

APPENDIX I

GENERAL CONDITIONS

1. The responsibility of complying with the provisions of the licence is vested in the licensee and may not be ceded to any other person or body.
2. The licence is subject to sections 43, 45 and 54 of the Act.
3. In terms of section 151 of the Act, any contravention of or failure to comply with any condition of the licence, constitutes an offence.
4. In terms of section 124 of the Act, the Minister and any person authorised by him in writing may at any time enter upon the premises of the licensee to perform the functions contemplated in section 125(1), (2) and (3) of the Act.
5. The licence shall not be construed to be exempting the licensee from compliance with the provisions of the Health Act, 1977 (Act 63 of 1977), the Environment Conservation Act, 1989 (Act 73 of 1989) or any other applicable Act, Ordinance, Regulation or By-law.
6. In terms of section 148(1)(f) of the Act any person who has timeously lodged a written objection against the application for this licence may appeal to the Water Tribunal and the Tribunal may confirm, amend or withdraw the licence or make any other order as it deems appropriate.
7. Any incident that causes or may cause water pollution shall immediately be reported to the Regional Director or his representative.
8. The licensee shall immediately inform the Regional Director of any change of name, address, premises and/or legal status.
9. The availability of the allocated quantity of water and the quality thereof is not guaranteed. The right is reserved, if a general water shortage is experienced in the area, to implement such curtailments or restrictions on the impoundment, storage, abstraction, supply or use of public water as may be deemed necessary under the circumstances.
10. The Department reserves the right to construct storage works at any time, at any stream and to store all surplus water reaching such works and to control the allocation of such water.
11. In case of possible over-allocation of water in this water resource when compulsory licensing is required in future in terms of Chapter 4 of the Act, this licence shall be subject to a reduction of the allocated volume in order to comply with the requirements of the Act.
12. The licence and any amendment of this licence are also subject to all the applicable procedural requirements and other applicable provisions of the Act, as amended from time to time.



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APPENDIX II

CONDITIONS OF LICENCE

SECTION 21(a) OF THE ACT.

1. TAKING OF WATER FROM A WATER RESOURCE

- 1.1 The licence authorises the taking of a maximum quantity of 60 000 (sixty thousand) cubic metres (m³) of water per annum from the Vaal River on Erf No. 71, Township of Windsorton, District of Barkley West, located within the Lower Vaal River Water Management Area, for diamond mining purposes.
- 1.2 If the property mentioned in paragraph 1.1 is subdivided, sold or consolidated this Department must be notified within 14 days after the said transactions took place.
- 1.3 The installation of a water pump or other abstraction equipment for the taking of water from the Vaal River must be made at the expense of the licensee and shall be equipped with a self-registering water meter.
- 1.4 Before the installation of a pump or pump structure or other abstraction equipment the Regional Director must be consulted to ensure that personnel of the Sub-Directorate: Abstraction and Storage is present during the installation of such pump structure or other abstraction equipment.
- 1.5 The installation of the water meter must comply with the specifications of the manufacturer with regard to distance from obstructions in the pipeline upstream and downstream of the meter.
- 1.6 This Department before installation must approve of the meter. The meter must reach 999 999m³ before resetting to 0 m³.
- 1.7 The meter must be fitted with a flexible coupling in order to facilitate the removing and replacing of it.
- 1.8 The meter must be maintained at the expense of the licensee and must at least be serviced and tested for accuracy every six months starting from the date of the issuing of the licence. The meter must be checked and recalibrated if readings deviate by more than 10% from that of a standard calibrated gauging apparatus. Calibration certificates must be made available to the Department on request by the Regional Director.
- 1.9 The licensee must supply a suitable pipe insert to temporarily replace the meter should it be necessary to remove it for any reason.
- 1.10 Officers from this Department must at any time have free access to the property and water pump or other abstraction equipment for supervision and control purposes and to monitor the meter readings.
- 1.11 The licensee must keep record of the meter readings on a daily basis and these readings must be provided to the Regional Director on or before the 20th of each month to enable the

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Department to serve regular accounts on the licensee in accordance with its Raw Water Strategy for the area.

- 1.12 The Department accepts no liability for any damage, loss or inconvenience of whatever nature, suffered as a result of:
- 1.12.1 a shortage of water;
 - 1.12.2 inundation or flood;
 - 1.12.3 siltation of the river; and
 - 1.12.4 the shifting of the pump or other abstraction equipment in the event of the rise or drop in the water level of the river.
- 1.13 All installations, pipes and taps must be leak proof to prevent any spillage of water.



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APPENDIX III

CONDITIONS OF LICENCE

SECTION 21(g) OF THE ACT.

1. DISPOSING OF WASTE IN A MANNER WHICH MAY DETRIMENTALLY IMPACT ON A WATER RESOURCE.
 - 1.1 This licence authorises the disposal of all water containing waste into settling ponds for re-use.
 - 1.2 Sediments that settle within the settling ponds must be disposed of in a way that enhances revegetation of disturbed areas, in the event of routine maintenance and prior to mine closure.
 - 1.3 A temporary retaining wall must be constructed to prevent washing water from the works area to come into contacts with other areas, other than the settling ponds.
 - 1.4 Settling ponds must be inspected at least once a day for leaks or signs of weakness, and repaired or replaced if necessary.
 - 1.5 The disposal of sediments must take place in a manner that will not constitute an additional source of runoff into the river system and does not contribute to localised salinisation.
 - 1.6 Settling ponds must be located well above the 1:50 year floodline as stipulated in Government Gazette No. 704, dated 4 June 1999 {Schedules 6(d) and 6(f)}.
 - 1.7 No septic tanks may be constructed in the vicinity of the watercourse or within the 1:50 year floodline area or within a horizontal distance of 100 meters from any watercourse or water resource.
 - 1.8 Sewage generated on the site must be disposed off in portable toilets into a sewerage system of the nearest town with the necessary written agreement/permission and/or approval of the local authority.
 - 1.9 Activities that lead to elevated levels of turbidity must be minimised.
 - 1.10 The licensee must prepare an "*Integrated Water and Waste Management Plan, Rehabilitation Strategy and Implementation Programme*", which must be submitted to the Regional Director for approval within six (6) months of the date of issuing of this licence.
 - 1.11 The plan referred to in 1.10 above must be updated annually and submitted to the Regional Director for approval.
 - 1.12 The "*Integrated Water and Waste Management Plan,*" shall clearly quantify the short, medium and long-term impacts of the mining method on the receiving water environment.
 - 1.13 In terms of the conditions of this licence, the licensee is hereby exempted in terms of Regulation 3 from the requirements of Regulation 4 (Restriction on Locality) of


