AN ENVIRONMENTAL EVALUATION SYSTEM IN THE PLANNING PROCESS OF QUARRIES IN SOUTH AFRICA

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DEDICATION

To my parents, Ann and Martin, with eternal thanks.

ABSTRACT

The historical framework and background to the process of approving quarries for construction materials in South Africa is examined in depth. In order to produce a proposed Environmental Evaluation System for the assessment of quarries in South Africa, the interrelationships of Quarries and the Environment are briefly examined philosophically. Environmental Impact terminology and Environmental Impact Assessment methodologies, techniques and procedures are also discussed.

UITTREKSEL

Die historiese raamwerk en agtergrond van die proses waarvolgens groewe vir konstruksiemateriale in Suid-Afrika gemagtig word, word in diepte ondersoek. Ten einde 'n voorgestelde Omgewingsevalueringstelsel vir die beoordeling van groewe in Suid-Afrika te verskaf, word die verwantskappe tussen Groewe en die Omgewing filosofies ondersoek. Omgewingsimpakterminologie en metodieke, tegnieke en prosedures vir die bepaling van Omgewingsimpak word ook kortliks bespreek.

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PREFACE

The need for this study arose from the author's experience in attempting to evaluate the Environmental Impact and the environmental and economic feasibility of proposed new quarries or extension to existing quarries.

It was the author's opinion that the decision on the granting of permits for new quarries was essentially based upon an economic, market-orientated premise. This was reinforced by the fact that the data provided for evaluation of Environmental Impact were totally inadequate, requiring a considerable degree of additional "detective work" to establish even a reasonable basis for opinion formulation.

Recognising a number of limiting factors, which are discussed in the study, it was decided to try and develop a transitional system which would enable a better quality of evaluation of Environmental Impacts as well as avoiding a destabilisation of the existing system of quarry approval. It was hoped that the transitional system could form a sound platform from which to develop a more scientifically-based decision-making process which would incorporate environmental, economic and technical feasibility with the ultimate aim of meeting the human needs of development whilst recognising the equally important needs of balanced, sustained, development in the natural Environment.

The author's employer, the Department of Environment Affairs, recognised the complexity of the problem and granted the study official project status.

CHAPTER 1: HISTORICAL FRAMEWORK

In order to create a platform from which to develop new Environmental Evaluation techniques for quarries, it is necessary to review the history of quarry control measures, the state of South African Environmental Control mechanisms, and the history and change of Government departments involved in the quarry development progress. Specifically, the review will examine Government departments involved through their officially stated aims and functions; the relevant legislation, namely the Mines and Works Act, 1956, the Physical Planning Act, 1967 (previously the Physical Planning and Utilisation of Resources Act, 1967 and the Environmental Planning Act, 1967); and the measures taken within quarry planning at various stages to take cognisance of the needs of the Environment.

1.1 TITLES OF GOVERNMENT DEPARTMENTS INVOLVED WITH QUARRY APPROVAL, 1972-1984

1.1.1 Historical summary

During the period 1972 (the year of the U.N. Stockholm Conference on the Environment and acknowledged as the start of official Environmental awareness in South Africa (Department of Water Affairs, Forestry and Environmental Conservation 1980)) to 1984, various Government departments have been involved in the quarry approval process, all of which underwent changes during the period in question. (See Figure 1 - Rear pocket) These departments have had three foci; Mining, Planning and Environment.

1.1.2 Mining

In title, the present day Department of Mineral and Energy Affairs has undergone least change, having previously been called the Department of Mines and only having Energy added to its functions following the reorganisation of Government departments in 1980/81, during which the Department of Environmental Planning and Energy was broken up (detailed in section 1.1.3); The Environmental part of Environmental Planning becoming Environmental Conservation and being attached to the newly formed Department of Water Affairs, Forestry and Environmental Conservation and Energy being added to the Department of Mines.

1.1.3 Planning

Following the Stockholm Conference in 1972 the Minister of Planning was charged with overall responsibility for the Environment and the Department of Planning became the Department of Planning and the Environment. In 1979, the Department underwent a name change and became the Department of Environmental Planning and Energy and took over the newly created Energy portfolio. The Department of Environmental Planning and Energy was then disbanded. In 1980, a new institution, the Office of the Prime Minister, was created and took over the planning responsibility.

In 1982, the Office of the Prime Minister was further reorganised and streamlined to include the function of constitutional development and renamed the Department of Constitutional Development and Planning.

In 1983, the Department of Water Affairs, Forestry and Environmental Conservation became the Department of Environment Affairs with the addition of responsibility for Marine Development, which was transferred from the Department of Agriculture.

1.1.4 Environment

During the 1972 Parliamentary Session, Environmental Conservation as a complex subject with many interdependent facets was discussed comprehensively for the first time. At the time, the Minister of Planning was charged with overall responsibility for the Environment and, in order to emphasise the importance of Environmental Aspects, the name of the Department of Planning was changed to "Planning and the Environment" in 1973 (Department of Water Affairs, Forestry and Environmental Conservation 1980). In 1979 the Department underwent changes as a part of Government reorganisation and became the Department of Environmental Planning and Energy.

In 1982, further reorganisation of Government departments took place and the Environment portfolio was renamed "Environmental Conservation" and formed part of the newly created Department of Water Affairs, Forestry and Environmental Conservation. In 1983, this Department was again renamed, (with no change to aims or functions) the Department of Environment Affairs.

1.1.5 Summary

From 1979 the Departments mentioned went through a series of confusing name changes as a result of a national strategy for the rationalisation and revitalisation of the Public Service. This strategy was announced by the Minister of the Interior in September 1979 and included proposals to: reduce the number of Government departments and associated institutions from 40 to 18; review all laws and regulations; repeal of obsolete measures; and simplification of the remaining legislation. (Department of Foreign Affairs and Information, 1984)

These changes of names and functions made it difficult for individuals to locate the foci of responsibility for different aspects of quarrying between 1979 and 1984 and caused confusion.

1.2 GOVERNMENT DEPARTMENTAL AIMS AND FUNCTIONS

1.2.1 Mining

No specific references are made to the Environment in the main aim and functions of either the former Department of Mines or the present Department of Mineral and Energy Affairs.

In both cases the philosophies are clearly laid down in the aims of the Departments. Department of Mines: "... To stimulate the exploitation of all mineral resources in the best interests of the country ..."; and for the Department of Mineral and Energy Affairs: "... To promote the efficient exploitation of the

country's mineral resources and to ensure the optimum utilisation of energy resources ...." The word stimulate means "... to incite; to instigate; to excite ..." and the word promote means "... to help forward; to further; to further the progress of ...." (MacDonald, 1974).

The Department of Mines' aims contain the phrase "... in the best interests of the country ..." which could be interpreted as including those interests outside of the sphere of the Department i.e., good quality of Environment might in certain circumstances be more in the interest of the country than a mining process. This does not appear to have occurred to any noticeable degree and emphasis seems to have rested more on another of the prime functions of the Department, viz. "... to promote optimum utilisation of South Africa's mineral resources ...."

It is interesting to note that in the restructuring of Government departments, the phrase "... in the best interests of the country ..." was dropped from the main aim of the newly formed Department of Mineral and Energy Affairs.

In summary, the emphasis of these two Departments has always been an exploitation of minerals. South Africa has traditionally built up its wealth on the basis of the mineral industry and this emphasis is understandable. However, in the twelve years that Environmental matters have been recognised within the Governmental structure, specific references to "Environment" in the mining department's aims and objectives are absent.

1.2.2 Planning

The Department involved with national planning has had five names, Department of Planning; Department of Planning and the Environment; Department of Environmental Planning and Energy; Office of the Prime Minister; and Department of Constitutional Development and Planning.

When compared with its later aims, the Department of Planning's first reference to Environment was somewhat elementary: "... co-ordinates all national efforts towards more effective control of Environmental Pollution and the better conservation of the Environment ...." The emphasis reflects the concerns of the Stockholm Conference, problems of Environmental Pollution and the urgent need to instigate control measures.

In 1979, the renamed Department of Environmental Planning and Energy retained the same basic aims but added an objective to optimise utilisation of energy resources. The use of the term Environmental Planning would seem to indicate that at the time thoughts were moving towards a more integrated approach to planning which included considerations such as the non-human and the natural Environment. It is curious that the Office of the Prime Minister, established in 1982, had no reference whatsoever to Environment in its aims and functions. The nearest to a direct reference is the function listed as "... planning the effective utilisation of the soil ...." The Afrikaans word used in the original act is the word "bodem" which translates more widely than soil and perhaps could better have been translated as land. Even so this can be seen as a regression in emphasis as regards Environmental Planning. There are nevertheless

indirect references to Environment. For example, during the discussions leading up to the approval of the Guide Plan for the Knysna-Wilderness-Plettenberg Bay Area, general Environmental matters and nature conservation received considerable attention. (See Appendix 1 for an explanation of the Guide Plan.) The most recent change for those involved in national planning was to the Department of Constitutional Development and Planning. Reference to Environment re-appears in the aims and functions formulated for this Department: "... plan the efficient utilisation of the Environment ...." The scale of this is clearly defined as one of the two major functions of the Department is "co-ordinated macro planning".

In summary, the Planning function has taken cognisance of the Environment in its aims and functions. It is nevertheless difficult, without specific studies, to establish how effectively Environmental considerations have actually been included in broad based planning.

1.2.3 Environment

As mentioned in section 1.2.2, early reference to Environment in the aims of the Department of Planning and the Environment and the Department of Environmental Planning and Energy was crude and emphasised the need to control the problems of Environmental Pollution. A more practical approach appears with the creation of the Department of Water Affairs, Forestry and Environmental Conservation. One of this Department's aims is specifically "... to protect the Environment and to create a balance between Environmental Conservation and Development ...." Furthermore, this Department's

specific functions include "... taking steps aimed at protecting and conserving the Environment in order to protect the quality of the Environment ...." Here for the first time "Environment" and "Development" were linked and an attempt was made to look at a reconciliation between the two interests. This approach would have been invaluable in negotiations between the then Department of Mines, with its commitment to view exploitation of minerals "... in the best interests of the country ...", and the Department of Water Affairs, Forestry and Environmental Conservation's mandate to "protect the Environment ..." and "protect and conserve the Environment in order to protect the quality of the Environment ...."

There is nevertheless a major problem. At no stage was any attempt made to define crucial terms such as "Environment", "quality of the Environment", "Environmental Planning" and "Environmental Conservation". This omission may have contributed to a view that "Environment" is the sole responsibility of the Department of Water Affairs, Forestry and Environmental Conservation (latterly the Department of Environment Affairs). The preferred view, as stated in the White Paper on a National Policy regarding Environmental Conservation 1980, is for Environment to be seen as the joint responsibility of all Government departments but co-ordinated by the Department of Environment Affairs.

In the change of name from the Department of Water Affairs, Forestry and Environmental Conservation to the Department of Environment Affairs, the previous aims and functions remained the same.

A further change occurred on 1 September 1984 when "Water Affairs" became a separate Department falling under the control of the Minister of Agriculture and Water Supplies. This change relates to South Africa's new tricameral constitution which has created "Own Affairs" responsibilities within the three individual Houses of Parliament. The Department of Environment Affairs was also split into two branches: the Forestry Branch and the Branch for Marine Development and Environmental Conservation.

In summary, the environment-orientated departments have expanded their aim and functions to more specific environment-related activities but have failed to encourage a multi-departmental approach. Inadequate definition of the concept of Environment has prevented a clear picture of individual departmental responsibilities towards the environment from developing. There has also been overlap between departments involved in "planning" and those involved in "Environment". This has manifested itself in an evolution of aims and functions which emphasise balance between Environment and development and holistic perspectives of the Environment. The natural progression of these trends should be recognition that human development is dependent upon the Environment and cannot operate independently outside natural systems.

Unfortunately the departments involved in mining have operated without Environmental concern and thus can be perceived to have created an unbalanced situation. It should be recognised that guidance to correct the imbalance appears not to have been forthcoming from either the planning or environment-orientated departments.

1.3 LEGISLATION

The legislation that controls quarry development in South Africa will be discussed with specific emphasis being placed on those parts of the Acts that have a direct or indirect effect on the Environment.

1.3.1 Mines and Works Act, 1956 (Act 27 of 1956)

This Act deals with the operation of mines and works, and the machinery used in such operations; the safety, health and welfare of persons employed in or at mines and works, and also with the protection of property, and the public, against the hazards which may arise from prospecting and mining operations. The regulations gazetted under the Mines and Works Act are also binding on quarry operations - particularly those sections which relate to mining methods, excavation processes and the safety of employees.

The only part of the Act relating to Environment and its conservation is a section contained in the regulations promulgated under the Act. Sections 15.11 to 15.14.3 were incorporated into the Act on 21 March 1980 as a result of recommendations made by the Advisory Committee on Open-Cast Mining. (See Appendix 2.) The regulations call for rehabilitation plans to be submitted before commencement of operations for all open-cast mines removing more than 12 000 tons of material (including overburden) per annum. There is also provision for the requirement of rehabilitation plans for open-cast operations removing less than 12 000 tons per annum at the discretion of the Inspector of Mines. Specific reference is also made to sand mining and pumping operations but only for river bank protection and erosion control.

The Act and its Regulations are enforced by the Mines Inspectorate which falls under the Government Mining Engineer's Division of the Department of Mineral and Energy Affairs.

The implications of the 1980 incorporation of sections 15.11 to 15.14.3 into the regulations so as to include rehabilitation are such as to introduce a new dimension to the work of the Inspectorate. Whereas previously the Inspectorate was concerned solely with matters relating directly to the operation of the mine and the safety, health and welfare of workers and the public, the new regulations involve such specialised fields as Environmental Impact Assessment; revegetation procedures; detailed soil analysis; vegetation suitability and selection; and aesthetics and visual impact analysis. The new regulations have been in operation for too short a time to effectively assess what effect they have had and to what degree the Mines Inspectorate has been able to incorporate the new concept into their working systems.

1.3.2 Physical Planning Act, 1967 (Act 88 of 1967)

This Act (previously the Environmental Planning Act and the Physical Planning and Utilisation of Resources Act) was promulgated in 1967 to control the physical development of South Africa. Section 6B of the Act covers construction materials and the control of their extraction. This is done by means of a change of land use permit. (See Appendix 3 for section 6b of the Physical Planning Act, 1967 and Appendix 4 for an example of the current application form for a change of land use permit.)

A shortcoming of the Act is that it is not binding upon the State. For example, a change of land use permit is not needed where land is used under the direct control or supervision of any provincial administration, the Transport Services Administration or the National Transport Commission for the construction of a public road or railway line. In addition, any quarry that has been continuously operating since before July 1976 is exempt from the requirement of a permit.

All land in South Africa is zoned for a particular use. If the use has not been specified then it is assumed to be classed as agricultural. Establishment of a quarry usually requires a change of land use zoning and therefore requires a permit to meet the needs of the Act. The authority for enforcement of this section of the Act was exercised by the Department of Environmental Planning and Energy, then by the Physical Planning Branch of the Office of the Prime Minister and from October 1982 by the Department of Mineral and Energy Affairs.

When authority for the issue of change of land use permits was held by the Department of Planning and the Environment, the evaluation of potential quarries was assessed from both planning and Environmental perspectives. The emphasis within the two sectors of the Department was on multi-disciplinary assessment: thus overall decision-making was placed on a broad basis.

For example, an application, after having been referred internally to the Environment Division of the Department, would be circulated to the Department's appropriate Regional Representative. At the local level, the Regional Representative would co-ordinate a

multi-departmental site inspection to evaluate the potential impact of the proposed quarry on agriculture, commerce and industry, local settlements, mining, water affairs, forestry and nature conservation. At local field level, wherever possible, differences of opinion would be discussed and settled. Thereafter, a detailed report would be submitted by the Regional Representative to the Department's decision-makers in Pretoria. This system ran relatively smoothly except for disruptions caused by lack of skilled manpower for field evaluation in the regions, lack of time for inspections and co-ordination problems.

The Department of Mineral and Energy Affairs' approach to the issuing of permits reflects its aims and functions i.e. to encourage the extraction of the materials as far as possible. Consequently attempts have been made to shorten procedures and the responsibility for site inspection now lies with each individual department as to whether it is necessary to refer applications to the Regional Representative. As yet, the requirement for environmental information in permit application documentation is limited. Figure 2 shows the routing for an application as it stands at the present time.

