

**ZNB4292/18A: APPOINTMENT OF A SERVICE PROVIDER / CONTRACTOR TO
INSTALL A SUBSURFACE DRAINAGE AT MAKHATHINI IRRIGATION SCHEME BLOCK
15 AT UMKHANYAKUDE DISTRICT**

ADENDUM

**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200A

1200 GENERAL REQUIREMENTS AND PROVISIONS						
Item No.	Payment	Description	Unit	Quantity	Rate	Amount
	SANS 1200 A	PRELIMINARY & GENERAL				
A.1	8,3	FIXED-CHARGE ITEMS				
A.1.1	8.3.1	Contractual requirements (eg. Insurances, UIF etc)	Sum	1		
A.1.2	8.3.2	Establish facilities on site (eg. Fencing, Electricity, Water, Plant ...)	Sum	1		
	8.3.2.1	Facilities for Engineer (SANS 1200 AB) Supply and install Two Name boards	Sum	1		
A.1.3	8.3.2.2	Facilities for contractor				
A.1.4		Office and storage sheds	Sum	1		
A.1.5		Workshops	Sum	1		
A.1.6		Laboratories	Sum	1		
A.1.7		Living Accommodation - Site Security	Sum	1		
A.1.8		Ablution and latrine facilities	Sum	1		
A.1.9		Tools and equipment	Sum	1		
A.1.10		Water supplies, electricity and communications	Sum	1		
A.1.11	8.3.3	Other fixed-charge obligations	Sum	1		
A.1.12	8.3.4	Remove Engineer's and contractor's site establishment on completion of contract	Sum	1		
A.1.13	8.3.5	Provision for OSH&S requirements such as but not limited to : HIV awareness and safety training	Sum	1		
A.1.14	8.3.6	Provision for Environmental management plan requirements	Sum	1		
TOTAL CARRIED FORWARD						

**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200A

1200 GENERAL REQUIREMENTS AND PROVISIONS						
Payment	Description	Unit	Quantity	Rate	Amount	
TOTAL BROUGHT FORWARD						
A.2	8.4	TIME-RELATED ITEMS				
A.2.1		Contractual requirements	Month	18		
	8.4.2.2	Facilities for contractor				
A.2.2		Office and storage sheds	Month	18		
A.2.3		Workshops	Month	18		
A.2.4		Laboratories	Month	18		
A.2.5		Living Accommodation	Month	18		
A.2.6		Ablution and latrine facilities	Month	18		
A.2.7		Tools and equipment	Month	18		
A.2.8		Water supplies, electricity and communications	Month	18		
A.2.9		Dealing with water	Month	18		
A.2.10		Access for contractor and affected parties	Month	18		
A.2.11	8.4.3	Supervision for duration of construction or contract	Month	18		
A.2.12	8.4.4	Provision for OSH&S requirements such as but not limited to : HIV awareness and safety training	Month	18		
A.2.13	8.4.5	Provision for Environmental management plan requirements	Month	18		
TOTAL CARRIED FORWARD						

**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200A

1200 GENERAL REQUIREMENTS AND PROVISIONS						
Payment	Description	Unit	Quantity	Rate	Amount	
TOTAL BROUGHT FORWARD						
A.3	PS.A 8.5	SUMS STATED PROVISIONALLY BY ENGINEER				
A.3.1	1) Provision for Community Liaison Officer (CLO)	Provisional / Month	18	R 12 500,00		
A.3.2	2) Specialist services geotechnical agricultural subsurface drainage engineer	Provisional / Month	18	R 25 000,00	-	
A.3.3	3) Entrepreneurial skills Training and Venue	Provisional / Month	18	R 2 000,00		
A.3.4	4) Geotechnical and Filtration tests requirements	Provisional / Month	18	R 7 500,00		
A.3.5	5) Surveys (Stakeouts, Quality Control & Verification)	Provisional / Month	18	R 15 000,00		
A.3.6	6) Re-establishment of damaged agricultural crops or crop losses within farms.	Provisional / Hectare	50	R 20 000,00		
A.3.7	7) Construction contingencies 5% of estimated contract value	Provisional sum	1	R 1 050 000,00		
A.3.8	8) Contractors handling costs, profit and all other charges in respect of sub items	%				
TOTAL CARRIED FORWARD						

**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200A

1200 GENERAL REQUIREMENTS AND PROVISIONS						
	Payment	Description	Unit	Quantity	Rate	Amount
TOTAL BROUGHT FORWARD						
A.4	PS A 8.6	DAYWORKS				
A.4.1		Unskilled Labour	Day	20		
A.4.2		Semi-skilled Labour	Day	20		
A.4.3		Skilled Labour	Day	20		
A.4.4		Foreman	Day	20		
A.4.5		6 ton Tipper truck with operator	Hour	200		
A.4.6		10 ton Tipper truck with operator	Hour	200		
A.4.7		0.5 cubic metre excavator with operator	Hour	200		
A.4.8		5 000 litres water tanker with operator	Hour	200		
TOTAL CARRIED FORWARD TO SUMMARY						

**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200C

1200 SITE CLEARANCE					BLOCK 15 MAKATHINI	
Item No.	Payment	Description	Unit	Quantity	Rate	Amount
	8.2.1	Clear and grub:				
B.1.1		Area within existing canal reserve	ha	13		
B.1.2		Subsoil drainage route (10,0m wide)	m	28 500		
B.1.3	8.2.2	Remove and grub large trees and tree stumps of girth:				
B.1.3.1		Trees over 1.0 m and up to and including 2,0 m	No	10		
B.1.4	8.2.9	Transport materials and debris to unspecified sites	m ³ .km	60		
TOTAL CARRIED FORWARD						

**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200D

1200 D EARTHWORKS					BLOCK 15 MAKATHINI	
Item No.	Payment	Description	Unit	Quantity	Rate	Amount
C.1	SANS 1200 D	EARTHWORKS EXCAVATION				
C.1.1	8.3.5(a)	Restricted excavation:				
C.1.1.1		1) Excavate for restricted manhole foundations or structures in all materials, and use for backfill or dispose	m ³	3 100		
C.1.2	8.3.5(b)	Extra excavation in all materials to provide working space around structure				
C.1.2.1		1) Intermediate excavation	m ³	300		
C.1.2.2		2) Hard rock excavation	m ³	50		
C.1.3	8.3.6(b)	Overhaul (provisional)				
C.1.3.1	8.3.6(b)	Limited overhaul	m ³	2 500		
C.1.3.2	8.3.6(b)	Long overhaul	m ³ /km	6 250		
C.1.4		Top soiling	m ³	13000		
C.1.5		Extra over for temporary stock piling	m ³	2 500		
C.1.6		Extra over items for disposing of spoil material on a site provided by the contractor	m ³	7 500		
TOTAL CARRIED FORWARD TO SUMMARY						



