C235A-D02-1

1st DAM SAFETY INSPECTION REPORT

of

Byevanger Dam

Owner: Johannes Gerhardus Nel Familie Trust

12 September 2019

Report No: C235A-D02-1
DSO No: 12/2/J331/55
WARMS Reg No: Not Available

Gorra Water
Consulting Civil & Agricultural Engineers

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FIRST DAM SAFETY INSPECTION REPORT
OF
BYEVANGER DAM

CONTENTS

CONFIRMATION

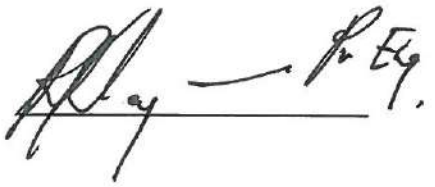
This First Dam Safety Inspection Report, including the appendices, has been prepared upon instruction of the owner, Johannes Gerhardus Nel Familie Trust in compliance with directives issued by the Dam Safety Office of the Department Water and Sanitation in terms of Section 118(3)(b) of the National Water Act, 1998 (Act No. 36 of 1998).

Information included in this report was obtained from:

1. The owner, Johannes Gerhardus Nel Familie Trust
2. Calculations, investigations and processing
   by the APP, Mr R Kleynhans (Pr Eng.) and Mr J Nel.

The APP hereby declares that all information contained in this report was, to the best of the professional team's ability, collected, measured, calculated, evaluated, processed and presented for the benefit of this project.

APPROVED PROFESSIONAL PERSON: Mr Retief Kleynhans, Pr Eng.
19 Progress Street
PO Box 1965
George
6530
Tel: 044 874 3866
Fax: 0866 709 157

Signature: 

Date: 12 September 2019

LIST OF ABBREVIATIONS

AMSL	Above Mean Sea Level
APP	Approved Professional Person
C	Spillway discharge coefficient
DSI	Dam Safety Inspection
EGL	Existing Ground Level
FSL	Full Supply Level
HEC	Hydrological Engineering Centre
HRU	Hydrological Research Unit
K	Regional coefficient
LM	Local Municipality
MAP	Mean Annual Precipitation
MSL	Mean Sea Level
NOSC	Non Overspill Crest
NWA	National Water Act, Act No. 36 of 1998
OME	Operation and Maintenance Manual & Emergency Plan
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
RDD	Recommended Design Discharge
RDF	Recommended Design Flood
RI	Recurrence Interval
RL	Reduced Level
RMF	Regional Maximum Flood
SANCOLD	South African National Committee On Large Dams
SCS	Soil Conservation Service
SED	Safety Evaluation Discharge
SEF	Safety Evaluation Flood
SPT	Standard Penetration Test
WL	Water Level
WSA	Water Services Authority
WSP	Water Services Provider

FIRST DAM SAFETY INSPECTION REPORT
OF
BYEVANGER DAM

1. INTRODUCTION

1.1 TERMS OF REFERENCE

This report including the appendices, has been prepared on instruction of the owner as a result of instructions from the Dam Safety Office of the Department Water and Sanitation in terms of section 118(3)(b) of the National Water Act, 1998, (Act No. 36 of 1998)

This report is to be read together with sections 118 and 119 promulgated by the Minister of the Department Water and Sanitation in terms of section 163(4) of the National Water Act, 1998, (Act No. 36 of 1998)

The following documentation is relevant to the task:

(a) Letter 12/2/J331/55 from the Director-General of the Department Water and Sanitation to Johannes Gerhardus Nel Familie Trust, with the instruction that a first dam safety inspection of the dam be executed by an Approved Professional Person.

1.2 CREDENTIALS

(a) Letter C235 dated 7 August 2019 from Gorra Water applying for the approval of Mr R Kleynhans as the Approved Professional Person.

(b) Letter 12/2/J331/55 dated 13 August 2019 from the Department Water and Sanitation approving Mr R Kleynhans as the Approved Professional Person.

1.3 LIST OF PERSONS CONTRIBUTING TO INSPECTION AND REPORT

Gorra Water

Mr	R Kleynhans, Pr Eng, APP	Inspection, evaluation, calculations
Mr	J Nel	Compilation, calculations

Johannes Gerhardus Nel Familie Trust

Mr	Stephanus Nel	History, information

2. DESCRIPTION OF THE DAM AND PROJECT

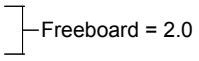
2.1 DESCRIPTION

Byevanger Dam is an in-channel earthfill embankment with a catchment area of 5.8 km². The dam site is situated approximately 25 km west of Ladismith in the Western Cape Province. The dam is in-channel and is supplied by tributary of Groot River (See Appendix E).

The dam is owned by Johannes Gerhardus Nel Familie Trust and controlled by Mr S Nel. The dam provides water for Irrigation purposes. The original designer of the dam is the owner and the original contractor is the owner. The dam completion date is 2018.

The main features of the dam are presented below (levels are to a local datum):

Location	:	33º 28' 49.00" S, 21º 3' 37.00" E
Classification	:	12/2/J331/55 dated 14 Mar 2019
Category	:	II
Size	:	Small
Hazard potential	:	Significant
Gross storage capacity	:	150 000 m³
Surface area at FSL	:	3.95 ha
Catchment area	:	5.8 km²
Maximum wall height in terms of regulations	:	10.7 m
Embankment crest length	:	160 m
Level of lowest point on non-overspill crest	:	RL 102 m
Full supply level	:	RL 100 m
Crest width	:	3 m (Average)
Upstream face slope (vertical : horizontal)	:	1V : 3H (Average)
Downstream face slope (vertical : horizontal)	:	1V : 2H (Average)
Type of spillway	:	Side Channel
Spillway crest length	:	5 m
Spillway channel length (including approach)	:	80 m
Freeboard above FSL	:	2.0 m
Spillway capacity with zero freeboard	:	30 m³/s
Drainage system	:	None



Outlet works ..... : 300mm dia outlet pipe underneath the embankment with a downstream valve.

2.2 DOCUMENTATION

Document	Date
None	

2.3 ORIGINAL DESIGN AND CONSTRUCTION DATA

The embankment was built using mostly materials excavated from within the reservoir basin. In general these materials appear stable with no slippage or settlement evident. Some erosion was observed on the upstream slope due to the fine gravel materials on the surface.

3. ON-SITE INSPECTION

Mr R Kleynhans, the approved APP for this dam safety inspection, visited and inspected the Byevanger Dam on 2 May 2019.

Photos are included as part of the appendices.

The red marker on the small image to the right of the photos in the photo report indicates the position of the photographer.

4. CONCLUSION

The Byevanger Dam is about 1 years old and is considered stable at present. This inspection has found that the embankment requires minor maintenance and the spillway channel design is a concern. The recommendations made in this report should be implemented and adhered to.

The capacity of the spillway is regarded inadequate and the non-overspill crest will be overtopped in the event of the RDF & SEF occurring.

The investigation also finds that due to the size and position of the dam, the classification details are appropriate.

APPENDIX A

DW 149E - Form for the Dam Safety Inspection Report

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

File no. **12/2/J331/55**

DW 149E (Cat II)
(Mar 2013)

FORM FOR THE DAM SAFETY INSPECTION REPORT OF A SMALL CATEGORY II DAM

Name of dam: **BYEVANGER DAM**

Departmental file reference for dam: **12/2/J331/55**

Name of Approved Professional Person: **Mr Retief Kleynhans Pr Eng.**

Name of Owner: **Johannes Gerhardus Nel Familie Trust**

Address of Owner: **Mr Stephanus Nel, PO Box 6, Ladismith, 6885**

Email: **vzd@mweb.co.za** Tel: **083 381 7293**

Notes:
(i) Where possible sections 1 to 8 should be completed prior to the dam safety inspection. You can delete any sections not applicable to the particular dam and insert extra lines where needed. You can also change the format to suit your own reporting format.
(ii) Survey instruments (at least a level and tape) should be taken along on the site inspection to check the longitudinal profile of the non-overspill crest, relative heights between NOC and spillway crest, and to check embankment slopes (where applicable).
(iii) Additional information or issues requiring more detailed description may be included on separate pages and attached to this form.
(iv) For a detailed checklist of the requirements for the dam safety evaluation of a Category II dam, refer to Regulation 35 in the new dam safety regulations in Government Notice No, R. 139 of 24 February 2012.

SECTION 1: AVAILABLE INFORMATION

List all plans and reports that are available on the dam and which have been studies for the dam safety inspection. Please enclose copies of plans with typical details. If no such plans exist, sketches must be made. A copy of a 1:50,000 map showing the location must also be supplied. Photographs taken during the inspection should also be enclosed and referred to in the report.

None available.