The applicant for a change of land use permit under section 6B of the Physical Planning Act, 1967, submits his application form (see Appendix 4) and supporting documents to the Department of Mineral and Energy Affairs' Head Office in Pretoria. The application is processed by the Department and copies are then sent to a variety of Departments, authorities and organisations for comment. The Department is not obliged to consult with anyone on a permit application. There is a centre core of bodies which are consulted

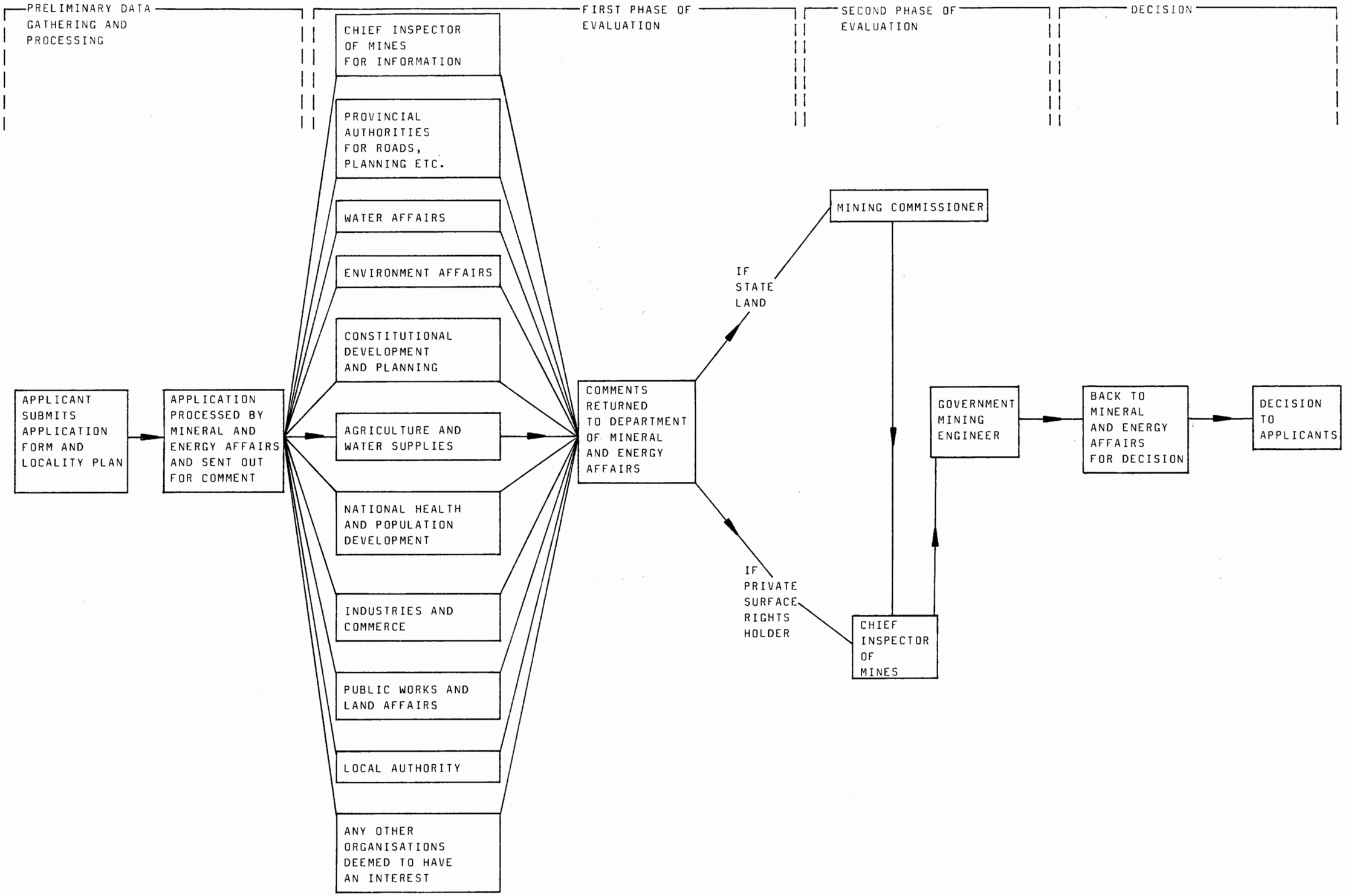


FIGURE 2 FLOW CHART SHOWING THE PRESENT ROUTING OF A PERMIT APPLICATION UNDER SECTION 68 OF THE PHYSICAL PLANNING ACT

and these are: Department of Constitutional Development and Planning; Department of Agriculture and Water Supplies; Department of Environment Affairs; Department of Water Affairs; Department of National Health and Population Development; Department of Public Works and Land Affairs; the relevant Provincial authority; and the relevant local authority.

The Department also consults other Departments, bodies and organisations where they may be affected. For example, if power lines or telephone servitudes are in the vicinity, Escom or the Department of Posts and Telecommunications would be asked for comment. Similarly, if railways were affected directly or indirectly, the Department of Transport would be asked to comment. This consultation is common with State or semi-state bodies with the exception of the Nature Conservation authorities at Provincial level who are rarely consulted unless through the Department of Environment Affairs or if the Department of Mineral and Energy Affairs' officials have reason to believe there may be a nature conservation issue involved in the application. It is rare that private nature and environmental organisations such as the Wildlife Society of Southern Africa or the South African Ornithological Society or the Habitat Council are consulted. This can be explained by the fact that the Department of Mineral and Energy Affairs employs no ecologists, botanists, zoologists or environmental scientists who would be trained to identify situations where referral to such organisations would be of value. Furthermore, the philosophical base of the Department of Mineral and Energy Affairs' aims does not provide for consideration of the natural environment. (Discussed in section 1.2.1)

The response time from the consulted bodies varies from 6 weeks to 18 months. It would seem that low prioritisation and manpower and resource shortages create long delays in the returning of comments. The Department of Mineral and Energy Affairs will hold back the processing of the application until the Government departments contacted have submitted their comments. In some cases, either where the applicant puts pressure on the Department to speed up an application or where the Department's officials judge that the application would not be contentious, the application may be processed without key comments, which would then "follow" the application on their receipt.

Under normal circumstances, once all the comments have been received, the application file and comments are forwarded to the Chief Inspector of Mines of the region in which the application falls. This is the case if the surface rights of the property are in private hands. However, if the application is on State land or the State owns the surface rights, then the application is first referred to the Mining Commissioner in whose district the application falls. The Mining Commissioner administers the Mining Rights Act 1967 (Act 20 of 1967) and calculates the royalties payable by the applicant to the State for use of State land. Once these details are added to the file, it is referred to the Chief Inspector of Mines. The Chief Inspector of Mines also administers the Mines and Works Act, 1956 as it applies to the quarry (control of safety, explosives, machinery, rehabilitation, manpower, licensing and operation). A copy of the application is sent to him at the same time as it is circulated to Government departments for his convenience in order to allow him to fit a field inspection into his normal inspection schedule. The

Chief Inspector will examine the various comments and his own Inspectors' inspection reports and make a recommendation to the Government Mining Engineer on whether or not the permit should be granted and what conditions should be added, based on the recommendations contained in the commentaries. If the Government Mining Engineer concurs, the recommendation is passed back to the Head Office of the Department of Mineral and Energy Affairs where the Minister's delegate takes the final decision on the issuing or not of the permit. Should the Government Mining Engineer not agree with the Chief Inspector of Mines, negotiations will be carried out between the two until concensus is reached.

In the majority of cases, Government departments will respond strictly within the parameters of their legislative responsibilities. For example, the majority of replies from the Department of Water Affairs will not object in principle provided the applicant complies with the provisions of the Water Act, 1956 applying to pollution control and water course diversion. There is little, if any, communication between Departments on applications. This is a regression in integrated resource planning because at one stage there was cross-pollination of concerns when the Department of Planning and the Environment administered section 6B permit applications. (Described earlier in section 1.3.2)

If the applicant is refused a permit, he can appeal to the Minister of Mineral and Energy Affairs. In this case the whole procedure is repeated with the exception of the final stage where the Minister makes the final decision on the issuing or not of the permit.

1.4 ENVIRONMENTAL PROTECTION MEASURES 1985

1.4.1 Consultation

The Department of Mineral and Energy Affairs refers applications for change of land use permits to other Government departments, State and semi-state organisations, provincial and local authorities and occasionally to private bodies. It is not obliged to do so nor is it obliged to heed advice or accept proposed permit conditions. It is unlikely, however, that the Department would ignore comments made by influential Departments such as Agriculture and Water Supplies, Constitutional Development and Planning, or National Health and Population Development.

The comments submitted are normally strictly within the sphere of the Department's aims and objectives or the legislation which they administer and enforce. The Department of Mineral and Energy Affairs will evaluate the comments within the parameters of its own aims and objectives (see section 1.2.1) which give priority to mineral extraction.

The consultative process is therefore flawed because (a) the specialised comments will conflict with the aims and objectives of the Department of Mineral and Energy Affairs; (b) the Department of Mineral and Energy Affairs does not have specialised multi-disciplinary staff to interpret and evaluate the information received and (c) the Department has no internal formal conflict resolution mechanisms to cope with the inevitable clashes of interest between Mining, Agriculture, Environment and Development.

1.4.2 Chief Inspector of Mines

The Chief Inspector of Mines has a pivotal role in the assessment of permit applications. He is first in the application process to evaluate all the comments submitted from the various sources. He will assess the application using his considerable experience in the field of mining and submit a report to the Government Mining Engineer recommending approval, or approval with conditions, or rejection.

The Chief Inspector of Mines' main function is the enforcement of the Mines and Works Act, 1956. The time that he is able to spend on section 6B applications is very limited. One Chief Inspector remarked to the author that he was often faced with the choice of spending time either on coal mine safety or quarries and he stated that he had no hesitation in spending his time on coal mine safety.

The questions that must therefore be asked are: (a) does the Chief Inspector of Mines have the necessary skills and experience to evaluate the need and desirability of a quarry using the multi-disciplinary information available? (b) Within the sphere of his other responsibilities, does he have the time to give sufficient attention to quarry evaluation? and (c) Is his brief wide enough to allow him the opportunity to evaluate priorities beyond mining concerns? The author's answer to all these questions is no.

1.5 SUMMARY

This chapter has examined the history of the names, aims and functions of the Government departments involved in the process of quarry licensing from 1972 to 1984. This was done under the headings, Mining, Planning and the Environment. Legislation pertaining to the control of quarry development was briefly reviewed and discussed. Present measures taken to protect the Environment were described and discussed. The broad conclusion reached is that the present system is not geared towards taking into account the broad-based needs and priorities of Environmental Planning and Conservation.

CHAPTER 2: THE ENVIRONMENT AND QUARRIES

2.1 INTRODUCTION

The previous chapter demonstrated that the current system of evaluating quarries does not take into account the needs and priorities of Environmental Planning and Conservation.

In order to develop an alternative process that will satisfy both the Mining and Environmental fraternities, it is necessary to examine in more detail the components under discussion, namely, the Environment and quarries. This chapter will look at the perceptions of the Environment from the broadest aspects to more specialised concerns. It will also place the quarry into perspective within the environment and discuss the adverse attitudes that exist between the mining and environmental fraternities.

2.2 ENVIRONMENT

2.2.1 Legislation

Rau and Wooten (1980) observe that the United States' National Environmental Policy Act, 1979 (NEPA) does not define the term "Environment". Consequently, Rau and Wooten put forward a sound, but wide, definition which provides a starting point for grasping the wider conceptual implications of the term Environment. Their definition is: "... the whole complex of physical, social, cultural, economic and aesthetic factors which affect individuals and

communities and ultimately determine their form, character, relationship and survival ..." where "individuals and communities", refer to both human and non-human organisms.

The South African Environment Conservation Act (Act 100 of 1982) also does not include a definition of Environment but the Report by the Commission of Inquiry into Environmental Legislation (Anon., 1982) included two definitions. They were "... The Environment consists of the entire complex of interacting factors - physical, biological, social, economic and cultural - that routinely affect the lives of individuals and communities" (Environmental Planning Professions Interdisciplinary Committee, 1983) and "The Environment is the total context of the human life cycle" (Anon. 1982)

It is necessary to have an all-encompassing definition of Environment to reinforce the fact that man's development and societal physical actions such as mining, building, landscape alteration and physical modification, must be viewed together with natural environmental features such as flora and fauna. Lack of such definition has probably contributed to the polarisation that exists between the Mining and Environmental fraternities because they have perceived themselves as being separate entities and not units of a total system. Rau and Wooten's previously mentioned definition is the better of the three definitions discussed because it emphasises and qualifies the factors listed by linking them together, clarifying organism survival and implying an interdependency.

2.2.2 Scope of Environment

Fuggle and Rabie (1983) recognise that the term Environment is widely used and means different things to different people. He points out that for clarification purposes, the term should be qualified when used, to give more precision and accuracy to its use. For example, when applied to man, Environment could be referred to as "... the totality of objects and their interrelationships which surrounds and routinely influences the lives of man ...." He regards this as the "Human Environment".

Beanlands and Duinker (1983) concede that the term Environment has come to include the social and economic milieu of development proposals as well as the natural (biophysical) Environment. Munn (1979) attaches little importance to defining Environment, using simply "that which surrounds" which closely resembles dictionary definitions e.g. "surrounding; and the action of environing; (Little et al, 1978), "a surrounding". (MacDonald, 1974)

Parker (1980) though discussing Environment in an engineering context, limits her definition to a biological base, "... the Environment is the sum of all external conditions and influences affecting the life and development of organisms ..."

Section 2.2.1 clarified the need to define environment in its broadest sense, legislatively, to encourage all sectors of the community, including the industrial and commercial fields, to include their fields of activity within a holistic perception of environment. In contrast, this section has attempted to clarify the

need to qualify specific references to environment with a definite description of the facet in question. This is necessary for manageable description and manipulation and specific concerns. Thus the term Environment should be described or qualified when used to understand and set parameters for the purposes of practicality and manageability.

The discussion of Environmental Impact adds another dimension to "Environment" and this, along with Environmental Impact Assessment methodologies, will be examined in Chapter 3 and 4.

2.3 QUARRIES

2.3.1 Definition

Within the Physical Planning Act, 1967 a quarry "... means any open excavation made with the intention of searching for or removing any soil, sand, gravel, stone or clay ...." For the purposes of the study, this will be used as the basic definition.

2.3.2 Description

A quarry can also be described as an open-cast mine or an open-cast pit. The Mines and Works Act, 1956 refers to an open-cast mine in the rehabilitation regulations. It states, "... 'open-cast mine' means a mine, including prospecting operations and any hole, trench or other excavation made in the course of prospecting operations, where a mineral deposit is or has been worked at or from the surface of the earth after removal of the overburden; ...."

The size of quarries in South Africa ranges from very small one man operations removing 50 cubic metres of material per month to large-scale, highly mechanised operations removing 100,000 cubic metres of material per month.

Specific impacts arising from quarrying can be summarised as: noise and vibration; dust; water pollution; traffic generation; solid waste generation and aesthetic implications. The extent of these impacts varies considerably according to size, quarry material, material demand, quarry planning and position.

Quarry location is controlled by market location, low value of commodity, transport costs and material quality. It becomes uneconomic to the quarryman to transport his materials beyond a radius of approximately 30 km from the quarry site. This figure may vary according to market conditions, transportation costs and competition.

2.3.3 Purpose and growth

It is important to clarify the purpose of quarries. Their primary necessity is to supply construction materials for the construction industry, without which virtually all building work would cease. (Bradshaw & Chadwick, 1980)

With the improvement of building technology, material demand has increased as has the demand for high quality materials. This has caused an expansion in the quarrying industry and establishment of more quarries to meet demand. Table 1 illustrates some of these factors.

TABLE 1: Growth factor in selected construction materials: 1980 and 1983

Commodity	L.S.M. (1980)	L.S.M. (1983)	% change
Quarries (total)	32 012 699	36 832 634	15,05
Gravel	779 326	615 457	-21,03
Sand	4 746 861	7 502 562	58,05
Limestone (for cement)	9 285 449	9 904 525	6,67
Clay	521 288	358 355	-31,25

[L.S.M. - Local Sales Mass (Tons)]

Commodity	L.S.V. (1980)	L.S.V. (1983)	% change
Quarries (total)	115 359 404	194 102 002	68,26
Gravel	1 072 411	1 930 464	80,01
Sand	9 384 836	22 864 765	243,63
Limestone (for cement)	15 499 663	24 003 406	54,86
Clay	12 355 447	10 643 154	-13,85

[L.S.V. - Local Sales Value (Rands)]

Source: Minerals Bureau

Total local quarry sales by mass indicate a 15,05% increase which was reflected by a 68,26% increase in local sales value in Rands. The higher increase in value over quantity produced reflects a rapid rise in construction, for which the quarry sector could not supply sufficient materials thus causing an increase in price through restricted supply.

The decrease in gravel sales is probably caused by higher priority being placed on rapid building of Black housing to meet increased Black urbanisation demands. Cement blocks used in the provision of mass low-cost housing in South Africa require shorter manufacturing time and use sand. This growth is reflected in a 58,05% sales mass increase and a corresponding local sales value increase of 243,63% for the same reasons as mentioned previously.

Restricted national reserves of limestone of sufficiently uniform quality for cement manufacture reflects a low mass increase. However, high value increase (mass increase of 6,67% but sales value increase of 54,84%) reflects high demand, and with limited supply, causes a commodity price increase and corresponding increased sales value.

2.3.4 Public perception

Public perception and awareness of quarries has increased in South Africa during the last decade for the following reasons:

1. Increased urbanisation, industrial development, and population; and expanding transport systems have increased demand for construction materials (see Table 1) necessitating more and bigger quarries which are more visually and perceptually conspicuous and therefore generate more public concern.

2. Increased demand for suburban residential areas is pushing urban development into the zone just outside of towns and cities which is occupied by quarries supplying urban material demands and creating a conflict between the need to supply building materials and the desire for a high quality, undisturbed environment in the new suburbs.

3. Growth of conflict in medium and long term land use planning between increasing construction material demands and environmental conservation demands. (There is an interesting correlation between areas which are conservation-worthy but have been zoned for construction materials. For example, in

the case of sand and gravel, good drainage and availability of fertile silt results in the development of diverse and productive ecosystems which are desirable for conservation and recreation.)

4. Improved technology has created considerable cost savings through: economies of scale; improved extraction and removal techniques; improved engineering and rock mechanics techniques - thus creating an attractive investment and encouraging more quarrying companies to develop, particularly those that are large enough to benefit from economies of scale and are efficient enough to keep capital and operating costs low.

5. An increased awareness by the general public of the need for Environmental Conservation and the importance of a good quality of Environment for recreation, conservation and preservation.

The quarrying industry has in the past been able to operate undisturbed by controls or restrictions. Industrialisation, economic expansion, urbanisation and population growth within the last two decades caused an expansion in the industry which began to create a conflict with other land uses. First came the Physical Planning Act which put a control on the opening of new quarries and later in 1980, the rehabilitation regulations of the Mines and Works Act made the quarryman responsible for ensuring that what was left after quarrying was completed could be used for other purposes.

These moves forced the quarrying industry to become more professional in its approaches and the results are now showing in that the Institute of Quarrying is running regular conferences and has instituted a professional examination through a recognised educational institution.

A growing environmental awareness amongst the public in general within the last five years has also influenced the quarrying industry. Quarries tend to have a prominent visual profile which attracts attention. Usually it is older quarries that are attracting the most adverse comment because no consideration was given to environmental factors when they were first opened. Newer quarries are being planned using landscape architects and town planners to blend quarries with their surroundings and to plan after-use, even before quarry operations commence.

