No.

MINISTRY OF WORKS AND TRANSPORT (MOWT)
GOVERNMENT OF THE REPUBLIC OF UGANDA

THE FEASIBILITY STUDY
ON
THE CONSTRUCTION
OF
A NEW BRIDGE ACROSS RIVER NILE AT JINJA
IN
THE REPUBLIC OF UGANDA

FINAL REPORT

VOLUME 3: APPENDICES

OCTOBER 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

ORIENTAL CONSULTANTS CO., LTD.

EIGHT - JAPAN ENGINEERING CONSULTANTS INC.

EID
CR(2)
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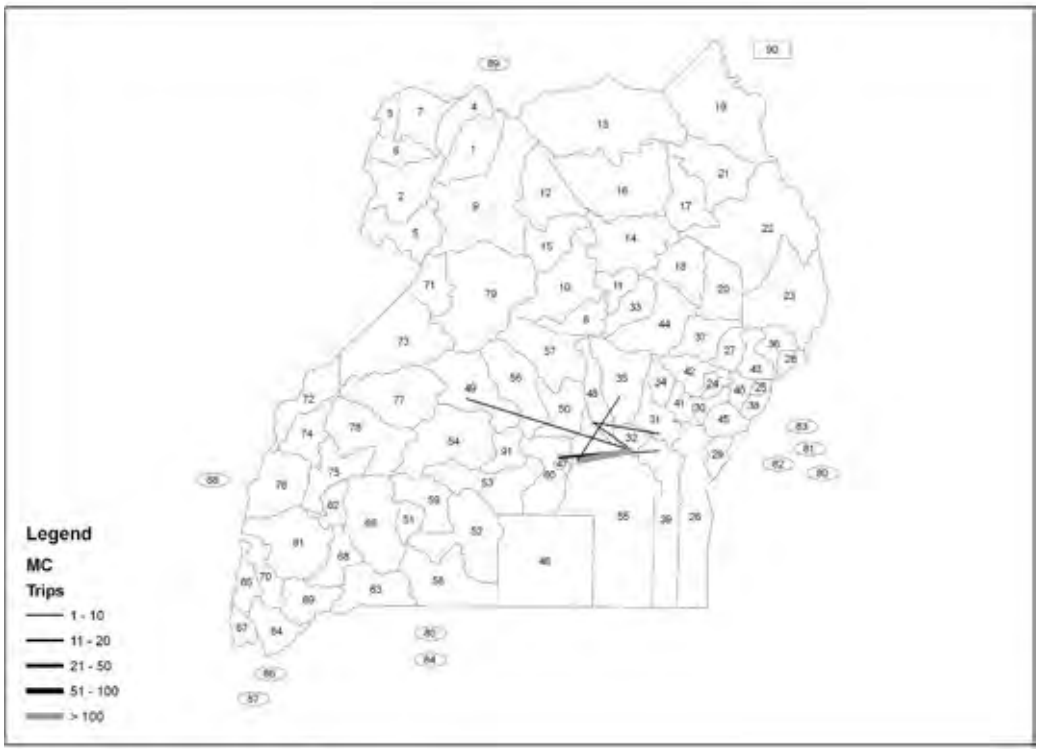
APPENDICES

APPENDIX 1

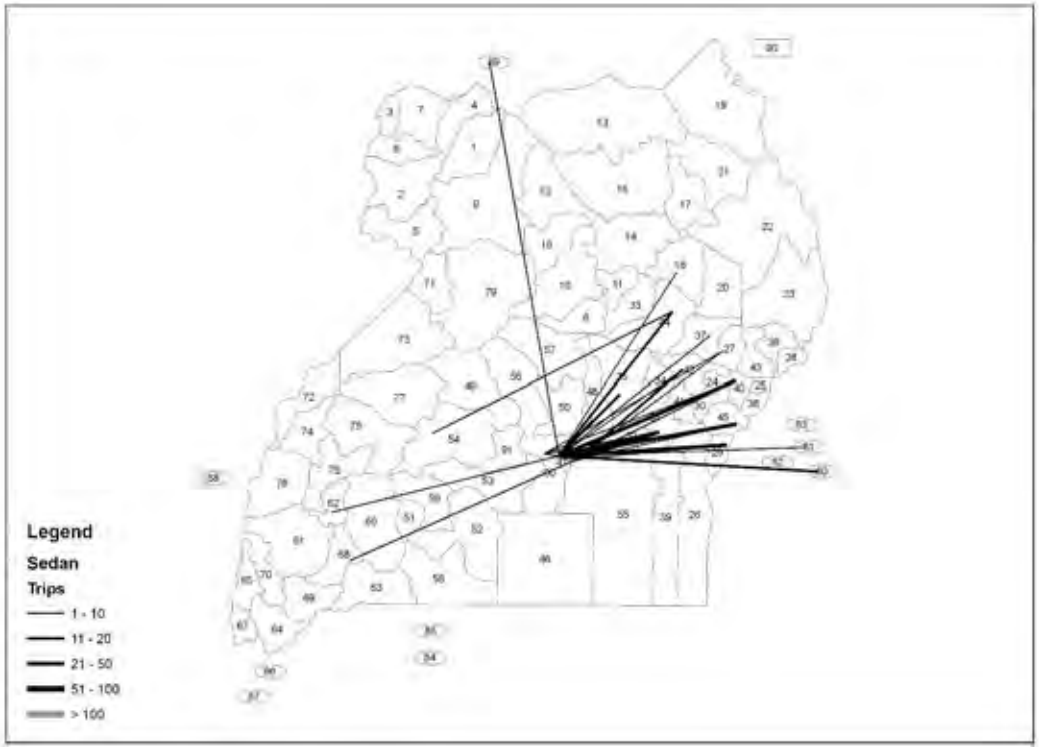
TRAFFIC DEMAND FORECAST

1.1 Desired Line

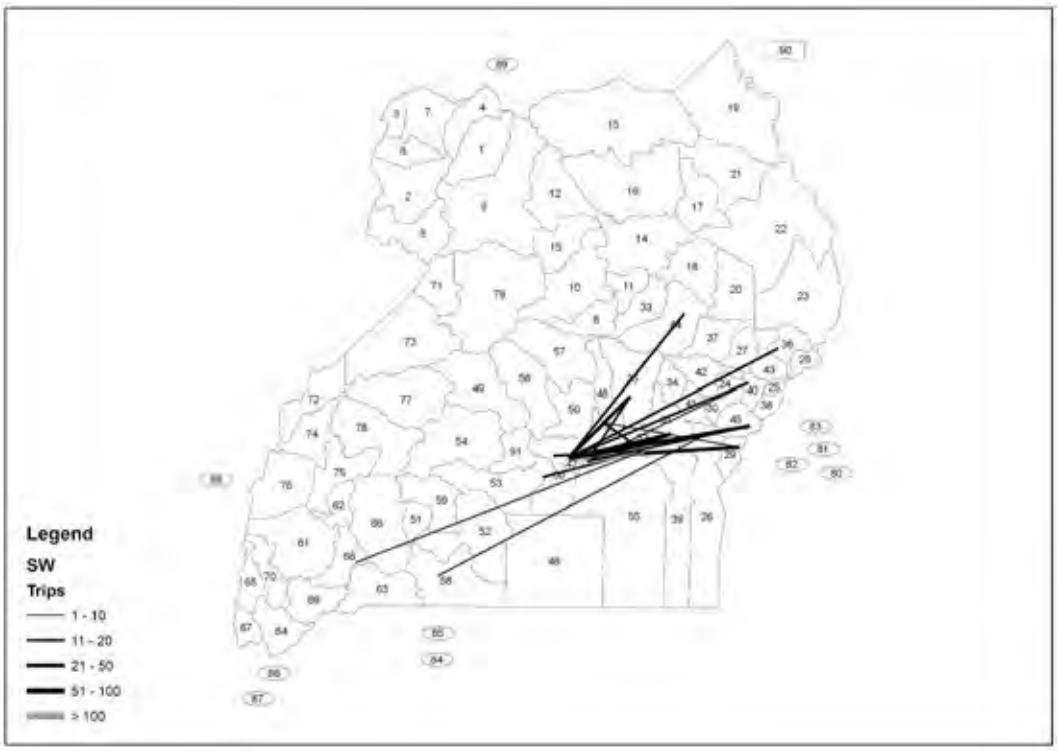
Motorcycle



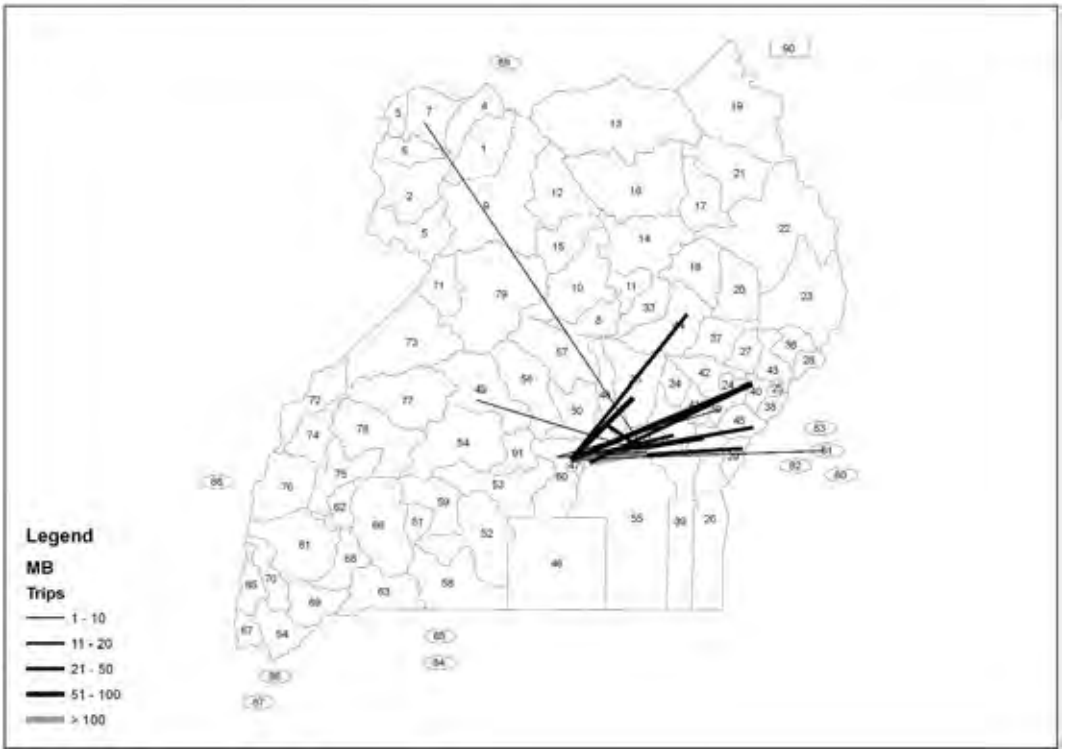
Sedan



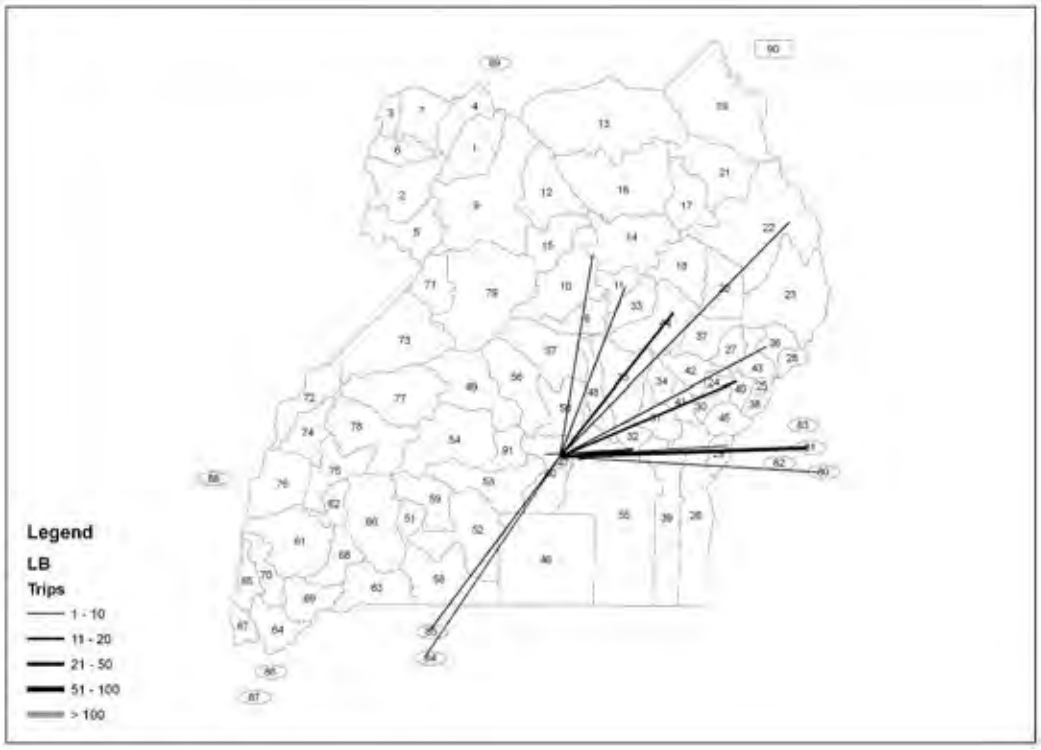
Station Wagon



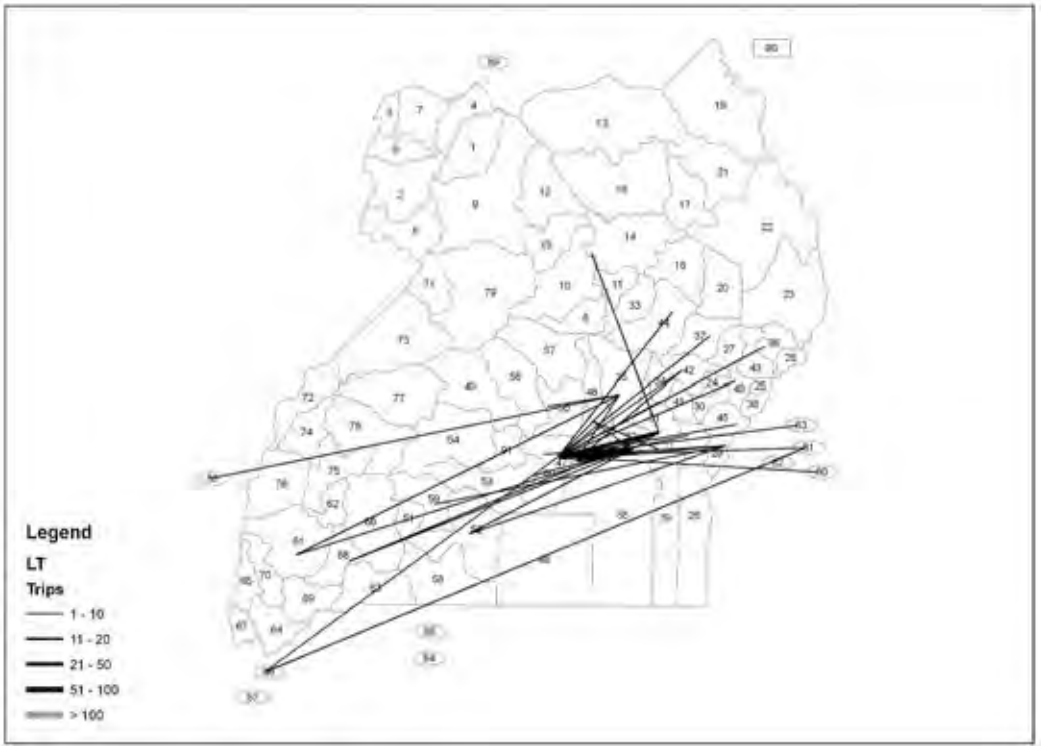
Mini Bus



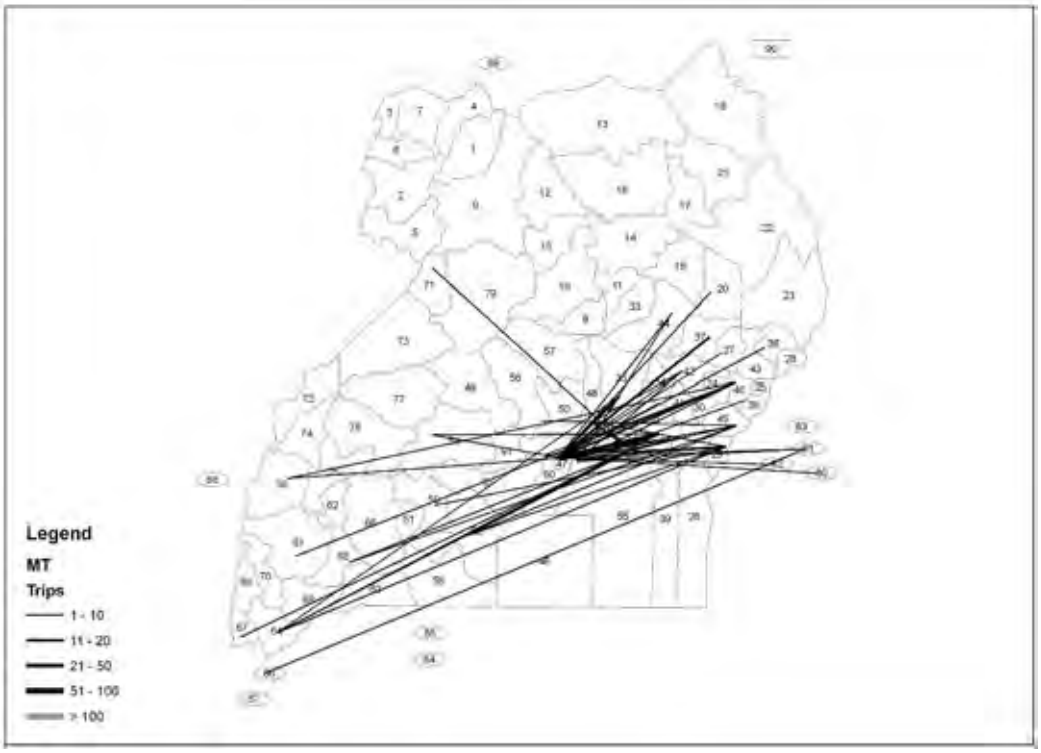
Large Bus



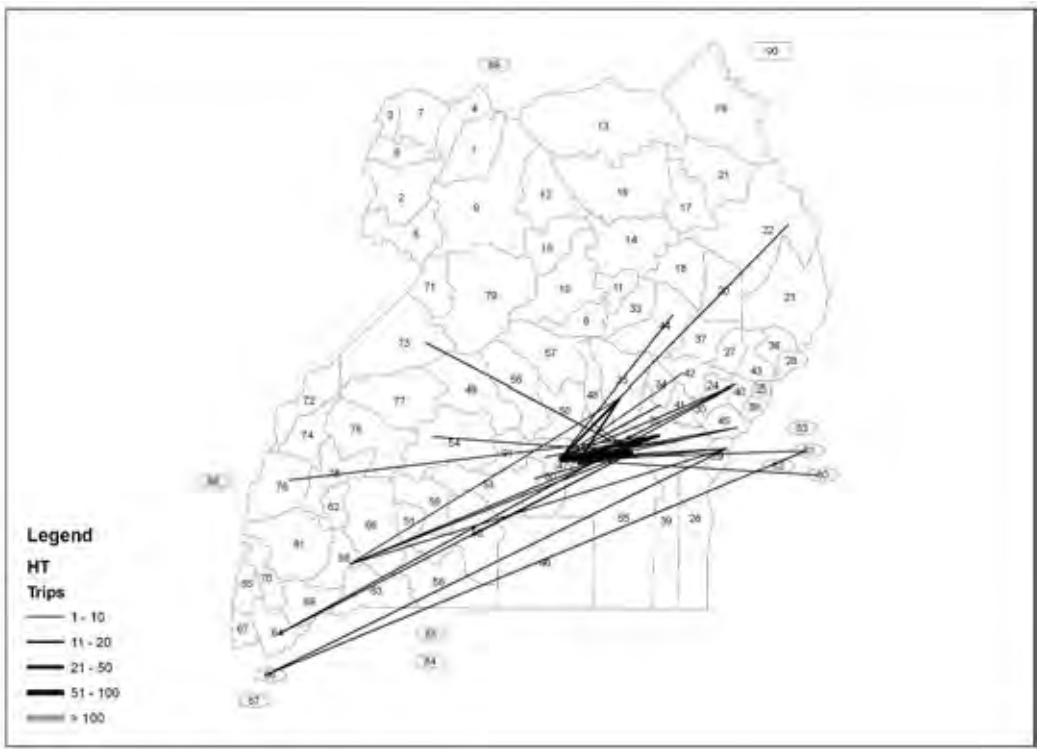
Light Truck



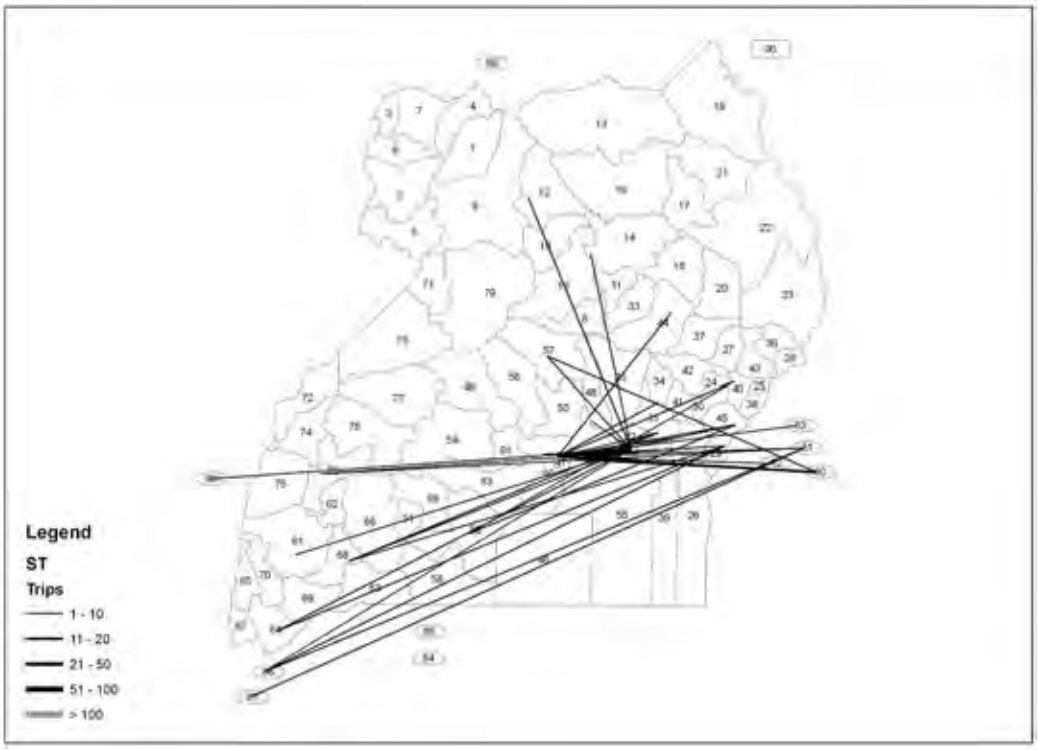
Medium Truck



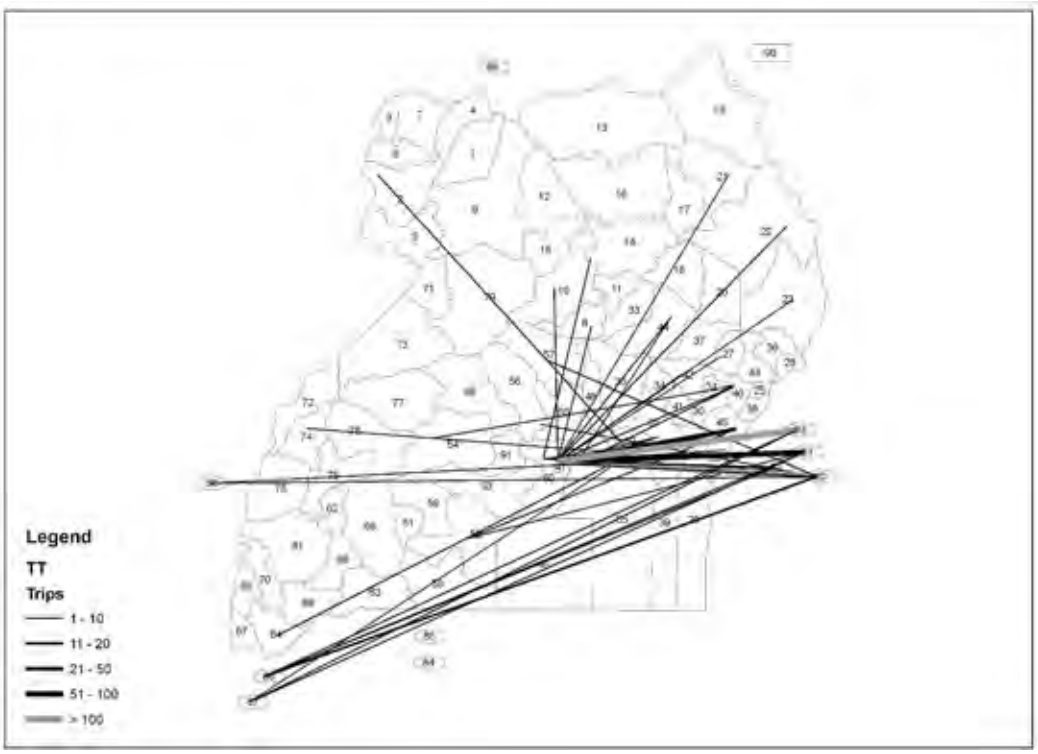
Heavy Truck



Semi Trailer

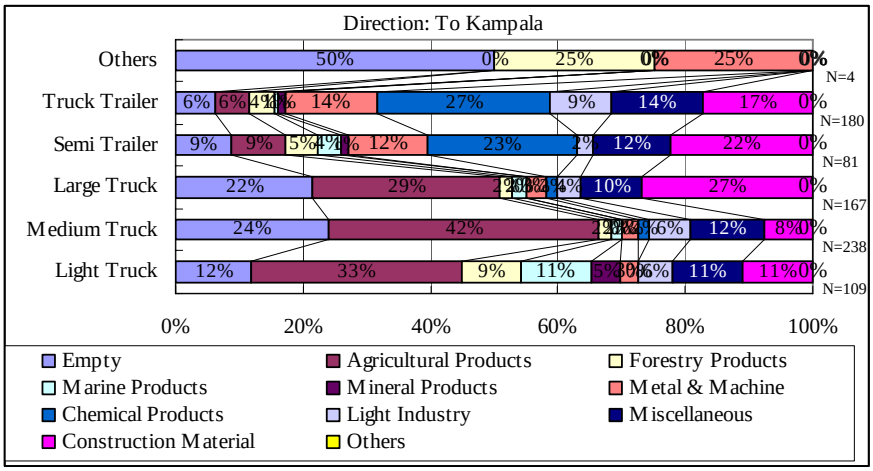


Truck Trailer

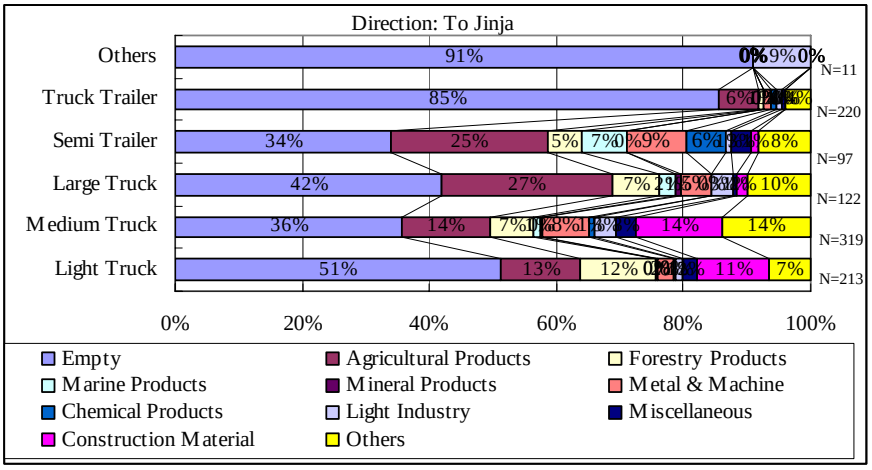


1.2 Commodity Type

Commodity Type by Direction (To Kampala)



Commodity Type by Direction (To Jinja)



APPENDIX 2

RECORDS OF EXCHANGE WITH CIVIL AVIATION AUTHORITY (CAA)

2.1 Request for Information regarding Proposal to Uganda Jinja Airfield dated 06 January 2009, by JICA Study Team

JICA Study Team
for
The Feasibility Study on the Construction of A New Nile Bridge at Jinja

Office Address: Ministry of Works Kyambogo Training School Tel: +256-312-113054 Fax: +256-312-266-243

Ref. No. 025/Jan/09/685R5641

06/January/2009

The Permanent Secretary
Ministry of Works & Transport
P.O. Box 10
Entebbe, Uganda

Dear Sir,

RE: THE PROPOSED 2ND BRIDGE ACROSS RIVER NILE AT JINJA
Request for Information regarding Proposal to Upgrade Jinja Airfield

Currently, a team of experts contracted by JICA is in the country collecting data that will serve as input into the feasibility study for the construction of the new Nile Bridge.