SECTION 2: DESCRIPTION OF THE DAM

Wall type: **Earthfill** Wall height (maximum): **10.7 m**

Storage capacity: **150 000 m³** Completion date: **2018**

Crest length: **160 m** Crest width: **3 m**

Contractor: **the owner** Designer: **the owner**

Betterment works done after completion: **None documented.**

Problems which occurred previously: **None documented.**

SECTION 3: GEOLOGY OF DAM SITE

General details
(Rock types, quality, weathering, joint spacing, joint openings, joint filling, shear zones, etc.)

Underlain by sedimentary rocks of the Cape Super Group. This consists of formations of the Witteberg, Bokkeveld, and Table Mountain sub-groups of the Cape Super Group.

Geological conditions must be concisely summarised below and actual or potential problems such as sliding resistance, settlement, seepage, erodability, etc. mentioned.

Left flank: **Fine to rocky gravel materials resistant to erosion, including sparse vegetation.**

Right flank: **Coarse gravel materials, well compacted and appearing resistant towards erosion.**

River section: **Compacted alluvial materials with minor erosion and sparse vegetation.**

Spillway channel: **Excavated on the right flank in the local geology with minimal erosion visible.**

Assessment: **Visually and comparing it to the neighbouring Dam-Met-Eiland Dam (J112/18), the local geology is seen as adequate for such a structure if constructed according to acceptable safety guidelines and factors.**

Are the slopes around the dam basin stable? **Yes, vegetated and stable.**

SECTION 4: DESCRIPTION OF DAM WALL MATERIAL

Built using materials from the dam basin, weathered products of local geology.

SECTION 5: CHECKING OF REGISTRATION INFORMATION

A computer printout of the registration information of the dam was issued with the instruction to inspect. Please check whether all information is correct and complete. If there are any changes please indicate them on the computer printout and send it back with the inspection report. Information corrected: **Yes or No?** **Yes**

SECTION 6: EVALUATION OF THE HAZARD POTENTIAL

Estimate of potential loss of life: **Not more than ten.**

Estimate of potential economic loss: **Significant**

Has there been new development downstream or within the dam basin within the last five years? **No**

Describe: **None**

Hazard potential rating as classified: **Significant**

Do you agree with the classification? **Yes**

If not, please apply for reclassification on the DW692E form.

SECTION 7: FLOOD ESTIMATES

Catchment area (km²): **5.8**

Methods used for flood estimates: **HRU and TR137 methods were used.**

Flood estimates 1:20 (m³/s): **46**

1:50 (m³/s): **56**

1:100 (m³/s): **67**

1:200 (m³/s): **72**

Regional maximum flood (m³/s):

Probable maximum flood (m³/s): **130**

Recommended design flood (m³/s): **67**

Safety evaluation flood (m³/s): **90**

Motivation for choice of recommended design flood and safety evaluation flood (which guidelines were used)

Recommended by SANCOLD.

SECTION 8: EVALUATION OF SPILLWAY CAPACITY

Spillway type: **Side Channel**

Spillway length: **80.0 m** Critical spillway width: **5.0 m**

Height of lowest point on non-overflow crest above spillway (m): **2**

Full Supply Level or spillway level (m): **100**

Spillway capacity with no freeboard (m³/s): **30**

Will the incoming flood be significantly reduced by flood absorption? **No**

Available freeboard during recommended design flood (m): **0**

Will the dam fail if the non-overflow crest is overtopped? **Yes, dependant on duration.**

What erosion could be expected during the recommended design flood? **Significant erosion expected downstream.**

And during the safety evaluation flood? **Significant to severe erosion anticipated.**

Final evaluation of spillway capacity: **The spillway channel was found to be inadequate for the calculated RDF and SEF flood peaks. For the dam to service at least the RDF flood peak, the spillway channel will have to be enlarge by increasing the freeboard and the spillway channel width. (See Photo's 1,3,10-12,16,17)**

SECTION 9: INSPECTION OF THE DAM

Date: **02 May 2019** Water level in dam: **0.0 m**

Did it rain recently? **No** Describe: **None**

Persons present at inspection: **Mr R Kleynhans Pr Eng APP inspected the dam and took the photographs.**

EARTH WALLS

CREST OF EARTH WALLS

Crest width (m): **3** Has the crest width changed since construction? **No**

Is the crest still level or has settlement occurred? **Mostly level with very slight undulations**

Are there signs of erosion? **No** Describe: **No erosion visible. (See Photo's 4,8,14,19)**

Are there signs of cracks? **No** Describe (use separate page, if necessary) **None visible.**

Is regular maintenance necessary on the crest? **Yes**

Are there signs of holes (ants, rats, meercats, moles, crabs, etc?) Describe: **No**

UPSTREAM FACE OF EARTH WALLS

Slope (vertical: horizontal): **1 : 3**

Slope protection measures (if any): **Only gravel surface with no additional protection. (See Photo's 2,5-7,13,14)**

Are there signs of erosion? **Yes** Describe: **Minor signs of erosion visible, rip rap placement recommended.**

Are there signs of cracks? **No** Describe: **None visible.**

Are there signs of settlement? **No** Describe: **None visible.**

DOWNSTREAM FACE OF EARTH WALLS

Slope (vertical: horizontal): **1 : 2**

Slope protection measures (if any): **Mostly rocky surface with some shrub growth at the lower section of the face. (See Photo's 4,8,9,21)**

Are there signs of erosion? **Yes** Describe: **Only minor signs of erosion.**

Are there signs of cracks? **No** Describe: **None visible.**

Are there signs of settlement? **No** Describe: **None visible.**

Are there signs of bulging/sliding? **None visible.**

Are there wet patches? **No** Describe: **Dam was empty at the time of inspection, no wet patches observed.**

Are there signs of seepage/leaks? **No** Describe: **See above.**

Amount of leakage? **N/A**

Is the leaking water clear or turbid? **N/A**

Are there signs of holes (ants, rats, meercats, moles, crabs, etc?) **No** Describe: **None visible**

VEGETATION ON EARTH WALL

Are there any trees or shrubs on the wall? **No**

If so describe type, size, number and position: **Only minor shrub growth at the downstream toe.**

DRAINAGE SYSTEM IN EARTH WALL

Does a toe drain or internal drainage system exist? **No**

Describe: **None**

Amount of leakage? **N/A**

Is the water from the drains clear or turbid? **N/A**

CONCRETE WALLS

Do cracks exist? **N/A** Describe on separate page, if necessary (position, size, length):

N/A

Is there leakage through the cracks? **N/A** Describe (flow rate: **N/A**

Is there leakage at the joints? **N/A** Describe: **N/A**

Is there settlement? **N/A** Describe: **N/A**

Is there relative movement? **N/A** Describe: **N/A**

Describe condition of concrete: **N/A**

Upstream slope (horizontal: vertical): **N/A**

Downstream slope (horizontal: vertical): **N/A**

Describe pressure relief holes: **N/A**

DOWNSTREAM TOE AND FLANKS OF ANY DAM

Describe wet patches (position, size): **None observed.**

Seepage/leaks (position, flow rate): **None observed.**

Describe: **The dam basin was empty at the time of inspection and only dry conditions were present.**

FLOOD OUTLETS (OF ANY DAM) / RETURN CHANNELS / TRAINING WALLS

Condition of structures in spillway channel (cills, retaining walls etc.)

No structures within the spillway channel, concrete beams are placed on the left retaining wall. Spillway appears stable but too small for calculated flood peaks. (See Photo's 1,3,10-12,16,17)

Is the stability of the damwall threatened by the spillway channel? **No**

Is there loose material in the spillway channel? **No** Describe: **Besides concrete beams.**

Is there any erosion in the spillway channel? **No** Describe: **Minimal erosion observed.**

Is there any erosion in the river? **No** Describe: **Only minor erosion.**

Are the spillway length and freeboard still as shown on the drawings? **N/A**

STILLING BASINS / APRON

When was the stilling basin last emptied and inspected for scouring ? **N/A**

Observations and Evaluation: **N/A**

OUTLET WORKS (OF ANY DAM)

Number of outlet pipes: **1** Diameter: **250 mm** Type: **uPVC**

Condition of outlet pipe foundation: **The outlet pipe foundations appear to be stable on both the upstream and downstream sides. (See Photo's 5,22,24)**

Is the control upstream or downstream? **Downstream**

Is there provision for an upstream emergency valve? **No**

Are the valves used regularly? **Yes***

Are the valves in working condition? **Yes***

Are there leaks alongside the outlet pipe? **No**

Any erosion downstream of the outlet works? **No**

Rust protection? **Yes**

Other observations: ***The dam was inspected shortly after completion and the dam had not been filled yet, meaning valves were not yet operational or used.**

SECTION 10: EVALUATION OF STABILITY OF DAMWALL

The dam wall is visually in a stable condition. Some maintenance issues were observed and these should be addressed as recommended (DW19E).

SECTION 11: EVALUATION OF DRAINAGE SYSTEM

No drainage installed.

SECTION 12: EVALUATION OF THE QUALITY OF OPERATION AND MAINTENANCE BY OWNER/ PERSON IN CONTROL

The dam is not currently in a bad state of maintenance but some issues were identified that should be attended to. The recommendations made in this report as well as the OME should be implemented.