2.3.5 Quarry evaluation

The author's experience is that there appear to be two approaches taken by officials of the Department of Mineral and Energy Affairs when assessing change of land use permit applications. The first approach, which covers the majority of applications, applies to those quarries where, in the view of the officials, there is unlikely to be objection because, for example, the proposed quarry would be in a barren, uninhabited area or where perhaps the quarry had already commenced operations. In this case, the decision-making process focusses on <u>how</u> the quarry should be developed rather than on whether or not it should be developed.

The second approach covers those quarries that the officials think might be sensitive. The sensitivity could be physical, biological, social, cultural, economic or aesthetic. The decision on this is taken by Department of Mineral and Energy Affairs officials and in the absence of appropriately qualified experts or scientists, appears to be arbitrary and dependant upon the relevant official's knowledge, experience or interest.

The difference between the two is crucial. Most of the physical environmental damage done by a quarry is done during the site clearance and preparation period when overburden is removed, haul roads established and plant and machinery erected. In the second approach outlined, the applicant will probably be told in definite terms not to commence operations until the permit is issued. In the first approach, experience has shown that the applicants proceed with quarrying work irrespective of the progress of their application. The shortage of manpower in the Inspectorate is a contributing factor to the lack of control. The Physical Planning Act states quite clearly that it is illegal to commence a quarry without a change of land use permit but lack of Inspectors limits enforcement of this. Furthermore, in order to stop an illegal quarry, a full motivation of the details of the case must be submitted to the Director-General of the Department of Mineral and Energy Affairs who, if he concurs, will appoint a senior official to investigate and make recommendations, after which the Director-General, if the case is confirmed, will issue an order for the illegal operation to cease, subject to a permit being applied for.

In the case of illegal operations, the Department of Mineral and Energy Affairs' policy is to rather legalise illegal quarries than to stop them or require them to be restored, as empowered by the Physical Planning Act. The reasoning put forward is that to stop and restore when the likelihood of the permit being granted is high, would be an unnecessary waste of money and contrary to the national interest.

It is clear from discussions that the bias towards mining that exists in the quarry permit approval authorities is not necessarily in the best interests of effective and correct utilisation of South Africa's natural resources. In order to overcome this bias without total replacement of permit-issuing authorities, it is necessary to introduce other disciplines into the evaluation process at as early a stage as possible.

2.4 DISCUSSION AND CONCLUSIONS

It is necessary to have a wide definition of Environment to help to conceptualise that man and his actions are a part of a wider, holistic all-encompassing system. It is also necessary, when discussing specific aspects, to qualify the word environment by some descriptive or explanatory term e.g. human environment, social environment, to place practical parameters on work within a specific sphere.

The increased involvement of quarrying concerns in everyday life require a greater degree of professionalism in planning and integration with other land use priorities. The responsible

authorities need to recognise that a higher priority needs to be attached to the quarry assessment process, and that stricter control must be maintained to ensure conformity with the legal requirements of the Physical Planning Act. In addition, a wider involvement of specialists and experts outside of the mining professions is necessary to categorise and isolate those quarry applications that are more sensitive and need greater attention and consideration.

The desire of the public to be heard with respect to quarries that are likely to affect them must be recognised. The increase in the number of quarries, coupled with the greater environmental awareness of the public, indicate a change in circumstances which should be adequately reflected in both legislation and Government Departmental policies and attitudes.

In order to introduce environmental concepts into what has previously been a purely mining-orientated evaluation process, it is necessary to examine Environmental Impact and Environmental Impact Assessment and to add a quarrying perspective. This will be done in Chapter 3 which will be followed in Chapter 4 by an examination of methodologies and techniques leading up to a basis for a suggested multi-disciplinary environmental evaluation system in Chapter 5.

CHAPTER 3: ENVIRONMENTAL IMPACT TERMINOLOGY

3.1 INTRODUCTION

This chapter will include selected definitions of Environmental Impact Terminology and provide the definitive basis for the proposed evaluation system to be described in Chapter 5.

3.2 TERMINOLOGY

3.2.1 Environmental Impact

Shopley (1981) quotes Matthews' (1975) definition that Environmental Impacts are a by-product of human activities undertaken to meet the physical and emotional requirements of man. This delimitation is useful for identifying and extracting related factors. On a wider scale, it is unwise to isolate human involvement from total Environmental Impact evaluation. (For example, quarry dust pollution is a human-related Environmental Impact but dust pollution from a volcanic eruption has an Environmental Impact that is probably more severe but tends to be ignored in formal evaluation processes.)

Rau and Wooten (1980) define Environmental Impact as "... any alteration of Environmental conditions or creation of a new set of Environmental conditions, adverse or beneficial, caused or induced by the actions or set of actions under consideration ..."

Sager in Ditton and Goodale (1972) states that Environmental Impact should be "defined or evaluated on the basis of man's ability to tolerate or adapt, both physically and mentally, to the altered, artificial Environment that is rapidly being created ...."

Rau and Wooten's approach provides a broad conceptual base and Sager's definition of development provides the manoeuvrability to help in "trade-off" situations between the man-made and natural Environments where a conflict of interests occurs. This is particularly important where one of the conflict proponents has little or no knowledge or interest in holistic Environmental considerations.

3.2.2 Primary and secondary impacts

The assessment and consequences of impact on the Environment are complex. The impacts may be of a direct or indirect, or of a primary or secondary nature. It is important to consider these various strata of impact, particularly when considering the need and depth of assessment studies at an early stage in project planning.

Shopley and Fuggle (1984) state that any effect on the biophysical and socio-economic Environments that arises directly from a cause related to the project is called a first order or primary impact. Secondary impacts are those effects on the biophysical and socio-economic Environments which arise from an action but which are not initiated directly by that action.

3.2.3 Environmental Impact Assessment

Jain et al (1977) define Environmental Impact Assessment as "the documentation of an Environmental analysis, which includes identification, interpretation, prediction, and mitigation of impacts caused by a proposed action or project ...." It should be pointed out that Jain et al (1977) discuss Environmental Impact Assessment and analysis in terms of NEPA with specific reference to the US experience.

Munn (1979) defines Environmental Impact Assessment as "... an activity, designed to identify and predict the impact on the biogeophysical environment and on man's health and well-being of legislative proposals, policies, programmes, projects, and operational procedures, and to interpret and communicate information about the impacts ...."

Fuggle (1983) describes Environmental Impact Assessment as the administrative process by which the Environmental Impact of a project is determined.

Beanlands and Duinker (1983) refer to Environmental Impact Assessment as "a process or set of activities designed to contribute pertinent Environmental information to project or programme decision-making ... to predict or measure the Environmental effects of specific human activities or do both, and to investigate and propose means of ameliorating those effects ...."

Munn's definition, by reference to impact generally and by referral to man's procedures as well as his physical actions, has more flexibility to cover the negative and positive Environmental Impacts of a project within the wider context of the Assessment. Jain et al (1977) and to a similar extent, Beanlands and Duinker (1983) make specific reference to mitigation and amelioration which by inference, indicates a greater concern over the negative impacts. It is important, particularly in a conflict situation, to be able to evaluate positive and negative impacts side-by-side rather than from different philosophical standpoints or time-scales. For example, if negative Environmental Impacts are put forward, and at a later stage the positive benefits of a project are introduced, there will already have been time for a polarisation of attitudes to have occurred, thus hindering any rational, balanced "trade-off" of concerns.

3.2.4 Environmental Impact Analysis

Environmental Impact Analysis and assessment have often been confused or interchangeably used. Catlow and Thirlwall (1981) state that the term Environmental Impact Analysis describes the process of carrying out an appraisal and evaluation of the total effects of a particular development on the Environment. They comment on the identification of terminology with the American system and remark that alternative terms such as "development appraisal statement" might be more appropriate.

Jain et al (1977) describe Environmental Impact Analysis as the study of the probable changes in the various socio-economic and biophysical characteristics of the Environment which may result from a proposed or impending action.

Shopley and Fuggle (1984) describe Environmental Impact Analysis as a process contained in Environmental Impact Assessment by which the Environmental effects of a project are analysed.

Catlow and Thirlwall's (1981) comments about terminology are relevant and terminology which generates preconceived biases may have serious consequences and compromise the adoption of Environmental Impact Assessment techniques in developing countries.

Shopley and Fuggle's (1984) description of Environmental Impact Analysis being a part of Environmental Impact Assessment would seem to be a platform from which to work.

3.2.5 Environmental Impact Statement

An Environmental Impact Statement is the documentation of an Environmental Analysis of a project or action with a potential for Environmental Impacts which are either significant or highly controversial and is a legal document required by the National Environmental Policy Act (NEPA) of the United States of America (Jain et al, 1977).

The use of this term outside of the USA serves little more than to confuse and thus will not be used in this study.

3.2.6 Environmental Impact Control

The term "Environmental Impact Control" has been given prominence in South Africa through its use by EPPIC (Environmental Planning

Professions Interdisciplinary Committee). EPPIC, through a set of guide-lines, has formulated the responsibilities of the planning professions as regards the Environment, and has indicated how Environmental Impact Assessment may be incorporated in planning and design (EPPIC, 1983). Although not directly defined, it would seem that Environmental Impact Control is a philosophical goal which, using tools such as Environmental Impact Assessment, seeks to "achieve a net improvement of the Environment of the community, taking all aspects of the Environment into account ...." (EPPIC, 1983). Furthermore, the emphasis seems to be on Environmental Impact Control being an on-going process rather than a "once-off" report.

3.2.7 Environmental Evaluation

In order to avoid confusion, the use of Environmental Impact Terminology was avoided in the title of this study and instead, "Environmental Evaluation" was used in a generic sense.

McAllistair (1980) describes evaluation as the obtaining, organising and weighing of information on the consequences, or impacts, of alternatives. He sees the full spectrum of biological, social, economic and political consequences as all part of an evaluation process. McAllistair's approach is very similar to approaches taken by authors describing the Environmental Impact Assessment process (Rau and Wooten 1980; Catlow and Thirlwall 1981; Munn 1979) in that his broad categories are the same. A major difference is that McAllistair sees the political role as more integral in the evaluation ("assessment") process. He gives active support to the concept that part of the Environmental planner's (or Environmental scientist's) role is to present political alternatives.

Consideration of political aspects is important at both macro and micro levels. For example, at a local level, ignorance of local interpersonal and intergroup politics can imbalance the ultimate decision-making process despite scientifically-orientated assessment or evaluation processes. Environmental Impact Assessment procedures based solely on scientific data cannot incorporate local political questions, thereby building in an inadequacy into the tool assisting the decision-making process.

3.2.8 Screening

Screening is a mechanism to establish whether a project or action will have environmental consequences such as to warrant the need for an Environmental Impact Assessment (Tomlinson, 1984). The United States Council for Environmental Quality, in terms of the regulations of NEPA, require government agencies to prepare an Environmental Assessment (EA) to determine whether a proposed action is of such magnitude to require the preparation of an EIA. The EA is a brief document (10-15 pages) which includes a discussion of the need for the proposed action, the Environmental Impacts of the proposed action and alternative actions and listing of persons and agencies consulted. An EA reaches one of two conclusions:

1. A decision to prepare an EIA.
2. A Finding Of No Significant Impact known as a FONSI (where an EIA is not required) (Council on Environmental Quality, 1983)

Tomlinson (1984) identifies three categories as a result of screening:

(i) Projects clearly requiring an EIA.

(ii) Projects not requiring an EIA.

(iii) The intermediate category for which the need for an EIA is unclear.

He suggests that the best manner to deal with the intermediate category is to introduce a secondary screening process. He adds that the United Nations Environment Programme utilise the concept of Initital Environmental Evaluation (IEE) within their guide-lines for EIA (UNEP, 1980). The IEE then either indicates that an EIA is not required or identifies impacts and lays a framework for a full EIA.

3.2.9 Scoping

"... Scoping is a process where the scope, that is what will be covered and in what detail, of an Environmental Impact Assessment is explored before work on the Analysis and resulting Assessment commences ...." (Council on Environmental Quality, 1981)

The concept of scoping as interpreted by the regulations of NEPA is discussed in detail in sections 1501.7 and 1508.25 of the regulations (Council on Environmental Quality, 1978): These are reproduced in Appendix 5.

Beanlands and Duinker (1983) view the scoping process in detail. They identify two forms of scoping: ecological scoping and social scoping. They view social scoping as the establishment of the terms

in which impacts should be expressed while ecological scoping represents the terms under which the impacts can be effectively studied.

Beanlands and Duinker (1983) take scoping into microscopic detail. An examination of scoping in the NEPA regulations (Council of Environmental Quality, 1978; Appendix 5) which originated from the need to clarify and simplify EIA procedures, indicates that if the concepts described are used, then ecological and social scoping will automatically be considered.

The approach adopted by the Ministry of Housing, Physical Planning and Environment (1984) summarises the aims of scoping into three sectors:

1. To enable a competent authority to properly brief the EIA preparer on the alternatives and impacts to be examined and how they should be examined.
2. To provide an opportunity for other parties to have their interests taken into account in the preparation of the EIA and
3. To focus the work of the EIA compiler on relevant issues and to ensure that the resulting EIA is useful to the decision-maker and is understandable to the public.

Tomlinson (1984) views scoping as establishing the terms of reference for an EIA and identifies five aims:

1. To identify concerns and issues needing consideration.
2. To facilitate an efficient EIA preparation process.

3. To enable those responsible for EIA to properly brief the study team on the alternatives and impacts to be considered at different depths of analysis.
4. To provide an opportunity for public involvement and
5. To save time.

3.3 PROPOSALS REGARDING TERMINOLOGY FOR USE IN SOUTH AFRICA

Based on the foregoing discussions, the terms listed below are proposed for use in the formulation of an Environmental Evaluation process for quarries in South Africa.

3.3.1 Environmental Impact - Any alteration of Environmental conditions or creation of a new set of Environmental conditions, adverse or beneficial, caused by the action or set of actions under consideration. The adversity or benefit shall be judged with due consideration to man's ability to tolerate or adapt, both physically and mentally, to an altered artificial Environment which may have a primary or secondary impact. (Modified after Rau and Wooten, 1980 and Sager in Ditton and Goodale, 1972)

3.3.2 Primary and secondary impacts - A primary impact is any effect on the biogeophysical and socio-politico-economic Environment that arises directly from a cause related to the project.

A secondary impact is any effect on the biogeophysical and socio-politico-economic Environment which arises from an action but which is not initiated directly by that action. (Fuggle 1984, modified)

3.3.3 Environmental Impact Assessment - The documentation of an Environmental Analysis, designed to identify and predict the impact on the biogeophysical and socio-politico-economic environment and on man's health and well-being of legislative proposals, policies, programmes, projects, and operational procedures, and to interpret and communicate information about the positive and negative impacts. (Modified from Jain et al, 1977, and Munn 1979)

3.3.4 Environmental Impact Analysis - The process contained in an Environmental Impact Assessment where the probable changes in various biogeophysical and socio-politico- economic characteristics of the Environment which may result from a proposed or impending action are analysed. (Modified from Fuggle, 1984 and Jain et al, 1977)

3.3.5 Environmental Impact Control - The description of a dynamic management process which uses planning tools, such as Environmental Impact Assessment, in the planning, construction, maintenance and decommissioning of a project.

3.3.6 Environmental Evaluation - The preparatory obtaining, organising and weighing of information on the consequences, or impacts of alternatives with a view to deciding upon the need for either (a) no further Environmental investigation, (b) a simplified Environmental Impact Assessment or (c) a full Environmental Impact Assessment. (Modified McAllistair, 1980)

The term is used in a broad generic sense, descriptively, as opposed to screening which is a discrete specific procedure.

3.3.7 Screening is a procedure for establishing whether or not the environmental consequences of a project are significant enough to warrant the preparation of an EIA. The procedure identifies three resultant categories:

(i) No requirement for an EIA.

(ii) An indeterminant requirement for an EIA or

(iii) a definite requirement of an EIA.

In the case of (ii), a secondary screening procedure is implemented to reach a final decision. (Adopted Tomlinson, 1984; Council on Environmental Quality, 1983)

3.3.8 Scoping is a procedure for the delineation and addressing of significant issues related to a proposed action. This procedure should focus the work of the EIA compiler on relevant issues (raised in both the public and private sectors) to ensure that the resulting EIA is useful to the decision-maker and (where relevant) understandable to the public. (Adapted Council on Environmental Quality 1978; Ministry of Housing, Physical Planning and Environment, Ministry of Agriculture and Fisheries, 1984).

3.4 CONCLUSIONS

This chapter has established a definitive basis for an Environmental Evaluation System for quarries in South Africa. This, together with recommended methodologies to be discussed in Chapter 4, will be used in constructing the system described in Chapter 5.

CHAPTER 4: ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGIES, TECHNIQUES AND PROCEDURES

4.1 INTRODUCTION

This chapter will review EIA methodology and the techniques and procedures which make up that methodology. The aim is to clarify terms used and to develop a theoretical basis on which the proposed Environmental Evaluation methodology for South African quarries will be developed in Chapter 5.

4.2 DEFINITIONS

4.2.1 Method

A method can be described as the mode of accomplishing an end (Macdonald, 1974) or a mode of investigation (Little et al, 1978). Fuggle (1983) states that a method of Environmental Impact Analysis describes a complete activity for analysing impacts for an Environmental Impact Assessment.

4.2.2 Methodology

A methodology is a system of methods and rules applicable to research or work in a given science. (Macdonald 1974) Fuggle (1984) describes methodologies as the conditions pertaining to the activity of conducting an Environmental Impact Investigation (i.e. the terms of reference by which the impacts of a project are investigated, presented and, finally, considered by decision-makers).