Specifically, this time, the study team is interested in obtaining information on the proposed upgrading of the Jinja Airfield.

The purpose of this letter is to request for an introduction to the Civil Aviation Authority who are the custodians of this information.

Mr Kazuya URANO will carry out this assignment.

Yours sincerely,

For 井澤勇郎

Isamu GUNJI
Team Leader
JICA Study Team

2.2 Information and details regarding Proposal to Uganda Jinja Airfield dated 06 January 2009, by the Ministry of Works and Transport

Telegram: MINIWORKS
Telephone: 256-41-320101/9
Telex: 61313 WORKS UGA
Fax: 256-41-320135
E-Mail: MOWHC@imul.com
In any correspondence on this subject please quote No: CG/T/18

THE REPUBLIC OF UGANDA

Ministry of Works and Transport
Headquarters,
P O Box 10,
ENTEBBE.
Uganda

January 6, 2009

The Managing Director
Civil Aviation Authority
Entebbe

Dear Sir,

RE: THE PROPOSED 2ND BRIDGE ACROSS R. NILE AT JINJA
RE: Information and details regarding proposal to Upgrade Jinja Airfield

As you are aware, The Government of Japan extended to the Government of Uganda a JICA Study team for the Feasibility Study on the Construction of a New Bridge at Jinja.

Civil Aviation Authority has been identified as a custodian of information that is crucial to the successful completion of the feasibility study.

The purpose of this letter therefore, is to introduce to you Mr. Kazuya URANO, a JICA expert who is interested in obtaining information on the upgrading of the Jinja Airfield.

Uganda National Roads Authority who are the technical representatives on this project will furnish you any further details.

A O Mugisa
FOR: PERMANENT SECRETARY

CC Uganda National Roads Authority

2.3 Meeting to Review Effect of the Bridge to Jinja Airfield dated 25 February 2009, by the Ministry of Works and Transport

Telegram: 'MINIWORKS
Telephone: 256-42-320101/9
Telex: 61313 WORKS UGA
Fax: 256-42-320135
E-Mail: MOWHC@imul.com,
In any correspondence on this subject please quote No. TR/CA 93/158/01

THE REPUBLIC OF UGANDA

Ministry of Works and Transport Headquarters,
P O Box 10,
Entebbe,
UGANDA

25th February 2009

The Managing Director
Civil Aviation Authority
ENTEBBE

THE PROPOSED 2ND BRIDGE ACROSS RIVER NILE AT JINJA : MEETING TO REVIEW EFFECT OF THE BRIDGE TO JINJA AIRFIELD

Please find hereto attached a letter referenced 037/Feb/09/685R5641 and date 10th February 2009 from the JICA Study Team that is carrying out a feasibility study for the bridge captioned above. The concerns and wishes of the study team are well and crisply stated in the letter.

You are, please, asked to give the team an appointment and arrange to discuss and resolve the issue soonest possible. You can contact the Team Leader on the telephone or facsimile numbers indicated at the top of their letter cited above.

The 2nd Bridge project is a dear and important project for Uganda and the Great Lakes Region. Time is of marked essence; hence my request for an earliest appointment for the interface.

C. Muganzi
PERMANENT SECRETARY

c.c. The Executive Director
Uganda National Roads Authority
KAMPALA (Attn: The Director, Projects)

c.c. The Commissioner for Roads
Ministry of Works and Transport
ENTEBBE

c.c. Mr. Isamu GUNJI
Team Leader, JICA Study Team
Public Works Training Centre, Kyambogo
KAMPALA (Fax: 0414 : 266 243)

2.4 Request for A Meeting to Discuss Jinja Airfield dated 03 March 2009, by Civil Aviation Authority

CIVIL AVIATION AUTHORITY

UGANDA

Head Office Building
Entebbe International Airport
P.O. Box 5536, Kampala, Uganda

Our Ref: **CAA/08/JA/44**

Your Ref:

03 March 2009

Team Leader
JICA Study Team
KAMPALA
Fax: 256 313 266 243

RE: REQUEST FOR A MEETING TO DISCUSS JINJA AIRFIELD

We are in possession of a letter TR/CA93/158/01 dated 25 February 2009 from the Permanent Secretary, Ministry of Works and Transport and attached to it a copy of your letter 037/Feb/09/685R5641 dated 10 February 2009.

I have scheduled a meeting with the JICA Study Team on Wednesday 04 March 2009 at 10.00 a.m. in my office on the subject highlighted above.

Sam Muneeza
DIRECTOR SAFETY, SECURITY AND ECONOMIC REGULATION

2.5 Interpretation of Aerodrome Surface Limitation for Jinja Airfield dated 05 March 2009, by JICA Study Team

JICA Study Team
for
The Feasibility Study on the Construction of A New Nile Bridge at Jinja

Office Address: Ministry of Works Kyambogo Training School Tel: +256-312-113054 Fax. +256-312-266-243

Ref. No. 047/Mar/09/685R5641
05/March/2009

Mr. Sam Muneeza
Director Safety, Security and Economic Regulation
Civil Aviation Authority

Re: The Proposed 2nd Bridge across River Nile at Jinja
Interpretation of Aerodrome Surface Limitation for Jinja Airfield

It is to confirm you whether or not the Aerodrome Surface Limitation for Jinja Airfiled as attached in Appendix-1 is correct, which was prepared by JICA Study Team based on the documents in Appendix-2 provided by you on 11 December 2008. It was also given by you verbally that Jinja Airfield is classified as Non-instrument Runway.

During the topographic survey works for the Project, runway surface elevation survey was carried out to obtain the base elevation of Aerodrome Surface Limitation base on Uganda Standard Datum (USD). Elevations of runway surface are 1171.671 at the lowest and 1173.891 at the highest.

It was confirmed by the JICA Study Team that all Bridge Location Alternatives A, B and C are within the Inner Horizontal Surface as shown in Appendix-3. Taking the lowest runway surface elevation of 1171.671 with a room, aviation limitation elevation for the Project Bridge is assumed to be 1216.0 (1171.671 + 45.000 = 1216.671 → 1216.000).

It is to be confirmed by you that Bridge Type A4 with pylon top elevation of 1215.451 is accepted for Aerodrome Surface Limitation, while Bridge Type A5 is not.

Detailed discussion will be made at 10:00AM on 09 March 2009 between Civil Aviation Authority and JICA Study Team. If you have any comments on the above and attached documents, it is kindly requested you to give us prior to the scheduled meeting.

Yours sincerely,

Dr. Masaaki TATSUMI
Deputy Team Leader
JICA Study Team

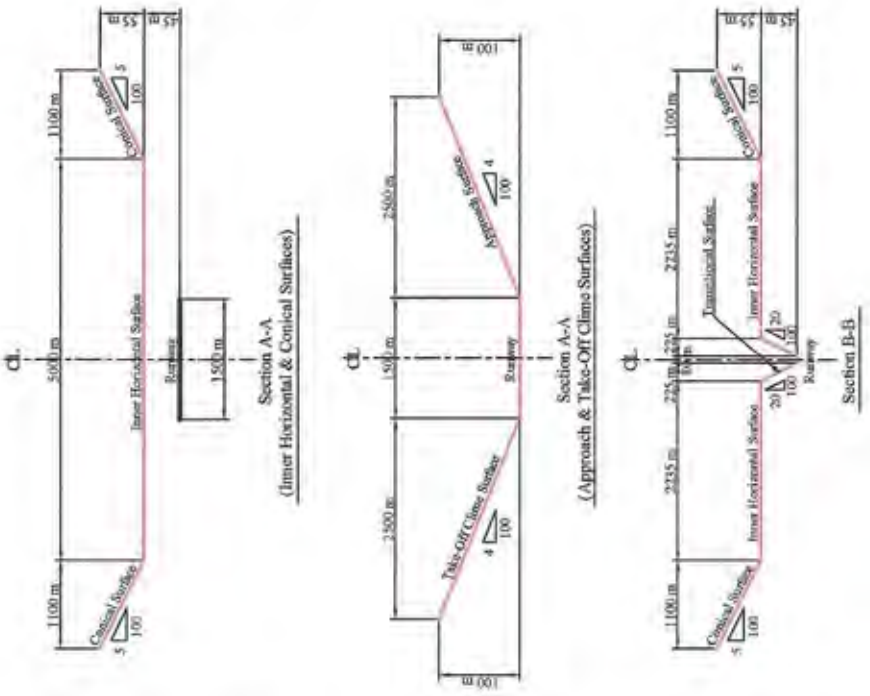
Cc: Project Manager – UNRA (Eng. George Bwanga)

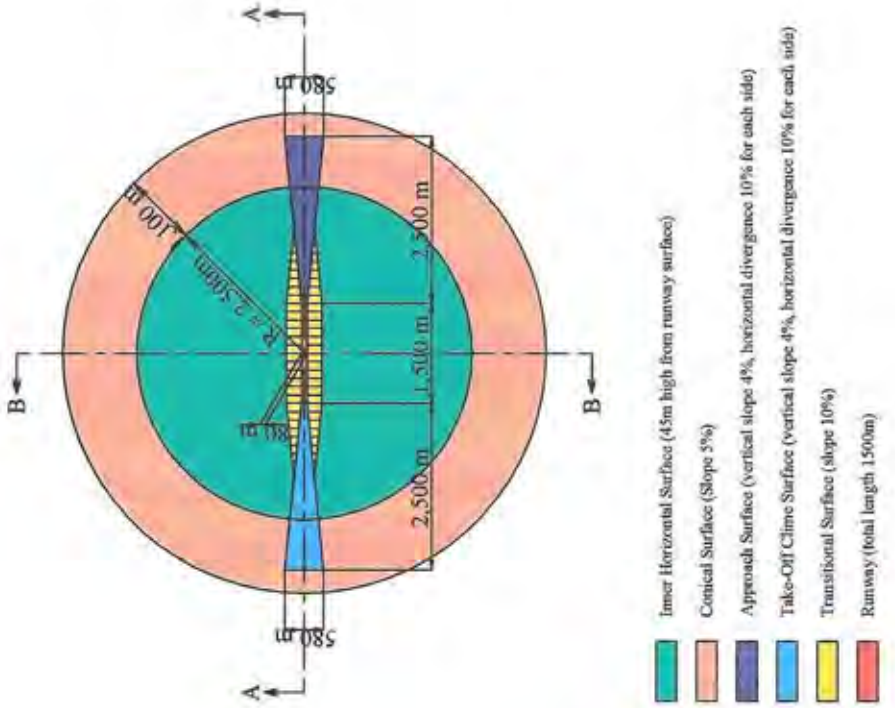
JICA Study Team
for
The Feasibility Study on the Construction of A New Nile Bridge at Jinja

Office Address: Ministry of Works Kyambogo Training School Tel: +256-312-113054 Fax: +256-312-266-243

Appendix-1	Interpreted Aerodrome Surface Limitation for Jinja Airfield by JICA Study Team (1 Page),
Appendix-2	Documents for Aerodrome Surface Limitation provided by Civil Aviation Authority (8 Pages),
Appendix-3	Relation between Bridge Location Alternatives and Aerodrome Surface Limitation (1 Page),
Appendix-4	Bridge Alternatives on Bridge Location A (1 Page),

Appendix-1 Interpreted Aerodrome Surface Limitation for Jinja Airfield by JICA Study Team,





1/1

Appendix-2 Documents for Aerodrome Surface Limitation provided by Civil Aviation Authority,

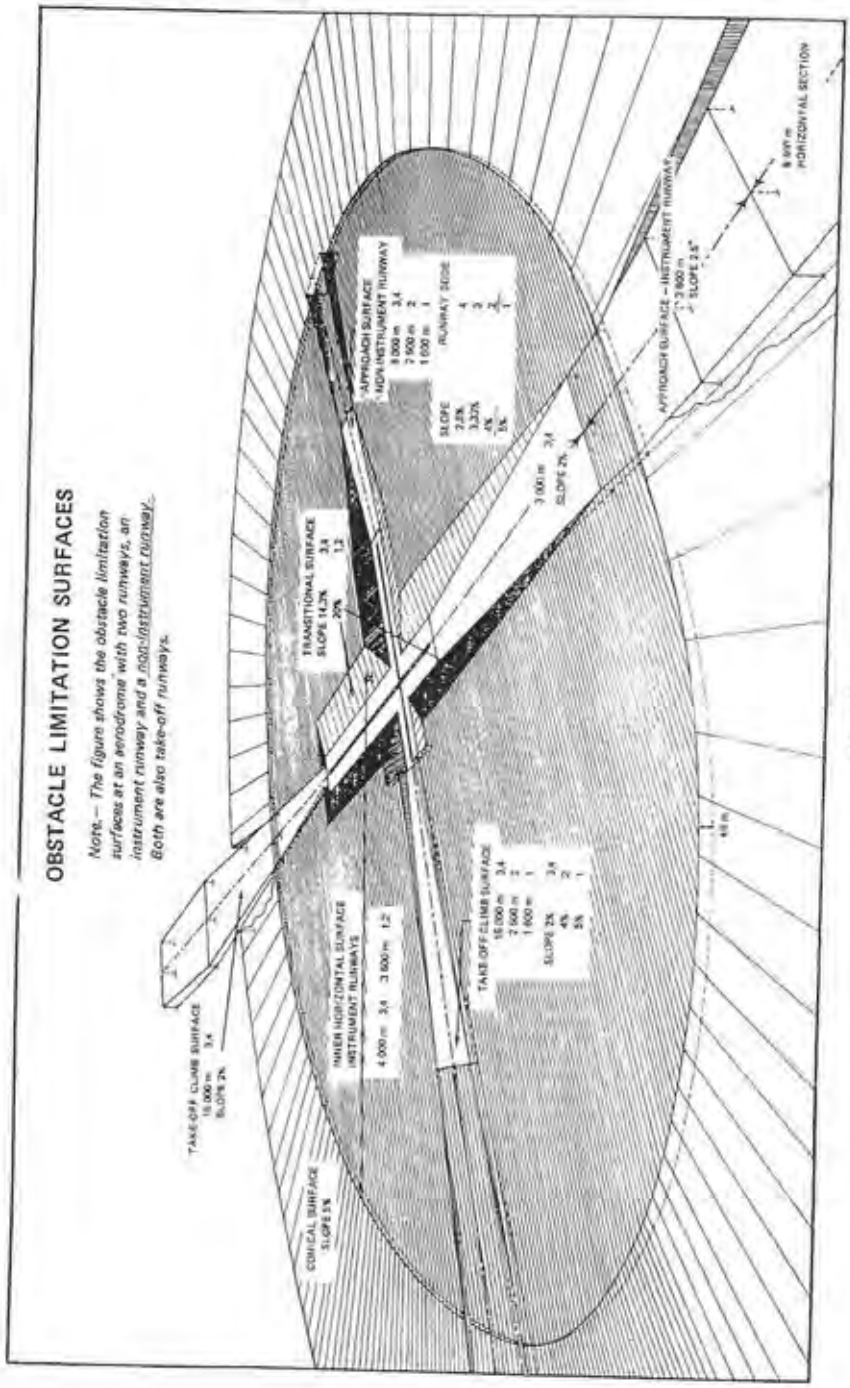


Figure A-1-1

Part 6. - Control of Obstacles
Appendix 1.- Illustration of Obstacle Limitation Surfaces other than those constituting an Obstacle-Free Zone

45

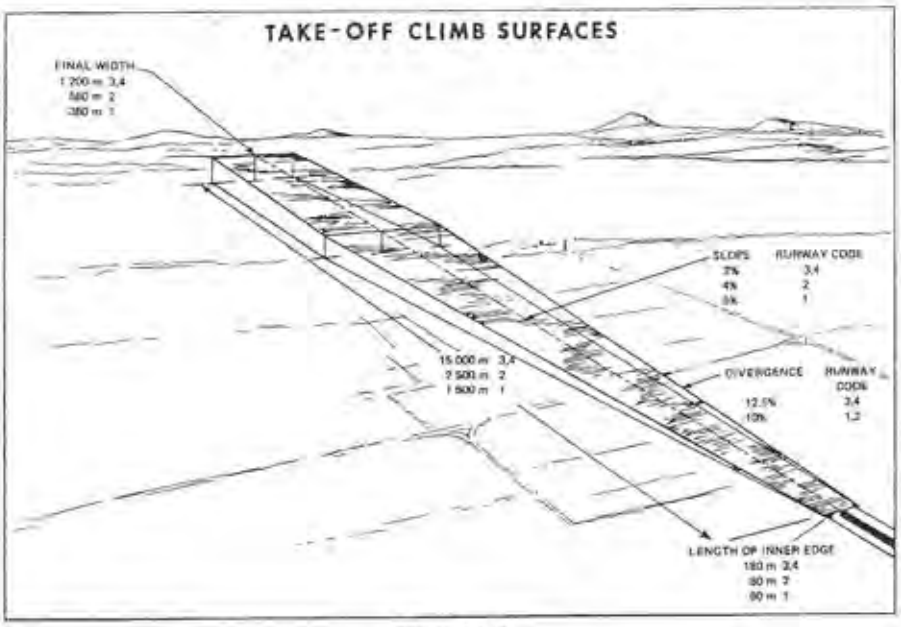


Figure A-1-2

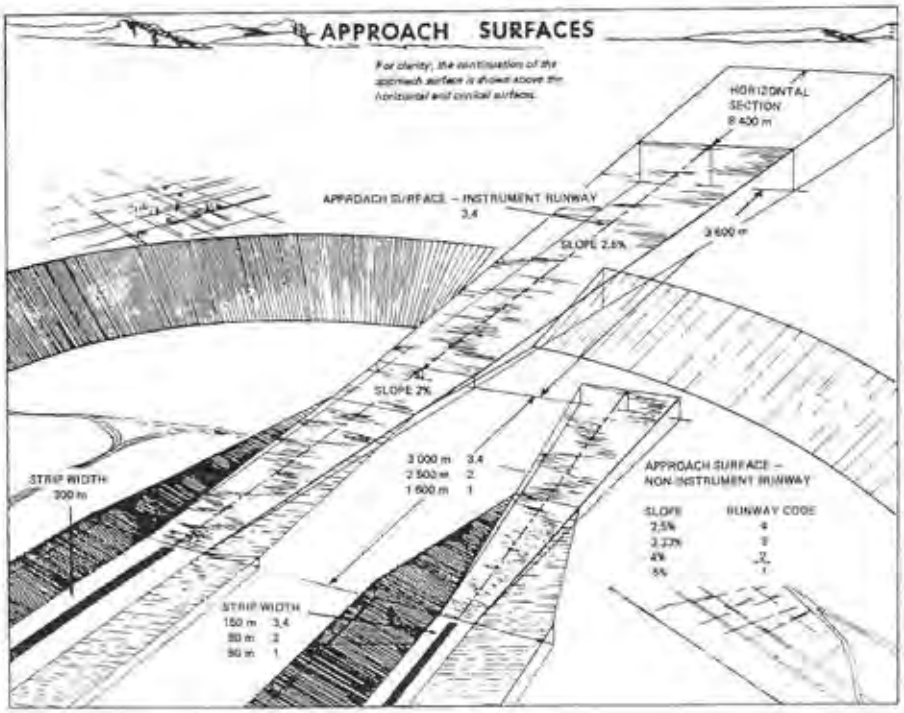


Figure A-1-3

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Annex 14 — Aerodromes *Volume*

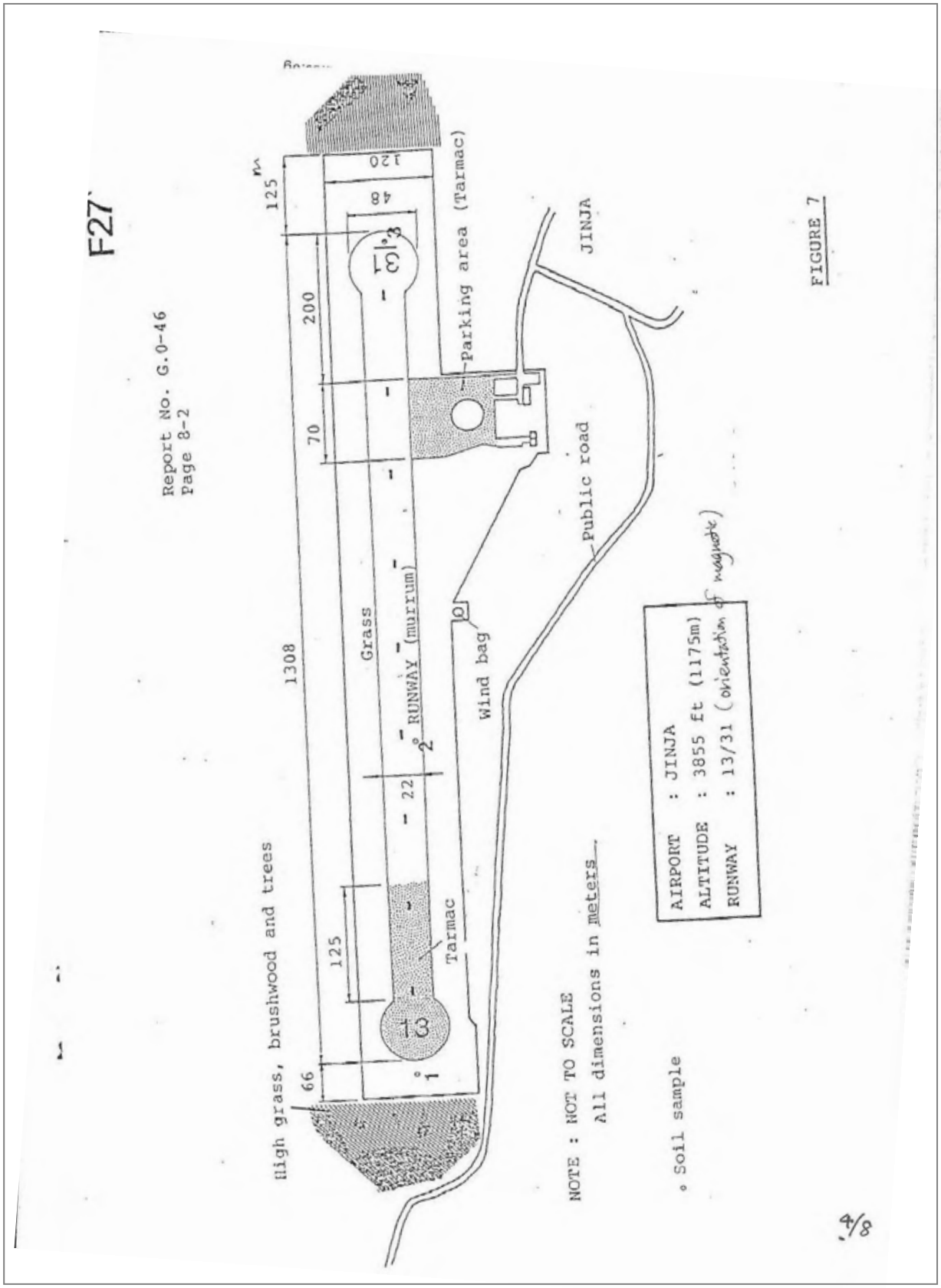
Table 4-1. Dimensions and slopes of obstacle limitation surfaces —Approach runways