**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200DB

1200 DB		SUBSOIL DRAINAGE PIPELINES			BLOCK 15 MAKATHINI	
	Payment	Short Description	Unit	Qty	Rate	Amount
F.1	SABS 1200DB PSDB 8.3.2	PIPE TRENCHES Excavation				
	8.3.2 (a)	Excavation in all materials for trenches , backfill, compact and dispose of surplus materials within 0.5 km for 200mm dia & smaller PE pipes and trench widths of 600 mm (min) and trench depths of:				
F.1.1		Exceeding 0,0m up to 1,5m	m	50		
F.1.2		Exceeding 1,5m up to 2,0m	m	1 000		
F.1.3		Exceeding 2,0m up to 2,5m	m	27 800		
	8.3.2(b)	Extra-over item DB 8.3.2(a) for:				
F.1.4		Intermediate Material	m ³	6 500		
F.1.5		Hard rock excavation	m ³	500		
F.2	8.3.3	Excavation Ancillaries				
	8.3.3.1	Make up deficiency in backfill materials				
F.2.1		a) from other necessary excavations on site	m ³	500		
F.2.2		b) by importation from designated borrow pits	m ³	500		
TOTAL CARRIED FORWARD						



**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
UMKHANYAKUDE DISTRICT**

1200DB


1200 DB		SUBSOIL DRAINAGE PIPELINES			BLOCK 15 MAKATHINI	
Payment	Description	Unit	Quantity	Rate	Amount	
TOTAL BROUGHT FORWARD						
F.3	8.3.4	Particular Items				
F.3.1	8.3.4(a)	Shore trench	m	10 000		
F.3.2	8.3.4(b)	Control of ground water	Day	150		
F.4	8.3.6	Finishing				
F.4.1	8.3.6.1	Reinstate road surfaces complete with all courses Gravel roads	m ²	1500		
F.5	SABS 1200LB	BEDDING				
	8.2.1	Provision of bedding from trench excavation				
	8.2.1	Available from trench excavations within 0,5 km				
F.5.1	a)	Selected granular material Graded Riversand Crushed Stone 6,7 - 13mm	m ³	1 728		
F.5.2	b)	Selected fill material	m ³	2 000		
	8.2.5	Overhaul of material for bedding, cradle and selected fill blanket				
F.5.3	a)	Selected granular material	m ³ .km	1 728		
F.5.4	b)	Selected fill material	m ³ .km	2 000		
F.5.5	8.2.8	Controlled levelling & compation of trench bottom	m ²	9 975		
	1200LE 8.2.15	PE DRAINAGE PIPES				
		Supply, lay join bed perforated PE drainage pipes, 400 Kpa, hoop stiffness heavy duty to SABS 1601-1994 for the following:				
F.6.1		110mm internal dia, perforated pipes	m	26 700		
F.6.2		160mm internal dia, perforated pipes	m	2 100		
TOTAL CARRIED FORWARD						



**CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME
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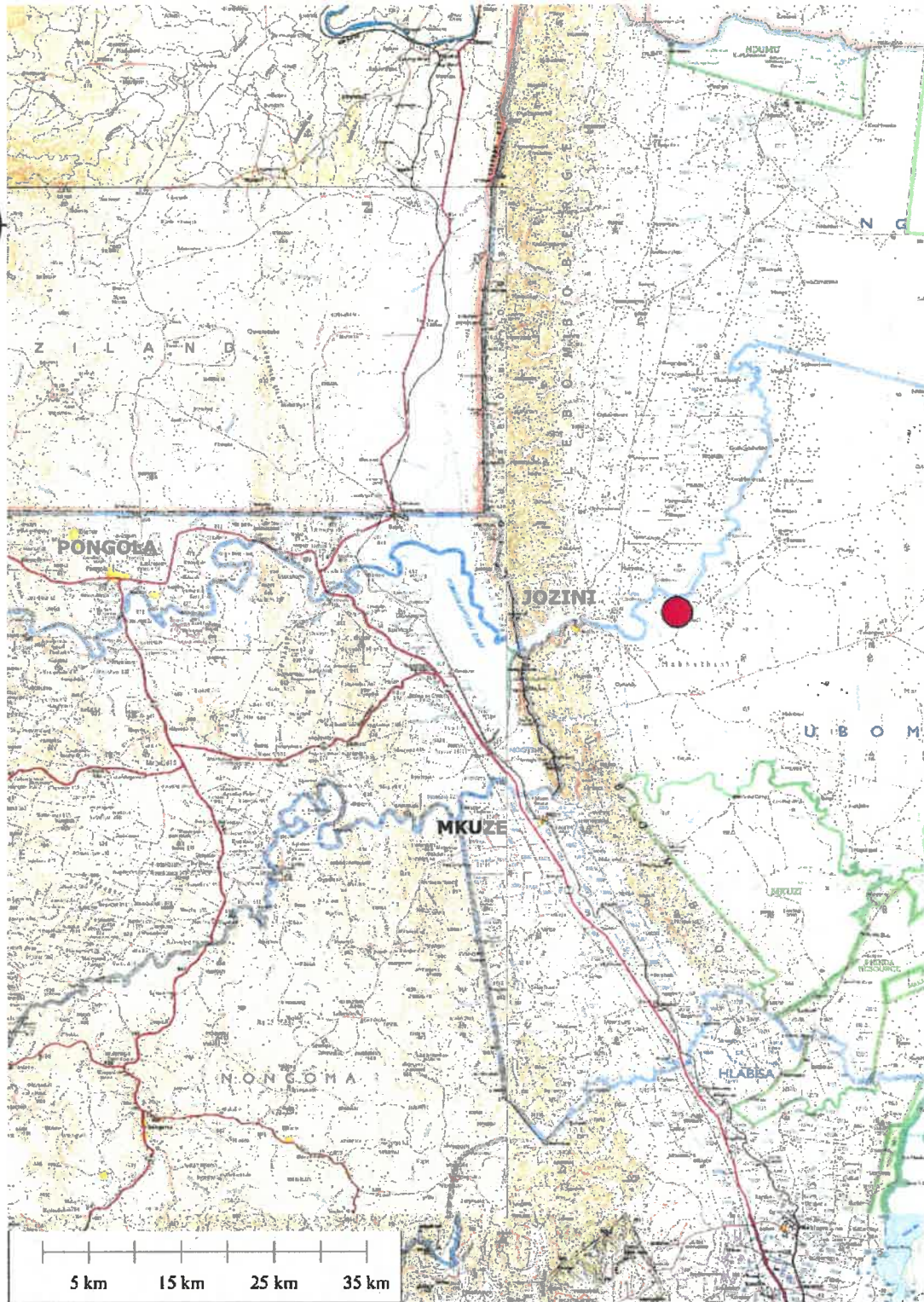
1200DB

