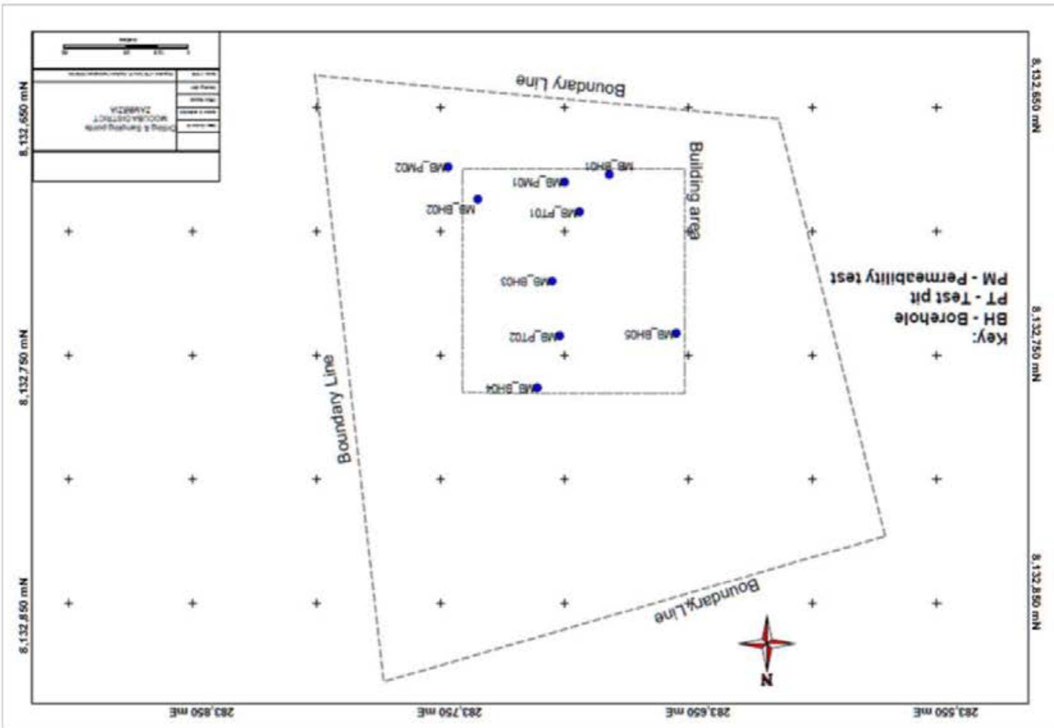
APPENDIX A: BORING LOCATION AND TEST PIT PLAN

Lugela



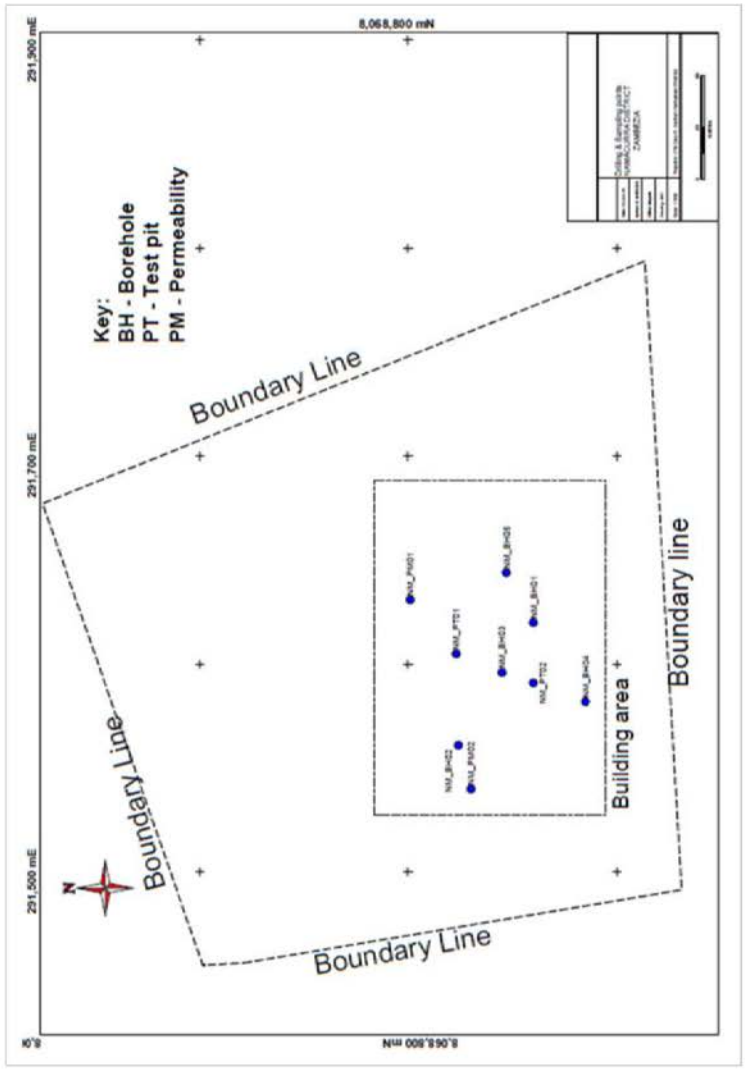
32

Mocuba

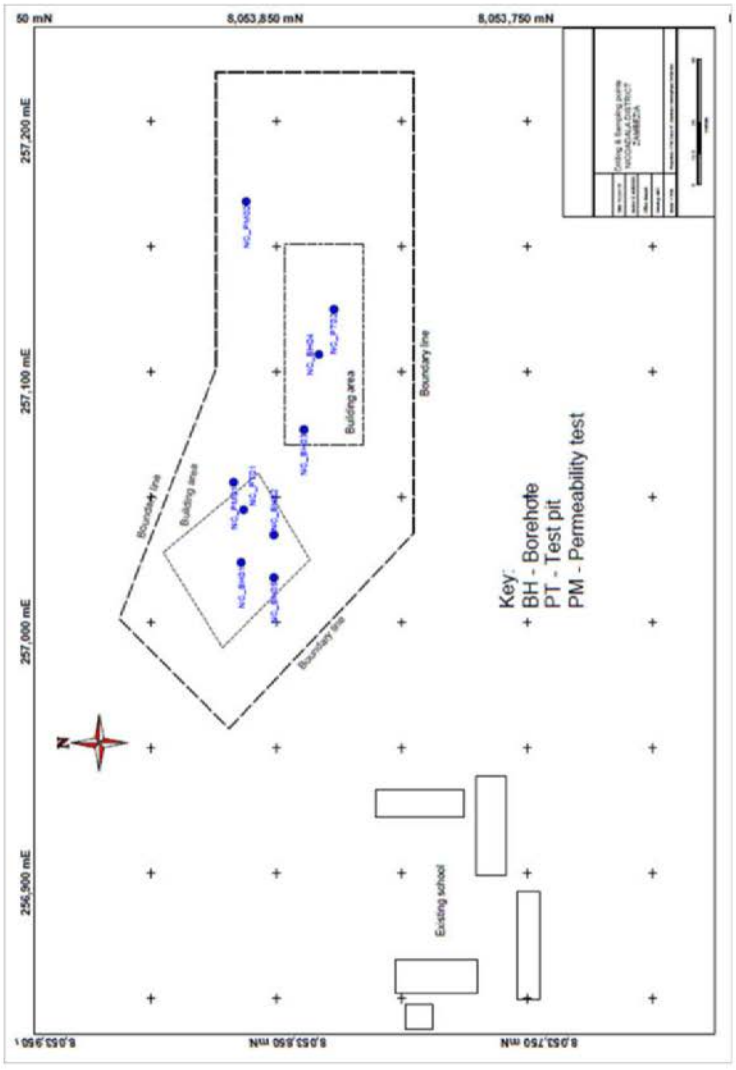


33

Namacurra

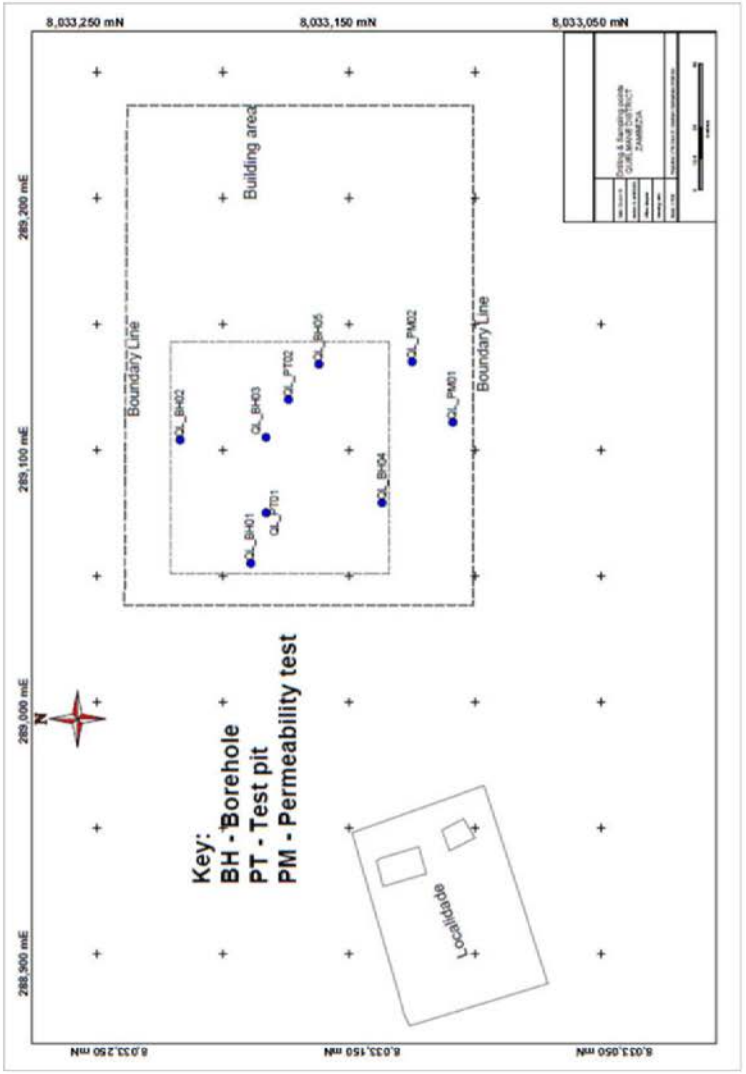


Nicoadala



APPENDIX B - TEST BORING LOGS AND CORE LOGS

Quelimane



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TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - PT02
			SHEET: 1/1

Water Level: NR
Coordenate **Lat:** 16º 44 46.1'' **Long:** 036º 56'54.5''
Start date: 27/4/2018
End date: 27/4/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5	Brown SAND with some clay intersections		
1 (0.5)	Brown meddium SAND with some quartz blocks		
1.5	Brown to yellowish SAND with some clay intersections		
2			

END AT : 2.00 m

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

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TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - PT01
			SHEET: 1/1

Water Level: NR
Coordenate: **Lat:** 16º 44'44.7'' **Long:** 036º 56'54.9''
Start date: 27/4/2018
End date: 27/4/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5	Brown SAND with some clay intersections		
1 (0.5)	Brown meddium SAND with some quartz blocks		
1.5	Brown to yellowish SAND with some clay intersections		
2			

END AT : 2.00 m

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

VF GeoNat
Consultoria e Projectos

TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - PT02
			SHEET: 1/1

Water Level: 1.35 m
Coordenate: **Lat:** 16° 52´45.8´´ **Long:** 036° 58´12.1´´
Start date: 3/5/2018
End date: 3/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5	Ferruginous concretion, composed maily by fine o medium SAND, dark brown in colour		
1	Greyish to light brown silt CLAY.		
1.5	Coarse to medium brown SAND with some quartz.		
2	Light brown CLAY with some sand		
	END AT : 1.50 m		

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

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TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - PT01
			SHEET: 1/1

Water Level: 1.20 m
Coordenate: **Lat:** 16° 52´45.6´´ **Long:** 036° 58´10.5´´
Start date: 5/5/2018
End date: 5/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5	Ferruginous concretion, composed maily by fine o medium SAND, brown in colour.		
1	Coarse to meddium SAND intercalated by clay, brown in colour		
1.5	Brownish mudy CLAY		
2	**END AT : 1.70 m**		

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

VF GeoNat
Consultoria e Projectos

TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC - PT02
			SHEET: 1/1

Water Level: 1.00 m **Start date:** 5/5/2018

Coordenate: **Lat:** 17º 35' 20.1'' **Long:** 036º 42' 41.4'' **End date:** 5/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5	Organic top soil with medium SAND, brownsh in colour		
1	White to light brown SAND, slightely silt		

END AT : 1.00 m

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

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Consultoria e Projectos

TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC - PT01
			SHEET: 1/1

Water Level: 1.30 m **Start date:** 5/5/2018

Coordenate: **Lat:** 17º 35'18.9'' **Long:** 036º 42'38.7'' **End date:** 5/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5	Brown to dark brown SAND with organics on top		
1	White to light brown SAND		
1.5	**END AT : 1.30 m**		
2			

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

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Consultoria e Projectos

TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURA	NM - PT02
			SHEET: 1/1

Water Level: 0.90 m
Coordenate: **Lat:** 17° 27´ 26.7´´ **Long:** 037° 02´ 13.5´´
Start date: 8/5/2018
End date: 8/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5 — 1	Brown, fine to medium SAND with some organics on top **END AT : 0.90 m**		

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

VF GeoNat
Consultoria e Projectos

TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURA	NM - PT01
			SHEET: 1/1