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Government Notice No. 704 of 4 June 1999, specifically for the disposal of tailings in the mining excavations.

2. MONITORING AND REPORTING

2.1 Water quality monitoring must be done on a quarterly basis.

2.2 The quality of the water containing waste must be monitored by taking grab samples upstream and downstream of the mining activities and be analysed for the following parameters:

Variable	Unit
pH	
Electrical conductivity	mS/m
Suspended solids	mg/l
Total dissolved solids	mg/l
Nitrate	mg/l
Sulphate	mg/l
Magnesium	mg/l
Calcium	mg/l
Chloride	mg/l
Sodium	mg/l

or any other variable deemed necessary from time to time by the Regional Director.

2.3 Analysis must be carried out in accordance with methods prescribed by the South African Bureau of Standards (SABS), in terms of the Standard Act, 1982 (Act 30 of 1982).

2.4 The date, time and monitoring point(s) in respect of each sample must be recorded with the results of the analysis, and submitted to the Regional Director within 20 days of monitoring.

3. MITIGATION OF IMPACTS

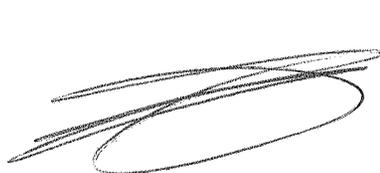
3.1 Mining activities must not take place within the 1:100 year flood-line or within a horizontal distance of 100 meters from any watercourse or water resource.

3.2 Mining of channels associated with seasonal drainage lines traversing the floodplain must not take place when there is flow in these channels.

3.3 Erosion of water channels must be guarded against.

3.4 Stockpiles and overburden must be stored well above the 1:50 year floodline or 100 meters horizontally or more from any watercourse or water resource.

3.5 Heavy machinery used for mining is not allowed on vegetated areas not earmarked for excavations.



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4. (a) **Property on which water is to be taken and utilised :**
Erf No. 71, Township of Windsorton, in extent 1.4647 ha, District of Barkley West, Northern Cape.
- (b) **Registered owner of the property:**
Republic of South Africa.
5. (a) **Licence Period**
This licence is valid for a period of three (3) years from the date of issuance.
- (b) **Review Period**
As provided by section 49 of the Act, this licence may be reviewed at intervals of 12 months.

6. **DEFINITIONS**

The "Act" means the National Water Act, 1998 (Act 36 of 1998).

The "Minister" means the Minister of Water Affairs and Forestry.

The "Department" means the Department of Water Affairs and Forestry.

The "Director-General" means the Director-General: Water Affairs and Forestry.

The "Reserve" means the quantity and quality of water required to satisfy basic human needs and to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.

The "Regional Director" means the Regional Director: Northern Cape, Department of Water Affairs and Forestry who may be contacted at the following address:

Regional Director: Northern Cape
Department of Water Affairs & Forestry
Private Bag X6101
KIMBERLEY
8800



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- 3.6 Mining activities and associated infrastructure, including stockpiling, must be avoided in drainage lines of lateral tributaries. Where this is not possible, steps to divert storm water from mining activities must be taken pro-actively.
- 3.7 Increased runoff due to vegetation clearance and/or soil compaction must be managed, to ensure that storm water does not lead to excessive levels of silt entering the river.
- 3.8 Soils that have become compacted, as a result of the activities of the development must be loosened to an appropriate depth to allow seed germination.
- 3.9 Concurrent rehabilitation must take place in conjunction with mining or prospecting operations.
- 3.10 Installation of water pumps and pipelines required for washing of alluvial material on site must be such that disturbance to the aquatic riverine habitat is minimised.
- 3.11 Vehicles and other machinery must be serviced well above the 1:50 year floodline or within a horizontal distance of 100 meters from any watercourse or water resource. Oils and other potential pollutants must be disposed off at an appropriate licensed site, with the necessary agreement from the owner of such a site.
- 4. REHABILITATION OF DISTURBED MINING AREA**
- 4.1 Mining must take place in sectors to permit rapid levelling and rehabilitation of disturbed areas as well as to reduce the impacts of long-term changes to the water table.
- 4.2 Any additional recommended mitigation measures to protect the environment and any changes required to existing measures must only be implemented after approval of the Regional Director or his/her representative.
- 4.3 A photographic record must be kept of the mined sector to demonstrate problems in the implementation of rehabilitation procedures.
- 4.4 Overburden must be evenly redistributed over exposed areas as soon as possible after operations has been completed.
- 4.5 All efforts must be made to reinstate water channels, as far as possible during the rehabilitation phases of the project.
- 4.6 Plants that are indigenous to the immediate surroundings must be used in the rehabilitation of disturbed areas.
- 4.7 Activities that lead to elevated levels of turbidity must be minimised.
- 4.8 A layout plan of the mine activities and records relating to the compliance/non-compliance with the environmental conditions must be kept and shall be available to the Regional Director on request.
- 4.9 A plant species list comprising of species appropriate to the area under consideration must be drawn up as part of the mining management plan for use in the planning of the rehabilitation process.