4.2.3 Technique

A technique is a method of performance or manipulation (Macdonald, 1974) or performance in relation to formal or practical details (Little et al, 1978). The term technique is used for specialised procedures within Environmental Impact Analysis which evaluate (rather than identify) impacts. (PADC, 1976)

4.2.4 Procedure

A procedure is a course of action or a step taken (Macdonald, 1974) or a particular action or mode of action. (Little et al, 1978)

4.3 METHODS

The classification of methods and the subsequent number of methods which are recognised varies from author to author. Rosenberg et al, (1981) identify six methods. (Panels, check-lists, flow diagrams, matrices, overlays and modelling.) Shopley and Fuggle (1984) categorise eight methods (ad hoc approaches, check-lists, matrices, networks, overlays, modelling procedures, evaluation techniques and adaptive methods). Couillard (1984) quotes Warner and Preston (1974) and uses eight methods: check-lists, matrix methods, cartographic methods, networks, statistical methods, scenarios and contextual representations, the Delphi method and other creative methods. He also introduces the Coherence Graph as a ninth approach. Bisset (1981) only goes so far as to list five methods (check-lists, matrices, networks/systems diagrams, quantitative/index methods and modelling), qualifying his reasoning by describing these as the main types.

For an efficient and comprehensive review of the methods the summary table from Rosenberg et al (1981) showing use, description, strengths and weaknesses will be reproduced as Table 2 (see rear pocket), and individual commentary on methods will be given.

4.3.1 Ad hoc approaches

Ad hoc methods (perhaps the oldest and crudest approach to Environmental Impact Analysis) were widely used by USA Federal agencies in the 1970s as a result of NEPA guide-lines which suggested areas of possible impact without recommending specific means for their measurement or evaluation. (Shopley and Fuggle, 1984)

It is the author's opinion that, currently, virtually all Environmental Impact studies carried out in South Africa are done using ad hoc methods in view of the lack of specific legislative guide-lines from central or provincial government. It can be concluded that, currently, South Africa is undergoing exactly the same genesis as was seen after the introduction of NEPA in the USA and before the promulgation of regulations specifying detailed requirements.

4.3.2 Check-lists

Bisset (1981) describes check-lists, at their simplest as comprehensive lists of Environmental factors which may be affected by a particular project. Fuggle and Rabie (1983) note that check-lists omit the important step of Environmental description because they provide a predetermined list. Shopley and Fuggle (1984) identify

three classes of check-list: simple and descriptive, scaled, and weight-scaled.

4.3.2.1 Simple and descriptive check-lists

These check-lists differ from ad hoc methods only in that defined areas of possible impacts are listed. Furthermore, no attempt is made to evaluate impacts qualitatively or quantitatively. (Shopley and Fuggle, 1984) Bisset (1981) sees them as aids for identifying impacts and ensuring that important factors are not omitted from an EIA.

4.3.2.2 Scaled check-lists

Scaled check-lists allow impacts to be ranked in order of magnitude or severity. Unfortunately, they are based on mathematical criteria which include specific interval or ratio scales which tend to be inflexible when evaluating diverse impacts or irregular physical parameters. Shopley and Fuggle (1984) question their effectiveness because they tend to rely upon the subjective assignment of numerical values.

4.3.2.3 Weight-scaled check-lists

The weight-scaled check-list, as described by Dee et al (1973), is incorporated in an Environmental Evaluation System developed by the Battelle Columbus Laboratories.

Seventy-eight Environmental parameters are weighted by a multi-disciplinary team using a method of fractionation. A normalised numerical value is derived for each parameter by the use of a value function which transforms parameter measures into Environmental Impact Units. The Delphi technique (discussed in 4.3.7) is used to encourage a consensus of opinion among a team of assessors on relative weightings, impact scores and the form of the value functions. An index is derived which can be used to compare the no-project situation with various project alternatives. (Shopley and Fuggle, 1984)

4.3.3 Matrices

Matrices tend to consist of at least two check-lists, one horizontal and one vertical. They are generally an enumeration of Environmental factors and likely development actions, e.g. vegetation clearance and pile-driving. (Bisset, 1981) A pioneering model developed by Leopold et al (1971) is useful because it contains, in one format, a list of impact-causing factors and a list of sensitive Environmental features. Shopley and Fuggle (1984) differentiate between two types of matrix which utilise different techniques to display their information: presentational and mathematical matrices.

4.3.3.1 Presentational matrices

Where a project action has an effect on an Environmental characteristic, the appropriate matrix cell is scored for potential impact magnitude and significance. (Shopley and Fuggle, 1984)) Chase (1976) lists five varieties of matrices with different

representation forms: (1) Descriptive (short two to three word descriptions are inserted into the matrix cell); (2) Symbolised (shapes are used to distinguish between direct and indirect impacts with shading indicating severity); (3) Characterised (characters are used ordinally to rank impacts); (4) Numeric (where ordinal and interval scaled evaluations are given numeric scores); and (5) Combinative (where impacts are represented by both numeric and non-numeric indicators).

4.3.3.2 Mathematical matrices

A mathematical matrix is a rectangular array of quantities upon which algebraic operations can be legitimately performed. They have not played an important role in Environmental Impact Analysis because of problems in quantifying all types of impacts. Shopley and Fuggle (1984) remark that their use has been as supportive assessment techniques. There are three major types: (i) the Peterson-type matrix (Peterson et al, 1974) in which a matrix of casual factors and Environmental Impacts is multiplied by a matrix of Environmental Impacts and human impacts to produce an overall "score"; (ii) The Component Interaction Matrix (Ross, 1974) arranges Environmental components along both horizontal and vertical axes, direct dependencies between the components are identified by assessors and marked in appropriate cells. Using a mathematical matrix powering procedure higher order interdependencies are generated; iii) input-output matrices. (Leontief, 1970) Here a matrix is used to analyse the level of output of each sector of a given economic system in terms of its relationship to the productivity in all other sectors.

Fuggle (1979) has developed an extended presentational, combinative matrix which allows for assessment of importance, benefit, probability, time of occurrence, duration, risk, remedial measures and secondary impacts to be represented. As a presentational matrix, the model requires a considerable degree of visual multi-dimensional perception to interpret the relevance of the represented data. It is doubted, at the current level of Environmental awareness and perception within the quarrying industry, if the required degree of "literacy" exists to interpret and utilise this form of data presentation.

4.3.4 Networks

This method attempts to aid identification of indirect impacts. Networks have also been termed "linear graphs" by Skutsch and Flowerdew (1976) and "stepped matrix" (Canter, 1977) but were originally developed by Sorensen (1971). The method recognises that a series of impacts may be triggered by a project action and, by defining a series of possible networks, permit the identification of impacts by selection of the appropriate project actions. (Jain et al, 1977) Shopley and Fuggle (1984) identify two types of networks, that are described by Jain et al (1977) and a second type which traces the higher order dependencies among the components of a defined system.

4.3.5 Overlays

The use of map overlays as a formalised aid to planning was developed by McHarg (1971; originally 1968) to incorporate broad Environmental

considerations into the selection of highway routes and rural planning.

The McHarg overlay is based on a set of transparent maps, each of which represents the spatial variation of the social value of an Environmental parameter (e.g. physical, social, aesthetic, ecological). The maps are shaded to show degrees of social cost. A composite picture of the overall social cost of affecting any particular area is approximated by superimposing all the transparent maps. (Shopley and Fuggle, 1984; Jain et al, 1977)

From a practical point of view, the maximum number of parameters in a transparency overlay is ten (Munn, 1975) but Clark et al, (1980) note that the practical efficiency of overlays can be extended by computerised techniques for mapping.

4.3.6 Modelling

Munn (1975) describes models in Environmental Impact Analysis as simplified representations of the real, complex systems which may be affected by a project. Modelling to a greater and lesser degree has already been described in some of the above-mentioned methods but there is a danger that a model could be constructed that is unrealistic in real world terms. Bisset (1981) puzzles over Holling (1978) who criticised the lack of models in EIA at that time. Bisset (1981) remarks that "as higher and higher levels of abstraction and conceptual complexity are reached at the expense of Environmental simplification, the public is excluded and the world is reduced to the manipulation of symbols in a closed world of EIA experts." He

concludes that this would be politically unacceptable unless a greater public involvement was incorporated.

Despite problems, Shopley and Fuggle (1984) conclude that the modelling of system processes is possibly the most efficient means of investigating the origins of secondary impacts, and probably the only way of quantifying them.

4.3.7 Evaluation techniques

Environmental Impact Assessment originates as a decision, reflecting the social values of a community, to consider the Environmental cost of development projects. Economic and Environmental costs are both implicitly related to the value preferences of society, yet they differ in their ability to be quantified. The cost of economic goods is related to the utility attached to them by society and can be quantified in monetary terms. Environmental quality is less easily quantified as there are no common units of Environmental health. (Shopley and Fuggle, 1984; McAllistair, 1980)

The Delphi technique, as an evaluation technique, first made its major debut as an integral feature of the weight-scaled check-list method of Dee et al (1973). The technique was originally designed for business purposes to encourage consensus development among experts and to sharpen their thinking with respect to prognostication. (Dalkey and Helmer, 1963; Dajani and Gilbert, 1975) It is a staged discussion process which commences with a "brain storming" session followed by a series of numeric evaluations and written feedbacks to assess the degree of consensus. One of the

advantages of the technique is its anonymity and avoidance of direct exchange between participants thus giving protection from dominant personalities via the anonymity of a central co-ordinator. Despite the care taken, the quantified evaluation of impacts will always be an entirely subjective activity. (Matthews, 1975)

4.3.8 Adaptive methods

Adaptive methods have been developed because flexibility and the combination of individual methods is required to cope with varying circumstances and conditions. Shopley and Fuggle (1984) summarise four adaptive approaches: (1) Catlow and Thirlwall (1976) conclude that the United Kingdom's flexible administrative and planning structures favour descriptive rather than evaluative methods; (2) the approach by Clark et al (1976), whose adaptive approach to impact assessment for the United Kingdom is based on Catlow and Thirlwall's 1976 recommendations, and which contain a check-list compatible with the existing planning structure, an interaction matrix, and guide-lines on the communication of impact information; (3) Holling (1978) who suggests that EIA should be plan and policy-orientated rather than initiated at post-design stage; and (4) Sondheim (1978) who stresses evaluation of impact, as opposed to investigating impacts.

It is clear from the varying approaches that if methods commence from basics and progress hierachically as interactions become more complex, then it is quite possible to modify standard methods to meet specific needs.

4.3.9 Coherence graphs

Couillard (1984) cites Tenière-Buchot (1972) who, in an analysis of existing impact evaluation methods, demonstrated that they all converged towards the objective of describing the behaviour of systems in relation to a given action. Couillard concludes that what is needed is a guide, or a general approach, which permits the identification and evaluation of different impacts. The coherence graph is described as a composite of several techniques in a formal framework which permits the interrelationships between Environmental components of an action and the consequences of this action to be represented schematically.

4.4 DISCUSSION AND CONCLUSION

It has been demonstrated that there is a wide range of technical methods for Environmental Impact Assessment and that there are many non-qualifiable and non-quantifiable facets in an assessment. Many of the methods can only be managed by highly skilled, experienced and specialised experts and require equally specialised staff to interpret and utilise the results of the methods and techniques.

Currently, there is in the quarrying industry in South Africa a deep suspicion of anything related to Environmental Impact Assessment as a concept. That suspicion is related to the fact that there is considerable ignorance as to what EIA is, what its purpose is and what benefits are derived from using it.

South Africa currently suffers from a serious shortage of skilled labour and expertise throughout industry and commerce. This applies also to the commercial field of Environmental consultancy. There is a shortage of trained environmental scientists, ecologists, social scientists, economists, engineers and landscape architects with experience in Environmental Impact Assessment.

These limitations must be taken into account in any proposed Environmental Evaluation System for quarries. In order to be practical such a system should:

1. Fit the existing quarry planning process without unreasonable disruption;
2. Be capable of being utilised with a minimum of specialised expertise;
3. Be capable of implementation by professionals within the quarrying industry;
4. Be capable of being "up-graded" and improved as the degree of involvement of EIA and Environmental planning increases within the industry;
5. Take into account the implications of cultural perceptions of development proposals;
6. Have realistic cost implications when considered in terms of the overall cost structure of quarry operation.

Chapter 5 will present an Environmental Evaluation System which seeks to meet the above-mentioned conditions and which could be applied within the South African quarrying industry.

CHAPTER 5: A PROPOSED ENVIRONMENTAL EVALUATION SYSTEM FOR THE ASSESSMENT OF QUARRIES IN SOUTH AFRICA

5.1 INTRODUCTION

This chapter will outline and explain the proposed evaluation system with reference to a flow diagram. (Figure 3.) Each major stage in the procedure will be explained in detail and, where necessary, guidelines (see Appendices 6, 7 and 8) have been drawn up. Furthermore, a revised application form has been developed. (Appendix 9)

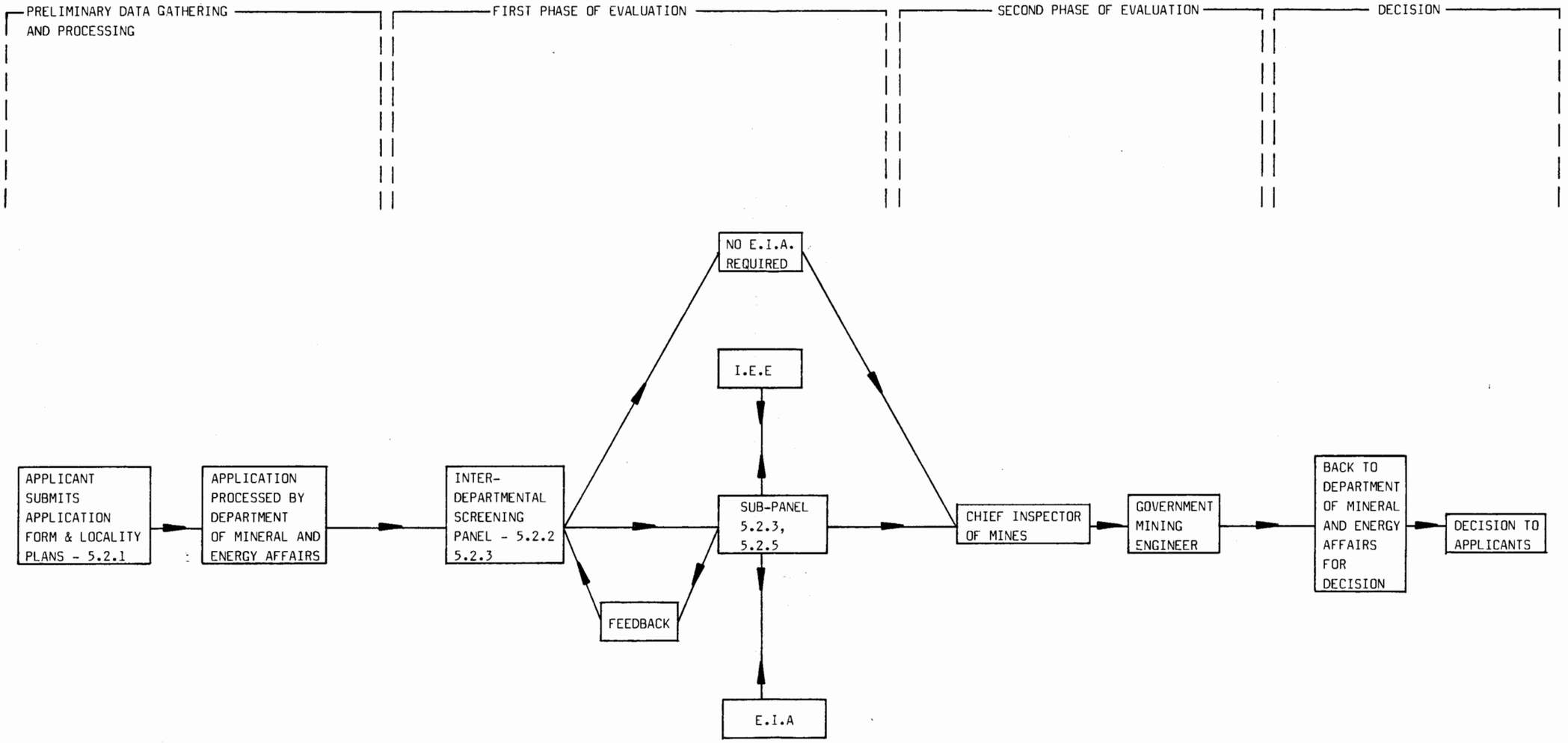
The procedure has been made, as far as possible, to fit the existing procedures of the Department of Mineral and Energy Affairs. Consideration has been given to historical problems and changes (discussed in Chapter 1), existing quarry evaluation (sections 2.3 and 2.4) and the limitations listed in section 4.4.

The existing application form has been expanded to function as a descriptive check-list (see section 4.3.2.1). The adaptations to the application form are designed to generate information to allow preliminary evaluation of the economic and environmental feasibility of the proposed quarry.

5.2 FLOW DIAGRAM STAGES

5.2.1 Application form

The existing quarry approval system obtains information using a basic application form. (Appendix 4 is an example) This functions as a



NOTE

NUMBERS REFER TO RELEVANT DESCRIPTIVE SECTIONS IN THE TEXT

FIGURE 3 FLOW CHART FOR A PROPOSED ENVIRONMENTAL EVALUATION SYSTEM FOR THE ASSESSMENT OF QUARRIES IN SOUTH AFRICA

crude check-list but with insufficient information to identify potential environmental concerns. Furthermore, applicants do not fill the form in fully or correctly and the Department of Mineral and Energy Affairs has indicated that it has insufficient administrative staff to ensure the form is filled in correctly or returned to the applicant for more information.

A new application form has been created, based upon the existing form but with guide-lines on how to complete the form and the implications of not completing the form fully. (Appendix 9 contains the proposed new application form and a document entitled "Advice to Applicants") The form is designed to provide preliminary information to enable the inter-departmental screening panel to screen the application.

The main changes to the existing application form are as follows:

(a) The applicant is instructed to read an explanatory document entitled "Advice to Applicants" whilst filling in the form. The document urges the applicant to fill in the form fully and warns that failure to do so will delay issuing of the permit. (This is sufficient motivation to encourage co-operation from the applicant.) The major questions in the form are then dealt with in detail and, where possible there is an explanation of why the information is needed and how it interlinks with other legislation The document is also designed to enable the applicant to fill in the form with confidence and also to demonstrate that the information required is necessary and relevant.