Water Level: 1.00 m
Coordenate: **Lat:** 17° 27´ 25.8´´ **Long:** 036° 02´ 16.6´´
Start date: 8/5/2018
End date: 8/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5 — 1	Brown, fine to medium SAND with some organics on top		

END AT : 1.00 m

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

VF GeoNat
Consultoria e Projectos

TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - PT02
			SHEET: 1/1

Water Level: NR
Coordenate: **Lat:** 17º 46´ 45.1´´ **Long:** 037º 00´ 39.3´´
Start date: 9/5/2018
End date: 9/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5 – 1 – 1.4 – 2	Brown to orangish medium to fine SAND, with organic on top		

END AT : 2.00 m

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

VF GeoNat
Consultoria e Projectos

TRENCH

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - PT01
			SHEET: 1/1

Water Level: NR
Coordenate: **Lat:** 17º 46´ 43.2´´ **Long:** 037º 00´ 37.3´´
Start date: 9/5/2018
End date: 9/5/2018

LITHO STRATIGRAPHY (m)	LITOLOGY	TEST	PHOTO
0.5 – 1 – 1.5 – 2	Brown to orangish medium to fine SAND, with organic on top		

END AT : 2.00 m

OBSERVATION:

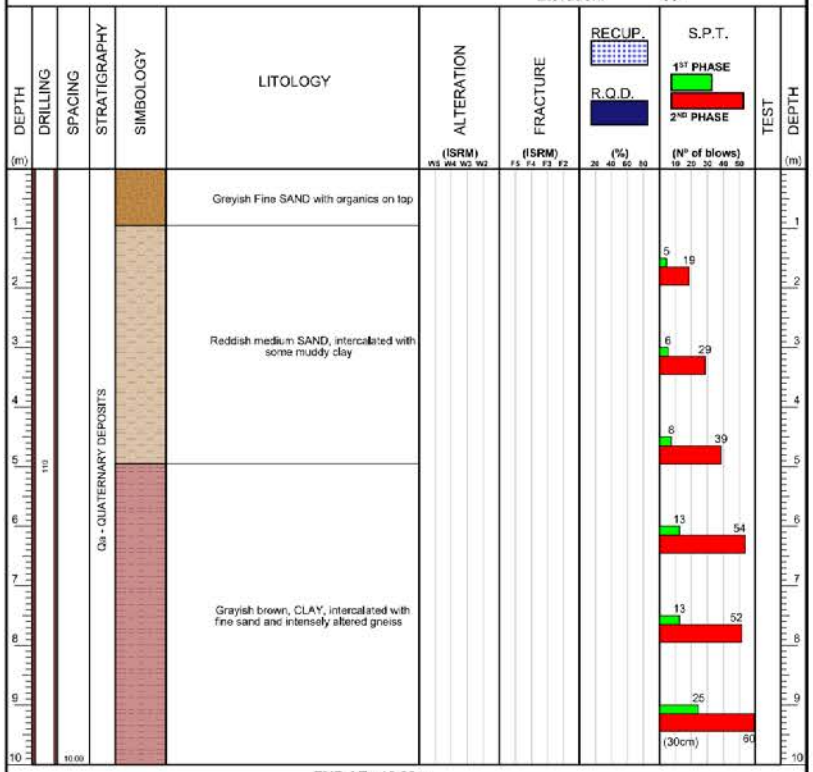
LOGGED BY: E. M. Vicente **ISSUED DATE:** 30/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH02
			SHEET: 1/1

Equipament: Hanfa HF 130 | Casing: 10.00 m (II) | Start date: 27/4/2018
Water Level: Not intersected | Coordenate Lat: 16° 44' 45.7'' | End date: 27/4/2018
Long: 036° 56' 56.5'' | Elevation: 90 °



END AT : 10.00 m

OBSERVATION:

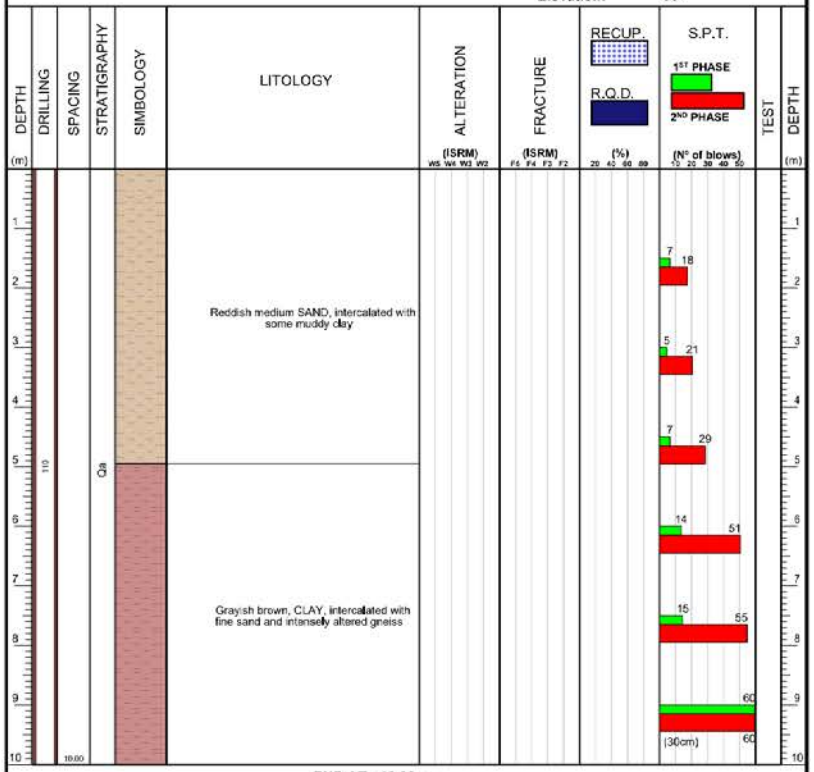
LOGGED BY: E. M. Vicente | ISSUED DATE: 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH01
			SHEET: 1/1

Equipament: Hanfa HF 130 | Casing: 10.00 m (II) | Start date: 27/4/2018
Water Level: Not intersected | Coordenate Lat: 17° 27' 21.1'' | End date: 27/4/2018
Long: 037° 02' 13.5'' | Elevation: 90 °



END AT : 10.00 m

OBSERVATION:

LOGGED BY: E. M. Vicente | ISSUED DATE: 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH03
			SHEET: 2/2

Equipament: Hanfa HF 130 **Casing:** 10.50 m (||) **Start date:** 27/4/2018
Water Level: Not intersected **Coordenate** Lat: 16º 44´ 45.7´´ **End date:** 27/4/2018
Long: 036º 56´ 56.5´´
Elevation: 90 °

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
0	110	10.50			Brown, CLAY, intercalated with fine sand and intensely altered gneiss						0
11					END AT : 10.50 m						11
12											12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH03
			SHEET: 1/2

Equipament: Hanfa HF 130 **Casing:** 10.50 m (||) **Start date:** 27/4/2018
Water Level: Not intersected **Coordenate** Lat: 16º 44´ 45.7´´ **End date:** 27/4/2018
Long: 036º 56´ 56.5´´
Elevation: 90 °

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
0	110		Qa - QUATERNARY DEPOSITS		Red Fine SAND and silt with organics on top						0
1									10 / 30		1
2					Reddish medium SAND, intercalated with some muddy clay				8 / 25		2
3											3
4									8 / 33		4
5											5
6									12 / 50		6
7											7
8					Brown, CLAY, intercalated with fine sand and intensely altered gneiss				15 / 52		8
9									60 / 60 (30cm)		9
10											10

OBSERVATION:

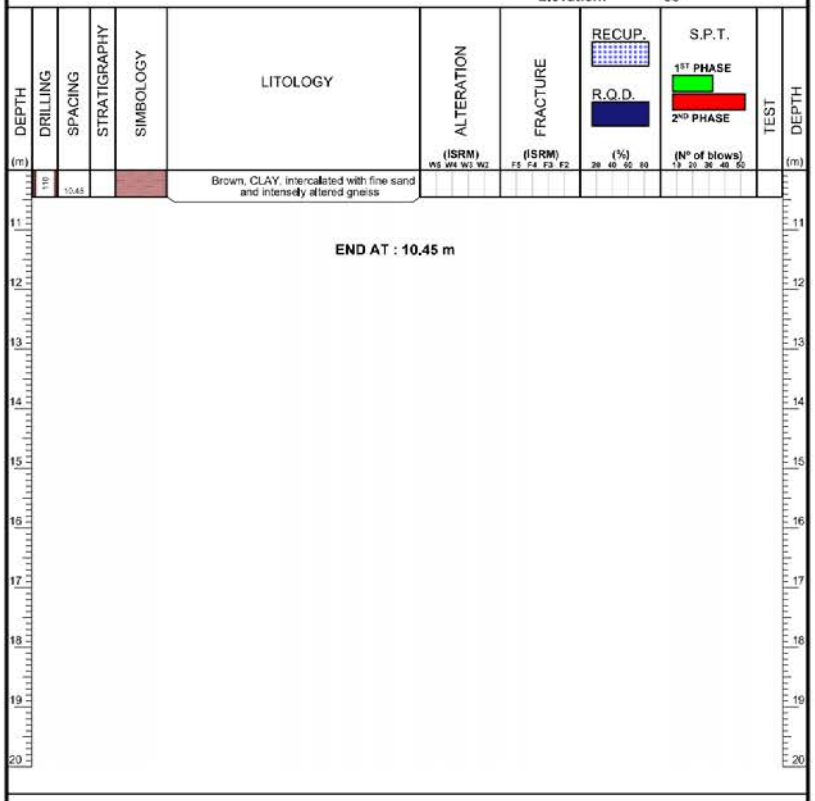
LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH04
			SHEET:2/2

Equipament: Hanfa HF 130 **Casing:** 10.45 m (II) **Start date:** 28/4/2018
Water Level: Not intersected **Coordenate** Lat: 16º 44´ 45.7´´ **End date:** 28/4/2018
Long: 036º 56´ 54.4´´
Elevation: 90 º



OBSERVATION:

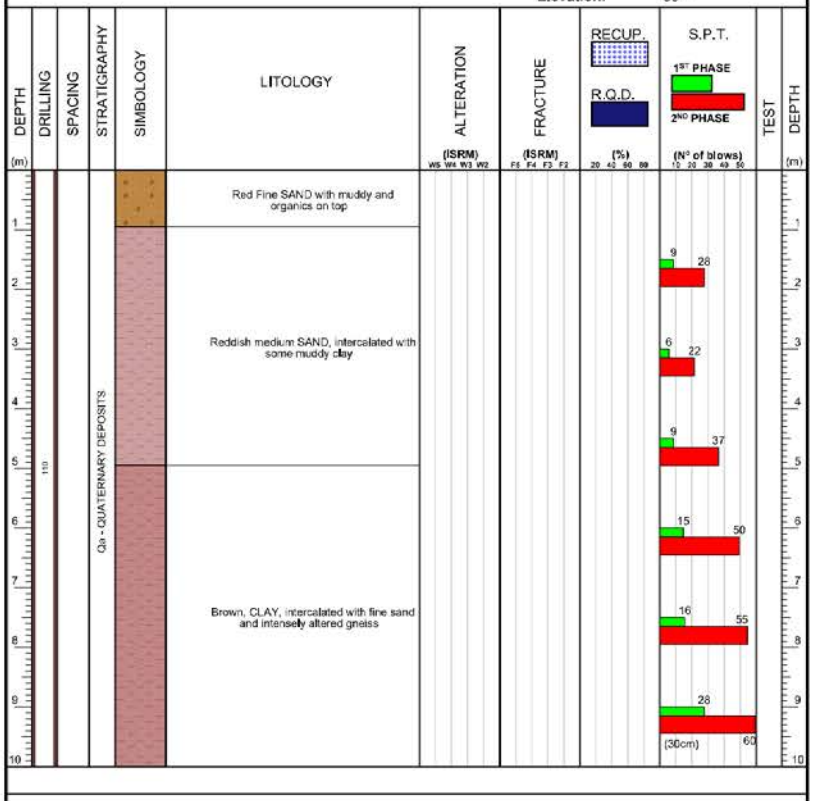
LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH04
			SHEET: 1/2

Equipament: Hanfa HF 130 **Casing:** 10.45 m (II) **Start date:** 28/4/2018
Water Level: Not intersected **Coordenate** Lat: 16º 44´ 45.7´´ **End date:** 28/4/2018
Long: 036º 56´ 54.4´´
Elevation: 90 º



OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH05
			SHEET: 2/2

Equipament: Hanfa HF 130 — Casing: 10.90 m (II) — Start date: 28/4/2018
Water Level: Not intersected — Coordenate: Lat: 17º 46´ 43.9´´ — End date: 28/4/2018
Long: 037º 00´ 39.4´´ — Elevation: 90 º

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
11	110 / 10.90				Brown, CLAY, intercalated with fine sand and intensely altered gneiss						11
					END AT : 10.95 m						
12–20											12–20

OBSERVATION:

LOGGED BY: E. M. Vicente — ISSUED DATE: 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	LUGELA	LU - BH05
			SHEET: 1/2

Equipament: Hanfa HF 130 — Casing: 10.90 m (II) — Start date: 28/4/2018
Water Level: Not intersected — Coordenate: Lat: 17º 46´ 43.9´´ — End date: 28/4/2018
Long: 037º 00´ 39.4´´ — Elevation: 90 º