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ANNEXURE F:

WATER

ANALYSIS

RESULTS

AWAITING RESULTS FROM DWAF

ANNEXURE G:

FLOCCULANT –

PRODUCT

BULLETIN

**BROCHURE NOT AVAILABLE AS
YET**

ANNEXURE H:

PROOF OF

I & AP

CONSULTATION

CONSENT IN TERMS OF THE NATIONAL WATER ACT NO. 36 OF 1998:

I the under signed owner of property number:

Name of owner: *M. Hill-Mestruizen*

Name of farm: *PLOT 283*
MEANWATER
WINDSOETON

Date: *6 Augustus 2009*

1. Hereby have no objection against the mining of A.J. Davids along and in the Vaal River.

Support: *[Signature]*

2. Hereby has objections against the mining of Mr A.J. Davids:

Not supporting:

2.1 Reasons:
.....
.....
.....

CONSENT IN TERMS OF THE NATIONAL WATER ACT NO. 36 OF 1998:

I the under signed owner of property number:

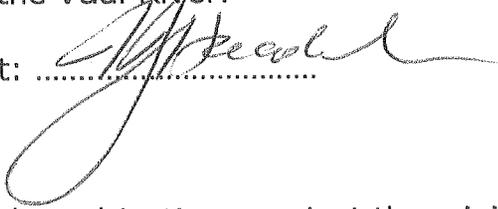
Name of owner: I J HAASBROEK

Name of farm: DE VALEIRA

.....
.....

Date: 6 AUGUSTUS 2009

1. Hereby have no objection against the mining of A.J. Davids along and in the Vaal River.

Support: 

2. Hereby has objections against the mining of Mr A.J. Davids:

Not supporting:

2.1 Reasons:
.....
.....
.....

**CONSENT IN TERMS OF THE NATIONAL WATER ACT NO. 36 OF
1998:**

I the under signed owner of property number:

Name of owner: *M.W. Westhuizen*

Name of farm: *ROOIBOSDORP
FARM 254
MUNDORATION*

Date: *6 Augustus 2009*

1. Hereby have no objection against the mining of A.J. Davids along and in the Vaal River.

Support: *[Signature]*

2. Hereby has objections against the mining of Mr A.J. Davids:

Not supporting:

2.1. Reasons:
.....
.....
.....

**CONSULTATION
IN TERMS OF
SECTION 40 OF
THE MPRDA ACT
2002 (ACT 28 OF
2002)**

Reference of Public Participation

- 1. Letter dated 1/08/2006.**
- 2. Diamond Field Advertiser dated Wednesday 08 July 2009.**



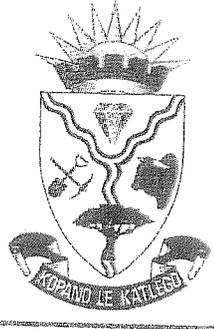
DIKGATLONG MUNICIPALITY

Kantoor van die
Munisipale Bestuurder
Office of the Municipal Manager

Alle Korrespondensie moet aan die
Munisipale Bestuurder gerig word.
*All Communication to be
addressed to the Municipal
Manager*

Privaatsak X5
Private Bag
Campbellstraat / Street
Barkly-Wes
Barkly West
8375

Tel: 053 531 0671
Faks / Fax: 053 531 0624
E-mail: dikgatlong@lantic.net



01 August 2006

P/Address
P O Box 82
Windsorton
8510

Attention: Mr. A Davids

TO WHOM IT MAY CONCERN

Consent is hereby acknowledged by our office, and the Department of Mineral and Energy / Northern Cape office is responsible for granting of a permit to mine on the area under application.

Hope you find this in order

Kind Regards

Yours in Economic Development

LED / IDP OFFICER
GEORGE DAMOENSE

Classifieds

LEGALS

711 PUBLIC NOTICES

Notice for an Application of a Mining Right

The proposed mining development: The mining of alluvial mineral deposit on the farm Erf 1, Windsorton, Barkly West district, Northern Cape, a Portion of state land situated on the Vaal River, 2,7 km south of Windsorton next to Sluipklip North No A32 and next to the Farm Hermanus, Erf 253, Windsorton and next to the Farm Aantjies Pan, and next to the farms Portion 5 Geluk Sluipklip, North No 3 a Portion of Portion 16 of Sluipklip North and Portion 7 the Farm, Delwera of the Farm Sluipklip North, No 32 "an island" under Department of Water Affairs and Tourism.

Notice is hereby given that the applicant is in possession of prospecting and mineral rights for the same land and has applied for a mining right in terms of the MPRDA (Act 28 of 2002) Section 22(1) of the Mineral Act (Act 2002), a scoping report was submitted to the relevant State authorities in terms of Regulation 4(6) of the Regulations published in Government Notice No R.1183 under Section 26 of The Environmental Conservation Act (Act 73 of 1989) of the intent to carry out the following mining activities: Description of Proposal Activity — The mining of alluvial minerals (diamonds) through the opencast mining method, the processing of gravel with washing plants on the farm Erf 1, Windsorton island, (next to the above mentioned farms Northern Cape Province.)

Extent:

The total Extent is 135 hectares. Mining will take place of this whole portion.

Name of Proponent:

The application is AJ Davids Mining and Construction. Contact person — any comment or objections with regard to this application can be submitted in writing to: Attention Miss M van Wyk, Breeze Court Investment 47 (Pty) Ltd, PO Box 82, Windsorton 8510 as consultants of the applicant Fax (053) 551-0089. E-mail gurty@telkomsa.net

No telephonic comments or objections are accepted. In order to ensure that you are identified as interested and/or affected party, please submit your name, contact information and interest in the matter to the contact person given above within 14 days of publication of this advertisement. You will be notified of a public meeting that will be held if there is sufficient interest.