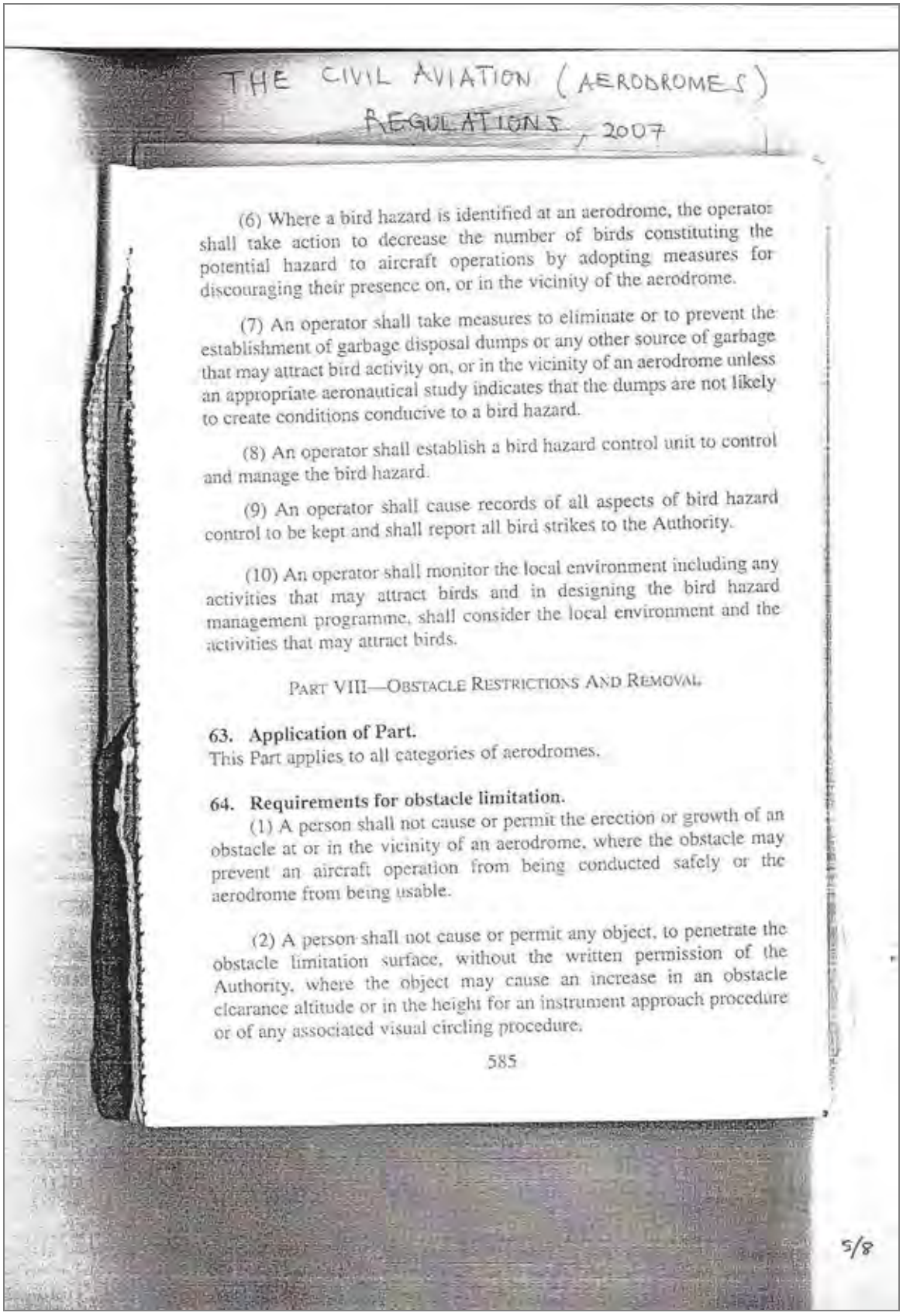
APPROACH RUNWAYS

Surfaces and dimensions[a]	RUNWAY CLASSIFICATION: Non-instrument, Code number 1	2	3	4	Non-precision approach, Code number 1,2	3	4	Precision approach category I, Code number 1,2	3,4	Precision approach category II or III, Code number 3,4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
CONICAL										
Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Height	35 m	55 m	75 m	100 m	60 m	75 m	100 m	60 m	100 m	100 m
INNER HORIZONTAL										
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m
Radius	2 000 m	2 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m
INNER APPROACH										
Width	—	—	—	—	—	—	—	90 m	120 m[b]	120 m[b]
Distance from threshold	—	—	—	—	—	—	—	60 m	60 m	60 m
Length	—	—	—	—	—	—	—	900 m	900 m	900 m
Slope								2.5%	2%	2%
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	150 m	300 m	300 m	150 m	300 m	300 m
Distance from threshold	30 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence (each side)	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
First section										
Length	1 600 m	2 500 m	3 000 m	3 000 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m	3 000 m
Slope	5%	4%	3.33%	2.5%	3.33%	2%	2%	2.5%	2%	2%
Second section										
Length	—	—	—	—	—	3 600 m[b]	3 600 m[b]	12 000 m	3 600 m[b]	3 600 m[b]
Slope	—	—	—	—	—	2.5%	2.5%	3%	2.5%	2.5%
Horizontal section										
Length	—	—	—	—	—	8 400 m[b]	8 400 m[b]	—	8 400 m[b]	8 400 m[b]
Total length	—	—	—	—	—	15 000 m	15 000 m	15 000 m	15 000 m	15 000 m
TRANSITIONAL										
Slope	20%	20%	14.3%	14.3%	20%	14.3%	14.3%	14.3%	14.3%	14.3%
INNER TRANSITIONAL										
Slope	—	—	—	—	—	—	—	40%	33.3%	33.3%
BALKED LANDING SURFACE										
Length of inner edge	—	—	—	—	—	—	—	90 m	120 m[c]	120 m[c]
Distance from threshold	—	—	—	—	—	—	—	[c]	1 800 m[d]	1 800 m[d]
Divergence (each side)	—	—	—	—	—	—	—	10%	10%	10%
Slope	—	—	—	—	—	—	—	4%	3.33%	3.33%

a. All dimensions are measured horizontally unless specified otherwise.
b. Variable length (see 4.2.9 or 4.2.17).
c. Distance to the end of strip.
d. Or end of runway whichever is less.
e. Where the code letter is F (Column (3) of Table 1-1), the width is increased to 155 m.

25/11/04 4-6 3/8


F27
Report No. G.0-46
Page 8-2
FIGURE 7
125
200
70
1308
Grass
RUNWAY (murrum)
22
125
66
Tarmac
Wind bag
Parking area (Tarmac)
JINJA
Public road
High grass, brushwood and trees
AIRPORT : JINJA
ALTITUDE : 3855 ft (1175m)
RUNWAY : 13/31 (orientation of magnetic)
NOTE : NOT TO SCALE
All dimensions in meters
Soil sample
4/8



THE CIVIL AVIATION (AERODROMES) REGULATIONS, 2007

(6) Where a bird hazard is identified at an aerodrome, the operator shall take action to decrease the number of birds constituting the potential hazard to aircraft operations by adopting measures for discouraging their presence on, or in the vicinity of the aerodrome.

(7) An operator shall take measures to eliminate or to prevent the establishment of garbage disposal dumps or any other source of garbage that may attract bird activity on, or in the vicinity of an aerodrome unless an appropriate aeronautical study indicates that the dumps are not likely to create conditions conducive to a bird hazard.

(8) An operator shall establish a bird hazard control unit to control and manage the bird hazard.

(9) An operator shall cause records of all aspects of bird hazard control to be kept and shall report all bird strikes to the Authority.

(10) An operator shall monitor the local environment including any activities that may attract birds and in designing the bird hazard management programme, shall consider the local environment and the activities that may attract birds.

PART VIII—OBSTACLE RESTRICTIONS AND REMOVAL

63. Application of Part.
This Part applies to all categories of aerodromes.

64. Requirements for obstacle limitation.
(1) A person shall not cause or permit the erection or growth of an obstacle at or in the vicinity of an aerodrome, where the obstacle may prevent an aircraft operation from being conducted safely or the aerodrome from being usable.

(2) A person shall not cause or permit any object, to penetrate the obstacle limitation surface, without the written permission of the Authority, where the object may cause an increase in an obstacle clearance altitude or in the height for an instrument approach procedure or of any associated visual circling procedure.

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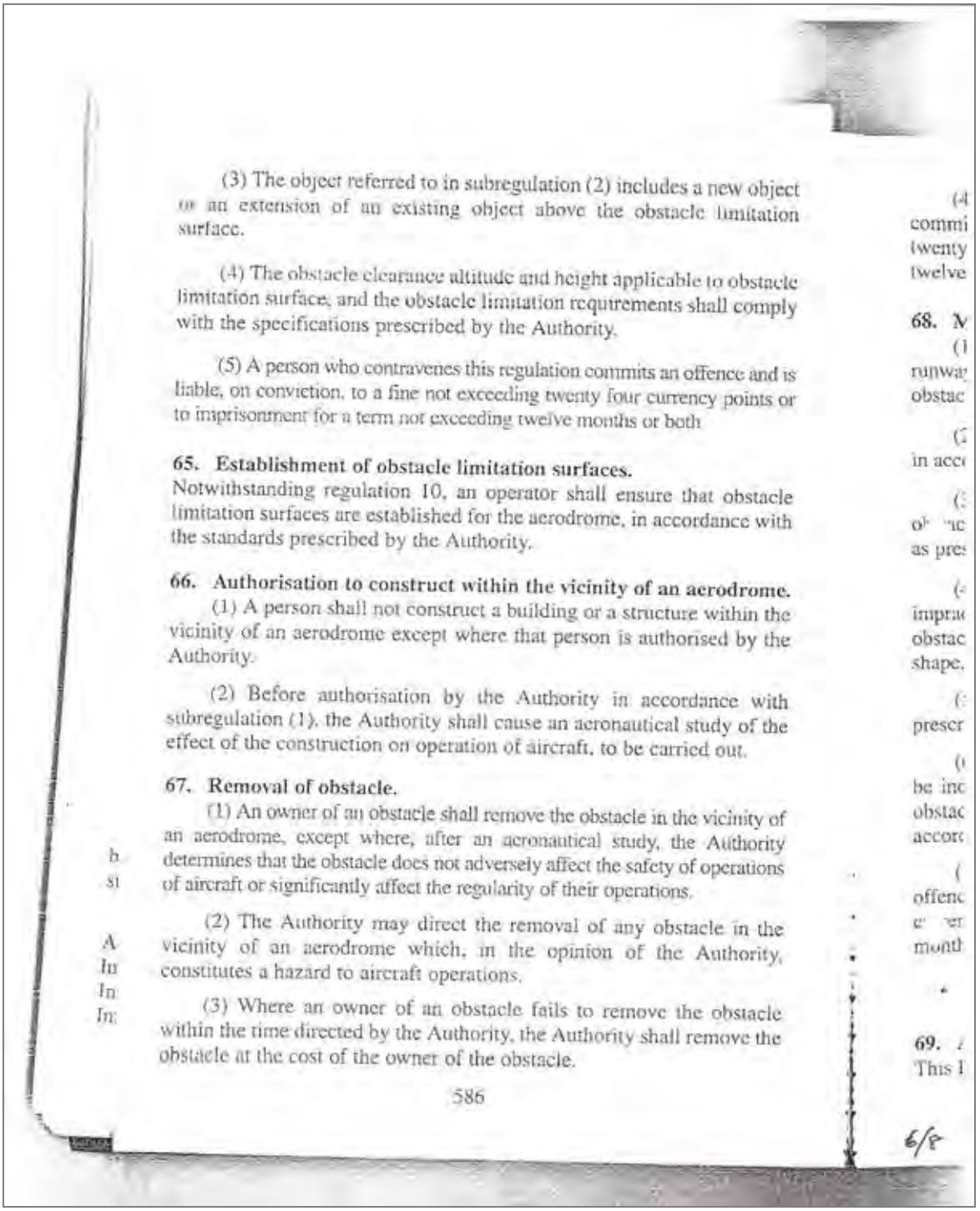

(3) The object referred to in subregulation (2) includes a new object or an extension of an existing object above the obstacle limitation surface.

(4) The obstacle clearance altitude and height applicable to obstacle limitation surface, and the obstacle limitation requirements shall comply with the specifications prescribed by the Authority.

(5) A person who contravenes this regulation commits an offence and is liable, on conviction, to a fine not exceeding twenty four currency points or to imprisonment for a term not exceeding twelve months or both.

65. Establishment of obstacle limitation surfaces.
Notwithstanding regulation 10, an operator shall ensure that obstacle limitation surfaces are established for the aerodrome, in accordance with the standards prescribed by the Authority.

66. Authorisation to construct within the vicinity of an aerodrome.
(1) A person shall not construct a building or a structure within the vicinity of an aerodrome except where that person is authorised by the Authority.

(2) Before authorisation by the Authority in accordance with subregulation (1), the Authority shall cause an aeronautical study of the effect of the construction on operation of aircraft, to be carried out.

67. Removal of obstacle.
(1) An owner of an obstacle shall remove the obstacle in the vicinity of an aerodrome, except where, after an aeronautical study, the Authority determines that the obstacle does not adversely affect the safety of operations of aircraft or significantly affect the regularity of their operations.

(2) The Authority may direct the removal of any obstacle in the vicinity of an aerodrome which, in the opinion of the Authority, constitutes a hazard to aircraft operations.

(3) Where an owner of an obstacle fails to remove the obstacle within the time directed by the Authority, the Authority shall remove the obstacle at the cost of the owner of the obstacle.

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(4) An owner of an obtacle who contravenes this regulation commits an offence and is liable, on conviction, to a fine not exceeding twenty four currency points or to imprisonment for a term not exceeding twelve months or both.

68. Marking and lighting of obstacle.

(1) An operator shall ensure that an obstacle is marked and where a runway is used at night and is associated with the obstacle, that the obstacle is lighted.

(2) The markings and lights referred to in subregulation (1) shall be in accordance with guidelines prescribed by the Authority.

(3) An operator shall, where practicable, ensure that all fixed obstacles to be marked in accordance with subregulation (1) are coloured as prescribed by the Authority.

(4) Where the requirements specified in subregulation (3) are impracticable, markers or flags shall be displayed on or above the fixed obstacles, except the obstacles that are sufficiently conspicuous by their shape, size or colour, which may not be marked.

(5) An operator shall ensure that a mobile obstacle is coloured as prescribed by the Authority or has displayed on it or above it, a flag.

(6) An obstacle lighted in accordance with subregulation (1) shall be indicated as low-intensity, medium-intensity or high-intensity light obstacle or a combination of these lights and shall be displayed in accordance with guidelines prescribed by the Authority.

(7) An operator who contravenes this regulation commits an offence and is liable, on conviction, to a fine not exceeding twenty four currency points or to imprisonment for a term not exceeding twelve months or both.

PART IX—AERONAUTICAL GROUND LIGHTING

69. Application of Part.

This Part applies to aerodromes in categories A and B.

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AERODROME REGISTER

AERODROME DETAILS

License No.	CAA/AL/....
Name of Aerodrome	**Jinja**
Location Indicator	**HUJI**
Name of Operator	Director of Airports and Aviation Security, Up-Country Airports
Nationality	Ugandan
Address of Operator	Civil Aviation Authority, P.O. Box 5536, Kampala
Telephone 256 41 353100	**Fax** 256 41 321 401 **E-mail** aviation@caa.co.ug
Geographical Position	(00° 27' N 033° 12' E)
Local Position	4km from Jinja town along Jinja-Budondo road
Altitude above Mean Level	3840 ft **Sea**
Length	1500 meters
Width	30 meters
Runway Orientation	13/31
Surface	Murrum
Status	Unserviceable
Critical Aircraft	B200 **MTOM** 5700kg
Date of License Issue	NIL **Expiry Date NIL**
RFFS Category	Not available
Operation Hours	

8/8

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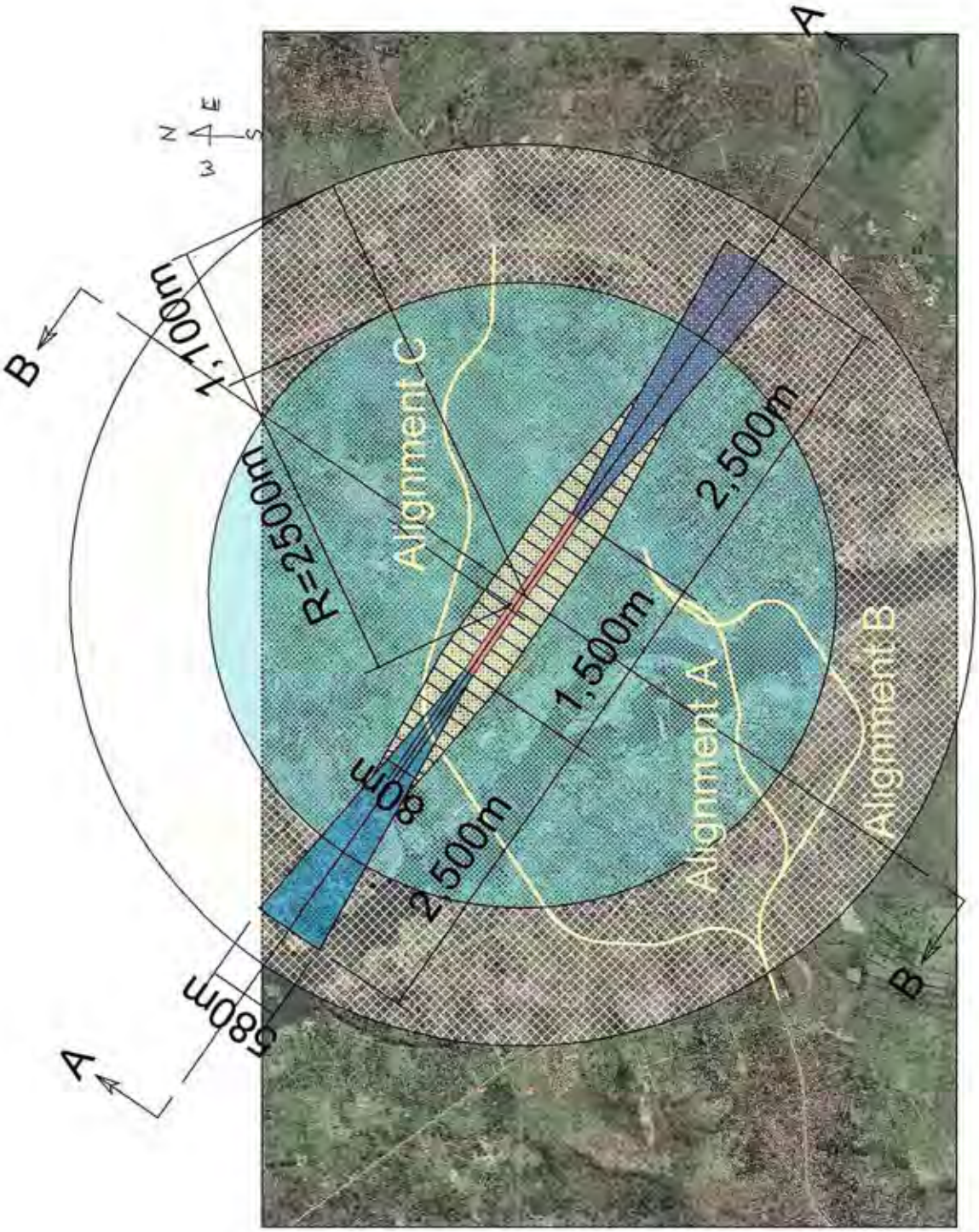
Appendix-3 Relation between Bridge Location Alternatives and Aerodrome Surface Limitation



Appendix-4 Bridge Alternatives on Bridge Location A

The Feasibility Study on the Construction of a New Bridge Across River Nile at Jinja
Bridge Alternatives, 2006/03/04

Bridge Alternatives on Bridge Location A

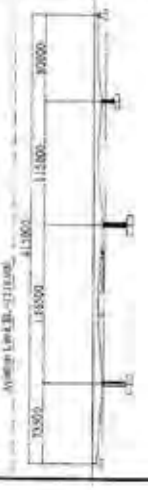
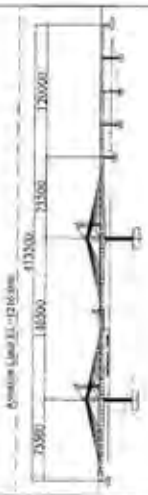
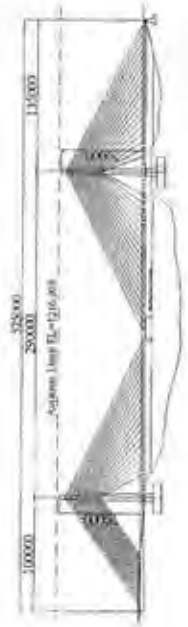
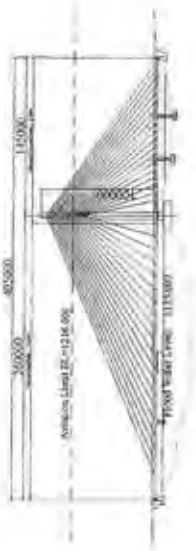
Figure – 1 (Bridge Type A1)	Figure – 2 (Bridge Type A2)	Figure – 3 (Bridge Type A3)
Cantilever PC Box Girder Bridge	Extra-dosed PC Box Girder with PC-I Girder	2 Spans PC Cable-stayed with PC-I Girder
		

Figure – 4 (Bridge Type A4)	Figure – 5 (Bridge Type A5)
3 Span PC Cable-stayed Bridge	2 Spans Composite Cable-stayed Bridge
	

1/1

2.6 Proposed Second Bridge across River Nile at Jinja and Its Effects on the Aerodrome dated 26 March 2009, by Civil Aviation Authority

UGANDA

CIVIL AVIATION AUTHORITY

Head Office Building
Entebbe International Airport
P.O. Box 5536, Kampala Uganda

Our Ref: **CAA/12/ADM/46**

Your Ref: **TR/CA 93/158/01**

26th March, 2009

The Permanent Secretary
Ministry of Works and Transport
P.O. Box 10
Entebbe

Attn: Mr. Charles Muganzi

Dear Sir.

RE: PROPOSED SECOND BRIDGE ACROSS RIVER NILE AT JINJA AND ITS EFFECTS ON THE AERODROME.

Reference is made to yours Ref: TR/CA93/158/01 dated 25 February 2009 and a meeting held between CAA Officials, UNRA and the JICA Study team on the proposed Second Bridge across River Nile. We have since evaluated the drawings for the various alternative routes and the Bridge options.

We note that Bridge option (Type A5) penetrates the inner horizontal safety surface for the runway. It is therefore recommended that this Bridge option is not used since it infringes on the safety surface of the Aerodrome.

The other Bridge options notably Type A1, A2, A3 and A4 are all below the horizontal surface and do not penetrate it. For the safe aircraft operations at Jinja Aerodrome, the Consultants should consider only options that do not penetrate the safety surfaces.

The existing runway length at Jinja Aerodrome is 1500m. The development plan for the Airstrip is to progressively increase the runway length up to 2500m. This will enable the Aerodrome to operate cargo and passenger flights with bigger aircraft like B737-200. B737-300, B737-500, B737-800 and A320-100, A320-200.

The alternative routes A and B have been evaluated and will not limit the proposed expansion of the runway. The current route C plan limits the expansion of the runway to only 2250m, which would restrict the operation to general aviation aircraft and the small jet aircraft like Embraer 145 ER. Our preferred position is to have room for extension of the runway up to 2500m.

Head Office Tel: 256-41-4362000, 31-2362000
Airport Tel: 256-41-4363000, 31-2363000
Fax: 256-41-4321401, 256-41-4320571 or 4320618
E-mail: aviation@caa.co.ug
Telex: 6150@CAA UGA
Website: www.caa.co.ug

CIVIL AVIATION AUTHORITY
Continuation Sheet

Should route C be preferred, it should be modified to accommodate the expansion of the runway in the Northern direction by 700m.

Yours Faithfully
CIVIL AVIATION AUTHORITY

W. Rama Makuza, Ph.D
MANAGING DIRECTOR

Copy to:

The Executive Director
Uganda National Roads Authority
KAMPALA

The Commissioner for Roads
Ministry of Works and transport
ENTEBBE

Mr. Isamu GUNJI
Team Leader, JICA Study Team
Public Works Training Centre, Kyambogo
KAMPALA (Fax 0414-266243)

Director Airports & Aviation Security
Civil Aviation Authority
ENTEBBE

APPENDIX 3

TOPOGRAPHICAL SURVEY

3.1 Mapping Area

3.2 Aerial Triangulation Log

Appendix 1 Topo.LOG

TimeStamp No.1 1:50:27 PM
PROJECT: JINJA BRIDGE
==========
TimeStamp No.2 1:50:28 PM

---------- Input Statistics. ----------

No. of Cameras used: 1
No. of Photos: 10
No. of Object Points: 39
No. of A-GPS Drift Params: 0
Total Unknowns: 177

No. of Image Points: 113
No. of Surveying Obsv: 0
No. of APs: 0

DOFs due to camera center obsrv: 0
DOFs due to ground control pts: 59
DOFs due to image coord obsrv: 226

Total Degrees of Freedom (Nobsrv - Nunks): 108

Average Degrees of Freedom (DOFs / Nunks): 0.61

TimeStamp No.3 1:50:28 PM
TimeStamp No.4 1:50:28 PM
TimeStamp No.10 1:50:28 PM
TimeStamp No.11 1:50:28 PM
TimeStamp No.10 1:50:28 PM
TimeStamp No.11 1:50:28 PM
TimeStamp No.5 1:50:28 PM
TimeStamp No.6 1:50:28 PM
TimeStamp No.7 1:50:29 PM
TimeStamp No.8 1:50:29 PM

Standardized Photocoordinate Residuals: Wi = Vi / (sqrt(1/WT - A(N**-1)AT) * SigmaO)

Points| (Pht No., Wx, Wy) .....