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
1	110		Qa - QUATERNARY DEPOSITS		Light brown Overburden with organic on top				8 / 31		1
2–3					Reddish to brown medium SAND, intercalated with some muddy clay				7 / 25		2–3
4–5									10 / 41		4–5
6					Brown, CLAY, intercalated with fine sand and intensely altered gneiss				16 / 56		6
7–8									18 / 60 (30cm)		7–8
9–10									25 / 60 (30cm)		9–10

OBSERVATION:

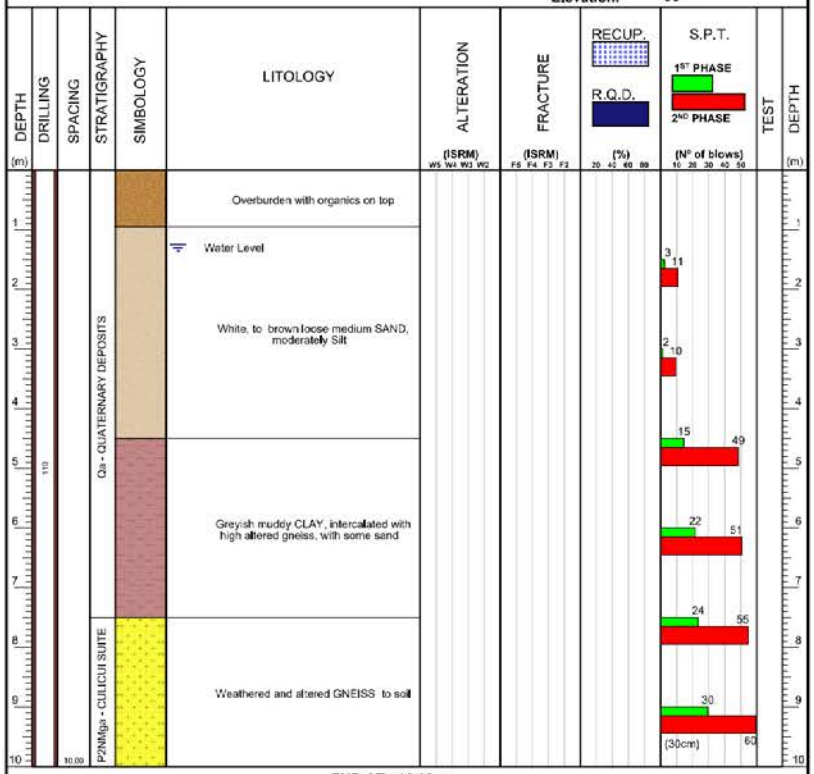
LOGGED BY: E. M. Vicente — ISSUED DATE: 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - BH02
			SHEET: 1/1

Equipament:	Hanfa HF 130	**Casing:**	10.00 m (II)	**Start date:**	3/4/2018
Water Level:	1.25 m	**Coordenate:**	Lat: 16º 52´ 45.4´´	**End date:**	3/4/2018
			Long: 036º 58´ 11.7´´	**Elevation:**	90 º



END AT : 10.00 m

OBSERVATION:

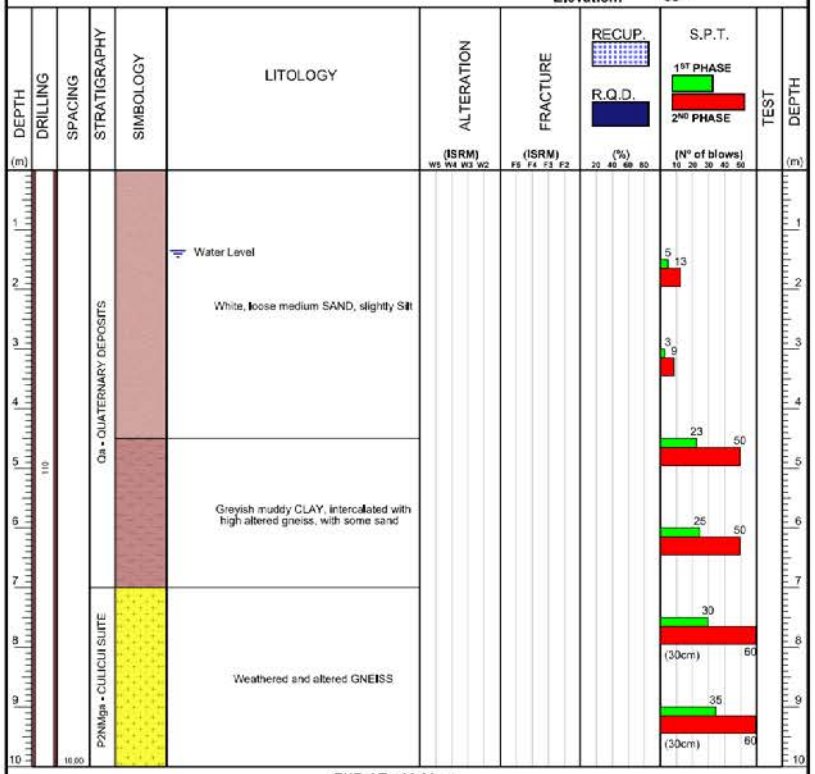
LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - BH01
			SHEET: 1/1

Equipament:	Hanfa HF 130	**Casing:**	10.00 m (II)	**Start date:**	3/4/2018
Water Level:	1.35 m	**Coordenate:**	Lat: 16º 52´ 45.7´´	**End date:**	3/4/2018
			Long: 036º 58´ 09.9´´	**Elevation:**	90 º



END AT : 10.00 m

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - BH03
			SHEET: 2/2

Equipament: Hanfa HF 130 Casing: 10.50 m (II) Start date: 3/4/2018
Water Level: 1.35 m Coordenate: Lat: 16º 52' 44.3'' End date: 3/4/2018
Long: 036º 58' 10.7''
Elevation: 90 º

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
0	110	10.50			Weathered and altered GNEISS to soil						0
11					END AT : 10.50 m						11
12											12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20

OBSERVATION:

LOGGED BY: E. M. Vicente ISSUED DATE: 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - BH03
			SHEET: 1/2

Equipament: Hanfa HF 130 Casing: 10.50 m (II) Start date: 3/4/2018
Water Level: 1.35 m Coordenate: Lat: 16º 52' 44.3'' End date: 3/4/2018
Long: 036º 58' 10.7''
Elevation: 90 º

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
1	110		QA - QUATERNARY DEPOSITS		Dark brown Overburden with organic on top				4 / 5		1
2					Water Level Brownish loose fine medium SAND, moderately Silt and clay				4 / 10		2
3											3
4											4
5									17 / 58		5
6					Light grey muddy CLAY, intercalated with high altered gneiss, with some sand				20 / 55		6
7											7
8			P2NMga - CULICUI SUITE						30 / 60 (30cm)		8
9					Weathered and altered GNEISS to soil				32 / 60 (30cm)		9
10											10

OBSERVATION:

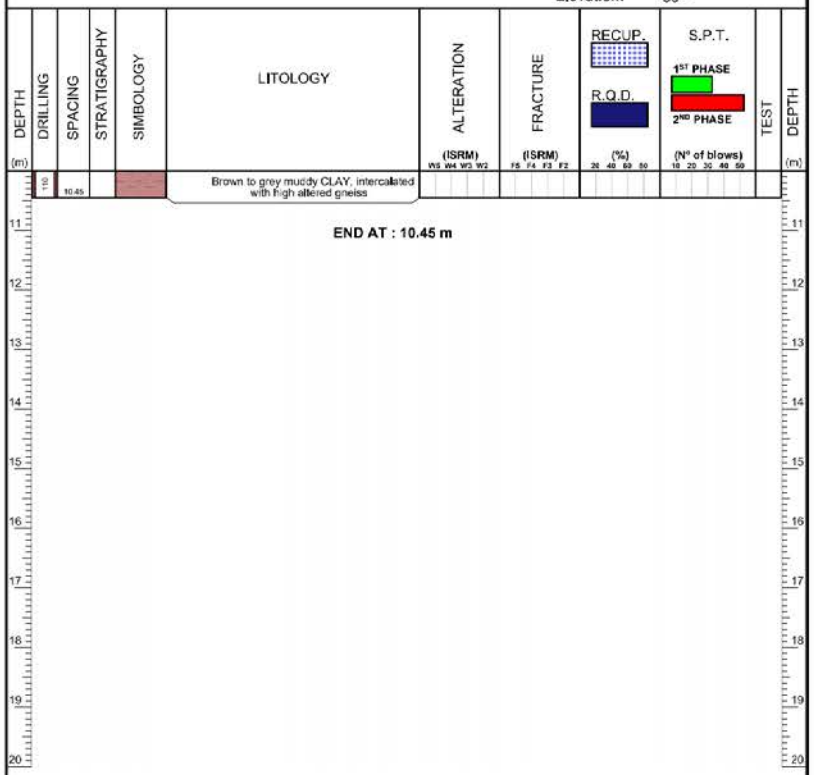
LOGGED BY: E. M. Vicente ISSUED DATE: 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB-BH04 SHEET: 2/2

Equipament: Hanfa HF 130 **Casing:** 10.45 m (II) **Start date:** 4/4/2018
Water Level: 1.30 m **Coordenate:** Lat: 16º 52´ 42.9´´ **End date:** 4/4/2018
Long: 036º 58´ 10.9´´
Elevation: 90 º



OBSERVATION:

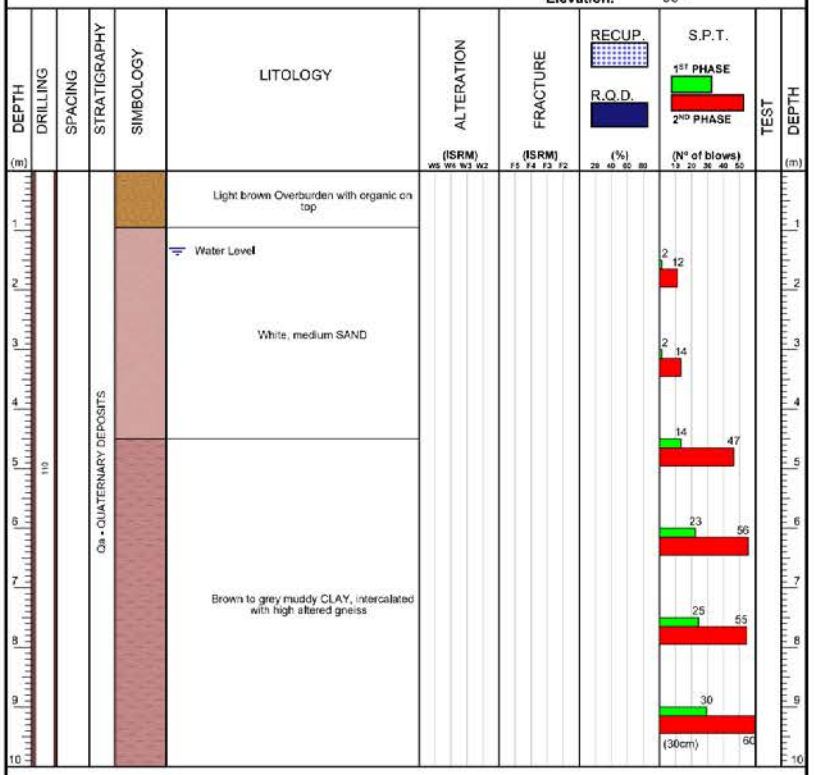
LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB-BH04 SHEET: 1/2

Equipament: Hanfa HF 130 **Casing:** 10.45 m (II) **Start date:** 4/4/2018
Water Level: 1.30 m **Coordenate:** Lat: 16º 52´ 42.9´´ **End date:** 4/4/2018
Long: 036º 58´ 10.9´´
Elevation: 90 º



OBSERVATION:

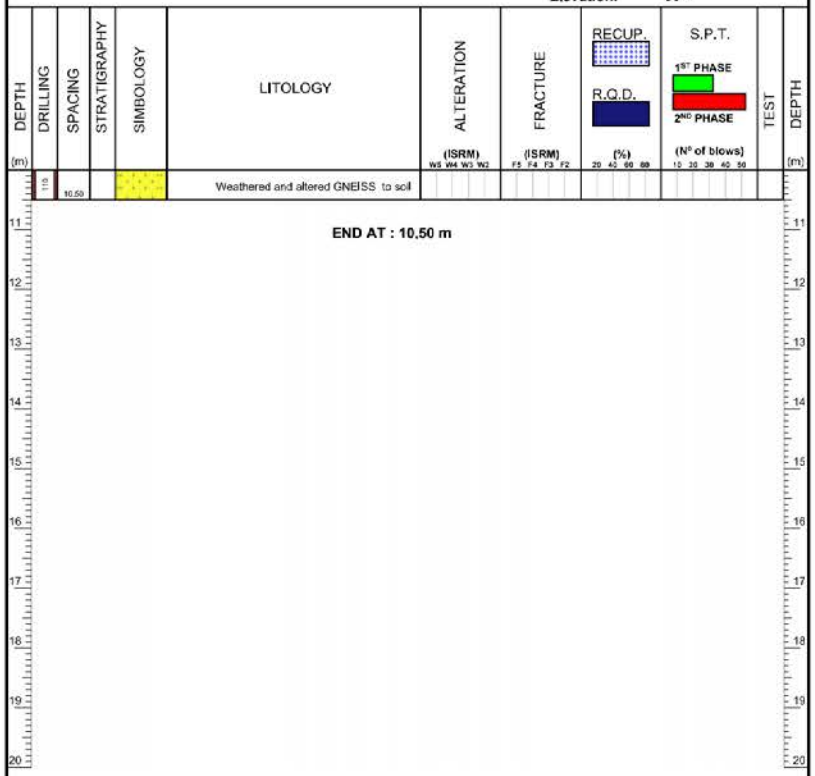
LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - BH05
			SHEET: 2/2

