SANITATION IS DIGNITY

GUIDELINES FOR ON-SITE SANITATION WITH DIFFICULT TECHNICAL CIRCUMSTANCES

water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

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ABBREVIATIONS

BP	Business Plan
EIA	Environmental Impact Assessment
LOS	Level of service
PSC	Project Steering Committee
APF	Area Planning Forum
IA	Implementing Agent
PA	Project Agent
WSA	Water Service Authority
DWAF	Department of Water Affairs and Forestry

1. Background

This document is aimed at Water Service Authorities, Project Agents and DWAF staff. The aim of the guideline is to inform stakeholders how best to prepare, evaluate or manage sanitation projects where difficult technical considerations, in terms of on-site conditions, are identified. The guideline might be used at any point during the project cycle.

The guideline's goal is to provide advice on how to deal with project applications and project variations where ground conditions are such that non-standard solutions for the latrine structure or sewer pipelines must be adopted. This will then avoid the preparation of unrealistic project or business plan proposals; delays in project implementation; or misunderstandings between stakeholders in the sector.

2. Conditions under which an additional sanitation subsidy can be requested

2.1 Application for the Additional Subsidy

Project agents may make application for an additional budget allocation to deal with difficult ground conditions on a project. The purpose of the additional budget allocation is to ensure that all households can access basic sanitation services (while at the same time protecting the environment) even where the onsite conditions make it difficult to build within the limits of the subsidy. It also recognises that previous planning processes have left many communities behind in areas where it is difficult or costly to provide these services.

2.2 Underlying principle

The underlying principle of the additional budget allocation is that qualifying households should end up no better off, and if possible no worse off, than other non-qualifying households. To this end, the standard MIG capital allocation of R3 850 per on-site toilet structure can be supplemented by up to an additional amount of R 1 600 . This is available on demonstration of difficult technical circumstances that make on site sanitation facilities more expensive, in capital cost terms, than usual.

2.3. Application of the additional budget allocation

This additional budget allocation is solely for the additional capital costs associated with standard designs that have to be adapted for the on-site conditions. Any shortfall in capital and any additional operation and maintenance costs incurred through the adapted designs would have to be met by local resources alone.

3 Classification of Technical Conditions

A broad classification of the difficult technical conditions found in South Africa and the potential technical response from decision-makers is outlined in Table 1 below.