(b) Section 2 of the application form has been expanded to encourage the applicant to describe exactly what his operation encompasses. Where his operation is not included on a list of alternatives,he is asked to give specific details.

(c) Section 5 has added to it a requirement to give the name and number of the 1:50 000 or 1:250 000 map on which the operational site has been located. This is to enable a rapid check of the location to be made.

(d) Section 18 has been added, requiring the applicant to consult the National Atlas of Critical Environmental Components. This Atlas has been developed by the Department of Environment Affairs to assist developers to identify possible critical environmental components, which may be located on their property, at an early stage in their planning and thus allow a reasoned evaluation of the restrictions that critical areas may impose.

(e) The most significant change to the form has been the requirement, in section 24, for a memorandum stating the need and desirability of the proposed operation; a second memorandum describing mitigating measures for the negative environmental impacts of the operation; and finally an indication of the measures to be taken after cessation of activities. The purpose of this is to encourage the applicant to justify his application and to encourage a logical reasoned basis for the development which takes into account other related factors.

(f) Finally, a check-list of documents to accompany the application form has been slightly expanded to cater for changes.

There is no guarantee that the new form will be filled in any more effectively than the existing form. However, the greater emphasis on the delay consequences of not supplying sufficient information and a strong emphasis on the illegality of operating a quarry without a permit will encourage the applicant to consider carefully the manner in which the approaches the quarry application process.

5.2.2 Inter-departmental screening panel

The author's experience is that it is not practical to categorise quarries into groups for ease of evaluation. There is also a lack of skilled manpower in the public sector to carry out a basic screening process individually in each department. An inter-departmental screening panel to undertake preliminary evaluation of quarries is therefore proposed.

The panel will have two functions: First, to screen quarry applications, ultimately making recommendations to the Department of Mineral and Energy Affairs on an application; second, as an "in-service" training medium. The panel is necessary because the current system fails to take into account priorities other than mining and because the existing informal internal assessment process of the department (described in section 2.3.5) is not multi-disciplinary. There is a need to increase knowledge and understanding of the multi-disciplinary concerns and priorities that form part of the responsibility of approving, or otherwise, quarry permit applications. It is hoped that this will assist in re-creating multi-disciplinary decision-making input as discussed in paragraph two of section 1.3.2.

The panel's membership should consist of professional representatives from all the Departments consulted in the present system to ensure that decisions made are based on professional judgement and not administrative necessity. (See Figure 2) The panel should ideally be chaired by a senior official of the Government Mining Engineer's Office (preferably with experience or responsibility for Environmental matters) because this is the professional arm of the Department of Mineral and Energy Affairs which is responsible for the issuing of permits. The panel should also have the authority to co-opt any additional members. The co-opted members would be experts in their own particular right, offering specialist guidance.

The panel would meet on a regular basis (dependant upon numbers of applications and time availability) to discuss applications which would be circulated to members before meetings to enable the meetings to concentrate on decision-making and conflict-resolution, particularly on matters concerning land-use conflict.

The panel will appoint from its members a sub-panel (described in further detail in section 5.2.5) to examine and referee Initial Environmental Evaluations (IEE) and Environmental Impact Assessments (EIA) on behalf of the panel. The panel will have ten to fifteen members and the sub-panel would be a small manageable group able to meet more easily and be less cumbersome than the main, large panel.

This study has identified and described a number of Environmental Impact Assessment methodologies, techniques and procedures and concluded that a descriptive check-list is the best method to use in the circumstances. However, as this study has indicated that the system described is transitional in nature, it is anticipated that

the panel will use the other methodologies and techniques, if applicable, once they gain experience through operating the evaluation system. The transitional system will be necessary to train officials in various holistic environmental concepts and to guide them towards a more integrated evaluation system.

Participant departments and individual participants would receive a set of guide-lines to initially assist them in their deliberations (See Appendix 6). It is hoped that with experience these guide-lines would be expanded and would be acceptable to all participants.

In view of the increasing importance placed on public participation and the valuable role that can be played by informed members of the public, the panel will have the authority to subject an application to public scrutiny via a public meeting, media exposure or other appropriate means. It is recognised that this may not be necessary in all applications but the use of this exposure in problematic cases will assist in the decision-making process by increasing the amount of information available regarding socio-economic and socio-political aspects of the application. Public participation in day-to-day departmental legislative operations is relatively untried in the South African political system, thus the panel will have the opportunity to experiment and ultimately would introduce an automatic system of public participation that would be practically acceptable and make use of the potential input the informed public can make.

5.2.3 Panel decisions

The panel, as a result of its deliberations, will record one of three decisions:

(i) No EIA required, in which case a standard set of conditions (which may be modified to suit individual situations) will accompany the recommendation for permit approval. (See section 5.2.4 for Standard Conditions discussion and section 2.3.3 for background information)

(ii) An IEE is required, where the panel needs additional information on aspects unclear from the application form or

(iii) A full EIA required, where the Environmental implications of the quarry are such that the panel requires an EIA to establish whether a quarry is environmentally and economically viable and whether or not mitigating measures are possible to minimise or remove negative Environmental Impacts.

The role of increasingly stringent, scaled examination of Environmental factors is two-fold. Firstly, to bring into play economic controls of time and further feasibility study to establish how important the particular quarry is through the eyes of the developer and the mechanisms of the market situation. This will establish the financial soundness of the developer and the degree of professionalism in his planning. Secondly, it assists as an integrating factor in a more logical land-use compromise and Environmental planning programme.

Whatever the outcome of deliberations, each application examined will result in a Record of Decision (ROD) which will record, succinctly, the reasoning behind the approval or rejection of the application. This information should, ultimately, be made available for public scrutiny and education.

Guide-lines are provided to assist in the setting of terms of reference (see sections 3.2.9 and 3.3.8 on scoping) for an IEE and an EIA. (See Appendix 7)

5.2.4 Standard conditions

In view of the fact that standard conditions will be laid down in cases where no EIA is required, it is necessary to ensure that the conditions are as wide and complete as possible. At the present time, most consulted bodies have their own particular conditions. It would therefore be one of the first tasks of the panel to combine individual standard conditions into a practical working document.

At the present time, the Department of Environment Affairs' standard conditions include requirements for tree screening to minimise visual intrusion and spreading of dust, retention and protection of topsoil, control of potential water pollution, slope angles of quarry sides, breaking up of quarry floor for blending of topsoil and sub-soil (not sand or gravel quarries), analysis of topsoil before backfilling, and grassing of all exposed surfaces.

5.2.5 Sub-panel

A sub-panel consisting of 3-4 persons will be appointed from the inter-departmental screening panel (see section 5.2.2) for the purpose of refereeing IEEs and EIAs and feeding back regularly to the panel on progress, problems and matters of pertinent interest to the group as a whole.

It is envisaged that the sub-panel (acting rather like a technical advisory group) would meet more regularly than the panel and would develop specific expertise and experience on matters relating to assessment of Environmental Impact and integration of conflicting and problematic land-uses.

Guide-lines for refereeing of IEEs and EIAs are provided in Appendix 8.

5.2.6 Referral

The application form, IEE, EIA and ROD would be referred, finally, to the Chief Inspector of Mines (as per the existing system, Figure 2) who would then use the information to make a recommendation on approval or rejection of the application to the Government Mining Engineer.

5.3 CONCLUSIONS

The proposed system modifies the current procedures for evaluation of applications for permits for change of land-use. It has not proved possible to leave the existing system entirely untouched. The current Department of Mineral and Energy Affairs' referral system has been modified to include round-table discussions which, it is hoped, would assist in making individual Government departments more aware of each other's concerns, problems and priorities and thus allow a more rational, balanced and informed decision-making process. The problems of isolated, function-dependent Departmental operations were discussed in sections 1.2; 1.3; 1.4 and 1.5.

This study has included a number of sets of guide-lines to assist in the first steps that the proposed new organisations will take. The guide-lines have purposely not been laid down in a detailed form as much new ground will be broken and it is anticipated that experience will cause the guide-lines to be amended and improved by the panel itself.

The system has been deliberately designed for flexibility and to allow for up-grading and development to a more formal, holistic Environmental planning process, implying that this would be incorporated into a future, as yet unforeseen inter-departmental Environmental Planning System. The reason for this stems from the conclusions drawn in Chapter 1 and a recognition that change is not an instantaneous action and requires a considerable degree of awareness, education and insight.

"Things do change. The only question is that since things are deteriorating so quickly, will society and man's habits change quickly enough?"

Isaac Asimov

APPENDIX 1: Explanation of the Guide-plan as described in the Physical Planning Act, 1967 (Act 88 of 1967)

THE GUIDE-PLAN

The aim of a Guide-plan is to determine a broad land-use pattern for the future development of the city or metropolitan complex. The structure of the city-to-be is determined and a basic plan is provided for its road and transport systems. Guide-plan level planning is policy formulation which, together with the systematic study of the available space, comprises largely parallel activities with mutual interaction at all times. As new information and policy directives become available, guide-plans are amended to suit the new circumstances.

The Guide-plan became an enforceable policy document as a result of the amendment of the Physical Planning Act (Act 88 of 1967) to provide for the appointment of statutory guide-plan committees under the aegis of the Department of Constitutional Development and Planning. These committees are formed from members of all interested parties at central Government, provincial and municipal authority level and from the private sector and are appointed for specifically demarcated areas. ".... The Department (of Constitutional Development and Planning) views the environment in its entirety and recognises the fundamental inter-dependence of all environmental factors, and must ensure that man's actions are not detrimental to his habitat .... The environment and the proper utilisation of resources are also taken into account when regional guide-plans are drawn up ...." (Department of Foreign Affairs and Information, 1984).

APPENDIX 2: Rehabilitation regulations of the Mines and Works Act 1956 (Act 27 of 1956) - sections 15.11 to 15.14.3

5.11 For the purpose of this Chapter of the regulations -

(a) "bank" -

(i) in the case of a stream or a river, means the ground bordering upon and within the high flood zone of the stream or river, or 100 metres from either side of the channel referred to in paragraph (d) of this regulation, whichever area is the wider; and

(ii) in the case of a dam, pan or lake, means the ground bordering upon the high-water mark of the dam, pan or lake and all ground within 100 metres of such high-water mark in an outward direction;

(b) "oil" means any kind of mineral oil and includes spirit produced from oil and a mixture of such oil and water or any other substance which contains not less than one hundred parts of oil in a million parts of the mixture;

(c) "opencast mine" means a mine, including prospecting operations and any hole, trench or other excavation made in the course of prospecting operations, where a mineral deposit is or has been worked at or from the surface of the earth after removal of the overburden;

(d) "stream" or "river" means a natural stream of water which flows in a defined channel, whether or not such channel is dry during any period of a year and whether or not its conformation has been changed by artificial means;

(e) "topsoil" means all cultivable soil material that can be removed mechanically to a depth of one metre without blasting.

5.12.1 A layout plan and a rehabilitation programme as well as such other relevant information as may be reasonably required by the Inspector of Mines, shall on request be submitted in respect of an opencast mine to the Inspector of Mines: provided that, in the case of any new opencast mine which is planned to remove annually more than 12 000 tons of mineral, including overburden, such plan and programme shall be submitted to the Inspector of Mines prior to the commencement of the opencast mining operations or any activity incidental thereto.

5.12.2 Rehabilitation of the surface at any opencast mine shall form an integral part of the mining operations and shall, as far as is practicable, be conducted concurrently with such operations and, where applicable, in accordance with a programme laid down by the Inspector of Mines after consultation with the manager and approved by the Government Mining Engineer.

5.12.3 Unless exemption is granted in writing by the Inspector of Mines with the approval of the Government Mining Engineer, all topsoil removed at any opencast mine for the purpose of exposing, working or searching a mineral deposit, shall be deposited at a specially selected site for replacement as topsoil during rehabilitation of the disturbed surface: Provided that where rehabilitation of the surface is carried out concurrently with prospecting, mining or operations incidental thereto, the topsoil may be replaced directly.

5.12.4 Where it becomes necessary to divert the course of a stream or river in order to carry out opencast mining operations, written permission to do so shall be obtained from the Inspector of Mines, who shall consult the Department of Water Affairs beforehand and who may prescribe such conditions as he may deem necessary.

5.13 No encroachment on the environment or despoliation of the surface in any manner whatsoever shall take place or be allowed to take place outside the area, which in the opinion of the Government Mining Engineer, is actually required for prospecting, mining or a works and such area shall at all times be confined to the minimum compatible with the efficient operation of such prospecting, mine or works.

5.13.1 No dumping or impounding of rubble, litter, garbage, rubbish or discards of any description, whether solid or liquid, shall take place elsewhere than at the site or sites demarcated for the purpose by the manager with the approval of the Inspector of Mines. Every such site shall be limited to a minimum and every dump or dam shall be so controlled to ensure that the environment is, as far as is practicable, not polluted.

5.13.2 In every case where vegetation, including trees, shrubs or grasses, has been disturbed for purposes such as the making of access roads, the clearing of sites for stockpiles and the erection of plant or other installations, such vegetation shall be re-established to the satisfaction of the Inspector of Mines. The Inspector of Mines may, with the approval of the Government Mining Engineer, introduce a programme according to which rehabilitation shall be done.

5.13.3 When prospecting for or recovery of a mineral finally ceases and when the operations finally cease at any works or the prospecting rights or mining titles or contracts held cease to exist, the owner or manager shall cause to be demolished all buildings, walls, foundations, dams, swimming pools, posts or other structures or installations, including pipelines and private railway lines laid on the surface of the land, where such operations were conducted and shall ensure the removal or the disposal of the rubble resulting from the demolition thereof and the rehabilitation of the surface to as near to its natural state as is practicable, to the satisfaction of the Inspector of Mines: Provided that such liability for demolition shall not apply in respect of -

(a) any dwelling lawfully erected within the area of jurisdiction of a local authority;

(b) dwellings and other residential accommodation in respect of which permission for demolition is required in terms of section 85 of the Housing Act, 1966; or

(c) any building or structure or groups of buildings or structures, including pipelines, private railway lines and roads, exempted by the Inspector of Mines on such conditions as he may prescribe.

5.13.4 Wherever practicable, waste material from reduction works, beneficiation plants, coal preparation plants, screening and washing installations and generating stations at a mine shall be disposed of in the workings of such mine: Provided that such disposal shall only be carried out under written authority from the Inspector of Mines, who shall consult the Department of Water Affairs beforehand.

5.14 No sand shall be extracted from the bank of any stream, river, dam, pan or lake, except with the written permission of the Inspector of Mines and upon such conditions as the said Inspector may prescribe.

5.14.1 Sand may be extracted from the channel of a stream or river as well as from a dam, pan or lake: Provided that -

(a) adequate precautions are taken to ensure that stability of the banks is not affected by such operations;

(b) adequate precautions are taken to prevent the scouring and erosion of the banks which may result from such operations or work incidental thereto; and

(c) effluent produced from such operations shall not be returned to any stream, river, dam, pan or lake unless such effluent conforms to the purity standards laid down by the Department of Water Affairs.

5.14.2 In any case where damage to the bank of a stream, river, dam, pan or lake is or has been caused, such bank shall be restored to a condition acceptable to the Inspector of Mines at the expense of the owner or manager.

5.14.3 No sand dump or slimes dam shall be established on the bank of any stream, river, dam, pan or lake without the written permission of the Inspector of Mines, who shall obtain approval therefore from the Goverment Mining Engineer, and upon such conditions as the said Inspector may prescribe.

APPENDIX 3: Section 6B of the Physical Planning Act 1967 (Act 88 of 1967)

RESTRICTION ON USE OF LAND FOR CERTAIN PURPOSES

6B. (1) Notwithstanding the provisions of section 6(2)(c) or any other law, no person shall except under the authority of a permit, use any land -

(a) for purposes of a brickworks or brick-making or pottery or stone crushing or sand washing; or

(b) unless by or under the direct control or supervision of any provincial administration, the Railway Administration or the National Transport Commission referred to in the Transport (Co-ordination) Act, 1948 (Act 44 of 1948), for the construction of a public road or railway line, for the purposes of a quarry; or

(c) for processing any mineral in any other manner, unless such land subject to the provisions of subsection (2), has immediately prior to the commencement of the Physical Planning and Utilization of Resources Amendment Act, 1975 (Act 73 of 1975) lawfully been used for that purpose.

(2) Notwithstanding the provisions of subsection (1), no person shall from the commencement of the Environment Planning Amendment Act, 1977, except under the authority of a permit, so use land (except land reserved under section 4(1) or zoned in terms of a guide-plan for any purpose referred to in subsection (1)) which -

(a) has been used immediately prior to 3 November 1976 in terms of approval granted under section 199 of the Divisional Councils Ordinance, 1952 (Ordinance 15 of 1952), of the province the Cape of Good Hope, as a quarry, as defined in that Ordinance; or

(b) has been used immediately prior to 27 August 1976 in terms of approval granted under section 183 of the Municipal Ordinance, 1974 (Ordinance 20 of 1974), of the province the Cape of Good Hope, as a quarry, as defined in that Ordinance, other than in accordance with the conditions which were in force in respect of the relevant approval so granted.

(3) No application for a permit for the purposes of subsection (1) for the use of any land involving the processing of any minerals shall be granted by the Minister or any person authorised by him unless he has consulted the Minister of Mineral and Energy Affairs or any person authorised by him.

(4) The Minister may direct any person who uses land for a quarry in conflict with subsection (1), to close that quarry and to restore such land, before a specified date, to the satisfaction of the Minister and may, if such person fails to do so, cause steps to be taken for the restoration of the land, and may recover the costs connected therewith from such person.

DEFINITIONS UNDER THE ACT

Mineral - ".... means any substance, whether in solid, liquid or gaseous form, occurring naturally in or on the earth and having been formed by or subjected to a geological process, but does not include water and soil, unless they are taken from the earth for the production or extraction therefrom of a product of commercial value ...."