1200 DB		SUBSOIL DRAINAGE PIPELINES			BLOCK 15 MAKATHINI	
Payment	Description	Unit	Quantity	Rate	Amount	
TOTAL BROUGHT FORWARD						
F.6.3		200mm internal dia, perforated pipes	m	1 100		
F.7	8.2.3	MANHOLES				
	8.2.3.1	Concrete manholes Supply and install 1,2m diameter pre-cast concrete manholes, complete with cover and frame and step irons, for the following depths.				
F.7.1		a) Depth 0,0m up to 1,5m	No.	10		
F.7.2		b) Depth 1,5m up to 2,0m	No.	30		
F.7.3		c) Depth 2,0m up to 2,5m	No.	270		
F.8		Connections Supply, lay join and bed PE subsurface drainage pipes, SABS 1601 - 1994 sewer pipes of the following connections, sloping and vertical:				
F.8.1		110mm x 110mm Ø junction	No.	50		
F.8.2		160mm x 110mm Ø at junction	No.	110		
F.9	PSG 8.6	FOUNDATIONS				
F.9.1	8.4.4	Unformed surface finishes	m ³	310		
F.10	8.2.3	END CAPS				
F.10.1		Supply all material and labour for the installation of the elbows to the 110mm diameter pipes and rodding-eyes complete within manhole junctions	No	650		
F.11.1	PSLE 8.2.18	a) Permeable material to subsoil eg. Selected granular material Approved Graded Riversand Crushed Stone 6,7 - 13mm	m ³	8 640		
CARRIED FORWARD TO SUMMARY						

 CONSTRUCTION OF SUBSURFACE DRAINAGE MAKHATHINI IRRIGATION SCHEME UMKHANYAKUDE DISTRICT		
SECTION	SUMMARY OF SCHEDULES	AMOUNT
1200A	A. GENERAL REQUIREMENTS AND PROVISIONS	R -
1200C	B. SITE CLEARANCE	R -
1200D	C. EARTHWORKS	R -
1200DB	D. AGRICULTURAL INFIELD SUBSOIL DRAINAGE LINES	R -
	SUB TOTAL 03	R -
		15% VAT R -
	ESTIMATED CONTRACT VALUE	R -

Sum stated provisionally :-

- 1) Community Liaison Officer
 - 2) Overheads, charges and profit : %
 - 3) The Contractor will pay the remuneration of the CLO & farmers agricultural practice re-instatement after construction
- A provisional sum has been provided for these expenditures



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PRIVATE BAG X9059, PIETERMARITZBURG, 3200
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Notes & Reference drawings

No.	Description	
Amendment		
No.	Date	Checked By

Nov 2018 JM Van Der Merwe

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Project :