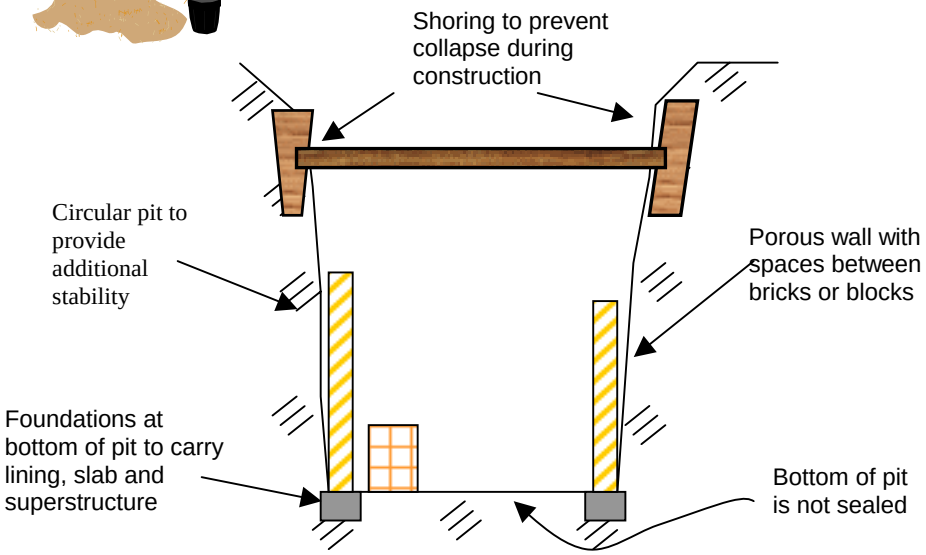
A. Pit Latrines

- **Difficulty with construction**

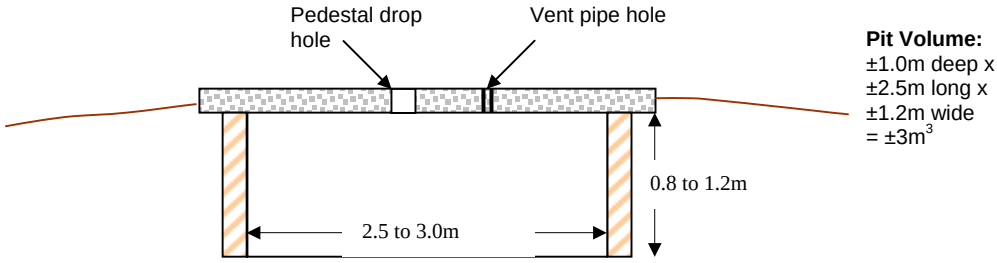
Table 1a: Classification of difficult technical conditions for pit latrines & potential responses

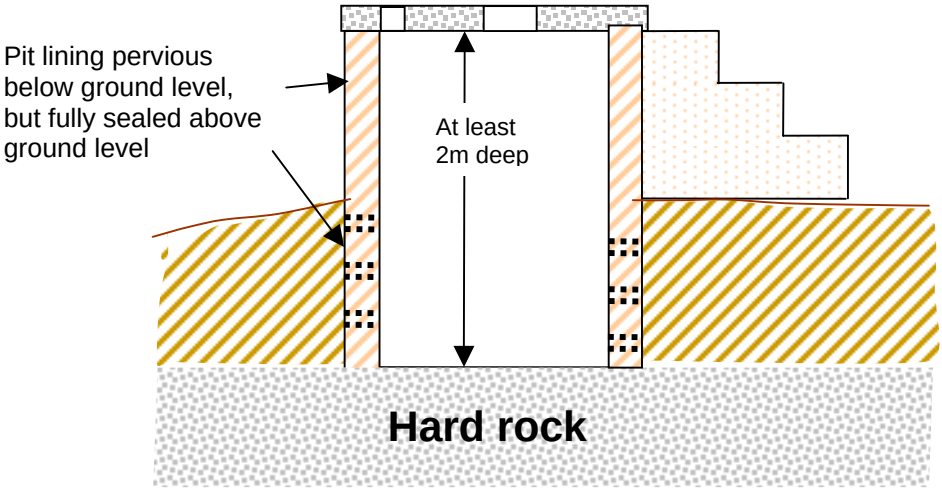
Problem	*Potential Technical Response (one or any combination of)*
Weak or collapsible soils	• Use shoring during digging and lining of the pit • Strengthen the pit lining and include a foundation to the lining such that it can support the superstructure from the base of the pit (note that this does not mean sealing the pit to prevent water seeping into the soil) • Decrease the pit depth but increase the width to keep the same pit volume • Use a circular pit with a lining to provide additional stability and prevent the internal collapse of the sides of the pit