ANNEXURE I:

DWAF's GUIDELINES ON PRIVATE NON- COMMERCIAL FARM WASTE DISPOSAL SITES

DWAF POLICY ON THE REGISTRATION OF SMALL PRIVATE NON-COMMERCIAL FARM WASTE DISPOSAL SITES

The DWAF regional offices have been tasked to register all waste disposal sites within their regions as required in the National Waste Management Strategy and in terms of the National Water Act, 1998 (Act 36 of 1998) (NWA), where all water users must be registered. The DWAF DW 808 (replaces the DW 768) registration form must be completed and electronically captured on the WARMS system by the DWAF official. This would enable the regional offices to determine the following:

- Where and how many disposal sites exist in their region.
- What type of waste is being disposed of.
- The volume of waste that was and will be disposed of on specific sites.
- Whether sites are still operational and if not, whether disused sites have been sufficiently rehabilitated.
- What possible impacts or risks the sites pose to human health and well being and the environment.
- Whether sites are permitted, and if whether the sites comply with permit conditions,
- Whether the regional offices can control the sites by means of Directions in terms of section 20(5) of the Environment Conservation ACT, 1989 (Act 73 of 1989) (EGA) or whether a permit in terms of section 20 (1) of EGA / a licence in terms of section 21(g) of NWA application must be requested.
- Prioritize the sites according to the pollution risk potential.
- Keep a register of the sites.

The risk of pollution posed by small non-commercial farm disposal sites to the quality of the water resource, especially the quality of drinking water, is regarded as negligible, for the following reasons:

- Usually these sites are small pits in which only the general household waste that is produced by the permanent residents of the farm is disposed of and often burned. These small volumes and the nature of the waste would normally not pose a risk to the environment.
- The risk of pollution posed by small non-commercial farm disposal sites is an issue that is of low priority when compared with the pollution caused by activities resulting from other sources. Examples of this include the improper siting and inadequate operation of commercial farm waste disposal sites (fruit husks or animal products), feedlots and the use and storage of pesticides.

"Waste disposal sites located on privately owned farms receiving no 'more than one ton of general household waste (not agricultural or industrial waste, such as fruit rests or animal products) per day (small non-commercial farm disposal sites), may therefore be exempt from registration on condition that:

- The site is situated outside a water resource and above the 1:50 year floodline;

- The site is adequately fenced to prevent entry of people and animals;
- The site does not overlay an area with shallow or emergent water tables;
- The burning of waste does not cause any nuisance conditions to neighbours: and;
- The waste does not cause any nuisance conditions due to the breeding of flies or other vermin.

However, should the Regional Officer become aware (e.g. through complaints from neighbours' or other parties) of instances where small non-commercial farm disposal sites could cause nuisance conditions or pose a risk to the quality of drinking water, due to the conditions below, the registration of that site may be requested, after having visited the site.

- Burning of waste (such as tyres) causes persistent and unacceptable air pollution or nuisance conditions.
- Burning waste that is left unattended, poses a fire hazard.
- The small non-commercial farm disposal site is located such that floodwaters may wash the waste into a water source.
- Livestock and animals have access to the site.
- The site attracts or breeds flies or vermin.
- The site could cause the contamination of a shallow ground water resource or a surface water resource.

In such cases the Regional Officer should determine the extent of the problem (site visit) and discuss possible solutions with the offending fanner before requesting the fanner to register his/her small non-commercial farm disposal site.

A copy hereof could also be provided to farmers, to guide them in the management of their own small non-commercial farm disposal site.

ANNEXURE J:

ECO

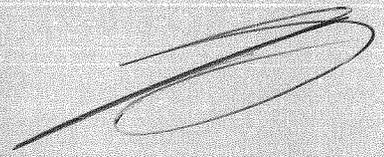
SAN

TOILETS

ANNEXURE J:

ECO SAN

TOILETS

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EcoSan

Ecologically Friendly Sanitation

JoJo

Vervaardig deur/Manufactured by



EcoSan

PO Box 75870
Lynnwood Ridge
0040

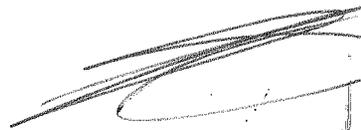
Ecologically Friendly Sanitation

**SANITATION IS FAR MORE THAN THE
CONSTRUCTION OF TOILETS**

**IT IS A PROCESS OF IMPROVEMENTS WHICH
MUST BE ACCOMPANIED BY PROMOTION
ACTIVITIES AS WELL AS HEALTH AND
HYGIENE EDUCATION**

**THE AIM IS TO ENCOURAGE AND ASSIST
PEOPLE TO IMPROVE THEIR HEALTH AND
QUALITY OF LIFE**

**SANITATION IS THEREFORE A COMMUNITY
RESPONSIBILITY AND THIS MUST BE
EMPHASISED THROUGH SANITATION
AWARENESS PROGRAMMES**



EcoSan

PO Box 75870
Lynnwood Ridge
0040

Tel
Fax

Ecologically Friendly Sanitation

OBJECTIVES.

EcoSan's current environmental objectives, established to focus effort on measures to address the main environmental issues are:

- ✓ Promotion of environmental protection and social upliftment
- ✓ Active involvement in pollution prevention, treatment and management of organic and hazardous waste
- ✓ Making available new, cost effective and efficient methods of waste management through continuous research and development
- ✓ Active involvement in educating rural communities on basic health, water, sanitation and environmental issues in an attempt to promote environmental awareness and reduce rural health and sanitation-related problems

Water satisfies a basic human survival need. As no one can live without water, the demand for improved cheap convenient clean regular water supplies due to lack of services, is huge in Africa. But the provision of water while satisfying a human need and easing the situation of women and children whom previously spent hours collecting water, will not necessarily result in significantly improved health.