SECTION 13: POLLUTION CONTROL DAMS

How is ground water and surface water quality monitored around the dam? **N/A**

How many times did the dam spill during the last five years? **N/A**

Are there leaks/seepage and is it returned to the dirty water system? **N/A**

Will the dam be able to hold a 1:50 year flood? **N/A**

General evaluation of the effectiveness of the dam to prevent pollution of ground and surface water:

N/A

SECTION 13: OTHER FINDINGS

SECTION 14: LIST OF APPENDICES

Appendix	Y	N	Comments
Site plan / Locality plan	X		**See Appendix E**
Recent survey as required by Regulation 35(5)	X		**See Appendix D**
Selected Design / Completion Drawings		X	**N/A**
Photos	X		**See Appendix C**
Spillway discharge curve / table / formula	X		**See Appendix B**
Area capacity curves / tables	X		**See Appendix B**
Inflow / Outflow Hydrographs	X		**See Appendix B**
Instrumentation graphs		X	**N/A**
DW19E: Recommendations	X		**See Appendix G**

SECTION 15: RECOMMENDATIONS OF PREVIOUS DAM SAFETY EVALUATION BY AN APP

Date of previous evaluation: **N/A** Name of APP: **N/A**

List of previous recommendations and status of implementation:

No	Recommendation	Status
	No previous recommendations.	

SECTION 16: RECOMMENDATIONS OF THIS DAM SAFETY EVALUATION

It is suggested that the recommendation are repeated in the covering letter to the owner. The recommendations must be clearly numbered for future reference and a copy of the letter submitted to the Department with the report.

No	Recommendation
	See Attached DW19E for all recommendations, APP involvement, planned or actual starting dates and planned or actual completion dates.

SIGNATURE (APPROVED PROFESSIONAL ENGINEER): Pr Eng

12 September 2019
DATE:

APPENDIX B

SUPPORTING DATA

Contents

B1. HYDROLOGY

B1.1 DESIGN FLOOD GUIDELINES

The guidelines used for the selection and determination of suitable design floods are contained in SANCOLD'S "Guidelines on Safety in Relation to Floods" (SANCOLD, December 1991)

According to the Guidelines a two assessment level approach should be followed. The first assessment level is based on the RMF, which is more suitable for catchments larger than 10km². The second assessment level involving site specific methods is more suitable for catchments less than 10km². Byevanger Dam has a catchment area of 5.8 km² and the second assessment level has been chosen as suitable.

For Byevanger Dam the recommended minimum floods are: the Recommended Design Flood (RDF) = 1:100 yr, and the Safety Evaluation Flood (SEF) = PMF Factored. (SANCOLD: Safety Evaluation of Dams, Report No. 4).

B1.2 FLOOD PEAK ESTIMATES

B1.2.1 Parameters for flood calculation

Byevanger Dam is an in-channel earthfill embankment dam situated 25 km west of Ladismith in the Western Cape Province.

The small catchment of Byevanger Dam is steeply sloping (20% upwards) with moderately vegetated slopes. The parameters of the catchment are listed in Table B1.1 below and the extent of the catchment can be seen in Appendix E.

TABLE B1.1 : CATCHMENT PARAMETERS

Catchment area	:	5.8 km²
Mean Annual Precipitation	:	304 mm
Average catchment slope	:	20 %

B1.2.2 Storm rainfall

Storm rainfall figures with a recurrence interval of 1:100 years were determined by using the co-axial formula for the mountainous region.

The PMF was obtained from C4 of HRU Report 1/72 (Hydrological Research Unit, 1972) for region 5. No aerial reduction of the point rainfall was taken into account due to the small catchment size.

B1.2.3 Calculation method

The HRU 1/72 method was considered to be appropriate for this size of catchment.

The highest calculated flood peak inflows into the Byevanger Dam are shown in Table B1.2

TABLE B1.2: BYEVANGER DAM: FLOOD PEAKS

Flood Category	Flow from Catchment (m^3/s)	Inflow from Other Works (m^3/s)	Total Flood Peaks (m^3/s)
1: 100 yr	67	0	67
1: 200 yr	72	0	72
RMF	N/A	N/A	N/A

B1.3 Recommended floods

According to the SANCOLD guidelines the recommended total flood peaks would be:

Recommended Design Flood (RDF) = 1:100 yr flood + Other Inflows
= 67 + 0
= 67 m^3/s

Safety Evaluation Flood (SEF) = PMF Factored flood + Other Inflows
= 90 + 0
= 90 m^3/s

The above total flood peaks have been adopted and routed through the dam, reduced due to surface storage for checking the adequacy of the spillway. (Refer to Table B2.1)

B2. SPILLWAY

B2.1 CHARACTERISTICS

The Byevanger Dam embankment has a side channel spillway on the right flank with a spilling crest level (FSL) at RL 100m and a maximum capacity of about 30 m^3/s. The spillway has a crest length of 5m. A discharge coefficient of 1.6 was assumed for the spillway crest.

B2.2 RESERVOIR WATER LEVELS

The routed inflow values were used to evaluate the design spillway. The resultant reservoir water levels are presented in Table B2.1 below.

TABLE B2.1: RESERVOIR WATER LEVELS

Flood Category	Flood Peak (Catchment + Other) (m^3/s)	Max Water Level RL (m)	Height above FSL (m)	Height above NOC (m)
First assessment level not applicable due to catchment size < 10 km^2				
Second assessment level: Site specific hydrological calculations.				
RDF	67			
Routed	64	102.2	2.2	0.2
SEF	90			
Routed	86	102.3	2.3	0.3

From the above figures it can be seen that the water level during the routed RDF will rise 2.2m above the full supply level at which stage it will be 0.2m above the non-overspill crest. During the routed SEF the non-overspill crest will be overtopped with the flood level at 0.3m above the non-overspill crest.

B2.3 FREEBOARD

Various combinations of conditions are recommended in the SANCOLD Guidelines for determining the minimum recommended freeboard allowance. The results of calculations for the combination that usually leads to the lowest freeboard requirement is set out below.

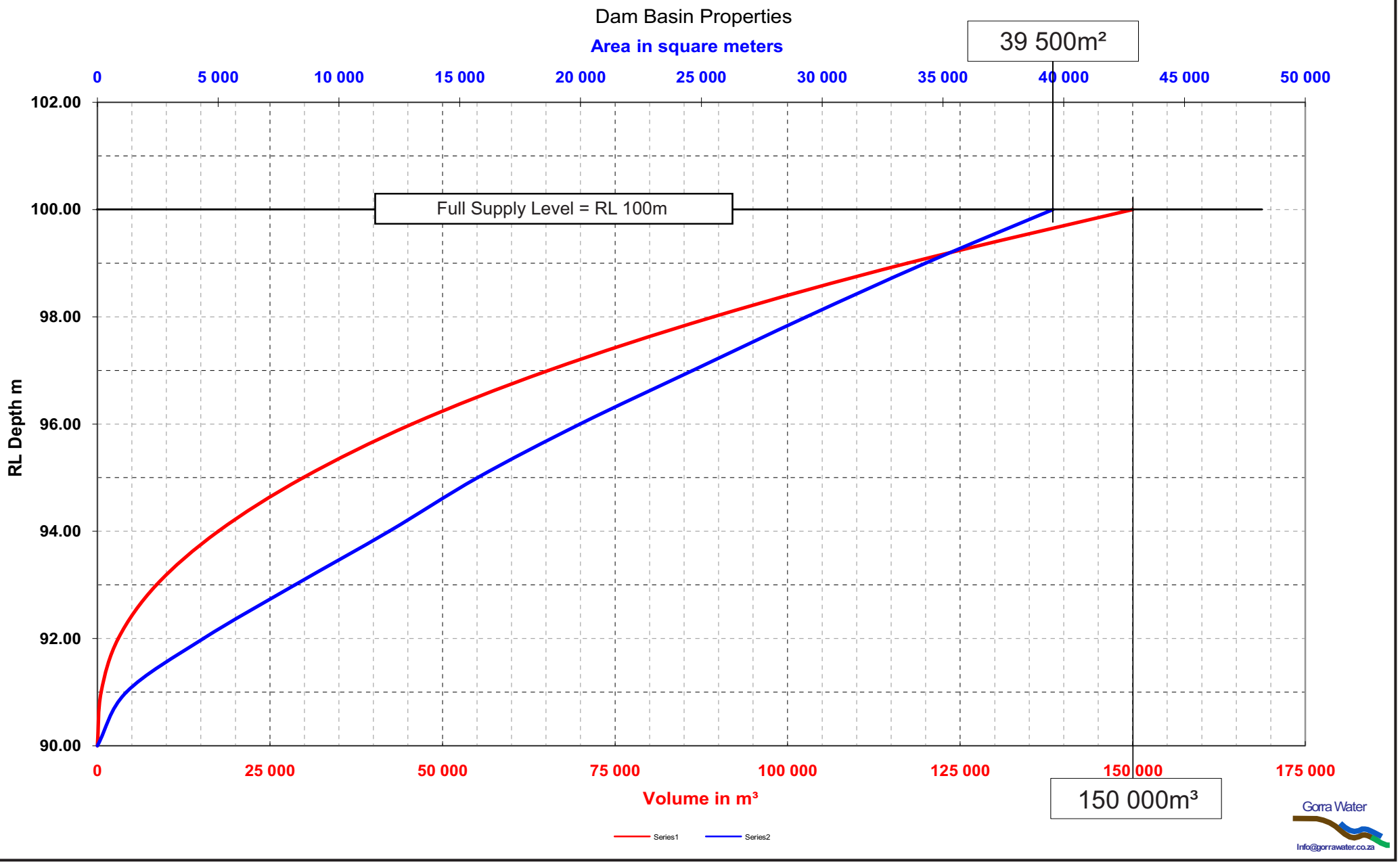
NOSC Level:		(m)
FSL	RL	100.00
Non-overspill (embankment) crest level	**RL**	**102.00**
Freeboard Requirement:		
RDF water level	RL	102.20
25 year wave height		0.15
Wind set-up		0.10
Flood surge		0.20
Level of RDF + freeboard factors	**RL**	**102.65**