P5 6581 0.12 -1.67 6580 0.08 -0.90 6579 0.47 -0.53
P6 6580 0.18 1.15 6579 0.35 0.05
PH01 6556 -1.08 1.12 6557 0.79 0.26
PH02 6556 -0.10 -0.58 6557 -0.55 0.61 6558 -0.32 0.53
PH03 6557 0.90 -1.03 6558 0.67 -0.40 6559 -1.34 0.62
PH04 6559 0.12 -1.88 6560 -0.16 -2.23
PH05 6559 1.23 -0.47 6560 -0.22 0.16
PH06 6559 2.52 1.02 6560 1.38 0.07 6579 0.79 0.13 6578 0.72 -0.42
PH07 6558 1.27 0.54 6559 -0.98 1.01 6560 -1.14 1.39 6579 -0.42 -1.76 6578 -1.32 -1.27
PH08 6580 -1.89 2.90 6579 -0.56 2.75
PH09 6557 0.40 0.42 6558 -0.83 0.48 6559 -1.86 1.13 6580 0.90 -0.56 6579 0.32 -0.63
PH10 6556 -0.40 -0.69 6557 -1.50 -1.87 6582 0.50 1.14 6581 0.09 1.73 6580 1.64 0.81
PH11 6556 2.18 1.17 6557 2.34 -1.15 6582 0.11 -2.48 6581 1.11 -2.71
PH12 6582 -0.96 1.83 6581 -0.36 1.25
PH13 6582 1.32 -0.41 6581 1.86 -1.16
PH14 6582 -1.41 -0.37 6581 -2.35 -0.71
PH15 6580 -0.27 1.51 6579 -0.51 -0.12
PH16 6580 -0.80 -0.31 6579 -0.39 0.32 6578 -0.01 -0.30
RA2A 6556 -0.37 -0.22 6557 -1.18 1.39 6558 0.01 0.75

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Appendix 1 Topo.LOG

```
      RWY13  6581  0.55 0.11 6580 -0.38 0.06 6579 -0.10 -0.19
      RWY31  6582  0.33 0.38 6581 -0.34 -0.37
      65783  6559  0.44 0.40 6560 -0.15 -0.67 6579 -0.85 0.00 6578  0.52 0.26
      65803  6556 -0.30 -1.02 6557 -1.00 0.62 6558 -0.11 -0.40 6581 -0.03 0.63 6580  0.81 -0.60
6579  0.66 0.67
      65562  6556  0.62 0.62 6557 -0.62 -0.62
      65572  6556 -0.25 0.07 6557  0.28 1.00 6558 -0.26 -1.14
      65582  6557  0.62 0.29 6558 -0.61 -0.15 6559  0.61 -0.13
      65592  6558  0.38 -0.20 6559 -0.39 -0.26 6560  0.40 0.47
      65593  6558 -0.03 -0.27 6559  0.02 -1.27 6560 -0.00 1.82
      65602  6559  0.23 0.23 6560 -0.23 -0.23
      65781  6579 -0.22 -0.22 6578 -0.22 0.22
      65782  6579  0.35 0.35 6578 -0.35 -0.35
      65791  6580  0.44 -0.64 6579 -0.43 0.54 6578  0.42 0.10
      65792  6580 -0.34 -1.17 6579  0.35 0.00 6578 -0.34 1.24
      65801  6581  0.32 0.49 6580 -0.34 0.21 6579  0.33 -0.71
      65802  6581  0.58 0.41 6580 -0.58 0.19 6579  0.57 -0.60
      65811  6582  0.47 0.24 6581 -0.49 2.10 6580  0.47 -2.46
      65812  6582  0.32 -0.44 6581 -0.30 1.12 6580  0.31 -0.73
      65821  6582 -0.54 0.54 6581 -0.54 -0.54
      65822  6582 -0.38 0.38 6581 -0.38 -0.38
```

---

* Denotes that Critical Value of 5.29 exceeded, ie. possible gross error

Maximum Standardized Residual = 2.90 from Point No.PH08 on Photo No.6580

---

0 posible blunders/outlyers detected

<----------->
< Ten Largest Photocoordinate Residuals >
< PointNo, PhotoNo, Vx, Vy >

```
   PH11  6557  0.050 -0.026
   PH14  6581 -0.058 -0.018
   PH04  6559  0.003 -0.048
   PH11  6582  0.002 -0.056
   PH11  6556  0.048  0.022
   PH08  6580 -0.041  0.059
   PH06  6559  0.054  0.020
   PH04  6560 -0.003 -0.052
   PH08  6579 -0.015  0.071
   PH11  6581  0.027 -0.065
```

Distribution of Standardized Residuals in X

```
Blunder |  0|
  -3.50 |  0|
  -3.25 |  0|
  -3.00 |  0|
  -2.75 |  0|
  -2.50 |  0|
  -2.25 |  1|*
  -2.00 |  2|:
  -1.75 |  0|
  -1.50 |  2|:
  -1.25 |  4|:.
```

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Appendix 1 Topo.LOG

```
-1.00 |  4|:.
-0.75 |  3|:+
-0.50 | 17|:::::::+
-0.25 | 19|:::::::::+
 0.00 | 14|::::::
 0.25 | 12|::::::
 0.50 | 17|::::::::+
 0.75 |  6|:::
 1.00 |  3|:+
 1.25 |  3|:+
 1.50 |  1|+
 1.75 |  2|:
 2.00 |  0|
 2.25 |  2|:
 2.50 |  1|+
 2.75 |  0|
 3.00 |  0|
 3.25 |  0|
 3.50 |  0|
Blunder |  0|
```

Distribution of Standardized Residuals in Y

```
Blunder |  0|
 -3.50 |  0|
 -3.25 |  0|
 -3.00 |  0|
 -2.75 |  1|+
 -2.50 |  2|:
 -2.25 |  1|+
 -2.00 |  1|+
 -1.75 |  3|:+
 -1.50 |  0|
 -1.25 |  6|:.
 -1.00 |  3|:+
 -0.75 |  7|::+
 -0.50 | 14|::::::
 -0.25 | 14|::::::
  0.00 |  9|:::+
  0.25 | 12|::::::
  0.50 | 16|::::::::
  0.75 |  4|:.
  1.00 |  5|:+
  1.25 |  6|::
  1.50 |  3|:+
  1.75 |  3|:+
  2.00 |  1|+
  2.25 |  0|
  2.50 |  0|
  2.75 |  1|+
  3.00 |  1|+
  3.25 |  0|
  3.50 |  0|
Blunder |  0|
```

--- Root Mean Square Image Coordinate Errors ---

--- RMS Vx = 11.9 micrometers ---

--- RMS Vy = 16.2 micrometers ---

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Appendix 1 Topo.LOG

RMS Vxy = 20.1 micrometers

Adjusted Control Points

No.	Point ID	Xg	Yg	Zg	<Res X>	<Res Y>	<Res Z>	<Std Vx>	<Std Vy>	<Std Vz>
1	P5	520582.300	49712.039	1138.890	0.000	-0.001	0.000	0.38	-1.82	0.86
2	P6	520559.080	49671.811	1137.350	0.000	0.001	-0.000	0.39	0.86	-0.42
3	PH01	521921.120	47720.690	1150.310	-0.000	0.000	-0.000	-0.18	0.91	-0.21
4	PH02	521141.960	47672.450	1157.470	-0.000	0.000	-0.000	-0.60	0.45	-0.51
5	PH03	520567.520	47597.400	1162.250	0.000	-0.000	-0.000	0.29	-0.55	-0.43
6	PH04	519724.040	47989.948	1171.000	-0.000	-0.002	0.000	-0.01	-3.03	2.34
7	PH05	519117.510	47977.240	1172.700	0.000	-0.000	-0.000	0.74	-0.25	-0.73
8	PH06	519207.302	49332.640	1150.180	0.002	0.000	-0.000	3.22	0.59	-1.29
9	PH07	519873.029	49071.870	1144.461	-0.001	0.000	0.001	-1.20	0.08	1.64
10	PH08	520108.239	49096.912	1141.569	-0.001	0.002	-0.001	-1.63	4.03	-2.86
11	PH09	520429.610	49252.280	1136.440	-0.000	0.000	0.000	-0.39	0.22	0.58
12	PH10	521471.030	49128.510	1145.939	0.000	0.000	-0.001	0.02	0.31	-2.60
13	PH11	521876.452	49089.468	1156.902	0.002	-0.002	0.002	2.83	-2.82	3.85
14	PH12	522266.149	49256.041	1162.799	-0.001	0.001	-0.001	-0.95	2.25	-1.99
15	PH13	522138.961	50742.239	1165.040	0.001	-0.001	-0.000	2.43	-1.35	-0.34
16	PH14	521720.378	50576.560	1166.710	-0.002	-0.000	-0.000	-2.84	-0.76	-0.41
17	PH15	520664.800	50633.761	1167.310	-0.000	0.001	0.000	-0.56	1.06	0.73
18	PH16	520032.440	50722.480	1147.290	-0.000	-0.000	0.000	-0.85	-0.13	0.46
19	RA2A	521121.849	48837.321	1138.450	-0.001	0.001	0.000	-0.94	1.18	1.02
20	RWY13		1172.530		-0.000			-0.38		
21	RWY31		1173.890		-0.000			-0.33		

* Denote that critical value of 5.29 exceeded, i.e. possible gross error!

Maximum Standardized Residual = 4.03 from Control Point No.PH08

Control Point Root Mean Square Errors

Axis	3D Control	Horizontal Control	Vertical Control
RMS Vx	0.001	0.001	
RMS Vy	0.001	0.001	
RMS Vz	0.000		0.000
RMS Vs	0.001		

Final Adjusted Exterior Orientations and Standard Errors

<PhtNo>	<Omega>	<Phi>	<Kappa>	<So>	<Sp>	<Sk>
<PhtNo>	<X>	<Y>	<Z>	<Sx>	<Sy>	<Sz>
6578	-0- 13' 43"	1- 20' 10"	359- 33' 8"	0- 1' 32"	0- 2' 38"	0- 0' 37"
6578	519500.481	49981.376	2457.150	1.086	0.778	0.304
6579	-0- 31' 11"	0- 22' 19"	359- 35' 4"	0- 0' 54"	0- 0' 50"	0- 0' 19"
6579	520179.554	49973.869	2457.320	0.368	0.427	0.128
6580	-0- 3' 50"	0- 35' 30"	359- 3' 20"	0- 0' 51"	0- 0' 53"	0- 0' 21"

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Appendix 1 Topo.LOG

6580	520857.006	49965.683	2463.817	0.379	0.411	0.150
6581	-0- 18' 52"	1- 17' 38"	359- 2' 35"	0- 0' 51"	0- 0' 49"	0- 0' 19"
6581	521545.133	49951.608	2462.286	0.370	0.417	0.124
6582	0- 11' 40"	1- 27' 42"	358- 10' 2"	0- 1' 25"	0- 1' 51"	0- 0' 33"
6582	522255.018	49933.071	2453.010	0.732	0.721	0.269
6560	0- 25' 2"	-0- 51' 12"	0- 6' 28"	0- 1' 55"	0- 2' 26"	0- 0' 37"
6560	519207.263	48472.458	2475.254	0.979	0.911	0.364
6559	0- 1' 35"	-0- 34' 3"	359- 57' 58"	0- 0' 57"	0- 0' 60"	0- 0' 21"
6559	519891.636	48462.157	2475.645	0.443	0.454	0.143
6558	0- 11' 39"	-0- 27' 21"	359- 58' 28"	0- 1' 9"	0- 1' 15"	0- 0' 23"
6558	520554.339	48452.767	2472.850	0.543	0.552	0.155
6557	-0- 40' 58"	-0- 49' 33"	0- 24' 42"	0- 0' 53"	0- 0' 54"	0- 0' 20"
6557	521186.029	48444.017	2471.884	0.404	0.434	0.135
6556	-1- 0' 41"	-0- 58' 56"	0- 51' 14"	0- 1' 22"	0- 1' 45"	0- 0' 34"
6556	521871.735	48439.943	2475.288	0.720	0.691	0.306

--- Mean Standard Deviations for the Elements of Exterior Orientation ---

Omega	0- 1' 11"
Phi	0- 1' 26"
Kappa	0- 0' 26"
XL	0.602
YL	0.580
ZL	0.208

---------- Final Adjusted Object Space Coordinates, Standard Errors, and Residuals

<No> <---Point ID---><-----Xg-----><-----Yg-----><-----Zg----><---Sx---><---Sy---><---Sz---><---Vx---><---Vy---><---Vz---><--- Vs--->

<CONTROL POINTS> <3D>

1	P5	520582.300	49712.040	1138.890	0.010	0.010	0.011	0.000	-0.001	0.000 0.001
2	P6	520559.080	49671.810	1137.350	0.011	0.011	0.010	0.000	0.001	-0.000 0.001
3	PH01	521921.120	47720.690	1150.310	0.010	0.010	0.011	-0.000	0.000	-0.000 0.000
4	PH02	521141.960	47672.450	1157.470	0.011	0.011	0.010	-0.000	0.000	-0.000 0.000
5	PH03	520567.520	47597.400	1162.250	0.010	0.010	0.011	0.000	-0.000	-0.000 0.000
6	PH04	519724.040	47989.950	1171.000	0.011	0.011	0.010	-0.000	-0.002	0.000 0.002
7	PH05	519117.510	47977.240	1172.700	0.010	0.010	0.011	0.000	-0.000	-0.000 0.000
8	PH06	519207.300	49332.640	1150.180	0.011	0.011	0.010	0.002	0.000	-0.000 0.002
9	PH07	519873.030	49071.870	1144.460	0.010	0.010	0.011	-0.001	0.000	0.001 0.001
10	PH08	520106.240	49096.910	1141.570	0.010	0.010	0.011	-0.001	0.002	-0.001 0.002
11	PH09	520429.610	49252.260	1136.440	0.011	0.011	0.010	-0.000	0.000	0.000 0.000

Appendix 1 Topo.LOG

12	PH10	521471.030	49128.510	1145.940	0.010	0.010	0.011	0.000	0.000
-0.001	0.001								
13	PH11	521876.450	49089.470	1156.900	0.011	0.011	0.010	0.002	-0.002
0.002	0.003								
14	PH12	522266.150	49256.040	1162.800	0.011	0.011	0.010	-0.001	0.001
-0.001	0.001								
15	PH13	522138.960	50742.240	1165.040	0.010	0.010	0.011	0.001	-0.001
-0.000	0.001								
16	PH14	521720.380	50576.560	1166.710	0.011	0.011	0.010	-0.002	-0.000
-0.000	0.002								
17	PH15	520664.800	50633.760	1167.310	0.010	0.010	0.011	-0.000	0.001
0.000	0.001								
18	PH16	520032.440	50722.480	1147.290	0.011	0.011	0.010	-0.000	-0.000
0.000	0.000								
19	RA2A	521121.850	48837.320	1138.450	0.010	0.010	0.011	-0.001	0.001
0.000	0.001								

<CONTROL POINTS> <Horizontal>

<CONTROL POINTS> <Vertical>

20	RWY13	520806.556	50805.496	1172.530	0.179	0.187	0.011
-0.000							
21	RWY31	521846.101	50040.604	1173.890	0.189	0.212	0.010
-0.000							

<PASS/TIE POINTS>

22	65562	521864.240	48457.709	1166.623	0.274	0.219	0.740
23	65572	521327.499	48266.611	1133.046	0.166	0.180	0.417
24	65582	520489.350	48413.402	1147.590	0.162	0.171	0.400
25	65592	519921.483	48554.823	1152.374	0.165	0.179	0.414
26	65593	519890.209	47739.343	1174.520	0.187	0.310	0.511
27	65602	519242.858	48519.057	1151.517	0.265	0.223	0.747
28	65781	519526.663	50587.545	1120.002	0.327	0.438	0.878
29	65782	519457.679	49966.514	1148.114	0.311	0.235	0.769
30	65783	519525.841	49218.724	1146.702	0.151	0.147	0.231
31	65791	520154.930	50682.256	1153.306	0.176	0.285	0.427
32	65792	520123.336	49931.516	1115.454	0.165	0.173	0.406
33	65801	520896.057	50601.080	1171.110	0.171	0.246	0.375
34	65802	520779.337	49914.187	1135.931	0.160	0.163	0.378
35	65803	521007.195	49206.709	1135.386	0.125	0.126	0.199
36	65811	521491.334	50683.577	1161.912	0.185	0.289	0.466
37	65812	521483.441	49978.231	1166.823	0.163	0.173	0.382
38	65821	522223.578	50694.010	1170.316	0.288	0.469	0.738
39	65822	522171.878	49943.841	1171.102	0.240	0.223	0.671

Mean Standard Deviations			
(including Control Points)		(excluding Control Points)	
0.109	Sx	0.205	
0.124	Sy	0.236	
0.240	Sz	0.508	
0.292	Spherical	0.597	

TimeStamp No.9 1:50:29 PM

ページ(6)

Appendix 1 Topo.LOG

System Memory Storage Summary

No. of Cameras = 1 ====> 0.0 Kbytes
No. of Photos = 10 ====> 2.0 Kbytes
No. of Points = 39 ====> 3.7 Kbytes
No. of Photo Coordinates = 113 ====> 4.4 Kbytes

Total Data Storage Required ==========> 10.1 Kbytes

Envelope data structure requires 8908 real number elements
to store the off-diagonal locations of the normal equations.

======= Average Bandwidth = 8.4 =====
======= =====
======= =====
======= Total MBs of storage required for reduced normals =====
======= =====
======= Sn (left-hand side) = 0.07 =====
======= C (right-hand side) = 0.00 =====
======= =====
======= Total = 0.07 =====
======= =====

TimeStamp No.12 1:50:30 PM

System Computing Time Summary

Number of Iterations: 2

Reading Data Input Files: 0 Hrs 0 Min 0.44 Sec
Initializing Data Structures: 0 Hrs 0 Min 0.11 Sec

Forming & Solving Normal Equations: 0 Hrs 0 Min 0.28 Sec
Per Iteration: 0 Hrs 0 Min 0.14 Sec

Cholesky Solution Per Iteration: 0 Hrs 0 Min 0.06 Sec
Forming Normal Eqns Per Iteration: 0 Hrs 0 Min 0.08 Sec

Normal Equations Inverse: 0 Hrs 0 Min 0.22 Sec
Statistics: 0 Hrs 0 Min 0.55 Sec

Total Computing Time: 0 Hrs 0 Min 2.09 Sec

ページ(7)

3.3 Photo Control Points

PHOTOMAP

FEASIBILITY STUDY ON THE CONSTRUCTION OF A NEW BRIDGE ACROSS RIVER NILE AT JINJA IN UGANDA

LIST OF CO-ORDINATES AND HEIGHTS

PHOTO CONTROL POINTS

Point Name	Description/location	North	East	Levelled Height	Remark
PH01	IPC	47,720.69	521,921.12	1,149.87	GL
PH02	IPC	47,672.45	521,141.96	1,157.47	GL
PH03	IPC	47,597.40	520,567.52	1,162.25	GL
PH04	IPC	47,989.95	519,724.04	1,171.00	GL
PH05	IPC	47,977.24	519,117.51	1,172.70	GL
PH06	IPC	49,332.64	519,207.30	1,150.18	GL
PH07	IPC	49,071.87	519,873.03	1,144.46	GL
PH08	IPC	49,096.91	520,108.24	1,141.57	GL
PH09	Corner wall	49,252.28	520,429.61	1,136.44	Pavement
PH10		49,128.51	521,471.03	1,146.30	GL
PH11	Corner wall	49,089.47	521,876.45	1,156.83	GL
PH12	IPC	49,256.04	522,266.15	1,162.80	GL
PH13	IPC	50,742.24	522,138.96	1,165.04	GL
PH14	IPC	50,576.56	521,720.38	1,166.71	GL
PH15	IPC	50,633.76	520,664.80	1,167.31	GL
PH16	IPC	50,722.48	520,032.44	1,147.29	GL
RA2A	Tree stump	48,837.32	521,121.85	1,138.45	GL
RWY13	Level at threshold 13 of airstrip	-	-	1,172.53	Concrete Level
PWY31	Level at threshold 31 of airstrip	-	-	1,173.89	Concrete Level
P5	Pillar	49,712.04	520,582.30	1,138.89	Top pillar
P6	Pillar	49,671.81	520,559.08	1,137.35	Top pillar

3.4 Temporary Benchmarks

PHOTOMAP

TEMPORARY BENCHMARKS – CAN BE USED FOR HEIGHT CHECK

Point Name	Description/location	North	East	Levelled Height	Remark
RA01	IPC	48,735.09	520,708.43	1,138.70	
RA02	IPC	48,837.09	521,119.95	1,138.26	
RB01	IPC	48,088.72	521,180.12	1,143.20	
RB02	IPC	48,250.76	521,325.12	1,132.87	
RB03	IPC	48,571.25	521,413.31	1,145.37	

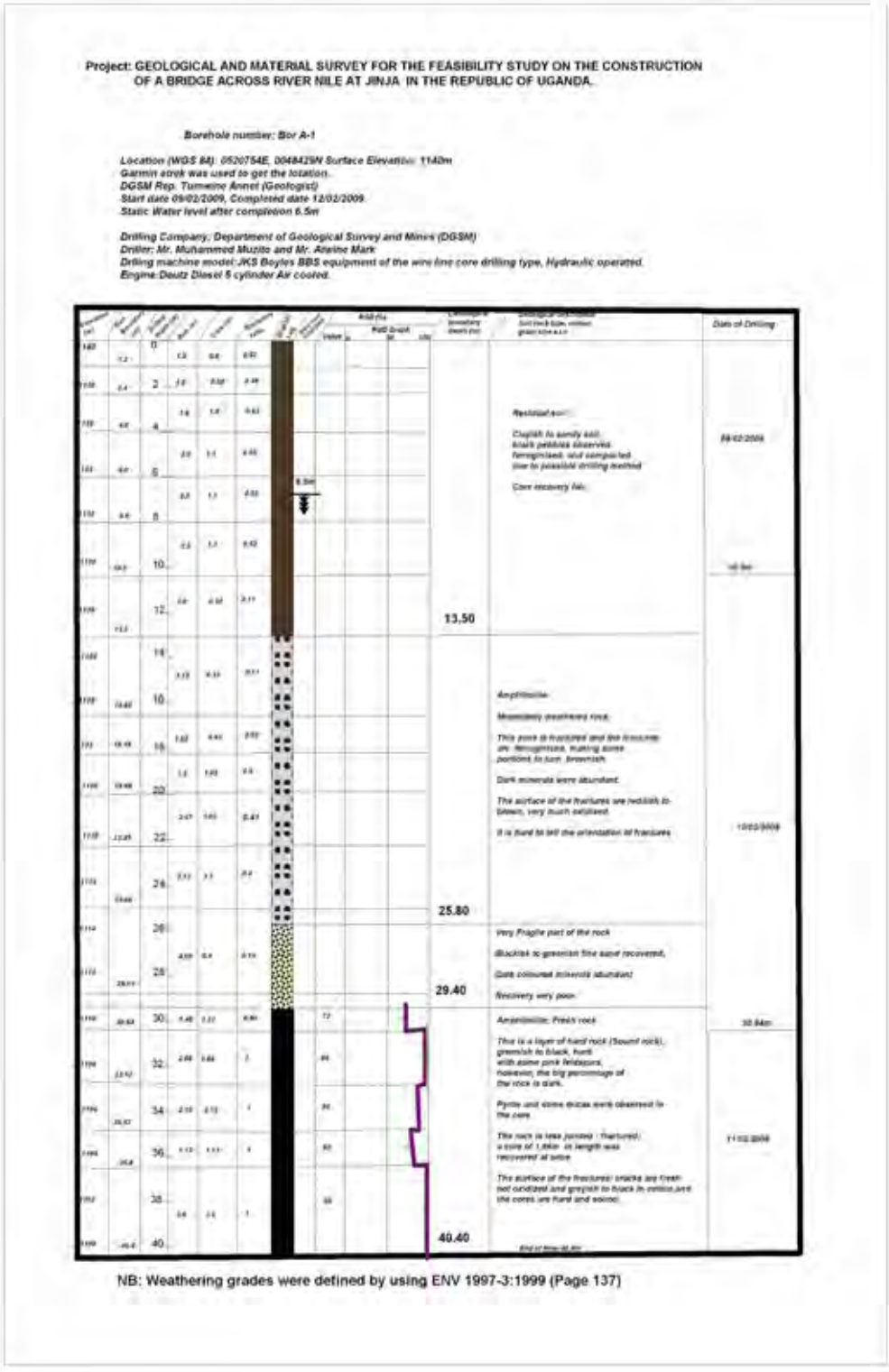
2

APPENDIX 4

GEOLOGICAL AND GEOTECHNICAL CONDITION

4.1 Drilling Logs

Borehole log for Bor.A-1



Project: GEOLOGICAL AND MATERIAL SURVEY FOR THE FEASIBILITY STUDY ON THE CONSTRUCTION OF A BRIDGE ACROSS RIVER NILE AT JINJA IN THE REPUBLIC OF UGANDA.

Borehole number: Bor A-1

Location (WGS 84): 0520754E, 0048429N Surface Elevation: 1140m
Garmin etrek was used to get the location.
DGSM Rep. Tumwine Annet (Geologist)
Start date 09/02/2009, Completed date 12/02/2009.
Static Water level after completion 6.5m

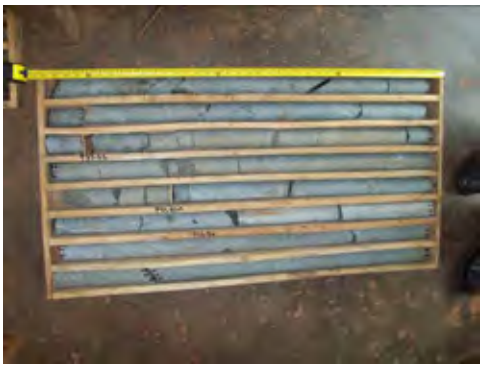
Drilling Company; Department of Geological Survey and Mines (DGSM)
Driller; Mr. Muhammed Muzito and Mr. Ateine Mark
Drilling machine model:JKS Boyles BBS equipment of the wire line core drilling type, Hydraulic operated.
Engine:Deutz Diesel 5 cylinder Air cooled.

NB: Weathering grades were defined by using ENV 1997-3:1999 (Page 137)

Bor.A-1








BH No.: BH A-1 (520754 N, 48429 E)

RL: 1140.0

Water Table Depth(m): Not encountered

DEPTH (m)	FIELD SPT VALUE	N-VALUE	SOIL DESCRIPTION (By visual inspection)	REMARKS
0.00				
1.50	5, 5, 8	13	Dark brown sandy silt	Medium dense
1.95				
3.00	9, 24, 41	65	Dark brown sandy silty clay	Hard
3.45				
4.50	16, 47, 76	123	Brown - grey sandy silty clay	Hard
4.95				
6.00	16, 65, 100	165	Brown- grey sandy silty clay	Hard
6.45				
7.50	24, 54, 50	104	Brown-grey - black Amphibolite	Very dense
7.95				
9.00	16, 97, 100	197	Brown-grey - black Amphibolite	Very dense
9.45				
10.50	34, 150, 130	280	Brown - grey - black Amphibolite	Very dense
10.95				

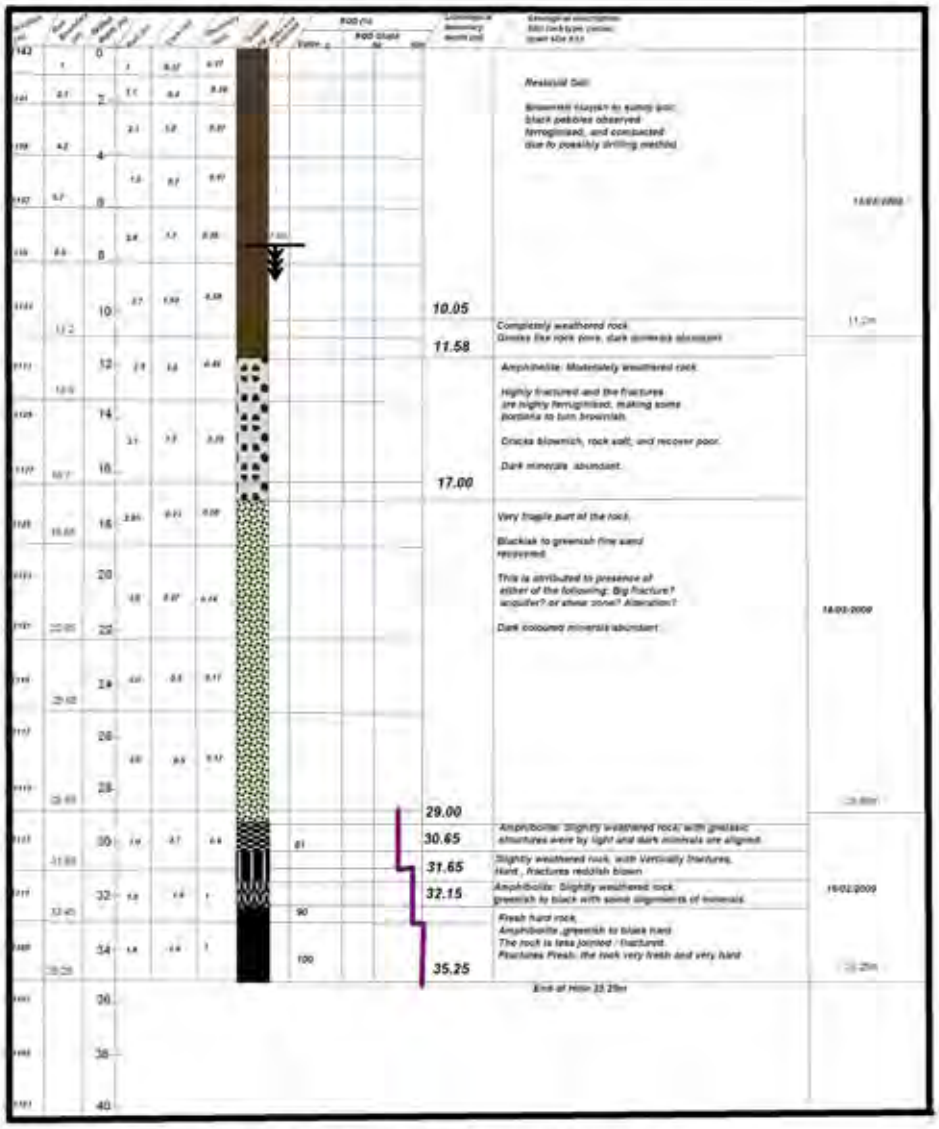
Borehole log for Bor.A-2-2

Project: GEOLOGICAL AND MATERIAL SURVEY FOR THE FEASIBILITY STUDY ON THE CONSTRUCTION OF A BRIDGE ACROSS RIVER NILE AT JINJA IN THE REPUBLIC OF UGANDA.