Good sanitation is not in the same way as water a basic human need for survival. But for good health, not only water and sanitation required, but also sound hygienic practices and behaviour. The evidence of these relationships is now well proven internationally with extensive studies in many parts of the world.

Building improved facilities and providing more water goes only part of the way to improving health. It can provide the environment in which there is potential for improved health, but rarely if ever will it actually deliver the full potential benefits unless improved hygienic behaviour is practised by all. The evidence of research available suggest that improved water supply **only** delivers significant health benefits when accompanied by improved sanitation and these are maximised when households and communities practice good hygiene.

Malfunctioning sanitation systems are a particular threat to health and often cause pathogen (i.e. disease causing agents) transfer on a massive scale. It is therefore essential that the medical costs of pollution and economic impact of losses in productivity with pollution as a result of malfunctioning sanitation systems be looked at when planning a sewerage treatment plant. Further that users of improved facilities are educated in the proper use, maintenance and upkeep of the facilities on a household level.

In addition at the community level it is essential that the consumers and local authorities are able to afford the full operation and maintenance costs of whatever system is installed or serious health risks can result from breakdown and failure of the systems.



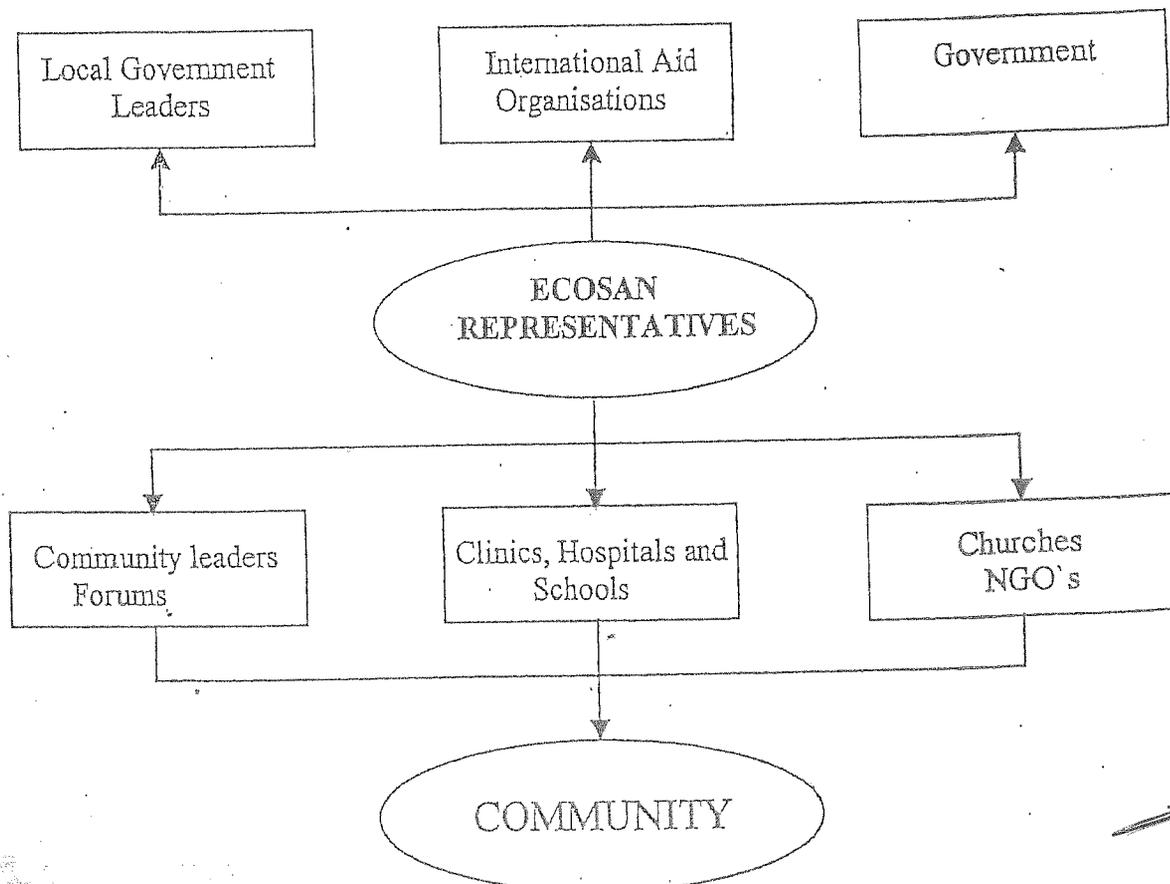
COMMUNITY PARTICIPATION IN THE ECOSAN SANITATION PROJECTS

“the poor public health situation, arising out of the generally low level of sanitation and waste management, but perhaps, more from the low level of the public's own perceptions of the need for a clean and healthy surrounding.”

An integrated part of ECOSAN sanitation projects is community education and participation. The community must first be made aware of the seriousness of their sanitation and health situation. ECOSAN commits itself to projects that not only include the supply of technology and products to solve the sanitation crisis but also provides to the community the following:

- ✓ *Education* of the community on the basic sanitation and health issues with the aim of making them aware of the dangers of polluted drinking water and poor sanitation related diseases.
- ✓ *Training* the community on the use and care of water and sanitation facilities such as water tanks and dry sanitation so that disease is prevented and general living conditions are improved. This training will include informing the community about the benefits of dry sanitation and storage of rain water.
- ✓ *Employment* of members of the community to assist in implementing the project. The product is simple to use; thus no skills are required to operate it. These are *employment intensive* projects, which involve the community in solving their own problems.