Equipament: Hanfa HF 130 **Casing:** 10.50 m (II) **Start date:** 4/4/2018
Water Level: 1.25 m **Coordenate:** Lat: 16° 52' 43.6'' **End date:** 4/4/2018
Long: 036° 58' 09.0''
Elevation: 90 °



OBSERVATION:

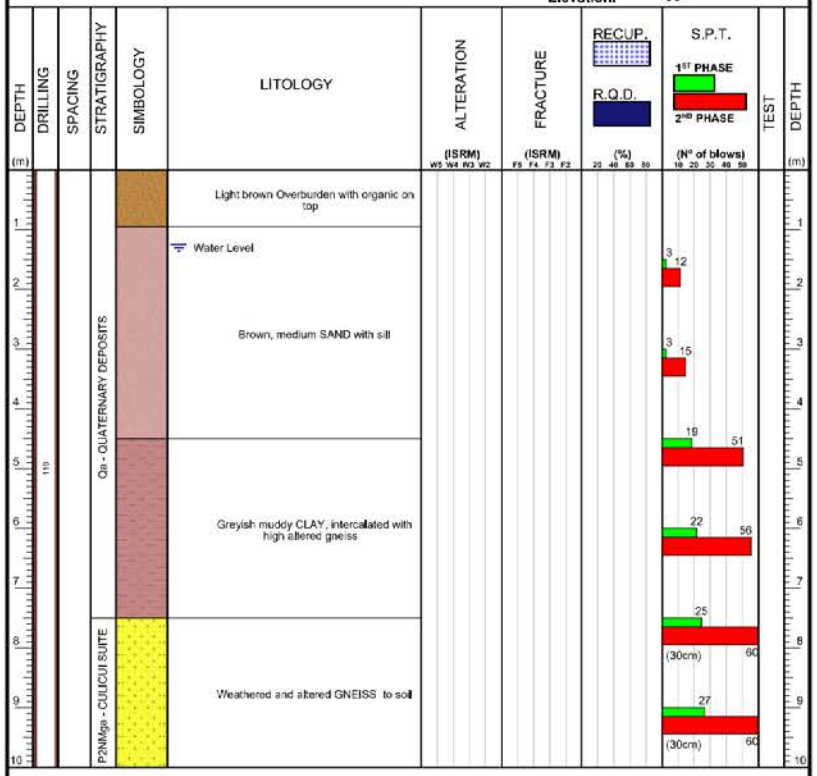
LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	MOCUBA	MB - BH05
			SHEET: 1/2

Equipament: Hanfa HF 130 **Casing:** 10.50 m (II) **Start date:** 4/4/2018
Water Level: 1.25 m **Coordenate:** Lat: 16° 52' 43.6'' **End date:** 4/4/2018
Long: 036° 58' 09.0''
Elevation: 90 °



OBSERVATION:

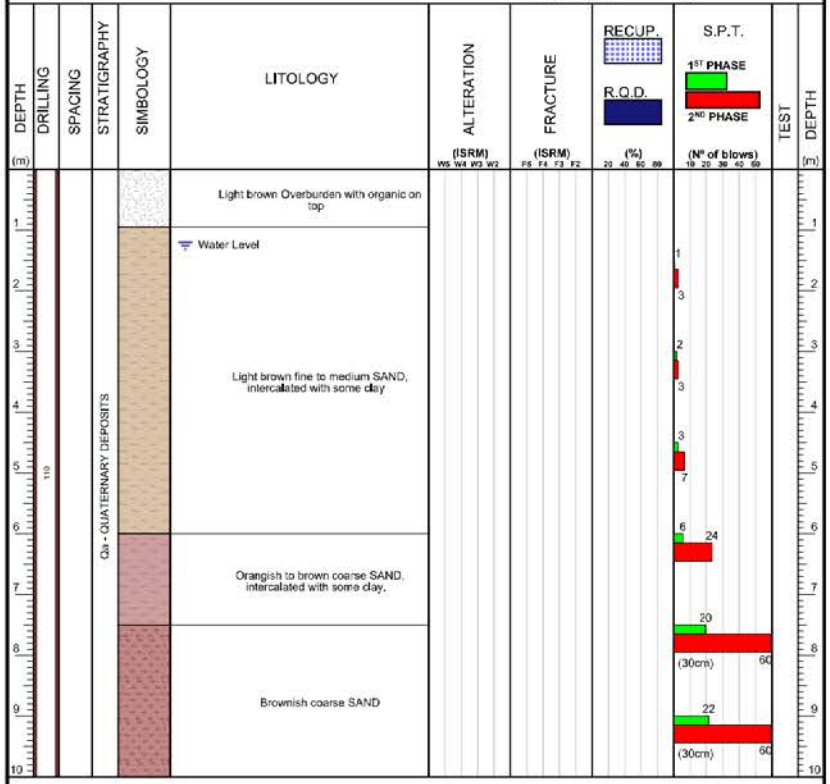
LOGGED BY: E. M. Vicente **ISSUED DATE:** 29/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY:	PROJECT:		
Matsuda Consultants Intl, ltd	Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH02 SHEET: 1/2

Equipament: Hanfa HF 130 **Casing:** 10.45 m **Start date:** 9/4/2018
Water Level: 1.3 m **Coordenate:** Lat: **End date:** 9/4/2018
Long:
Elevation: 90 °



OBSERVATION:

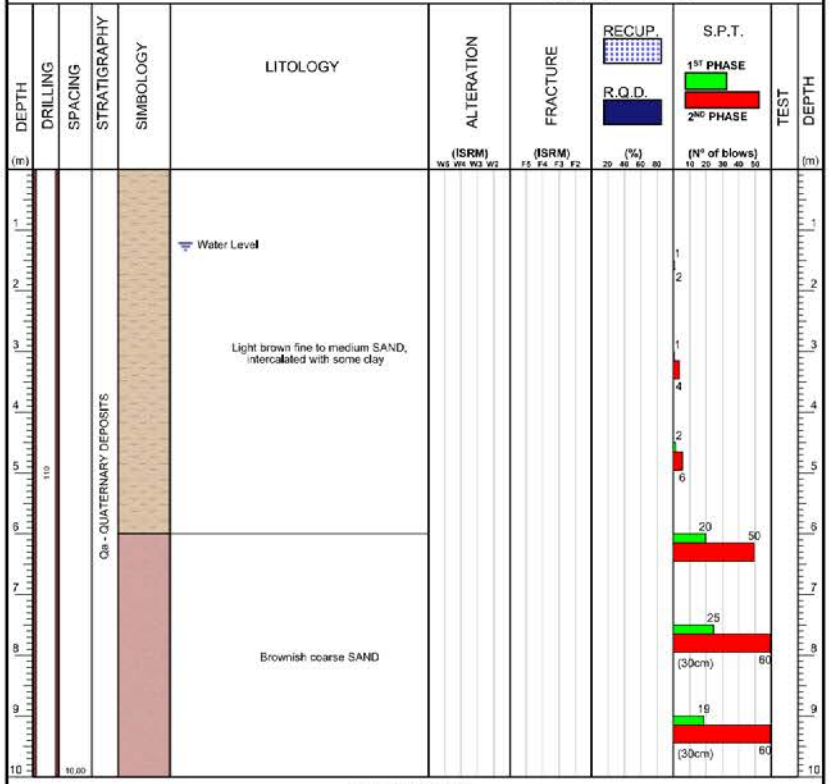
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY:	PROJECT:		
Matsuda Consultants Intl, ltd	Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH01 SHEET: 1/1

Equipament: Hanfa HF 130 **Casing:** 10.00 m **Start date:** 8/4/2018
Water Level: 1.20 m **Coordenate:** Lat: 17º 27´ 25.8´´ **End date:** 8/4/2018
Long: 037º 02´ 16.2´´
Elevation: 90 °



END AT : 10.00 m

OBSERVATION:

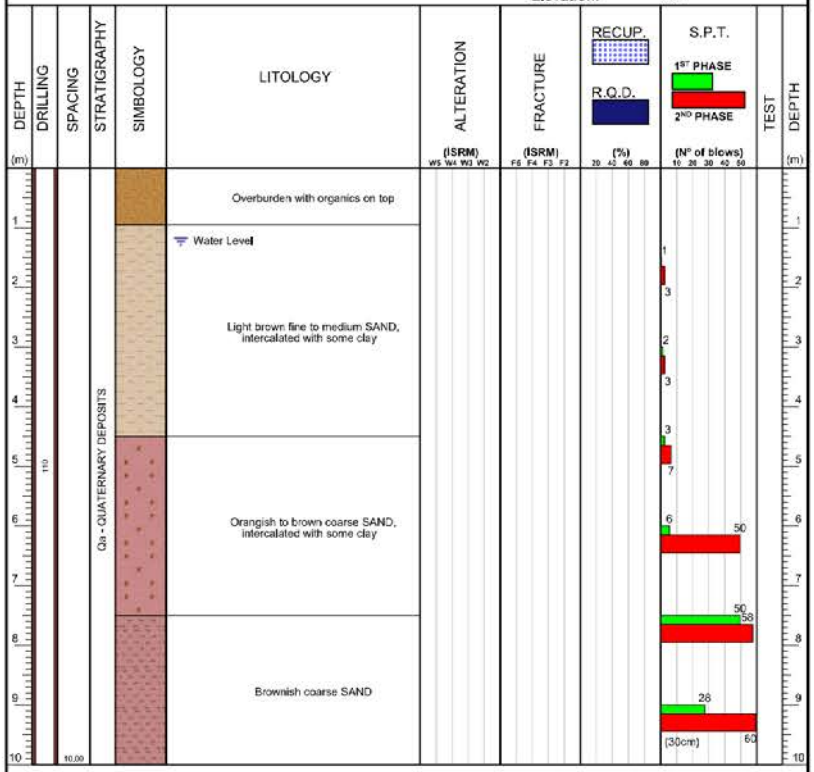
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH03
			SHEET: 1/1

Equipament:	Hanfa HF 130	**Casing:**	10.00 m (II)	**Start date:**	8/5/2018
Water Level:	1.2 m	**Coordenate:**	Lat: 17º 27' 27.2''	**End date:**	8/5/2018
			Long: 037º 02' 15.4''	**Elevation:**	90 º



END AT : 10.00 m

OBSERVATION:

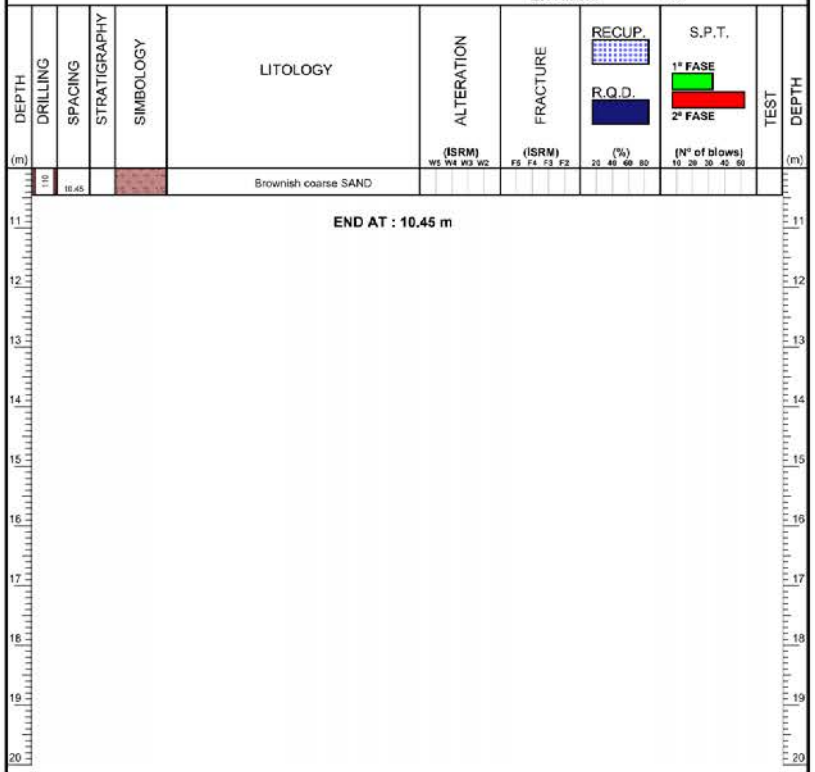
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH02
			SHEET: 2/2

Equipament:	Hanfa HF 130	**Casing:**	10.45 m (II)	**Start date:**	9/4/2018
Water Level:	0.3 m	**Coordenate:**	Lat:	**End date:**	9/4/2018
			Long:	**Elevation:**	90 º



END AT : 10.45 m

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH04
			SHEET: 2/2

Equipament:	Hanfa HF 130	**Casing:**	10.50 m (II)	**Start date:**	9/5/2018
Water Level:	0.2 m	**Coordenate:**	Lat: 16° 52' 44.3''	**End date:**	9/5/2018
			Long: 036° 58' 10.7''		
				Elevation:	90 °

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (N° of blows) 10 20 30 40 50	TEST	DEPTH (m)
11	110	10.50			Brownish coarse SAND						11
12					END AT : 10,50 m						12
13											13
14											14
15											15
16											16
17											17
18											18
19											19
20											20