Digging and Lining Pit in Collapsible Soils

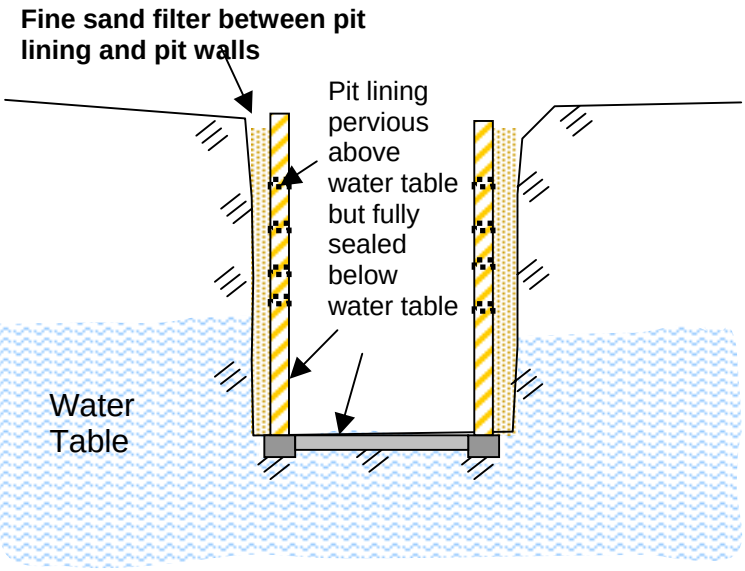


Changing the Dimensions of the Pit



Problem	*Potential Technical Response (one or any combination of)*
Unpick-able ground	• Use power tools (jack hammers) if available • Raise the pit partly above ground with the above ground portion fully lined and sealed • Use a shallow pit in conjunction with: i.) increase the horizontal dimensions of the pit, and/or ii.) use a double chamber,
Raising the pit partly above ground  	
High ground-water table	• Assess the risk of contamination of water sources (e.g. boreholes) and decide on level of protection required. • Use shoring during digging and lining of the pit (and pumping if required) • Seal the bottom part of the pit which will be below the water table • Install a fine sand filter (0.5m thick) on the base and sides of the pit • Raise the pit partly above ground with the above ground portion fully lined and sealed • Use a shallow pit in conjunction with: i.) increase the horizontal dimensions of the pit, and/or ii.) use a double chamber,

Precautions when pit extends below water table



High density small plots (where pits cannot be moved or easily emptied)	• Dig deeper pits (4 to 5m to allow at least 20yr life) • Use shoring during digging and lining of the pit

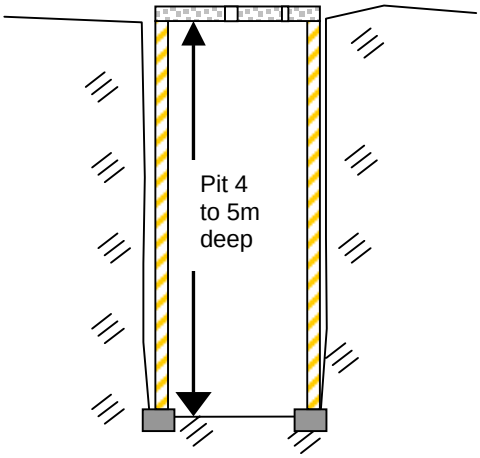
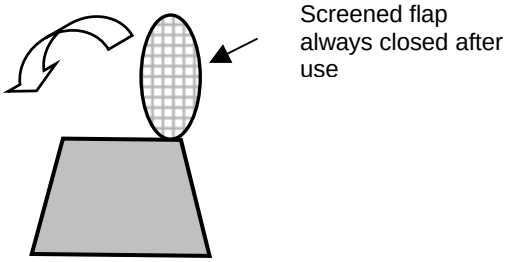


Table 1b: Classification of health risk conditions for pit latrines & potential responses