The flow chart below shows how this education and awareness campaign is to be executed:



Five good reasons to use the EcoSan Dry Sanitation System.

Due to the country's scarce resources, it is not feasible to provide rural communities with modern sewerage infrastructure, and due to these constraints the trend is to provide these communities with other affordable sanitation options, i.e. EcoSan dry sanitation toilets.

- ✓ 1. EcoSan toilets are relatively light-weight and easy to manoeuvre into position. (Two men are adequate to lift one unit).
- ✓ 2. The unit does not require any type of flushing mechanism or gadget, which leaves no risk for mechanical problems later, which leads to savings on time and labour.
- ✓ 3. The unit is economically competitive, and very viable with its price bracket matching with the budgetary demands of a low cost housing project.
- ✓ 4. The toilet is very convenient for rural areas where there are no sewerage systems, and where it would simply be out of the question cost-wise to implement and engineer a sewerage system. Such an undertaking, as we know, would expend vast and ill-affordable resources in the form of time and money, whereas the dry sanitation concept presents a more realistic solution.
- ✓ 5. If eventually in years to come, a region is in the economic position to implement a waterborne sewerage system, and construct permanent sanitary facilities, these portable toilets can easily be uplifted, and transferred to another low cost housing development site, thereby almost totally reducing sanitation costs on that future site in years to come. This assist in planning and cost-cutting.



The EcoSan Dry Sanitation System

Why waste precious water resources to treat human waste when nature can treat it.

Waterless Toilet tumble-dries costs.

Introduction

The EcoSan Toilet is a waterless, dehydration / evaporation toilet system that provides a **safe, non-polluting, cost-effective solution** to the sanitation crisis. It offers a standard of respectibility and convenience, comparable to a waterborne system, yet without the prohibitive costs and obvious **strain** on precious **water resources**.

The system has been tried, tested and evaluated in the field since 1997. The evaluation period involved scientific, health as well as community feedback. The December 2000 launch of the EcoSan Toilet has therefore been taking the local and the international building industry by storm. Over 1000 units have been installed on a widespread basis throughout South Africa and neighbouring countries, namely Botswana, Namibia, Mozambique, Lesotho and in other countries further afield, such as Madagaskar and Antarctica.

Worldwide Problems

- Many countries are chronically **short of water**, which makes the utilisation of **waterborne** sanitation an unrealistic option.
- The **capital cost** required for waterborne sanitation is **prohibitive** in the majority of situations.
- It has been **conclusively** proven that nitrate loaded ~~effluent~~ effluent from pit-latrines is **directly responsible** for widespread **contamination** of valuable groundwater resources.
- The regular operating and maintenance costs for sanitation systems such as bucket latrines, septic tanks, chemical and waterborne toilets **are very high**.

Adequate Sanitation Requirements

- A respectable and hygienic system that meets the health and functional requirements of all users and government authorities
- It must not pose any risk of pollution to the surrounding environment or valuable groundwater resources.
- It must satisfy the dignity of all users.
- The system should require minimal water usage and operate effectively.
- The system should require minimal operational and maintenance expenditure.

The EcoSan Toilet Solution.

- Affordable, water free system.
 - Completely closed system.
 - No extra sewage pipe network and sewage treatment plants required.
 - No effluent seepage into underground water resources.
 - No flies or obnoxious odours.
 - Indoor or outdoor installation.
 - **Minimum** monthly operating costs.
 - **Plumbing-free** solution.
- 

Odour control

During daytime, the unique ventilation system causes a negative pressure within the system, which ensures no back draft into the toilet pan area. At night with a drop in temperature on the outside, the process can reverse. Research to overcome this is in progress. The ventilation extraction unit, positioned on top of the outlet vent pipe, assists the airflow. Air is drawn into the system via the toilet opening ensuring adequate ventilation for fast evaporation of urine and moisture removal from human excrement in the screw conveyer.

A cup of plant ash down the chute of the toilet after use will also prevent potential foul odours if the system is not in regular use. If plant ash is not available then use OdourKing. OdourKing is a powder substance that rapidly encapsulates all liquids / moisture (assist with drying process), and got odour control properties.

Material for the manufacturing of collective bags must allow air to pass through waste accumulating over a period of time in the bag.

Maintenance

EcoSan Toilets require minimal servicing, thereby enabling a saving in operating and maintenance costs.

- Rate of removal of accumulated dry waste material in the bag depends on the number of people in the household using the toilet on a daily basis. Capacity of bag is 110 litre.

For 3 members in the family it will take about 7 months for the bag to fill.

For 5 members in the family it will take about 4 months for the bag to fill.

For 8 members in the family it will take about 2.5 months for the bag to fill.

Under low usage conditions, the maintenance required can extend to once a year.

- To retrieve the dry waste, remove inspection hole cover (6) grab the handles on the bag and lift the bag out. The dry waste is extremely manageable, offering the option of being processed into compost or dispose of via municipal waste services. It is also combustible, meaning it could be used as a fuel source.
- The toilets need to be inspected on a daily basis to ensure that no blockages occurred. Especially when toilet paper is not used. Chute opening at bottom end of chute that opens into the screw conveyer must remain open at all times to allow air to pass through.
- Although not recommended, if odd objects such as beverage cans, disposable nappies or anything of that size accidentally dropped down the toilet bowl, it will not block the system.
- Human excrement skid marks on the surface of the chute can be brushed off with a toilet brush dipped into a disinfectant and washed down with a minimum of water.
- The dried waste matter can be further composted prior to use as a soil conditioner. Testing undertaken by the CSIR has proved that the technology produced one of the lowest counts of harmful bacteria.