The non-overspill crest level does not comply with this freeboard requirement and the routed RDF + freeboard factors will overtop the non-overspill crest.

APPENDIX B3

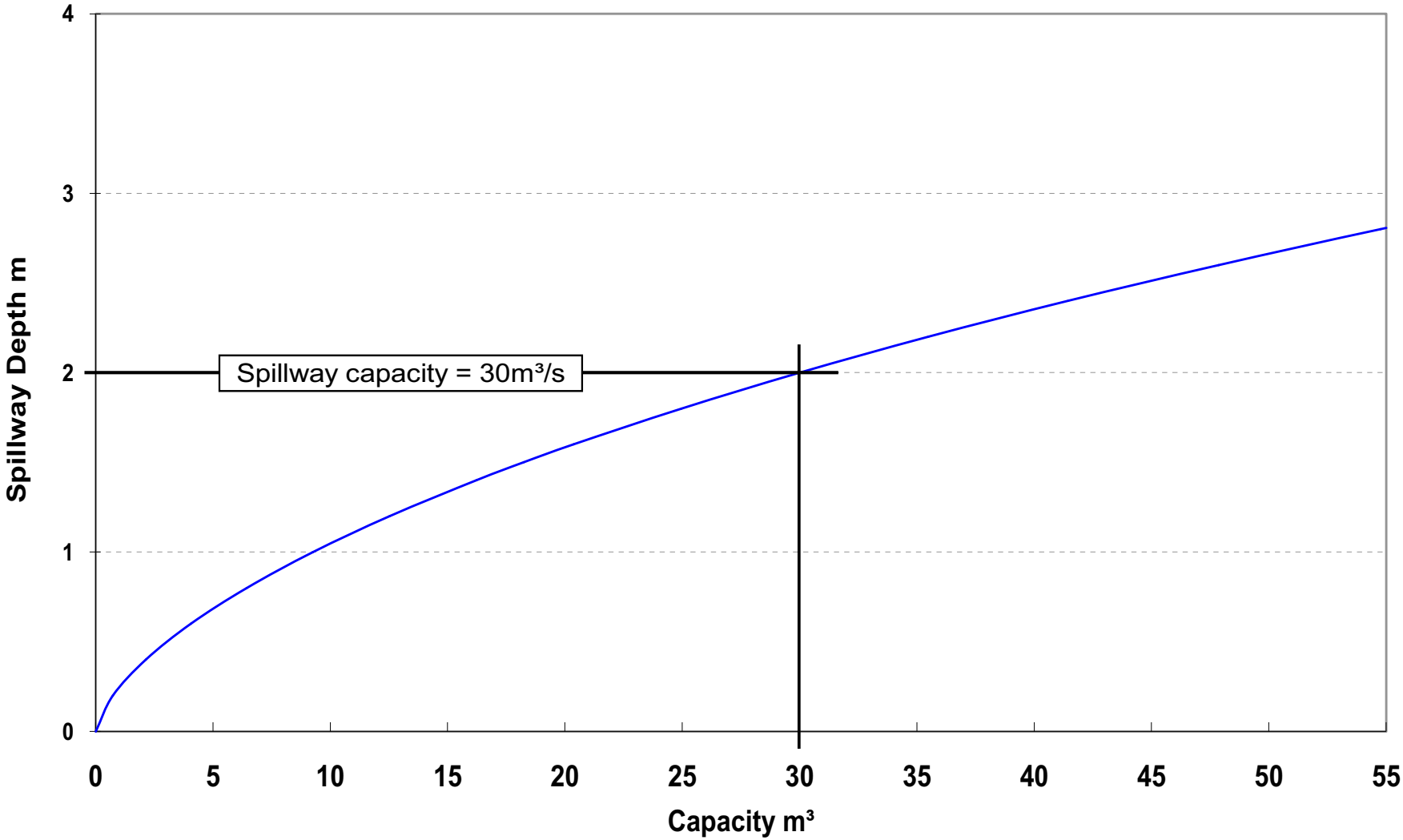
GRAPHS

12/2/J331/55 Byevanger Dam
C235-Johannes Gerhardus Nel Familie Trust



12/2/J331/55 Byevanger Dam
C235-Johannes Gerhardus Nel Familie Trust

Spillway Capacity



Gorra Water
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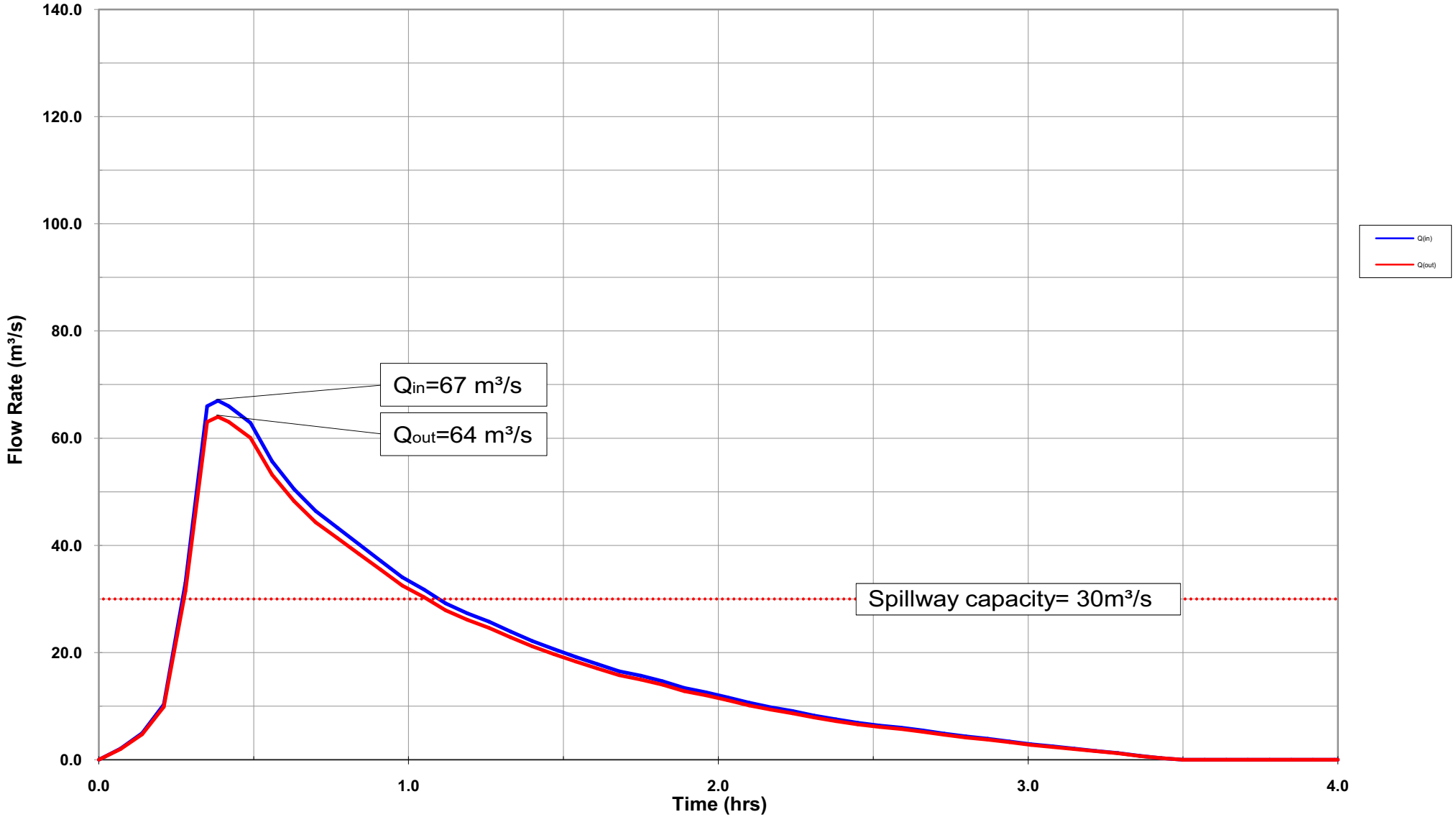
12/2/J331/55 Byevanger Dam
C235-Johannes Gerhardus Nel Familie Trust

RDF 1 : 100 (Cat.II Small Sig.)