**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**

Drawing description

LOCALITY MAP

Scale

NTS

Date

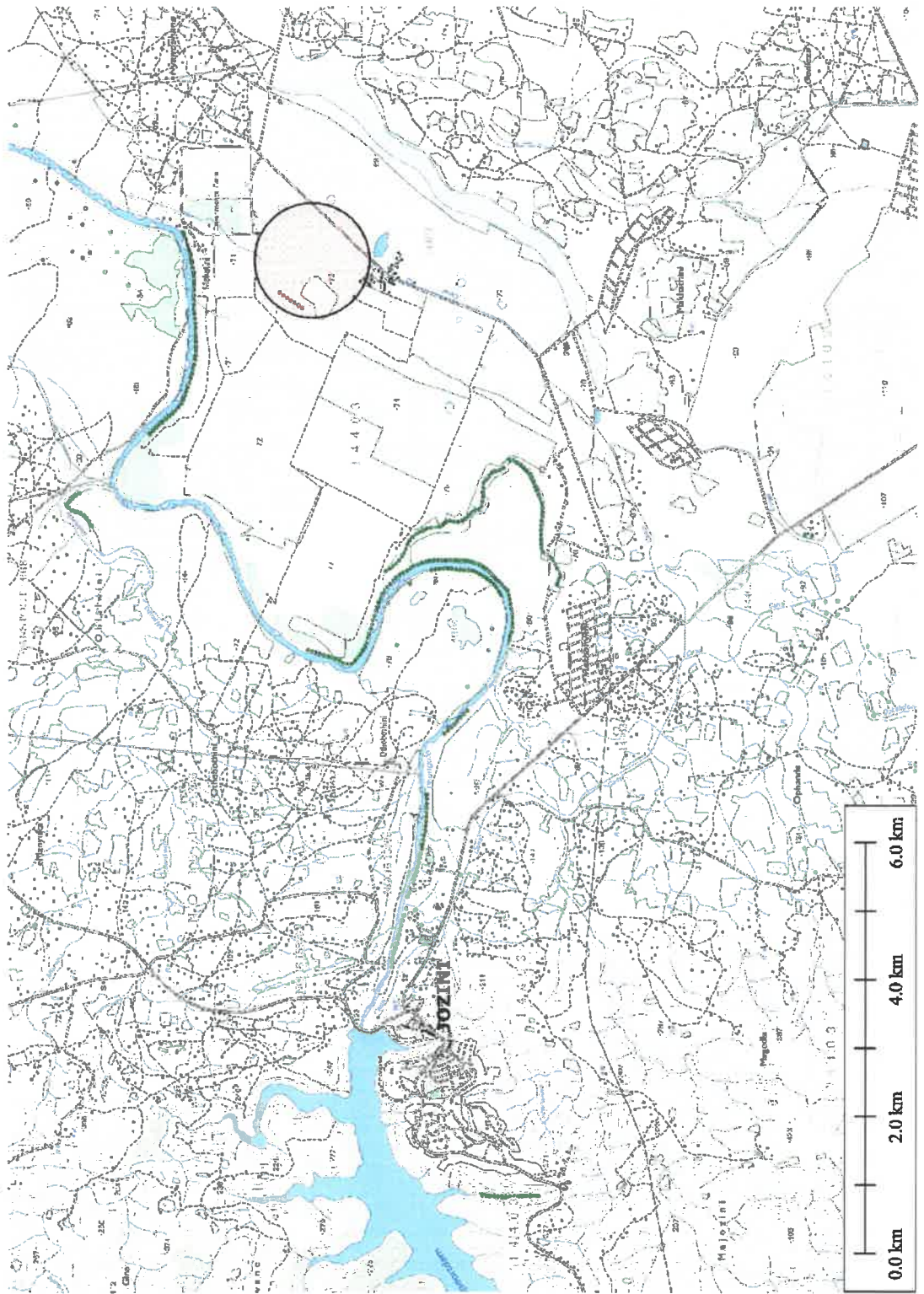
02/11/2018

Drawing number

NHL-KZNDARD 2018-09

SHEET

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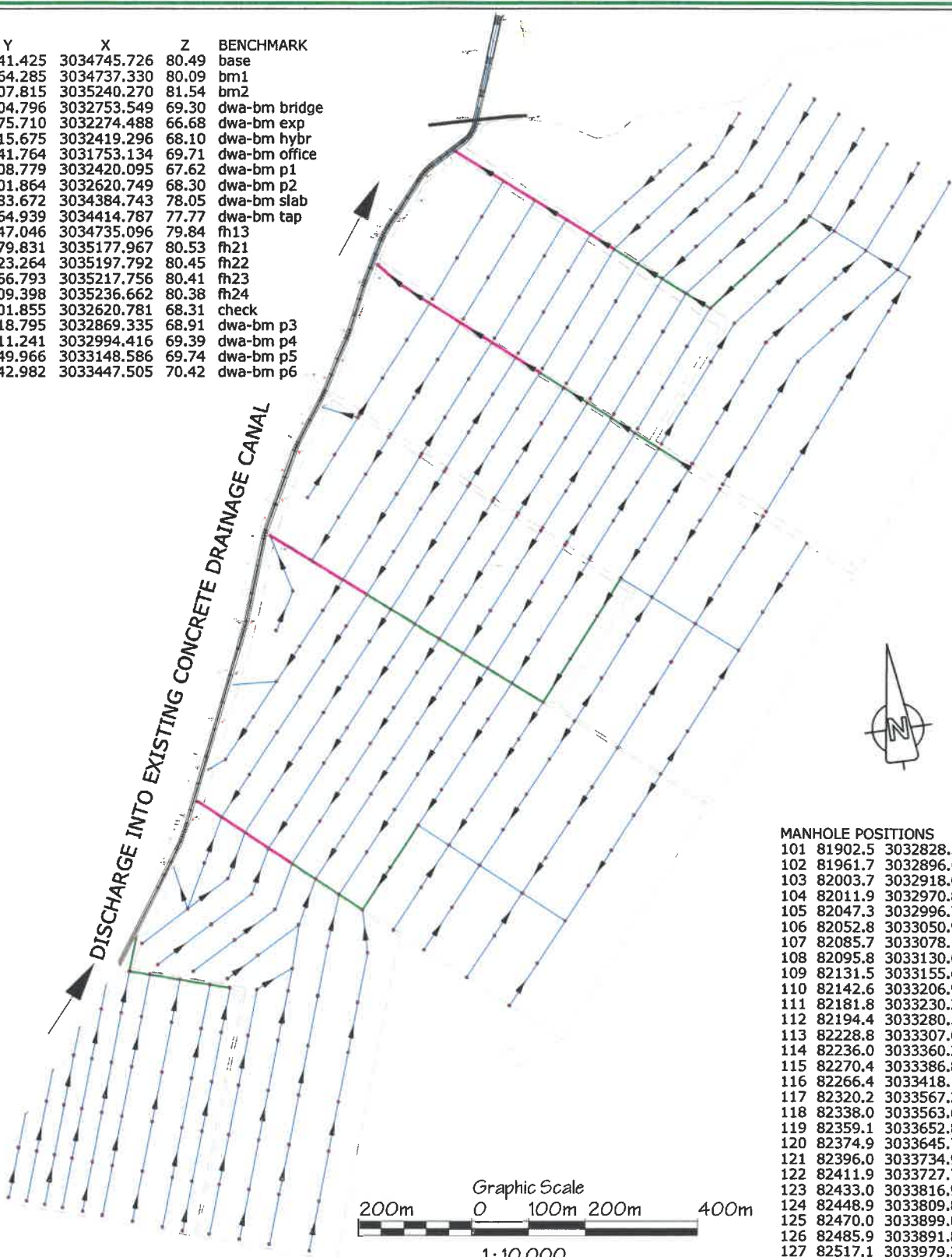
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1	Nov, 2018
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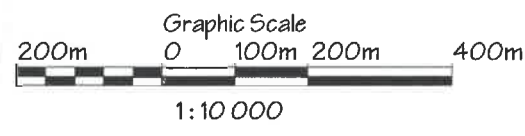
Project :
**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**
Drawing description
SITE MAP

Scale	NTS	Date	02/11/2018
Drawing number	NHL-KZNDARD 2018-09		SHEET 2 of 10

Y	X	Z	BENCHMARK
82341.425	3034745.726	80.49	base
82264.285	3034737.330	80.09	bm1
82307.815	3035240.270	81.54	bm2
81704.796	3032753.549	69.30	dwa-bm bridge
81575.710	3032274.488	66.68	dwa-bm exp
81715.675	3032419.296	68.10	dwa-bm hybr
81441.764	3031753.134	69.71	dwa-bm office
81708.779	3032420.095	67.62	dwa-bm p1
81801.864	3032620.749	68.30	dwa-bm p2
81983.672	3034384.743	78.05	dwa-bm slab
81964.939	3034414.787	77.77	dwa-bm tap
82347.046	3034735.096	79.84	fh13
82479.831	3035177.967	80.53	fh21
82423.264	3035197.792	80.45	fh22
82366.793	3035217.756	80.41	fh23
82309.398	3035236.662	80.38	fh24
81801.855	3032620.781	68.31	check
81918.795	3032869.335	68.91	dwa-bm p3
82011.241	3032994.416	69.39	dwa-bm p4
82149.966	3033148.586	69.74	dwa-bm p5
82242.982	3033447.505	70.42	dwa-bm p6



MANHOLE POSITIONS			
101	81902.5	3032828.3	MH1
102	81961.7	3032896.0	MH2
103	82003.7	3032918.0	MH3
104	82011.9	3032970.8	MH4
105	82047.3	3032996.7	MH5
106	82052.8	3033050.9	MH6
107	82085.7	3033078.1	MH7
108	82095.8	3033130.0	MH8
109	82131.5	3033155.6	MH9
110	82142.6	3033206.9	MH10
111	82181.8	3033230.2	MH11
112	82194.4	3033280.5	MH12
113	82228.8	3033307.0	MH13
114	82236.0	3033360.2	MH14
115	82270.4	3033386.8	MH15
116	82266.4	3033418.1	MH16
117	82320.2	3033567.2	MH17
118	82338.0	3033563.6	MH18
119	82359.1	3033652.8	MH19
120	82374.9	3033645.7	MH20
121	82396.0	3033734.9	MH21
122	82411.9	3033727.7	MH22
123	82433.0	3033816.9	MH23
124	82448.9	3033809.8	MH24
125	82470.0	3033899.0	MH25
126	82485.9	3033891.8	MH26
127	82517.1	3033979.2	MH27
128	82531.3	3033969.5	MH28



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Project :
MAKATHINI BLOCK 15 SUBSURFACE DRAINAGE

Drawing description
SYSTEM LAYOUT

Scale	1 : 10 000	Date	02/11/2018
Drawing number	NHL-KZNDARD 2018-09	SHEET	3 of 10

NOTES :-

Ideally, all construction should follow a definite plan that has been prepared in advance in consultation with the project engineer.

