Numbers Sheet Name	Numbers Table Name	Excel Worksheet Name
Annex Cover XXX Village		
	Table 1	Annex Cover XXX Village
Sched1 P&G		
	Table 1	Sched1 P&G
Sched2 Site Clearance		
	Table 1	Sched2 Site Clearance
Sched3 Wat Earthworks		
	Table 1	Sched3 Wat Earthworks
Sched4 Wat Pipeworks		
	Table 1	Sched4 Wat Pipeworks
Summary		
	Table 1	Summary
Flexible		
	Table 1	Flexible
Flexible (2)		
	Table 1	Flexible (2)
Flexible Bulk Steel		
	Table 1	Flexible Bulk Steel
Flexible		
	Table 1	Flexible

SCHEDULE 1: PRELIMINARY & GENERAL

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
1	SANS 2001A	**SCHEDULE 1:** PRELIMINARY & GENERAL				
1,1	8,3	**FIXED-CHARGE ITEMS**				
1.1.1	8.3.1	1. Contractual requirements	Sum	1		
	8.3.2	2. Establishment of facilities on the site:				
1.1.2	PSA 8.3.2.2	1) Facilities for the Engineer				
		a. Name Boards	No	1		
		b. Furnished Office(No.2)	Sum	1		
		c. Latrine facilities	Sum	1		
		d. Covered carport	Sum	1		
		e. Survey instruments(1 no)	Sum	1		
	PSA 8.3.2.2	2) Facilities for the Contractor				
		a. Offices and storage sheds	Sum	1		
		b. Workshops	Sum	1		
		c. Ablution and latrine facilities	Sum	1		
		d. Tools and equipment	Sum	1		
		e. Water supplies and electric power and communications	Sum	1		
		f. Security of works	Sum	1		
1.1.3	8.3.3	Other fixed-charge obligations	Sum	1		
1.1.4	8.3.4	Removal of site establishment	Sum	1		
1.1.5		Locating existing services	PC Sum	1	10000,00	10 000,00
1.1.6		Provision for reinstating of existing fences	PC Sum	1	15 000,00	15 000,00

TOTAL CARRIED FORWARD
BROUGHT FORWARD

1,2	8,4	**TIME-RELATED ITEMS**		
1.2.1	8.4.2	Operation and maintenance of facilities on site for the duration of construction		
1.2.1.1	8.4.2.2	2) Facilities for Contractor for construction duration, except where otherwise stated		
		a. Offices and storage sheds	Month	12
		b. Workshops	Month	12
		c. Ablution and latrine facilities	Month	12
		d. Tools and equipment	Month	12
1.2.2	8.4.3	Supervision for the duration of construction	Month	12
1.2.3	8.4.4	Company and head office overhead costs for the duration of the Contract	Month	12

TOTAL CARRIED FORWARD -
BROUGHT FORWARD -

1.2.6	PS7	Allow for compliance with all aspects of the OH&S Spec including: risk assessment; provision of the safety plan; appoir safety officer; safety training (induction) of workforce and notification(s) to the Department of Labour	Month	12		
1.2.7	PS8	Allow for compliance with all aspects of the Environment Management Plan	Month	12		
	PS 12	2) Training of Workers				
		a. Training allowance paid to targeted labour in terms of formal training	PC Sum	1		30 000,00
		b. Overheads, charges and profit on (a) above	%		10%	3 000,00
		c. Transportation and communication of workers for training where it is not possible to undertake the training in close proximity to the site	PC Sum	1		35 000,00
		d. Overheads, charges and profit on (c) above	%		10%	3 500,00

TOTAL CARRIED FORWARD
BROUGHT FORWARD

3) Relocation of services				
a. Relocation of essential services to be done by administering authority if required	PC Sum	1		35 000,00
b. Overheads, charges and profit on (a) above	%		10%	3 500,00
4) Community Liaison Officer				
a. Allow for work done by community liaison officer	Month	12		
b. Overheads, charges and profit on (a) above	%		10%	