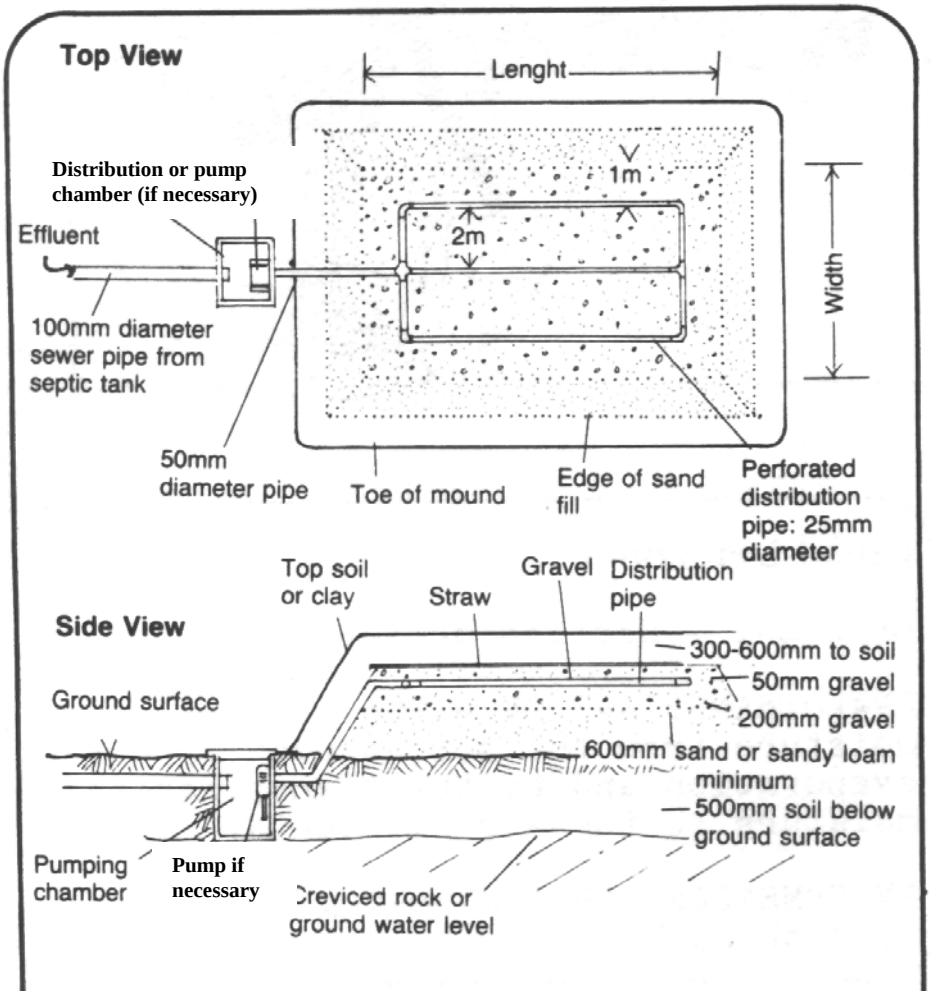
Problem	*Potential Technical Response (one or any combination of)*
Potential pollution of groundwater resources (Use the ground-water protocol procedures)	• Increase path length to groundwater table by shallower pits, raised pits or partially sealed pits as described in table 1a above • Adopt eco-san or off-site sanitation systems (e.g. UDS, composting, or various proprietary products). • Minimise infrastructure close to faults and dykes (i.e. pit latrines, soak-aways, grey water drains, as well as sewer pipelines, waste dumps, etc.) • Move or install new water abstraction points sufficiently far from pollution sources
Potential spread of disease through mosquito vectors when high water table	• Screen all openings to pit o vent pipe o door and window of structure, or o flap cover on pedestal.  **Screened pedestal flap cover**

B. Flush latrines with digesters and soak-ways

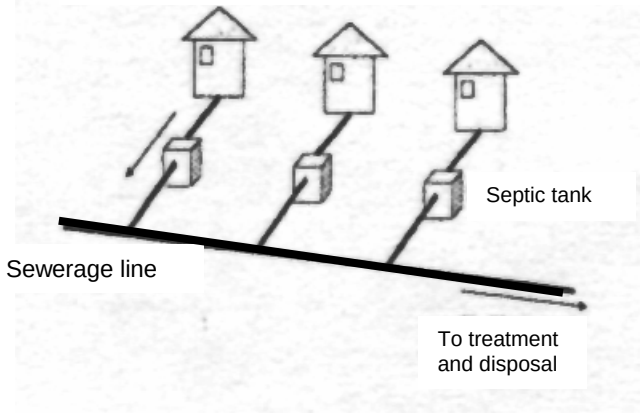
The following options may be adopted in response to specific conditions:

Table 1c: Classification of difficult construction conditions for flush latrines with digesters and soak-aways, & potential responses