Processing - ".... in relation to a mineral, means all processes through which a mineral is put, after having been removed from the earth, in order to refine it or to render it suitable for a specific purpose or to make the extraction of an element possible; and includes the recovery, concentration, refinement or conversion thereof ...."

Quarry - ".... means any open excavation made with the intention of searching for or removing any soil, sand, gravel, stone or clay ...."

APPENDIX 4: Facsimile

DEPARTMENT OF MINERAL AND ENERGY AFFAIRS

APPLICATION FOR A PERMIT IN TERMS OF SECTION 8(1)(a) READ WITH SECTION 68/4(2) OF THE PHYSICAL PLANNING ACT, 1967 (ACT 88 OF 1967)

1. (i) Name of applicant _____

_____

(if a company mention the date of registration and company number): _____

(ii) Address: _____

(iii) Name, address and telephone number of person who will assist the inspecting officer: _____

_____

_____

_____

2. Permit required for (delete which is not applicable):

Brickworks, brick-making, pottery, stone crushing, sand washing, quarry, processing of a mineral.

3. Period for which permit is required:

_____

4. Name and address of the person who will act as the manager of the undertaking:

_____

_____

5. Description of the property according to Title Deed No. _____ dated _____

(i) _____

_____

_____

(ii) Extent of site for which permit is required:

_____ ha.

(iii) Property is _____ km in a _____

_____ direction from _____

(nearest town).

6. Date of commencement of activities:

_____

7. Purpose for which site is used at present _____

_____

8. For what purpose will the ground possibly be utilised after activities have ceased _____

9. If operations were conducted previously, state -

(i) By whom? _____

(ii) Address: _____

(iii) During which period? _____

10. What material or product is to be mined or manufactured/treated:

_____

11. If processing is contemplated elsewhere, where will it take place?

_____

_____

12. Estimated -

(i) production per year:

_____

(ii) reserves (in tons) _____ and

(iii) number of employees to be employed -

Whites _____ Blacks _____ Coloureds/Other _____

Indicate where they are to be accommodated:

_____

_____

_____

13. (i) Expected capital investment _____

_____

(ii) Capital available for the undertaking:

_____

14. Estimated -

(i) working costs: _____; and

(ii) income: _____

15. (i) Source of water to be used:

_____

(ii) Estimated consumption per year - will there be any reuse:

_____

_____

16. Will any effluent be produced and if so, what volumes and quality and how is it going to be disposed of?

_____

17. Will the production process yield any solid waste, and if so, what solid waste and how is it going to be disposed of?

_____

18. (i) Topography

(a) Indicate (by means of a cross in the relevant block) the characteristics of the environment where the works is going to be established.

Flat (plane) _____

Waving _____

Hilly _____

Mountainous _____

(b) If the area is hilly or mountainous indicate whether the works is going to be established in a valley or against the hill or mountain: _____

(ii) Vegetation

(a) Indicate (by means of a cross in the relevant block) the nature of the natural vegetation on the site where the works is going to be established.

Grassland _____

Grassland with scattered trees _____

Grassland with trees 20-50 m apart _____

Grass with trees nearer than 20 m from each other but not with over-lapping crowns _____

Trees dense with crowns overlapping _____

Shrub veld _____

Shrubbery _____

(b) If vegetation is grassland indicate whether it is sweet, sour or mixed:

_____

_____

(c) Are the trees mostly non-indigenous (pine, blue gum, wattle, hakea, etc.) or indigenous? _____

(iii) Are there any objects of cultural, historical or archeological interest present or in the immediate vicinity of the site?

_____

If so, give a short description: _____

_____

19. Are there any buildings, roads, railway lines, power-lines or telephone lines near to the site applied for?

If so, give a short description: _____

_____

_____

Indicate distance away: _____

Importance thereof: _____

_____

_____

20. If the activities result in the removal of topsoil, state -

(i) type of soil: _____

(ii) depth: _____

Indicate in a brief memorandum what steps are to be taken to restore the natural environment and to screen the activities -

(a) during the activities: _____

_____

_____; and

(b) after the cessation of the activities: _____

_____

_____

Signed at on this

day of 198 .

_____

APPLICANT

The application must be submitted to:

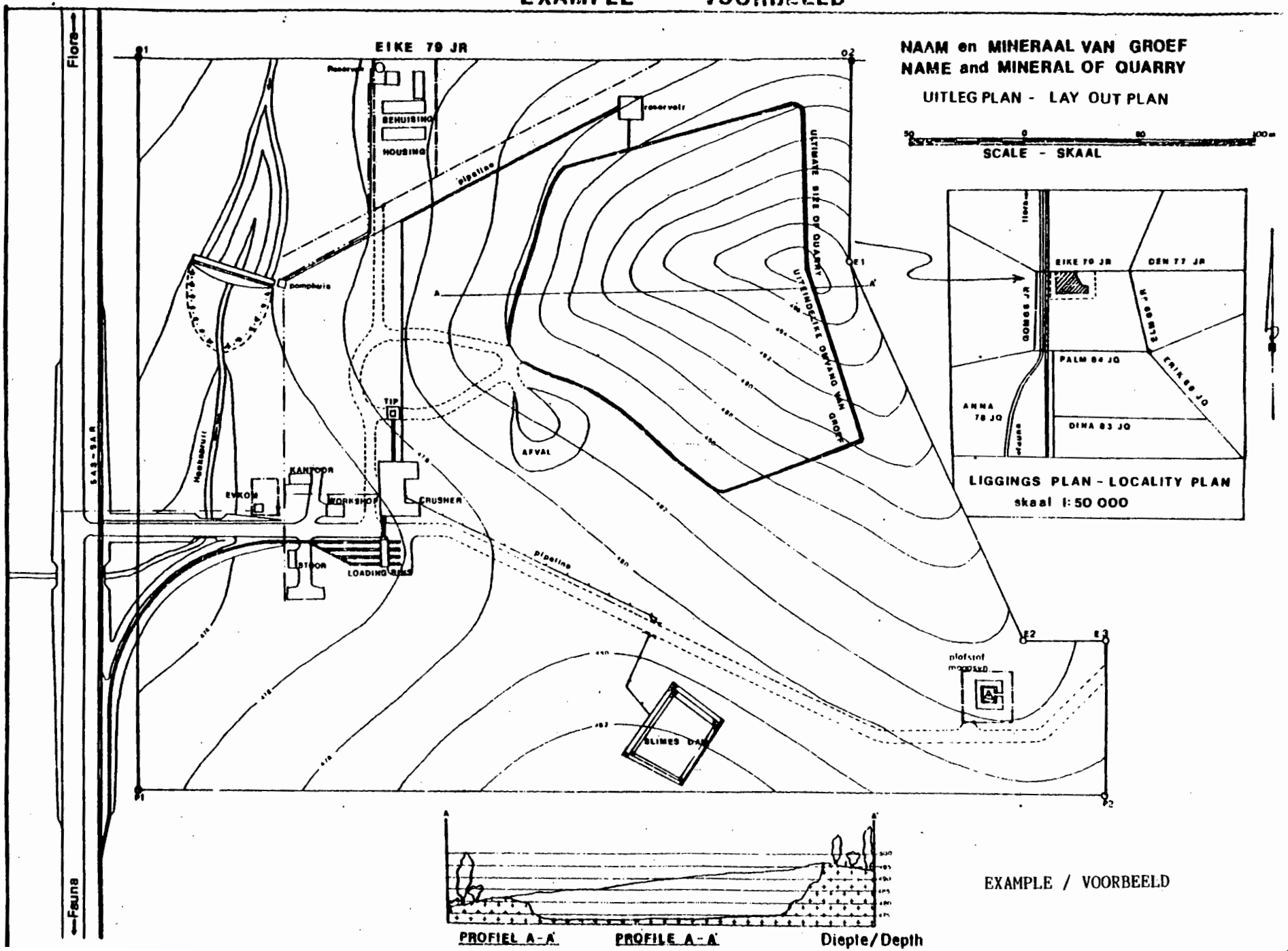
Director-General: Mineral and Energy Affairs

Private Bag X59

PRETORIA

0001

EXAMPLE VOORBEELD



DOCUMENTS WHICH MUST ACCOMPANY THE APPLICATION

1. (a) A 1:50 000 topocadastral map on which the site applied for is shown in relation to the boundaries of the farm (maps are obtainable from the Government Printer, Private Bag X85, Pretoria); or

   (b) alternatively, a locality sketch plan, drawn to any convenient scale, on which the site applied for is shown in relation to the boundaries of the farm and on which the names and numbers of the surrounding farms are also shown.

2. A layout plan - see attached example.

   NB. Ten copies of the plans are required.

3. A certified copy of the title deed of the property must accompany the application.

   PS. If the applicant is not the registered owner of the property (land) the permission of such owner as well as the permission of the holder of the right to base minerals where this is held separate from the land, must accompany the application.

APPENDIX 5: Extracts from the regulations of the US National Environmental Policy Act (NEPA) 1969 - sections 1501.7 "Scoping" and 1508.25 "Scope"

1501.7 Scoping

There shall be an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process shall be termed scoping. As soon as practicable after its decision to prepare an environmental impact statement and before the scoping process the lead agency shall publish a notice of intent (paragraph 1508.22) in the FEDERAL REGISTER except as provided in paragraph 1507/3(e).

(a) As part of the scoping process the lead agency shall:

(1) invite the participation of affected federal, state, and local agencies, any affected Indian tribe, the proponent of the action, and other interested persons (including those who might not be in accord with the action on environmental grounds), unless there is a limited exception under paragraph 1507.3(c). An agency may give notice in accordance with paragraph 1506.6;

(2) determine the scope (paragraph 1508.25) and the significant issues to be analysed in depth in the environmental impact statement;

(3) identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (paragraph 1506.3), narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect on the human environment or providing a reference to their coverage elsewhere;

(4) allocate assignments for preparation of the environmental impact statement among the lead and co-operating agencies, with the lead agency retaining responsibility for the statement;

(5) indicate any public environmental assessments and other environmental impact statements which are being or will be prepared that are related to but are not part of the scope of the impact statement under consideration;

(6) identify other environmental review and consultation requirements so the lead and co-operating agencies may prepare other required analyses and studies concurrently with, and integrated with, the environmental impact statement as provided in paragraph 1502.25;

(7) indicate the relationship between the timing of the preparation of environmental analyses and the agency's tentative planning and decision-making schedule;

(b) As part of the scoping process the lead agency may:

(1) set page limits on environmental documents (paragraph 1502.7);

(2) set time limits (paragraph 1501.8);

(3) Adopt procedures under paragraph 1507.3 to combine its environmental assessment process with its scoping process;

(4) Hold an early scoping meeting or meetings which may be integrated with any other early planning meeting the agency has. Such a scoping meeting will often be appropriate when the impacts of a particular action are confined to specific sites.

(c) An agency shall revise the determinations made under paragraphs (a) and (b) of this section if substantial changes are made later in the proposed action, or if significant new circumstances or information arise which bear on the proposal or its impacts.

1508.25 Scope

Scope consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. The scope of an individual statement may depend on its relationships to other statements (paragraphs 1502.20 and 1508.28). To determine the scope of environmental impact statements, agencies shall consider 3 types of actions, 3 types of alternatives, and 3 types of impacts. They include:

(a) actions (other than unconnected single actions) which may be:

(1) connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:

(i) automatically trigger other actions which may require environmental impact statements;

(ii) cannot or will not proceed unless other actions are taken previously or simultaneously;

(iii) are interdependent parts of a larger action and depend on the larger action for their justification.

(2) Cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

(3) Similar actions, which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequencies together, such as common timing or geography. An agency may wish to analyse these actions in the same impact statement. It should do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement.

(b) Alternatives, which include:

(1) no action alternative;

(2) other reasonable courses of actions;

(3) mitigation measures (not in the proposed action).

(c) Impacts, which may be:

(1) direct;

(2) indirect;

(3) cumulative.

APPENDIX 6: Operational guide-lines for the inter-departmental screening panel

1. NEED AND DESIRABILITY

The panel is ideally suited to assessing the need and desirability of the application by virtue of its multi-disciplinary membership. Members of the panel should evaluate the applicant's memorandum of need and desirability giving due consideration to their own Department's aims and functions and by applying local knowledge of situations and conditions as they affect, and are affected, by the application.

The purpose of the examination of need and desirability is to establish whether the application is in the best interests of the area and the country and to ensure that the applicant has shown through his investigation, preparation, and motivation that he is competent to undertake the proposed activities and that he has indicated that they are both economically and environmentally viable.

Members should attempt to obtain beforehand as much information as possible regarding the application through their regional infrastructures (where they exist) to allow the panel meetings to make decisions with as much background information available as possible.

2. PANEL DECISIONS

In general, the panel will make one of three decisions when evaluating an application:

1. FONSI (finding of no significant impact) which will mean that the application may go straight to the Chief Inspector of Mines with only the ROD (Record Of Decision); Standard Conditions and any specific conditions that the panel may feel are necessary.
2. Call for an IEE (Initial Environmental Evaluation) in which case it would be referred to the sub-panel for detailing of requirements before being sent back to the applicant; and
3. call for a full EIA where the panel is of the opinion that the impact of the proposed action is such that more detailed information is required. In this case once again the application will be referred to the sub-panel for scoping of the EIA.

The sub-panel will refer its detailed deliberations back to the panel as well as the resulting IEEs and EIAs to enable the panel to produce an ROD and recommendations for the Chief Inspector of Mines.

3. PUBLIC PARTICIPATION

There may be situations where input from the public and from informed members of the public can be used in assessing the need and desirability of the applications. In such cases the panel should

consider gathering that information through means of public meetings; questionnaires; media exposure or any other method that they deem suitable.

It is emphasised that the purpose of this is to make use of the opinions, experiences, knowledge and expertise of the informed public. In many cases particularly in urban, semi-urban and metropolitan areas, quarrying and related activities have a considerable environmental (including socio-politico-economic) impact on the surrounding human population and cognisance must be taken of these implications.

4. CO-OPTION OF MEMBERS

Though its membership is quite wide, the panel should recognise the value of making use of specialists in related fields to advise them on specific matters relating to applications. For example the use of social scientists to assist in the evaluating of long and short term impacts on urban populations of quarries in urban areas or those areas destined to become more urbanised during the life of a quarry.

5. ROD (RECORD OF DECISION)

The purpose of the ROD is to encourage crystallisation of opinions and thus enable a clear decision to be seen to be taken. This will of course be supported by the professional input made by the professional staff of the various departments and bodies on the panel. It puts the onus on the panel to ensure that its recommendations are sound, factually based and/or based on professional opinions and observations.

It should be borne in mind that the panel's decisions and recommendations are not binding on the Chief Inspector of Mines or the Government Mining Engineer but logically it could be expected that careful note would be taken of the panel's recommendations in view of its expertise and reasoned base of evaluation.

6. "IN-SERVICE" TRAINING

The formation of the multi-disciplinary panel is an ideal opportunity to create an in-service training situation for professional Civil Servants and assist in improving inter-departmental communication and ultimately improving efficiency in the Public Service. A better understanding of the problems experienced by different departments will help to improve the quality of decision-making to the benefit of the community at large.

APPENDIX 7: Operational guide-lines for scoping for IEEs and EIAs

In the main body of the study (section 3.3.8) scoping is defined as "... a procedure for the determination and addressing of significant issues related to a proposed action. This procedure should focus the work of the EIA compiler on relevant issues (raised in both public and private sectors) to ensure that the resulting EIA is useful to the decision-maker and (where relevant) understandable to the public."

Scoping is often closely linked with screening (i.e. the process which establishes the need or otherwise for an EIA) and methods developed for screening purposes also overlap in that during the screening process, issues are identified which need more detailed study. There are five main methods available to assist in screening (Tomlinson, 1984) and all of them identify to a greater or lesser degree, issues that warrant more detailed study. The five methods are:

1. project thresholds;
2. sensitive area criteria;
3. positive and negative lists;
4. matrices;
5. initial environmental evaluations.

These can be examined in more detail to demonstrate their individual uses.

1. PROJECT THRESHOLDS

In this approach, thresholds are established for key features within a project and if these are exceeded then this gives an indication

that an EIA may be necessary. In order to improve the effectiveness of this method, it is usual to rely on a series of linked thresholds. For example, a project size threshold might be linked to a total project cost; total pollution generation; and zone of visual influence. Although financial thresholds are often used they need to be constantly reviewed because of inflation and the changing financial climate.

2. SENSITIVE AREAS

The environmental consequences of a project are influences of both the project and the receiving environment, thus the sensitivity of that environment can be used as a criteria for deciding whether an EIA is needed. There are two approaches to this: firstly the carrying capacity of the area can be determined in relation to the degree of interference or disturbance. (This is only really effective if the area concerned has been studied, thus generating a knowledge of the possible resilience of the area to disturbance e.g. levels of absorbance of pollutants.) The second approach is to determine the importance of individual components within the area. The advantage here is that the characteristics of the environment (i.e. both subjective and objective values) rather than simply its ability to withstand abnormal influences are considered. For example an area might be valued in terms of its total abundance or scarcity within a country in terms of the pressures from competing land-uses.

3. POSITIVE AND NEGATIVE LISTS

This is perhaps the simplest approach and one of the most effective in terms of assisting the scoping process. Positive lists may be

compiled through identifying existing developments and noting those specific areas giving rise to significant environmental damage. Alternately, negative lists can be compiled which identify those situations and areas that do not give rise to significant environmental damage.

4. MATRICES

Matrices have already been touched upon in the main body of the study (see section 4.3.3). Matrices are simply two-dimensional lists which are more comparative but nevertheless also serve to assist in the scoping process through identification of potential impacts.

5. INITIAL ENVIRONMENTAL EVALUATION

Reference has already been made to the UNEP usage of IEEs within the broad based discussions in the study. (See section 3.2.8) This system is dependent upon the development of a questionnaire check-list and this tends to be more effective if the list is type-specific. For example, the quarry application form (see Appendices 4 and 9) could form the crude basis for an IEE.