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH04
			SHEET: 1/2

Equipament:	Hanfa HF 130	**Casing:**	10.50 m (II)	**Start date:**	9/5/2018
Water Level:	1.2 m	**Coordenate:**	Lat: 16° 52' 44.3''	**End date:**	9/5/2018
			Long: 036° 58' 10.7''		
				Elevation:	90 °

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (N° of blows) 10 20 30 40 50	TEST	DEPTH (m)
1	110		Qa - QUATERNARY DEPOSITS		Light brown Overburden with organic on top						1
2					Water Level				2 / 5		2
3					Light brown fine to medium SAND, intercalated with some clay				2 / 12		3
4									4 / 25		4
5					Orangish to brown coarse SAND, intercalated with some clay.						5
6									6 / 25		6
7											7
8					Brownish coarse SAND				20 / 60 (30cm)		8
9									30 / 60 (30cm)		9
10											10

OBSERVATION:

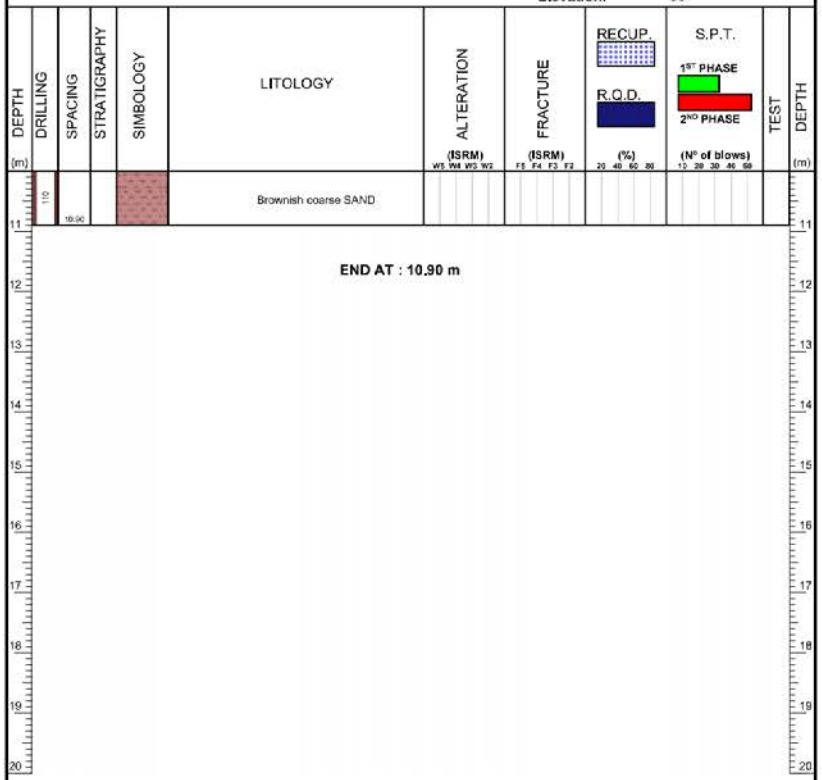
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH05
			SHEET: 2/2

Equipament:	Hanfa HF 130	**Casing:**	10.90 m (II)	**Start date:**	4/4/2018
Water Level:	0.1 m	**Coordenate:**	Lat: 16º 52´ 43.6´´ Long: 036º 58´ 09.0´´	**End date:**	4/4/2018
				Elevation:	90 º



OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

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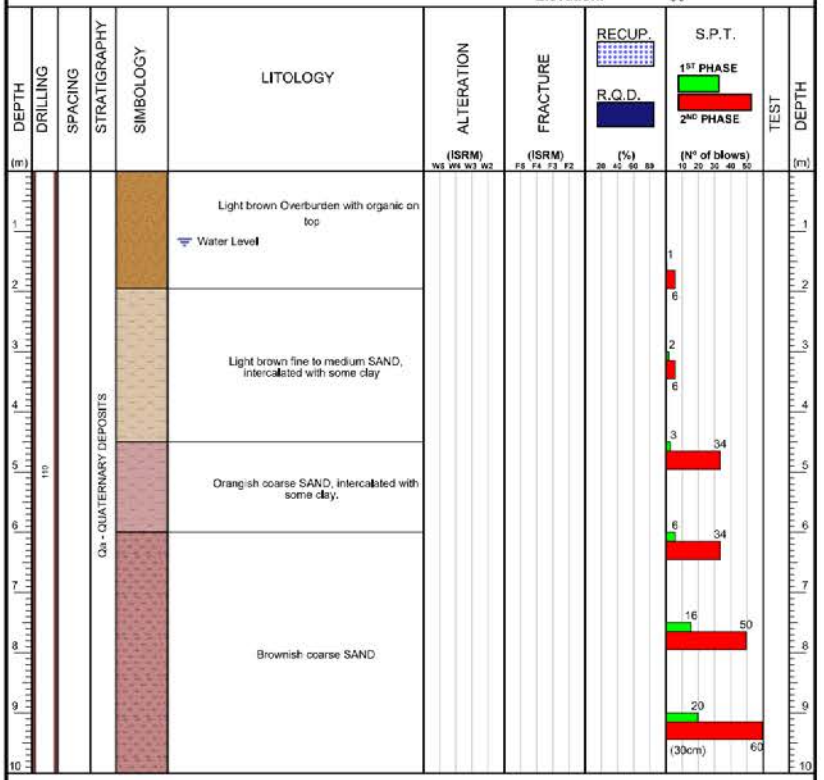
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NAMACURRA	NM - BH05
			SHEET: 1/2

Equipament:	Hanfa HF 130	**Casing:**	10.90 m (II)	**Start date:**	4/4/2018
Water Level:	1.1 m	**Coordenate:**	Lat: 16º 52´ 43.6´´ Long: 036º 58´ 09.0´´	**End date:**	4/4/2018
				Elevation:	90 º



OBSERVATION:

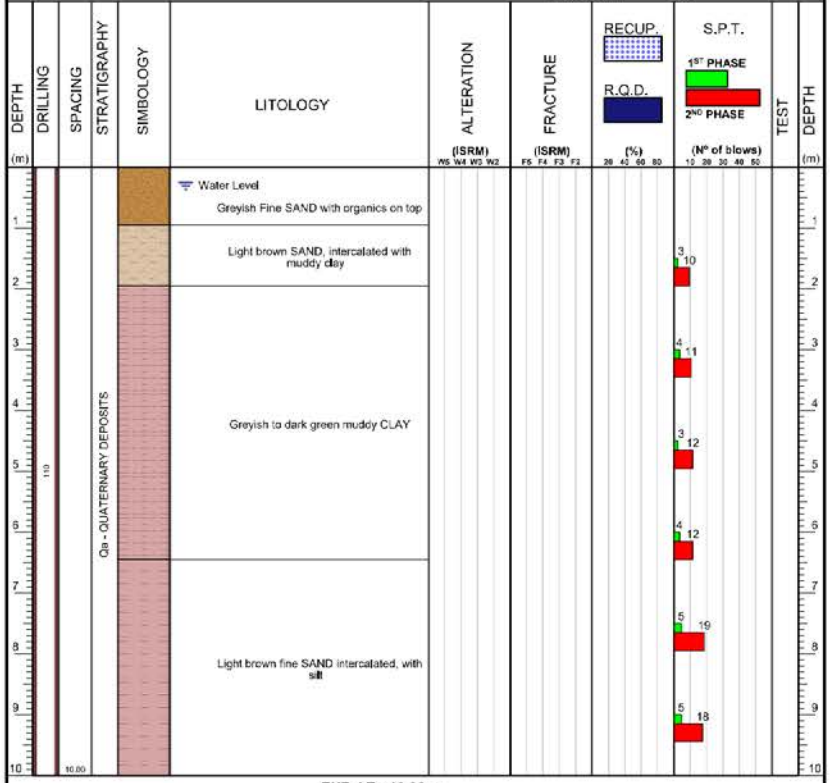
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC-BH02
			SHEET: 1/1

Equipament: Hanfa HF 130 **Casing:** 10.00 m (ø) **Start date:** 5/5/2018
Water Level: 0.20 m **Coordenate:** Lat: 17º 35´ 18.2´´ **End date:** 5/5/2018
Long: 036º 42´ 38.4´´
Elevation: 90 º



END AT : 10.00 m

OBSERVATION:

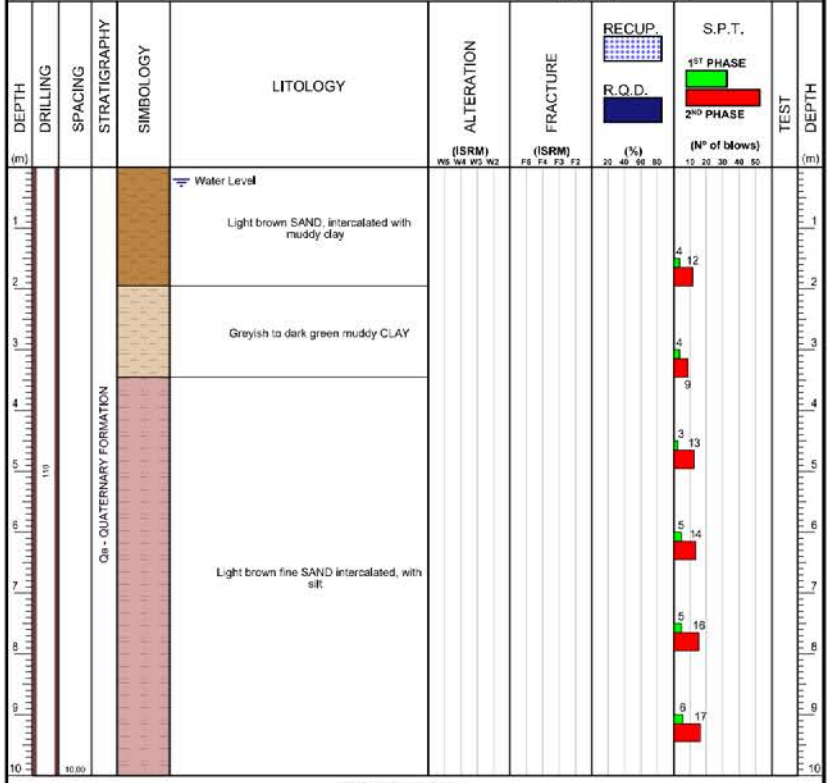
LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC - BH01
			SHEET: 1/1

Equipament: Hanfa HF 130 **Casing:** 10.00 m (ø) **Start date:** 5/5/2018
Water Level: 0.20 m **Coordenate:** Lat: 17º 27´ 21.1´´ **End date:** 5/5/2018
Long: 037º 02´ 13.5´´
Elevation: 90 º



END AT : 10,00 m

OBSERVATION:

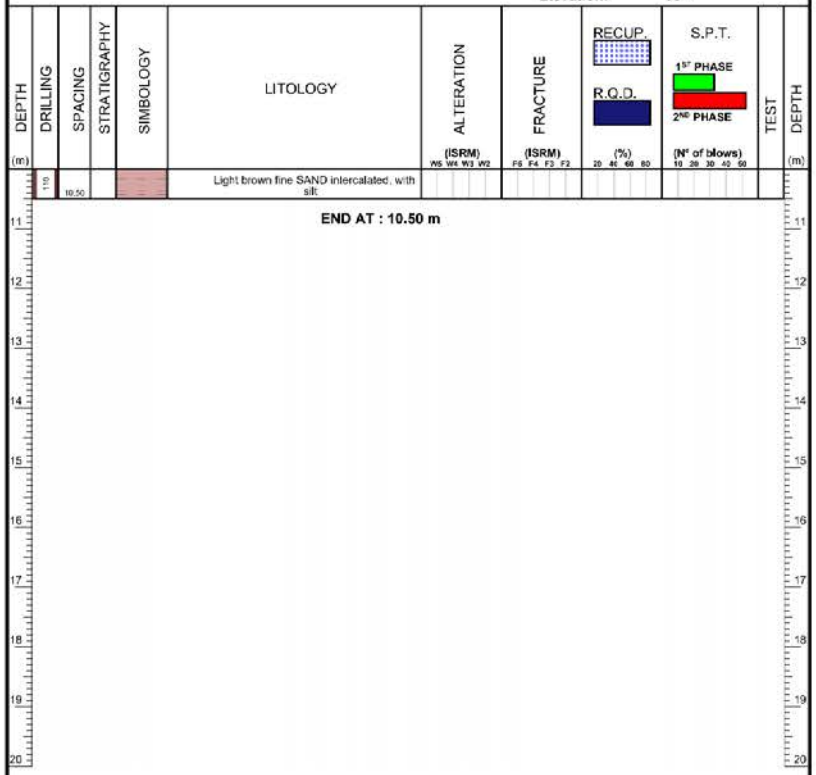
LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC - BH03
			SHEET: 2/2

Equipament:	Hanfa HF 130	**Casing:**	10.50 m (II)	**Start date:**	7/5/2018
Water Level:	0.30 m	**Coordenate:**	Lat: 17⁰ 35´ 19.9´´	**End date:**	7/5/2018
			Long: 036⁰ 42´ 39.8´´	**Elevation:**	90 °



OBSERVATION:

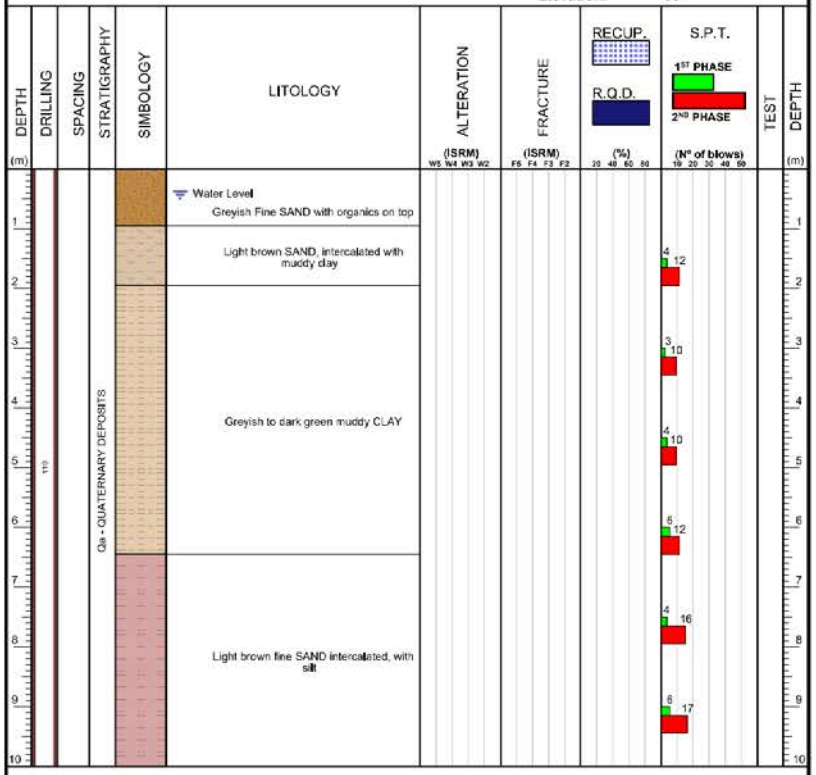
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC-BH03
			SHEET: 1/2

Equipament:	Hanfa HF 130	**Casing:**	10.50 m (II)	**Start date:**	7/5/2018
Water Level:	0.30 m	**Coordenate:**	Lat: 17⁰ 35´ 19.9´´	**End date:**	7/5/2018
			Long: 036⁰ 42´ 39.8´´	**Elevation:**	90 °



OBSERVATION:

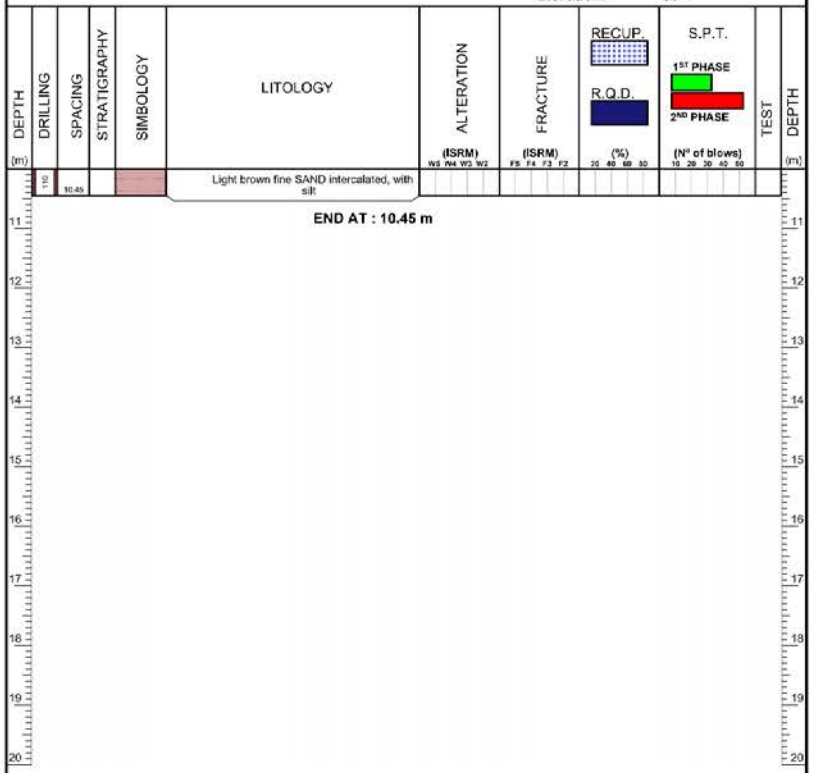
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC - BH04
			SHEET: 2/2

Equipament:	Hanfa HF 130	**Casing:**	10.45 m (II)	**Start date:**	7/5/2018
Water Level:	0.10 m	**Coordenate:**	Lat: 17° 435' 19.9''	**End date:**	7/5/2018
			Long: 036° 42' 40.8''		
				Elevation:	90 °



OBSERVATION:

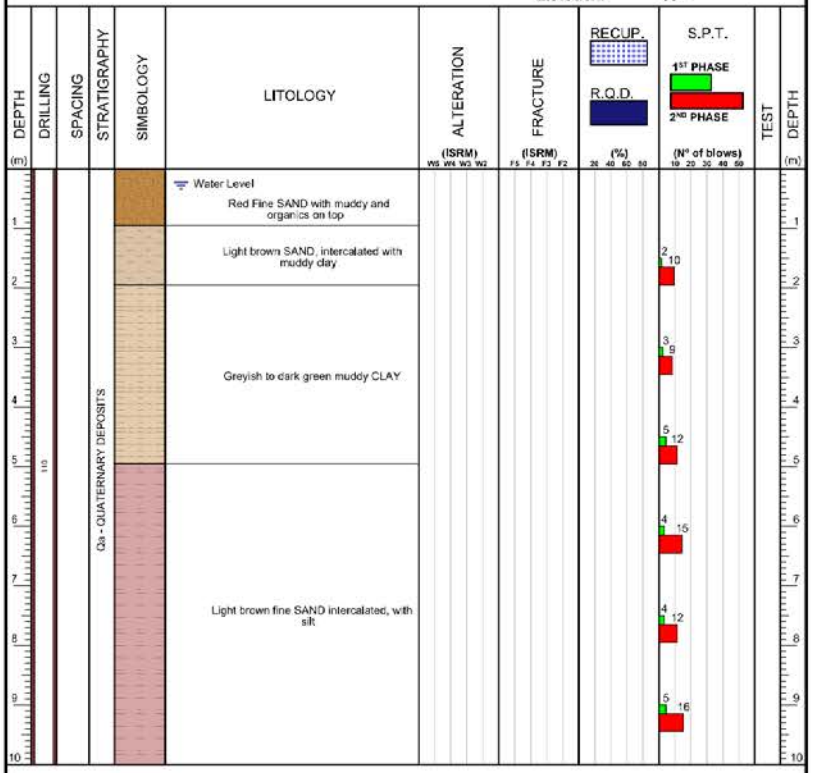
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC-BH04
			SHEET: 1/2

Equipament:	Hanfa HF 130	**Casing:**	10.45 m (II)	**Start date:**	7/5/2018
Water Level:	0.10 m	**Coordenate:**	Lat: 17° 435' 19.9''	**End date:**	7/5/2018
			Long: 036		
				Elevation:	90 °



OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC-BH05
			SHEET: 2/2

Equipament:	Hanfa HF 130	**Casing:**	10.90 m (II)	**Start date:**	7/5/2018
Water Level:	0.20 m	**Coordenate:**	Lat: 17º 35´ 19.3´´ Long: 036º 42´ 37.8´´	**End date:**	7/5/2018
				Elevation:	90 º

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
11	110	10.90			Light brown fine SAND intercalated, with silt						11
					END AT : 10.90 m						
20											20

OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	NICOADALA	NC - BH05
			SHEET: 1/2

Equipament:	Hanfa HF 130	**Casing:**	10.90 m (II)	**Start date:**	7/5/2018
Water Level:	0.20 m	**Coordenate:**	Lat: 17º 35´ 19.3´´ Long: 036º 42´ 37.8´´	**End date:**	7/5/2018
				Elevation:	90 º

DEPTH (m)	DRILLING	SPACING	STRATIGRAPHY	SIMBOLOGY	LITOLOGY	ALTERATION (ISRM) W5 W4 W3 W2	FRACTURE (ISRM) F5 F4 F3 F2	RECUP. / R.Q.D. (%) 20 40 60 80	S.P.T. 1ST PHASE / 2ND PHASE (Nº of blows) 10 20 30 40 50	TEST	DEPTH (m)
1	110		Qa - QUATERNARY DEPOSITS		Water Level Light brown Overburden with organic on top				3 10		1
2					Light brown SAND, intercalated with muddy clay				3 6		2
3											3
4					Greyish to dark green muddy CLAY				4 10		4
5									5 12		5
6											6
7									4 15		7
8											8
9					Light brown fine SAND intercalated, with silt				5 17		9
10											10

OBSERVATION:

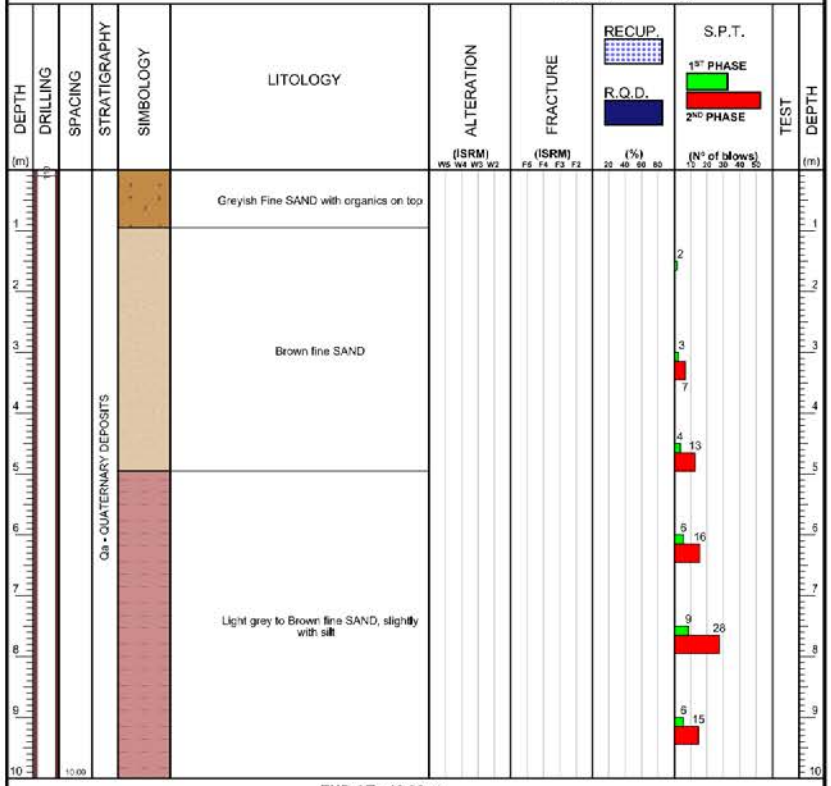
LOGGED BY: E. M. Vicente **ISSUED DATE:** 28/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - BH02
			SHEET: 1/1

Equipament: Hanfa HF 130 **Casing:** 10.00 m (II) **Start date:** 11/5/2018
Water Level: Not intersected **Coordenate** Lat: 17º 46´ 42.1´´ **End date:** 11/5/2018
Long: 037º 00´ 38.3´´
Elevation: 90 °



END AT : 10.00 m

OBSERVATION:

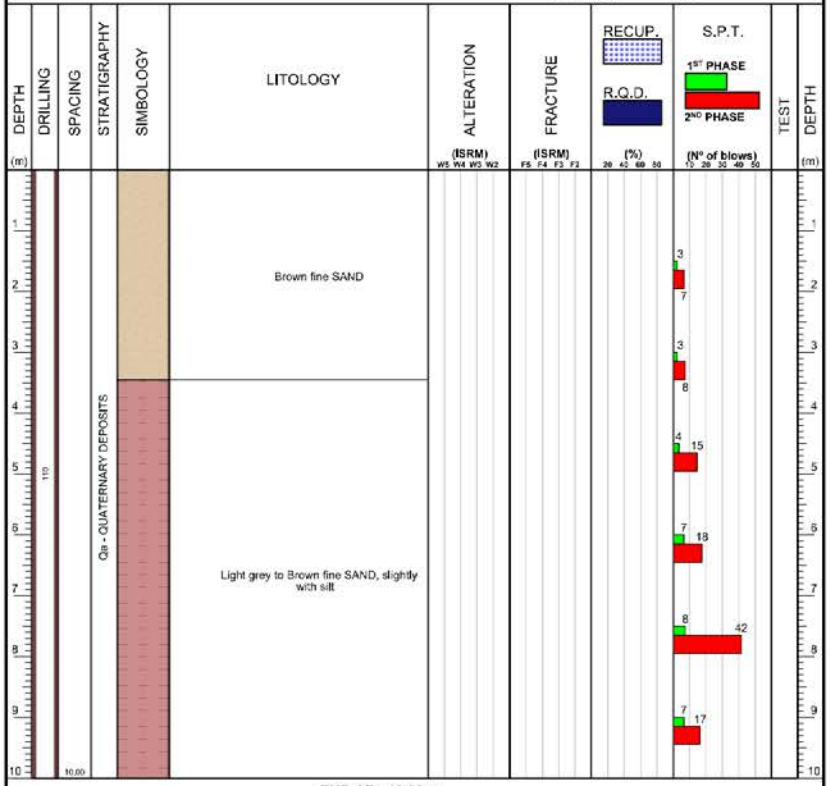
LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - BH01
			SHEET: 1/1