Borehole number: Bor A2-2

Location (WGS 84): 0521226E, 0048569N Surface Elevation: 1143m
Garmin etrek was used to get the lotation
DGSM Rep. Tumwine Annet (Geologist)
Start date 13/02/2009, Completed date 16/02/2009.
Static Water level after completion 7.4m

Drilling Company: Department of Geological Survey and Mines (DGSM)
Driller: Mr. Muhammed Muzito and Mr. Atwine Mark
Drilling machine model:JKS Boyles BBS equipment of the wire line core drilling type, Hydraulic operated.
Engine:Deutz Diesel 5 cylinder Air cooled.



NB: Weathering grades were defined by using ENV 1997-3:1999 (Page 137)

Bor.A-2-2

BH No.: BH A-2-2 **(521239 N, 48549 E)**

RL: 1143

Water Table Depth(m): Not encountered

DEPTH (m)	FIELD SPT VALUE	N-VALUE	SOIL DESCRIPTION (By visual inspection)	REMARKS
0.00				
1.50	2, 4, 5	9	Brown - grey- yellow silty sand	Loose
1.95				
3.00	7, 9, 20	29	Brown - grey- yellow silty sand	Medium dense
3.45				
4.50	15, 23, 27	50	Brown - grey- yellow silty sandy clay	Hard
4.95				
6.00	22, 37, 43	80	Brown - grey silty sandy clay	Hard
6.45				
7.50	19, 53, 100	153	Brown - grey silty sandy clay	Hard
7.95				
9.00	24, 35, 56	91	Brown - grey silty sand	Very dense
9.45				
10.50	13, 18, 64	82	Brown - grey silty sandy clay	Hard
10.95				

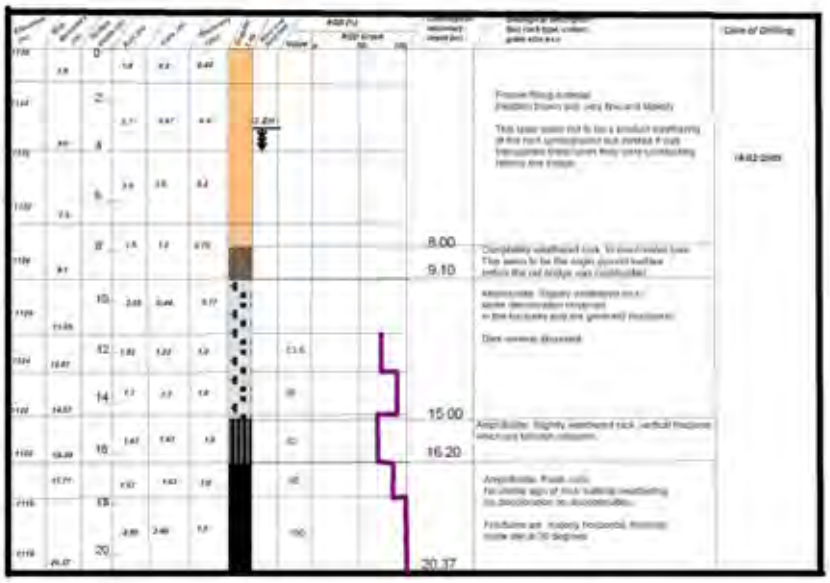
Borehole log for Bor. B-1

Project: GEOLOGICAL AND MATERIAL SURVEY FOR THE FEASIBILITY STUDY ON THE CONSTRUCTION OF A BRIDGE ACROSS RIVER NILE AT JINJA IN THE REPUBLIC OF UGANDA.

Borehole number; Bor B-1

Location (WGS 84): 0521493E, 0047920N Surface Elevation: 1136m
Garmin etrek was used to get the lobation.
DGSM Rep. Turnaine Annet (Geologist)
Start date 18/02/2009, Completed date 18/02/2009.
Static Water level after completion 3.2m

Drilling Company; Department of Geological Survey and Mines (DGSM)
Driller: Mr. Muhammed Muzito and Mr. Abeine Mark
Drilling machine model:JKS Boyles BBS equipment of the wire line core drilling type, Hydraulic operated.
Engine:Deutz Diesel 5 cylinder Air cooled.



NB: Weathering grades were defined by using ENV 1997-3:1999 (Page 137)

Bor.B-1

BH No.: BH B-1 (521403 N, 47920 E)

RL: 1136 Water Table Depth(m): Not encountered

DEPTH (m)	FIELD SPT VALUE	N-VALUE	SOIL DESCRIPTION (By visual inspection)	REMARKS
0.00				
1.50	2, 2, 4	6	Brown - yellow silty sand	Loose
1.95				
3.00	1, 1, 1	2	Brown - yellow schist silty clay	Very soft
3.45				
4.50	1, 1, 3	4	Brown - grey - yellow schist silty clay	Soft
4.95				
6.00	1, 3, 4	7	Dark brown - grey schist silty clay	Firm
6.45				
7.50	7, 9, 30	39	Brown - grey schist silty clay	Hard
7.95				
9.00	40, 65, 80	145	Grey schist silty clay	Hard
9.45				

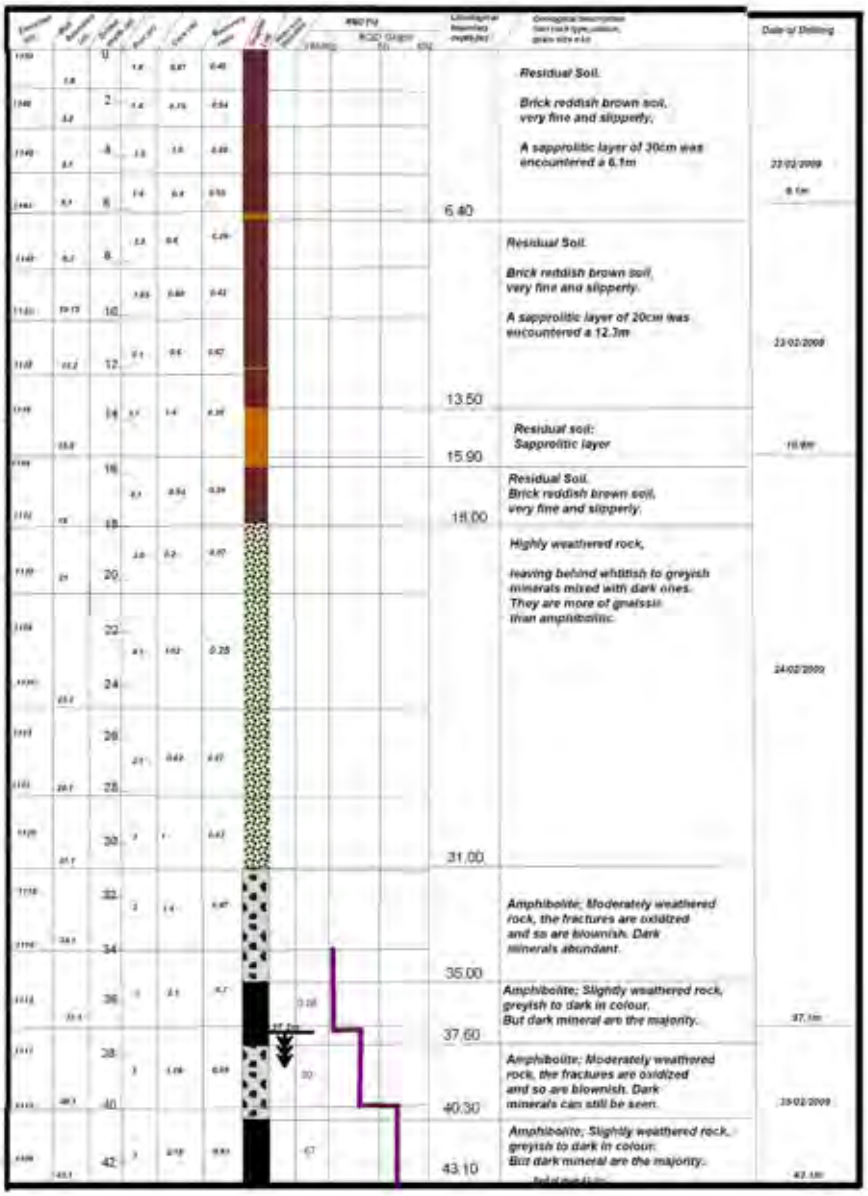
Borehole log for Bor.C-1

Project: GEOLOGICAL AND MATERIAL SURVEY FOR THE FEASIBILITY STUDY ON THE CONSTRUCTION OF A BRIDGE ACROSS RIVER NILE AT JINJA IN THE REPUBLIC OF UGANDA.

Borehole number: Bor C-1

Location (WGS 84): 0520154E, 0050394N Surface Elevation: 1150m
Garmin etrek was used to get the lotation.
DGSM Rep. Tumwine Annet (Geologist)
Start date 22/02/2009, Completed date 25/02/2009,
Static Water level after completion 37.2m

Drilling Company: Department of Geological Survey and Mines (DGSM)
Driller: Mr. Muhammed Muzito and Mr. Aheine Mark
Drilling machine model:JKS Boyles BBS equipment of the wire line core drilling type, Hydraulic operated
Engine:Deutz Diesel 5 cylinder Air cooled



NB: Weathering grades were defined by using ENV 1997-3:1999 (Page 137)

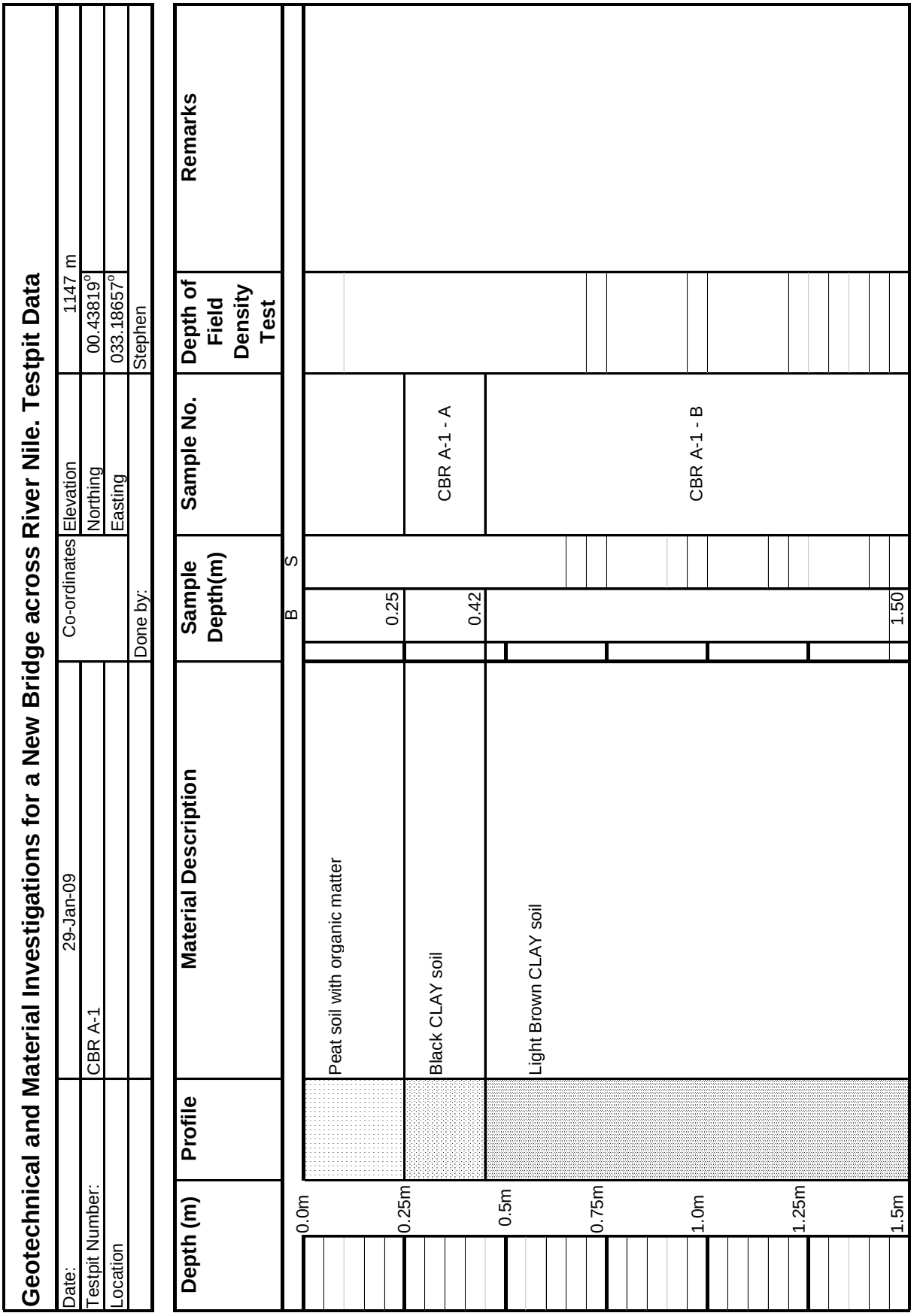
Bor.C-1

BH No.: BH C-1 (520161 N, 50420 E)

RL: 1150 Water Table Depth(m): Not encountered

DEPTH (m)	FIELD SPT VALUE	N-VALUE	SOIL DESCRIPTION (By visual inspection)	REMARKS
0.00				
1.50	3, 4, 6	10	Brown silty clay	Stiff
1.95				
3.00	2, 4, 6	10	Brown silty clay	Stiff
3.45				
4.50	3, 3, 5	8	Brown-red-yellow schist silt	Loose
4.95				
6.00	4, 4, 7	11	Brown - black schist silt	Medium dense
6.45				
7.50	8, 9, 14	23	Brown - yellow schist silty clay	Very stiff
7.95				
9.00	8, 10, 13	23	Brown - yellow - black schist silty clay	Very stiff
9.45				
10.50	9, 10, 14	24	Brown - yellow schist silty clay	Very stiff
10.95				
12.00	11, 19, 32	51	Brown - yellow schist silty clay	Hard
12.45				
13.50	28, 48, 130	178	Brown - red- yellow sandy silty clay	Hard
13.95				
15.00	24, 54, 142	196	Brown - grey- yellow silty clay	Hard
15.45				

4.2 Test Pit Excavation Records



Geotechnical and Material Investigations for a New Bridge across River Nile. Testpit Data

Date:	29-Jan-09	Co-ordinates	Elevation	1144 m
Testpit Number:	CBR A-2		Northing	00.43967°
Location			Easting	033.19038°
		Done by:		Stephen

Depth (m)	Profile	Material Description	Sample Depth(m)	Sample No.	Depth of Field Density Test	Remarks
			B S			
0.0m		Peat soil with organic matter	0.25			
0.25m		Black CLAY soil	0.50	CBR A-2 - A		
0.5m		Light Brown Stiff CLAY soil		CBR A-2 - B		
0.75m						
1.0m						
1.25m						
1.5m			1.50			

Geotechnical and Material Investigations for a New Bridge across River Nile. Testpit Data

Date:	29-Jan-09	Co-ordinates	Elevation	1151 m
Testpit Number:	Bor. A1		Northing	00.43822°
Location			Easting	033.18686°
		Done by:		Stephen

Depth (m)	Profile	Material Description	Sample Depth(m)	Sample No.	Depth of Field Density Test	Remarks
			B S			
0.0m		Peat soil with organic matter	0.25			
0.25m		Black Cotton CLAY soil	0.40	Bor. A1 - A		
0.5m						
0.75m						
1.0m						
1.25m						
1.5m						

Geotechnical and Material Investigations for a New Bridge across River Nile. Testpit Data

Date:	29-Jan-09	Co-ordinates	Elevation	1146 m
Testpit Number:	Bor. A2		Northing	00.43911°
Location			Easting	033.19057°
		Done by:		Stephen

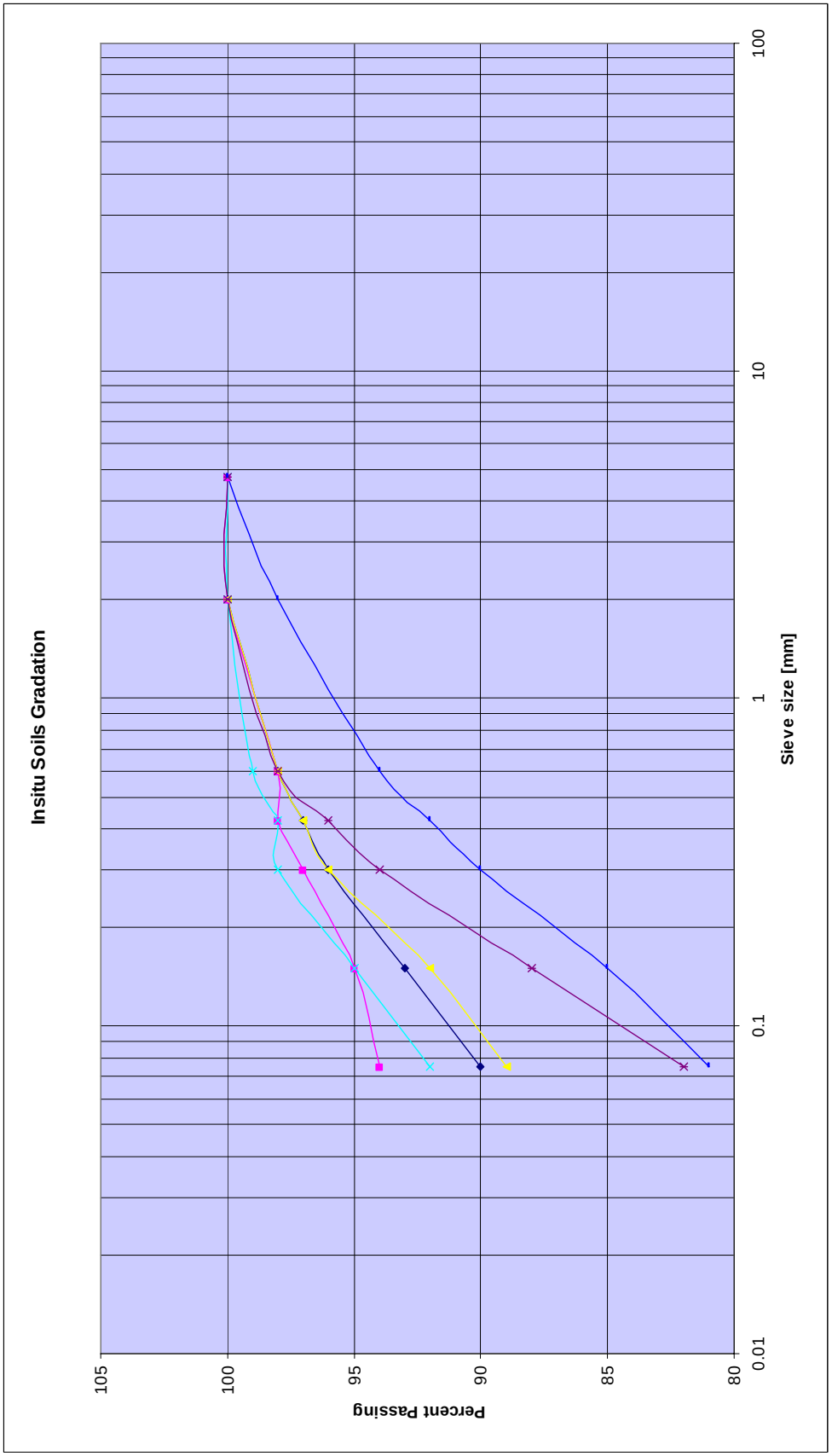
Depth (m)	Profile	Material Description	Sample Depth(m) B	Sample Depth(m) S	Sample No.	Depth of Field Density Test	Remarks
0.0m – 0.25m		Peat soil with organic matter	0.25				
0.25m – 0.42m		Black Cotton CLAY soil	0.42		Bor. A2 - A		
0.5m							
0.75m							
1.0m							
1.25m							
1.5m							

4.3 Laboratory Test Summary Results

(1) Laboratory Test Summary Results for Existing Insitu Soils

Summary of existing insitu soils laboratory test data

Sample Date	Location/Sample [m]	River Side [m]	ASTM	AASHTO classification M 145 Group	AASHTO classification M 145 G. Index		Nat. Moist [%]	Modified MDD [g/cm3]	Modified OMC [%]	Specific Gravity [g/cm3]	PI [%]	Sieve 4.75 [mm]	Sieve 2 [mm]	Sieve 0.6 [mm]	Sieve 0.425 [mm]	Sieve 0.3 [mm]	Sieve 0.15 [mm]	Sieve 0.075 [mm]	4-days CBR 90%	4-days CBR 95%	4-days CBR 100%
29-Jan-09	CBR A-1 - A	LHS	CH	A-7-5	(44)	P	31	1.48	23	2.52	42.0		100.0	98.0	97.0	96.0	93.0	90.0	1	5	12
29-Jan-09	CBR A-1 - B	LHS	CH	A-7-5	(61)	P	32	1.43	24	2.51	53.0	100.0	100.0	98.0	98.0	97.0	95.0	94.0	1	9	11
29-Jan-09	CBR A-2 - A	RHS	CH	A-7-5	(47)	P	30	1.52	25	2.5	45.0		100.0	98.0	97.0	96.0	92.0	89.0	2	8	13
29-Jan-09	CBR A-2 - B	RHS	CH	A-7-5	(45)	P	35	1.56	22	2.57	41.0	100.0	100.0	99.0	98.0	98.0	95.0	92.0	1	4	9
29-Jan-09	Bor. A1 - A	LHS	CH	A-7-5	(44)	P	32	1.46	26	2.58	47.0	100.0	100.0	98.0	96.0	94.0	88.0	82.0	1	4	11
29-Jan-09	Bor. A2 - A	RHS	CH	A-7-6	(29)	P	35	1.62	20	2.5	32.0	100.0	98.0	94.0	92.0	90.0	85.0	81.0	2	6	18


Insitu Soils Gradation
Sieve size [mm]
100
10
1
0.1
0.01
Percent Passing
105
100
95
90
85
80

(2) Laboratory Test Summary Results for underlying Soils

SOIL CLASSIFICATION

Label	Depth (m)	Percentage Passing												Atterberg limits			NMC (%)	USCS	REMARKS
		Sieve 37.5mm	Sieve 20mm	Sieve 10mm	Sieve 6.3mm	Sieve 5mm	Sieve 2mm	Sieve 0.600mm	Sieve 0.425mm	Sieve 0.300mm	Sieve 0.212mm	Sieve 0.150mm	Sieve 0.075mm	LL %	PL %	PI %			
Bor.A-1	1.50 - 1.95					100	98	81	75	68	64	60	52	43	28	15	15	ML	Silt
	3.00 - 3.45					100	96	80	77	72	70	67	62	43	21	22	7	CL	Lean clay
	4.50 - 4.95					100	99	92	90	84	82	78	69	45	18	27	7	CL	Lean clay
	6.00 - 6.45					100	98	89	87	83	79	76	71	39	17	22	11	CL	Lean clay
	7.50 - 7.95						100	98	97	90	87	84	81	36	16	20	16	CL	Lean clay
	9.00 - 9.45	100	88	81	79	78	71	58	54	50	47	44	40	42	14	28	8	SC	Clayey sand
	10.50 - 10.95					100	97	72	60	54	50	47	39	33	NP	-	11	SM	Silty sand
Bor.A-2-2	1.50 - 1.95					100	92	76	73	69	67	65	61	45	31	14	27	ML	Silt
	3.00 - 3.45					100	97	86	85	82	78	73	65	46	29	17	21	ML	Silt
	4.50 - 4.95			100	92	91	86	69	67	61	59	56	51	42	24	18	13	CL	Lean clay
	6.00 - 6.45					100	99	85	81	76	73	70	64	51	23	28	12	CH	Sandy fat clay
	7.50 - 7.95					100	99	92	90	87	84	82	76	49	21	28	12	CL	Lean clay
	9.00 - 9.45					100	98	69	66	60	57	53	49	39	26	13	17	SM	Silty sand
	10.50 - 10.95			100	86	86	83	70	67	61	59	56	50	32	17	15	14	CL	Lean clay
Bor.B-1	1.50 - 1.95				100	87	84	79	78	76	75	74	72	66	34	32	25	MH	Elastic silt
	3.00 - 3.45		100	96	94	93	88	84	82	80	79	79	77	70	27	43	39	CH	Sandy fat clay
	4.50 - 4.95			100	93	91	87	86	85	84	82	81	79	66	26	40	43	CH	Sandy fat clay
	6.00 - 6.45					100	99	98	98	97	97	96	95	79	30	49	39	CH	Sandy fat clay
	7.50 - 7.95			100	95	90	85	83	78	76	70	65	60	65	25	40	41	CH	Sandy fat clay
	9.00 - 9.45			100	93	91	84	80	70	68	65	60	55	63	27	36	40	CH	Sandy fat clay

SOIL CLASSIFICATION

Label	Depth (m)	Percentage Passing												Atterberg limits			NMC (%)	USCS	REMARKS
		Sieve 37.5mm	Sieve 20mm	Sieve 10mm	Sieve 6.3mm	Sieve 5mm	Sieve 2mm	Sieve 0.600mm	Sieve 0.425mm	Sieve 0.300mm	Sieve 0.212mm	Sieve 0.150mm	Sieve 0.075mm	LL %	PL %	PI %			
Bor.C-1	1.50 - 1.95				100	99	94	92	92	91	91	89	88	62	30	32	23	CH	Sandy fat clay
	3.00 - 3.45					100	98	95	94	93	93	92	90	64	27	37	23	CH	Sandy fat clay
	4.50 - 4.95					100	98	95	93	91	89	87	84	61	34	27	24	MH	Elastic silt
	6.00 - 6.45					100	99	94	93	90	89	87	82	59	30	29	30	MH	Elastic silt
	7.50 - 7.95						100	97	93	91	90	88	84	76	31	45	18	CH	Sandy fat clay
	9.00 - 9.45						100	99	99	96	95	93	89	80	26	54	13	CH	Sandy fat clay
	10.50 - 10.95					100	99	94	93	89	88	86	83	81	23	58	18	CH	Sandy fat clay
	12.00 - 12.45							100	99	97	96	94	92	79	28	51	16	CH	Sandy fat clay
	13.50 - 13.95						100	99	97	97	96	94	91	75	27	48	15	CH	Sandy fat clay
	15.00 - 15.45					100	98	91	87	84	82	79	74	64	25	39	13	CH	Sandy fat clay