Internal scoping can be highly effective and need not be a long-winded affair. The use of the public at large to identify key issues is now well established e.g. the Canadian Federal Environmental Assessment Panels often utilise public opinion through written comment, workshops or public meetings. (FEARO, 1980)

APPENDIX 8: Operational guide-lines for refereeing IEES and EIAs

The key factor in refereeing IEEs and EIAs is the comparison of how effective the EIA preparer's report and final document is in meeting the requirements set forth by the scoping process.

There are no hard and fast rules for the refereeing process but it is generally true that good and on-going communication between the EIA preparer and the referees from the time of the scoping process through to the production of the final document tends to help in the production of an effective and practical report.

It can be important where an IEE or an EIA generates considerable numerical data to find some means of checking the validity of that data either by working in tandem with the preparer and undertaking random checks or by verifying data randomly on completion of the document.

In view of the specific nature of the panel and sub-panel's work it can be expected that original methods will be developed with experience. It follows that the effectiveness of the final document will depend very much upon the quality of the scoping recommendations.

APPENDIX 9: Proposed new application form for a change of land-use permit under section 6B of the Physical Planning Act (Act 88 of 1967)

DEPARTMENT OF MINERAL AND ENERGY AFFAIRS

(NB. READ "ADVICE TO APPLICANTS" WHILST FILLING IN THIS FORM)

APPLICATION FOR A PERMIT IN TERMS OF SECTION 8(1)(a) READ WITH SECTION 6B/4(2) OF THE PHYSICAL PLANNING ACT, 1967 (ACT 88 OF 1967)

1. (i) Name of applicant: _____

_____

(if a company, give also the date of registration and company number.)

(ii) Address: _____

_____

_____

(iii) Name, address and telephone number of person who will assist inspecting officers: _____

_____

2. Permit required for (delete which is not applicable):

Brickworks, brick-making, cement block manufacture, pottery, stone crushing, ornamental stone quarrying/removal, quarry, sand washing, sand pumping, sand removal, processing of a mineral, other. (Please state nature of "other" and give specific details of "processing of a mineral") _____

_____

_____

3. Period for which permit is required _____

4. Name and address of the person who will act as the manager of the undertaking _____

_____

5. Description of the property according to Title Deed No._____ dated _____

_____

(i) Total extent of property: _____ha

(ii) Extent of site for which permit is required:

_____ha

(iii) Property is _____ km in a _____ direction from _____ (nearest town)

(iv) Name and number of 1:50 000 or 1:250 000 map on which site is located _____(name)

_____ (number)

6. Date of proposed commencement of activities _____

7. (i) Purpose for which site is used at present _____

_____

(ii) Land-use zoning of area if different from above _____

_____

8. For what purpose will the ground possibly be utilised after activities have ceased _____

_____

9. If operations were conducted previously on the site, state

(i) By whom? _____

(ii) Address: _____

(iii) During what period? _____

(iv) Permit no. (if known) _____

10. What material or product is to be mined/manufactured/processed

_____

11. If processing is to be carried out elsewhere, state where (mark on map if possible) _____

_____

12. Estimated

(i) Production per year (state metric tons or cubic metres)

_____

(ii) Reserves (state metric tons or cubic metres)

_____

(iii) Number of employees to be employed

Whites	Blacks	Coloureds/Other
_____	_____	_____

Indicate where they are to be accommodated

_____

_____

_____

13. Expected capital investment for project and approximate breakdown of major categories _____

_____

_____

_____

14. Estimated

(i) working costs _____

(ii) income _____

15. (i) Source of water to be used _____

_____

(ii) Estimated water consumption per year - will there be any re-cycling _____

_____

16. Will any effluent be produced and if so, what volume and quantity and how is it going to be disposed of? _____

_____

_____

_____

17. Will the production process yield any solid waste, and if so, what solid waste and how is it going to be disposed of? _____

_____

_____

_____

18. On consultation, did the National Atlas of Critical Environmental Components indicate any problems? YES / NO (circle appropriate)

If so give details (including date and reference number of reply)

_____

_____

_____

19 (i) Topography

(a) Indicate (by means of a cross) the characteristics of the environment where the works or quarry is going to be established.

Flat _____

Gently hilly _____

Hilly _____

Mountainous _____

(b) If the area is hilly or mountainous, indicate whether the works or quarry is going to be established in a valley, against the hill or mountain or on top of the hill or mountain.

_____

_____

_____

20. Vegetation

(a) Indicate (by means of a cross) the closest description of the nature of the vegetation occurring on the site where the quarry or works is going to be established

Denuded of any vegetation _____

Grassland _____

Grassland with scattered trees _____

Grassland with trees 20 m to 50 m apart _____

Grassland with trees nearer than 20 m

to each other but not with overlapping crowns _____

Trees dense with crowns overlapping _____

Shrub veld _____

Other (please describe) _____

_____

_____

(b) If vegetation is grassland, indicate whether it is sweet, sour or mixed _____

(c) What are the predominant tree species? _____

_____

(d) Is the vegetation still in its natural state or is it disturbed?

_____

21. Are there any objects or sites of cultural historic or archaeological interest present on the site or in the immediate vicinity? YES / NO

If yes, give details _____

_____

_____

22. Are there any buildings, roads, railway lines, power-lines or telephone lines on or near the site? If so give a short description (These should also be shown on the site plan) _____

_____

_____

23. Topsoil

Give a broad description of the type of soil in the area of the proposed operation and the depth _____

_____

_____

24. Motivation

(i) Attach to this form a memorandum stating the need and desirability of the proposed operation.

(ii) Attach to this form a second memorandum indicating

(a) measures to be taken to minimise the negative environmental impacts of the project. (This should include visual screening, noise control, dust suppression, erosion and pollution control, access road maintenance etc.)

(b) measures to be taken after cessation of activities.

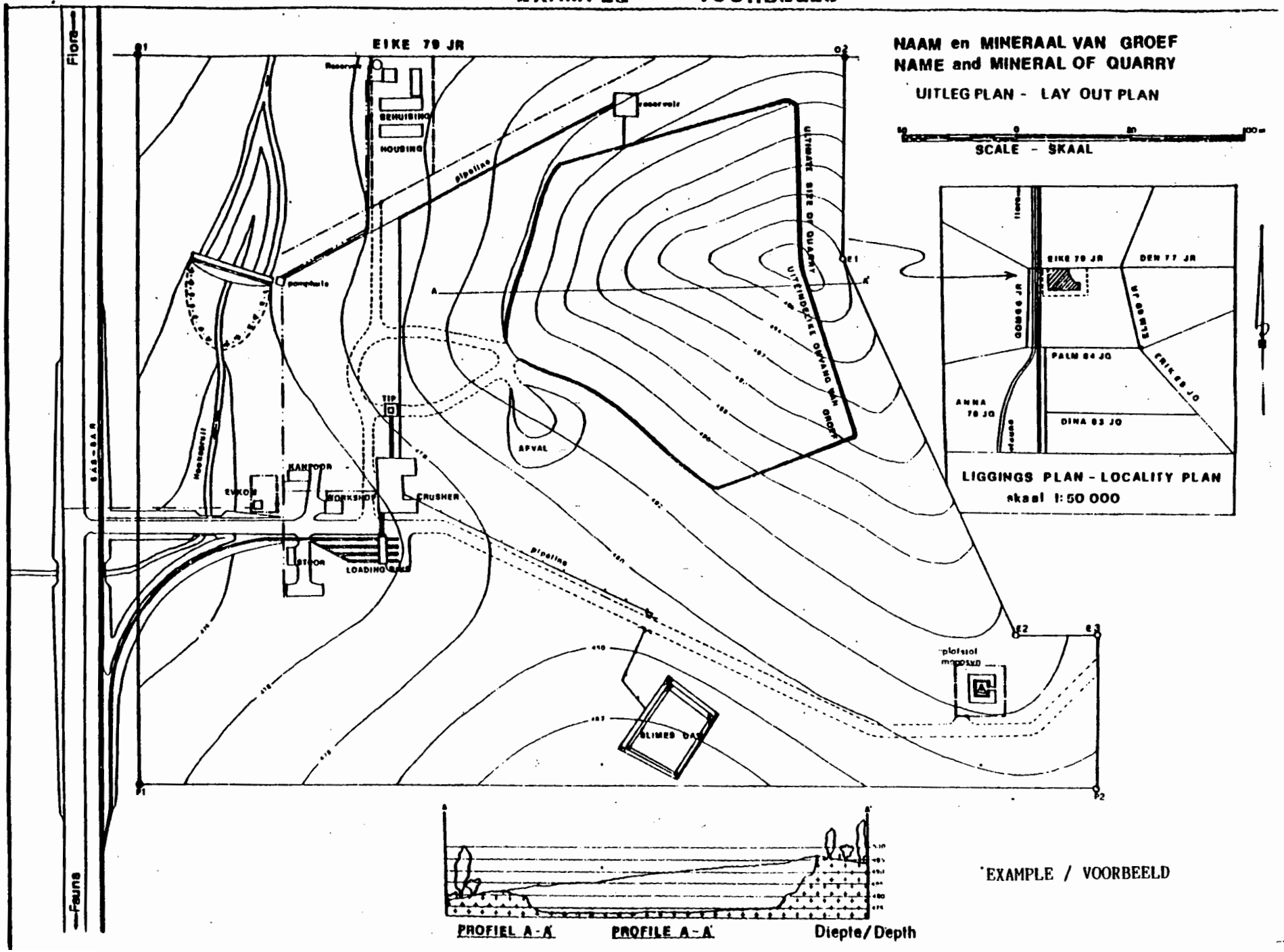
SIGNED AT ON THIS

DAY OF 19

_____

APPLICANT

EXAMPLE VOORBEELD



ADVICE TO APPLICANTS

1. GENERAL

(a) It is in your interest to complete the whole of this form and attach the required documents. Should you fail to do this, delays will result and forms will be returned for correction. Should you have any problems or queries, the Department's staff will be only too glad to assist you.

(b) Complete the form in black ink legibly.

(c) It is acknowledged that this form is long and quite involved. The purpose behind this is to protect the country's natural resources and to ensure that those entrusted to mine and quarry are competent, sufficiently skilled and have carried out sufficient investigation to ensure their operations will be viable both economically and environmentally.

2. DETAILED GUIDE-LINES

Question 1

Do not forget to complete all details. Officers need to inspect sites and it is important, also, that the person assisting the inspecting officer is able to answer questions about the proposed operation. Failure to comply with this may cause delay.

Question 2

If your proposed operation is not listed, state clearly and concisely the nature of your operation.

Question 3

Remember to relate this time period to the figures noted in your reserves in Question 12.

Question 5

Describe the property details as fully as possible.

Question 6

Remember it is illegal to commence a mining or quarry operation without a Change of Land-use Permit. Allow at least 5 months to obtain a permit.

Question 7

Please answer as accurately as possible.

Question 8

Bear in mind that the Chief Inspector of Mines will also require this information as a part of the statutory Mining/Rehabilitation Plan that is required under regulation 5.12.1 of the Mines and Works Act 1956 (Act 27 of 1956)

Question 9

Every effort should be made to obtain this information.

Questions 12, 13, 14, 16, 17, 19, 20, 21, 22

This information can indicate the degree of competency and preparation put into the proposed operation. It is in your interest to be as accurate and complete as possible.

Question 15

Have you checked with the Department of Water Affairs if you need a permit for the quantity of water you propose to abstract?

Question 18

You can check whether your proposal will affect, or be affected by, critical environmental components. Write to the Co-ordinator, National Atlas of Critical Environmental Components, Department of Environment Affairs, Private Bag X447, Pretoria, 0001 giving details of your proposed operation and location details. (Check-list items 1 and 2 will be sufficient.)

Question 23

Careful thought should be given to this question. As in Question 8, some of this information will be required by the Chief Inspector of Mines as a part of the Mining/Rehabilitation Plan. In order to make best use of our scarce natural resources and minimise environmental marring, it is necessary to scrutinise every application carefully and weigh up its need and desirability. Insufficient or inaccurate information will prejudice your application.

CHECK-LIST

1. 10 copies of a 1:50 000 topocadastral map (or if not available, 1:250 000) on which the site applied for is clearly marked. (Maps obtainable from the Government Printer, Private Bag X85, Pretoria 0001.) If a 1:50 000 map is not available, a locality sketch plan, accurately drawn to any convenient (but indicated) scale on which the site applied for is clearly shown in relation to the boundaries of the farm and on which the names and numbers of the surrounding farms are shown.

2. 10 copies of an accurately drawn layout plan (see attached example).

3. A certified copy of the title deed of the property must accompany the application. If the applicant is not the registered owner of the property (land) the permission of such owner as well as the permission of the holder of the right to base minerals where this is held separate from the land, must accompany the application.

4. The two memoranda noted in Question 24 must accompany the application.

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TABLE 2 SUMMARY OF METHODS FOR DOING ENVIRONMENTAL IMPACT ASSESSMENTS (E.I.A's)
AFTER ROSENBERG et al (1981)

Method	Panels (and workshops)	Checklists	Flow diagrams	Matrices
Examples	Sondheim (1978), Love et al. (1975) (see also "Battelle method" Holling (1978)	Hagan and Roberts (1971) Henwood (1971) Burchell and Listokin (1975)	Sorensen (1971) in Munn 1975, p. 44) Van Winkle et al. (1976) Skutsch and Flowerdew (1976)	Leopold et al (1971). Environmental Research and Counsel (1973) Fischer and Davies (1973) Fischer and Francis (1974): Parker and Howard (1977) Federal Activities Branch Environmental Protection Service and Federal Environmental Assessment and Review Office (1978)
Use	To choose between project alternatives (including no-go). Recommended as a guideline only and not as an ultimate decision algorithm (Sondheim 1978)	To broadly list possible consequences of a proposed action in order to: 1. Recommend methods of investigation. 2. Standardize inputs. 3. Provide consistency (predictability, replicability) in topic coverage (Munn 1975, Buschell and Listokin 1975)	To identify action - effect relationships (Munn 1975)	To assess impacts associated with almost any type of activity by assessing interactions between environmental setting and proposed action. (Munn 1975: Gilliland and Risser 1977 Sondheim 1978)
Description	A number of separate panels: 1. List project alternatives and environmental aspects to be considered. 2. Rate each aspect of all alternatives 3. Weight each aspect. Favoured alternative is obtained by multiplying ratings and weightings (Sondheim 1978). See Love et al (1975) for Delphi method and Dee et al. (1973) Battelle method. Workshops (Burchell and Listokin 1975) use an assemblage of experts to investigate aspects of the environment and could be considered a type of panel. Usually deal with a specific area of e.i.a.	Comprehensive lists, perhaps hierachical items to be considered in evaluating environmental impact. (Munn 1975, Gilliland and Risser 1977)	Steps of actions/effects connected by direction indicating arrows to show sequences of events. These causal chains can indicate overall effect of a development. Basic organization by land-use types. (Skutsch and Flowerdew 1976:: Gilliland and Risser 1977)	An extension of the checklist. One axis describe the proposed action, the other axis lists environmental conditions. Cells in the matrix can numerically indicate impact magnitude, importance, probability, time scale. etc. (Munn 1975. Gilliland and Risser 1977. Parker and Howard 1977)
Strengths	1. Cheap and fast. 2. A large number of alternatives can be handled. 3. Ease of reassessment, if necessary. 4. Direct public participation possible. 5. Can incorporate other methods as part of panel's work. (Sondheim 1978)	1. Stimulated broad thought about possible impacts. 2. Can ensure significant items are not omitted. (Munn 1975) Gilliland and Risser 1977)	1. Permits visualization of connection between action and impact and immediate identification of causal elements. 2. Simplifies overall effect because impacts are organized according to use of land. 3. Organizes action - effects impact chains so they can evolve into a matrix or models with further study and quantification. (Munn 1975: Skutsch and Flowerdew 1976 Gilliland and Risser 1977)	1. Provide helpful mutual guidance in designing further studies. 2. Inexpensive. 3. Highly visual. Communicates well (helpful to decision maker) 4. Convenient and comprehensive 5. Allows comparison of seemingly incomparable events. 6. Allows comparison of importance of each impact. Kefalas and Pittenger 1975. Munn 1975: Skutsch and Flowerdew 1976 Jackson et al 1978 Sondheim 1978)
Weakness	1. Tends to be too subjective: i.e. (a) results will depend on composition of the panels. (b) selection of panel members is difficult especially because of the non-replicability of rating schemes. (Sondheim 1978) (c) aspects of environment chosen may not be important. 2. Attempt to be too all-inclusive but: (a) only deals with choice of alternatives, a small part of e.i.a. (b) does not consider interactions. (Sondheim 1978) 3. Workshops - Analysis overall is frequently uneven, some impacts receive detailed attention while others do not (but see Holling 1978)	1. Static and non-quantitative: give no idea of degree or magnitude of impacts or of probable interactions 2. Impact not considered. 3. More descriptive than comparative. (Buschell and Listokin 1975: Gilliland and Risser 1977)	1. Identification of major types of impact not facilitated 2. Not recommended for large regional actions: best suited to single project assessments because displays (for the former) may become so extensive (especially when alternatives are considered) that they are useless. 3. Usually are not quantitative 4. Not comprehensive and usually do not have feedback capabilities. 5. Can be subverted to display the management of e.i.a.'s (Munn 1975: Kefalas and Pittenger 1975: Van Winkle et al. 1976: Gilliland and Risser 1977)	1. Visually, can be overwhelming if large numbers of cells are involved (e.g. when alternatives are considered) Unwieldy volumes of data in a relatively compact format may make it too difficult to assess overall impact by inspection. 2. Interdependency among impacts (i.e interactions) ignored Only relationship between initial action and its terminal effects considered. 3. Numerical estimates are subjective There is no objective procedure to ensure comparability between impacts. Only ordinal conclusion can be used. Summarization is conceptually difficult 4. Too much is attemted, no quantification involved (Jowett 1972: Sorenson 1972: Fischer and Davies 1973a: Burchell and listdrin 1975: Skutsch and Flowerdew 1976 Gilliland and Risser 1977: Jackson et al 1978: Lee and Wood 1978, Sondheim 1978)