Equipament: Hanfa HF 130 **Casing:** 10.00 m (II) **Start date:** 11/5/2018
Water Level: Not intersected **Coordenate** Lat: 17º 46´ 43.0´´ **End date:** 11/5/2018
Long: 037º 00´ 36.6´´
Elevation: 90 °



END AT : 10.00 m

OBSERVATION:

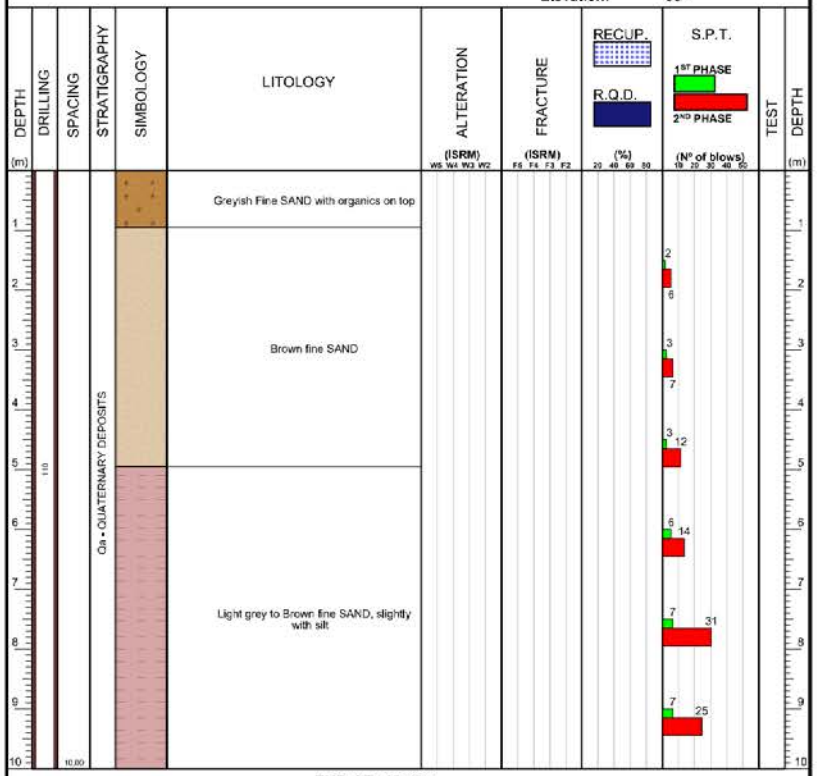
LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - BH04
			SHEET: 1/1

Equipament:	Hanfa HF 130	**Casing:**	10.45 m (II)	**Start date:**	12/4/2018
Water Level:	Not intersected	**Coordenate**	Lat: 17º 46´ 44.7´´	**End date:**	12/5/2018
			Long: 037º 00´ 37.4´´		
				Elevation:	90 º



END AT: 10.45m

OBSERVATION:

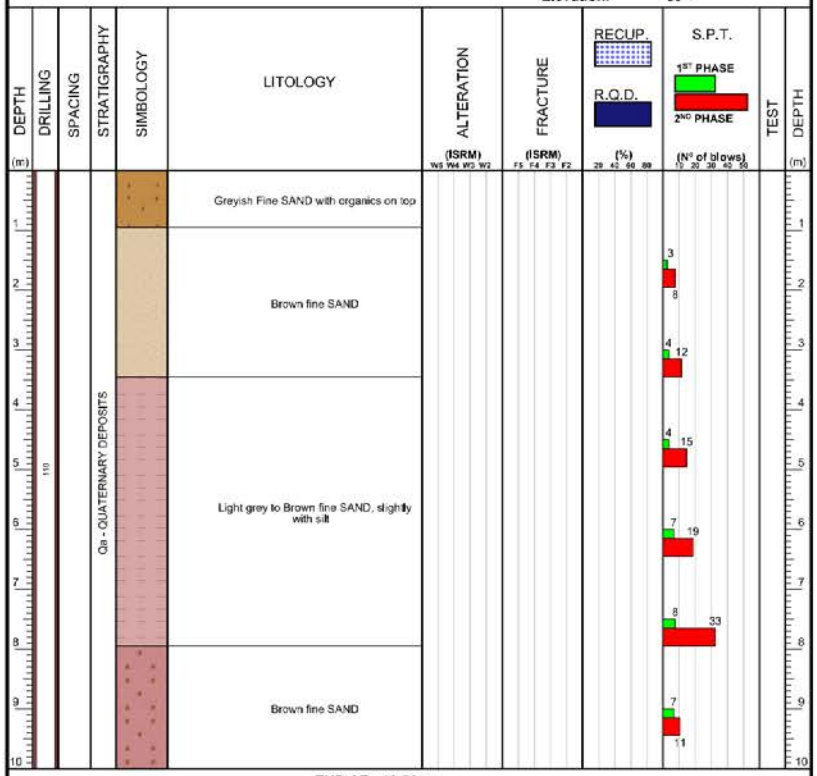
LOGGED BY: E. M. Vicente	ISSUED DATE: 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - BH03
			SHEET: 1/1

Equipament:	Hanfa HF 130	**Casing:**	10.50 m (II)	**Start date:**	12/5/2018
Water Level:	Not intersected	**Coordenate**	Lat: 17º 46´ 43.2´´	**End date:**	12/5/2018
			Long: 037º 00´ 38.3´´		
				Elevation:	90 º



END AT : 10.50 m

OBSERVATION:

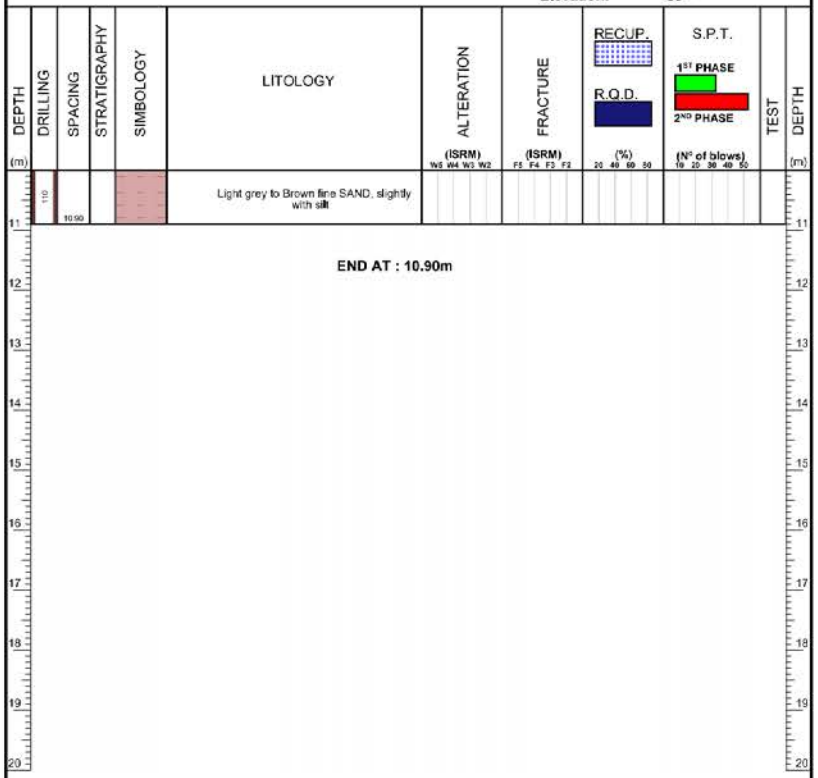
LOGGED BY: E. M. Vicente	ISSUED DATE: 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - BH05
			SHEET: 2/2

Equipament: Hanfa HF 130 **Casing:** 10.90 m (II) **Start date:** 12/5/2018
Water Level: Not intersected **Coordenate** Lat: 17° 46´ 43.9´´ **End date:** 12/5/2018
Long: 037° 00´ 39.4´´
Elevation: 90 °



OBSERVATION:

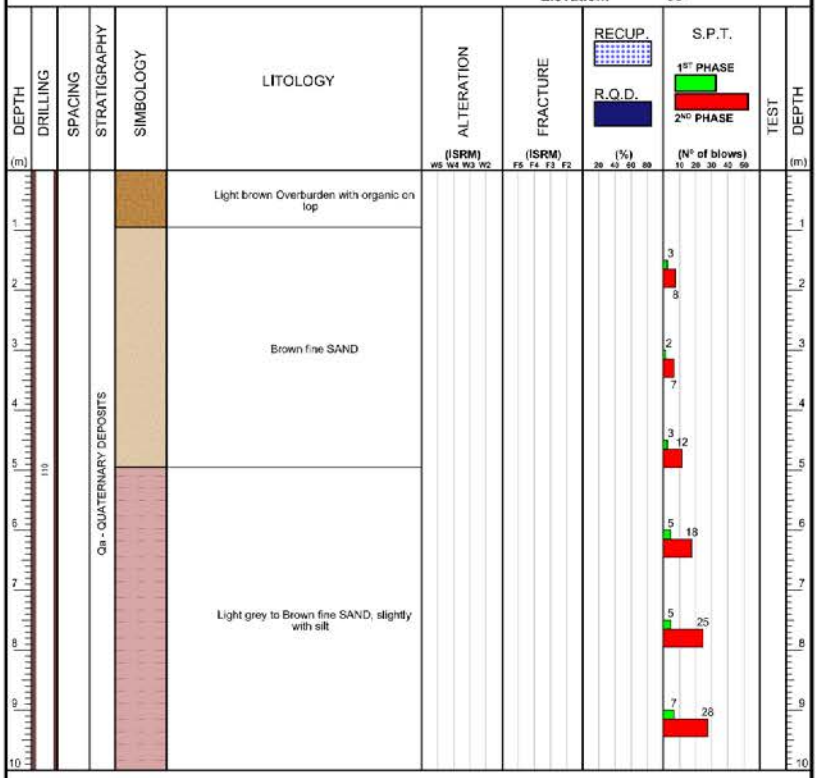
LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

VF GeoNat
Consultoria e Projectos

DRILLING

COMPANY: Matsuda Consultants Intl, ltd	PROJECT: Secondary Schools Construction at Zambezia - Zambezia Province	QUELIMANE	QL - BH05
			SHEET: 1/2

Equipament: Hanfa HF 130 **Casing:** 10.90 m (II) **Start date:** 12/5/2018
Water Level: Not intersected **Coordenate** Lat: 17° 46´ 43.9´´ **End date:** 12/5/2018
Long: 037° 00´ 39.4´´
Elevation: 90 °



OBSERVATION:

LOGGED BY: E. M. Vicente **ISSUED DATE:** 27/05/2018

6-3. 機材検討表

① カリキュラムの実施に必要である
② 施設運営・維持管理に不可欠である
③ 機材設置に必要なスペース及び施設各室のスペースが確保されている
④ 維持管理が比較的容易である（特殊技術や高価で調達困難な消耗品を必要としない）
⑤ 使用者が容易に使用できる
⑥ モ国内で調達可能である
⑦ モ国政府の優先度に沿ったものである
⑧ 日本の無償資金協力の方針に沿ったものである

機材検討表

Code No.	機材名	要請数量	要請優先度	選定基準								判定	計画数量.	数量算定根拠
				1	2	3	4	5	6	7	8			
AO-1	複合コピー機	1	A	-	○	○	○	○	○	○	○	○	1	事務室用に 1 台
AO-2	デジタル複写機	1	A	-	○	○	○	○	○	○	○	×	0	AO-1 に兼ねる
AO-3	手動製本機	1	A	-	○	○	○	○	○	○	○	○	1	事務室用に 1 台
AO-4	電動製本機	2	C	-	○	○	○	○	○	△	○	×	0	
AO-5	裁断機	1	A	-	○	○	○	○	○	○	○	○	1	事務室用に 1 台
AO-6	FAX	1	C	-	×	○	○	○	○	△	○	×	0	
AO-7	金庫	1	C	-	×	○	○	○	○	△	△	×	0	
AO-8	フリップチャート	3	C	△	-	○	○	○	○	△	○	×	0	
AO-9	フリップチャート用紙	7	C	△	-	○	○	○	○	△	×	×	0	
AO-10	ステープラー	10	C	-	△	○	○	○	○	△	○	×	0	
AO-11	大型ステープラー	3	C	-	△	○	○	○	○	△	○	×	0	
AO-12	穴あけパンチ	10	C	-	△	○	○	○	○	△	○	×	0	
AO-13	大型パンチ	3	C	-	△	○	○	○	○	△	○	×	0	
AO-14	ステープル（小）	10	C	-	△	○	○	○	○	△	×	×	0	
AO-15	ステープル（大）	3	C	-	△	○	○	○	○	△	×	×	0	
AO-16	製本用リング（6 mm）	150	C	-	△	○	○	○	○	△	×	×	0	
AO-17	製本用リング（12 mm）	500	C	-	△	○	○	○	○	△	×	×	0	
AO-18	製本用リング（16 mm）	250	C	-	△	○	○	○	○	△	×	×	0	
AO-19	製本用リング（22 mm）	100	C	-	△	○	○	○	○	△	×	×	0	
AO-20	表紙用紙	1000	C	-	△	○	○	○	○	△	×	×	0	
AO-21	表紙用透明カバー	1000	C	-	△	○	○	○	○	△	×	×	0	
AO-22	シュレッダー	2	C	-	△	○	○	○	○	△	○	×	0	
SP-01	バスケットゴールセット	1	A	○	-	○	○	○	○	○	○	×	0	
SP-02	バスケットボール	10	A	○	-	○	○	○	○	○	○	×	0	
SP-03	バレーボール	10	A	○	-	○	○	○	○	○	○	×	0	
SP-04	サッカーボール	10	A	○	-	○	○	○	○	○	○	×	0	
SP-05	バレーボールネットセット	1	A	○	-	○	○	○	○	○	○	×	0	
SP-06	サッカーゴール	1	A	○	-	○	○	○	○	○	○	×	0	
SP-07	ホイッスル	4	A	○	-	○	○	○	○	○	×	×	0	
SP-08	空気入れ	3	A	○	-	○	○	○	○	○	○	×	0	
SP-09	コンプレッサー	2	C	△	-	○	○	○	○	△	○	×	0	
SP-10	ストップウォッチ	2	A	○	-	○	○	○	○	○	○	×	0	
IT-01	デスクトップコンピュータ	32	A	○	○	○	○	○	○	○	○	○	18	ｸﾗｽ半数 24 名に 1 台/2 名で 12 台､ICT 教師用 1 台､教職員用に 5 台
IT-02	サーバー	1	A	-	○	○	○	○	○	○	○	○	1	学校内のﾃﾞｰﾀ保存用に 1 台
IT-03	ラップトップコンピュータ	2	A	-	○	○	○	○	○	○	×	×	0	
IT-04	ワイヤレスルーター	4	A	-	○	○	○	○	○	○	○	○	1	校内ﾈｯﾄﾜｰｸ構築のため 1 台
IT-05	モノクロレーザープリンタ	4	A	-	○	○	○	○	○	○	○	○	4	教職員用に 3 台､ICT 教室に 1 台