Problem	*Potential Technical Response (one or any combination of)*
Weak or collapsible soils	• Use shoring during digging of the digester pit • Slope the ground during digging and construction of the digester, and back-fill when complete • Line the sides of the soak-away pit
Unpick-able ground	• Hire rock-breakers for installing the digester • Install the digester as deep as practicable, and then raise the toilet level so that the flush water can flow by gravity to the digester (either by building the toilet above ground level or by moving it to a higher part of the property). • Construct mound soak-aways



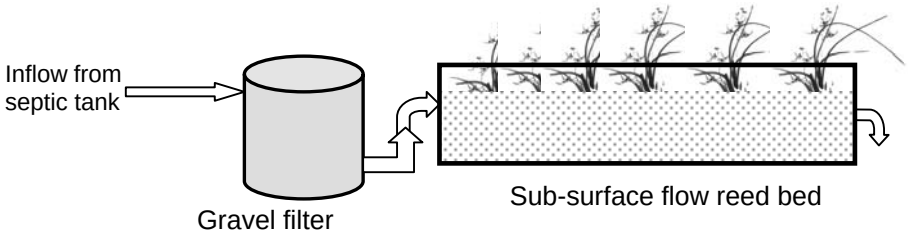
Mound Soak-away System (Water for the World - San 2.C.8)

High ground-water table	• Assess the risk of contamination of water sources (e.g. boreholes) and decide on level of protection required. • Use shoring during digging and lining of the digester pit (and pumping if required) • Install a fine sand filter on the base and sides of the soak-away • Construct mound soak-aways
High density small plots and/or poorly draining soils	• Dig deeper soak-aways • Install solids-free sewer to transport septic tank or digester effluent to a safe disposal site **Solids free sewer system (WRC manual)** 

- **Risk to health and environment**

Table 1d: Classification of health risk conditions for flush latrines with digesters and soak-aways, & potential responses

Problem	*Potential Technical Response*
Potential pollution of groundwater resources (Use of the ground-water protocol procedures)	• Increase path length to groundwater table by shallower soak-aways, or mound soak-aways • Adopt eco-san or off-site sanitation systems • Move or install water abstraction points sufficiently far from pollution sources
Potential spread of disease through surface water contamination and/or mosquito vectors when high water table or impermeable ground causes pooling at the surface	• Install solids-free sewer to transport digester effluent to a safe disposal site and thus avoid the risk of standing water. • Install household level gravel filters with sub-surface flow reed beds, or other small package treatment plants.



Small scale household reed bed treatment system

4. IDENTIFICATION OF PROBLEMS AND DECISION MAKING

Difficult technical problems will usually be identified at the feasibility study stage of a project. However problems may be identified prior to this, for example during the first phase of the ground water protocol study. Or alternatively problem conditions may only be identified later when pits or trenches are actually being dug during the implementation of the project.

Table 2 is a matrix that shows typically by who and when in a project cycle problems may be identified and by whom a decision on the action to be taken and the allocation of the additional budget allocation will be taken.

Table 2 Matrix outlining situations in which problems might be identified

Who may identify the problem	When	Proposal for remedial action by	Decision by
Geohydrologist appointed to undertake the GW Protocol or DWAF Geohydrology	Phase 1 of the GW Protocol	WSA or Implementing Agent	WSA with support from DWAF Regional Office
Implementing agent	Feasibility study, technical report development or Phase 2 of the GW Protocol,	Implementing Agent	WSA
Project Agent	Phase 2 of the GW Protocol, and/or during design or implementation	Project Agent or Implementing Agent	WSA or Implementing agent
Project Steering Committee	Implementation (individual sites)	Project Agent or Implementing Agent	Project Agent or Implementing Agent*

*Note that the Implementing Agent or Project Agent can only make decisions on the allocation of additional budget allocation where a budget amount for addressing individual problems during implementation has already been approved.