The plan should include profiles and construction notes for all mains and submains and a map showing the locations, sizes, and grades of all lines and other components. The map also should show physical features so that components of the system can be readily located in the future for repairs and maintenance.

The location of buried cables, pipelines, or other utilities also should be noted (long before construction begins, the contractor should obtain any necessary permission or easements that might be required to cross the land of other owners, roads, etc.).

The contractor should carefully examine the plan before work is begun and should not proceed with installation until the authorities have marked the location of any buried obstacles at points where drains are to be constructed. As the work proceeds, the contractor should be careful to note on the plan and map any modifications in the design that are necessitated in the field, especially any changes in grade. Once the job is completed, the contractor should provide the engineer with an as-built plan.

Safety

Observe safety standards for persons and machines. Persons working in trenches should be protected from cave-ins, and they should not work alone. Moving parts of machinery should be protected by proper guards. Persons observing the work should not be permitted to come close to the excavating operation.

Trench method of installation

Construction of the trench should begin at the outlet and proceed upgrade. Align trenches in such a way that the drain can be laid in straight lines or in smooth curves. The width of the trench at the top of the drain should be the minimum required to permit installation and enable the bed to support the load on the drain. But there should be at least 150mm of clearance on either side of the drain.

Tile should be bedded in an earth foundation that is shaped to fit the lower part of the pipe. The foundation can be shaped in this way with most trenching machines. If you dig the trench with a backhoe, you will have to hand grade and shape the trench bottom to fit the pipe.

If the drain is to be laid in a rock-cut, the trench should be overexcavated to a depth of 150mm below grade level; this space should be filled with graded sand and gravel or well-pulverized soil and tamped enough to provide a firm foundation. Then, the bottom of the trench should be shaped and leveled to grade. The trench should be filled with designed bedding or envelope material to the top of the rock-cut. Where the trench bottom is unstable, as in fine sandy soils be extremely careful to keep sediment from entering the drain and to provide a firm foundation for the drain.

Installing the subsurface drains

Listed below are some guidelines to follow when installing drains:

1. Remove all soil or debris inside drains before installation.
2. Make sure the drain is free from clinging wet material that could hinder laying the drain on grade.
3. Begin laying tile or tubing at the outlet and progress upgrade. If possible, place the drain inside the shoe casing of the trencher during the trenching operation.
4. Automatic drain-laying devices are acceptable, provided that they can lay the drain according to the requirements stated in this publication.
5. Lay bedding in the groove and pipe on a firm bed that is free of loose soil on the planned grade.
6. Hold plastic tubing in position on grade immediately after installation by careful placement of blinding material.
7. Where lengths of plastic tubing are to be joined, cut the ends square and remove all ragged or burred edges. Use a plastic coupling to
8. secure the ends of the tubing in proper alignment and to prevent the joint from
9. separating during installation.
10. Before work is suspended for the day, blind and backfill all drains laid in trenches.
11. Close any open ends tightly with an end plug. Use continuous pipe when in areas closer than 30 meters of trees.
12. Any stretch that occurs during installation of pipe will decrease its strength somewhat and may pull perforations open wider than is desirable. The amount of stretch that occurs during installation depends on the temperature of the tubing at the time it is installed, the amount and duration of drag that occurs when the Pipe is fed through the installation equipment, and the stretch resistance of the tubing. The drainage pipe should not be stretched so much that its stiffness is reduced to less than the minimum allowable pipe stiffness. Stretch, which is expressed as a percentage increase of length, should not exceed 5 percent.

Inspection of materials

The contractor should inspect construction materials before and during installation. All materials should be satisfactory for the intended use and should meet the requirements described in the Materials section of this publication, and any additional requirements of the contract. Reject any defective or damaged drain pipe; remove defective or damaged sections of plastic pipe. Make sure that the perforations in the plastic drainage pipe are of the proper size.

Storage of materials

Drainage materials should be protected from damage during handling and storage. The storage area should be dry, well drained, and free of rodents, vegetation, and fire hazards.

Take more precautions to protect plastic tubing. Where rodents could be a problem, we recommend that you use end caps. Since pipe can be harmed by excessive exposure to ultraviolet rays, protect it from sunlight when it is to be stored outside for a long period.

TRENCH AND EXCAVATION SAFETY MANAGEMENT

Collapse :-

Excavation sides can be protected by battering the sides to a safe angle, supporting them with shattering and sheeting, the use of trench boxes or hydraulic support systems.

People falling in :-

Substantial barriers (guardrail, intermediate rail, toe board), warning tape and signs should be provided where there is a risk of persons falling.

Materials falling in :-

Excavated soil, materials and effluent should be placed at a safe distance from the excavations as the extra weight can contribute to a collapse.

Vehicles on the rim :-

Stop-blocks should be placed about 1.5 metres from an excavation to prevent vehicles falling or surcharging (collapse due to weight pressure).

Service line risks :-

Electrical cables, water piping, telecom lines, manholes and other services must be located. Safe digging practice must be used, including metal detection.

Hazardous atmospheres :-

Noxious or flammable gases could occur naturally in an excavation, Methane is odourless but could cause severe cramps on inhalation. Stop the work if cramps occur.

Undermining adjacent structures :-

If there is any doubt that an excavation could undermine an adjacent structure, an engineer should be consulted prior to starting work.

MORE TRENCH SAFETY MEASURES

- The sides of the trench should be more than 15 degrees from vertical
- Bench or batter the sides.
- Excavator operators must be supervised.
- Supervisors must have the authority and means to prevent workers from entering the trench.
- Responsibilities for inspection of excavation must be clearly designated.
- A work permit system must be fully applied.
- Risk assessment for excavation must be extensive, including soil conditions, equipment and experience.
- Workers must be trained on their jobs and on the risks.
- Competency of plant operators must be assessed and permitted.
- Regular inspections and audits must include compliance to excavation laws and all aspects of operational procedures.
- Managerial and disciplinary procedures must be consistent.
- When new risks are identified, work must not proceed until a review of the risk assessment is completed by specialists, and the recommended measures are taken.