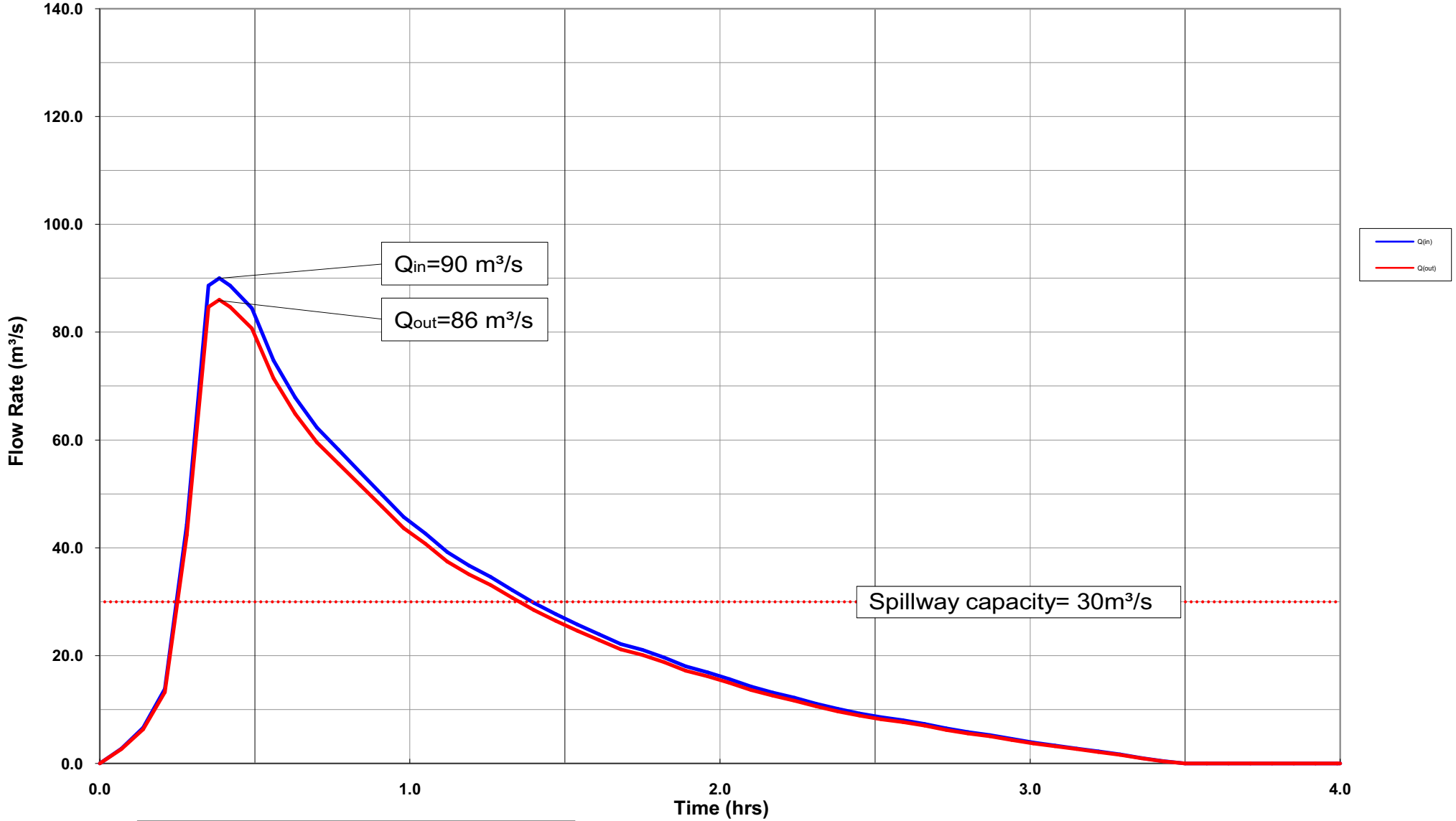


Overtopping at a max flow rate of 34m³/s

Gorra Water
Info@gorrawater.co.za

12/2/J331/55 Byevanger Dam
C235-Johannes Gerhardus Nel Familie Trust

SEF = PMF (Cat.II Small Sig.)



Overtopping at a max flow rate of 56m³/s

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12/2/J331/55 Byevanger Dam
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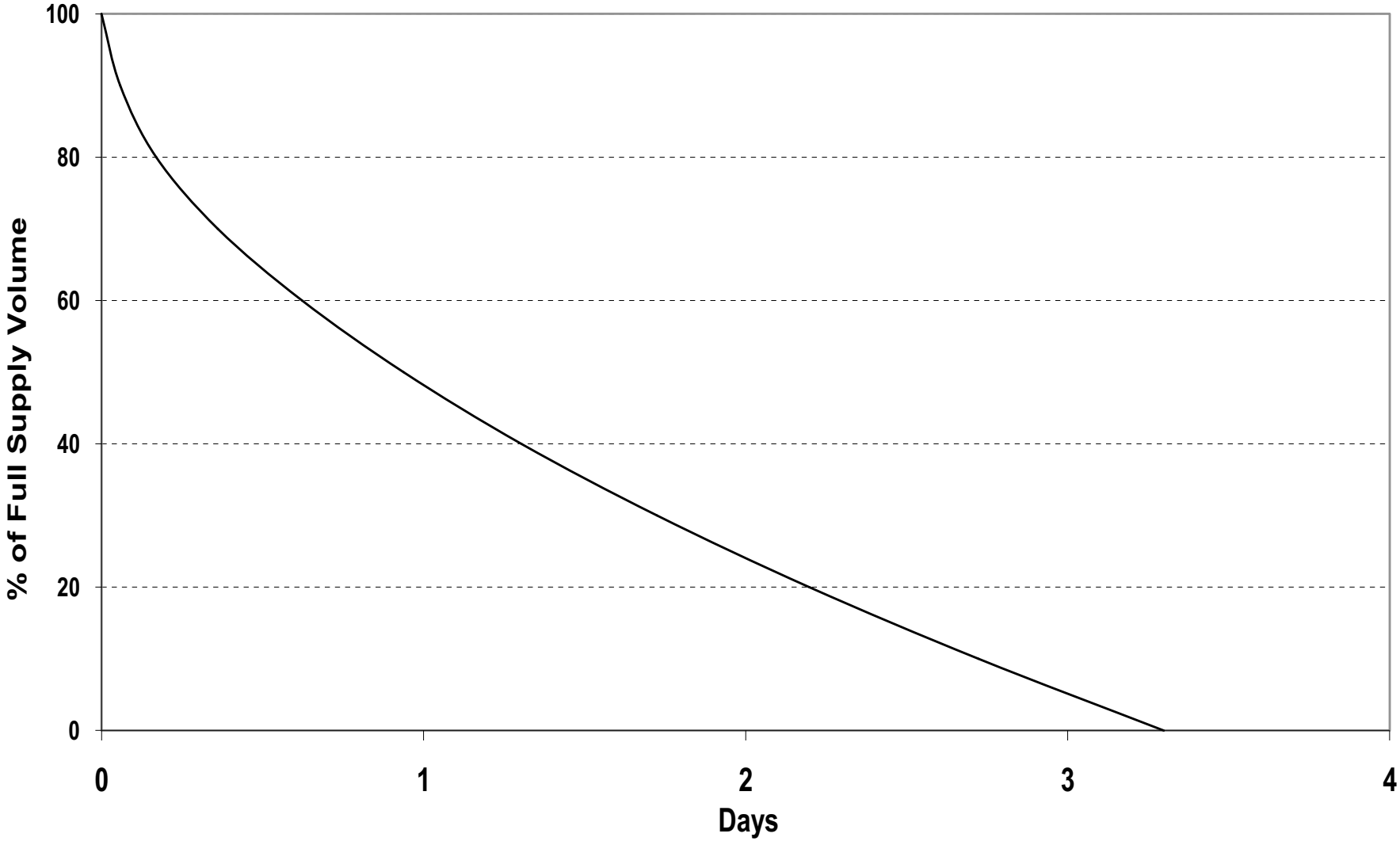
Emptying Curve



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APPENDIX B4

GEOTECHNICAL SUPPORT

(Not Required)