5. PROCEDURES TO BE FOLLOWED

When any of the above situations are identified and a request for additional subsidy is to be made, the attached application form must be completed and submitted to the responsible authority (WSA). Preferably this should be done at the time of the feasibility study or the technical report, and thus the additional budget allocation can be budgeted for in the technical report. Where difficult ground conditions are only discovered following approval of the technical report, the attached form should be submitted with a request to use part of the contingency for the additional subsidy. Where the contingency is insufficient, the form must be submitted with a request for a variation order on the project.

Clearly, it would be advantageous for a precise set of criteria to be developed against which all requests for additional funds could be evaluated. However, the variety of situations identified in Tables 1 and 2 do not lend themselves to this approach. Instead, Table 3 outlines some of the more common situations anticipated and how it is expected that they would be dealt with.

There will still be a few circumstances where the case for the additional subsidy is far from clear. These will need to be dealt with through discussion between the Implementing Agent and the responsible authority (Water Services Authorities).

Table 3 Typical Procedure and Response to Difficult Ground Conditions (on-site sanitation)

Situation	Option	Procedure	Typical Response
1. Weak or collapsible soils			
Identified as general or isolated condition prior to project implementation	Propose optimum solution in technical report and design stage (structurally sound pit lining)	Include in technical report and budget for additional budget allocation	Increase budget by R150 to R200 per affected household.
Identified as isolated conditions during implementation	Strengthen pit lining to take full weight of slab and superstructure	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R150/latrine may be granted from contingency.
	Decrease pit depth but increase width	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R200/latrine may be granted from contingency.
	Use circular pits with suitable lining to prevent internal collapse	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing subsidy.
	Use Eco-san option	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R350/latrine may be granted from

Situation	Option	Procedure	Typical Response
			contingency.
2. Unpickable ground			
Identified as general or isolated condition prior to project implementation	Propose optimum solution in technical report and design stage (raised pits or shallow, wide pits)	Include in technical report and budget for additional budget allocation	Increase budget allocation by R200 to R300 per household.
Identified as isolated conditions during implementation	Raise the pit partly above ground with the above ground portion fully lined and sealed	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R250/latrine may be granted from contingency.
	Decrease pit depth but increase width (as double pit if required)	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R250/latrine may be granted from contingency.
	Use Eco-san option	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R350/latrine may be granted from contingency.
3. High Groundwater Table			
Identified as general or isolated condition prior to project implementation	Propose optimum solution in business plan and design stage (e.g. seal bottom of pit + add sand filter)	Include in technical report and budget for additional budget allocation	Increase budget by R200 to R300 per household.
Identified as isolated conditions during implementation	Seal the bottom part of the pit which will be below the water table	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R200/latrine may be granted from contingency.
	Install a fine sand filter on the base and sides of the pit	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R150/latrine may be granted from contingency.
	Raise the pit partly above ground with the above ground portion fully lined and sealed	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R200/latrine may be granted from contingency.
	Use Eco-san option	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R350/latrine may be granted from

Situation	Option	Procedure	Typical Response
			contingency.
4. High density small plots (where pits cannot be moved or emptied)			
Identified as general or isolated condition prior to project implementation	Propose optimum solution in technical report and design stage (e.g. eco-san or deep pit)	Include in technical report and budget for additional budget allocation	Increase budget allocation by R200 to R300 per household.
Identified as isolated conditions during implementation	Dig deeper pits (4 to 5m to allow at least 20yr life)	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R250/latrine may be granted from contingency.
	Use Eco-san option	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R350/latrine may be granted from contingency.
5. Potential pollution of groundwater resources			
Identified as general or isolated condition prior to project implementation	Propose optimum solution in technical report and design stage (e.g seal bottom of pit and add sand filter)	Include in technical report and budget for additional budget allocation	Increase budget by R200 to R300 per household.
	Move or install water abstraction points sufficiently far from pollution sources	IA or PA submits application form to WSA/DWAF	A single grant that covers the cost of moving the borehole may be granted
Identified as isolated conditions during implementation	Increase path length to groundwater table by shallower pits, raised pits or partially sealed pits as described in options for high water table above	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R300/latrine may be granted from contingency.
	Use Eco-san option	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R350/latrine may be granted from contingency.
	Move or install water abstraction points sufficiently far from pollution sources	IA or PA submits application form to WSA/DWAF	A single grant that covers the cost of moving the borehole may be granted
6. Potential spread of disease through mosquito vectors			
Identified as general or isolated condition prior to project implementation	Propose optimum solution in technical report and design stage (e.g. screen all openings and prevent	Include in technical report and budget for additional budget allocation	Increase budget by R100 to R200 per household.