TRENCH WORK LAWS

OHS Act , 8 (2)(b) Employers must take steps to eliminate hazards. Section 14 on General Duties of Employees at work; Every employee has a duty to (a) take reasonable care of themselves, (c) obey health and safety rules. Construction Regulations; CR 7 Risk assessment; (4) ensure that employees are informed, instructed and trained by a competent person regarding hazards and related work procedures.



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Notes & Reference drawings

No.	Description	
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Project :

**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**

Drawing description

GENERAL NOTES

Scale	NTS	Date	02/11/2018
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ENVELOPE MATERIAL NOTES :

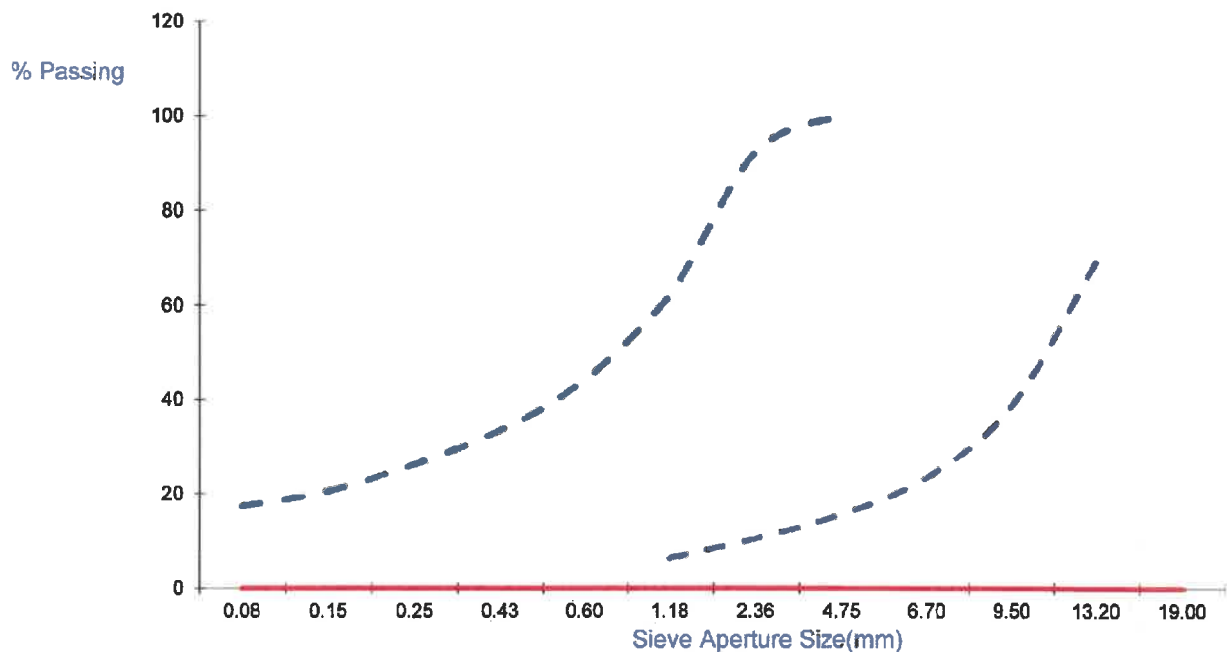
The following envelope criteria is to be used in conjunction with the perforated subsurface pipes to improve the internal drainage of the soil.

Requirements that should be satisfied for the selected envelope material as tabled below.

Regular random filtermaterial samples to be analysed and results be submitted to the Engineer for approval thereof.

Requirement	Criteria
1	$\frac{D_{15} \text{ sand filter}}{D_{65} \text{ soil material}} \leq 5$
2	$\frac{D_{60} \text{ soil material}}{D_{10} \text{ soil material}} < 20$
3	$\frac{D_{15} \text{ sand filter}}{D_{15} \text{ soil material}} \geq 5$
4	$\frac{D_{50} \text{ sand filter}}{D_{50} \text{ soil material}} < 5$

Particle Size Grading vs. Acceptable Upper & Lower Limits



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Nov 2016 *JM Van Der Merwe*

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Project :

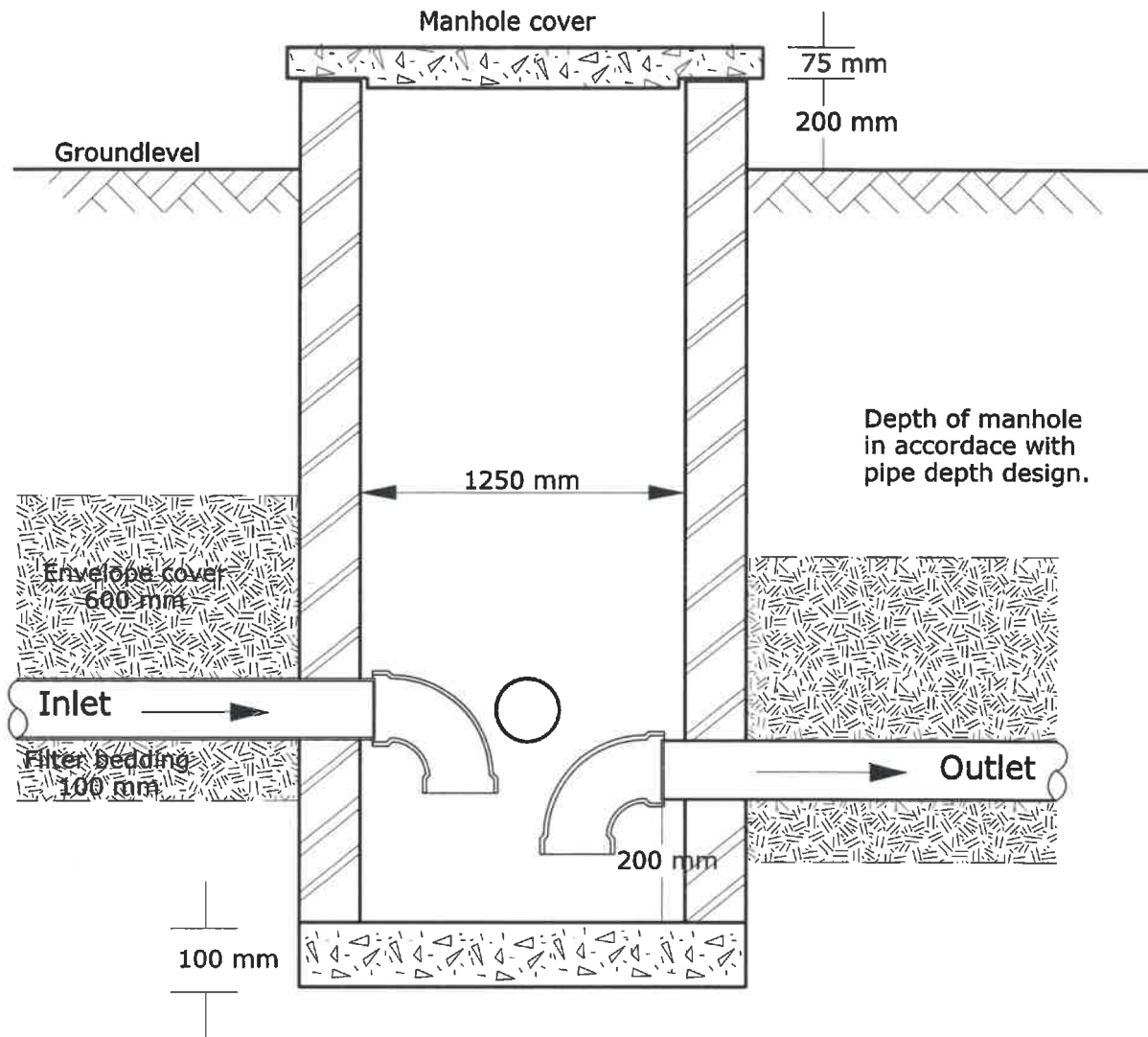
**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**