LL: Liquid Limit

PL: Plastic Limit

PI: Plastic Index

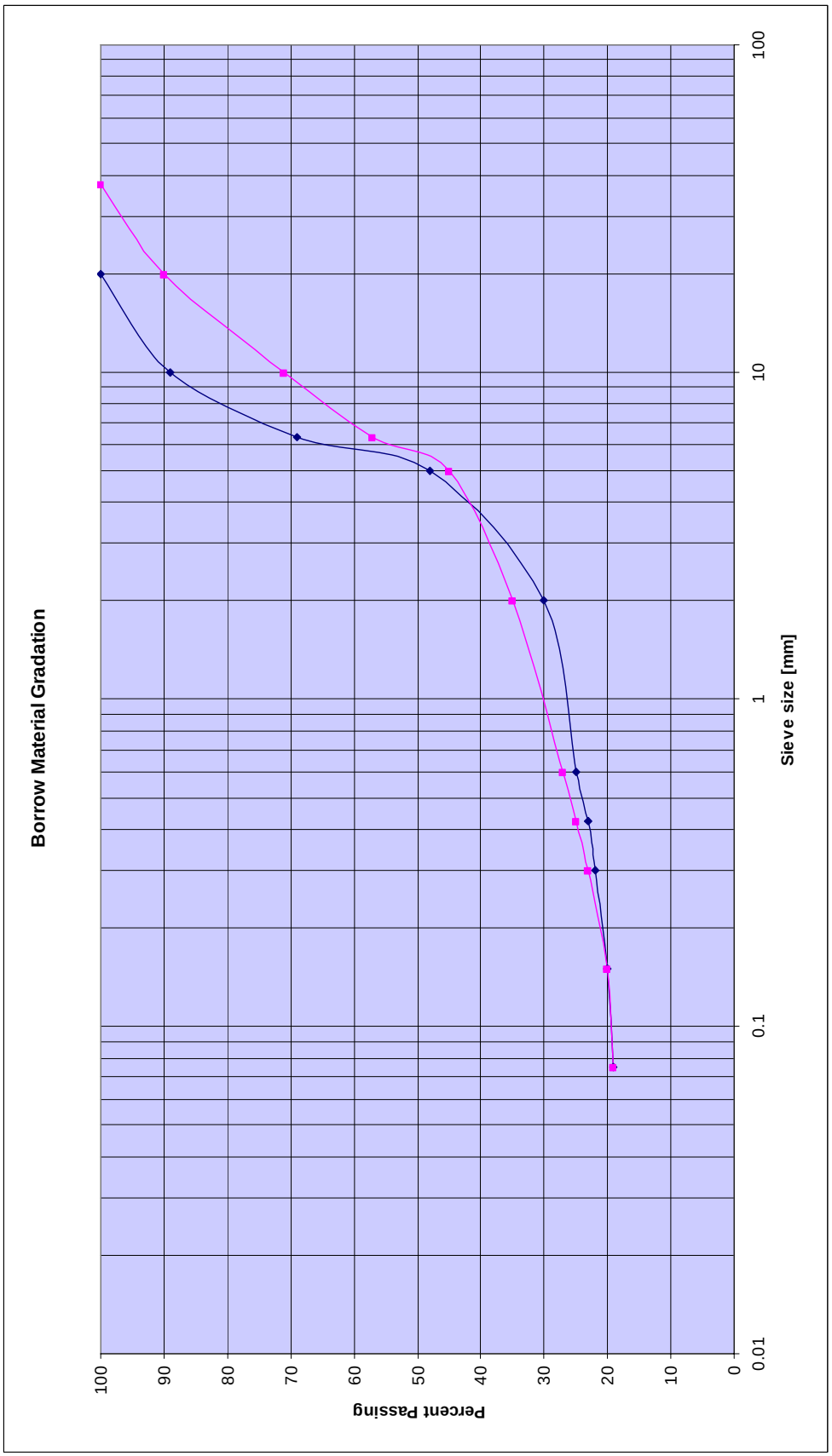
NMC: Natural Moisture Content

USCS: Unified Soil Classification System

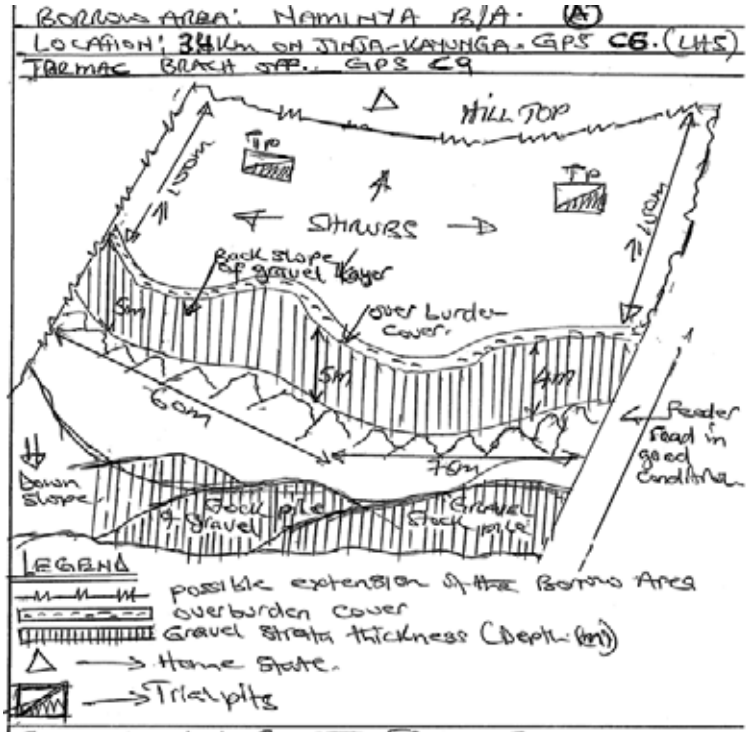
4.4 Laboratory Test Summary Results for Quarry Materials

Test Performed	Test No.	Results	Permissible Limits	
			BS 812 Road Works	BS 882 Concrete Works
Aggregate Crushing Value (ACV)	1	20	Max 21	Max 30
	2	23		
Los Angeles Abrasion Value (LAAV)	1	22	Max 28	Max 50
	2	23		
Stripping	1	+95	Good	-
	2	+95		

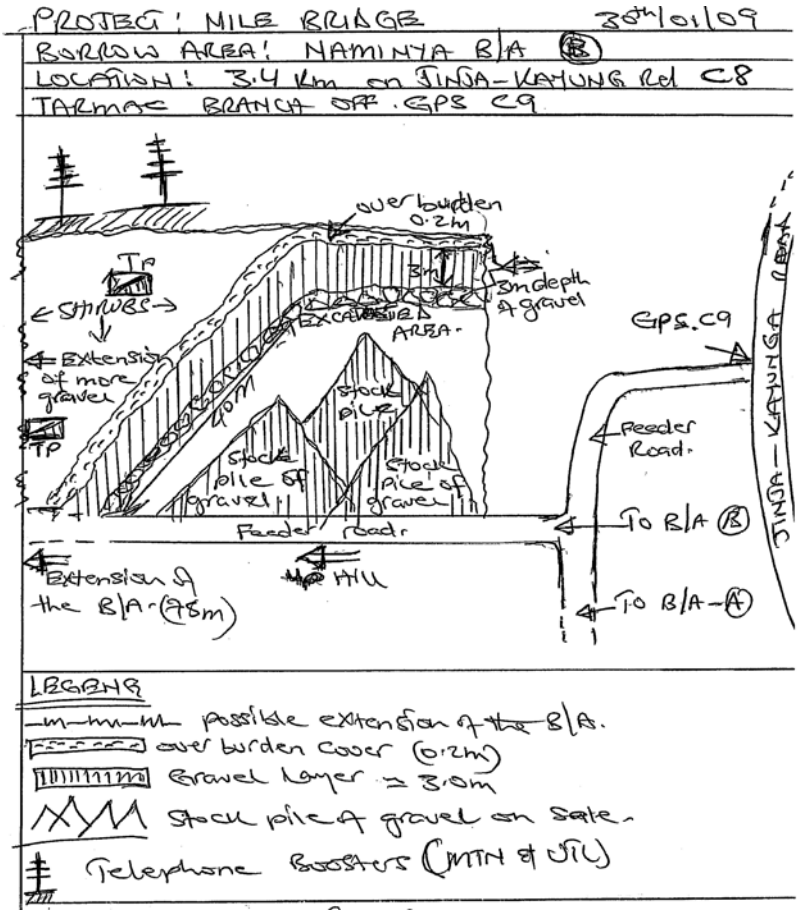
4.5 Laboratory Test Summary Results for Borrow Materials



4.6 Borrow Pit Description

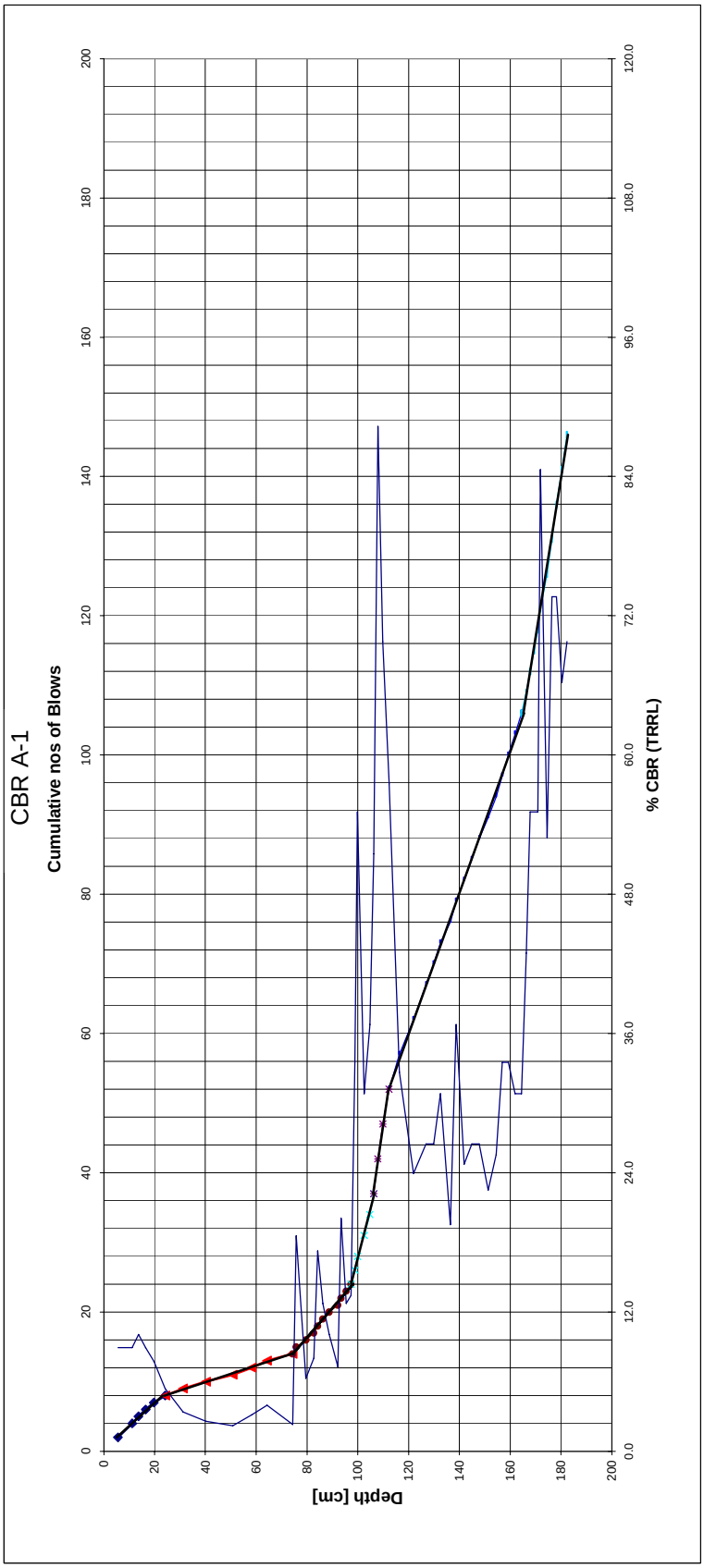


Naminya B/A, GPS C6 (LHS)

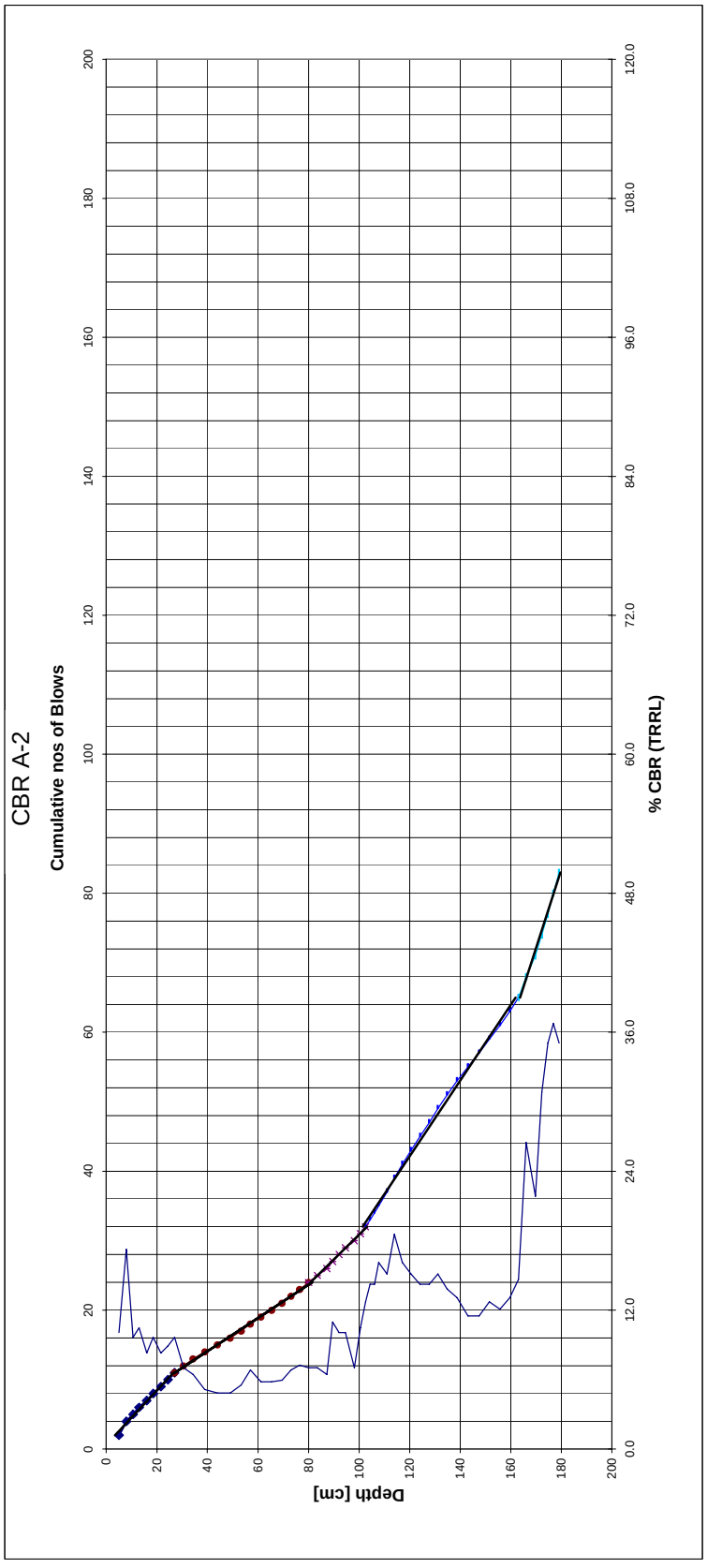


Naminya B/A GPS C8

4.7 Dynamic Cone Penetrometer (DCP) Results



Layer Depth [cm]	mm/blow	Layer Thickness [cm]	CBR
0			
24	3.01	24	8
74	8.37	50	3
97	2.35	23	11
106	0.71	9	38
112	0.4	6	70
166	0.99	54	27
182	0.44	16	63



Layer Depth [cm]	mm/blow	Layer Thickness [cm]	CBR
0			
27	2.55	27	10
80	4.19	53	6
102	2.79	22	9
164	1.84	62	14
179	0.88	15	30

New Bridge across River Nile. DCP Test Form				
Date		29-Jan-09		
Location		CBR A-1		
Co-ordinates		Elevation	1147 m	
		Northing	00.43819°	
		Easting	033.18657°	
Blows.	**Pene-tration**	**Cumul. Blows**	**mm/blow**	**Depth**
	[cm]			[cm]
0	10.8	0		0
2	16.4	2	28.0	5.6
2	22.0	4	28.0	11.2
1	24.5	5	25.0	13.7
1	27.3	6	28.0	16.5
1	30.5	7	32.0	19.7
1	35.0	8	45.0	24.2
1	42.0	9	70.0	31.2
1	51.0	10	90.0	40.2
1	61.5	11	105.0	50.7
1	69.0	12	75.0	58.2
1	75.0	13	60.0	64.2
1	85.1	14	101.0	74.3
1	86.5	15	14.0	75.7
1	90.4	16	39.0	79.6
1	93.5	17	31.0	82.7
1	95.0	18	15.0	84.2
1	97.0	19	20.0	86.2
1	99.5	20	25.0	88.7
1	102.9	21	34.0	92.1
1	104.2	22	13.0	93.4
1	106.2	23	20.0	95.4
1	108.1	24	19.0	97.3
2	109.7	26	8.0	98.9
2	110.7	28	5.0	99.9
3	113.3	31	8.7	102.5
3	115.5	34	7.3	104.7
3	117.1	37	5.3	106.3
5	118.7	42	3.2	107.9
5	120.7	47	4.0	109.9
5	123.1	52	4.8	112.3
5	127.2	57	8.2	116.4
5	132.7	62	11.0	121.9
5	137.7	67	10.0	126.9
3	140.7	70	10.0	129.9
3	143.3	73	8.7	132.5
3	147.3	76	13.3	136.5
3	149.5	79	7.3	138.7
3	152.7	82	10.7	141.9
3	155.7	85	10.0	144.9
3	158.7	88	10.0	147.9
3	162.2	91	11.7	151.4
3	165.3	94	10.3	154.5
3	167.7	97	8.0	156.9
3	170.1	100	8.0	159.3
3	172.7	103	8.7	161.9
3	175.3	106	8.7	164.5
3	177.2	109	6.3	166.4
3	178.7	112	5.0	167.9
3	180.2	115	5.0	169.4
3	181.7	118	5.0	170.9
3	182.7	121	3.3	171.9
5	185.3	126	5.2	174.5
5	187.2	131	3.8	176.4
5	189.1	136	3.8	178.3
5	191.2	141	4.2	180.4
5	193.2	146	4.0	182.4

New Bridge across River Nile. DCP Test Form				
Date		29-Jan-09		
Location		CBR A-2		
Co-ordinates		Elevation	1144 m	
		Northing	00.43967°	
		Easting	033.19038°	
Blows.	**Pene-tration**	**Cumul. Blows**	**mm/blow**	**Depth**
	[cm]			[cm]
0	5.0	0		0
2	10.0	2	25.0	-0.8
2	13.0	4	15.0	2.2
1	15.6	5	26.0	4.8
1	18.0	6	24.0	7.2
1	21.0	7	30.0	10.2
1	23.6	8	26.0	12.8
1	26.6	9	30.0	15.8
1	29.4	10	28.0	18.6
1	32.0	11	26.0	21.2
1	35.5	12	35.0	24.7
1	39.3	13	38.0	28.5
1	44.0	14	47.0	33.2
1	49.0	15	50.0	38.2
1	54.0	16	50.0	43.2
1	58.4	17	44.0	47.6
1	62.0	18	36.0	51.2
1	66.2	19	42.0	55.4
1	70.4	20	42.0	59.6
1	74.5	21	41.0	63.7
1	78.1	22	36.0	67.3
1	81.5	23	34.0	70.7
1	85.0	24	35.0	74.2
1	88.5	25	35.0	77.7
1	92.3	26	38.0	81.5
1	94.6	27	23.0	83.8
1	97.1	28	25.0	86.3
1	99.6	29	25.0	88.8
1	103.1	30	35.0	92.3
1	105.5	31	24.0	94.7
1	107.5	32	20.0	96.7
1	109.3	33	18.0	98.5
1	111.1	34	18.0	100.3
1	112.7	35	16.0	101.9
2	116.1	37	17.0	105.3
2	118.9	39	14.0	108.1
2	122.1	41	16.0	111.3
2	125.5	43	17.0	114.7
2	129.1	45	18.0	118.3
2	132.7	47	18.0	121.9
2	136.1	49	17.0	125.3
2	139.8	51	18.5	129
2	143.7	53	19.5	132.9
2	148.1	55	22.0	137.3
2	152.5	57	22.0	141.7
2	156.5	59	20.0	145.7
2	160.7	61	21.0	149.9
2	164.6	63	19.5	153.8
2	168.1	65	17.5	157.3
3	171.1	68	10.0	160.3
3	174.7	71	12.0	163.9
3	177.3	74	8.7	166.5
3	179.6	77	7.7	168.8
3	181.8	80	7.3	171
3	184.1	83	7.7	173.3

4.8 Bearing Capacity based on SPT Values

BORE HOLE	DEPTH (m)	PREDOMINANT SOIL FRACTION	Design N-value	Unconfined Compressive qu (kPa)	Undrained Cohesion Cu (kPa)	Ultimate Bearing Capacity qult (kPa)	Allowable Bearing Capacity qall (kPa)
Bor.A-1	1.50	Silt	13	-	-	-	260
	3.00	Clay	65	852	426	2188	> 700
	4.50	Clay	123	1611	806	4141	> 700
	6.00	Clay	165	2162	1081	5555	> 700
	7.50	Amphibolite	104	-	-	-	* >700
	9.00	Amphibolite	197	-	-	-	* >700
	10.50	Amphibolite	280	-	-	-	* >700
Bor.A-2-2	1.50	Sand	9	-	-	-	* 180
	3.00	Sand	29	-	-	-	* 580
	4.50	Clay	50	655	328	1683	561
	6.00	Clay	80	1048	524	2693	> 700
	7.50	Clay	153	2004	1002	5151	> 700
	9.00	Clay	91	1192	596	3064	> 700
	10.50	Clay	82	1074	537	2761	> 700
Bor.B-1	1.50	Sand	6	-	-	-	* 120
	3.00	Clay	2	26	13	67	22
	4.50	Clay	4	52	26	135	45
	6.00	Clay	7	92	46	236	79
	7.50	Clay	39	511	255	1313	438
	9.00	Clay	145	1900	950	4882	> 700
Bor.C-1	1.50	Clay	10	131	66	337	112
	3.00	Clay	10	131	66	337	112
	4.50	Silt	8	-	-	-	* 160
	6.00	Silt	11	-	-	-	* 220
	7.50	Clay	23	301	151	774	258
	9.00	Clay	23	301	151	774	258
	10.50	Clay	24	314	157	808	269
	12.00	Clay	51	668	334	1717	572
	13.50	Clay	178	2332	1166	5993	> 700
	15.00	Clay	196	2568	1284	6599	> 700

- qu = 13.1 x Design N-value,
- Cu = qu/2; and
- qall = 5.14 x Cu.

qall is evaluated using a factor of safety of 3

* Terzaghi and Peck published in1967 that the Allowable Bearing Capacity with settlement limited to approximately 25mm for cohesionless soils is read off directly from the Chart.

APPENDIX 5

NATURAL ENVIRONMENTAL STUDY

5.1 Environmental Management Costs

Environmental protection costs are of two types: (i) sub-components of bridge/approach road structures (e.g., drains, vegetation, fence and other relevant facilities), and (ii) technical support and management. Generally, the cost of direct environmental protection measure such as drains and fence construction works is included within the estimation of the direct construction cost. So, here, the cost for the later item is summarized as environmental management costs, and is usually included within the administration cost.

The environmental technical support for the project consists of following five components: (1) hiring environmental personnel, (2) local consultation, (3) training and co-ordination meeting, (4) facilitation, and (5) periodical environmental survey.

From the economical points of view, it is strongly recommended to carry out periodical on-site monitoring such as roadside air quality, noise and water quality survey not by another contracted survey company but by EMs themselves. Besides, those survey instruments manufactured recently are very portable and accurate, so that the feedback of those survey results to environmental monitoring program will be quick.

Mainly, the environmental management cost to be associated with this bridge construction project consists of following two components: i.e., (1) periodical environmental monitoring activities around the study area, and (2) the conservation activities of several endemic fishes (IUCN Endangered). Periodical environmental monitoring activities cover from water quality survey of the River Nile to the roadside noise survey. The annual cost of the proposed environmental monitoring program excluding the cost of the conservation pond, described later, would be of US$ 116,200.00/year (see Table 3). Entire bridge construction work would take roughly 3.5 years, so it can be assumed that relevant environmental monitoring activities summarized within its environmental program will be and/or must be carried out continuously/or periodically during this period. Thus, the total cost of this environmental monitoring work would be of US$ 406,700.00.

Table 4 summarizes the cost estimate to be required for the conversion of the ex-old river ponds into the conservation pond for several endemic fish species (IUCN Endangered). Here, it is assumed that the conservation pond can be constructed within five months, provided that the detailed design of the conservation pond is finalized. In addition, relevant monitoring activities such as periodical site inspections will be required for at least five years after the conservation pond construction is completed. The construction and relevant monitoring and follow-up work would cost US$ 95,850.00. As a total, whole environmental cost to be associated with this bridge construction project would be of US$ 502,550.00.

Table 3 Cost Estimates of Environmental Program for New Nile Bridge Construction Project

Item	Unit Price [US$]	Quantity	Amount [US$]
Hiring Environmental Staff			
Environmental Monitor	48,000.00	1 person/yr	48,000.00
Assistant EM	24,000.00	1 person/yr	24,000.00
Short-Term Consultation Services			
Contractor Crew Briefing on-site		L.S.	1,000.00
Base Technical Support and Assistance			
Periodical water quality survey (6 pts x 10 parameters, monthly)	1,200.00	12 times	14,400.00
Periodical groundwater quality survey (4 pts x 10 parameter, monthly)	800.00	12 times	9,600.00
Periodical air quality survey (2 pts x 2 parameters, monthly)	1,100.00	12 times	13,200.00
Periodical Roadside noise survey (2 pts x daytime only & monthly)	500.00	12 times	6,000.00
Total			116,200.00

Note: The construction cost of conservation pond is not included in this valuation.