EcoSan Technology

Mr. J. Joubert, director of EcoSan as well as co-inventor and developer of the EcoSan Toilet System together with his expertise gained in research and development of the polyethylene industry, developed the EcoSan Dry Sanitation Toilet System. Widespread experience with the system in South Africa and neighbouring countries has demonstrated that it is a cost-effective, respectable, hygienic and environmentally friendly sanitation system that satisfies the dignity of all users.

Applications

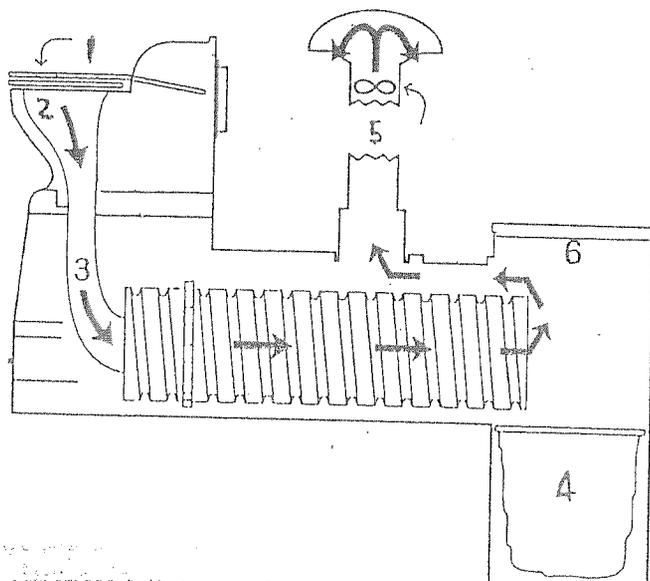
- Housing sector - rural / peri-urban
- Holiday cottages
- Game farms
- Underground mining
- Walking trails
- Clinics
- High water table areas
- Farms
- Industry
- Schools

How the system works

The EcoSan Toilet is in operation when the top lid on the toilet seat (1) is lifted. Human excrement and urine falls down a vertical chute (2) and into one open end of a specially designed helical (3) screw conveyer. After using the toilet, bring down (close) top lid on toilet seat. Every time the top lid is lifted, the galvanised steel mechanism that links the top lid with the helical screw conveyer rotates the conveyer a fraction of a full cycle. Human excrement in the mean time slowly moves along in a tumbling action to the open end on the other side of the helical screw conveyer taking about 25 days before falling into a (4) disposable bag.

Through the uniquely designed (5) ventilation system, adequate airflow is provided for the dehydration / evaporation, deodorising process. Human excrement consists of roughly 95 % moisture. Urine and moisture from the solids as the solids dry in the conveyer, evaporates and is vented to the atmosphere. The solid waste then dries into a compost-like material, roughly 5 to 10 % of its original mass.

Every EcoSan Toilet has a separate urinal for gents. The urinal divert urine for collection or discharge it direct into the soil. Collected urine is mixed with water and can be used as a fertiliser, foliar spray, on plants. Less liquid enters the system and in doing so help to speed up the drying process in the conveyer.



- In addition, the SABS has also carried out durability testing on the drum rotating mechanism and conveyer. In the event of a breakdown, the toilet can be repaired in no time, as all replaceable parts are easy to access. No sewage spillages will occur when replacing parts that drive the system. The only replaceable part to take care with when replacing is the screw conveyer as the conveyer when in use contains sewage. The use of protective clothing like a face shield, gloves, boots and a overall is advised. Water should be nearby for washing.
- In underground mining operations the system operates no different from when on surface. The only alteration is that the use of a removable bucket with a lid that seals with a clamp was recommended due to the high frequency of users. The result - waste dropping into the bucket is a wet sludge. Once the bucket is removed, lid on and sealed it is considered safe to handle and send to surface for emptying, cleansing with a disinfectant and then back underground for reuse. Safety precautionary measures must be taken when changing buckets in the event of a possible sewage spillage. Water should be nearby for washing.

Logistics

This high quality, factory assembled dry toilet system features the following design elements:

- Modern and functional design.
- Robust (manufactured from high quality polyethylene).
- Easy to transport.
- Light in weight (two men can lift one unit).
- Low maintenance.
- Easy installation.
- Affordable and easy to use. Even children lift the lid on the toilet seat.
- Factory sealed and assembled.
- Environmental friendly **green product** – will not pollute the environment.



ECOSAN DRY SANITATION TOILET SYSTEM.

Please study the assembly and installation instructions carefully as to avoid any malfunctioning of the toilet system. We at ECOSAN want you our valued customer not to be dissatisfied with your unique purchase.

The ECOSAN Toilet is a safe, water free, hygienic sanitation system that will operate effectively if used correctly.

Care must be taken in the implementation of the operating instructions:

- ✓ The ECOSAN Toilet is a dry sanitation system for human excrement only. Any excessive fluids other than urine will cause the system to malfunction and will also result in unpleasant odours.
- ✓ Should the toilet bowl require cleaning on the inside, clean with a stiff brush that was dipped into a disinfectant solution.
- ✓ The ECOSAN Toilet was designed for use by a family of 6 to 10 people only. This will prevent overloading and the system to malfunction.
- ✓ Assist and train small children to use the toilet correctly. Small children may throw articles down the toilet and put their hands into the toilet to retrieve it. Avoid putting larger foreign objects like beverage cans, stones, baby nappies and sanitary pads down the toilet.
- ✓ Use only toilet paper or similar materials.
- ✓ Ensure that the toilet seat and lid is in the down position after use.
- ✓ It will take approximately 7 to 9 months for the waste collecting bag to fill with dry, manageable waste. When the bag is full dispose of the waste in a responsible manner by burying the waste or via municipal waste collecting services.