Drawing description

ENVELOPE NOTES

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Manhole detail
(not to scale)

Check the slope and depth of the pipe at regular intervals. Due to the extent and nature of these works, regular intermediate inspections needs to be arranged. No excavation should be backfilled without the verification and inspection of the required filtermaterial cover by the Resident project Engineer. Regular maintenance should be done on the system after installation completion. Written consent is required from the authority / land user concerned to authorise you to lay the pipeline(s) within arable lands , infield roads, canals or other fixed structures.



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Project :

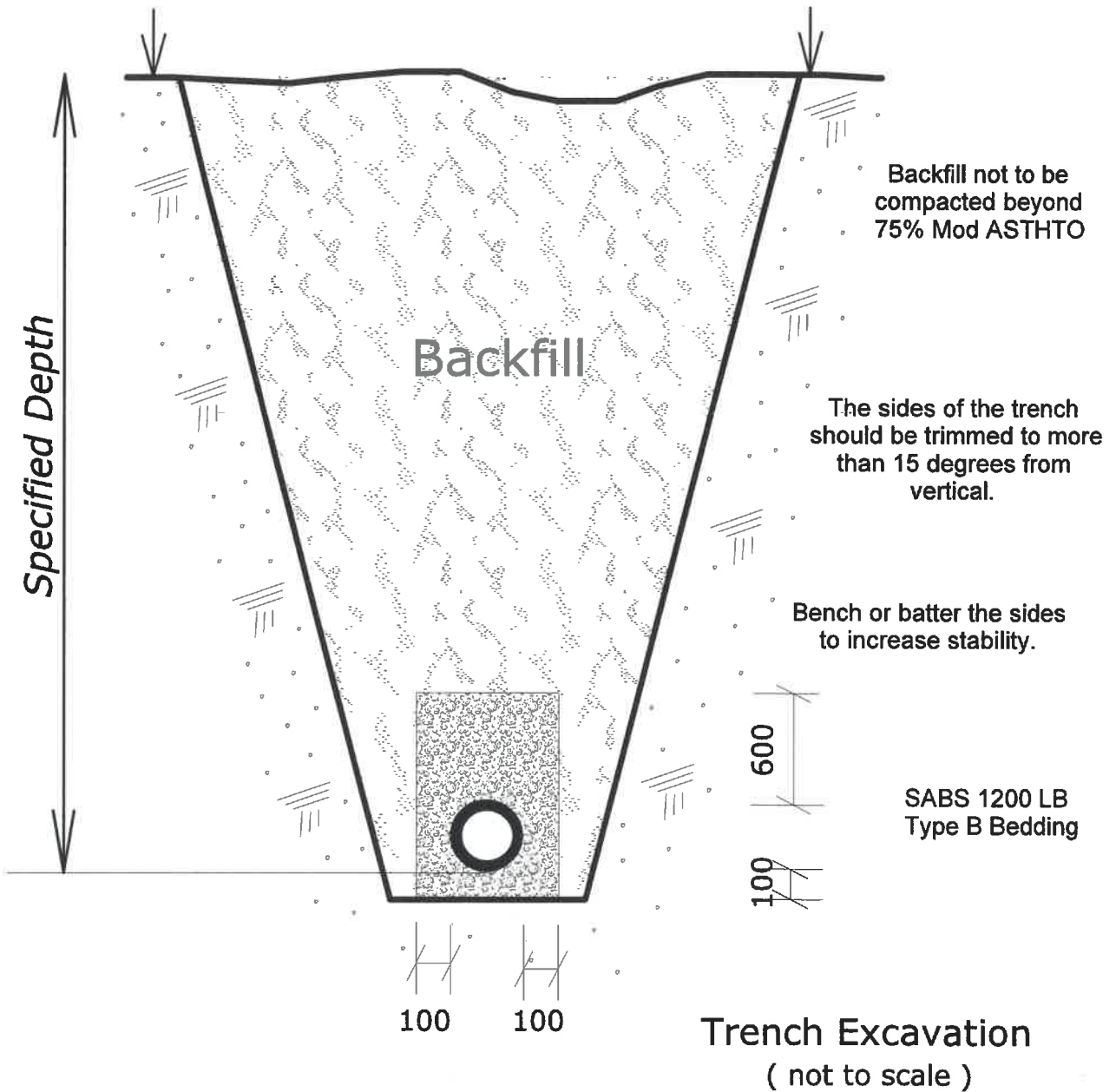
**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**

Drawing description

MANHOLE DETAIL

Scale **NTS** Date **02/11/2018**

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Project :