TOTAL CARRIED FORWARD
BROUGHT FORWARD

1,4 8,7 **DAY WORKS**

Note: To be executed on instruction of the Engineer only

1. Labour		
a. Skilled	hr	Rate Only
b. Semi-skilled	hr	Rate Only
c. Unskilled	hr	Rate Only
d. Armed guard	Man-days	Rate Only
2. Plant Hire (Work rates on site)		
Tipper trucks		
a. Capacity 6 m3 (small)	hr	Rate Only
b. Capacity 10m3 (medium)	hr	Rate Only
c. Capacity 12m3 (large)	hr	Rate Only
Flat bed trucks		
d. Capacity 3 tonne (small)	hr	Rate Only
e. Capacity 5 tonne (medium)	hr	Rate Only
f. Capacity 10 tonne (large)	hr	Rate Only
3. LDVs		
a. Capacity 1 tonne	km	Rate Only
4. Water tankers		
a. Capacity 6 000 litres (small)	hr	Rate Only
b. Capacity 9 000 litres (medium)	hr	Rate Only
c. Capacity 15 000 litres (large)	hr	Rate Only
5. Excavators		
Crawler excavators		
a. 20 tonne	hr	Rate Only
b. 30 tonne	hr	Rate Only

TOTAL CARRIED FORWARD
BROUGHT FORWARD

6. TLBs Tractor Loader Backhoe a. 2 x 4		
	hr	Rate Only
b. 4 x 4		
	hr	Rate Only
7. Rollers Walk behind vibrating rollers a. Model BW 61 (small)		
	hr	Rate Only
b. Model BW 76 (medium)		
	hr	Rate Only
c. Model BW 90 (large)		
	hr	Rate Only
8. Compactors		
	hr	Rate Only
9. Compressors Portable diesel compressors a. Small		
	hr	Rate Only
b. Medium		
	hr	Rate Only
c. Large		
	hr	Rate Only
10. Water pumps Portable water pumps a. Small		
	hr	Rate Only
b. Medium		
	hr	Rate Only
c. Large		
	hr	Rate Only

TOTAL CARRIED FORWARD TO SUMMARY
BROUGHT FORWARD

a. 2 x 4		
	hr	Rate Only
b. 4 x 4		
	hr	Rate Only
7. Rollers		
Walk behind vibrating rollers		
a. Model BW 61 (small)		
	hr	Rate Only
b. Model BW 76 (medium)		
	hr	Rate Only
c. Model BW 90 (large)		
	hr	Rate Only
8. Compactors		
	hr	Rate Only
9. Compressors		
Portable diesel compressors		
a. Small		
	hr	Rate Only
b. Medium		
	hr	Rate Only
c. Large		
	hr	Rate Only
10. Water pumps		
Portable water pumps		
a. Small		
	hr	Rate Only
b. Medium		
	hr	Rate Only
c. Large		
	hr	Rate Only

TOTAL CARRIED FORWARD TO SUMMARY

-

SCHEDULE 2: SITE CLEARANCE

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
2	SANS PSC 2001 C	**SCHEDULE 2:** SITE CLEARANCE				
2,1	8.2.1	Clear and grub 1.0m wide street strip for pipe in road reserve.	m	0		
2,2	8.2.2	Remove and grub large trees, and tree stumps of girth:				
		a. Over 1m and up to and including 2m	No	5		
		b. Over 2m and up to and including 3m	No	5		

TOTAL CARRIED FORWARD TO SUMMARY -

SCHEDULE 3: WATER SUPPLY - EARTHWORKS

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
3	SANS	**SCHEDULE 3: WATER SUPPLY - EARTHWORKS**				
3,1	2001DB	**EXCAVATIONS**				
	PSDB 8.3.2	Excavate in all materials for trenches, backfill, compact for trenches, and dispose of excess material				
		a) For base width up to 1000mm, Excavation depth over and up to:				
		1) 0.0 m to 1.5 m	m	0		
		2) 1.5 m to 2 m	m	0	94,90	Rate only
3,2	8.3.2	Extra-over items 3.1 for				
		1. Intermediate excavation	m³	0		
		2. Hard rock excavation	m³	0		
3,3	8.3.2	Excavate and dispose of unsuitable material from trench bottom (Provisional)	m³	0		
3,4	8.3.3	**EXCAVATION ANCILLARIES**				
3,5	8.3.3.3	Compaction in road reserves	m³	2 560		
3,6	8.3.5	Existing services that intersect or adjoin a pipe trench				
		a. Services that intersect a trench	No.	90		
		b. Services that adjoin a trench	m	3 200		
	SANS 2001LB	**BEDDING**				
3,7	8.2.1	Provision of bedding from trench excavation				
		a. Selected granular	m³	0		
		b. Selected fill	m³	0		
3,8	8.2.2	Provision of bedding from commercial source				
		a. Selected granular	m³	0		Rate only
		b. Selected fill	m³	0		Rate only
3,9	8.2.4	Encasing of pipes in concrete (20MPa)	m³	18		0,00