Method	Matrices (continued) - indexed	Overlays	Modelling
Examples	Battelle method - Dee et al (1973)	McHarg (1971), Rattray et al (1973)	Walters (1974, in Munn 1975) Gilliland and Risser 1977) Holling (1978) Ogawa and Mitsch (1979) Carter et al.(1979)
Use	For quick and rough estimates of impacts of water resource developments. (Burchell and Listokin 1975: Munn 1975: Sondheim 1978)	To choose the most suitable location for project siting by demonstrating differences in impacts and costs as a function of variation in land characteristics. (Burchall and Listokin 1975; Gilliland and Risser 1977: Sondheim 1978)	Potentially the most worthwhile method because of its predictive capabilities, use of large amounts of (quantitative) data, and its capability to identify additional research needs
Description	A matrix method which focuses on specific environmental quality components chosen for relevance to project alternatives under consideration.	The study area is subdivided into geographical units, and social and physical parameters assumed to affect land use are mapped on transparencies. Relative numerical weights may be assigned to each parameter Areas(grid-cells) possessing preferred combinations of parameters (social and physical characteristics) are determined by overlapping the transparencies. Computer maps can be used instead. (Munn 1975: Gilliland and Risser 1977: Sondheim 1978)	Simplified representations of reality utilizing mathematical representations to link physical, ecological, and sociological effects.(Munn 1975)
Strengths	1. Public participation built in at several stages. 2. Results weighted according to importance and divisible into short and long term impacts. (a) values allocated over range of possible impacts (b) uses ranges for parameters (c) individual biases minimized when choosing "important" environmental components (d) decision maker helped in quantifying value judgment. 3. "Red flags" indicate areas of further study needed due to insufficient data or unacceptable values 4. Job of analyst simplified (e.g. use of ranges for parameters, red flags, assessment trees) (Burchell and Listokin 1975: Munn 1975: Skutch and Flowerdew 1976: Sondheim 1978.)	1. A simple means to obtain quantified, comparative and aggregative measure of impact: (a) best combination of land-use suitability, engineering feasibility, and compatibility of action can be evaluated. (b) illuminates complex spatial relationships. (c) process can be computerized to aggregate predicted impacts and choose least affected areas. 2. Qualitative and quantitative data can be used. (Burchell and Listokin 1975: Munn 1975)	1. Requires commitment to be made at start of e.i.a. 2. Requires quantitative definition of essential elements of assessment and relationships between the elements. 3. Can handle large volumes of data and complicated linkages between physical, ecological and social studies. Consequences of many options can be investigated. 4. assumptions must be checked carefully because every link must be defined. 5. Ranges of effects can be checked. 6. Macroscale models can identify needs for additional research which are then dealt with in detail by Microscale models. (Munn 1975:Gilliland and Risser 1977)
Weakness	1. Composition of weighting panel a problem. "Delphi" method of choosing relative importance of environmental components. (i.e. iterative judging by members of a panel until consensus obtained) minimises individual bias but the panel could become polarized. 2. Time Consuming 3. Expensive 4. Ignores interdependency of impacts. 5. Value judgements pervade the methodology Best choice of environmental quality components to be evaluated not always obvious. Importance of incremental changes in the environment are prejudged. 6. Scoring Algorithm fairly inflexible, may be unsuitable to evaluate some components. (Burchell and Lastokin 1975: Munn 1975: Skutsch and Flowerdew 1976: Sondheim 1978)	1. Factor interdependency not considered. 2. Usually restricted to environmental characteristics already mapped. 3. Use of large numbers of factors results in difficult choices 4. Only 10 overlays can be used effectively 5. Not useful if location is already chosen and/or if the real problem concerns the type of feature to be constructed. (Munn 1975: Skutsch and Flowerdew 1976: Sondheim 1978)	1. Expensive (labour, time, cost) 2. Output quality depends on input quality. Links must be identified and explicitly defined. 3. Still cumbersome in e.i.a's. Successful models notably lacking. Of doubtful routine application to e.i.a's because of certain analytical and informational limitations (i.e. levels of and synthesis required for in-depth study exceed capabilities of agencies responsible for e.i.a.'s (Munn 1975: Sondheim 1978: Ogawa and Mitsch 1979 Carter et al 1979) Criticisms specific to energy models of Gilliland and Risser (1977) Carter et. al 1979) 1. Not all impacts can be defined in energy terms. (e.g. groundwater contamination) 2. No absolute assurance that important pathways and interactions have been identified. 3. Cannot deal with differences in value systems. 4. Interpretation magnitude of impact depends on how the system is bounded initially, something the method cannot tell you how to do. 5. Requires relatively "simple" systems (e.g. desert) 6. Requires much background, energetic data.

* SEE ALSO HOLLING (1978, TABLE 5.2. p. 76) FOR ADVANTAGES AND DISADVANTAGES OF LEOPOLD MATRIX

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DEPARTMENT OF MINES

PURPOSE; TO STIMULATE THE EXPLOITATION OF ALL MINERAL RESOURCES IN THE BEST INTERESTS OF THE COUNTRY.

ORGANISATION AND FUNCTIONS: *MINING RIGHTS DIVISION: ADMINISTERING THE LAWS GOVERNING PROSPECTING AND MINING RIGHTS.
*GEOLOGICAL SURVEY BRANCH: CARRIES OUT GEOLOGICAL SURVEYS AND INVESTIGATIONS IN ORDER TO MAKE AVAILABLE THE BASIC INFORMATION REQUIRED FOR THE EXPLOITATION OF MINERALS. PROVIDING SPECIALIST SERVICES IN CONNECTION WITH THE AVAILABILITY OF GROUNDWATER; GEOPHYSICS AND CONSTRUCTION GEOLOGY.
*MINERALS BUREAU: PROMOTES THE OPTIMUM UTILISATION OF SOUTH AFRICA'S MINERAL RESOURCES AND IS THE FOCAL CENTRE FOR THE DISSEMINATION OF ALL INFORMATION RELATING TO THE COUNTRY'S MINERALS.
*GOVERNMENT MINING ENGINEER: ADMINISTERS THE LAWS GOVERNING THE SAFETY AND HEALTH OF PERSONS EMPLOYED AT MINES AND WORKS.
*MEDICAL BUREAU FOR OCCUPATIONAL DISEASES: DETERMINES THE FITNESS OF PERSONS TO PERFORM 'RISK' WORK AT CONTROLLED MINES AND WORKS.
*COMPENSATION COMMISSIONER FOR OCCUPATIONAL DISEASES: ADMINISTERS THE COMPENSATION FUND FOR MINES AND WORKS ESTABLISHED TO PROVIDE COMPENSATION FOR EMPLOYEES WHO HAVE CONTRACTED COMPENSATABLE DISEASE THROUGH THE PERFORMANCE OF RISK WORK AT MINES AND WORKS.
*STATE ALLUVIAL DIGGINGS: MINES DIAMONDS AT THE STATE ALLUVIAL DIGGINGS AT ALEXANDER BAY.
*MINING COMMISSIONERS' DIVISION: THE COUNTRY IS DIVIDED INTO 11 AREAS A MINING COMMISSIONER IS APPOINTED FOR EACH OF THESE TO PROMOTE AND REGULATE THE PROSPECTING FOR AND MINING OF MINERAL DEPOSITS.
*REGISTER OF MINING TITLES: REGISTERS MINING TITLES AND PROSPECTING AND SURFACE RIGHTS IN PROCLAIMED MINING AREAS.

DEPARTMENT OF MINERAL AND ENERGY AFFAIRS

AIM: TO PROMOTE THE EFFICIENT EXPLOITATION OF THE COUNTRY'S MINERAL RESOURCES AND TO ENSURE THE OPTIMUM UTILISATION OF ENERGY RESOURCES.

FUNCTIONS: * STIMULATING AND ADMINISTERING THE EXPLOITATION OF MINIRALS AND REGISTERING MINE TITLES.
*ACTING AS TECHNICAL LIAISON BETWEEN THE STATE AND THE MINING INDUSTRY.
*CONDUCTING EXAMINATIONS AND ISSUING CERTIFICATES OF COMPETANCY IN TERMS OF THE MINES AND WORKS REGULATIONS.
*CARRYING OUT GEOLOGICAL SURVEYS AND INVESTIGATIONS AND MAKING AVAILABLE BASIC GEOLOGICAL INFORMATION IN RESPECT OF MINERAL DEPOSITS THAT IS ESSENTIAL FOR EXPLOITATION.
*EXERCISING MEDICAL CONTROL OVER WORKERS IN THE SOUTH AFRICAN MINING INDUSTRY DIAGNOSING AND CERTIFYING COMPENSATIBLE INDUSTRIAL DISEASES AND PAYING COMPENSATION UNDER THE OCCUPATIONAL DISEASES IN MINES AND WORKS ACT 1973.
*OPERATING THE STATE ALLUVIAL DIGGINGS ALEXANDER BAY.
*UNDERTAKING MINERAL-ECONOMIC STUDIES AS A BASIS FOR THE DETERMINATION OF POLICY AND STRATEGY.
*ESTABLISHING ENERGY REQUIREMENTS AND TAKING STEPS TO ENSURE THAT THEY ARE MET.

DEPARTMENT OF PLANNING AND THE ENVIRONMENT

PURPOSE: THE DEPARTMENT REGULATES THE PHYSICAL DEVELOPMENT OF THE COUNTRY AND THE UTILISATION OF IT'S NATURAL RESOURCES. IT SEEKS TO ENSURE THAT DEVELOPMENT IS ORDERLY AND SYSTEMATIC AND COORDINATES ALL NATIONAL EFFORTS TOWARDS MORE EFFECTIVE CONTROL OF ENVIRONMENTAL POLLUTION AND THE BETTER CONSERVATION OF THE ENVIRONMENT.
+
ORGANISATION AND MAIN FUNCTIONS: *AREA DEMARCATION: DEMARCATES RESIDENTIAL AND OTHER AREAS FOR VARIOUS POPULATION GROUPS.
*CONTROL MEASURES: APPLICATION OF SPECIFIC CONTROL MEASURES ON LAND USAGE IN TERMS OF THE PHYSICAL PLANNING AND UTILISATION ACT 1967.
*GROWTH POINT DEVELOPMENT: PROMOTION OF THE DEVELOPMENT OF GROWTH POINTS.
*SCIENTIFIC PLANNING: PROMOTION OF SCIENTIFIC ACTIVITIES ON A COORDINATED BASIS.

DEPARTMENT OF ENVIRONMENTAL PLANNING AND ENERGY

PURPOSE: THE DEPARTMENT REGULATES THE PHYSICAL DEVELOPMENT OF THE COUNTRY AND THE UTILISATION OF IT'S NATURAL RESOURCES. IT SEEKS TO ENSURE THAT DEVELOPMENT IS ORDERLY AND SYSTEMATIC AND COORDINATES ALL NATIONAL EFFORTS TO PROMOTE EFFECTIVE CONTROL OF ENVIRONMENTAL POLLUTION AND BETTER CONSERVATION OF THE ENVIRONMENT.
+
ORGANISATION AND MAIN FUNCTIONS: *LAND USE PLANNING BRANCH: DETERMINES USE OF LAND.
*LAND DEVELOPMENT BRANCH: REGULATES THE DEVELOPMENT OF LAND.
*SCIENCE DEVELOPMENT DIVISION: THE PROMOTION OF THE HUMAN AND NATURAL SCIENCES AND TECHNOLOGY IN THE COUNTRY ON A COORDINATED BASIS.
*ENERGY DIVISION: ENSURES THE OPTIMUM UTILISATION OF ENERGY RESOURCES.

DEPARTMENT OF WATER AFFAIRS FORESTRY AND ENVIRONMENTAL CONSERVATION

AIM: TO ENSURE THAT AN ADEQUATE SUPPLY OF WATER OF ACCEPTABLE QUALITY FOR ALL ESSENTIAL PURPOSES IN SOUTH AFRICA CAN BE MADE AVAILABLE TO ADMINISTER THE FOREST AND TIMBER INDUSTRY EFFECTIVELY: TO PROTECT THE ENVIRONMENT AND TO CREATE A BALANCE BETWEEN ENVIRONMENTAL CONSERVATION AND DEVELOPMENT.

FUNCTIONS: *DETERMINING THE SOURCE POTENTIAL FOR THE BEST POSSIBLE UTILISATION OF THE AVAILABLE WATER RESOURCES: PLANNING WATER SOURCES; DESIGNING AND BUILDING WATER SCHEMES AND EXERCISING CONTROL OVER THE DISTRIBUTION OF WATER.
* TAKING STEPS AIMED AT PROTECTING AND CONSERVING THE ENVIRONMENT IN ORDER TO PROTECT THE QUALITY OF THE ENVIRONMENT.
*ACQUIRING LAND FOR FORESTRY PURPOSES AND PROMOTING THE FORESTRY INDUSTRY BY MEANS OF RESEARCH; THE CULTIVATION OF FORESTS; THE ACQUISITION AND DISTRIBUTION OF SEEDS; THE OPERATION OF TIMBER PROCESSING INSTALLATIONS AND THE MARKETING OF PLANTATION PRODUCTS.
*CONSERVING AND PROTECTING INDIGENOUS FORESTS AND ADMINISTERING THEIR UTILISATION E.G. FOR RECREATION PURPOSES OF WILDERNESS AREAS AND NATURE RESERVES.

DEPARTMENT OF ENVIRONMENT AFFAIRS

AIM: TO ENSURE THAT AN ADEQUATE SUPPLY OF WATER OF ACCEPTABLE QUALITY FOR ALL ESSENTIAL PURPOSES IN SOUTH AFRICA CAN BE MADE AVAILABLE: TO ADMINISTER THE FOREST AND TIMBER INDUSTRY EFFECTIVELY, TO PROTECT THE ENVIRONMENT AND TO CREATE A BALANCE BETWEEN ENVIRONMENTAL CONSERVATION AND DEVELOPMENT.

FUNCTIONS: *DETERMINING THE SOURCES POTENTIAL FOR THE BEST POSSIBLE UTILISATION OF THE AVAILABLE WATER SOURCES; PLANNING WATER SOURCES; DESIGNING AND BUILDING WATER SCHEMES AND EXERCISING CONTROL OVER THE DISTRIBUTION OF WATER.
*TAKING STEPS TO PROTECT AND CONSERVE THE ENVIRONMENT TO PROTECT THE QUALITY OF THE ENVIRONMENT.
*ACQUIRING LAND FOR FORESTRY PURPOSES AND PROMOTING THE FORESTRY INDUSTRY BY MEANS OF RESEARCH; THE CULTIVATION OF FORESTS; THE ACQUISITION AND DISTRIBUTION OF SEEDS; THE OPERATION OF TIMBER PROCESSING INSTALLATIONS AND THE MARKETING OF PLANTATION PRODUCTS.
*CONSERVING AND PROTECTING INDIGENOUS FORESTS AND ADMINISTERING THEIR UTILISATION E.G. FOR RECREATIONAL PURPOSES AND BY MEANS OF DELIMITATION OF WILDERNESS AREAS AND NATURE RESERVES BY MEANS OF DELIMITATION
*PROMOTING THE RATIONAL DEVELOPMENT AND UTILISATION OF THE MARINE RESOURCES BY WAY OF RESEARCH AND THE APPLICATION OF CONTROL MEASURES.

OFFICE OF THE PRIME MINISTER

AIM: TO ENSURE THE PROJECTED DEVELOPMENT OF THE RSA AND TO LIAISE BETWEEN THE STATE PRESIDENT; PARLIAMENT AND THE PUBLIC SERVICE.

FUNCTION: *FORMULATING A NATIONAL SECURITY STRATEGY.
*PLANNING THE EFFECTIVE UTILISATION OF THE LAND.
*PROMOTING THE EFFECTIVE DEVELOPMENT OF SOCIETY BY MEASURES OF RATIONAL PLANNING.
*CREATING A SCIENTIFIC BASIS FOR THE EFFECTIVE DEVELOPMENT OF THE ECONOMIC SYSTEM.
*CARRYING OUT CONSTITUTIONAL DEVELOPMENT PLANNING.
*ORDERING AND PLANNING SCIENTIFIC DEVELOPMENT.
*SERVING AS LIAISON BETWEEN PARLIAMENT: THE STATE PRESIDENT AND THE PUBLIC SERVICE ESPECIALLY IN ADMINISTERING THE CONSTITUTION.
*ACTING AS SECRETARY FOR THE CABINET; THE EXECUTIVE COMMITTEE AND THE VARIOUS WORKING COMMITTEES.
*CONDUCTING STATISTICAL SURVEYS AND PUBLISHING STATISTICAL DATA.

DEPARTMENT OF CONSTITUTIONAL DEVELOPMENT AND PLANNING

AIM: TO PROMOTE CONSTITUTIONAL DEVELOPMENT AND COORDINATED MACRO PLANNING IN THE REPUBLIC.

FUNCTION: *PLAN CONSTITUTIONAL SYSTEMS AND STRUCTURES.
* PLAN THE EFFICIENT UTILISATION OF THE GOVERNMENT
*PROVISION OF COMPREHENSIVE ECONOMIC STRATEGIES.
*COORDINATE REGIONAL STRATEGIES.
*INITIATE COORDINATE AND PROMOTE THE INSTITUTION OF CONSTITUTIONAL SYSTEMS AND STRUCTURES.
*COLLECT PROCESS AND PUBLISH DEMOGRAPHICAL ECONOMIC AND SOCIO-ECONOMIC STATISTICS.

KEY

—▶— MINING (TEXT 1.2.1)

--▶-- ENVIRONMENT (TEXT 1.2.3)

—▶·· ENVIRONMENT (TEXT - SEE PARAGRAPH 2 OF 1.2.2)

···▶····· PLANNING (TEXT 1.2.2.)

NB At the time of printing, detailed aims and functions were not available for the newly constituted Departments of water affairs and Environment Affairs.

FIGURE 1: The progression of change in Government Departments, showing their change aims and functions.