For any further information please contact -

at

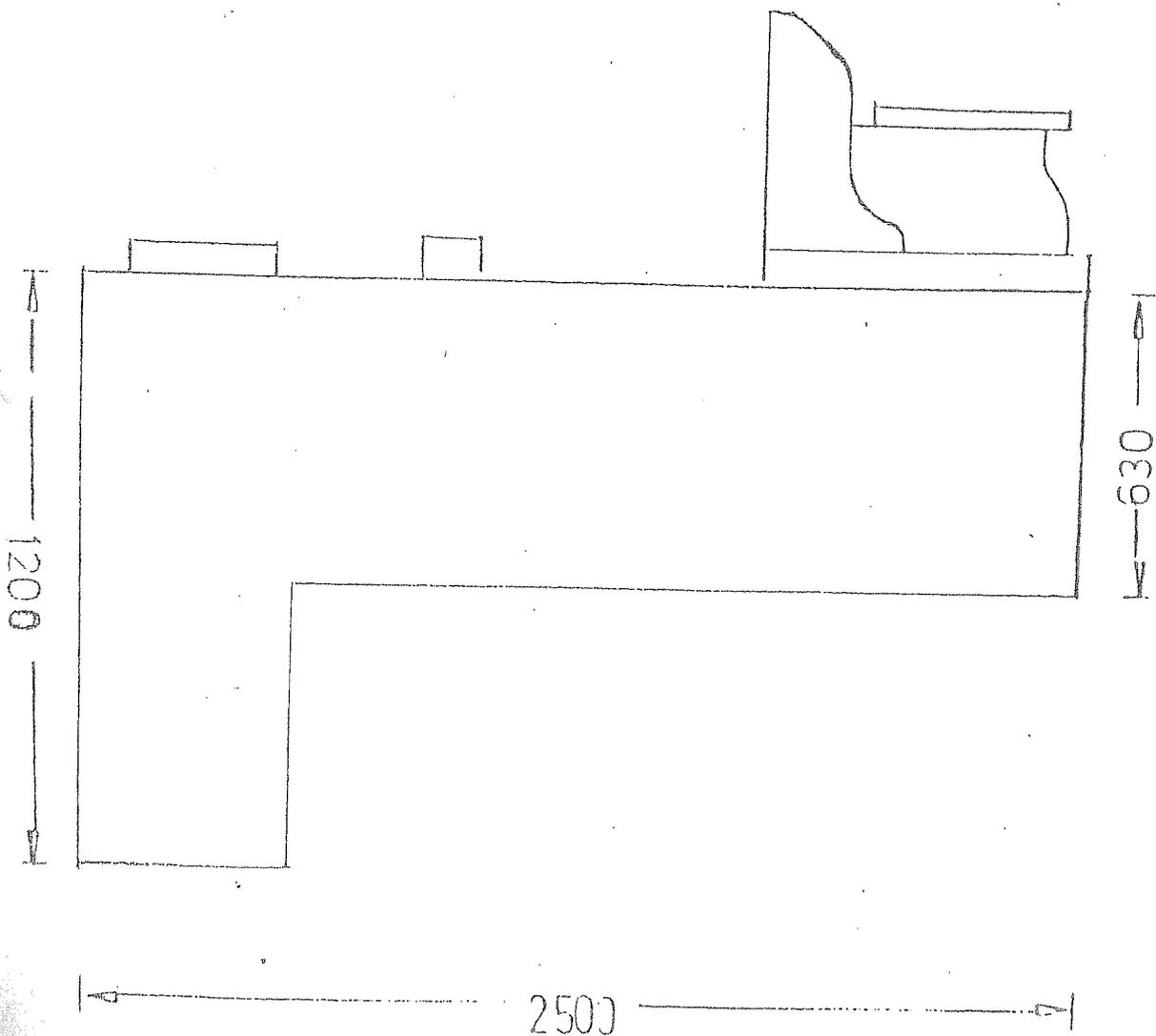
the following number -



EcoSan

Ecologically Friendly Sanitation

EXCAVATION MEASUREMENTS



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Report No: 5415/1612720/UM09

Date: 2001-02-14

Page: 1 of 2

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TESTING OF A DRY SANITATION SYSTEM

1. DESCRIPTION OF SAMPLE

The sample consisted of one dry sanitation system incorporating a drum conveyor as shown on the attached photo.

2. OBJECT OF TEST

To conduct a durability test on the sample which will represent approximately 6 years at a rate of 15 cycle per day in actual use.

3. TEST METHOD

3.1 The following tests were conducted to assess the durability of the sample:

1 Opening moment of the lid. The opening moment of the toilet lid which operates the sanitation conveyor system was measured with, using a calibrated spring balance, no load and with a 7,34 kg load spread over the entire length of the drum conveying system before and after the cycling test.

3.1.2 Cycling test. The cycling test was conducted with the equipment as supplied which opened and closed the lid as in normal use. The system was operated for 32850 opening and closing cycles which represents approximately 6 years (2190 days) at a rate of 15 cycle per day and approximately 3285 full rotations of the conveying drum. The conveying system was then visually inspected for wear and workmanship.

3.2 The test sequence was as follows:

- * opening moment of lid before cycling.
- * cycle test.
- * opening moment after cycling test.
- * visual inspection.
- * report.

This report relates only to the specific sample(s) tested as identified herein. It does not imply SABS approval of the quality and/or performance of the item(s) in question and the test results do not apply to any similar item that has not been tested. (Refer also to the complete conditions printed on the back of official test reports.)

Hierdie verslag het slegs betrekking op die spesifieke monster(s) wat getoets is, soos hierin geïdentifiseer. Dit impliseer nie dat die kwaliteit en/of prestasie van die betrokke artikel(s) deur die SABS goedgekeur is nie en die toetsresultate is nie van toepassing op 'n soortgelyke artikel wat nie getoets is nie. (Sien ook die volledige voorwaardes op die ruggant van amptelike toetsverslae.)