TOTAL CARRIED FORWARD TO SUMMARY -

SCHEDULE 4: WATER SUPPLY - PIPEWORKS

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
4	SANS	**SCHEDULE 4: WATER SUPPLY - PIPEWORKS**				
4,1	2001L	**PIPES**				
4.1.1	8.2.1a	Supply, handle, lay, bed in flexible pipe bedding and test uPVC class 9 pipes complete with spigot and socket joints to				
		1. 63 mm diameter	m	16 357		
		2. 75 mm diameter	m	4 041		
		3. 90 mm diameter	m	1 500		
		4. 110 mm diameter	m	2 190		
4,2	8.2.2	**SPECIALS AND FITTINGS**				
		Extra-over item 4.1 for supplying, handling, laying, bedding, jointing and testing of the following fittings				
4.2.1		**Bends**				
		11.25 degree bends				
		1. 63 mm diameter	No	115		
		2. 75 mm diameter	No	12		
		3. 90 mm diameter	No	18		
		4. 110 mm diameter	No	9		
		22.5 degree bends				
		1. 63 mm diameter	No	63		
		2. 75 mm diameter	No	8		
		3. 90 mm diameter	No	17		
		4. 110 mm diameter	No	9		
		45 degree bends				
		1. 63 mm diameter	No	48		
		2. 75 mm diameter	No	7		
		3. 90 mm diameter	No	11		
		4. 110 mm diameter	No	16		

TOTAL CARRIED FORWARD				-
BROUGHT FORWARD				-
	90 degree bends			
	1. 63 mm diameter	No	126	
	2. 75 mm diameter	No	8	
	3. 90 mm diameter	No	6	
	4. 110 mm diameter	No	4	
4.2.2	**Cast Iron Tees**			
	1. 75 X 63 mm diameter	No	3	
	2. 90 X 63 mm diameter	No	42	
	3. 110 X 63 mm diameter	No	19	
	4. 110 X 75 mm diameter	No	1	
	5. 110 X 90 mm diameter	No	3	
4.2.3	**Cast Iron Equal Tees**			
	1. 63 mm diameter	No	64	
	2. 75 mm diameter	No	4	
	3. 90 mm diameter	No	11	
4.2.4	**Flange adaptors**			
	1. 63 mm diameter	No	11	
	2. 75 mm diameter	No	2	
	3. 90 mm diameter	No	3	
	4. 110 mm diameter	No	1	
4.2.5	**Reducers**			
	1. 75 X 63 mm diameter	No	4	
	2. 90 X 63 mm diameter	No	14	
	3. 90 X 75 mm diameter	No	1	
	4. 110 X 63 mm diameter	No	5	
	5. 110 X 75 mm diameter	No	1	

TOTAL CARRIED FORWARD				-
BROUGHT FORWARD				

		6. 110 X 90 mm diameter	No	2
4.2.6		**Cast Iron End Caps**		
		1. 63 mm diameter	No	22
4,3	PSL3.10	**Isolating valves**		
	PSL 3.10.2	Extra-over item 4.1 for the supplying, installing cutting in and testing flanged Class 12 clockwise closing non rising spindle resilient seal gate valves , as per drawing.		
		1. 63 mm diameter	No	4
		2. 75 mm diameter	No	1
		3. 90 mm diameter	No	1
		4. 110 mm diameter	No	6
4,4	PSL3.10	**Water Meter**		
		Kent Helix H4000 woltmann-type flanged water meter or similar approved as per drawing , for pipe diameters:		
		1. 63 mm diameter	No	3
		2. 75 mm diameter	No	1
		3. 90 mm diameter	No	1
		4. 110 mm diameter	No	6
4,5	PSL5.6	**CHAMBERS**		
		Construct valve chambers complete with step irons, cover and frames, as per drawing	No.	22
		4. Backfill chambers using selected fill	m³	150
4,6		**SUNDRIES**		
4.6.1	8.2.11	Thrust blocks and pedastals class 25/19 concrete, as per drawing	m³	18,0
4,7		Pipe Markers Supply and install precast concrete pipeline markers, as per drawing	No	17