Table 4 Cost Estimate of the Creation of the Conservation Pond

Item	Unit Price [US$]	Quantity	Amount [US$]
Construction Phase			
Construction Worker	70.00/month/person	5 workers over 4 months	1,400.00
Restoration Worker	70.00/month/person	5 worker over 3 months	1,050.00
Local Management	200.00/month	1 person over 12 months	2,400.00
Management and Supervision	1,000.00/month	1 person over 12 months	12,000.00
Development and production of educational materials (e.g., leaflets, fence, signboard and others)		L.S.	2,000.00
Sub Total			18,850.00
Monitoring and follow-up Phase			
Local Management	5,000.00	1 person/half year over 5 years	25,000.00 50,000.00
Management and Supervision	10,000.00	1 person/half year over 5 years	2,000.00
Conservation-related Social Survey	1,000.00	2 times	
Sub Total			77,000.00
Total			95,850.00

5.2 Photo Records of Technical Site Visit

Crop Field along Route A（Eastside）

Railway line around Route A (Westside)

Jack fruit tree occurred around Route B (Eastside)

Crop Field along Route B (Westside)

Crop Filed along Route C (Eastside)

Crop Field along Route C (Westside)

Figure 1 Agricultural Lands observed around Study Area

(Photos taken in November and December of 2008)

5.3 Photo Records of the River Nile Waterfront

River Nile Eastside Waterfront: Route A

River Nile Westside Waterfront: Route A

Eastside small Bay of River Nile along Route B

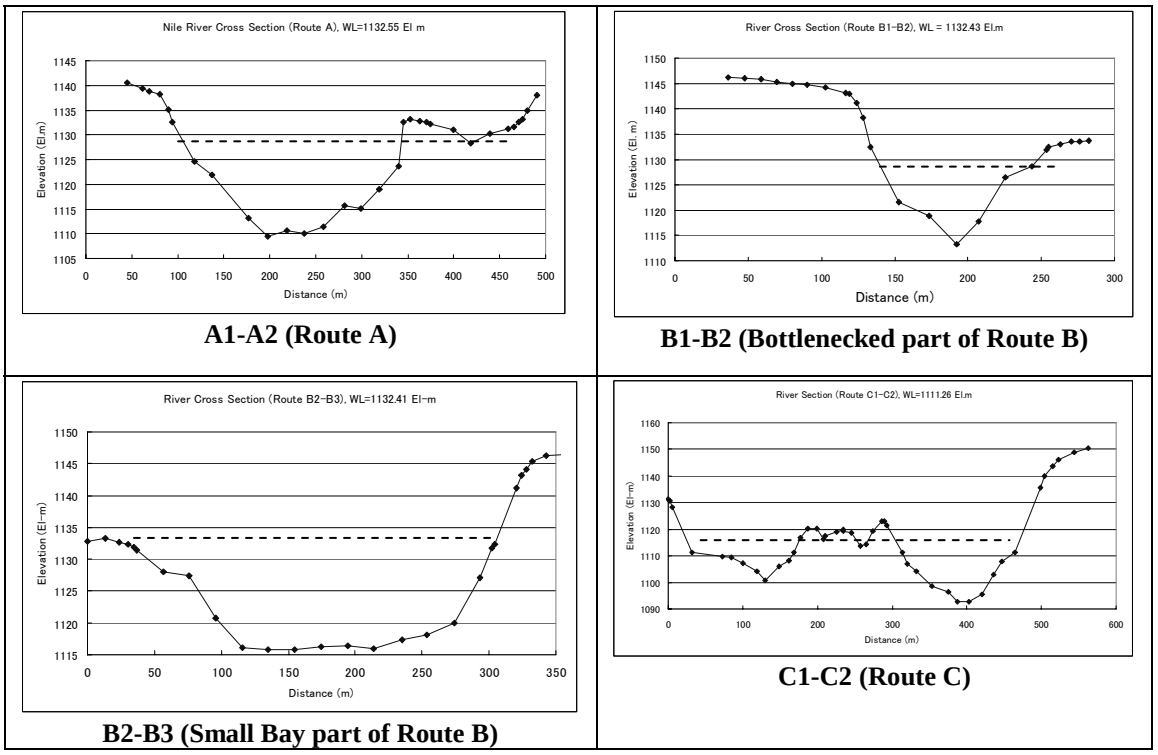
River Nile Eastside Waterfront, bottlenecked part around Route B

Small Islands of River Nile around Route C

River Nile (Downstream from Nalubaale Dam: Route C): Overview from Njeru Side

Figure 2 River Nile around the study site (photo taken in November and December of 2008)

5.4 River Sections of the River Nile



A1-A2 (Route A)

B1-B2 (Bottlenecked part of Route B)

B2-B3 (Small Bay part of Route B)

C1-C2 (Route C)

Figure 3 Cross Section of the River Nile

Note: Exact location of Point A1, A2, B1, B2, B3, C1 and C2 are described in the survey section of the Progress Report of this study. Dotted lines drawn in these figures indicate the water levels measured during the field survey period of this study. (Source: This Study, 2009)

5.5 Cross-Sectional Velocity Profile of River Nile

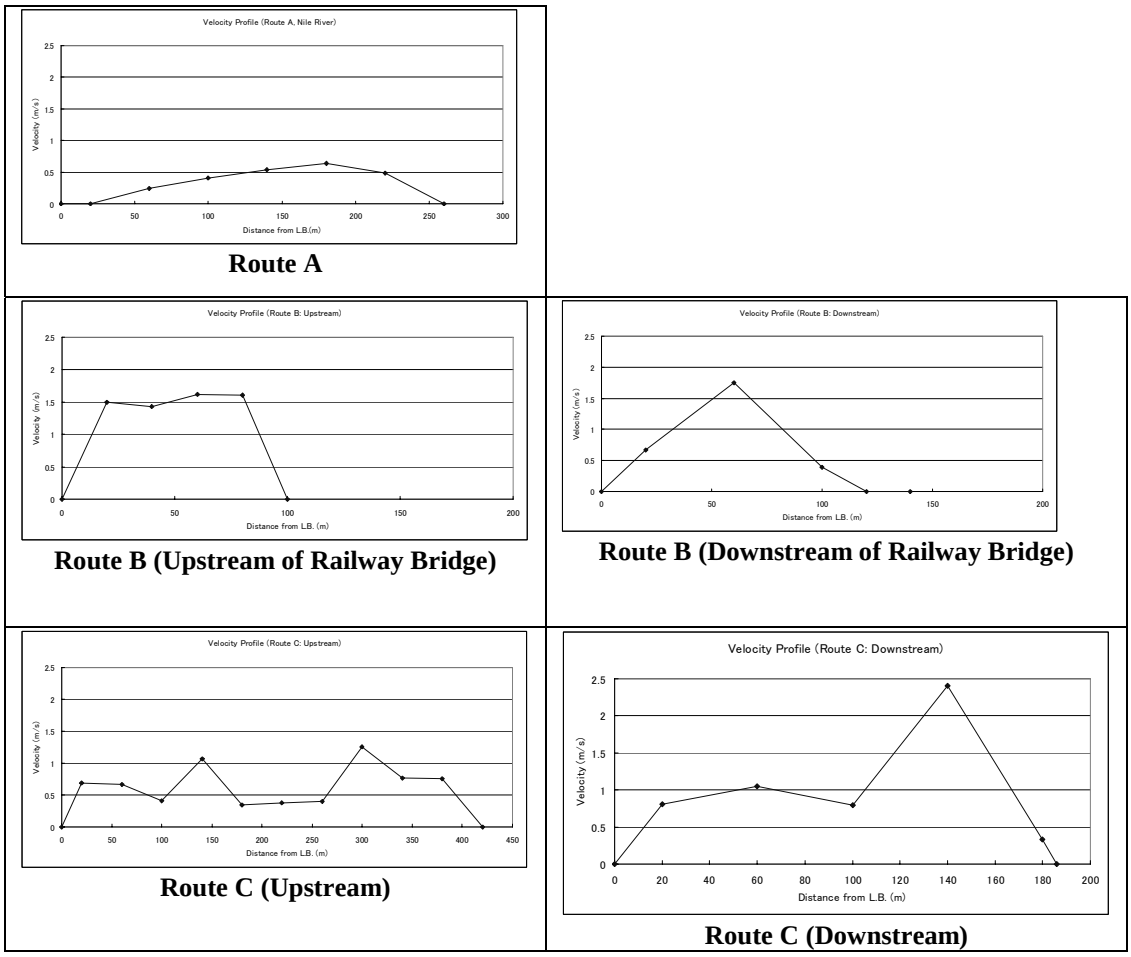


Figure 4 Cross-Sectional Velocity Profile of River Nile

Note: Velocity survey was conducted in December 2008. (Source: JICA Study Team, 2009)

5.6 Photo Records of Current Flora/faunal Condition along the River Nile

Drying of Fish (Route A, Westside)

Fish caught in River Nile(Route B, Westside)

Birds nesting within bush of west riverbank (Route A)

Westside waterfront along River Nile between Routes A and B)

Snail Shell (benthos of River Nile) found at Route C (Eastside)

Monitor Lizard found at island within River Nile

Figure 5 Current Flora/faunal Condition along the River Nile

Note that all photo taken in December 2008.

5.7 Milicia Excelsa (African Teak: Mavule)

Milicia Excelsa (African Teak:Mavule)
Image after Arkive

Leaves of Milicia Excelsa
(Image after Arkive)

Figure 6 Milicia Excelsa (African Teak: Mavule)

5.8 IUCN Red List Category

According to the IUCN Red List Categorization, there are 9 categories, depending on past and current biological status of species of concern (http://www.iucnredlist.org). Figure 7 shows a representation of the relationships between the categories.

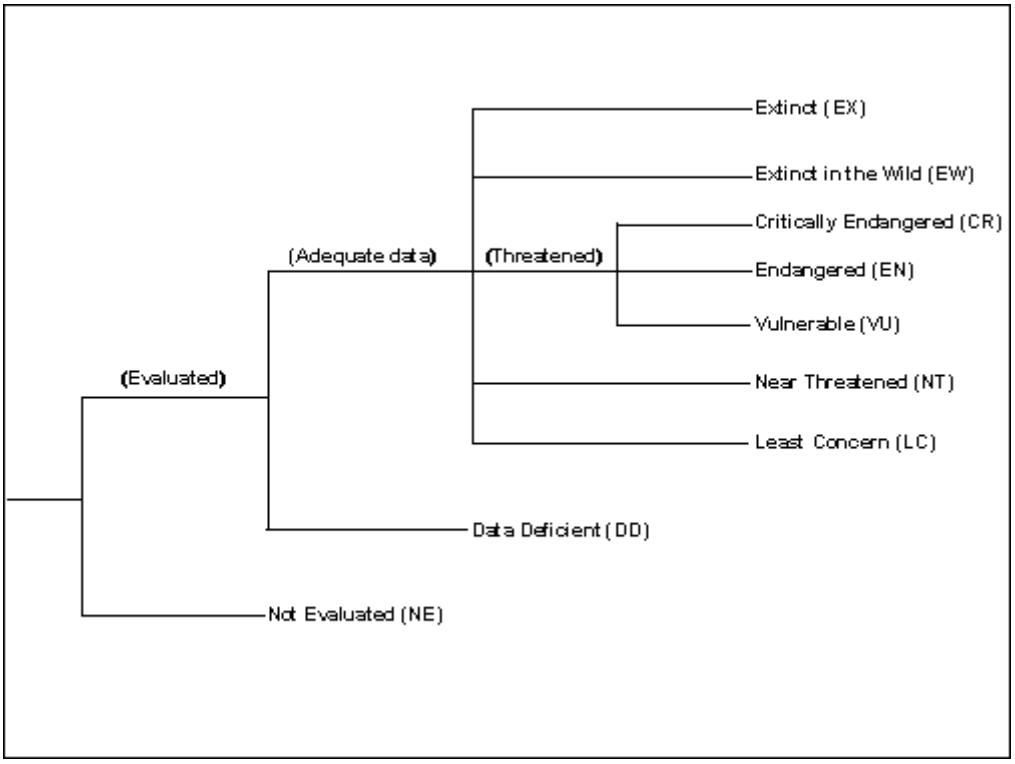


Figure 7 Structure of the categories

(Source: http://www.iucnredlist.org/static/categories_criteria_3_1)

More detailed descriptions of each category are attached as follows,

(1) EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

(2) EXTINCT IN THE WILD (EW)

A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

(3) CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria, defined for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

(4) ENDANGERED (EN)

A taxon is endangered when the best available evidence indicates that it meets any of the criteria, defined for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

(5) VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria, defined for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

(6) NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

(7) LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

(8) DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

(9) NOT EVALUATED (NE)

A taxon is Not Evaluated when it is has not yet been evaluated against the criteria.

5.9 Spot-necked Otter

Figure 8 Spot-necked Otter

Note: all photo images of this spot-necked otter are after "otternet".

5.10 Baseline Herpetological Inventory

Table 1 Baseline Herpetological Inventory around the Study Site

	Scientific Name	English Equivalent
Order Testudines (tortoise, turtles and terrapins)		
1	*Kinixys belliana*	Bell's Hinged Tortoise (listed in Appendix II of CITES)
2	*Pelomedusa subrufa*	Helmeted Terrapin
Order Squamata (lizards and worm lizard)		
3	*Hemidactylus brooki*	Brook's Gecko
4	*Hemidactylus mabouia*	Tropical House Gecko
5	*Mabuya maculilabris*	Speckle-Lipped Skink
6	*Mabuya quinquetaeniata*	Five-Lined Skink
7	*Mabuya Striata*	Striped Skink
8	*Chamaesaura anguina*	Highland Grass Lizard
9	*Acanthocercus atricollis*	Blue-Headed Tree Agama
10	*Agama agama*	Red-Headed Rock Agama
11	*Chamaeleo gracilis*	Slender Chameleon
12	*Varanus niloticus*	Nile Monitor
Order Crocodylia (crocodiles)		
13	*Crocodylus niloticus*	Nile Crocodile
Order Squamata (snakes)		
14	*Typhlops punctatus*	Spotted blind Snake
15	*Typhlops lineolatus*	Lineolate blind Snake
16	*Leptotyphlops scutifrons*	Peter' Worm Snake
17	*Python sebae*	Central African Rock Python
18	*Lamprophis fuliginosus*	Brown House Snake
19	*Lycophidion capense*	Cape Wolf Snake
20	*Lycophidion ornatum*	Forest Wolf Snake
21	*Mehelya capensis*	Cape File Snake
22	*Mehelya poensis*	Forest File Snake
23	*Grayia smythii*	Smyth's Water Snake
24	*Grayia tholloni*	Thollon's Water Snake
25	*Philothamnus angolensis*	Angolan Green Snake
26	*Philothamnus battersbyi*	Battersby's Green Snake
27	*Philothamnus heterolepidotus*	Slender Green Snake

28	*Philothamnus semivariegatus*	Spotted Bush Snake
29	*Hapsidophrys smaragdina*	Emerald Snake
30	*Thrasops jacksoni*	Jackson's Tree Snake
31	*Scaphiophisalbopunctatus*	Hook-nosed Snake
32	*Boiga blandingii*	Blanding's Tree Snake
33	*Crotaphopeltis hotamboeia*	White-Headed Snake/White-Lip
34	*Dispholidus typus*	Boomslang
35	*Thelotornis kirtlandii*	Forest Vine Snake
36	*Psammophis mossambicus*	Olive Sand Snake/Hissing Sand Snake
37	*Natriciteres olivacea*	Olive Marsh Snake
38	*Dasypeltis atra*	Montane Egg-Eater
39	*Dasypeltis scabra*	Common Egg-Eater
40	*Aparallactus lunulatus*	Plumbeous Centipede-Eater
41	*Polemon christyi*	Christy's Snake Eater
42	*Atractaspis irregularis*	Variable Burrowing Asp
43	*Elapsoidea loveridgei*	East African Garter Snake
44	*Naja haje*	Egyptian Cobra
45	*Naja melanoleuca*	Forest Cobra
46	*Naja nigricollis*	Black-Necked Spitting Cobra
47	*Pseudohaje goldii*	Gold's Tree Cobra
48	*Dendroaspis jamesoni*	Jameson's Mamba
49	*Causus rhombeatus*	Rhombic Night Adder
50	*Causus resimus*	Velvety-Green Night Adder
51	*Bitis arietans*	Puff Adder
52	*Bitis gabonica*	Gaboon Viper
53	*Bitis nasicornis*	Rhinoceros Viper
54	*Atheris squamiger*	Green Bush Viper
Order Anura (frogs and toads)		
55	*Bufo kisoloensis*	Kisolo Toad
56	*Hemisus guineensis*	Guinea Snout-Burrower
57	*Afrixalusquadrivittatus*	Striped Leaf-Folding Frog
58	*Hyperolius cinnamomeoventris*	Cinnamon-Bellied Reed Frog
59	*Hyperolius kivuensis*	Kivu Reed Frog
60	*Hyperolius lateralis*	Side-Blotched Reed Frog
61	*Hyperolius nasutus*	Sharp-nosed Reed Frog
62	*Kassina senegalensis*	Senegal Kassina
63	*Rana angolensis*	Angolan River Frog
64	*Amnirana galamensis*	Galam White-Lipped Frog/Golden-Backed Frog
65	*Anirana albolabris*	Forest White-Lipped Frog
66	*Hoplobatrachus occipitalis*	Eastern Groove-crowned Bullfrog
67	*Phrynobatrachus natalensis*	Natal Puddle Frog
68	*Ptychadena mascareniensis*	Mascarene Rocket Frog

CITES: Convention on International Trade in Endangered Species
(Source: Spawls et. al., 2006)

5.11 Victoria Nile Conservation Area and Kimaka Forest Reserve

Figure 9 Victoria Nile Conservation Area

Note that shaded strips along both riverbanks are declared as "conservation area" by law.

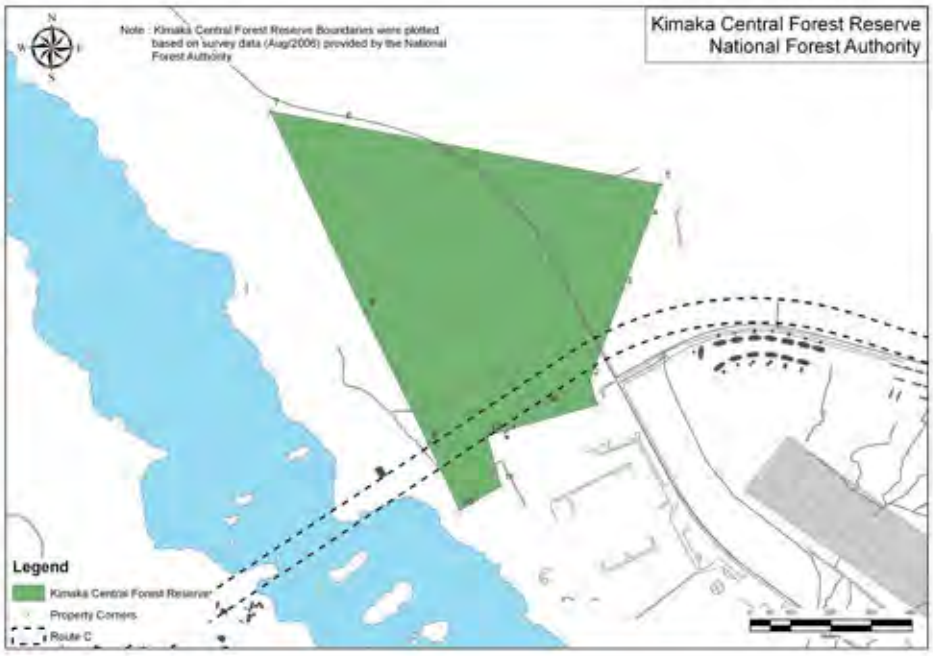


Figure 10 Kimaka Forest Reserve

Note that dotted lines indicate RoW of Alignment C

APPENDIX 6

SOCIAL ENVIRONMENTAL STUDY

6.1 Inventory of Affected Buildings (Alignment A)

No.	ID.No.	Route	Use	Size	Story (No.)	Type	Wall Material	Condition	Remarks
<Route A>									
1	615	A	Industrial	Medium	1	Exist	Concrete	Good	Nile Brewery
2	613	A	Industrial	Medium	1	Exist	Concrete	Good	Nile Brewery
3	614	A	Industrial	Medium	1	Exist	Concrete	Good	Nile Brewery
4	652	A	Industrial	Medium	1	Exist	Concrete	Good	
5	645	A	Industrial	Large	1	Exist	Concrete	Good	
6	179	A	Residential	Small	1	Exist	Brick	Good	
7	351	A	Residential	Medium	1	Exist	Concrete	Good	
8	183	A	Industrial	Small	1	Exist	Concrete	Good	Nytil Security
9	184	A	Industrial	Large	1	Exist	Concrete	Good	Administrative Bldg of Nytil
10	185	A	Industrial	Large	1	Exist	Concrete	Good	Nytil Warehouse
11	197	A	Residential	Large	2	Under Const.	Concrete	Good	
12	234	A	Residential	Small	2	Under Const.	Brick	Good	
13	235	A	Residential	Small	1	Under Const.	Brick	Good	
14	192	A	Residential	Large	2	Under Const.	Concrete	Good	
15	A001	A	Residential	Medium	1		Concrete	Good	
16	195	A/B	Residential	Medium	1	Under Const.	Concrete	Good	
17	196	A/B	Residential	Medium	1	Under Const.	Concrete	Good	
18	204	A/B	Residential	Small	1	Under Const.	Concrete	Good	Foundation
19	202	A/B	Residential	Medium	1	Exist	Brick	Moderate	
20	200	A	Residential	Medium	1	Exist		Moderate	
21	198	A	Residential	Medium		Exist	Concrete	Good	
22	201	A	Residential	Large	2	Exist	Brick	Good	
23	211	A	Residential	Large	2	Under Const.	Brick	Good	
24	219	A	Residential	Small	1		Brick	Moderate	
25	221	A/B	Commercial	Medium	1	Exist	Steel	Good	CALTEX:Gas Station
26	220	A/B	Commercial	Medium	1	Exist	Concrete	Good	CALTEX: Supermarket

6.2 Inventory of Affected Buildings (Alignment B)

No.	ID.No.	Route	Use	Size	Story (No.)	Type	Wall Material	Condition	Remarks
<Route B>									
1	226	B	Industrial	Large	1	Exist	Concrete	Good	Vita Foam Ltd.
2	225	B	Industrial	Large	2	Exist	Concrete	Good	Vita Foam Ltd.
3	374	B	Residential	Large	1	Exist	Concrete	Good	
4	370	B	Residential	Small	1	Exist	Concrete	Good	
5	371	B	Residential	Small	1	Exist	Concrete	Good	
6	372	B	Residential	Large	1	Exist	Concrete	Good	
7	369	B	Residential	Small	1	Exist	Concrete	Good	
8	368	B	Residential	Small	1	Exist	Concrete	Good	
9	229	B	Industrial	Medium	1	Exist	Concrete	Good	Umeme(Power Co.)
10	228	B	Industrial	Medium	1	Exist	Concrete	Good	Umeme(Power Co.)
11	377	B	Others	Medium	1	Exist	Make Shift	Poor	Dilapidated
12	376	B	Others	Medium	1	Exist	Make Shift	Poor	Dilapidated
13	232	B	Residential	Large	2	Exist	Concrete	Good	
14	233	B	Residential	Large	1	Exist	Concrete	Good	
15	231	B	Residential	Small	1	Exist	Make Shift	Poor	
16	230	B	Residential			Under Const.		-	
17	209	B	Residential	Medium	2	Under Const.	Brick	-	
18	206	B	Residential	Medium	1	Exist	Brick	Good	
19	205	B	Residential	Medium	1	Exist	Brick	Moderate	
20	210	B	Residential	Medium	2	Exist	Brick	Moderate	
21	195	A/B	Residential	Medium	1	Under Const.	Concrete	Good	
22	196	A/B	Residential	Medium	1	Under Const.	Concrete	Good	
23	204	A/B	Residential	Small	1	Under Const.	Concrete	Good	Foundation
24	202	A/B	Residential	Medium	1	Exist	Brick	Moderate	
25	217	B	Residential	Medium	2	Under Const.	Concrete	Good	
26	212	B	Residential	Medium	1	Under Const.	Brick	Good	
27	218	B	Residential	Small	1	Exist	Brick	Poor	Shed
28	B01	B	Residential	Small	1	Exist	Concrete	Moderate	
29	221	A/B	Commercial	Medium	1	Exist	Steel	Good	CALTEX:Gas Station
30	220	A/B	Commercial	Medium	1	Exist	Concrete	Good	CALTEX: Supermarket

6.3 Inventory of Affected Buildings (Alignment C)

No.	ID.No.	Route	Use	Size	Story (No.)	Type	Wall Material	Condition	Remarks
<Route C>									
1	262	C/W	Residential	Medium	1	Exist	Concrete	Moderate	
2	34	C/W	Residential	Medium	1	Exist	Concrete	Good	
3	35	C/W	Residential	Medium	1	Exist	Concrete	Good	
4	30	C/W	Residential	Medium	1	Exist	Concrete	Moderate	
5	C01	C/W	Residential	Small	1	Under Const.	Brick	Moderate	
6	27	C/W	Residential	Medium		Under Const.	Concrete	Moderate	
7	24	C/W	Residential	Large		Exist	Brick	Good	
8	20	C/W	Residential	Medium	1	Exist	Concrete	Good	
9	18	C/W	Residential	Small	1	Exist	Make Shift	Good	Hut
10	19	C/W	Residential	Small		Exist	Concrete	Moderate	
11	17	C/W	Residential	Large	1	Exist	Concrete	Good	Main house
12	16	C/W	Residential	Small	1	Exist	Concrete	Good	
13	15	C/W	Residential	Large	1	Exist	Concrete	Good	Main house
14	14	C/W	Residential	Medium	1	Exist	Brick	Moderate	
15	13	C/W	Residential	Small	1	Under Const.	Brick	Moderate	
16	245	C/W	Residential	Medium	1	Exist	Brick	Moderate	
17	10	C/W	Residential	Medium	1	Exist	Concrete	Moderate	Residential complex(12 families)
18	8	C/W	Residential	Medium	1	Exist	Concrete	Moderate	
19	9	C/W	Residential	Medium	1	Exist	Concrete	Moderate	
20	12	C/W	Residential	Small	1	Exist	Concrete	Moderate	
21	11	C/W	Residential	Small	1	Exist	Brick	Poor	16 families(Toilet)
22	7	C/W	Residential	Small		Under Const.	Brick	Moderate	
23	6	C/W	Residential	Small	1	Under Const.	Brick	Moderate	
24	3	C/W	Residential	Medium	1	Under Const.	Brick	Moderate	
25	5	C/W	Residential	Medium	1	Exist	Concrete	Good	
26	4	C/W	Residential	Medium	1	Exist	Concrete	Good	
27	2	C/W	Residential	Large	1	Under Const.	Brick	Good	
28	1	C/W	Residential	Large	1	Exist	Brick	Moderate	
29	321	C/W	Residential	Small	1	Exist	Brick	Good	
30	322	C/W	Residential	Small	1	Exist	Brick	Moderate	
31	323	C/W	Residential	Medium	1	Exist	Brick	Moderate	
32	324	C/W	Residential	Medium	1	Exist	Concrete	Good	
33	C02	C/W	Residential	Large	1		Concrete	Good	
34	63	C/W	Commercial	Large	1	Exist	Concrete	Good	MTO Moyoni
35	62	C/W	Commercial	Large	1	Exist	Concrete	Good	MTO Moyoni
36	60	C/W	Commercial	Medium	1	Exist	Make Shift	Poor	Poutry House
37	59	C/W	Residential	Medium	1	Exist	Concrete	Moderate	
38	58	C/W	Residential	Large	1	Under Const.	Brick	Good	
39	75	C/W	Residential	Medium	1	Exist	Brick	Moderate	
40	77	C/W	Residential	Small	1	Exist	Brick	Poor	Storehouse
41	76	C/W	Residential	Medium	1	Exist	Concrete	Moderate	
42	56	C/W	Residential	Medium	1	Exist	Concrete	Good	
43	C04	C/W	Residential	Small	1	Exist	Concrete	Poor	Small Apt.
44	C05	C/W	Residential	Small	1	Exist	Concrete	Poor	Shed
45	55	C/W	Residential	Medium	1	Exist	Concrete	Moderate	
46	C03	C/W					Steel		Transmission Tower
47	50	C/W	Residential	Medium					
48	49	C/W	Residential	Medium					
49	51	C/W	Residential	Large	1				
50	C07	C/W					Steel		Transmission Tower
51	268	C/W	Residential	Medium	1	Exist	Brick	Poor	Animal Shed
52	264	C/W	Residential	Small	1	Exist	Concrete	Poor	Shed
53	265	C/W	Residential	Small	1	Exist	Concrete	Poor	
54	267	C/W	Residential	Small	1	Exist	Make Shift		Animal Shed
55	C06	C/W	Residential	Small	1	Exist	Concrete		Shed
56	109	C/E	Residential	Small	1	Exist	Make Shift		
57	107	C/E	Residential	Small	1	Exist	Make Shift	Poor	
58	108	C/E	Residential	Small	1	Exist	Make Shift	Poor	
59	110	C/E	Residential	Medium	1	Under Const.	Brick	Poor	
60	111	C/E	Residential	Small	1	Exist	Make Shift	Poor	
61	112	C/E	Residential	Small	1	Exist	Concrete	Moderate	Security Shed for School
62	114	C/E	Residential	Medium	1	Exist	Concrete	Good	
63	113	C/E	Residential	Medium	1	Under Const.	Brick	Moderate	
64	115	C/E	Residential	Medium	1	Under Const.	Concrete	Good	
65	119	C/E	Residential	Medium	1	Exist	Concrete	Moderate	
66	120	C/E	Residential	Small	1	Under Const.	Brick	Moderate	
67	118	C/E	Residential	Small	1	Exist	Concrete	Poor	
68	117	C/E	Residential	Medium	1	Exist	Concrete	Poor	
69	125	C/E	Residential	Large	1	Exist	Concrete	Good	Apt.(Kiwa Merembe Service
70	122	C/E	Residential	Small	1	Exist	Brick	Moderate	Formation Coomunity)
71	127	C/E	Residential	Small	1	Exist	Steel		Animal Shed
72	126	C/E	Residential	Medium	1	Exist	Concrete	Moderate	
73	290	C/E	Residential	Medium	1	Under Const.	Brick	Moderate	
74	291	C/E	Residential	Medium	1	Exist	Make Shift	Poor	
75	128	C/E	Residential	Medium	1	Exist	Brick	Moderate	
76	104	C/E	Residential	Large	1	Exist	Concrete	Good	
77	135	C/E	Residential	Medium	1	Under Const.	Brick	Moderate	
78	129	C/E	Residential	Small	1		Concrete	Poor	Toilet
79	293	C/E	Residential	Small	1	Exist	Make Shift	Poor	Mudhouse
80	296	C/E	Residential	Small	1	Exist	Brick	Poor	Mud toilet
81	299	C/E	Residential	Medium	1	Exist	Make Shift	Poor	Mud house

APPENDIX 7

RESETTLEMENT ACTION PLAN

7.1 Minutes of Meeting of NYTIL

REPORT ON THE MEETING AT SOUTHERN RANGE NYANZA-NYTIL.