APPENDIX C

PHOTO REPORT

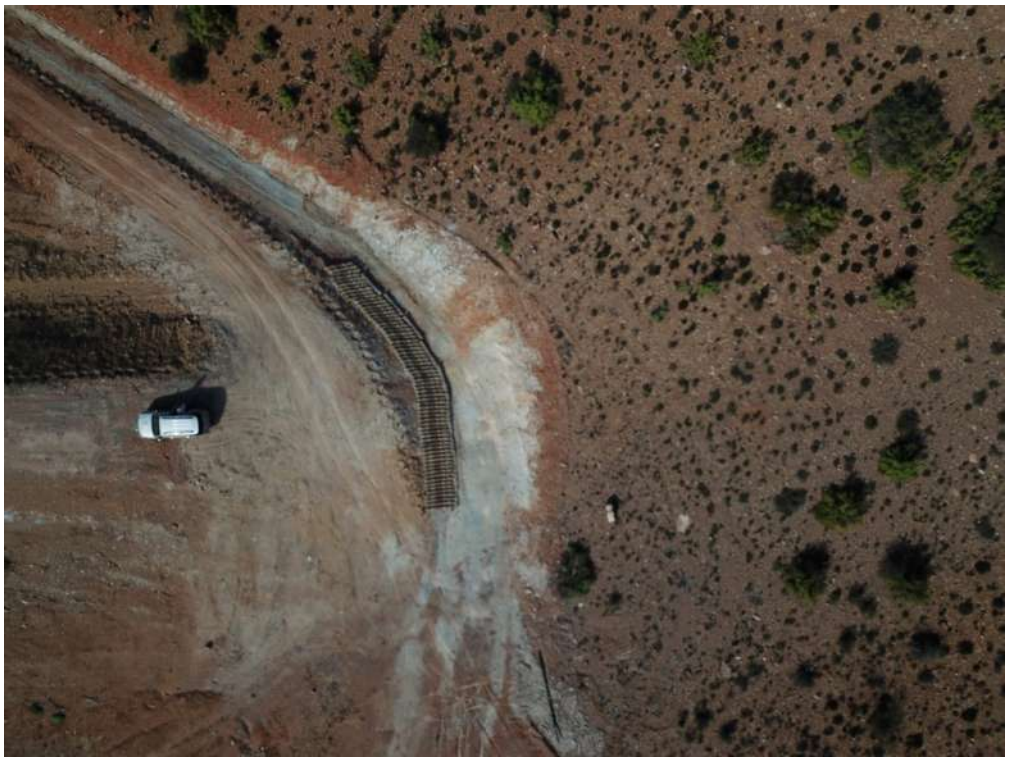


Photo 1
Aerial view of the spillway channel on the right flank with forebay and crest visible.

Photo 2
Aerial view of the embankment from the right flank with the dam basin visible.

Photo 3
View of the right hand section embankment and spillway channel from the right flank.

Photo 4
Aerial view of the downstream slope and toe with vegetation visible.

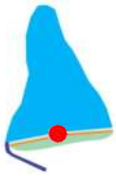


Photo 5
Aerial view of the middle section embankment with outlet pipe inlet upstream and the outlet pipe trench at the downstream toe.

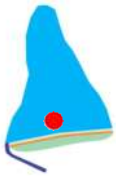


Photo 6
Aerial view over the upstream slope looking downstream.

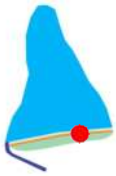


Photo 7
Aerial view of the left flank with left section embankment including the dam basin.

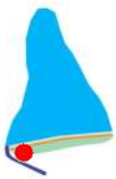


Photo 8
General view of the downstream slope and toe with minor erosion visible.

Photo 9
General view of the stepped downstream slope with minimal erosion.

Photo 10
View inside the spillway channel looking upstream with concrete block placement as protection.

Photo 11
View inside the spillway channel looking upstream with concrete block placement as protection.

Photo 12
View inside the downstream section spillway channel on the right flank.

Photo 13
View over the right hand section upstream slope and dam basin.

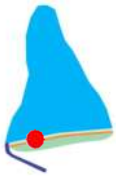


Photo 14
General view of the upstream slope with gravel surface, but riprap placement required.

Photo 15
Right hand section upstream slope overlooking the spillway channel forebay.

Photo 16
View inside the spillway channel with dimensions taken.

Photo 17
View inside the spillway channel from the forebay looking downstream, with profile visible.

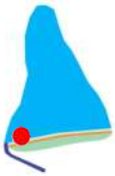


Photo 18
General view of the upstream slope from the right flank. Even gradient and minor erosion visible.

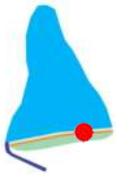


Photo 19
Middle to right hand section non overspill crest with even profile. Low spots to be filled.

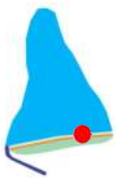


Photo 20
Right to middle section upstream slope overlooking the dam basin.

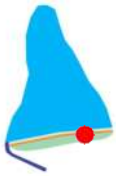


Photo 21
Middle section downstream slope with gravel and rocky surface, protecting against erosion.

Photo 22
Inside the dam basin with the outlet pipe inlet visible.

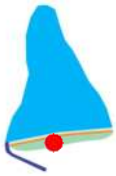


Photo 23
Middle section downstream slope with minimal erosion.

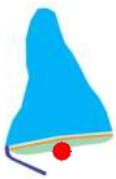
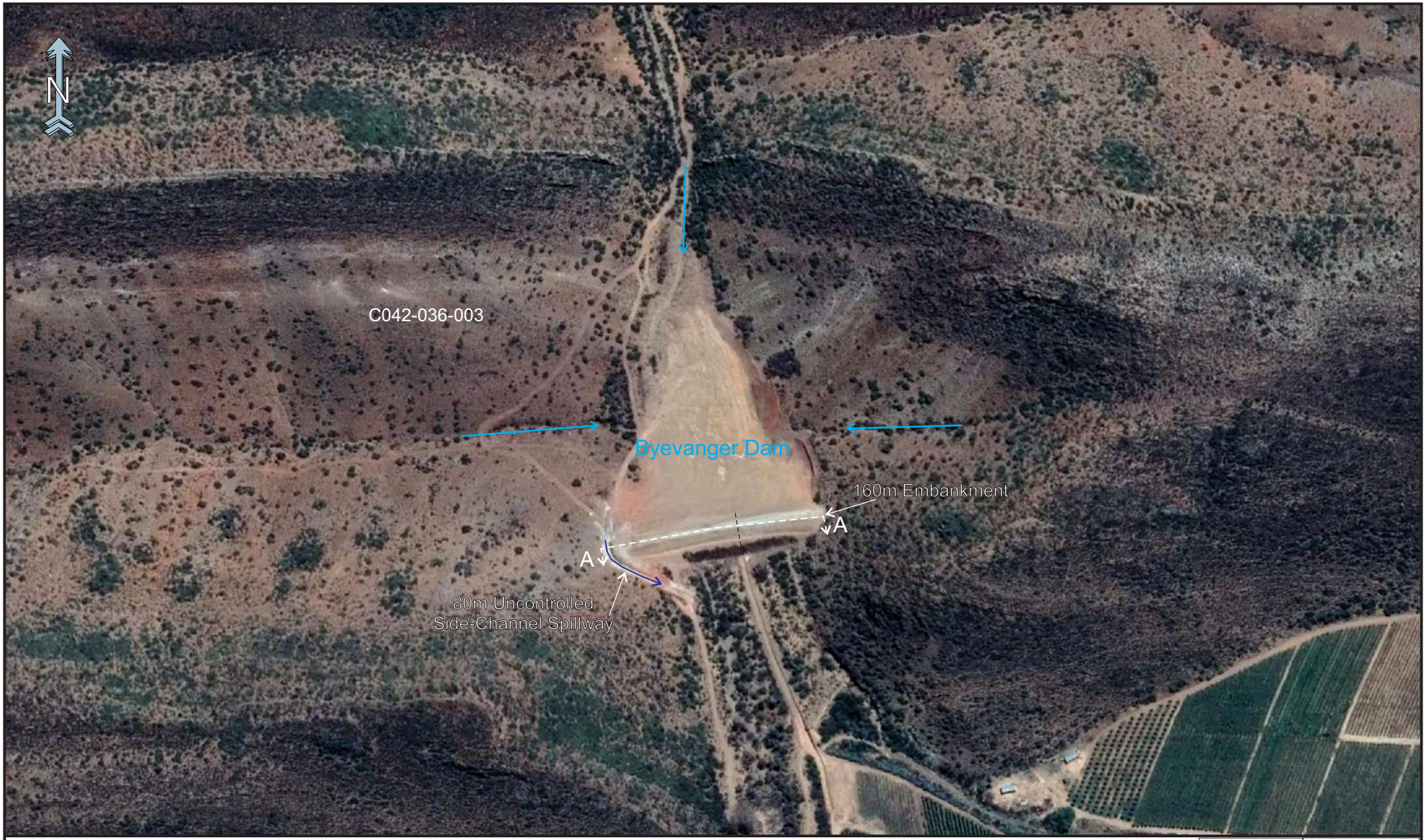


Photo 24
Middle section downstream toe with temporary cover over the outlet pipe.