TOTAL CARRIED FORWARD TO SUMMARY -

Volume 1
Pricing Data

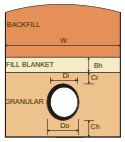
SUMMARY OF BILL OF QUANTITIES

SCHEDULE	**DESCRIPTION**	**AMOUNT (R)**	
SCHEDULE 1:	PRELIMINARY AND GENERAL	R	-
SCHEDULE 2:	SITE CLEARANCE	R	-
SCHEDULE 3:	WATER - EARTHWORKS	R	-
SCHEDULE4:	WATER SUPPLY - PIPEWORKS	R	-
Subtotal 2		**R**	**-**
Contingencies (10%)		R	-
Sub-total 3		**R**	**-**
VAT		R	-
TOTAL		**R**	**-**

Bedding volume calculation

110 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,075	m
Inside diam, Di =	0,071	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,275	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,675	m
Fill Blanket area, Ba =	**0,135**	m²
Granular area, Ca =	**0,101**	m²



Bedding volume calculation

160 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,160	m
Inside diam, Di =	0,154	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,360	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,760	m
Fill Blanket area, Ba =	**0,152**	m²
Granular area, Ca =	**0,253**	m²

Bedding volume calculation

200 Diam Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,200	m
Inside diam, Di =	0,192	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,400	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,800	m
Fill Blanket area, Ba =	**0,160**	m²
Granular area, Ca =	**0,289**	m²

Bedding volume calculation

250 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,250	m
Inside diam, Di =	0,240	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,450	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,850	m
Fill Blanket area, Ba =	**0,170**	m²
Granular area, Ca =	**0,333**	m²

Bedding volume calculation

315 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,315	m
Inside diam, Di =	0,303	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,515	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,915	m
Fill Blanket area, Ba =	**0,183**	m²
Granular area, Ca =	**0,393**	m²

Bedding volume calculation

355 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,355	m
Inside diam, Di =	0,341	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,555	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,955	m
Fill Blanket area, Ba =	**0,191**	m²
Granular area, Ca =	**0,431**	m²

Bedding volume calculation

400 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,400	m
Inside diam, Di =	0,384	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,600	m
Fill Blanket height, Bh =	0,200	m
Width, W =	1,000	m
Fill Blanket area, Ba =	**0,200**	m²
Granular area, Ca =	**0,474**	m²

Excavation Volume to Pipe Invert

Pipe diameter	Length	Ave depth	Width	Volume	Total Volume
mm	m	m	m	m³	m³
75	3 201,81	1,075	0,68	2 323	**2871,81**
90	0,00	1,090	0,68	0	**0,00**
110	1 843,26	1,110	0,68	1 381	**1508,22**
160	0,00	1,160	0,76	0	**0,00**
200	0,00	1,200	0,76	0	**0,00**
250	0,00	1,250	0,80	0	**0,00**
200	0,00	1,200	0,80	0	**0,00**
200	0,00	1,200	0,80	0	**0,00**
250	0,00	1,250	0,85	0	**0,00**
250	0,00	1,250	0,85	0	**0,00**
315	0,00	1,315	0,92	0	**0,00**
Sub-Totals	5 045			3 704	**4 260**
site clearance=	5 045				

Excavation Volume of Trench Bottom

Pipe diameter	Length	Ave depth	Width	Volume	Total Volume
mm	m	m	m	m³	m³
75	3 201,81	0,100	0,68	216	**240**
90	0,00	0,100	0,68	0	**0**
110	1 843,26	0,100	0,68	124	**143**
160	0,00	0,100	0,76	0	**0**
200	0,00	0,100	0,76	0	**0**
250	0,00	0,100	0,80	0	**0**
200	0,00	0,100	0,80	0	**0**
200	0,00	0,100	0,80	0	**0**
250	0,00	0,100	0,85	0	**0**
250	0,00	0,100	0,85	0	**0**
315	0,00	0,100	0,92	0	**0**
Sub-Totals	5 045,07			341	**392**

Total Trench Excavation Volume

Excavation Volume to Pipe Invert	**4 260**
Excavation Volume of Trench Bottom	**392**
Total	**4 652**