DATE: July 13, 2009

VENUE: SOUTHERN RANGE NYANZA.

START: 3:45PM.

MEMBERS PRESENT.

1. Mr. Sanjay. - Nytil.
2. Mr. Piyush Chandarana. - Nytil.
3. Mr. Shingeru Sai.-JICA Study Team.
4. Eng. Bwanga George- UNRA- Project Manager.
5. Mr. Nelson Omagor- COWI –Team Leader.
6. Mr. Bernard Ochola- COWI- Sociologist.
7. Mr. Paul Muragati-COWI-Land Valuer.
8. Mr. Muramira Eugene-COWI- Environmental Economist.
9. Mr. Nkutu David Nelson- COWI- Plant Ecologist.
10. Ms. Mubeezi Juliet- UNRA Trainee.
11. Ms. Philippa Arinaitwe- UNRA Trainee.

Issues Raised:

- Mr. Sanjay explained to members present that the major issues of concern to Southern Range Nyanza were access to the warehouse and factory by trucks since the major access road would be destroyed by the construction of the new bridge, re-location of the administration block, and destruction of the manager's house.
- Eng. Bwanga responded by telling Mr. Sanjay that Southern Range Nyanza as a company need to come up with or provide options/ solutions after which they can start looking at the proposals. He further pointed out that the solutions to these issues should initially come from Southern Range Nyanza.
- Mr. Paul Mungati inquired if the factory had enough land to accommodate the relocation of the administration building and warehouse.
- Response from Mr. Sanjay was that the land is available and enough.
- Mr. Nelson Omagor requested Nytil to show the feasible areas were the administration building and warehouse could be relocated.
- Mr. Sanjay pointed out that the major issue that Nytil wanted to know was the bridge's exact location of the bridge's starting point, so that they can plan for the offloading point for the trucks coming form Mombassa through Jinja. He also wanted to know were the main entrance will be after the bridge is constructed.
- Eng. Bwanga responded to this by saying that details of bridge plan could not be revealed at the moment, but he went ahead to inform that the trucks will use the designed bridge round about to get access to the factory.
- Mr. Sanjay explained to members present that creation of a new entrance for both the administration building and warehouse was necessary. He also inquired about the manager's house that would be affected by the construction of the new bridge.
- Eng. Bwanga responded by telling Mr. Sangay that property outside the road corridor should be consulted by the chief government valuer, for proper clarification on policies concerning this, but property with in the road corridor will be compensated.

- Mr. Sanjay requested if the main access road of the factory could be retained. He pointed out that this road was the heart of the factory as it is the major entry of the factory.
- Mr. Paul Muragati pointed out that the when construction of the new bridge begins, the vibrations from this construction will affect the near by buildings with in the factory.
- Mr. Omagor explained to members present that the Environmental Impact study is looking at the direct and indirect impacts of the project.
- It was agreed by members present that the road length from the center point to the affected main access road of the factory could be reduced by 6meters from 30-24meters.
- Mr. Nelson Omagor requested for Mr. Sanjay to provide the study with plans for factory's underground utilities and effluent lines.
- Mr. Sai pointed out that we were still doing a feasibility study and necessary amendments will be made were necessary.

7.2 Request letter from Nile Breweries

NILE Breweries Ltd.

P.O. Box 762,
Jinja, Uganda
Tel: +256 +43 121992/3/4
+256 +33 210009
Fax: +256 +43 120425/120759
+256 +33 240292/303

09/07/2009

The Head of JICA Study Team
Ministry Of Works
Kyambogo, Kampala

RE: NJERU/JINJA NEW CARRIAGE WAY& BRIDGE OVER RIVER NILE.

Following the Environmental Impact Assessment tour with your team, Road & Local Council Authority, together with officials from the Industries affected by the carriage way, Nile Breweries Limited has the following concerns which need to be reviewed by yourselves:

- The New road cuts across Nile Breweries Water treatment plant and reservoir which means it will have to be moved from its current position. This can only be done by purchasing and installing a new water treatment plant before the old plant is dismantled. This is to prevent production loss which would be disastrous to our company. It should be noted the water treatment plant our brewery uses is imported from Germany and has an approximate delivery time of one year.
- The Employees Canteen and recreational block will need relocation.
- Employees Change rooms will need relocation.
- 50% of the Finance service block will need relocation. This will affect our operations as the Company's main Server is located in the same building. The Server is the heart of all the Breweries operations.
- The current Effluent Pipe line and septic drain system (3 off) has to be relocated and will affect our operations majorly.
- The current Water Pump station at the river and intake pipe line to the brewery will need relocation upstream.
- The over head HT Electric lines to the water pump station will need rerouting.
- The Oil interceptor to be relocated.
- Power line to the plant will need to be rerouted.
- The brewery boundary wall will have to be restored for security reasons.
- Entry Gate for Commercial Vehicles to be shifted to the western side.
- The storm water drainage to be redone

The above are serious constraints to the continuous operation of the brewery and our business in Uganda. We request you to look at the option of moving the new road further east thereby eliminating the disruption to the brewery and minimizing the compensation costs to the brewery.

Thanking you for your continued cooperation and I look forward to a cost effective solution.

Yours sincerely,

Gavin Van Wijk
Technical Director
Nile Breweries Limited

7.3 Memorandum of Meeting with Nile Breweries

Memorandum of the Meeting

Prepared by Mr.SAI (JICA Study Team)

Reference: Feasibility Study on a New Bridge across River Nile at Jinja

Date: 22nd July 2009

Venue and time: Nile Breweries Ltd., 15:30-17:00.

Participants:

1. Mr.Anabo Drapi Summy(Chief Engineer of Nile Breweries Ltd.)
2. Mr.Eturuket Charles (Site Services Engineer of Nile Breweries Ltd.)
3. Mr. George Bwanga (Project Director of UNRA)
4. Ms. Pamela (Land Acquisition Specialist of UNRA)
5. Mr.Nelson Omagar(Team leader of EIA/RAP team of COWI)
6. Mr.Patrick (Project manager of COWI)
7. Mr.Mutusera Katusabe(Land surveyor of COWI)
8. Mr. Shigeru SAI (Social Environmental Specialist of the JICA Study Team)

Meeting Objectives:

The discussion and field inspection were held to solve serious concerns expressed by Nile Breweries Ltd. in the letter to JICA Study Team (refer to the attached request letter)

Meeting Summary:

- To avoid impact to water treatment plant and reservoir, UNRA decided that the ROW width of the affected section will be decreased by 7m. Therefore the ROW width of the south side will be 23m.
- UNRA mentioned that following affected properties will be subjects to compensation. And Nile Breweries Ltd. agreed with this.
    1. Employee canteen and recreational block
    2. Effluent pipe line and septic drain system
    3. Oil interceptor
    4. Brewery boundary wall
    5. Entry gate.
- Responses to the concerns expressed by Nile Breweries Ltd. were made by the party consisting of UNRA, COWI and JICA Study team) as follows.
    1. The mitigation measures to avoid negative impact (vibration and noise caused by construction activities) to Finance block will be considered in the EIA study. This will include temporary relocation of the facilities. (Mr.Nelson Omagor).
    2. The Project Bridge has no piers in the river. So, relocation of water pump station and intake will not be necessary. In addition, mitigation measure to avoid water contamination will be proposed in the EIA study. (Mr.SAI).

3. The Power line to the plant (UMEME properties) and over head HT Electric lines (Nile Brewery's property) will be relocated by the project. (UNRA)
4. The consideration about the storm water drainage will be made in the detailed design.(Mr.SAI)

- Nile Breweries Ltd. accepted the above explanations eventually.
- Field inspection was conducted to confirm the affected properties after the discussion.

7.4 Number of Plot and Affected Area

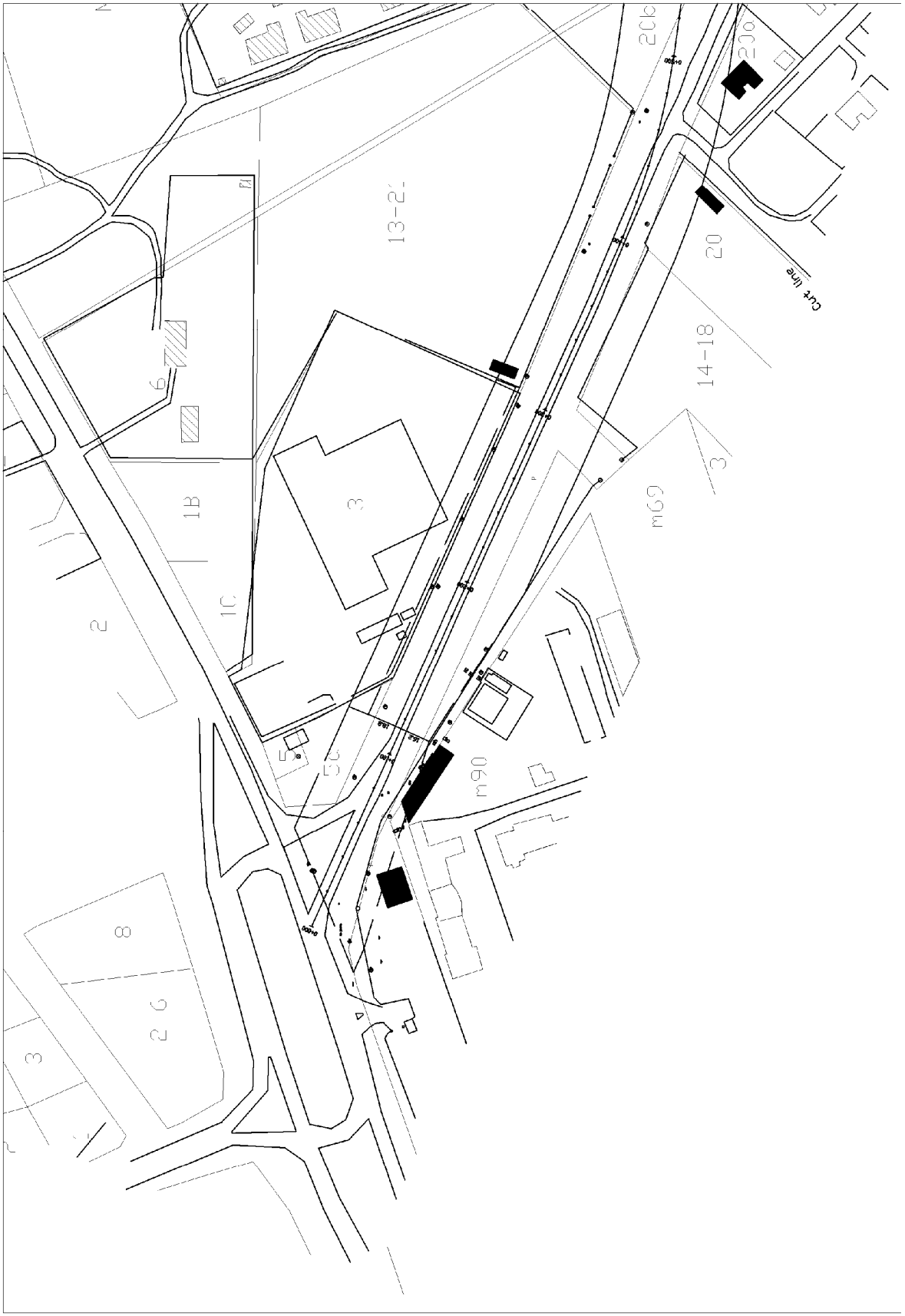
JINJA SIDE

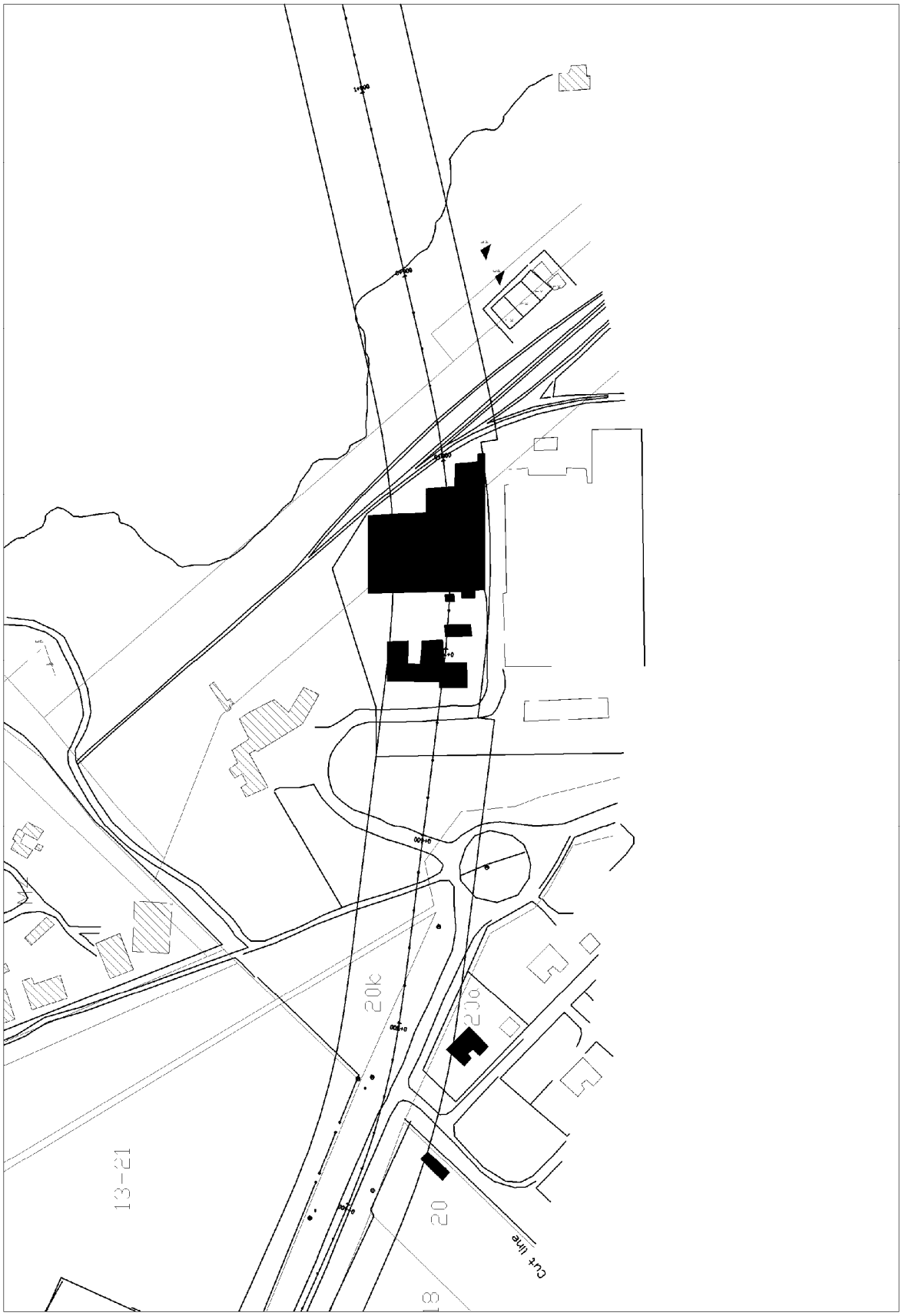
Road Name	Plot no.	Affected area(sq.metres)
Kyabasinga Way	20	1059.95
	26A	909.07
	24	3848.25
	18-22	16390.99
	10A-14A	34.87
	2-8	2598.93
Sub total		24842.06
Kyesimira Close		
	5	46.05
	7	458.48
	9	47.37
	11	1343.83
	13	482.03
	12	6.63
	14	491.64
	16	604.46
	18	782.99
	20	289.02
Sub total		4552.5
Kalikwani Road		
	1	317.46
	3	1508.55
	5	1752.57
Sub total		3578.58
Kyesimira Road		
	1	1950.04
	3	1563.29
	5	1338.83
	7	1284.2
	9	1516.89
	11	893.03
	13	497.75
Sub total		9044.03
Army Close		
	1	75.37
Sub total		75.37
Kyemba Close		
	1	442.07
	2	438.7
	3	497.62
	4	29.24
	10	96.74
	11	950.32
Sub total		2454.69
Kyemba Road		
	7	35.29
	9	275.94
Sub total		311.23
Grand Total		71625.1
No. of Plot		47

NJERU SIDE

Road Name	Plot no.	Affected area(sq.metres)
	Nytil 1	408.97
	nytil 2	4176.1
Sub total		4585.07
Yusuf Lule road		
	nytil 3	10687.13
	20b	1849.96
	20a	709.11
	20	891.19
	14-18	1501.92
	M69	2872.71
	13-21	2046.24
	3	627.19
	M90	122.27
	5a	873.85
Sub total		22181.57

7.5 Strip Map for Project ROW

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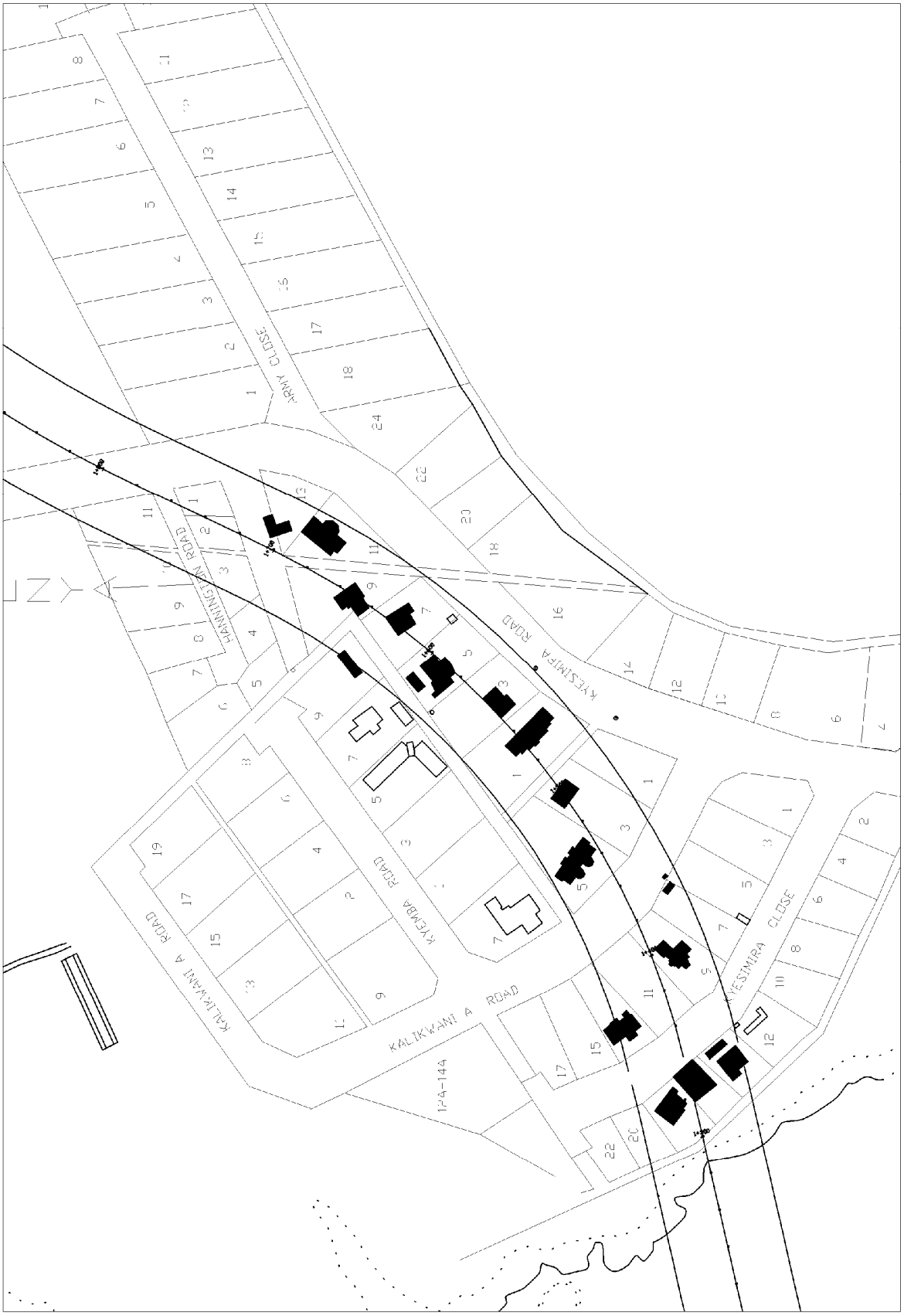
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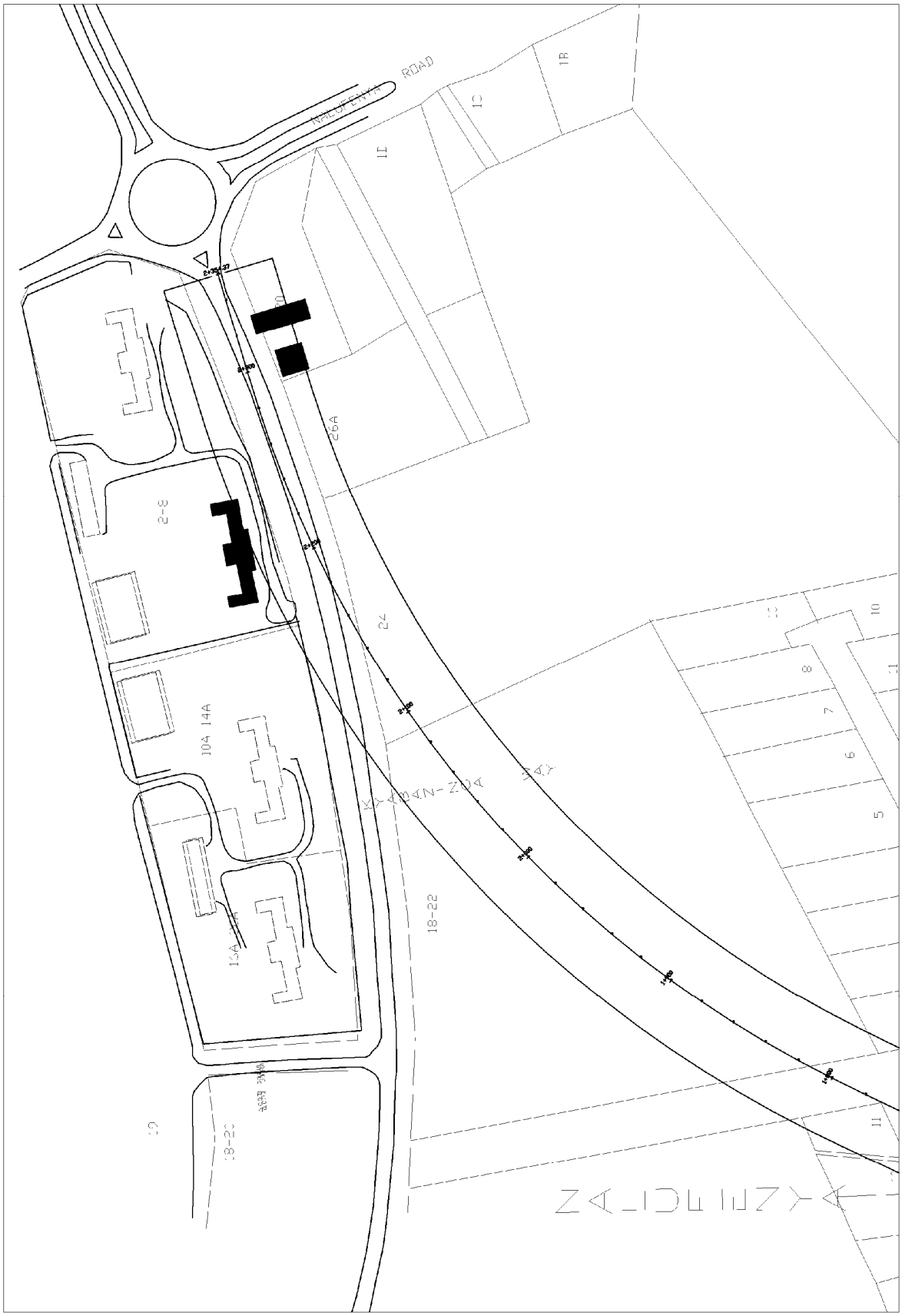
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