Photo 25
View at the middle section downstream toe with excavation for outlet pipe connections.

APPENDIX D

Drawings, Correspondence, Notes & Other Information



Review	No	Date	Description	Initials
	1	Sep 2019	DRAFT layout completed	JN

Legend:
- Outlet pipe
- Canal from River
- Flow from Catchment
- Spillway Channel

Drawing Title:

Johannes Gerhardus Nel Familie Trust

DSO Number: 12/2/J331/55 Registration Number: Not yet available

Byevanger Dam.Farm 36 Portion 3, Ladismith RD.

1st Dam Safety Inspection Report: September 2019

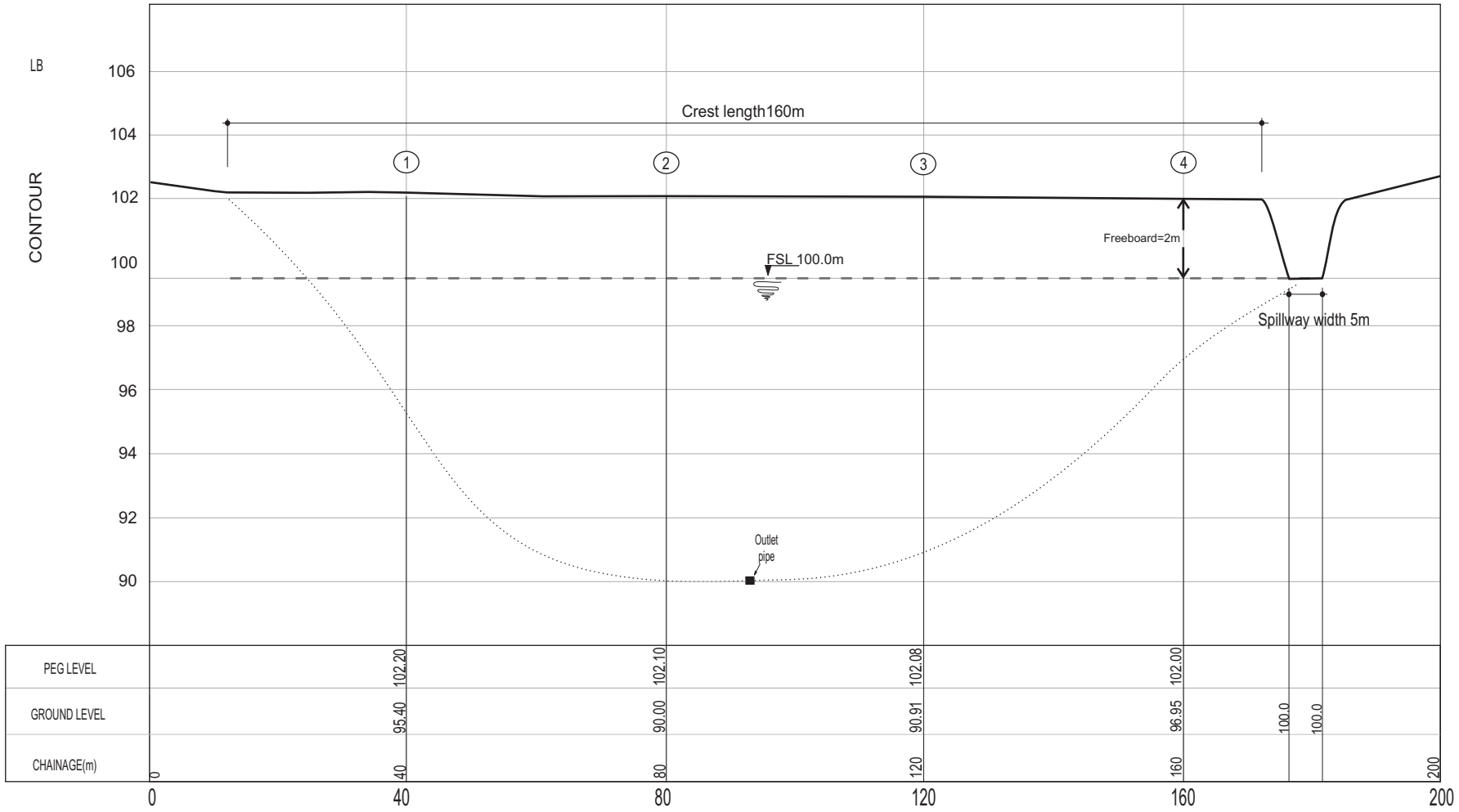
Gorra Water
info@gorrawater.co.za

Designed by:	JN
Checked by:	RK
Drawn by:	JN
Checked by:	RK

A4 scale: NTS

Client drawing No:
C235.B2.01

Gorra Water Drawing No:
C235.B2.01



SECTION A-A (Refer to drawing C235.B2.LS)
Scale : NTS
Survey Date : 2 May 209
Note: Dam basin shape estimated only

Review				
1	12 Sep 19	DRAFT layout completed	RK	
No	Datum	Description	Initials	

Drawing Title:

Johannes Gerhardus Nel Familie Trust

WARMS Reg No: **Not yet available** DSO No: **12/2/J331/55**

Byevanger Dam. Farm 36 Portion 3, Ladismith RD.
1st Dam Safety Inspection Report: September 2019
Long section of Embankment: Section A-A