Provision of Granular & Fill Volume

15,000

Pipe diameter	Length	Granular area	Granular volume	Pipe volume	Total Granular Volume	Fill area	Fill volume	Total Fill Volume
mm	m	m²	m³	m³	m³	m²	m³	m³
75	3 201,81	0,181	667	14	**751**	0,160	512	**589**
90	0,00	0,253	0	0	**0**	0,160	0	**0**
110	1 843,26	0,253	537	18	**598**	0,160	295	**339**
160	0,00	0,253	0	0	**0**	0,160	0	**0**
200	0,00	0,253	0	0	**0**	0,160	0	**0**
250	0,00	0,289	0	0	**0**	0,160	0	**0**
200	0,00	0,289	0	0	**0**	0,160	0	**0**
200	0,00	0,289	0	0	**0**	0,160	0	**0**
250	0,00	0,333	0	0	**0**	0,160	0	**0**
250	0,00	0,333	0	0	**0**	0,160	0	**0**
315	0,00	0,333	0	0	**0**	0,160	0	**0**
Sub-Totals			1 205	32	**1 349**		807	**928**
		%				%		
From trench excavations		65%	783	0	**900**	65%	525	**603**
From borrow pit		0%	0	0	**0**	0%	0	**0**
Imported commercially		35%	422	0	**485**	35%	283	**325**
Totals		1	1 205	0	**1 385**	1	807	**928**

Excavation and Bedding Ancillaries

	%	m³	m³
Intermediate	20%	852	**930**
Hard rock	25%	1 065	**1 225**
% Crushed Stone or Unsuitable Material	25%	98	**113**
Total required backfill			**2 375**
Total available backfill			**944**
Backfill Deficiency			**1 431**
Total Unsuitable Material			**3 127**

Excavation: Linear

930

Linear Measurements

Hand excav:	3201,810	63%	
Soft (m)		3187	
Intermediate (m)		6	
Hard (m)		8	63% 590
macnine	1843,260	**37%**	
Excav			
2-3m		1 843	0,37% 340
3-4m		1 843	37% 340
4-5m		0	0% 0
		3687	137%
Soft (m)		3678	
Intermediate (m)		4	
Hard (m)		5	1270
		8	
	3210		

Excavation: Volumetrics

Volumetric Measurements

Mat'l Type	**%**	**Hand m³**	63%
Soft	55%	1624	
Intermediate	20%	590	3 256
Hard rock	25%	738	
		2952	
Mat'l Type	**%**	**Machine m³**	37%
Soft	55%	935	
Intermediate	20%	340	
Hard rock	25%	425	
Total Hand & Machine		1700	
		4652	

2 426

2 375

170,5

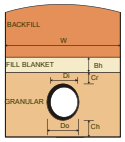
2 426

Z:\Projects\QUALIS CONSULTANTS\PROJECTS\Mogalakwena Local Municipality\Moordkoppie Mini Water Scheme 22\BoQ\BOQ Per villages\Bulkwater Pipeline BOQ - Rev 01.xlsx][E- Med Pipe

Bedding volume calculation

110 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,075	m
Inside diam, Di =	0,071	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,275	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,675	m
Fill Blanket area, Ba =	**0,135**	m²
Granular area, Ca =	**0,101**	m²



Bedding volume calculation

160 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,160	m
Inside diam, Di =	0,154	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,360	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,760	m
Fill Blanket area, Ba =	**0,152**	m²
Granular area, Ca =	**0,253**	m²

Bedding volume calculation

200 Diam Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,200	m
Inside diam, Di =	0,192	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,400	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,800	m
Fill Blanket area, Ba =	**0,160**	m²
Granular area, Ca =	**0,289**	m²

Bedding volume calculation

250 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,250	m
Inside diam, Di =	0,240	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,450	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,850	m
Fill Blanket area, Ba =	**0,170**	m²
Granular area, Ca =	**0,333**	m²

Bedding volume calculation

315 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,315	m
Inside diam, Di =	0,303	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,515	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,915	m
Fill Blanket area, Ba =	**0,183**	m²
Granular area, Ca =	**0,393**	m²

Bedding volume calculation

355 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,355	m
Inside diam, Di =	0,341	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,555	m
Fill Blanket height, Bh =	0,200	m
Width, W =	0,955	m
Fill Blanket area, Ba =	**0,191**	m²
Granular area, Ca =	**0,431**	m²

Bedding volume calculation

400 Diameter Flexible pipe

Project Name		ABC
Project number		**0000**
Outside diam, Do =	0,400	m
Inside diam, Di =	0,384	m
Contingency measurement	15	%
Granular support height, Ch =	0,100	m
Granular roof height, Cr =	0,100	m
Granular total height, Ct =	0,600	m
Fill Blanket height, Bh =	0,200	m
Width, W =	1,000	m
Fill Blanket area, Ba =	**0,200**	m²
Granular area, Ca =	**0,474**	m²