Situation	Option	Procedure	Typical Response
	pooling)		
Identified as isolated conditions during implementation	Screen all openings to pit and prevent pooling of waste water with appropriate drains	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R200/latrine may be granted from contingency.
7. Potential spread of disease through surface water contamination			
Identified as general or isolated condition prior to project implementation	Propose optimum solution in technical report and design stage (e.g. disposal system for wastewater and pit seepage)	Include in technical report and budget for additional budget allocation	Increase budget by R500 to R600 per household.
Identified as isolated conditions during implementation	Install household level soak trench or reed bed treatment system	Householder submits request to PSC (form B), and after approval PSC submits to PA or IA.	Costs to be covered within existing budget, or up to R200/latrine may be granted from contingency.

Note that additional budget allocations apply where the basic sanitation option has been selected. For higher levels of service, difficult ground conditions may be experienced in terms of the laying of sewer pipelines the following .

Table 4 Typical Procedure and Response to Difficult Ground Conditions (off-site sanitation)

Situation	Option	Procedure	Typical Response
1. Very flat terrain – pipelines must be buried deeper than normal or larger diameter pipes must be used			
Pipeline buried deep in normal ground (pickable)	Additional labour costs	Include in technical report and budget for additional budget allocation	Increase budget by R20 to R30 per meter where pipeline is deeper than 2m.
Pipeline buried deep in hard ground (un-pickable)	Use of machinery for digging	Include in technical report and budget for additional budget allocation	Increase budget by R40 to R50 per meter where pipeline is deeper than 2m.
Greater pipe diameter to allow flatter slopes	Purchase larger diameter pipes	Include in technical report and budget for additional budget allocation	Increase budget by R10 to R30 per meter where pipeline is larger than normal requirement.
2. Very hilly terrain – pipelines must be fitted with additional manholes			
Install additional manholes at changes in direction and slope	Install additional manholes	Include in technical report and budget for additional budget allocation	Increase budget by R10 to R25 per meter.

APPENDIX A

APPLICATION FORM FOR ADDITIONAL SANITATION SUBSIDY FOR DIFFICULT GROUND CONDITIONS

REQUEST TO WSA

Name of project and/or community:				
Local Municipality				
District Municipality or WSA				
Status of project:				
IA (if already appointed)				
PA (if already appointed)				
Specific conditions for which additional subsidy is requested	(Attach report)			
How additional subsidy amount was estimated				
Number of households affected				
Additional subsidy requested	per household		Total	
Request submitted by	Name		Organisation	
	Date		Signature	
Contact details	Postal address		Fax	
	email		telephone	
Approval	Request not approved		Request approved but with lower subsidy of:	
	Request approved		Other:	
	Name		Organisation	
	Date		Signature	

APPENDIX B

APPLICATION FORM FOR ADDITIONAL SANITATION SUBSIDY FOR DIFFICULT GROUND CONDITIONS

HOUSEHOLD REQUEST TO SANITATION COMMITTEE

Household				
Owner				
Conditions for which additional subsidy is requested				
Additional subsidy requested	labour materials builder		Total	
Request submitted by	Name			
	Date		Signature	
Approval	Request not approved		Request approved but with lower subsidy of:	
	Request approved		Other:	
	Name		Position	
	Date		Signature	

FOR MORE INFORMATION

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	Fax:	(018) 392 2998
KwaZulu-Natal	Tel:	(031) 336 2700
	Fax:	(031) 307 7279
Western Cape	Tel:	(021) 950 7100
	Fax:	(021) 946 3666
Eastern Cape	Tel:	(043) 604 5400
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