Code No.	機材名	要請数量	要請優先度	選定基準								判定	計画数量.	数量算定根拠
				1	2	3	4	5	6	7	8			
IT-06	レーザープリンタ	1	A	-	O	O	O	O	O	O	O	○	1	職員室用に 1 台
IT-07	プロジェクター	1	A	-	O	O	O	O	O	O	O	○	1	IT 教室用に 1 台
IT-08	延長ケーブル	10	C	×	-	O	O	O	O	△	○	×	0	
CL-01	ゴミ箱（蓋付き）	5	C	−	○	○	○	○	○	△	△	×	0	
CL-02	便器ブラシ	20	C	−	○	○	○	○	○	△	△	×	0	
CL-03	ゴミ箱	15	C	−	○	○	○	○	○	△	△	×	0	
CL-04	芝刈り機	10	C	−	×	○	○	○	○	△	△	×	0	
CL-05	剪定ばさみセット	5	C	−	×	○	○	○	○	△	△	×	0	
CL-06	レーキ	10	C	−	×	○	○	○	○	△	△	×	0	
CL-07	スプリンクラー	5	C	−	×	○	○	○	○	△	△	×	0	
CL-08	ホース&コネクター	4	C	−	×	○	○	○	○	△	△	×	0	
AU-01	マイクセット	1	A	−	○	○	○	○	○	○	○	×	0	
AU-02	音響システム	1	A	−	○	○	○	○	○	○	○	×	0	
SC-01	実験台セット	5	A	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-02	メジャー	5	B	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個、教師用 1 個
SC-03	ダブルスケール	5	B	○	-	○	○	○	○	○	○	×	0	
SC-04	アルキメデスの原理実験容器	5	C	▵	-	○	○	○	○	▵	○	×	0	
SC-05	ビーカー	5	B	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-06	メスシリンダー	5	B	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-07	動力計（1.5-2.0N）	10	A	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-08	おもりホルダー	10	B	○	-	○	○	○	○	○	○	○	14	8 名 x6 ｸﾞﾙｰﾌﾟで各 2 個、教師用 2 個
SC-09	ストップウォッチ	5	A	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個、教師用 1 個
SC-10	ノギス	5	B	○	-	○	○	○	○	○	○	×	0	
SC-11	ホールドピン	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個、教師用 1 個
SC-12	カップリングプラグ	5	C	△	−	○	○	○	○	△	○	×	0	
SC-13	摩擦ブロック	5	C	△	−	○	○	○	○	△	○	×	0	
SC-14	動力計（2.0-3.0N）	10	A	○	−	○	○	○	○	○	○	×	0	
SC-15	滑車実験セット	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-16	分銅皿	10	A	○	−	○	○	○	○	○	○	○	14	8 名 x6 ｸﾞﾙｰﾌﾟで各 2 個、教師用 2 個
SC-17	分銅	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-18	浮力実験キット	5	B	○	−	○	○	○	○	○	○	×	0	
SC-19	鉛ショット	5	B	○	−	○	○	○	○	○	×	×	0	
SC-20	圧力プローブ	5	B	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個、教師用 1 個
SC-21	ダブルパイプ	5	B	○	-	○	○	○	○	○	○	×	0	
SC-22	プラスチックチューブ	5	B	○	-	○	○	○	○	○	○	×	0	
SC-23	漏斗	5	A	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-24	ポンプモデル	5	C	▵	-	○	○	○	○	▵	○	×	0	
SC-25	ガス注射器	20	C	○	-	○	○	○	○	▵	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個、教師用 1 個
SC-26	毛細管	5	A	○	-	○	○	○	○	○	○	×	0	
SC-27	ゴム栓（穴あり）	5	A	○	-	○	○	○	○	○	○	×	0	試験管に付属
SC-28	チューブコネクター	5	B	○	-	○	○	○	○	○	○	×	0	
SC-29	シリコンチューブ	20	B	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個、教師用 1 個
SC-30	アルコールバーナー	5	A	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個、教師用 1 個
SC-31	フラスコ	5	A	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1

Code No.	機材名	要請数量	要請優先度	選定基準								判定	計画数量.	数量算定根拠
				1	2	3	4	5	6	7	8			
														セット
SC-32	着色剤	5	B	○	-	○	○	○	○	○	×	×	0	
SC-33	上昇管	5	B	○	-	○	○	○	○	○	○	×	0	
SC-34	温度計	5	A	○	-	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-35	放射線センサー	5	B	○	-	○	○	○	○	○	○	×	0	
SC-36	空気流実験車輪	5	A	○	−	○	○	○	○	○	○	×	0	
SC-37	縫い針	5	B	○	−	○	○	○	○	○	○	×	0	実験はさみｾｯﾄに含む
SC-38	バイメタル	5	B	○	−	○	○	○	○	○	○	×	0	
SC-39	電気実験ボードセット	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-40	銅線	5	B	○	−	○	○	○	○	○	×	×	0	
SC-41	鉄線	5	B	○	−	○	○	○	○	○	×	×	0	
SC-42	棒磁石	10	A	○	−	○	○	○	○	○	○	×	0	
SC-43	U 字磁石	5	A	○	−	○	○	○	○	○	○	×	0	
SC-44	光依存性抵抗(LDR)	10	B	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-45	方位磁針	25	B	○	−	○	○	○	○	○	○	×	0	
SC-46	コンパス	25	A	○	−	○	○	○	○	○	○	×	0	
SC-47	電極セット	5	B	○	−	○	○	○	○	○	○	×	0	
SC-48	検電器	5	C	△	−	○	○	○	○	△	○	×	0	
SC-49	マルチメーター	10	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-50	電源ユニット	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-51	光学レンズ実験セット	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-52	断熱容器	5	C	△	−	○	○	○	○	△	○	×	0	
SC-53	アルミニウム熱量計	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-54	るつぼ	5	B	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-55	シャーレ	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-56	空気槽	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-57	カバープレート	5	C	△	−	○	○	○	○	△	○	×	0	
SC-58	蒸発皿	10	B	○	−	○	○	○	○	○	○	○	14	8 名 x6 ｸﾞﾙｰﾌﾟ各 2 個､教師用 2 個
SC-59	ガラス管	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-60	攪拌棒	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-61	ガス供給管	10	C	△	−	○	○	○	○	△	○	×	0	
SC-62	曲げガラス管	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-63	蒸留用冷却器	5	C	△	−	○	○	○	○	△	○	×	0	
SC-64	ジョイントクリップ	10	C	△	−	○	○	○	○	△	○	×	0	
SC-65	スポイト	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-66	メスピペット	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-67	乳棒	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-68	乳鉢	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-69	ゴム管	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-70	ゴムベロー	5	C	△	−	○	○	○	○	△	○	×	0	
SC-71	ゴム栓	5	C	△	−	○	○	○	○	△	○	×	0	
SC-72	シリコン栓	5	C	△	−	○	○	○	○	△	○	×	0	
SC-73	安全ゴーグル	5	B	○	−	○	○	○	○	○	○	○	49	1 個/1 名で 48 個､教師用 1 個
SC-74	pH 試験紙	10	A	○	−	○	○	○	○	○	×	×	0	
SC-75	ケーブルセット	10	C	△	−	○	○	○	○	△	○	×	0	

Code No.	機材名	要請数量	要請優先度	選定基準								判定	計画数量.	数量算定根拠
				1	2	3	4	5	6	7	8			
SC-76	白熱電球	5	C	△	−	○	○	○	○	△	○	×	0	
SC-77	ソケット	5	C	△	−	○	○	○	○	△	○	×	0	
SC-78	金網	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-79	三角架付き三脚	5	B	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-80	スパチュラ	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-81	燃焼さじ	5	A	○	−	○	○	○	○	○	○	×	0	
SC-82	実験はさみセット	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-83	試験管バサミ	10	A	○	−	○	○	○	○	○	○	○	13	8 名 x6 ｸﾞﾙｰﾌﾟ各 2 個､教師用 1 個
SC-84	るつぼはさみ	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-85	マグネシア槽	10	C	△	−	○	○	○	○	△	○	×	0	
SC-86	吹管	5	C	△	−	○	○	○	○	△	○	×	0	
SC-87	ワニロクリップ	10	C	△	−	○	○	○	○	△	○	×	0	
SC-88	電極プレート槽	5	C	△	−	○	○	○	○	△	○	×	0	
SC-89	銅板	10	C	△	−	○	○	○	○	△	○	×	0	
SC-90	亜鉛板	5	C	△	−	○	○	○	○	△	○	×	0	
SC-91	鉄板	5	C	△	−	○	○	○	○	△	○	×	0	
SC-92	ニッケル板	10	C	△	−	○	○	○	○	△	○	×	0	
SC-93	アルミ板	5	C	△	−	○	○	○	○	△	○	×	0	
SC-94	カーボン板	10	C	△	−	○	○	○	○	△	○	×	0	
SC-95	試験管	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-96	U 字管	5	B	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-97	観察用ガラス皿	25	A	○	−	○	○	○	○	○	○	○	14	8 名 x6 ｸﾞﾙｰﾌﾟ各 2 個､教師用 2 個
SC-98	電極棒	10	B	○	−	○	○	○	○	○	○	×	0	
SC-99	ガラスノズル管（直角）	10	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-100	発酵管	5	C	△	−	○	○	○	○	△	○	×	0	
SC-101	試験管ラック	25	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-102	炎色実験用コバルトガラス	5	C	△	−	○	○	○	○	△	○	×	0	
SC-103	分離ホース	5	C	△	−	○	○	○	○	△	○	×	0	
SC-104	ガスバーナー	5	A	○	−	○	○	○	○	○	○	×	0	
SC-105	ホットプレート	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-106	電子天秤	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-107	ゴムバルブ（ピペット用）	5	C	△	−	○	○	○	○	△	○	×	0	
SC-108	ガーゼ	5	C	△	−	○	○	○	○	△	○	×	0	
SC-109	ガラスジャー	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-110	薬瓶	5	C	○	−	○	○	○	○	△	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個
SC-111	ビュレット	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ､教師用 1 ｾｯﾄ
SC-112	ミニクランプ	5	C	△	−	○	○	○	○	△	○	×	0	
SC-113	拡大鏡	25	C	○	−	○	○	○	○	△	○	○	25	1 個/2 名で 24 個､教師用 1 個
SC-114	プレパラートケース	5	C	△	−	○	○	○	○	△	○	×	0	
SC-115	両耳聴覚実験装置	5	C	△	−	○	○	○	○	△	○	×	0	
SC-116	触知毛	5	C	△	−	○	○	○	○	△	○	×	0	
SC-117	カラーペン	5	C	△	−	○	○	○	○	△	○	×	0	
SC-118	冷点感知棒	5	C	△	−	○	○	○	○	△	○	×	0	
SC-119	触知サークル	5	C	△	−	○	○	○	○	△	○	×	0	
SC-120	理科用ナイフ	5	C	△	−	○	○	○	○	△	○	×	0	
SC-121	ブラシ	5	C	○	−	○	○	○	○	△	○	×	0	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 個､教師用 1 個

Code No.	機材名	要請数量	要請優先度	選定基準								判定	計画数量.	数量算定根拠
				1	2	3	4	5	6	7	8			
SC-122	秤量皿	5	C	△	−	○	○	○	○	△	○	×	0	
SC-123	pH 実験紙	5	C	△	−	○	○	○	○	△	○	×	0	
SC-124	pH 実験紙（詰替え用）	5	C	△	−	○	○	○	○	△	○	×	0	
SC-125	ウッドターニング	5	C	△	−	○	○	○	○	△	○	×	0	
SC-126	折りたたみろ紙	5	C	△	−	○	○	○	○	△	○	×	0	
SC-127	単眼顕微鏡	5	A	○	−	○	○	○	○	○	○	○	7	8 名 x6 ｸﾞﾙｰﾌﾟ各 1 ｾｯﾄ、教師用 1 ｾｯﾄ
SC-128	プレパラートケース	5	C	△	−	○	○	○	○	△	○	×	0	