Excavation Volume to Pipe Invert

Pipe diameter	Length	Ave depth	Width	Volume	Total Volume
mm	m	m	m	m³	m³
75	3 201,81	1,075	0,68	2 323	**2671,81**
90	0,00	1,090	0,68	0	**0,00**
110	1 920,00	1,110	0,68	1 439	**1654,34**
160	0,00	1,160	0,76	0	**0,00**
200	0,00	1,200	0,76	0	**0,00**
250	0,00	1,250	0,80	0	**0,00**
200	0,00	1,200	0,80	0	**0,00**
200	0,00	1,200	0,80	0	**0,00**
250	0,00	1,250	0,85	0	**0,00**
250	0,00	1,250	0,85	0	**0,00**
315	0,00	1,315	0,92	0	**0,00**
Sub-Totals	5 122			3 762	**4 326**
site clearance=	5 122				

Excavation Volume of Trench Bottom

Pipe diameter	Length	Ave depth	Width	Volume	Total Volume
mm	m	m	m	m³	m³
75	3 201,81	0,100	0,68	216	**240**
90	0,00	0,100	0,68	0	**0**
110	1 920,00	0,100	0,68	130	**149**
160	0,00	0,100	0,76	0	**0**
200	0,00	0,100	0,76	0	**0**
250	0,00	0,100	0,80	0	**0**
200	0,00	0,100	0,80	0	**0**
200	0,00	0,100	0,80	0	**0**
250	0,00	0,100	0,85	0	**0**
250	0,00	0,100	0,85	0	**0**
315	0,00	0,100	0,92	0	**0**
Sub-Totals	5 121,81			346	**398**

Total Trench Excavation Volume

Excavation Volume to Pipe Invert	**4 326**
Excavation Volume of Trench Bottom	**398**
Total	**4 724**

Provision of Granular & Fill Volume

15,000

Pipe diameter	Length	Granular area	Granular volume	Pipe volume	Total Granular Volume	Fill area	Fill volume	Total Fill Volume
mm	m	m²	m³	m³	m³	m²	m³	m³
75	3 201,81	0,181	667	14	**781**	0,160	512	**589**
90	0,00	0,253	0	0	**0**	0,160	0	**0**
110	1 920,00	0,253	560	18	**623**	0,160	307	**353**
160	0,00	0,253	0	0	**0**	0,160	0	**0**
200	0,00	0,253	0	0	**0**	0,160	0	**0**
250	0,00	0,289	0	0	**0**	0,160	0	**0**
200	0,00	0,289	0	0	**0**	0,160	0	**0**
200	0,00	0,289	0	0	**0**	0,160	0	**0**
250	0,00	0,333	0	0	**0**	0,160	0	**0**
250	0,00	0,333	0	0	**0**	0,160	0	**0**
315	0,00	0,333	0	0	**0**	0,160	0	**0**
Sub-Totals			1 227	32	**1 374**		819	**942**
		%				%		
From trench excavations		65%	798	0	**917**	65%	533	**613**
From borrow pit		0%	0	0	**0**	0%	0	**0**
Imported commercially		35%	429	0	**494**	35%	287	**330**
Totals		1	1 227	0	**1 411**	1	819	**942**

Excavation and Bedding Ancillaries

	%	m³	m³
Intermediate	25%	865	**935**
Hard rock	25%	1 082	**1 244**
% Crushed Stone or Unsuitable Material	25%	99	**114**
Total required backfill			**2 408**
Total available backfill			**935**
Backfill Deficiency			**1 452**
Total Unsuitable Material			**3 177**

Excavation: Linear

930

Linear Measurements

Hand excav:	3201,810	63%	
Soft (m)		3187	
Intermediate (m)		6	
Hard (m)		8	63% 581
machine	1920,000	**37%**	
Pipes			
2-3m		1 920	0,37% 349
3-4m		1 920	37% 349
4-5m		0	0% 0
		3840	137%
Soft (m)		3831	
Intermediate (m)		4	
Hard (m)		5	1279
		9	
	3210		

Excavation: Volumetrics

Volumetric Measurements

Mat'l Type	**%**	**Hand m³**	63%
Soft	55%	1624	
Intermediate	20%	591	3 307
Hard rock	25%	738	
		2953	
Mat'l Type	**%**	**Machine m³**	37%
Soft	55%	974	
Intermediate	20%	354	
Hard rock	25%	443	
Total Hand & Machine		4724	

2 467

2 408

2 467

170,5