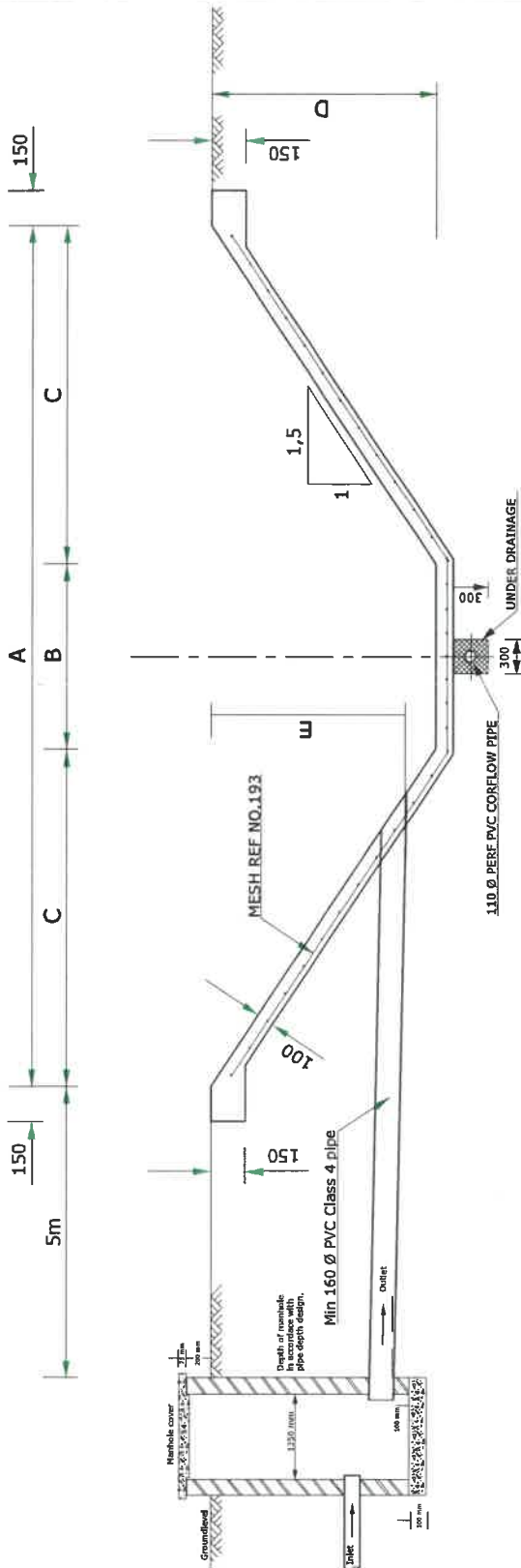
**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**

Drawing description

EXCAVATION DETAIL

Scale: **NTS** Date: **02/11/2018**

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(SEE TABLE 1)

TYPICAL CROSS SECTION OF DRAINAGE CANAL

DRAINAGE CANAL NOTES :

1. ONE PAIR OF WEEP HOLES SHALL BE PROVIDED AT EACH PANEL OF THE DRAINAGE CANAL.
2. INDIVIDUAL PANEL WIDTH 2,5 METER.
3. INSITU CASTED CONCRETE CLASS 25/19. 300kg SM/m³
4. BACKFILL SHALL BE COMPACTED TO A DENSITY OF 95% PROCTOR, MOISTURE CONTENT WITHIN +1% AND -3% OF THE OPTIMUM SHALL BE MAINTAINED DURING CONSTRUCTION.
5. WELDED STEEL MESH REF.193 (ACCORDING TO SABS 1024/74) MINIMUM COVER 40mm.
6. LAP LENGTH = 40 x DIA. UNLESS OTHERWISE INDICATED.



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Project :

**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**

Drawing description

**EXISTING CANAL
JUNCTION DETAIL**

Scale

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Subsurface drainage caution Notes :

Construction to commence when the watertable is deep.

Start the excavation from the outlet onwards.

Litmit the width of the trench to reduce excavation cost.

Avoid over excavation as this then has to be re-filled with filter material and not insitu material.

Avoid compacting of the trench invert as this reduces the permeability of the subsoil.

Depth is measured from the soil surface to the bottom of the drainage pipe.

Prevent fine-grained soil particles from entering drain.

Filtermaterial to conform to the prescribed spesification.

Place the course filtersand at least 100mm around the pipe.

Regular random samples will be analysed by the Department of Agriculture for approval thereof.

Check The slope and depth of the pipe at regular intervals.

Due to the extent and nature of these works, regular intermediate inspections needs to be arranged.

Department of Agriculture should be informed of the work progress on a weekly basis.

Regular maintenance should be done on the system after installation completion.

After installation 2 ton gypsum per hectare should be applied to the land.

General Notes

- Contractors to verify all levels, heights and site dimensions and to check same against drawings before putting any work in hand
- Any discrepancies to be reported to the Engineer immediately for clarification
- This drawing is not to be scaled - figured dimensions to be used at all times
- All work to be carried out in strict accordance with local authorities requirements, National Building Regs and relevant SABS standard
- This drawing is to be read in conjunction with all relevant consultants drawings, details and specifications or schedules as applicable
- Only the latest revision is to be used
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CONSTRUCTION NOTES

Excavation of trenches

A recommended alignment and grade of trench is established by the engineer in charge of the project.

The width of the trench should be kept to a minimum allowing just sufficient working area for jointing and initial compaction around the pipe.

For most purposes a trench 300mm wider than the diameter of the pipe allows enough room for jointing.

It is important that the trench is not opened too far in advance of the pipe laying operation. Pipes must be partly backfilled immediately after laying.

Trench preparation

The trench bed must be free from all stone or hard projections which are likely to cause damage to the pipe.

The bottom of the trench should be backfilled to a depth of 100mm, with suitable filter material such as free drainage coarse sand.

The bedding should be carefully placed to produce a level uniform bed onto which the pipe is directly laid.

Pipe laying

The pipeline must be laid directly on the prepared bedding in the trench and any temporary supports, bricks or other foreign hard bodies must be removed.

Perforated pipe should be placed with the majority of the slotted openings facing down.

Backfilling

It is essential that PVC pressure pipes are backfilled immediately after each pipe is installed, in order to contain the expansion and contraction to each individual pipe length where it is catered for by the socket.

Trenching, bedding and backfilling to be carried out according to SANS 2001:2010 or as specified in the contract documentation

Side-filling and Initial backfilling

Check that the pipe rotation mark is correct to ensure the majority of the openings / perforations facing down.

Selected material (as for bedding) should be placed gently and evenly in uncompacted layers of 100mm in thickness between the sides of the trench and the pipe.

Tamp each layer firmly with a hand tamper until the level of the crown of the pipe is reached, taking care to ensure that no voids are left under the pipe.

Movement of the pipe should be prevented by the simultaneous filling and even compaction of material on either side of the pipe.

Filter material should be placed in even and uncompacted layers of 150mm in thickness over the entire width of the trench to a height of 600mm above the crown of the pipe.

Main backfill

The remainder of the trench should be filled in layers of 300mm thickness and excavated trench material can be used.

Each layer must be firmly tamped, the first layer by hand and subsequent layers by mechanical means if so desired.

Refer to SANS 2001 DP2: 2010.



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Project :

**MAKATHINI BLOCK 15
SUBSURFACE DRAINAGE**

Drawing description

**CONSTRUCTION
GUIDELINES**

Scale

NTS

Date

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