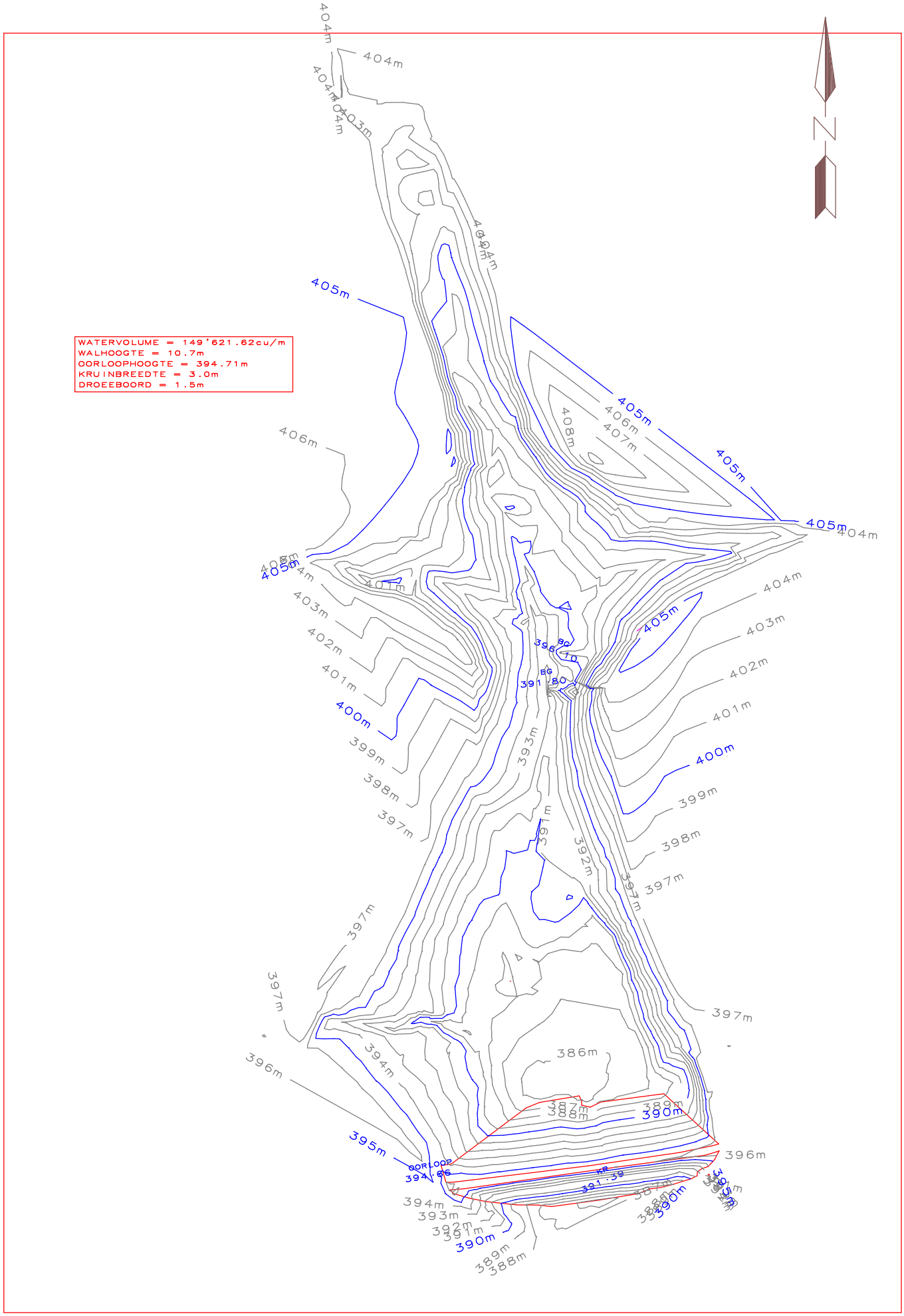
Gorra Water
Info@gorrawater.co.za

Designed by:	RK
Checked by:	RK
Drawn by:	PM
Checked by:	RK

A4 scale: NTS

Client drawing No:
C235.B2.LS

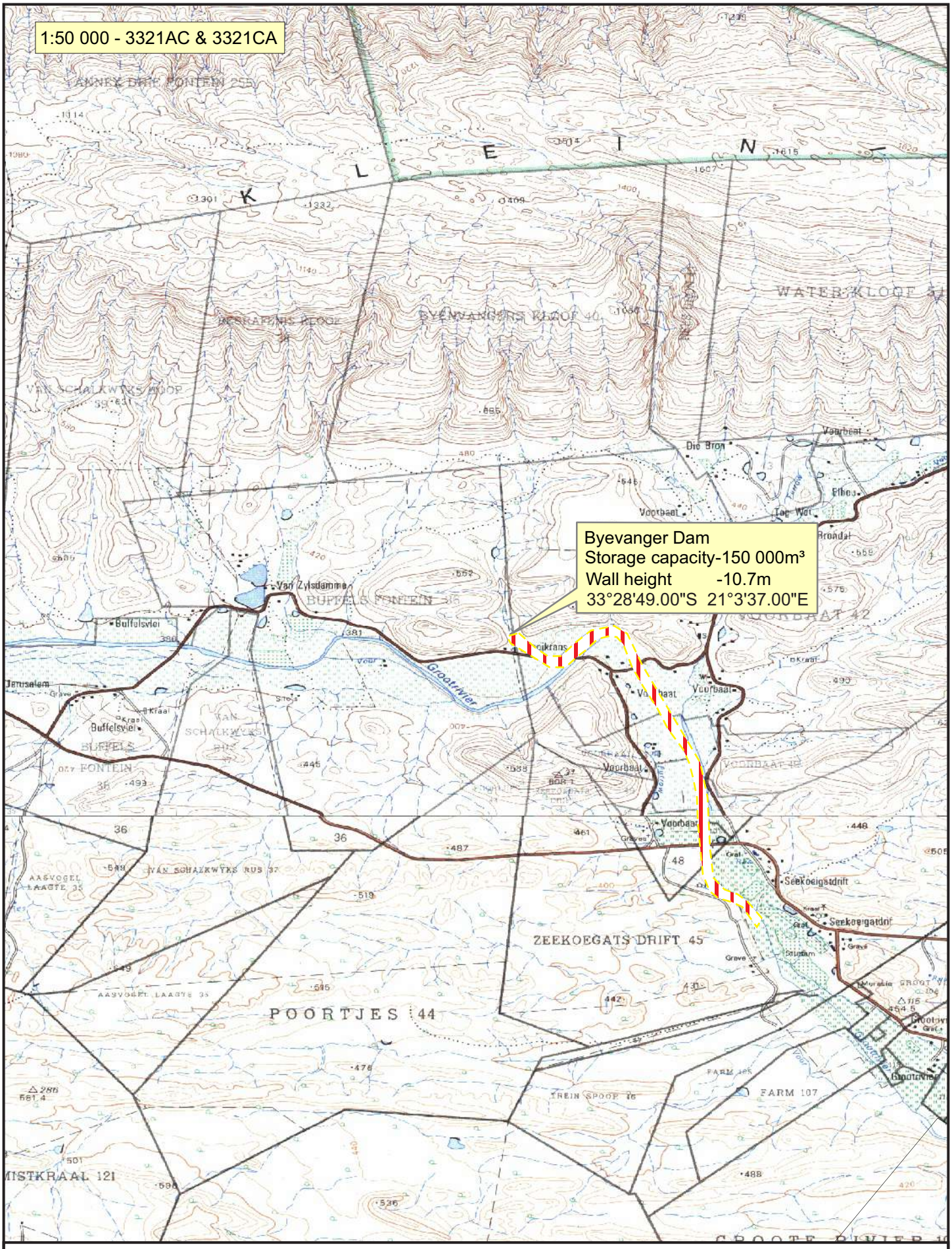
Gorra Water Drawing No:
C235.B2.LS



DRAWN BY	FOR	PROJECT	NOTES
Klein Karoo Agri	VANZYLSDAMME	NUWE DAMWAL	
0843178583		SCALE 1/3000	
		DATE : 22/8/2018	

APPENDIX E

LOCALITY MAP (1:50 000)



Owner: Johannes Gerhardus Nel Familietrust

DSO Number: 12/2/J331/55 Registration Number: Not Available

Byevanger Dam: Locality Map.

C235: 1st Dam Safety Inspection Report - September 2019

Gorra Water

Info@gorrawater.co.za

APPENDIX F

REVISED REGISTRATION DETAILS

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Registration Details of a Dam Registered in terms of Dam Safety Legislation in terms of Chapter 12 of the National Water Act (Act 36 of 1998)

(Please note that registration for dam safety legislation is not an entitlement for water use in terms of Chapter 4 of the National Water Act)

Enter No of dam	J331/55	Column
No of dam	J331/55	1
WARMS Dam ID	0	2
Name of dam	BYEVANGER DAM	3
Water management area	8	4
Quaternary Drainage Area	J33A	5
Latitude deg	33	6
Lat min	28	7
Lat sec	49	8
Longitude deg	21	9
Long min	3	10
Long sec	37	11
Town nearest	LADISMITH	12
Distance from Town	25	13
Name of farm	FARM 36 PTN 3	14
District	LADISMITH	15
Province	WC	16
DWS Provincial Office / Region	WC	17
Completion date	2018	18
Completion date raised	0	19
River or Watercourse	GROOTRIVIER TR.	20
Wall type	EARTHFILL	21
Wall height	10.7	22
Crest Length (m)	160	23
Spillway Type	SIDE CHANNEL	24
Capacity (1000 cub m)	150	25
Surface area (ha)	3.95	26
Catchment area (sq km))	5.8	27
Purpose	IRRIGATION	28
Owner Name	JOHANNES GERHARDUS NEL FAMILIE TRUST	29
Designer	OWNER	30
Contractor	OWNER	31
Registration date	2019/03/22	32
Size	S	33
Hazard Potential	S	34
Category	2	35
Classification date	2019/03/14	36
Sector	0	37
Date Last DSE	2019/05/02	38
Number Last DSE	1	39
Target date next DSE	2024/05/02	40

APPENDIX G

DW 19E - RECOMMENDATIONS

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

PROGRAMME / PROGRESS REPORT FOR THE IMPLEMENTATION OF THE RECOMMENDATIONS OF A DAM SAFETY EVALUATION / INSPECTION REPORT

NAME OF DAM	**BYEVANGER DAM**
DWS REF No	**12/2/J331/55**
NAME OF OWNER	**JOHANNES GERHARDUS NEL FAMILIE TRUST**

Tel	**083 381 7293**	E-Mail	**vzd@mweb.co.za**

No.	Description of Activity flowing from recommendations	Planned Start Date	Actual Completion Date (only if completed)
1	**Urgently adjust the spillway channel capacity to service the RDF flood peak by increasing the freeboard to 2.5m and the spillway crest length to 9m, but complying with the Sec. 24G NEMA and current WULA process.**	**27 Jan 2020**	
2	**Provide the upstream slope with rip rap placement as protection against erosion, but complying with the Sec. 24G NEMA and current WULA process.**	**27 Jan 2020**	
3	**Fill and compact with appropriate materials the low spots/potholes on the non overspill crest to prevent further degradation, but complying with the Sec. 24G NEMA and current WULA process.**	**27 Jan 2020**	
4	**Provide grass growth for the downstream slope to prevent/repair erosion process, but complying with the Sec. 24G NEMA and current WULA process.**	**27 Jan 2020**	
5	**Ensure that the dam does not store any water at all to comply with the Dam Safety Office/Environmental directive and to comply with the Sec. 24G NEMA and the current WULA process.**	**27 Jan 2020**	
6	**Implement and update the Operation and Maintenance Manual and Emergency Preparedness Plan according to the manual provided. Quarterly inspect the dam for critical points provided in the OME.**	**27 Jan 2020**	
7	**CAUTION: Reconsider, monitor continually and possibly redo flood calculations due to global warming and climate change at the end of this five year cycle and inspection certification lapsing on 02/05/2024.**		
8			

Send to: damsafety@dws.gov.za

Pr Eng

Signature of owner OR person in control of the dam

12 September 2019
Date

APPENDIX H

DW 692E - APPLICATION FOR RE-CLASSIFICATION

(Not Required)